SPIE. SECURITY+ DEFENCE SPIE. REMOTE SENSING

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ADVANCING LIGHT.

2016

SECURITY+ DEFENCE.

AND

REMOTE SENSING.

TECHNICAL PROGRAMME

EXHIBITION GUIDE

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Edinburgh International Conference Centre
Edinburgh, United Kingdom

Conferences: 26-29 September 2016
Exhibition: 27-28 September 2016

WELCOME TO EDINBURGH

SPIE. SECURITY+ DEFENCE

CONFERENCES: 26-29 September 2016
EXHIBITION: 27-28 September 2016
Edinburgh International Conference Centre,
Edinburgh, UK

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SPIE. REMOTE SENSING

CONFERENCES: 26-29 September 2016
Edinburgh International Conference Centre,
Edinburgh, UK

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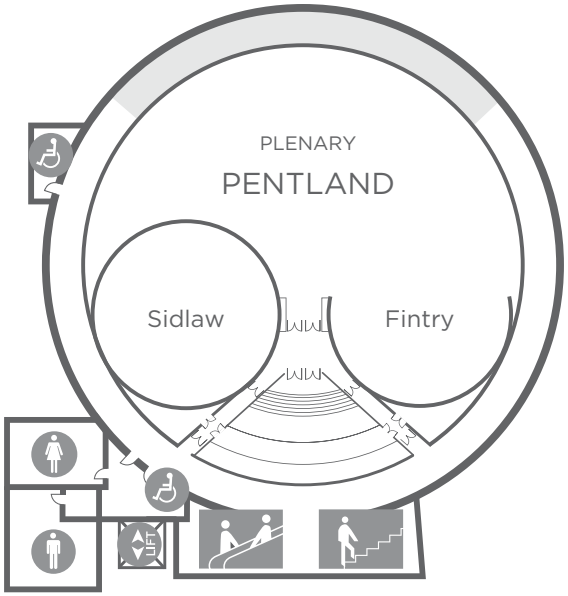
EDINBURGH INTERNATIONAL CONFERENCE CENTRE FLOOR PLANS

LEVEL 3



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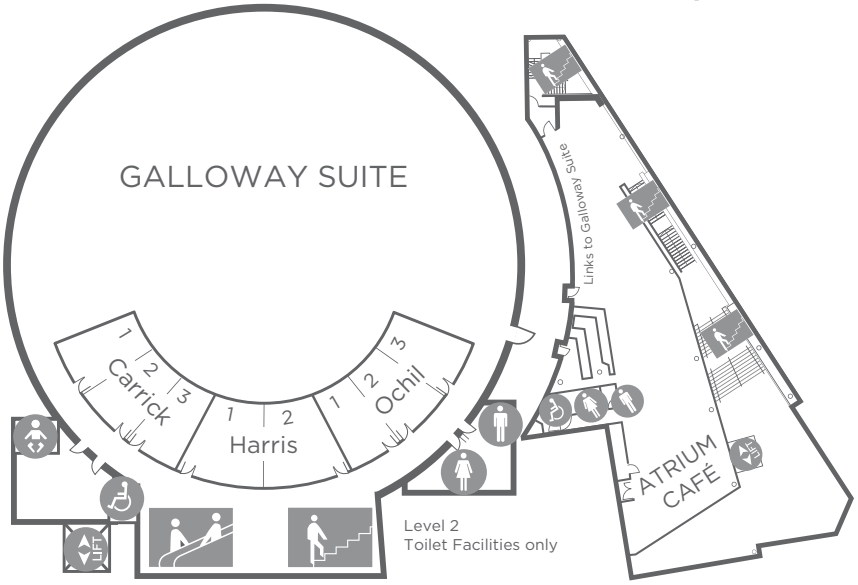

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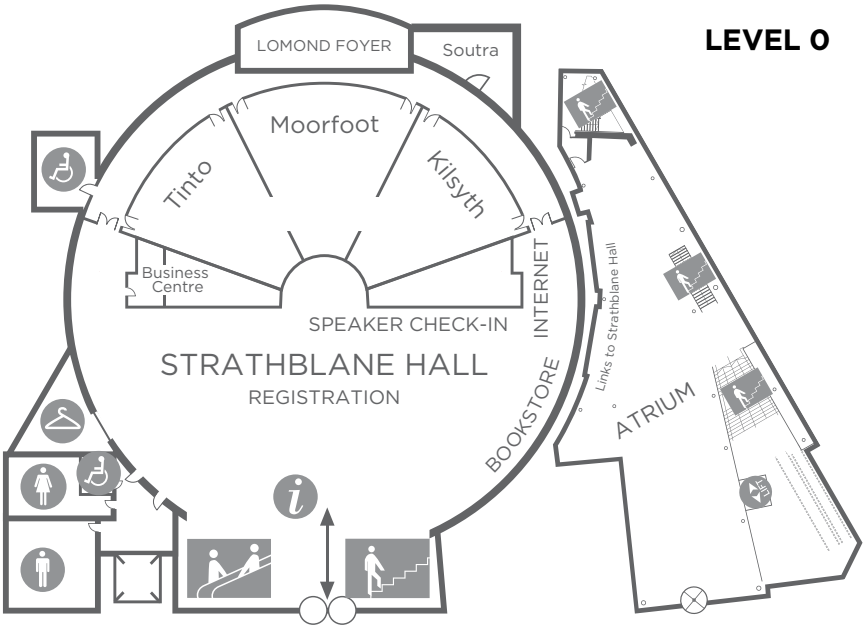

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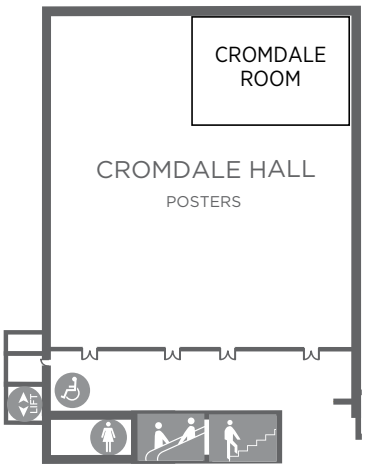

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Overview of presentations on hyperspectral sensing throughout the Security + Defence Symposium

SECURITY + DEFENCE EXHIBITION

REMOTE SENSING

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Remote Sensing Symposium

MANAGED BY SPIE.EUROPE

SPIE Europe Ltd., a subsidiary of SPIE, is a not-for-profit UK-registered company serving SPIE constituents throughout Europe as an advocate and liaison to political and industry associations within the European optics and photonics community.

In addition to providing membership services, SPIE Europe Ltd. organises and manages internationally recognised conferences, education Programmes, and technical exhibitions featuring emerging technologies in optics and photonics.

SPIE Europe, 2 Alexandra Gate, Ffordd Pengam, Cardiff, CF24 2SA; Tel: +44 29 208

SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, Programme committees, and session chairs who have so generously given of their time and advice to make this symposium possible. The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members.

This Programme is based on commitments received up to the time of publication and is subject to change without notice.

DAILY EVENT SCHEDULE

SECURITY+DEFENCE

MONDAY	TUESDAY	WEDNESDAY	THURSDAY

CONFERENCES

Conf. 9986: **Unmanned/Unattended Sensors and Sensor Networks** *(Carapezza, Datskos, Tsamis) p.18*

Conf. 9987: **Electro-Optical and Infrared Systems: Technology and Applications** *(Huckridge, Ebert) p.19*

Conf. 9988: **Electro-Optical Remote Sensing** *(Kamerman, Steinvall) p.21*

Conf. 9990: **High-Power Lasers: Technology and Systems** *(Ackerman, Bohn) p.25*

Conf. 9991: **Advanced Free-Space Optical Communication Techniques and Applications** *(Laycock, White) p.26*

Conf. 9989: **Technologies for Optical Countermeasures** *(Titterton, Richardson, Grasso) p.23*

Conf. 9992: **Emerging Technologies** *(Lewis, Hollins) p.27*

Conf. 9993: **Millimetre Wave and Terahertz Sensors and Technology** *(Salmon, Ahmed) p.29*

Conf. 9995: **Optics and Photonics for Counterterrorism and Crime Fighting** *(Burgess, Owen, Bouma, Carlysle-Davies, Stokes, Yitzhaky) p.33*

Conf. 9994: **Optical Materials in Defence Systems Technology** *(Zamboni, Kajzar, Szep) p.31*

Conf. 9996: **Quantum-Physics-Based Information Security** *(Gruneisen, Dusek, Rarity) p.35*

Conf. 9997: **Target and Background Signatures** *(Stein, Schleijpen) p.37*

REMOTE SENSING

MONDAY	TUESDAY	WEDNESDAY	THURSDAY

CONFERENCES

Conf. 9998: **Remote Sensing for Agriculture, Ecosystems, and Hydrology** *(Neale, Maltese) p.48*

Conf. 9999: **Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2011** *(Bostater, Neyt, Mertikas) p.52*

Conf. 10000: **Sensors, Systems, and Next-Generation Satellites** *(Meynart, Neeck, Kimura) p.54*

Conf. 10001: **Remote Sensing of Clouds and the Atmosphere** *(Kassianov, Schafer, Comeron) p.57*

Conf. 10002: **Optics in Atmospheric Propagation and Adaptive Systems** *(Stein, Gonglewski) p.59*

Conf. 10004: **Image and Signal Processing for Remote Sensing** *(Bruzzone) p.63*

Conf. 10003: **Active and Passive Microwave Remote Sensing for Environmental Monitoring** *(Notarnicola, Paloscia, Perdicca, Mitchard) p.61*

Conf. 10006: **Lidar Technologies, Techniques, and Measurements for Atmospheric Remote Sensing** *(Singh, Nicolae) p.70*

Conf. 10005: **Earth Resources and Environmental Remote Sensing/GIS Applications** *(Michel, Schulz) p.67*

Conf. 10008: **Remote Sensing Technologies and Applications in Urban Environments** *(Erbertseder, Esch, Chrysoulakis) p.74*

Conf. 10007: **High-Performance Computing in Remote Sensing** *(Huang, López, Wu) p.72*

SPECIAL EVENTS

Plenary Session

Welcome Reception

Poster Session

Industry Session

SPIE is the international society for optics and photonics, an educational not-for-profit organization founded in 1955 to advance light-based technologies. The Society serves nearly 264,000 constituents from 166 countries, offering conferences, continuing education, books, journals, and a digital library in support of interdisciplinary information exchange, professional networking, and patent precedent. SPIE provided more than $5.2 million in support of education and outreach Programmes in 2015. www.spie.org

SECURITY + DEFENCE/REMOTE SENSING PLENARY SESSION

Monday 26 September, 16:00 to 18:30 • 16:00 to 19:15 • Location: Pentland

16:00 to 16:05

Welcome Address

Robert A. Lieberman, Lumoptix LLC, United States
2016 SPIE President

16:05 to 16:15
Welcome and Introduction
David H. Titterton, UK Defence Academy, United Kingdom
2016 Security + Defence Symposium Chair

Klaus Schäfer, Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research *(Germany)-retired*
2016 Remote Sensing Symposium Chair

16:15 to 17:00

High-Power Fibre Lasers for Beam Combination

Sir David Payne, University of Southampton, Optoelectronics Research Ctr, United Kingdom

Fibre lasers have caught the imagination for applications requiring beam combination up to a 100kW in the near term, or multi MW in the future. Their near-perfect beam quality, stability and versatility, coupled with the low cost of the gain medium, make them ideal candidates for coherently combining perhaps up to a 1000 individual fibre amplifier beams. Using optical fibre circuitry derived from telecommunications, we can envisage all-fibre laser circuits and systems which are robust and transportable, with straight-forward management of heat load. The latter attribute comes from the large surface to volume ratio, the efficiency of fibre laser and the thermal stability of silica.

With a few kW probably the practical and reliable sweet spot for robust individual fibre laser emitters, we need to consider beam combination for power scaling, either spatial, wavelength or coherent. Coherent beam combination (as in synthetic-aperture radar) has the attributes of steerability and built-in adaptive optics. However, as the name implies, we require coherent single-frequency output in a stable, polarised beam from each fibre emitter, which is not straightforward.

Progress towards high-power single-frequency lasers will be reviewed, together with the expected limitations to the technology. Recent work on high-power pulsed fibre lasers will also be reviewed, together with prospects for beam combination to overcome the pulse energy limitations that result from the small active volume of the fibre core. Together with chirped pulse amplification, several GW peak power has been reported.

Biography: **Prof Sir David Payne** CBE FRS FREng, is a Professor of Photonics and Director of the Optoelectronics Research Centre (ORC) and the Zepler Institute at the University of Southampton. He has published over 650 Conference and Journal papers and is co-inventor on over 40 patents.

Over the last forty years, he has made numerous key contributions in optical fibre communications and laser technology. His work in fibre fabrication in the 1970s resulted in most of the special fibres used today, including the revolutionary erbium-doped fibre amplifier (EDFA) and kilowatt-class fibre lasers for manufacturing and defence. He is a Fellow of the UK Royal Society, the UK Royal Academy of Engineering, the Optical Society of America, the UK IET and the UK IoP. As an entrepreneur, he co-founded York Technologies, (now PK Technology Inc.), Fibercore, SENSA (now part of Schlumberger) and SPI Lasers plc (now part of the Trumpf Gruppe). He was the 2014 IEEE/RSE Wolfson James Clerk Maxwell Awardee.

17:00 to 17:45

Earth Observations for Improving Water and Food Security

Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

Insecurity is considered a risk that needs to be averted. Security not only relates to income, health and protection, but also to food production and its water footprint. At various fronts we are increasing our intelligence, but in agricultural water management there is still a long way to go. Our knowledge regarding crop types, cropped areas - both for rainfed and irrigated crops - crop yield (i.e. productivity per unit of land) and the amount of water consumed in order to acquire a certain amount of food, feed, fiber and timber (i.e. productivity per unit of water) is not acceptable. While the United Nations set some major directions in producing two times more food by 2050 to feed the growing world and increase water productivity by 50%, implementation on the ground will not occur without local and global intelligence from earth observations.

Earth observations with spatial resolutions varying between 10 to 375 m are nowadays available to determine the photosynthesis and evapotranspiration of crops. Low resolution images such as VIIRS and ProbaV are excellent to measure the globe daily, and freely available Landsat and Sentinel images are needed for zooming in to particular fields. Several remote algorithms developed and tested by academia over the last 25 years will be presented. The gaps in land and water productivity needs to be closed, and this can be achieved only if we better measure local production and irrigation systems, and define their target values. Commercial farmers, farming communities, irrigation districts and extension services require technical assistance from earth observation to better do their job. Hence, the challenge is to convert progress in science to operational services. Clouds are the biggest enemy for water and food security related intelligence. It will be pleaded that robotic drones should get more governmental support and permits for operations. Without zooming into our crops, ecosystems and hydrological processes, food and water security may decrease during the next years. Not exactly what we have in mind in our modern society where sustainability and aiming to obtain lower footprints of natural resources is high on the political agenda.

Biography: **Wim G.M. Bastiaanssen (Ph.D)** is a senior remote sensing expert with a specialization in agricultural water management. He has a background in agro-hydrology from Wageningen University. Wim Bastiaanssen holds the UNESCO Chair for Global Water Accounting and is a Senior Fellow to the Robert Daugherty Water for Food Institute of the University of Nebraska (Lincoln). Wim Bastiaanssen is also a Professor at the Faculty of Civil Engineering and Geosciences at the Delft University of Technology (The Netherlands) in the topic Water Resources Management and Remote Sensing. With Ph.D. students, he conducts research on determining earth surface hydrological and water management processes from satellite measurements including rainfall, evapotranspiration, soil moisture, biomass production, crop water productivity, surface runoff, withdrawals for irrigation and wetlands and groundwater interactions. This forms the basis for regional scale water accounting studies. Wim Bastiaanssen is the lead developer of Water Accounting Plus (WA+). Through the repository www.wateraccounting.org, Wim produces open access water accounts for river basins, that can be used by all stakeholders involved in the strategic planning of scarce water resources.

Wim is the developer of the Surface Energy Balance Algorithm for Land (SEBAL), which has grown out as one of the world leading algorithms that describes local scale actual water consumption of crops and environments. SEBAL3.0 is adopted by the Asian Development Bank to evaluate water productivity in 6 countries throughout Asia. He has used his expertise on water and energy balances in more than 50 projects in 30 different countries. Many of these projects are with the World Bank, ADB, FAO, IFAD and UNESCO. Wim Bastiaanssen as an enterpreneur has (co-) founded small advisory companies such as WaterWatch, eLEAF, SEBAL North America (Davis, CA) and more recently CropZoomer. He grew up with 6 brothers and 3 sisters on a Dutch farm, which shaped him into a very practical person.

SECURITY + DEFENCE/REMOTE SENSING PLENARY SESSION

Monday 26 September, 16:00 to 18:30 • 16:00 to 19:15 • Location: Pentland

17:45 to 18:30

Quantum Technology for a Networked World

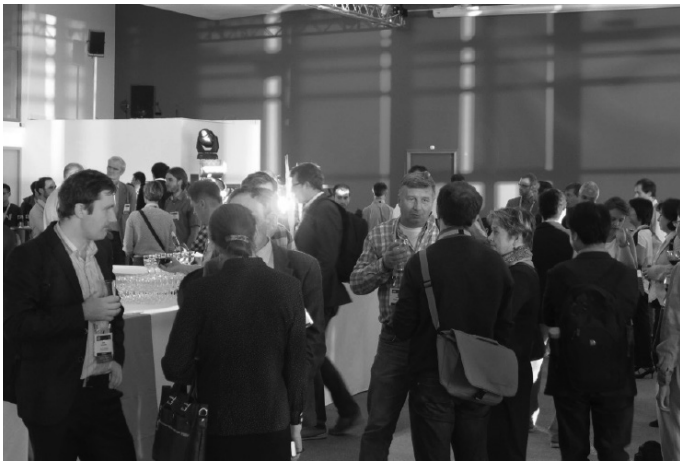
Sir Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)

The 21st Century has seen the emergence of a networked world, connected by global fibre-optic communications and mobile phones, with geo-location provided through GPS, and all this has changed our lives more dramatically than at any time since the industrial revolution. Quantum-enabled technology using light is at the heart of this change. The quantum world allows information to be encoded and manipulated in ways quite different from classical physics. The exploitation of quantum coherence is enabling what we have called the "Second Quantum Revolution" or more succinctly "quantum 2.0". Parallelism and entanglement enable us to undertake information processing tasks peculiar to the quantum world: secure encryption, quantum teleportation and algorithmic computational speedup. I describe progress towards such quantum processors using quantum bits (qubits"). I will describe how communications depend on lasers, and geo-located and synchronized by atomic clocks that depend on atomic coherence.

New developments in quantum technology, and in particular miniature atomic clocks have the potential for even more dramatic applications. Some of these include communications systems immune to GPS jamming (of real importance for global security), as well as quantum sensors for medical applications (including cardiography, neurophysiology), sensitive magnetometry, gyros, and geophysical surveying. Quantum physics has the potential to crack industry encryption standards through the development of quantum computers, although this is a long-term ambition rather than a near-term realization. Quantum physics also has a role in generating secure one time pads and provable security. I will describe the basic phenomena being exploited as well as prospects for exploitation focusing on the UK National Quantum Technology Initiative which is investing £350M over 5 years in this area in a strategically managed effort.

Biography: **Sir Peter Knight** is Senior Fellow in Residence at the Kavli Royal Society International Centre at Chicheley Hall and past-President of the Institute of Physics. Knight retired at the end of September 2010 as Deputy Rector (Research) at Imperial College where he was responsible for the College's research strategy and a member of the Imperial College Management Board and Council. He retains his Professorship of Quantum Optics at Imperial. His research centres on theoretical quantum optics, strong field physics and especially on quantum information science. He has a strong interest in fostering multidisciplinary research and set up the Grantham Institute for Climate Change and other centres at Imperial College London.

Peter Knight is a Past-President of the Optical Society of America. He is a Thomson-ISI "Highly Cited Author". He was knighted in the Queen's Birthday Honours List in 2005 for his work in optical physics. Knight was chair of the Defence Scientific Advisory Council at the UK Ministry of Defence until 2010 and a member of the Science and Technology Facilities Council until 2012. He continues to be involved in advising government on science issues. Knight was Chief Scientific Advisor at the UK National Physical Laboratory until the end of 2005 and currently chairs their Quantum Metrology Institute and is a Board member of the UK National Quantum Technology Initiative. He has won a number of prizes and awards including the Thomas Young Medal and Glazebrook Medal of the Institute of Physics, the Royal Medal of the Royal Society and the Ives Medal of the OSA, and Honorary Doctorates from a number of Universities including most recently Glasgow, Sussex, and Royal Holloway. He is currently a member of the Millennium Prize Jury at the TAF, Finland.



WELCOME RECEPTION

Monday 26 September . . . . . 19.00 to 21.30

Location: The Hub (see signs for map)

All attendees are invited to relax, socialize, and enjoy light refreshments.

Due to limited space and numbers, guests will be admitted on a first-come, first-served basis. Please contact the onsite registration desk for tickets

Please remember to wear your conference registration badges. Dress is casual.

BEST STUDENT PAPER AWARDS

As a committed supporter of excellence in student research, SPIE supports Best Student Paper Awards at SPIE conferences across the globe. In addition to cash prizes and award certificates, winners receive SPIE Digital Library downloads and complimentary SPIE Student Membership.

The awards are designed to encourage and acknowledge excellence in oral and poster student paper presentations. Best student papers will be recognized within each of the Remote Sensing and Security + Defence conferences.

INDUSTRY SESSION

Location: Cromdale Room

Wednesday 28 September . . . . . 9:00 to 17:00

The rapid emergence of innovative "dual use" technologies in the defense, security, and sensing marketplace is increasing the rate of access to many new and exciting end-use applications. Join our speakers and hear expert perspectives on how these applications are delivering in the real-world environment and the underlying technical trends that drive them. The Industry Sessions offer valuable technical insight, unparalleled networking opportunities, and are open to all attendees. Come and engage with the presenters and attendees, they could be potential suppliers, partners, or customers. www.spie.org/rsindustry

POSTER SESSION

Location: Cromdale Hall

Wednesday 28 September . . . . . 17:45 to 19:30

All symposium attendees are invited to attend Wednesday poster session provided as an opportunity to enjoy networking and refreshments while reviewing poster papers. The interactive poster sessions are designed to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Participants are requested to wear their conference registration badges to the poster sessions.

Poster presenters can begin to post their papers at 10:00 hours on Monday.

Each poster presenter is provided a space 0.95 x 1.20m in which to display a summary of the paper. Poster presenters will stand by their posters from 17:45 to 19:30 to answer questions.

Poster presenters who have not set up by 17:45 on Tuesday will be considered a "no show" and their manuscript will not be published.

Posters must be removed at the end of the poster session since the poster boards will then be removed and the remaining posters discarded. SPIE assumes no responsibility for posters left up after the end of each poster session.

IN MEMORIAM: MANFRED OWE

Conference Chair and Senior Scientist Emeritus at NASA Goddard Space Flight Center

The 2016 Conference on Remote Sensing for Agriculture, Ecosystems, and Hydrology (9998) will be dedicated to honoring Manfred Owe, former Remote Sensing for Agriculture, Ecosystems, and Hydrology conference chair and conference committee member. Through his decade-long involvement from 2000 to 2009, Manfred made considerable contributions to the success of the event. We will greatly miss our dear friend and colleague.

INDUSTRY SESSION

Wednesday 28 September 09:00-17:00 • Location: Cromdale Room

The rapid emergence of innovative "dual use" technologies in the defence, security, and sensing marketplace is increasing the rate of access to many new and exciting end-use applications. Join our speakers and hear expert perspectives on how these applications are delivering in the real-world environment and the underlying technical trends that drive them.

The Industry Sessions offer valuable technical insight, unparalleled networking opportunities, and are open to all attendees. Come and engage with the presenters and attendees, they could be potential suppliers, partners, or customers.

09:00

Opening Remarks

Paul Winstanley, Industry Session Chair, Executive Director, Innovation; Defence Solutions Centre (UK)

09:10

Keynote Presentation **- Beating the Battlespace Information Deficit: Agile Capability Driven by Enhanced Commercial Exploitation**

Sir Brian Burridge, SVP UK Corporate; Finmeccanica (UK)

09:50

Photonics & Defence: An Industry Update

Stephen G. Anderson, Director, Industry Development, SPIE (US)

10:20

Networking Break

11:00

Innovation in Defence

Paul Winstanley, Executive Director, Innovation; Defence Solutions Centre (UK)

11:30

Trends in Lasers for Applications in Remote Threat Detection

Graeme Malcom, CEO, M squared Lasers (UK)

12:00

Networking Lunch

13:30

The Innovation Centre Programme in Scotland

Ian Reid, CEO, CENSIS (UK)

14:00

Technology Trends in Remote Sensing

Stephen Marshall, Director of the Hyperspectral Imaging (HSI) Centre, University of Strathclyde, Department of Electronic and Electrical Engineering (UK)

14:30

Networking Break

15:15

The Earth Observation Gold Rush

Nigel Douglas, CEO, Global Surface Intelligence Ltd (UK)

15:45

Satellite based Earth Observation: Too much data, not enough information

Jaime Reed, Head of R&D, Earth Observation, Navigation, and Science; Airbus Defence and Space (UK)

16:15

Networking Reception

E. EXHIBITION

VISIT THE SPIE SECURITY + DEFENCE EXHIBITION

Get face-to-face time with products and research, as well as the experts (scientists, engineers, developers) who are behind them. Get questions answered while being able to make side-by-side comparisons and to make connections with suppliers and project partners.

See the latest in technology innovations and future applications.

Tuesday 27 September 2016 · 10:00 to 17:00
Wednesday 28 September 2016 · 10:00 to 16:00

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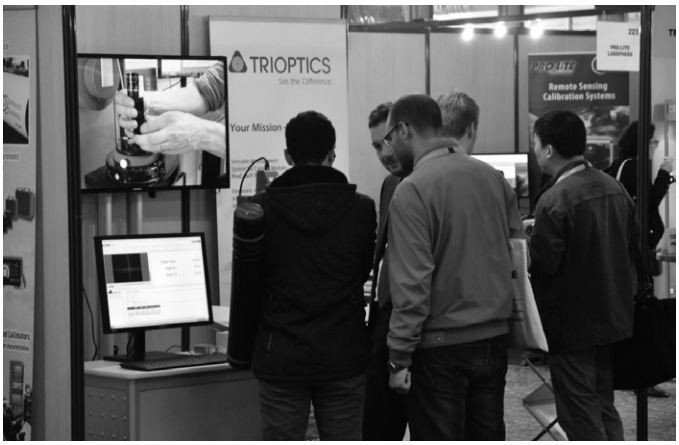
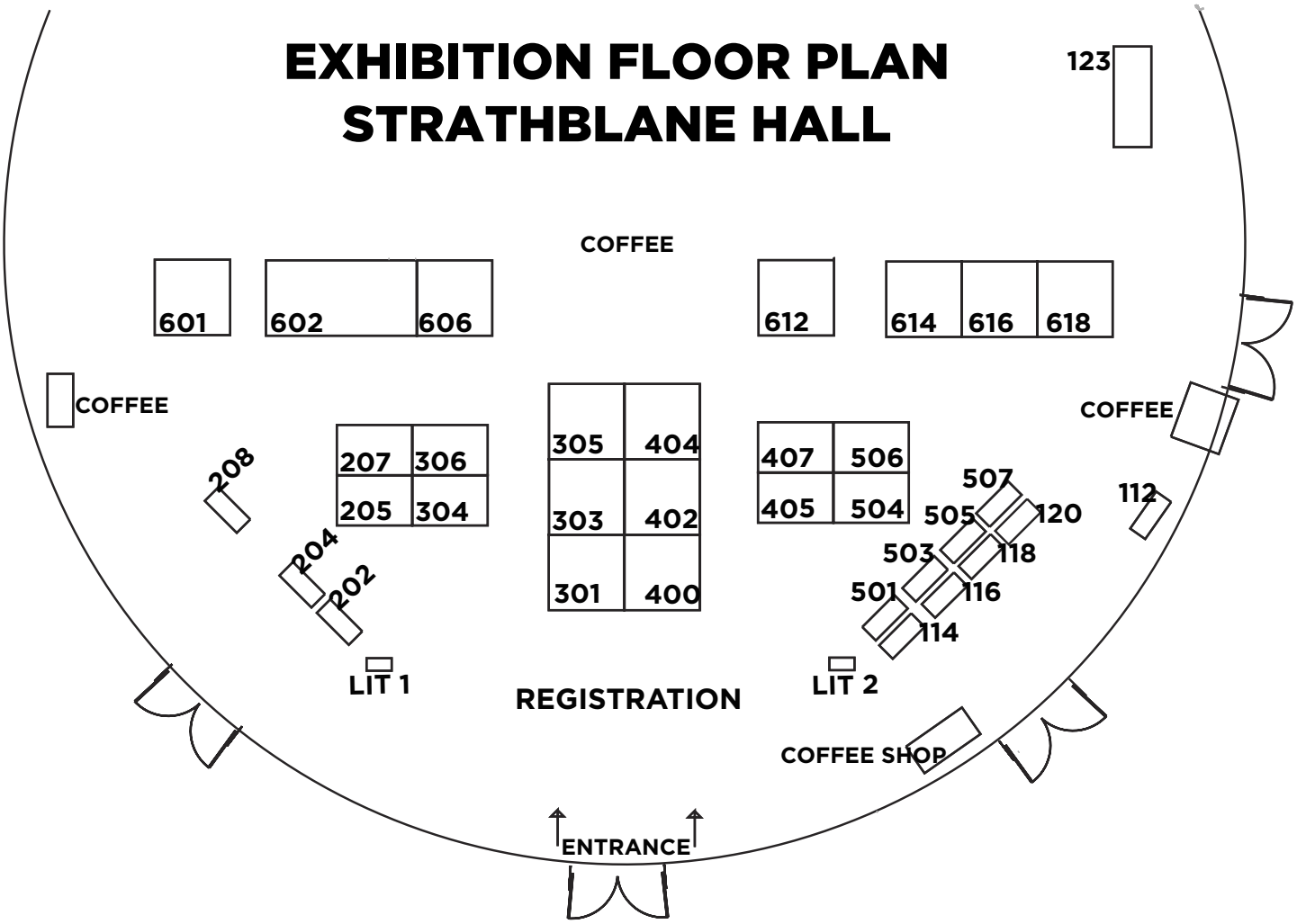


EXHIBITION FLOORPLAN



Exhibitor Booth Index *(Current as of 8/26/2016)*

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SPIE. Corporate Member

3400, Rue Pierre-Ardouin, Québec, QC, Canada G1P 0B2
+1 418.877 2944; +1 418 877 2834
ftir@ca.abb.com; www.abb.com/measurement

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ABB continues to set the standards for FT-IR Spectroradiometry used in atmospheric sounding, military targets IR signature characterization and gas detection. The company develops solutions with reliable airborne and spaceborne optical instruments, infrared calibration systems, hyperspectral imagers, and software for ground segments and simulation. ABB counts several projects in Defense & Security and Space success stories, positioning her at the forefront of the Remote Sensing Industry. Contact: Claude Roy, Product Line Manager, claude.b.roy@ca.abb.com; Sylviane Lelievre, Business Development Manager, sylviane.lelievre@ca.abb.com

Cooperating Organisation

ADS Group Ltd. #112

Showcentre, ETPS Road, Farnborough, Hampshire, United Kingdom GU14 6FD
+ 44 207091 7803
an.clapp@adsgrpoup.org.uk; www,adsgroup.org.uk

ADS is the Premier Trade Organisation for all companies operating in the UK Aerospace, Defence, Security and Space sectors. Farnborough International Limited (FIL) which runs the Farnborough International Airshow, is a wholly owned subsidiary. The industries represented by ADS are vital to the UK economy and are major drivers of growth and prosperity. The sector activities within ADS are designed to respond to the priority needs indicated by Members. It is also important to bring the sectors into focus for senior policy makers. The following priority objectives are designed to give focus to the work ADS undertakes: Improve the image and profile of our industries. Influence the policy debates of most importance to our industries. Support UK manufacturing and our industries' supply chains. Encourage investment in technology and innovation. Support business development opportunities nationally and in priority international markets. Increase Members value.

Belford Research Ltd. #507

32 Hardengreen Business Park, Eskbank, Dalkeith,
United Kingdom EH22 3NX
+44 131 660 1050; fax: +44 787 400 9800
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New Product: Laser Induced Damage Threshold (LIDT) Tests. Kerr Effect Demo & New Project for 2µm Test.

Belford Research Limited (BRL) is a laser damage test house. BRL has the scientific/engineering assets necessary to provide both an excellent qualification service and materials research capability. BRL is the only UK-based commercial LIDT facility. BRL has gained a reputation for accuracy and performance from a number of defence laser manufacturers and their optical coaters. BRL tested optics have a proven track record. Contact: Rona Belford, CEO, beford@btconnect.com; Kieran Mulholland, Research Physicist, k.mulholland@laserdamage.co.uk.

BioAge Srl #303

Via Trento 77, Lamezia Terme, CZ, Italy 88046
+39 0968 51061; fax: +39 0968 51061
info@bioage-srl.com; www.bioage-srl.com

Featured Product: The development complete system integration: Electronics; Firmware; Software; Mechanics; Hydraulics

BioAge is a hi-tech private company, born on 2003, devoted to the development of electronic systems having an high technology content, the company has its strength in the multidisciplinarity. The main activities of BioAge are: Realization of highly technological products (see the products page); Designing of products for other companies (see the designing page); Scientific Research (see the research page). BioAge is a partner of various European research projects with a very ambitious goals. Contact: Stefano Sinopoli, Electronic Engineering, info@bioage-srl.com

Cooperating Organisation

British Association of Remote Sensing Companies (BARSC) LIT#1

Unit 12B The Surrey Technology Ctr, 40 Occam Rd, Surrey Research Park Guildfold, United Kingdom GU2 7YG
+44 1483 685 238
alistair@quarry-one-eleven.com; www.barsc.org.uk

Cooperating Organisation

CENSIS: Innovation Centre for Sensor and Imaging Systems #118

Inovo Building, 121 George Street, United Kingdom G1 1RD
+44 (0)141 330 4899
info@censis.org.uk; www.censis.org.uk

CENSIS is the industry-led centre of excellence for sensor and imaging systems and is a key part of the developing innovation landscape in Scotland. It is one of eight Innovation Centres and its overarching goal is to create sustainable economic value in the Scottish economy in the important and diverse domain of sensor systems and their applications via the delivery of collaborative R&D projects and high quality postgraduate training.

DILAS Diodenlaser GmbH #208

SPIE. Corporate Member

Galileo Galilei-Str 10, Mainz-Hechtsheim, Germany 55129
+49 6131 9226 0; fax: +49 6131 9226 257
sales@dilas.de; http://www.DILAS.com

DILAS is the recognized expert in High-Power Diode Laser Technology. Founded 1994 and based in Mainz / Germany, close to the Frankfurt Main airport, DILAS is serving a worldwide customer base in markets like diode-pumped solid state lasers, materials processing, reprographics, defence, medical and many more. Contact: Florian Lenhardt, Sales Engineer, F.Lenhardt@dilas.de; Joerg Neukum, Sales Manager, J.Neukum@dilas.de

EdgeLab s.r.l. #303

Via Privato Oto 10, La Spezia (SP), Italy 19136
+39 0187 1822343; fax: +39 02 700428277
edgelab@edgelab.eu; www.edgelab.eu

EdgeLab is a hi-tech SME. We work on underwater robotics, AUVs (Autonomous Underwater Vehicles), sea technologies and sensors by developing solutions in ocean engineering, marine research, and sea security and defence. Edgelab's key product is the U_Tracker AUV: a small, hybrid vehicle of new conception, entirely based on low-cost, open source technologies. Portable, easily deployable and customizable, it opens new perspectives to cheap oceans operations, with its -1,000 mt operational depth.

EXHIBITOR DIRECTORY

Promotional Partner

Electro Optics Magazine LIT#2

4 Signet Ct, Cambridge, United Kingdom CB5 8LA
+44 1223 221030; fax: +44 1223 213 385
sales@europascience.com; www.electrooptics.com

Electro Optics is Europe's original photonics title and multi-platform resource for anyone involved in the photonics industry. Readers have access to the latest technological developments, trends and opinions; independent, in-depth editorial content; and informed commentary and analysis. Published 10 times a year in print & digital editions, alongside two monthly newsletters, Electro Optics is available at no cost to readers working or engaged in the photonics industry. www.electrooptics.com

Fraunhofer UK Research Ltd. #305

SPIE. Corporate Member

Technology and Innovation Centre, Level 5, 99 Geroge St., Glasgow United Kingdom G1 1RD
+44 141 548 4667
photonics@fraunhofer.co.uk; www.fraunhofer.co.uk

Featured Project: Professional, Applied, Research and Development Services - Photonics - Lasers and Systems.

Fraunhofer UK offers industry a flexible and practical applied Research & Development resource that responds to companies's needs in the development of photonic technologies. Our main areas of work are • A wide range of novel laser sources • Laser-based systems for sensing and materials processing • Laser applications Fraunhofer UK is part of the global Fraunhofer network and and can provide accesses to a wide range of expertise from across the Fraunhofer family of Institutes and Centres. Contact: Paul McCartney, Business Development Manager, paul.mccartney@fraunhofer.co.uk; Mark Goossens, Business Development Manager, mark.goossens@fraunhofer.co.uk

Gooch & Housego plc #301

SPIE. Corporate Member

Dowlish Ford, Ilminster Somerset, United Kingdom TA19 0PF
+44 1460 256440; fax: +44 1460 256441
sales@goochandhousego.com; goochandhousego.com

Featured Product: High performance SWIR modules: 12.5, 25mm and 40 mm–200mm zoom for security & defence applications

Gooch & Housego designs, engineers, manufactures and delivers ruggedized components, assemblies and systems for aerospace & defence. Manufacturing in the UK and the USA, the company provides photonics components and assemblies: armoured vehicle imaging systems, head up displays, missiles, range finding and target designation, sensing, thermal and SWIR imaging. Contact: Adrian Chance, Marcomms Manager, adchance@goochandhousego.com; Trevor Cook, European A&D Business Development Manager, tcook@goochandhousego.com

HGH Infrared Systems #306

10 rue Maryse Bastié, Igny, France 91430
+33 1 69 35 47 70; fax: +33 1 69 35 47 80
hgh@hgh.fr ; www.hgh-infrared.com

Featured Product: HGH offers the widest range of blackbodies to cover all needs for test & measurement applications

Since 1982, HGH Infrared Systems has provided leading-edge IR test equipment, to universities, research labs, manufacturers and test centers around the world. At SPIE Security + Defence, we will showcase our complete range of optronic test solutions, from metrology sources to integrated test benches: Blackbodies, associated with high performance collimators (IRCOL). Test bench for IRFPA (BIRD). Universal optronic test bench for visible, light intensification, IR & laser devices (COPI). Contact: Catherine Barrat, Sales Manager, hgh@hgh.fr; George Bailey, UK agent, appleshaw@globalnet.co.uk

Keopsys SA #405

2 rue Paul Sabatier, Lannion, France 2300
+33 2 9605 0800; fax: +33 2 9605 0801
websales@keopsys.com; http://www.keopsys.com

Featured Product: High performances fiber lasers and fiber amplifiers for demanding environments

Keopsys, started from an innovative company with new fiber lasers and fiber amplifiers design, is today an industrial company with more than 500 proved solutions from 532nm to 2µm. Vertically integrated, Keopsys insure performance, reliability and quality of its devices. Keopsys focuses its activities of scientific research, defense, space and Lidar applications. Established in France, with co-localization of all departments, Keopsys is certified ISO 9001. Contact us at websales@keopsys.com; Marc Le Flohic, CEO, mleflohic@keopsys.com; Melanie Leseignoux, Sales & marketing manager, mleseignoux@keopsys.com

Kigre, Inc. #506

SPIE. Corporate Member

100 Marshland Rd, Hilton Head Island, SC, United States 29926-2368
+1 843 681 5800 fax: +1 843 681 4559
info@kigre.com; www.kigre.com

Featured Product: MK-25-150A, 2+mJ, 1-5Hz, 6ns, -40 to +71C, 3.18 x 1.80 x 1.37cm, 20g

Kigre manufactures 1.54 um ""eye-safe"" diode pumped erbium glass laser transmitters. These transmitters can be used in applications including laser range finding, range gated imaging, LIDAR and Laser Induced Breakdown Spectroscopy (LIBS). Kigre's lasers range from 0.2 to 10 mJ and 1 to 30 Hz with a 6 ns pulse widths. Contact: Franziska Roth, Physicist, franzi@kigre.com; Jeffrey Myers, CEO, jeff@kigre.com

Cooperating Organisation

KTN Ltd. #204

Business Design Centre, London, United Kingdom N1 OQH
+44 1403 850 500
enquiries@ktn-uk.org; http://www.ktn-uk.co.uk

Technology Scotland is the leading cluster organisation for industry, academia, and other institutes engaged in the Key Enabling Technology (KET) sectors in Scotland.Technology Scotland brings like-minded companies together to solve problems, drive economic development, and build supply chains. In addition, Technology Scotland provides a range of services including events, workshops, Special Interest Groups, and collaborative networking, to help its membership improve their global competitiveness.

Labsphere, Inc. #602

SPIE. Corporate Member

231 Shaker Street, North Sutton, NH, United States 03260
+1 603 927 4266; fax: +1 603 927 4694
labsphere@labsphere.com; www.labsphere.com

Featured Product: HELIOS Uniform Light Sources

Labsphere, Inc. is headquartered in North Sutton, New Hampshire, with a satellite facility in China and a global network of distribution partners. Founded in 1979, it is part of the Halma group of companies. Labsphere specializes in the design and manufacture of high-end light measurement solutions for the LED/SSL lighting industry, uniform sources and products for remote sensing and imager/consumer camera calibration, diffuse optical coatings and materials including Spectralon®. Contact: Darlene Delano, Marcom Manager, ddelano@labsphere.com; Christopher Durell, Director of Imaging Products, cdurell@labsphere.com

Laser Components (UK) Ltd. #405

Goldlay House, 114 Pkwy, Chelmsford Essex, United Kingdom CM2 7PR
+44 1245 491499; fax: +44 1245 491801
info@lasercomponents.co.uk; www.lasercomponents.co.uk

We are a global, family-run company employing about 200 people in five manufacturing sites worldwide. As far as our products are concerned, the name Laser Components pretty much gives it away. Our range includes components for the creation, guidance and detection of light - everything optoelectronics-related at the components level, serving many different industries such as laser industry, medical, military, and automotive. As a manufacturer, we have specialised in delivering custom solutions.

Laser 2000 (UK) Ltd. #205

Ermine Business Park, Avro Court, Unit 9, Huntingdon Cambridgeshire, United Kingdom PE29 6XS
+44 1933 461 666; fax: +44 1933 461 699
sales@laser2000.co.uk; http://www.laser2000.co.uk

Featured Product: QCLs, fibre optics, fibre lasers, fibre amplifiers, laser safety, optics/optomechanics, stages, OTDR

We have served the market for nearly 25 years with state-of-the-art photonic and optoelectronic products. We are JOSCAR and ISO certified, understanding your needs for a safe supplier to work with. Our range includes fibre optics, lasers & laser safety, cameras, motion control, optics, ruggedised products, or custom-made if you need a special product. We will showcase our Security & Defence portfolio, i.e. QCLs and fibre optics. Visit us at stand 205 and chat with us about your applications. Contact: Louis Chawner, Account Manager, louisc@laser2000.co.uk; Peter Collins, Field Sales Team Leader, Industry, peterc@laser2000.co.uk

LASERVISION GmbH & Co. KG #205

Siemenstr 6, Fürth, Germany 90766
info@lvg.com; www.uvex-laservision.com

Advanced technology and a comprehensive portfolio of products have positioned laservision during the last 27 years as one of the leading global manufacturers of laser safety products. Under the logo “laservision” and with the claim “we protect your eyes“ leading edge laser protection technology following the relevant standards is globally developed, produced and distributed.

M Squared Lasers #618

SPIE. Corporate Member

West of Scotland Science Park, 1 Maryhill Road, Glasgow, United Kingdom G20 0SP
+44 141 945 0500; fax: +44 141 945 0505
mail@m2lasers.com; www.m2lasers.com

New Product: Firefly active hyper-spectral imager remotely detects explosives and chemical agents and their chemical composition.

Award-winning photonics technology company M Squared is harnessing the power of light to develop novel light-based applications that have the potential to tackle global problems. The company designs and manufactures advanced laser platforms for the scientific research community supplying world-leading universities and government institutions. Through its dedicated innovation group, the company also works with research and commercial partners to develop photonics applications in areas such as quantum technology, biophotonics and chemical sensing.

MW Technologies #202

SPIE. Corporate Member

Rua Engenheiro Frederico Ulrich 2650, Maia, Portugal 4470-605
+351 220 168 902
info@mw-technologes.com; www.mw-technologies.com

Featured Product: Pulsed Fiber Lasers, Optical ASE Sources, Optical Fiber Amplifiers, Laser Diode Drivers

MWTECHNOLOGIES offers innovative optical sources based on fiber-optic technologies, as well as product design, product development and engineering services aimed at developing and selling cost-effective and reliable products and solutions that fulfill customer needs. Operating in several markets, its line of products find to be valuable is many applications such as LIDAR, remote sensing, military testing and targeting, materials processing, imaging, optical communications and R&D. Contact: Miguel Melo, Director, info@mw-technologies.com

New Imaging Technologies (NIT) #407

Bat D 1er Etage, 1-4 impasse de la noisette, Verrières le Buisson, France 91370
+33 1 64 47 88 58
info@new-imaging-technologies.com; www.new-imaging-technologies.com

Featured Product: NIT offers a complete range of standard, customized and full custom CMOS imaging sensors.

New Imaging Technologies (NIT) offers world class CMOS imaging sensors based upon a unique and patented pixel technology which provides intrinsic high dynamic range response of more than 140dB, no noticeable fixed pattern noise and operability without image artifacts to more than 90°C. Contact: Pierre Potet, CEO, info@new-imaging-technologies.com; Jean-Louis Lauront, Sales Manager, info@new-imaging-technologies.com.

NOPTEL OY #207

SPIE. Corporate Member

Office of Naval Research (US), Teknologiantie 2, Oulu, Finland 90590
+1 358 401 814 351
info@noptel.fi; http://www.noptel.fi

Featured Product: Long distance laser rangefinders

Noptel Oy provides long distance laser rangefinders. The compact, eye safe and highly integrated Noptel long distance laser rangefinders are used as OEM products in various applications from demanding military measurements to portable systems. Contact: Matti Tervaskanto, Marketing and Sales Director, matti.tervaskanto@noptel.fi; Tuomo Karjalainen, Marketing Manager, tuomo.karjalainen@noptel.fi

Office of Naval Research (US) #606

875 N Randolph St Ste 1425, Arlington, VA, United States 22203-1995
+1 703 588 2826; fax: +1 703 696 5940
onrpao@onr.navy.mil; http://www.onr.navy.mil

The Office of Naval Research (ONR) is the science and technology provider for the U.S. Navy and Marine Corps. ONR Global finds, funds, and manages an international network of researchers and innovators in over 55 countries to discover the best science, maintain technical awareness, and build collaborative partnerships.

EXHIBITOR DIRECTORY

optics.org #123

Ffordd Pengm, 2 Alexandra Gate, Cardiff, United Kingdom CF24 2SA
+44 29 2089 4747; fax: +44 29 2089 4750
sales@optics.org; www.optics.org

optics.org is the longest-running online resource targeted toward OEMs and system integrators in the core growth markets for photonics applications, and is your gateway to thousands of potential new customers looking to buy your products and services. From LEDs to industrial lasers and from sensing to microscopy, optics.org covers all the latest company, product and business news as well as in-depth articles on product application and market analysis. Contact: Robert Fisher, rob.fisher@optics.org

Pixelteq, Inc. #501

SPIE. Corporate Member

8060 Bryan Dairy Rd, Largo, FL United States 33777
+1 727 545 0741; fax: +1 727 545 7900
info@pixelteq.com; www.pixelteq.com

Featured Product: PixelCam OEM multispectral cameras - ideal for remote sensing. NIR+SWIR & VIS+NIR modules available.

PIXELTEQ provides OEM spectral sensing & imaging solutions, patterned optical filters, & custom electro-optical devices for a variety of defense applications such as surveillance, authentication, & unmanned systems applications. Our specialists collaborate to provide expert design assistance & custom-engineered solutions from rapid prototyping through high-volume OEM production. PIXELTEQ is a subsidiary of Halma plc, an international market leader in safety, health & sensor technology. Contact: Marco Snikkers, VP Sales & Marketing, info@pixelteq.com

Pro-Lite Technology #602

Innovation Centre University Way, University Way, Cranfield Bedfordshire, United Kingdom MK43 0BT
+44 1234 436110; fax +44 1234 436111
info@pro-lite.co.uk

Pro-Lite Technology Ltd supplies a range of portable field spectro-radiometers, modular spectroscopy systems and accessories for various remote sensing and defence applications. We supply a range of novel real-time snapshot multi- and hyper-spectral imagers ideally suited for mobile spectral mapping. Additionally, we provide a range of uniform light sources, large area diffuse reflectance targets and solar simulators that can be used for accurately calibrating sensors and for ground-truthing.

QUANTIC #614

University of Glasgow, Glasgow, Scotland, United Kingdom G12 8QQ
+44 141 330 3786
www.quantic.ac.uk; info@quantic.ac.uk

QuantIC is the UK Quantum Technology Hub in Quantum Enhanced Imaging. We are pioneering a family of multi-dimensional cameras operating across a range of wavelengths, time-scales and length-scales and are seeking industrial collaborations to explore technology applications in the Security and Defence sector. Contact: Michael Fletcher, Business Development Manager, michael.fletcher@glasgow.ac.uk

Raptor Photonics Ltd. #616

SPIE. Corporate Member

Willowbank Business Park, Larne N Ireland, United Kingdom BT40 2SF
+44 2828 270141; fax: +44 2828 275685
sales@raptorphotonics.com; www.raptorphotonics.com

Featured Product: OWL 640 Digital VIS-SWIR InGaAs

Raptor Photonics, a global leader in the design and manufacture of high performance digital cameras has launched a new member to its family of SWIR and Visible SWIR cameras. The OWL SW1.7 CL-640 is a rugged, high sensitivity digital VIS-SWIR camera. Using a 640 x 512 InGaAs sensor from SCD, the OWL offers visible extension from 0.4 m to 1.7 m to enable high sensitivity imaging. The 15 m x 15 m pixel pitch enables highest resolution imaging. Contact: Mark Donaghy, VP Sales & Marketing, md@raptorphotonics.com; Olivier Bernard, Director, ob@raptorphotonics.com

Cooperating Organisation

Remote Sensing and Photogrammetry Society (RSPSoc) #116

RSPSoc Shool of Geography, University of Notthingham, University Park, Nottingham, United Kingdom NG7 2RD
+44 115 951 5435; fax: +44 115 951 5249
rspsoc@nottingham.ac.uk; http://www.rspsoc.org

The Remote Sensing and Photogrammetry Society (RSPSoc) is the UK's leading Society for remote sensing and photogrammetry and their application to education, science, research, industry, commerce and the public service. As a charity, its remit is to inform and educate its members and the public. It supports networking between the university, business and government sectors. As an international society, RSPSoc is also active in Europe and on the world stage.

SAES Getters SPA #504

Viale Italia 77, Lainate Milan, MI, Italy 20020
+39 02 93178 1; +39 02 93178 489; +39 02 93178 320
marcom@seas-group.com; http://www.saesgroup.com

Featured Product: Getters and Vacuum Packaging

Getters are metal alloy which through chemical absorption, allow to reach extreme vacuum conditions in the hermetically sealed electronics devices. Nowadays the Group supports both discrete and wafer-level packaged MEMS technology through the PageLid and PageWafer technology, the most advanced getter thin-film solution for MEMS sensors that require vacuum packaging. Contact: Marco Moraja, Sensors&Detectors/Electr.Phot. Business Manager, marco_moraja@saes-group.com; Luca Mauri, Senior Scientist, Luca_Mauri@saes-group.com

SENOP OY #114

Lentolantie 7, Kangasala, 36220, Finland
info@rikola.fi; http:/senop.fi/en/index

Senop is the leading provider of Night Vision Devices and Target Acquisition and Observation Systems, as well as high precision optics, in the Nordic countries. Senop offers also lightweight snapshot Rikola hyperspectral camera for UAVs (or handheld use) that provides only true image pixels. No interpolation is used in images. Camera doesn't need IMU for its operations making the system low cost and low weight. Senop sells also OEM multichannel and LED-modules as well as miniature spectrometers.

Spectra Vista Corp. #612

29 Firemen's Way, Poughkeepsie, NY, United States 12603
+1 845 471 7007; fax: +1 845 471 7020
svcinfo@spectravista.com; www.spectravista.com

Featured Project: Spectral Vista Corp is demonstrating their flagship SVC HR-1024i spectroradiometer.

Spectra Vista Corporation has over 20 years of experience in the design and manufacture of high performance field portable spectroradiometers and airborne imaging spectrometers. With a dedicated team of engineers the company produces some of the most advanced, light weight field instruments for environmental, agricultural, geological research including validation & ground support to airborne hyperspectral and vicarious satellite calibration. Visit us at booth #612 at the SPIE Remote Sensing 2106 conference in Edinburgh to discuss your application and for a demonstration of flagship HR-1024i field spectroradiometer. Contact: Tom Corl, President, svcinfo@spectravista.com; Chris MacLellan, Director, info@precisionphotometrics.com

SPACENET #503

2107 Wilson Boulevard, Suite 1100, Arlington, VA 22201 USA
www.IQT.org

SpaceNet is an online repository of satellite imagery and labeled training data that will advance the development of machine learning and deep learning algorithms that leverage remote sensing data. SpaceNet is a collaboration between DigitalGlobe, CosmiQ Works, and NVIDIA, and the imagery is now freely available as a public data set on Amazon Web Services, Inc. (AWS). GPU-accelerated deep learning has led to huge breakthroughs in the field of computer vision. Most of this innovation has occurred through research enabled by ImageNet, a database of 14 million photographs labeled in over 20,000 categories. SpaceNet aims to facilitate similar advances in automating the detection and extraction of features in satellite imagery, fueled by the massive amount of information about our changing planet that is collected every day.

Spectrogon UK Ltd. #120

Whitworth Rd, Glenrothes Fife, United Kingdom KY6 2TF
+44 1592 770 000; fax: +44 1592 770 040
sales.uk@spectrogon.com; http://www.spectrogon.com

New Product: Windows and filters for thermal imaging, BBP & BBAR coated optics for 3-5μm, 8-12μm & custom ranges

Spectrogon is an independent manufacturer of Thin Film Optical Coatings, filters and Holographic Diffraction Gratings. Our filters span the full range from the UV, through the visible and near infrared, and out to approximately 20 microns in the IR. Low defect coating manufacture and measurement - Custom manufacture for integration into cooled and uncooled thermal imagers - Coating on wafers up to 200mm (8") diameter - Excellent dicing capability – down to 1x1mm, delivery on tape available. Contact: Graeme Robb, General Manager, Graeme.robb@spectrogon.com

STFC #304

SPIE. Corporate Member

Polaris House, North Star Ave, Swindon, United Kingdom SN2 1SZ
+44 1793 442000
www.stfc.ac.uk

Featured Product: STFC provides large scale science facilities for Academia & Industry in Space Science and Astronomy

The STFC, via its world class facilities at RAL Space in Harwell and the UK ATC at the Royal Observatory Edinburgh, carries out an exciting range of world-class space research and technology development. It has had significant involvement in over 200 space missions (mainly EO) & is at the forefront of UK Space Research. They design and build instruments for the European Space Agency and many of the world's major telescopes. Contact: Donald MacLeod, ATC Innovation, donald.macleod@stfc.ac.uk

Stratium Ltd. #400

15th Floor, Brunel House, 2 Fitzalan Road, Cardiff CF24 OEB
hello@stratium.co.uk; www.stratium.co.uk

Stratium® manufactures mid-infrared quantum cascade lasers (QCLs) with industrial-grade performance and reliability and has considerable experience in designing and packaging QCLs for demanding high-performance applications. At SPIE Security + Defense we are showcasing our 100mW CW 5.3um Fiber-Coupled QCL Module. Contact us at hello@stratium.co.uk to prearrange a meeting at our Booth # 400.

Cooperating Organisation

Technology Scotland #505

Geddes House, Kirton North, Livingston,
United Kingdom EH54 6GU
+44 7736289986
info@technologyscotland.scot; www.technologyscotland.scot

Technology Scotland is the leading cluster organisation for industry, academia, and other institutes engaged in the Key Enabling Technology (KET) sectors in Scotland.Technology Scotland brings like-minded companies together to solve problems, drive economic development, and build supply chains. In addition, Technology Scotland provides a range of services including events, workshops, Special Interest Groups, and collaborative networking, to help its membership improve their global competitiveness.

ThermoAnalytics, Inc. #601

23440 Airpark Blvd, Calumet, MI United States 49913
+1 906 482 9560; fax: +1 906 482 9755
sales@thermoanalytics.com; http://www.thermoanalytics.com

Featured Product: Accurate assessments and actionable intelligence with TAIThermIR.

ThermoAnalytics has served automotive, aerospace, defense & other industries for 20 years as leading developers & consultants in thermal & infrared analysis. In addition to commercial applications, our software is used to generate radiance predictions of outdoor scenes with detailed targets, image-based target contrast & detection probability. Our engineering teams specialize in thermal, CFD, EO/IR & testing. TAI provides total thermal solutions whatever the challenge may be. Contact: Antti Jussila, Sales & Marketing Director, aj@thermoanalytics.com; Ellie Lesatz, Inside Sales Rep, eel@thermoanalytics.com

Attendee Pen Sponsor

The Optoelectronics Research Centre #402

University of Southampton, B46 4029 Highfield Campus,
Southampton, United Kingdom SO17 1BJ
+44 23 8059 9536; fax: +44 23 8059 3142
light@orc.soton.ac.uk; http://www.orc.soton.ac.uk

Featured Product: We will unveil a new chalcogenide glass, with improved optical, thermal and mechanical properties.

The Optoelectronics Research Centre is one of the world's foremost photonics institutes, based at the University of Southampton. The ORC is leading the development of next-generation photonics technologies through major research initiatives such as the Chalcogenide Advanced Manufacturing Partnership (ChAMP) and the Future Photonics Hub, an EPSRC Future Manufacturing Research Hub. Key technologies include high-performance optical fibres, silicon and mid-IR photonics, metamaterials & 2D materials. Contact: John Lincoln, Industrial Liaison Manager, j.lincoln@soton.ac.uk; Ruth Churchill, Institute Coordinator, r.churchill@soton.ac.uk

SPIE. SECURITY+ DEFENCE

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Technical Conference Contents

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Security + Defence Symposium

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Security + Defence

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Security + Defence Symposium

9988: ELECTRO-OPTICAL REMOTE SENSING

MONDAY 26 SEPTEMBER

Location: Room Tinto

10:50: **Standoff midwave infrared hyperspectral imaging of ship plumes** *(Invited Paper)*. . . . . [9988-6]

11:20: **Expanding the dimensions of hyperspectral imagery to improve target detection** . . . . . [9988-7]

TUESDAY 27 SEPTEMBER

Location: Room Harris 1

13:50: **Deep sub-space mapping in hyperspectral imaging** . . . . . [9988-26]

9997: TARGET AND BACKGROUND SIGNATURES

TUESDAY 27 SEPTEMBER 2016

Location: Room Kilsyth

9:00: **Tasks and tools for battlefield reconnaissance** *(Invited Paper)*. . . . . [9997-15]

9:30: **High-dynamic range hyperspectral imaging for camouflage performance test and evaluation** . . . . . [9997-16]

9:50: **Pixelated camouflage patterns from the perspective of hyperspectral imaging** . . . . . [9997-17]

10:40: **Determination of target detection limits in hyperspectral data using band selection and dimensionality reduction** . . . [9997-18]

11:00: **Multiwaveband simulation-based signature analysis of camouflaged human dismounts in cluttered environments with TAIThermIR and MuSES** . . . . . [9997-19]

13:40: **Computationally efficient target classification in multispectral image data with deep neural networks** . . . . . [9997-22]

9987: ELECTRO-OPTICAL AND INFRARED SYSTEMS: TECHNOLOGY AND APPLICATIONS

WEDNESDAY 28 SEPTEMBER

Location: Kilsyth

9:40: **Multispectral active gated imaging** . . . . . [9987-3]

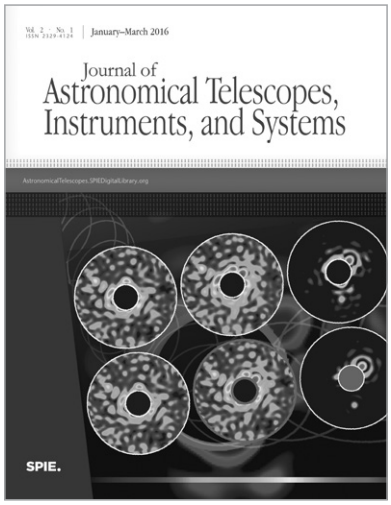
14:00: **Middle infrared hyperspectral imaging of adhesives, varnishes and inks on Al plate and papers by using a bolometer camera and an imaging type interferometer** . . . . [9987-11]

9992: EMERGING IMAGING AND SENSING TECHNOLOGIES

WEDNESDAY 28 SEPTEMBER

Location: Fintry

10:10: **Design of a miniature SWIR hyperspectral snapshot imager utilizing multivariate optical elements** . . . . . [9992-27]



Mark Clampin
NASA Goddard Space Flight Center
Editor-in-Chief

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AstronomicalTelescopes.SPIEDigitalLibrary.org

CONFERENCE 9986

LOCATION: ROOM HARRIS 2

Tuesday 27 September 2016 • Proceedings of SPIE Vol. 9986

Unmanned/Unattended Sensors and Sensor Networks

Conference Chairs: **Edward M. Carapezza,** EMC Consulting LLC (United States); **Panos G. Datskos,** Oak Ridge National Lab. (United States); **Christos Tsamis,** National Ctr. for Scientific Research Demokritos (Greece)

Programme Committee: **Mehdi F. Anwar,** Univ. of Connecticut (United States); **Mark E. Campbell,** Cornell Univ. (United States); **John M. Dolan,** Carnegie Mellon Univ. (United States); **Grant R. Gerhart,** Consultant (United States); **Todd M. Hintz,** Space and Naval Warfare Systems Command (United States); **Myron E. Hohil,** U.S. Army Armament Research, Development and Engineering Ctr. (United States); **Ivan Kadar,** Interlink Systems Sciences, Inc. (United States); **Tariq Manzur,** Naval Undersea Warfare Ctr. (United States); **George C. McNamara,** Naval Undersea Warfare Ctr. (United States); **Andre Samberg,** Sec-Control Innovation (Finland); **Huub A.J.M. van Hoof,** TNO Defence, Security and Safety (Netherlands)

TUESDAY 27 SEPTEMBER

SESSION 1

LOCATION: ROOM HARRIS 2 . . . . . TUE 8:30 TO 9:10

Keynote Session I

Session Chairs: **Edward M. Carapezza,** EMC Consulting LLC (United States); **Panos G. Datskos,** Oak Ridge National Lab. (United States)

8:30: **Perception and estimation challenges for humanoid robotics: applications to DARPA Robotics Challenge and NASA's Valkyrie Programme** *(Invited Paper)*, Maurice Fallon, The Univ. of Edinburgh (United Kingdom) . . . . . [9986-1]

SESSION 2

LOCATION: ROOM HARRIS 2 . . . . . TUE 9:10 TO 10:40

Unmanned/Unattended Air Sensors and Systems

Session Chairs: **Edward M. Carapezza,** EMC Consulting LLC (United States); **Panos G. Datskos,** Oak Ridge National Lab. (United States)

9:10: **Controls for Quadcopter UAV with Haptic Interface in MatLab/ Simulink** *(Invited Paper)*, Shariq N. Akhtar, Mark Wilson, Univ. of Leeds (United Kingdom); Houssam Assila, Contractor (Morocco) . . . . . [9986-2]

9:40: **Multibeam monopulse radar for airborne sense and avoid system**, Ashok Gorwara, Pavlo A. Molchanov, Planar Monolithic Industries, Inc. (United States) . . . . . [9986-3]

10:00: **Using crowd sourcing to combat potentially illegal or dangerous UAV operations**, Brooke Tapsall, AtlasGICS Ltd. (United Kingdom) . . . . . [9986-4]

10:20: **Optical flow and inertial navigation system fusion in the UAV navigation**, Boris Miller, Alexander Miller, Alexey Popov, Karen Stepanyan, Institute for Information Transmission Problems (Russian Federation). . . [9986-5]

Coffee Break . . . . . Tue 10:40 to 11:00

SESSION 3

LOCATION: ROOM HARRIS 2 . . . . . TUE 11:00 TO 12:00

Unmanned/Unattended Maritime Sensors and Systems

Session Chairs: **Panos G. Datskos,** Oak Ridge National Lab. (United States); **Tariq Manzur,** Naval Undersea Warfare Ctr. (United States)

11:00: **Beam propagation near marine boundary and challenges**, Tariq Manzur, Naval Undersea Warfare Ctr. (United States) . . . . . [9986-6]

11:20: **Non-lethal warfare with unmanned and unattended sensor technologies and systems**, Edward M. Carapezza, EMC Consulting LLC (United States) . . . . . [9986-7]

11:40: **Automated passive range estimation in real-time based on pixel coding for coastal surveillance**, Xiaoquan Liu, Xinwei Wang, Pengdao Ren, Songtao Fan, Pingshun Lei, Yan Zhou, Yuliang Liu, Institute of Semiconductors (China) . . . . . [9986-8]

Lunch/Exhibition Break . . . . . Tue 12:00 to 13:20

SESSION 4

LOCATION: ROOM HARRIS 2 . . . . . TUE 13:20 TO 14:40

Keynote Session II

Session Chairs: **Edward M. Carapezza,** EMC Consulting LLC (United States); **Panos G. Datskos,** Oak Ridge National Lab. (United States)

13:20: **Power for sensors, sensors for power** *(Invited Paper)*, Melvin Siegel, Carnegie Mellon Univ. (United States) . . . . . [9986-9]

14:00: **Collaborative autonomous sensing with Bayesians in the loop** *(Invited Paper)*, Nisar R. Ahmed, Univ. of Colorado Boulder (United States) . . . . . [9986-10]

SESSION 5

LOCATION: ROOM HARRIS 2 . . . . . TUE 14:40 TO 15:20

Unmanned/Unattended Ground Sensors and Systems

Session Chairs: **David B. Law,** Joint Non-Lethal Weapons Directorate (United States); **Tariq Manzur,** Naval Undersea Warfare Ctr. (United States)

14:40: **Tunable mechanical monolithic sensors for large band low frequency monitoring and characterization of sites and structures**, Fabrizio Barone, Gerardo Giordano, Fausto Acernese, Rocco Romano, Univ. degli Studi di Salerno (Italy) . . . . . [9986-11]

15:00: **Data fusion for target tracking and classification with wireless sensor network**, Benjamin Pannetier, Robin Doumerc, Julien Moras, Jean Dezert, ONERA (France); Loic Canevet, Delegation Generale Pour L'Armament (France) . . . . . [9986-13]

Coffee Break . . . . . Tue 15:20 to 15:50

SESSION 6

LOCATION: ROOM HARRIS 2 . . . . . TUE 15:50 TO 17:00

Unmanned/Unattended Sensors and Technologies

Session Chairs: **David B. Law,** Joint Non-Lethal Weapons Directorate (United States); **Tariq Manzur,** Naval Undersea Warfare Ctr. (United States)

15:50: **Antisoiling properties of transparent superhydrophobic coatings** *(Invited Paper)*, Panos G. Datskos, Oak Ridge National Lab. (United States) . . . . . [9986-14]

16:20: **2µm laser material for high power fiber laser**, Animesh Jha, Univ. of Leeds (United Kingdom) . . . . . [9986-15]

16:40: **Laser ablation method for production of surface acoustic wave sensors**, Alexander S. Kukaev, Dmitry P. Lukyanov, Sergey Y. Shevchenko, Daniil V. Safronov, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) . . . . . [9986-16]

CONFERENCE 9987

LOCATION: ROOM KILSYTH

Wednesday–Thursday 28–29 September 2016 • Proceedings of SPIE Vol. 9987

Electro-Optical and Infrared Systems: Technology and Applications

Conference Chairs: **David A. Huckridge,** Ridgeway Consulting (United Kingdom); **Reinhard Ebert,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Stephen T. Lee,** Thales Optronics Ltd. (United Kingdom)

Programme Committee: **Christopher C. Alexay,** StingRay Optics, LLC (United States); **Jan Y. Andersson,** Acreo Swedish ICT AB (Sweden); **Gisele Bennett,** Georgia Institute of Technology (United States); **Piet Bijl,** TNO Defence, Security and Safety (Netherlands); **Rainer Breiter,** AIM INFRAROT-MODULE GmbH (Germany); **Gordon A. Cain,** Vision4ce Ltd. (United Kingdom); **David J. Clarke,** Placing Value Co.,Ltd (Thailand); **Gérard Destéfanis,** Commissariat à l'Énergie Atomique (France); **Judith Dijk,** TNO Defence, Security and Safety (Netherlands); **Bernd Eberle,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Jean-Claude L. Fontanella,** Thales Optronique S.A.S. (France); **Natan S. Kopeika,** Ben-Gurion Univ. of the Negev (Israel); **Robert A. Lamb,** SELEX ES (United Kingdom); **Stephen T. Lee,** Thales Optronics Ltd. (United Kingdom); **José Manuel López-Alonso,** Univ. Complutense de Madrid (Spain); **John F. Parsons,** Thales UK Ltd. (United Kingdom); **Stanley R. Rotman,** Ben-Gurion Univ. of the Negev (Israel); **Armin L. Schneider,** Institut Franco-Allemand de Recherches de Saint-Louis (France); **Philip J. Soan,** Defence Science and Technology Lab. (United Kingdom)

WEDNESDAY 28 SEPTEMBER

SESSION 1

LOCATION: ROOM KILSYTH . . . . . WED 8:50 TO 11:30

Active Imaging

Session Chairs: **Stephen T. Lee,** Thales Optronics Ltd. (United Kingdom); **Reinhard Ebert,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Jose Alonso,** Univ. Complutense de Madrid (Spain)

Please Note:
Sessions of related interest: **Active Sensing I and Active Sensing II**, part of Conference 9988, Electro-Optical Remote Sensing, scheduled on Monday 26 September (Session 1 and 3)

8:50: **On the real performance of range-gated active imaging in scattering media** *(Invited Paper)*, Frank Christnacher, Stephane Schertzer, Nicolas Metzger, Emmanuel Bacher, Jean-Michel Poyet, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9987-1]

9:20: **Laser illumination and EO systems for covert surveillance from NIR to SWIR and beyond**, Edgaras Dvinelis, Tomas Zukauskas, Mindaugas Kausylas, Augustinas Vizbaras, Kristijonas Vizbaras, Dominykas Vizbaras, Brolis Photonics Solutions Ltd. (United Kingdom) . . . . . [9987-2]

9:40: **Multispectral active gated imaging**, Nick Spooren, IMEC (Belgium); Ran Ginat, BrightWay Vision Ltd. (Israel); Ya'ara David, IMEC (Japan); Eyal Levi, Yoav Grauer, BrightWay Vision Ltd. (Israel); Bert Geelen, Klaas Tack, Andy Lambrechts, Murali Jayapala, IMEC (Belgium) . . . . . [9987-3]

10:00: **Nondestructive testing of composite materials used in military applications by Eddy Current Thermography Method**, Waldemar Swiderski, Military Institute of Armament Technology (Poland) . . . . . [9987-4]

Coffee Break . . . . . Wed 10:20 to 10:50

10:50: **Non-destructive testing of mid-IR optical fiber using infrared imaging**, Marc-André Gagnon, Telops (Canada); Vincent Fortin, Réal Vallée, Univ. Laval (Canada); Vincent Farley, Telops (Canada) and Ctr. d'Optique, Photonique et Laser (Canada) and Univ. Laval (Canada); Philippe Lagueux, Telops (Canada); Éric Guyot, Telops France (France); Frédérick Marcotte, Telops (Canada)[9987-5]

11:10: **Active vision systems based on powerful laser diode matrixes: design peculiarities and vision range**, Yahor V. Lebiadok, SSPA "Optics, Optoelectronics & Laser Technology" (Belarus); Vladimir V. Kabanov, Denis V. Shabrov, B.I. Stepanov Institute of Physics (Belarus); Gevork T. Mikaelyan, INJECT (Russian Federation) . . . . . [9987-6]

SESSION 2

LOCATION: ROOM KILSYTH . . . . . WED 11:30 TO 12:20

Electro-Optical System Design, Technology and Applications I

Session Chairs: **Stanley R. Rotman,** Ben-Gurion Univ. of the Negev (Israel); **Jan Y. Andersson,** Acreo Swedish ICT AB (Sweden); **Rainer Breiter,** AIM INFRAROT-MODULE GmbH (Germany); **Armin L. Schneider,** Institut Franco-Allemand de Recherches de Saint-Louis (France)

11:30: **SSUSI-Lite: next generation far-ultraviolet sensor for characterizing geospace** *(Invited Paper)*, Larry J. Paxton, John E. Hicks, Matthew P. Grey, Steven N. Osterman, Charles Parker, Ramsey Hourani, Kathryn Marcotte, Johns Hopkins Univ. Applied Physics Lab., LLC (United States) . . . . . [9987-7]

12:00: **Concept for an airborne real-time ISR system with multisensory for 3D Data acquisition**, Laura Haraké, Hendrik Schilling, Andreas Lenz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Christian Blohm, OHB-System AG (Germany); Göksu Keskin, Merlin Becker, Wolfgang Middelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9987-8]

Lunch/Exhibition Break . . . . . Wed 12:20 to 13:40

SESSION 3

LOCATION: ROOM KILSYTH . . . . . WED 13:40 TO 15:00

Electro-Optical System Design, Technology and Applications II

Session Chairs: **Stanley R. Rotman,** Ben-Gurion Univ. of the Negev (Israel); **Jan Y. Andersson,** Acreo Swedish ICT AB (Sweden); **Rainer Breiter,** AIM INFRAROT-MODULE GmbH (Germany); **Armin L. Schneider,** Institut Franco-Allemand de Recherches de Saint-Louis (France)

13:40: **Electro-optical muzzle flash detection**, Jürgen Krieg, Christian Eisele, Dirk P. Seiffer, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9987-10]

14:00: **Middle infrared hyperspectral imaging of adhesives, varnishes and inks on Al plate and papers by using a bolometer camera and an imaging type interferometer**, Shigeru Sugawara, National Research Institute of Police Science (Japan); Mitsuhiro Yoshida, Kagawa Univ. (Japan); Tsubasa Saito, Kagawa Univ. (Japan) and National Research Institute of Police Science (Japan); Yoshihiko Nakayama, AOI ELECTRONICS Co., Ltd. (Japan); Yasuyuki Tsutsui, Hideya Taniguchi, AOI ELECTRONICS Co., Ltd. (Japan) and National Research Institute of Police Science (Japan); Ichiro Ishimaru, Kagawa Univ. (Japan) and National Research Institute of Police Science (Japan) . . . . . [9987-11]

14:20: **Challenges and solutions for high-performance SWIR lens design**, M. C. Gardner, T. Cook, Gooch and Housego UK Ltd. (United Kingdom); P. J. Rogers, VNF Ltd. (United Kingdom); A. Shipton, M. F. Wilde, P. Williams, Gooch and Housego UK Ltd. (United Kingdom) . . . . . [9987-12]

14:40: **Laser-induced damage threshold of camera sensors and micro-opto-mechanical systems**, Bastian Schwarz, Bernd Eberle, Gunnar Ritt, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . [9987-13]

Coffee Break . . . . . Wed 15:00 to 15:30

SESSION 4

LOCATION: ROOM KILSYTH . . . . . WED 15:30 TO 17:40

Image Processing

Session Chairs: **Piet Bijl,** TNO Defence, Security and Safety (Netherlands); **David J. Clarke,** Placing Value Co.,Ltd (Thailand); **Gisele Bennett,** Georgia Institute of Technology (United States); **Philip J. Soan,** Defence Science and Technology Lab. (United Kingdom); **John F. Parsons,** Thales UK Ltd. (United Kingdom)

15:30: **Turbulence mitigation methods for sea scenarios** *(Invited Paper)*, Judith Dijk, Klamer Schutte, Jochem van Vroonhoven, TNO Defence, Security and Safety (Netherlands); Johannes F. de Groot, Guido A. Gosselink, Thales Nederland B.V. (Netherlands) . . . . . [9987-14]

16:00: **Improvements in ship tracking in electro-optical and infrared data using appearance**, Sebastiaan P. van den Broek, TNO Defence, Security and Safety (Netherlands); Frank B. ter Haar, Jan Baan, Nanda van der Stap, Noelle Fischer, Robert P. Nieuwenhuizen, Judith Dijk, Klamer Schutte, TNO (Netherlands) . . . . . [9987-15]

CONFERENCE 9987

LOCATION: ROOM KILSYTH

16:20: **Multi-temporal anomaly detection technique**, Ira Dayan, Shimrit Maman, Dan G. Blumberg, Stanley R. Rotman, Ben-Gurion Univ. of the Negev (Israel) . . . . . [9987-16]

16:40: **Classifying objects in LWIR imagery via CNNs**, Iain Rodger, Barry Connor, Thales UK (United Kingdom); Neil M. Robertson, Queen's University Belfast (United Kingdom) . . . . . [9987-17]

17:00: **Real-time person detection in low-resolution thermal infrared imagery with MSER and CNNs**, Christian Herrmann, Thomas Müller, Dieter N. Willersinn, Jürgen Beyerer, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9987-18]

17:20: **Improved colour matching technique for fused nighttime imagery with daytime colours**, Maarten A. Hogervorst, Alexander Toet, TNO Defence, Security and Safety (Netherlands) . . . . . [9987-19]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Space-based optical staring sensor LOS determination and calibration using GCPs observation, Jun Chen, Wei An, Xin-Pu Deng, Jun-Gang Yang, Zhichao Sha, National Univ. of Defense Technology (China) . . . . . [9987-36]

Joint Fresnel transform correlator based on double optical wedges and its application in the optical image encryption, Xueju Shen, Chao Lin, Shijiazhuang Mechanical Engineering College (China) . . . . . [9987-38]

Active manipulating propagation in the graphene hybrid plasmonic waveguides in mid-infrared region, Xiaosai Wang, Jicheng Wang, Jiangnan Univ. (China); Dongdong Liu, Nanjing Univ. of Science and Technology (China); Xiushan Xia, Jiangnan Univ. (China) . . . . . [9987-39]

Analysis of the variation of range parameters of thermal cameras, Jaroslaw Barela, Mariusz Kastek, Krzysztof Firmanty, Michal Krupinski, Military Univ. of Technology (Poland) . . . . . [9987-40]

Test stand for determining parameters of microbolometer camera, Michal Krupinski, Jaroslaw Barela, Mariusz Kastek, Krzysztof Chmielewski, Military Univ. of Technology (Poland) . . . . . [9987-41]

A new systematic calibration method of ring laser gyroscope inertial navigation system, Guo Wei, chunfeng gao, National Univ. of Defense Technology (China) . . . . . [9987-42]

A three-axis turntable online initial state measurement method based on the high-accuracy laser gyro SINS, Xing Wu Long, Chunfeng Gao, Guo Wei, National Univ. of Defense Technology (China) . . . . . [9987-43]

Thermal investigation of electronic decives in CFD method, Rafal Kadlof, Military Univ. of Technology (Poland) . . . . . [9987-44]

Coherent synthetic imaging using multi-aperture scanning Fourier ptychography, Zongliang Xie, Chinese Academy of Sciences (China); Haotong Ma, Chinese Academy of Sciences (China) and Institute of Optics and Electronics (China); Bo Qi, Ge Ren, Li Dong, Yufeng Tan, Institute of Optics and Electronics (China) and Chinese Academy of Sciences (China) . . . . . [9987-45]

Simplified contrast enhancement method using weighted dynamic range separate histogram equalization, Seung-Hwan Kim, SK Telecom (Korea, Republic of); Gyu-Hee Park, SK Telecom, Quantum Tech Lab. (Korea, Republic of) . . . . . [9987-46]

THURSDAY 29 SEPTEMBER

SESSION 5

LOCATION: ROOM KILSYTH . . . . . THU 8:30 TO 10:10

Electro-Optical Systems: Performance Evaluation

Session Chairs: **Judith Dijk,** TNO Defence, Security and Safety (Netherlands); **Christopher C. Alexay,** StingRay Optics, LLC (United States); **Gordon A. Cain,** Vision4ce Ltd. (United Kingdom)

8:30: **How to pass a sensor acceptance test: using the gap between acceptance criteria and operational performance** *(Invited Paper)*, Piet Bijl, TNO Defence, Security and Safety (Netherlands) . . . . . [9987-20]

9:00: **SWIR, VIS and LWIR observer performance against handheld objects: a comparison** *(Invited Paper)*, Uwe Adomeit, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9987-21]

9:30: **Feature long axis size and local luminance contrast determine ship target acquisition performance: strong evidence for the TOD case**, Piet Bijl, Alexander Toet, Frank L. Kooi, TNO Defence, Security and Safety (Netherlands) . . . . . [9987-22]

9:50: **Visual acuity performance of several observers using the triangle orientation discrimination methodology**, Julia Mündel, Bärbel Geisel, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Katrin Braesicke, Helge Bürsing, Fraunhofer IOSB (Germany) . . . . . [9987-23]

Coffee Break . . . . . Thu 10:10 to 10:40

SESSION 6

LOCATION: ROOM KILSYTH . . . . . THU 10:40 TO 12:10

System Modelling

Session Chairs: **David A. Huckridge,** Ridgeway Consulting (United Kingdom); **Robert A. Lamb,** Leonardo-Finmeccanica (United Kingdom); **Jean-Claude L. Fontanella,** Thales Optronique S.A.S. (France)

10:40: **The prediction of the optical contrast of air-borne targets against the night-sky background for Photopic and NVG sensors** *(Invited Paper)*, Stephan Havemann, Gerald J. Wong, Met Office (United Kingdom) . . . . . [9987-24]

11:10: **A first order analytical TOD sensor performance model**, Piet Bijl, Maarten A. Hogervorst, TNO (Netherlands) . . . . . [9987-25]

11:30: **Analysis on the detection capability of the space-based camera for the space debris**, Chao Wang, Fugang Wang, Zhao Ye, Xianying Ge, Huan Yin, Qipeng Cao, Jun Zhu, Aerospace DongFangHong Satellite Co., Ltd. (China) . . . . . [9987-26]

11:50: **Ray tracing simulation of aero-optical effect using multiple gradient index layer**, Seul Ki Yang, Sehyun Seong, Dongok Ryu, Sug-Whan Kim, Hyeuknam Kwon, Yonsei Univ. (Korea, Republic of); Sang-Hun Jin, LIG Nex1 Co., Ltd. (Korea, Republic of) . . . . . [9987-28]

Lunch Break . . . . . Thu 12:10 to 13:30

SESSION 7

LOCATION: ROOM KILSYTH . . . . . THU 13:30 TO 16:00

Detectors

Session Chairs: **Stephen T. Lee,** Thales Optronics Ltd. (United Kingdom); **David A. Huckridge,** Ridgeway Consulting (United Kingdom); **Bernd Eberle,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

13:30: **True differential pyroelectric infrared detector with improved D* test results with analysis**, Alan P. Doctor, Laser Components Pyro Group, Inc. (United States) . . . . . [9987-29]

13:50: **A new monolithic approach for mid-IR focal plane arrays**, Chengzhi Xie, Vincenzo Pusino, Ata Khalid, Mohsin Aziz, Matthew J. Steer, David R. S. Cumming, Univ. of Glasgow (United Kingdom) . . . . . [9987-31]

14:10: **Advances in characterization of InAs/GaSb superlattice infrared photodetectors**, Andreas Woerl, Volker Daumer, Tsvetelina Hugger, Norbert Kohn, Wolfgang Luppold, Raphael Müller, Jasmin Niemasz, Robert Rehm, Frank Rutz, Johannes Schmitz, Johannes Schmitz, Tim O. Stadelmann, Matthias Wauro, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [9987-32]

14:30: **A practical implementation of high-resolution relative spectral response measurement of CMOS IRFPAs using Fourier Transform Infrared Spectrometer (FTIR)**, Catherine Barrat, HGH Systèmes Infrarouges (France) . . . . . [9987-33]

Coffee Break . . . . . Thu 14:50 to 15:20

15:20: **Accelerating space-charge gratings in wide-bandgap semiconductors as a tool for simultaneous velocity and accelaration measurement**, Igor A. Sokolov, Mikhail A. Bryushinin, Ioffe Institute (Russian Federation) . . . . . [9987-34]

15:40: **Ultracompact plasmonic sensor with graphene-based silicon reflector**, Jicheng Wang, Xiaosai Wang, Ci Song, Xiushan Xia, Jiangnan Univ. (China) . . . . . [9987-35]

CONFERENCE 9988

LOCATION: ROOM TINTO (MONDAY-TUESDAY AM); ROOM HARRIS 1 (TUESDAY PM)

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 9988

Electro-Optical Remote Sensing

Conference Chairs: **Gary Kamerman,** FastMetrix, Inc. (United States); **Ove Steinvall,** Swedish Defence Research Agency (Sweden)

Programme Committee: **Robert J. Grasso,** RJG Consulting (United States); **Laurent Hespel,** ONERA (France); **Dennis K. Killinger,** Univ. of South Florida (United States); **Martin Laurenzis,** Institut Franco-Allemand de Recherches de Saint-Louis (France); **Peter Lutzmann,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Kenneth J. McEwan,** Defence Science and Technology Lab. (United Kingdom); **Vasyl Molebny,** National Taras Shevchenko Univ. of Kyiv (Ukraine); **Philip St John Russell,** Max-Planck-Institut für die Physik des Lichts (Germany); **Peter N. Randall,** QinetiQ Ltd. (United Kingdom); **Philippe Réfrégier,** Institut Fresnel (France); **Knut Stenerssen,** Norwegian Defence Research Establishment (Norway); **Monte D. Turner,** Air Force Research Lab. (United States)

MONDAY 26 SEPTEMBER

SESSION 1

LOCATION: ROOM TINTO . . . . . MON 8:50 TO 10:20

Active Sensing I

Session Chair: **Ove Steinvall,**
FOI-Swedish Defence Research Agency (Sweden)

PLEASE NOTE:
Session of related interest: Active Imaging, part of Conference 9987, Electro-Optical and Infrared Systems: Technology and Applications, scheduled on Wednesday 28 September (Session 1)

8:50: **Real-time tracking around a corner** *(Invited Paper)*, Jonathan Klein, Institut Franco-Allemand de Recherches de Saint-Louis (France) and Univ. Bonn (Germany); Christoph Peters, Jaime Martin, Matthias B. Hullin, Univ. Bonn (Germany); Martin Laurenzis, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9988-1]

9:20: **Automated object detection and tracking with a Flash lidar system**, Marcus Hammer, Marcus Hebel, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9988-2]

9:40: **Sensing and reconstruction of arbitrary light-in-flight paths by a relativistic imaging approach**, Martin Laurenzis, Institut Franco-Allemand de Recherches de Saint-Louis (France); Jonathan Klein, Institut Franco-Allemand de Recherches de Saint-Louis (France) and Univ. Bonn (Germany); Emmanuel Bacher, Nicolas Metzger, Frank Christnacher, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9988-3]

10:00: **Penetration of pyrotechnic effects with SWIR laser gated-viewing in comparison to VIS and thermal IR bands**, Benjamin Goehler, Peter Lutzmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9988-4]

Coffee Break . . . . . Mon 10:20 to 10:50

SESSION 2

LOCATION: ROOM TINTO . . . . . MON 10:50 TO 12:40

Passive Sensing

Session Chair: **Kenneth J. McEwan,**
Defence Science and Technology Lab. (United Kingdom)

10:50: **Standoff midwave infrared hyperspectral imaging of ship plumes** *(Invited Paper)*, Marc-André Gagnon, Jean-Philippe Gagnon, Pierre Tremblay, Simon Savary, Vincent Farley, Telops (Canada); Éric Guyot, Telops (France); Philippe Lagueux, Martin Chamberland, Alexandrine Huot, Telops (Canada) . . . . . [9988-6]

11:20: **Expanding the dimensions of hyperspectral imagery to improve target detection**, Mark Z. Salvador, Zi Inc. (United States) . . . . . [9988-7]

11:40: **Image enhancement and color constancy for a vehicle-mounted change detection system**, Marco Tektonidis, David Monnin, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9988-8]

12:00: **Detection of object vibrations from high-speed infrared images**, Gabriela Paunescu, Peter Lutzmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9988-9]

12:20: **Reconstruction method of compressed sensing for remote sensing images cooperating with energy compensation**, Jinping He, Haibo Zhao, Yuchen Liu, Ningjuan Ruan, Beijing Institute of Space Mechanics and Electricity (China) . . . . . [9988-10]

Lunch Break . . . . . Mon 12:40 to 13:50

SESSION 3

LOCATION: ROOM TINTO . . . . . MON 13:50 TO 15:40

Active Sensing II

Session Chair: **Gary Kamerman,** FastMetrix, Inc. (United States)

PLEASE NOTE:
Session of related interest: Active Imaging, part of Conference 9987, Electro-Optical and Infrared Systems: Technology and Applications, scheduled on Wednesday 28 September (Session 1)

13:50: **Optical and acoustical UAV detection** *(Invited Paper)*, Frank Christnacher, Sebastien Hengy, Martin Laurenzis, Alexis Matwyschuk, Pierre Naz, Stephane Schertzer, Gwenaël Schmitt, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9988-11]

14:20: **Eye safe lidar and passive EO sensing for cloud monitoring**, Ove Steinvall, Ove Gustafsson, Folke Berglund, FOI-Swedish Defence Research Agency (Sweden). . . . . [9988-12]

14:40: **Rapid 2-axis scanning lidar prototype**, Daryl Hartsell, Paul E. LaRocque, Jeffrey Tripp, Teledyne Optech (Canada) . . . . . [9988-13]

15:00: **Effect of optical turbulence along a downward slant path on probability of laser hazard**, Ove Gustafsson, FOI-Swedish Defence Research Agency (Sweden). . . . . [9988-14]

15:20: **Visualization of oscillatory stresses in transparent media using a b-Ga_2O_3 adaptive detector**, Igor A. Sokolov, Mikhail A. Bryushinin, Ioffe Institute (Russian Federation) . . . . . [9988-15]

Coffee Break . . . . . Mon 15:40 to 16:00

Security+Defence Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

CONFERENCE 9988

LOCATION: ROOM TINTO (MONDAY-TUESDAY AM); ROOM HARRIS 1 (TUESDAY PM)

TUESDAY 27 SEPTEMBER

SESSION 4

LOCATION: ROOM TINTO . . . . . TUE 8:30 TO 10:00

Sensor Development

Session Chair: **Peter Lutzmann,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

8:30: **Multiband optics for imaging systems** *(Invited Paper)*, Jasbinder S. Sanghera, Daniel J. Gibson, Shyam S. Bayya, Vinh Q. Nguyen, U.S. Naval Research Lab. (United States); Mikhail Kotov, Sotera Defense Solutions, Inc. (United States); Collin McClain, Univ. Research Foundation (United States) . . . . . [9988-16]

9:00: **Noncontact thermoacoustic detection of targets embedded in dispersive media**, Kevin Boyle, Hao Nan, Butrus T. Khuri-Yakub, Amin Arbabian, Stanford Univ. (United States) . . . . . [9988-17]

9:20: **Research of dynamic goniometer method for direction measurements**, Yuri V. Filatov, Eugeni D. Bokhman, Pavel A. Ivanov, Petr A. Pavlov, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation); Roman A. Larichev, Saint Petersburg Electrotechnical Univ (Russian Federation) . [9988-18]

9:40: **Optimization design and evaluation specifications analysis for the optical remote system with a high spatial resolution**, Ningjuan Ruan, Jinping He, Zhao Jun Liu, Xiaoyong Wang, Beijing Institute of Space Mechanics and Electricity (China). . . . . [9988-19]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 5

LOCATION: ROOM TINTO . . . . . TUE 10:30 TO 12:00

Infrared Sensing

Session Chair: **Laurent Hespel,** ONERA (France)

10:30: **High-sensitivity InAs photodiodes for mid-infrared detection** *(Invited Paper)*, Jo Shien Ng, Shiyong Zhang, Andrey B. Krysa, John P. R. David, Chee Hing Tan, The Univ. of Sheffield (United Kingdom). . . . . [9988-20]

11:00: **A versatile algorithm for detecting different kind of moving objects in real-time having no a-priori Information**, Andrea Zingoni, Marco Diani, Giovanni Corsini, Univ. di Pisa (Italy). . . . . [9988-21]

11:20: **Use of multivariate analysis to minimize collecting of infrared images and classify the pixels**, Thomas Svensson, Dietmar Letalick, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9988-22]

11:40: **Generating object proposals for improved object detection in aerial images**, Lars Sommer, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) and Karlsruher Institut für Technologie (Germany); Tobias Schuchert, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Jürgen Beyerer, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) and Karlsruher Institut für Technologie (Germany) . . . . . [9988-23]

Lunch/Exhibition Break . . . . . Tue 12:00 to 13:10

SESSION 6

LOCATION: ROOM HARRIS 1 . . . . . TUE 13:10 TO 15:30

Signal Processing

Session Chair: **Ove Steinvall,**
FOI-Swedish Defence Research Agency (Sweden)

Please note the room change.
Session 6 will be held in Room Harris 1.

13:10: **Compressed sensing for super-resolution spatial and temporal laser detection and ranging**, Martin Laurenzis, Institut Franco-Allemand de Recherches de Saint-Louis (France); Stephane Schertzer, French-German Research Institute of Saint Louis (France); Frank Christnacher, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9988-24]

13:30: **Texture statistics from multiband infrared sensors imaging disturbed soil**, Henrik Petersson, David K. J. Gustafsson, Dietmar Letalick, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9988-25]

13:50: **Deep sub-space mapping in hyperspectral imaging**, Niclas Wadströmer, David K. J. Gustafsson, Henrik Perersson, David Bergstrom, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9988-26]

14:10: **Evaluating automatic registration of UAV imagery using multitemporal ortho images**, Günter Saur, Wolfgang Krüger, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9988-27]

14:30: **Importance of using field spectroscopy to support the satellite remote sensing for underground structures intended for security reasons in the eastern Mediterranean region.**, George Melillos, Kyriacos Themistocleous, Cyprus Univ. of Technology (Cyprus); Giorgos Christos Papadavid, Agricultural Research Institute (Cyprus); Athos Agapiou, Maria Prodromou, Cyprus Univ. of Technology (Cyprus); Silas Chr. Michaelides, Meteorological Service of Cyprus (Cyprus); Diofantos G. Hadjimitsis, Cyprus Univ. of Technology (Cyprus) . . . . . [9988-28]

14:50: **Aerial vehicles collision avoidance using monocular vision**, Valeriy V. Strotov, Vadim S. Muraviev, Oleg E. Balashov, Ryazan State Radio Engineering Univ. (Russian Federation). . . . . [9988-29]

15:10: **Range-intensity coding under triangular and trapezoidal correlation algorithms for 3D super-resolution range-gated imaging**, Xinwei Wang, Ruirong You, Songtao Fan, Pingshun Lei, Yan Zhou, Institute of Semiconductors (China) . . . . . [9988-30]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Remote sensing for oil products on water surface via fluorescence induced by UV filaments, Elena S. Sunchugasheva, P.N. Lebedev Physical Institute (Russian Federation) and Moscow Institute of Physics and Technology (Russian Federation); Andrey A. Ionin, P.N. Lebedev Physical Institute (Russian Federation); Daria V. Mokrousova, P.N. Lebedev Physical Institute (Russian Federation) and Moscow Institute of Physics and Technology (Russian Federation); Leonid V. Seleznev, Dmitry V. Sinitsyn, P.N. Lebedev Physical Institute (Russian Federation); Yuri E. Geints, Alexander A. Zemlyanov, V.E. Zuev Institute of Atmospheric Optics (Russian Federation). . . . . [9988-31]

An efficient visual saliency analysis model for region-of-interest extraction in high-spatial-resolution remote sensing images, Libao Zhang, Shiyi Wang, Beijing Normal Univ. (China) . . . . . [9988-32]

A novel adaptive image fusion method based on multiscale spectral saliency analysis for remote sensing images, Libao Zhang, Jie Chen, Beijing Normal Univ. (China) . . . . . [9988-33]

Structured output tracking guided by keypoint matching, Zhiwen Fang, Huazhong Univ. of Science and Technology (China) and Hunan Univ. of Humanities, Science and Technology (China); Zhiguo Cao, Yang Xiao, Huazhong Univ. of Science and Technology (China) . . . . . [9988-34]

CONFERENCE 9989

LOCATION: ROOM TINTO

Tuesday–Wednesday 27–28 September 2016 • Proceedings of SPIE Vol. 9989

Technologies for Optical Countermeasures

Conference Chairs: **David H. Titterton,** UK Defence Academy (United Kingdom); **Robert J. Grasso,** EOIR Technologies (United States); **Mark A. Richardson,** Cranfield Univ. (United Kingdom)

Programme Committee: **Brian Butters,** Meon Technology Limited (United Kingdom); **Marc Eichhorn,** Institut Franco-Allemand de Recherches de Saint-Louis (France); **Ian F. Elder,** SELEX Galileo Ltd. (United Kingdom); **Markus Henriksson,** FOI-Swedish Defence Research Agency (Sweden); **David B. James,** Cranfield Univ. (United Kingdom); **Helena Jelinkova,** Czech Technical Univ. in Prague (Czech Republic); **Espen Lippert,** Norwegian Defence Research Establishment (Norway); **Gerald C. Manke II,** Naval Surface Warfare Ctr. Crane Div. (United States); **Eric D. Park,** Q-Peak, Inc. (United States); **Manijeh Razeghi,** Northwestern Univ. (United States); **Kenneth A. Sarkady,** U.S. Naval Research Lab. (United States); **Ric H. M. A. Schleijpen,** TNO Defence, Security and Safety (Netherlands); **Dirk Peter Seiffer,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Ove Steinvall,** Swedish Defence Research Agency (Sweden); **Hans-Dieter Tholl,** Diehl BGT Defence GmbH & Co. KG (Germany); **Maria S. Willers,** Denel Dynamics (South Africa); **Cornelius J. Willers,** Council for Scientific and Industrial Research (South Africa)

TUESDAY 27 SEPTEMBER

Welcome and Introduction

LOCATION: ROOM TINTO . . . . . 12:55 TO 13:00

David H. Titterton, UK Defence Academy (United Kingdom);
Robert J. Grasso, EOIR Technologies (United States);
Mark A. Richardson, Cranfield Univ. (United Kingdom)

Presentation of the DEPS Award

to

David H. Titterton, UK Defence Academy (United Kingdom)

Presented by: **Mark W. Neice,** Directed Energy Professional Society (United States)

SESSION 1

LOCATION: ROOM TINTO . . . . . TUE 13:00 TO 15:00

Keynote Session

Session Chairs: **Robert J. Grasso,** EOIR Technologies (United States); **David H. Titterton,** UK Defence Academy (United Kingdom)

13:05: **New frontiers in quantum cascade lasers: high-power solid-state frequency comb and terahertz sources at room temperature** *(Invited Paper)*, Manijeh Razeghi, Northwestern Univ. (United States) . . . . . [9989-1]

13:45: **NATO EW challenges for platform protection** *(Invited Paper)*, Mark Elson, Defence Science and Technology Lab. (United Kingdom). . . [9989-2]

14:25: **Recent progress in MWIR and LWIR quantum cascade lasers** *(Invited Paper)*, C. Kumar N. Patel, Pranalytica, Inc. (United States) [9989-3]

Coffee Break . . . . . Tue 15:00 to 15:20

SESSION 2

LOCATION: ROOM TINTO . . . . . TUE 15:20 TO 16:30

Lasers and Sources

Session Chairs: **David H. Titterton,** UK Defence Academy (United Kingdom); **Ian F. Elder,** Leonardo-Finmeccanica (United Kingdom)

15:20: **Tunable thulium fiber laser: a flexible mid-IR source for science and defence** *(Invited Paper)*, Eric D. Park, Q-Peak, Inc. (United States). . . . . [9989-4]

15:50: **2.1 µm high-power laser diode beam combining**, Antoine P. C. Berrou, Heriot-Watt Univ. (United Kingdom); Ian F. Elder, Finmeccanica (United Kingdom); Robert A. Lamb, Finmeccanica (United Kingdom) and Heriot-Watt Univ. (United Kingdom); M. J. Daniel Esser, Heriot-Watt Univ. (United Kingdom) . . . . . [9989-5]

16:10: **UK industrial high-power fiber lasers**, Christophe A. Codemard, SPI Lasers UK Ltd. (United Kingdom) . . . . . [9989-26]

SESSION 3

LOCATION: ROOM TINTO . . . . . TUE 16:30 TO 17:30

Threats, Threat Detection and Discrimination

Session Chair: **Kenneth A. Sarkady,** U.S. Naval Research Lab. (United States)

16:30: **Optics detection and laser countermeasures on a combat vehicle** *(Invited Paper)*, Lars J. Sjöqvist, Lars Allard, Magnus Pettersson, FOI-Swedish Defence Research Agency (Sweden); Per Börjesson, Nils Lindskog, Johan Bodin, Saab Electronic Defence Systems (Sweden); Anders Widen, Håkan Persson, BAE Systems Bofors (Sweden); Jan Fredriksson, Army Combat School, MSS Skövde (Sweden); Sten Edström, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9989-6]

17:00: **Modelling threats** *(Invited Paper)*, Itor N. James, Defence Science and Technology Lab. (United Kingdom). . . . . [9989-25]

PANEL DISCUSSION

LOCATION: ROOM TINTO . . . . . 17:30 TO 18:10

Factors that Affect Installed IRCM System Performance

Moderators: Robert J. Grasso, EOIR Technologies (United States)
David H. Titterton, UK Defence Academy (United Kingdom)

Laser beams propagating through the atmosphere are distorted by turbulence, platform vibrations, engine exhaust, rotor downwash, and air flow over apertures; which can lead to a reduction of radiant intensity delivered to the target. Understanding the effects of naturally and artificially induced changes in the beam propagation environment can help to both define and understand the problem; and how this external medium through which all signals must pass can and will affect what is finally delivered to the target. Areas to be discussed will include platform and atmospheric effects such as engine exhaust, rotor downwash, boundary layer conditions, aero-optical effects, atmospheric turbulence, particulate scattering, absorption, and general issues that deal with getting a beam from point A to point B. Also, methods to mitigate platform effects on a compensation basis will be discussed. Please join us for an insightful discussion of those external effects that have a direct impact upon what leaves our system and what is finally delivered to the target.

WEDNESDAY 28 SEPTEMBER

SESSION 4

LOCATION: ROOM TINTO . . . . . WED 8:30 TO 10:20

Quantum Cascade Lasers

Session Chairs: **Hans-Dieter Tholl,** Diehl BGT Defence GmbH & Co. KG (Germany); **Eric D. Park,** Q-Peak, Inc. (United States)

8:30: **High-power and broadly tunable quantum cascade laser sources** *(Invited Paper)*, Laurent Diehl, Christian J. Pfluegl, Romain Blanchard, Masud Azimi, Mark F. Witinski, Federico Capasso, Daryoosh Vakhshoori, Pendar Technologies (United States) . . . . . [9989-28]

9:00: **Optimization of high-power quantum cascade lasers and their external cavity configurations for wavelength tuning** *(Invited Paper)*, W. Ted Masselink, Mykhaylo P. Semtsiv, Yuri V. Flores, Jan F. Kischkat, Humboldt-Univ. zu Berlin (Germany) . . . . . [9989-7]

9:30: **Anti-aliasing techniques for signal verification and sensor integrity** *(Invited Paper)*, Frances Bodrucki, The Univ. of North Carolina at Charlotte (United States). . . . . [9989-8]

10:00: **System physics modeling of quantum cascade lasers**, Hans-Dieter Tholl, Franz Münzhuber, Diehl BGT Defence GmbH & Co. KG (Germany)[9989-9]

Coffee Break . . . . . Wed 10:20 to 10:50

CONFERENCE 9989

LOCATION: ROOM TINTO

SESSION 5

LOCATION: ROOM TINTO . . . . . WED 10:50 TO 12:20

Countermeasure Systems

Session Chairs: **Eric D. Park,** Q-Peak, Inc. (United States);
Robert J. Grasso, EOIR Technologies (United States)

10:50: **Towards low-cost infrared image sensors: how to leverage Si CMOS** *(Invited Paper)*, Dorota S. Temple, Allan Hilton, Ethan J. D. Klem, RTI International (United States) . . . . . [9989-10]

11:20: **Electro-optic product design for manufacture: where next?** *(Invited Paper)*, John R. Barr, Finmeccanica (United Kingdom). . . . . [9989-11]

11:50: **The application of advanced technology to produce the smallest, lightest multihead DIRCM system available today: Miysis DIRCM** *(Invited Paper)*, Stuart N Chapman, Leonardo-Finmeccanica (United Kingdom) [9989-12]

SESSION 6

LOCATION: ROOM TINTO . . . . . WED 12:20 TO 13:00

Atmospheric Effects

Session Chairs: **Dorota S. Temple,** RTI International (United States);
Kenneth A. Sarkady, U.S. Naval Research Lab. (United States)

12:20: **Temporal extension of phase screen sequences using proper orthogonal decomposition**, Markus Henriksson, Lars J. Sjöqvist, Jonas Tidström, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9989-13]

12:40: **Identification, regression and validation of an image processing degradation model to assess the effects of aeromechanical turbulence due to installation aircraft**, Matteo Miccoli, Andrea Usai, Antonio Tafuto, Elettronica S.p.A. (Italy); Fabio Togna, Aeronautica Militare Italiana (Italy) . . . . . [9989-14]

Lunch Exhibition Break . . . . . Wed 13:00 to 14:00

SESSION 7

LOCATION: ROOM TINTO . . . . . WED 14:00 TO 16:50

Laser Effects

Session Chairs: **Ove Steinvall,** FOI-Swedish Defence Research Agency (Sweden); **Ric H. M. A. Schleijpen,**
TNO Defence, Security and Safety (Netherlands)

14:00: **Visible laser dazzle** *(Invited Paper)*, Bernd Eberle, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9989-15]

14:30: **Using a CO_2 laser for PIR-detector spoofing** *(Invited Paper)*, Ric H. M. A. Schleijpen, Frank J. M. van Putten, TNO Defence, Security and Safety (Netherlands) . . . . . [9989-16]

15:00: **Laser dazzling effects through task related experiments in a controlled environment**, Marijke Vandewal, Denis Budin, Amaury Pétriaux, Mathias Becquaert, Frédéric Moustier, Royal Military Academy (Belgium) . . . . . [9989-19]

15:20: **Concept of a human eye camera to assess laser dazzling**, Michael Koerber, Bernd Eberle, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9989-17]

Coffee Break . . . . . Wed 15:40 to 16:10

16:10: **Evaluation of protection measures against laser dazzling for imaging sensors**, Gunnar Ritt, Bernd Eberle, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9989-18]

16:30: **Ultrafast laser filamentation in air**, Martin C. Richardson, Matthieu Baudelet, Shermineh Rostami-Fairchild, Cheonha Jeon, Lawrence Shah, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States) . . . . . [9989-24]

SESSION 8

LOCATION: ROOM TINTO . . . . . WED 16:50 TO 17:30

Modelling and Simulation

Session Chair: **Stuart S. Duncan,**
Leonardo-Finmeccanica (United Kingdom)

16:50: **Updates on measurements and modeling techniques for expendable countermeasures**, Robert Gignilliat, U.S. Naval Research Lab. (United States); Rebekah Wilson, Thomas M. Taczak, Applied Technology, Inc. (United States) . . . . . [9989-20]

17:10: **Next generation chalcogenide glasses for visible and IR imaging**, Daniel W. Hewak, Paul Bastock, Christopher Craig, Chung-Che Huang, Khouler Khan, Andrea Ravagli, Edwin Weatherby, Univ. of Southampton (United Kingdom) . . . . . [9989-27]

SESSION 9

LOCATION: ROOM TINTO . . . . . WED 17:30 TO 18:10

Pointing and Beam Control

Session Chairs: **Ric H. M. A. Schleijpen,**
TNO Defence, Security and Safety (Netherlands);
Robert J. Grasso, EOIR Technologies (United States)

17:30: **Towards a setup for a beam control system for high-power laser system at DLR**, Ivo Buske, Andreas Walther, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9989-21]

17:50: **Adaptive conversion of input beam with nonsymmetrical intensity distribution to near-diffraction-limited flattop beam based on dual-phase only liquid crystal spatial light modulators**, Haotong Ma, National Univ. of Defense Technology (China); Guowen Zhang, Shanghai Institute of Optics and Fine Mechanics (China); Bing Lei, National Univ of Defense Technology (China); Xiaojun Xu, National Univ. of Defense Technology (China); Guangwen Jiang, National Univ. of Defense Technology (China); Zongliang Xie, Bo Qi, Ge Ren, Institute of Optics and Electronics (China); Ying Feng, National Univ. of Defense Technology (China) . . . . . [9989-22]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

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Accuracy analysis of a mobile tracking system for angular position determination of flying targets, Andreas Walther, Ivo Buske, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9989-23]

CONFERENCE 9990

LOCATION: ROOM TINTO

Thursday 29–29 September 2016 • Proceedings of SPIE Vol. 9990

High-Power Lasers: Technology and Systems

Conference Chairs: **Harro Ackermann,** High Energy Laser Joint Technology Office (United States); **Willy L. Bohn,** BohnLaser Consult (Germany); **David H. Titterton,** UK Defence Academy (United Kingdom)

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Laser-based space debris removal: design guidelines for coherent coupling power transmission, Jürgen Kästel, Jochen Speiser, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9990-15]

Method of large-aperture grating tiling, Jie Mu, China Academy of Engineering Physics (China) and Science and Technology on Plasma Physics Lab. (China) and Shanghai Jiao Tong Univ. (China); Xiao Wang, Qihua Zhu, Kainan Zhou, Zhilin Li, Yanlei Zuo, Song Zhou, Xiaoming Zeng, Dan Zhao, Jingqin Su, Feng Jing, China Academy of Engineering Physics (China). . . . . [9990-16]

The optical waveguide generated by acoustic waves emitted from femtoseconds filaments, Vladislav Pankratov, Daniil Shipilo, M. M. Yandulsky, Nicolay Panov, Olga G. Kosareva, M.V. Lomonosov Moscow SU (Russian Federation) . . . . . [9990-17]

THURSDAY 29 SEPTEMBER

OPENING REMARKS

LOCATION: ROOM TINTO . . . . . 8:35 TO 8:40

SESSION 1

LOCATION: ROOM TINTO . . . . . THU 8:40 TO 10:20

Novel Laser Systems and Power Scaling

Session Chair: **Willy L. Bohn,** BohnLaser Consult (Germany)

8:40: **Advanced Beam Control for Locating and Engagement (ABLE)** *(Invited Paper)*, Lawrence E. Grimes, High Energy Laser Joint Technology Office (United States) . . . . . [9990-1]

9:10: **Investigation on scalable high-power lasers with enhanced "eye-safety" for future weapon systems** *(Invited Paper)*, Karsten Diener, Stefano Bigotta, Marc Eichhorn, Lukasz Galecki, Lothar Geiss, Thierry Ibach, Harald Scharf, Michael H. von Salisch, Gregory Vincent, Jörg Schöner, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9990-2]

9:40: **Transparent ceramics for lasers: game changer for the future?**, Martin C. Richardson, Romain Gaume, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States); Dingyuan Tang, Nanyang Technological Univ. (Singapore). . . . . [9990-19]

10:00: **High-power monolithic adaptive fiber optics collimator based on flexible hinges with near-diffraction limited beam quality**, Dong Zhi, Yanxing Ma, Lei Si, National Univ. of Defense Technology (China); Wuming Wu, National Univ. of Defense Technology Club (China) . . . . . [9990-3]

Coffee Break . . . . . Thu 10:20 to 10:50

SESSION 2

LOCATION: ROOM TINTO . . . . . THU 10:50 TO 13:00

Fiber Lasers and Beam Scaling

Session Chair: **Martin C. Richardson,** CREOL, The College of Optics and Potonics, Univ. of Central Florida (United States)

10:50: **Fiber design and beam combination for power scaling of fiber lasers** *(Invited Paper)*, Till Walbaum, Thomas Schreiber, Matthias Heinzig, Johannes Nold, Nicoletta Haarlammert, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [9990-4]

11:20: **Multi-kW class fiber lasers: a perspective on the future** *(Invited Paper)*, Martin C. Richardson, Rodrigo Amezcua Correa, Axel Schülzgen, Lawrence Shah, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States). . . . . [9990-20]

11:50: **Study of coherent combination of femtosecond pulse laser beams** *(Invited Paper)*, Xiao Wang, Jie Mu, Qihua Zhu, China Academy of Engineering Physics (China) and Science and Technology on Plasma Physics Lab. (China) and Shanghai Jiao Tong Univ. (China); Zhilin Li, China Academy of Engineering Physics (China) and Xi'an Jiaotong Univ. (China) and Shanghai Jiao Tong Univ. (China); Yanlei Zuo, Xiaoming Zeng, Dan Zhao, Kainan Zhou, Jingqin Su, Feng Jing, China Academy of Engineering Physics (China) and Science and Technology on Plasma Physics Lab. (China) and Shanghai Jiao Tong Univ. (China) . . . . . [9990-5]

12:20: **2.1 kW ytterbium doped fiber amplifier based on direct multiwavelength pumping**, Lingchao Kong, Jinyong Leng, Pu Zhou, Zong-Fu Jiang, National Univ. of Defense Technology (China) . . . . . [9990-6]

12:40: **Enhanced visible supercontinuum generation in seven-core photonic crystal fiber**, Xue Qi, National Univ. of Defense Technology (China). . . . [9990-7]

Lunch Break . . . . . Thu 13:00 to 14:00

SESSION 3

LOCATION: ROOM TINTO . . . . . THU 14:00 TO 15:30

Diode Pumped Alkali Lasers and Other Advanced Gas Lasers

Session Chair: **Boris V. Zhdanov,** U.S. Air Force Academy (United States)

14:00: **Thermal effects in Cs DPAL and alkali cell window damage** *(Invited Paper)*, Boris V. Zhdanov, Matthew D. Rotondaro, Michael K. Shaffer, Randall J. Knize, U.S. Air Force Academy (United States) . . . . . [9990-8]

14:30: **Comparative study of DPAL and XPAL systems and selection principal of parameters**, Wei Huang, Chinese Academy of Sciences (China) and Univ. of Chinese Academy of Sciences (China); Rongqing Tan, Chinese Academy of Sciences (China); Zhiyong Li, Chinese Academy of Sciences (China); Gaoce Han, Institute of Electronics (China) and Chinese Academy of Sciences (China); Hui Li, Institute of Electronics (China) and Chinese Academy of Sciences (China) . . . . . [9990-9]

14:50: **Conceptual design of a space-based O_2 laser for defense**, Kiwamu Takehisa, O2 Laser Lab. (Japan). . . . . [9990-10]

15:10: **Experimental and theoretical study of the performance of optically pumped cesium vapor laser as a function of the pump-to-laser beam overlap**, Boris D. Barmashenko, Tom Cohen, Ben-Gurion Univ. of the Negev (Israel); Eyal Lebiush, Soreq Nuclear Research Ctr. (Israel); Ilya Auslender, Salman Rosenwaks, Ben-Gurion Univ. of the Negev (Israel) . . . . . [9990-18]

Coffee Break . . . . . Thu 15:30 to 15:50

SESSION 4

LOCATION: ROOM TINTO . . . . . THU 15:50 TO 17:30

Laser Interaction and Damage

Session Chair: **David H. Titterton,** UK Defence Academy (United Kingdom)

:50: **Study on the laser irradiation effects on coating reinforced glass fiber/resin composite material**, Min Sun Chen, Houman Jiang, Tianyu Zhang, Xiangyu Zhang, National Univ. of Defense Technology (China) . . . . . [9990-11]

16:10: **High-energy laser interaction with solids: a laser safety perspective**, Jean-François Daigle, Dominik Pudo, Defence Research and Development Canada, Valcartier (Canada); Francis Théberge, Marc Châteauneuf, DRDC Valcartier (Canada) . . . . . [9990-12]

16:30: **Neutralization of improvised explosive devices by high-power lasers: research results from the FP7 project ENCOUNTER**, Jens Osterholz, Martin Lueck, Bernd Lexow, Matthias Wickert, Fraunhofer-Institut für Kurzzeitdynamik, Ernst-Mach-Institut, EMI (Germany) . . . . . [9990-21]

16:50: **Laser irradiation effects on thin aluminum plates subjected to surface flow**, Houman Jiang, Guomin Zhao, Min Sun Chen, Xin Peng, National Univ. of Defense Technology (China) . . . . . [9990-13]

17:10: **Simulation study of the lethality effect of high-power laser with supersonic air flow**, Xin Peng, Guomin Zhao, Min Shun Cheng, National Univ. of Defense Technology (China) . . . . . [9990-14]

CONFERENCE 9991

LOCATION: ROOM HARRIS 2

Monday 26 September 2016 • Proceedings of SPIE Vol. 9991

Advanced Free-Space Optical Communication Techniques and Applications

Conference Chairs: **Leslie Laycock,** BAE Systems (United Kingdom); **Henry J. White,** BAE Systems (United Kingdom)

Programme Committee: **Aniceto Belmonte,** Univ. Politècnica de Catalunya (Spain); **G. Charmaine Gilbreath,** U.S. Naval Research Lab. (United States); **Andrew R. Harvey,** Univ. of Glasgow (United Kingdom); **Florian Moll,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Dominic C. O'Brien,** Univ. of Oxford (United Kingdom); **Angélique Rissons,** Institut Supérieur de l'Aéronautique et de l'Espace (France); **Andrew M. Scott,** QinetiQ Ltd. (United Kingdom); **Zoran Sodnik,** European Space Research and Technology Ctr. (Netherlands); **Ian Underwood,** The Univ. of Edinburgh (United Kingdom); **Murat Uysal,** Ozyegin Univ. (Turkey)

MONDAY 26 SEPTEMBER

OPENING REMARKS

ROOM: HARRIS 2 . . . . . 10:35 TO 10:40

SESSION 1

LOCATION: ROOM HARRIS 2 . . . . . MON 10:40 TO 11:50

Advanced Free-Space Optical Communication Techniques and Applications I

Session Chairs: **Henry White,** BAE Systems (United Kingdom); **Leslie Laycock,** BAE Systems (United Kingdom)

10:40: **LEO-ground scintillation measurements at 1550 nm with the OGSOP and the SOTA and OPALS terminals** *(Invited Paper)*, Florian Moll, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9991-9]

11:10: **Submersed free-space propagation of beams carrying orbital angular momentum**, Martin P. Lavery, Univ. of Glasgow (United Kingdom) . . . . [9991-7]

11:30: **Orbital angular momentum modulation technique in free space optical communications: signal statistics at the receiver plane**, Grigorii A. Filimonov, Valeri P. Aksenov, Valeriy V. Kolosov, Cheslav E. Pogutsa, V.E. Zuev Institute of Atmospheric Optics (Russian Federation). . . . . [9991-10]

Lunch Break . . . . . 11:50 to 13:10

SESSION 2

LOCATION: ROOM HARRIS 2 . . . . . MON 13:10 TO 15:30

Advanced Free-Space Optical Communication Techniques and Applications II

Session Chairs: **Henry White,** BAE Systems (United Kingdom); **Leslie Laycock,** BAE Systems (United Kingdom)

13:10: **Fading testbed for free-space optical communication** *(Invited Paper)*, Amita Shrestha, Dirk Giggenbach, Julio Cesar Ramirez Molina, Jorge Pacheco-Labrador, Fabian Rein, Ahmad Mustafa, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany). . . . . [9991-1]

13:40: **Microintegrated semiconductor laser modules for optical satellite communication**, Max Schiemangk, Ferdinand-Braun-Institut (Germany) and Humboldt-Univ. zu Berlin (Germany); Bassem Arar, Ferdinand-Braun-Institut (Germany); Ahmad I. Bawamia, Ferdinand-Braun-Institut (Germany) and Leibniz-Institut für Höchstfrequenztechnik (Germany); Mandy Krüger, Christian Kürbis, Wojciech Lewoczko-Adamczyk, Ferdinand-Braun-Institut (Germany); Andreas Wicht, Ferdinand-Braun-Institut (Germany) and Humboldt-Univ. zu Berlin (Germany); Achim Peters, Humboldt-Univ. zu Berlin (Germany) and Ferdinand-Braun-Institut (Germany); Günther Tränkle, Ferdinand-Braun-Institut (Germany) . . . . . [9991-2]

14:00: **Performance evaluation of non-line-of-sight optical communication system operating in the solar-blind ultraviolet spectrum**, Nikos Raptis, Evangelos Pikasis, Dimitris Syvridis, National and Kapodistrian Univ. of Athens (Greece). . . . . [9991-3]

14:20: **Statistical model for free-space optical coherent communications using adaptive optics**, Esdras Anzuola, Szymon Gladysz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9991-4]

14:40: **A new numerical model of optical communications in the maritime environment** *(Invited Paper)*, Charlotte R Bennett, Simon Woods, Don C Manson, Andrew M Scott, QinetiQ Ltd. (United Kingdom); Stephen Way, Frazer-Nash Consultancy (United Kingdom); Stephen Ayling, Richard Hollins, Dstl (United Kingdom). . . . . [9991-5]

15:10: **High speed visible light communication using blue GaN laser diodes**, Scott Watson, Stefano Viola, G. Giuliano, Univ. of Glasgow (United Kingdom); Stephen P. Najda, TopGaN Ltd. (Poland); Piotr Perlin, Tadek Suski, Institute of High Pressure Physics (Poland); Lucja Marona, Mike Leszczynski, Piotr Wisniewski, TopGaN Ltd. (Poland); Robert Czernecki, George Targowski, Institute of High Pressure Physics (Poland); Malcolm A. Watson, AVoptics Ltd. (United Kingdom); Henry White, Duncan P. Rowe, Leslie Laycock, BAE Systems (United Kingdom); A. E. Kelly, Univ. of Glasgow (United Kingdom) . . . . . [9991-6]

Coffee Break . . . . . Mon 15:30 to 16:00

Security+Defence Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session.. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml .

Studies of air traffic forecast and the effect of ADS-B via satellites on flight times, Zhao-Wei Zhong, Nanyang Technological Univ. (Singapore) . . . . [9991-8]

Fiber-array-based vortex beams propagation through a turbulent atmosphere, Grigorii A. Filimonov, Valeri P. Aksenov, Vadim V. Dudorov, Valeriy V. Kolosov, V.E. Zuev Institute of Atmospheric Optics (Russian Federation) . . . . . [9991-11]

CONFERENCE 9992

LOCATION: ROOM FINTRY

Wednesday–Thursday 28–29 September 2016 • Proceedings of SPIE Vol. 9992

Emerging Imaging and Sensing Technologies

Conference Chairs: **Keith L. Lewis,** Sciovis Ltd. (United Kingdom); **Richard C. Hollins,** Defence Science and Technology Lab. (United Kingdom)

Programme Committee: **Tibor Berceli,** Budapest Univ. of Technology and Economics (Hungary); **Arnaud Brignon,** Thales Research & Technology (France); **Gerald S. Buller,** Heriot-Watt Univ. (United Kingdom); **Béatrice Cabon,** Minatec (France); **John J. R. David,** The Univ. of Sheffield (United Kingdom); **Didier Decoster,** Univ. des Sciences et Technologies de Lille (France); **Dominique Hamoir,** ONERA (France); **Andrew R. Harvey,** Univ. of Glasgow (United Kingdom); **Christopher Hill,** Malvern Lidar Consultants (United Kingdom); **Robert A. Lamb,** SELEX Galileo Ltd. (United Kingdom); **Javier Marti-Sendra,** Univ. Politècnica de València (Spain); **Stephen P. McGeoch,** Thales Optronics Ltd. (United Kingdom); **Ralf Ostendorf,** Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); **Miles J. Padgett,** Univ. of Glasgow (United Kingdom); **Miguel A. Piqueras,** DAS Photonics (Spain); **Julien Poette,** Institut National Polytechnique de Grenoble (France); **Béla Szentpáli,** Research Institute for Technical Physics and Materials Science (Hungary); **Alexander Toet,** TNO Defence, Security and Safety (Netherlands); **Mauro G. Varasi,** Finmeccanica (Italy); **Jean-Pierre Vilcot,** Univ. des Sciences et Technologies de Lille (France)

WEDNESDAY 28 SEPTEMBER

OPENING REMARKS

LOCATION: ROOM FINTRY . . . . . .8:25 TO 8:30

SESSION 1

LOCATION: ROOM FINTRY . . . . . WED 8:30 TO 10:30

Infrared and Optical Devices

Session Chairs: **Keith L. Lewis,** Sciovis Ltd. (United Kingdom); **Richard C. Hollins,** Defence Science and Technology Lab. (United Kingdom)

8:30: **Patterned III-V nanopillars: a platform for integrated optoelectronic devices** *(Invited Paper)*, Diana L. Huffaker, Univ. of California, Los Angeles (United States). . . . . [9992-1]

9:10: **MWIR optical modulation using structured silicon membranes** *(Invited Paper)*, Ammar Zakar, Sungjin Park, Vera Zerova, Andrey Kaplan, The Univ. of Birmingham (United Kingdom); Keith L. Lewis, Sciovis Ltd. (United Kingdom); Leigh T. Canham, pSiMedica (United Kingdom); Christopher D. Burgess, Defence Science and Technology Lab. (United Kingdom) . . . . . [9992-2]

9:40: **Nanostructures for the colorisation of mid-infrared focal plane arrays** *(Invited Paper)*, Grégory Vincent, A Bierret, ONERA (France); Fabrice Pardo, Jean-Luc Pelouard, Lab. de Photonique et de Nanostructures (France); Riad Haïdar, ONERA (France) . . . . . [9992-3]

10:10: **Design of a miniature SWIR hyperspectral snapshot imager utilizing multivariate optical elements**, Ryan J. Priore, CIRTEMO (United States); Omer Cohen, Leonid Bikov, Itay Hirsh, SCD SemiConductor Devices (Israel); John D. Dougherty, Pixelteq, Inc. (United States) . . . . . [9992-27]

Coffee Break . . . . . .Wed 10:30 to 11:00

SESSION 2

LOCATION: ROOM FINTRY . . . . . .WED 11:00 TO 13:15

Optical Devics and Materials

Session Chairs: **Richard C. Hollins,** Defence Science and Technology Lab. (United Kingdom); **Keith L. Lewis,** Sciovis Ltd. (United Kingdom)

11:00: **Mid-infrared (MIR) Photonics: MIR fibreoptics for chemical and biomedical, sensing and imaging** *(Invited Paper)*, Angela B. Seddon, The Univ. of Nottingham (United Kingdom). . . . . [9992-5]

11:30: **Picosecond laser bonding of highly dissimilar materials** *(Invited Paper)*, Richard M. Carter, Heriot-Watt Univ. (United Kingdom); Michael Troughton, Finmeccanica (United Kingdom); Jianyong Chen, Heriot-Watt Univ. (United Kingdom) and Finmeccanica (United Kingdom); Ian F. Elder, Finmeccanica (United Kingdom) and Heriot-Watt Univ. (United Kingdom); Robert R. Thomson, Heriot-Watt Univ. (United Kingdom) and Finmeccanica (United Kingdom); Robert A. Lamb, Finmeccanica (United Kingdom) and Heriot-Watt Univ. (United Kingdom); Daniel M. J. Esser, Duncan P. Hand, Heriot-Watt Univ. (United Kingdom) and Finmeccanica (United Kingdom) . . . . . [9992-6]

12:00: **Design of infrared imaging birefringent interferometers for UAV applications** *(Invited Paper)*, Armande Pola Fossi, Yann Ferrec, Nicolas Guerineau, ONERA (France); Nicolas Roux, Emmanuel Kling, Sagem (France); Hervé Sauer, Lab. Charles Fabry (France) . . . . . [9992-7]

12:30: **Ultrafast electron spectroscopy of UV materials using a sub-ns capable photo-excited electron gun**, Thomas C. Schratwieser, Army Research Lab. (United States); Gregory A. Garrett, Eric W. Forsythe, U.S. Army Research Lab. (United States). . . . . [9992-4]

12:50: **The comparison of the influence of centrifugal forces and the Sagnac effect on a rotating whispering gallery modes resonators** *(Invited Paper)*, Anna D. Dmitrieva, Yuri V. Filatov, Egor V. Shalymov, Vladimir Y. Venediktov, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation). . . . [9992-9]

Lunch/Exhibition Break . . . . . .Wed 13:15 to 14:10

SESSION 3

LOCATION: ROOM FINTRY . . . . . WED 14:10 TO 15:40

Lasers and Laser Applications

Session Chair: **Robert A. Lamb,** Leonardo-Finmeccanica (United Kingdom)

14:10: **XCAN project : coherent beam combining of large number fibers in femtosecond regime** *(Invited Paper)*, Marie Antier, Thales Optronique S.A.S. (France); Jeremy Le Dortz, Jerome Bourderionnet, Christian Larat, Eric Lallier, Thales Research & Technology (France); Louis Daniault, Ihsan Fsaifes, Anke Heilmann, Ecole Polytechnique (France); Severine Bellanger, Lab. pour l'Utilisation des Lasers Intenses (France); Christophe Simon-Boisson, Thales Optronique S.A.S. (France); Jean-Christophe Chanteloup, Ecole Polytechnique (France); Arnaud Brignon, Thales Research & Technology (France). . . . [9992-10]

14:40: **Advances in AlGaInN laser diode technology for defence, security and sensing applications**, Stephen P. Najda, Piotr Perlin, TopGaN Ltd. (Poland); Tadek Suski, Lucja Marona, Institute of High Pressure Physics (Poland); Michal Bockowski, TopGaN Ltd (Poland) and Institute of High Pressure Physics (Poland); Mike Leszczynski, TopGaN Ltd. (Poland); Przemek Wisnieski, Robert Czernecki, Institute of High Pressure Physics (Poland); Gregorz Targowski, TopGaN Ltd. (Poland) . . . . . [9992-11]

15:00: **Environmental stability of actively modelocked fibre lasers**, Calum H. Hill, Thales UK Ltd. (United Kingdom) and Heriot-Watt Univ. (United Kingdom); Stephen T. Lee, Thales UK Ltd. (United Kingdom); Derryck T. Reid, Heriot-Watt Univ. (United Kingdom); Ghaya Baili, Thales Research & Technology (France); John Davies, Thales Defence Mission Systems (United Kingdom). . . . . [9992-12]

15:20: **Pulsed X-ray imaging using a 10 picosecond high-intensity laser driver**, Dean Rusby, Univ. of Strathclyde (United Kingdom) and Central Laser Facility (United Kingdom); Ceri M. Brenner, Central Laser Facility (United Kingdom); Reza Mirfayzi, Queen's Univ. Belfast (United Kingdom); Chris Armstrong, Univ. of Strathclyde (United Kingdom) and Central Laser Facility (United Kingdom); David Neely, Central Laser Facility (United Kingdom); Paul McKenna, Univ. of Strathclyde (United Kingdom); Robert M. Deas, Defence Science and Technology Lab. (United Kingdom) . . . . . [9992-13]

Coffee Break . . . . . .Wed 15:40 to 16:10

SESSION 4

LOCATION: ROOM FINTRY . . . . . WED 16:10 TO 17:40

Computational Imaging and Image Processing

Session Chairs: **Keith L. Lewis,** Sciovis Ltd. (United Kingdom); **Robert A. Lamb,** Leonardo-Finmeccanica (United Kingdom)

16:10: **Compressive imaging using fast transform coding** *(Invited Paper)*, Andrew Thompson, Univ. of Oxford (United Kingdom). . . . . [9992-14]

16:40: **Can coded-aperture techniques improve the performance of spectral imagers?**, Jonathan A. Piper, Defence Science and Technology Lab. (United Kingdom); Peter Yuen, Mengjia Ding, Umair Soori, Senthurran Selvagumar, Akhil Kallepalli, David James, Mark Richardson, Cranfield Univ. (United Kingdom) . . . . . [9992-15]

17:00: **Recognition of complex human behaviours using 3D imaging for intelligent surveillance applications**, Bo Yao, Finmeccanica (United Kingdom) and Univ. of Essex (United Kingdom) . . . . . [9992-16]

17:20: **Coherent imaging by using defocus grating**, Haotong Ma, National Univ. of Defense Technology (China); Zongliang Xie, Institute of Optics and Electronics (China); Yang Lv, National Univ. of Defense Technology (China); Bo Qi, Ge Ren, Institute of Optics and Electronics (China); Bing Lei, Ying Feng, National Univ of Defense Technology (China). . . . . [9992-17]

CONFERENCE 9992

LOCATION: ROOM FINTRY

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

The investigation of a shift of the whispering gallery modes caused by deformations and tensions, Yuri V. Filatov, Alexander S. Kukaev, Egor V. Shalymov, Vladimir Y. Venediktov, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) . . . . . [9992-8]

THURSDAY 29 SEPTEMBER

SESSION 5

LOCATION: ROOM FINTRY . . . . . THU 8:30 TO 10:30

Quantum Technologies

Session Chairs: **Keith L. Lewis,** Sciovis Ltd. (United Kingdom); **Gerald S. Buller,** Heriot-Watt Univ. (United Kingdom)

Please Note: Session is of related interest to conference 9996, Quantum Information Science and Technology

8:30: **Accelerated technology transfer: The UK Quantum Initiative** *(Invited Paper)*, Simon Bennett, Innovate UK (United Kingdom) . . . . . [9992-18]

9:10: **Atomic clock technologies approaching 2020** *(Invited Paper)*, Patrick Gill, National Physical Lab. (United Kingdom). . . . . [9992-19]

9:40: **Application of cold atoms to marine gravimetry** *(Invited Paper)*, Yannick Bidel, Alexandre Bresson, Nassim Zahzam, ONERA (France); Marie Francoise Lequentrec-Lalancette, Didier Rouxel, Service Hydrographique et Oceanographique de la Marine (France); Cedric Blanchard, ONERA (France) . . . . . [9992-20]

10:10: **Bayesian signal processing techniques for the detection of highly localised gravity anomalies using quantum interferometry technology**, Gareth Brown, Defence Science and Technology Lab. (United Kingdom); Kevin Ridley, Geoffrey De Villiers, Anthony Rodgers, The Univ. of Birmingham (United Kingdom). . . . . [9992-21]

Coffee Break . . . . . Thu 10:30 to 11:00

SESSION 6

LOCATION: ROOM FINTRY . . . . . THU 11:00 TO 13:10

Correlated Imagery

Session Chairs: **Gerald S. Buller,** Heriot-Watt Univ. (United Kingdom); **Keith L. Lewis,** Sciovis Ltd. (United Kingdom)

11:00: **Picosecond time-resolved imaging using SPAD array cameras** *(Invited Paper)*, Daniele Faccio, Heriot-Watt Univ. (United Kingdom) . . . . . [9992-22]

11:30: **TACImager: a high-frame rate 256 x 256 SPAD time to amplitude converter array with adjustable time zoom** *(Invited Paper)*, Neil Finlayson, Luca Parmesan, The Univ. of Edinburgh (United Kingdom); Neale A. W. Dutton, STMicroelectronics (R&D) Ltd. (United Kingdom); Neil J. Calder, Robert K. Henderson, The Univ. of Edinburgh (United Kingdom) . . . . . [9992-23]

12:00: **Real-time tracking of hidden objects with single-pixel detectors** *(Invited Paper)*, Susan Chan, Ryan E. Warburton, Genevieve Gariepy, Yoann Altmann, Steve McLaughlin, Jonathan Leach, Daniele Faccio, Heriot-Watt Univ. (United Kingdom). . . . . [9992-24]

12:30: **Long-range 3D imaging lidar with single element and Geiger-mode array detectors**, Agata M. Pawlikowska, Finmeccanica (United Kingdom); Yoann Altmann, Abderrahim Halimi, Gerald S. Buller, Heriot-Watt Univ. (United Kingdom); Robert A. Lamb, Finmeccanica (United Kingdom) . . . . . [9992-25]

12:50: **Depth imaging in highly scattering underwater environments using time-correlated single photon counting**, Aurora Maccarone, Aongus McCarthy, Abderrahim Halimi, Rachael Tobin, Andrew M. Wallace, Yvan R. Petillot, Gerald S. Buller, Heriot-Watt Univ. (United Kingdom) . . . . . [9992-26]

CONFERENCE 9993

LOCATION: ROOM CARRICK 2-3

Thursday 29–29 September 2016 • Proceedings of SPIE Vol. 9993

Millimetre Wave and Terahertz Sensors and Technology

Conference Chairs: **Neil A. Salmon,** MMW Sensors Ltd. (United Kingdom); **Sherif Sayed Ahmed,** Rohde & Schwarz GmbH & Co. KG (Germany)

Programme Committee: **Amir Abramovich,** Ariel Univ. (Israel); **Hakan Altan,** Middle East Technical Univ. (Turkey); **Nicholas J. Bowring,** Manchester Metropolitan Univ. (United Kingdom); **Stephan Dill,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Charmaine Cisneros Franck,** NASA Langley Research Ctr. (United States); **Marcin Kowalski,** Military Univ. of Technology (Poland); **Wojciech Knap,** Univ. Montpellier 2 (France); **Steven R. Murrill,** U.S. Army Research Lab. (United States); **Markus Peichl,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Douglas T. Petkie,** Wright State Univ. (United States); **Christopher A. Schuetz,** Phase Sensitive Innovations, Inc. (United States); **Vyacheslav A. Trofimov,** Lomonosov Moscow State Univ. (Russian Federation); **Vincent P. Wallace,** The Univ. of Western Australia (Australia)

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Polarization ratio property and material classification method in passive millimeter-wave polarimetric imaging, Yayun Cheng, Huazhong Univ. of Science and Technology (China) and National Key Lab. of Science and Technology on Multi-Spectral Information Processing (China); Bo Qi, Huazhong Univ of Science and Technology (China) and National Key Lab. of Science and Technology on Multi-Spectral Information Processing (China); Siyuan Liu, Huazhong Univ. of Science and Technology (China) and National Key Lab. of Science and Technology on Multi-Spectral Information Processing (China); Fei Hu, Huazhong Univ. of Science and Technology (China) and National Key Lab. of Science and Technology on Multi-Spectral Information Processing (China); Liangqi Gui, Xiaohui Peng, Huazhong Univ. of Science and Technology (China) and National Key Lab. of Science and Technology on Multi-Spectral Information Processing (China) . . . . . [9993-18]

A hardware-efficient, DOA estimation method based on digital channelized receiver, Rui Guo, XiaoLei Fan, Yue Zhang, Qianqiang Lin, Zengping Chen, National Univ. of Defense Technology (China) . . . . . [9993-19]

Electromagnetic model-based SAR ATR through attributed scatterers, Conghui Ma, Gongjian Wen, Feng Gao, Xiaohong Huang, Xiaoliang Yang, National Univ. of Defense Technology (China) . . . . . [9993-20]

THURSDAY 29 SEPTEMBER

SESSION 1

LOCATION: ROOM CARRICK 2-3 . . . . . THU 8:30 TO 10:00

Phenomenology, Signatures and Modelling I

Session Chairs: **Nicholas J. Bowring,** Manchester Metropolitan Univ. (United Kingdom); **Sherif Sayed Ahmed,** Rohde & Schwarz GmbH & Co. KG (Germany); **Wojciech Knap,** Univ. Montpellier 2 (France); **Steven R. Murrill,** U.S. Army Research Lab. (United States)

8:30: **Submillimetre wave imaging and security: imaging performance and prediction** *(Invited Paper)*, Roger Appleby, InnovaSec Ltd. (United Kingdom); Stuart Ferguson, Queen's Univ. Belfast (United Kingdom) . . . . . [9993-1]

9:00: **Through-the-wall UWB pulse radar for micromotion detection**, Vincent Merelle, Alain C. Gaugue, Michel Menard, Georges Louis, Univ. de La Rochelle (France) . . . . . [9993-2]

9:20: **340 GHz imaging system for detection of concealed threat objects at 5 meters stand-off distance**, Ihsan Ozan Yildirim, Vedat Ali Özkan, Taylan Takan, Middle East Technical Univ. (Turkey); Asaf Behzat Sahin, Yildirim Beyazit Univ. (Turkey); Hakan Altan, Middle East Technical Univ. (Turkey) . . . . . [9993-3]

9:40: **New algorithm for detection of dangerous objects hidden on a human body using passive THz camera**, Vyacheslav A. Trofimov, Vladislav V. Trofimov, Igor E. Kuchik, M.V. Lomonosov Moscow SU (Russian Federation) . . . . . [9993-4]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 2

LOCATION: ROOM CARRICK 2-3 . . . . . THU 10:30 TO 12:50

Systems and Concepts

Session Chairs: **Neil A. Salmon,** MMW Sensors Ltd. (United Kingdom); **Hakan Altan,** Middle East Technical Univ. (Turkey); **Christopher A. Schuetz,** Phase Sensitive Innovations, Inc. (United States); **Vyacheslav A. Trofimov,** M.V. Lomonosov Moscow SU (Russian Federation)

10:30: **Walk-through screening with multistatic mmW technology** *(Invited Paper)*, Frank Gumbmann, Sherif Sayed Ahmed, Rohde & Schwarz GmbH & Co. KG (Germany) . . . . . [9993-5]

11:00: **A portable W-band radar system for enhancement of infrared vision in firefighting pperations**, Mathias Klenner, Christian Zech, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) and Univ. of Freiburg (Germany); Axel Hülsmann, Jutta Kühn, Michael Schlechtweg, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Konstantin Hahmann, Bernhard Kleiner, Fraunhofer-Institut für Produktionstechnik und Automatisierung (Germany); Michael Ulrich, Univ. Stuttgart (Germany); Oliver Ambacher, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) and Univ. of Freiburg (Germany) . . . . . [9993-6]

11:20: **Detection of MAVs (Micro Aerial Vehicles) based on millimeter wave radar**, Denis Nötel, Stephan Stanko, Michael Caris, Alexander Hommes, Winfried Johannes, Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik (Germany) . . . . . [9993-7]

11:40: **Up-conversion of MMW radiation to visual band using Glow Discharge Detector and silicon detector**, Avihai Aharon Akram, Ariel Univ. (Israel) and Ben-Gurion Univ. of the Negev (Israel); Daniel Rozban, Amir Abramovich, Ariel Univ. (Israel); Yitzhak Yitzhaky, Natan S. Kopeika, Ben-Gurion Univ. of the Negev (Israel) . . . . . [9993-8]

12:00: **Millimeter-wave/THz FMCW radar techniques for sensing applications**, Douglas T. Petkie, Dinesh A. Mirando, Michael D. Higgins, Wright State Univ. (United States) . . . . . [9993-9]

12:20: **Experimental results and simulations from aperture synthesis three-dimensional imaging**, Neil A. Salmon, Manchester Metropolitan Univ. (United Kingdom) . . . . . [9993-10]

Lunch Break . . . . . Thu 12:50 to 14:00

SESSION 3

LOCATION: ROOM CARRICK 2-3 . . . . . THU 14:00 TO 15:30

Phenomenology, Signatures and Modelling II

Session Chairs: **Douglas T. Petkie,** Wright State Univ. (United States); **Vyacheslav A. Trofimov,** M.V. Lomonosov Moscow SU (Russian Federation); **Stephan Dill,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Neil A. Salmon,** MMW Sensors Ltd. (United Kingdom)

14:00: **Molecular detection with Terahertz waves based on absorption-induced transparency metamaterials** *(Invited Paper)*, Sergio Gutiérrez-Rodrigo, Ctr. Univ. de la Defensa Zaragoza (Spain) and Instituto de Ciencia de Materiales de Aragón (Spain); Luis Martín-Moreno, Instituto de Ciencia de Materiales de Aragón (Spain) and Univ. de Zaragoza (Spain) . . . . . [9993-11]

14:30: **Plasma shock waves excited by THz radiation**, Sergey Rudin, Greg Rupper, U.S. Army Research Lab. (United States); Michael S. Shur, Rensselaer Polytechnic Institute (United States) . . . . . [9993-12]

14:50: **Transmission and detection of terahertz radiation in a weakly ionized plasma**, Taylan Takan, Namig Alasgarzade, Ihsan Ozan Yildirim, Ilker U. Uzun-Kaymak, Middle East Technical Univ. (Turkey); Asaf Behzat Sahin, Yildirim Beyazit Univ. (Turkey); Hakan Altan, Middle East Technical Univ. (Turkey) . . . . . [9993-13]

15:10: **A methodology for the optimisation of a mm-wave scanner**, Lara Zoe Stec, Frank J. W. Podd, Anthony J. Peyton, The Univ. of Manchester (United Kingdom) . . . . . [9993-14]

Coffee Break . . . . . Thu 15:30 to 16:00

CONFERENCE 9993
LOCATION: ROOM CARRICK 2-3

SESSION 4
LOCATION: ROOM CARRICK 2-3 . . . . . THU 16:00 TO 16:20

Phenomenology, Signatures and Modelling III

Session Chairs: **Amir Abramovich,** Ariel Univ. (Israel); **Charmaine Cisneros Franck,** NASA Langley Research Ctr. (United States); **Sherif Sayed Ahmed,** Rohde & Schwarz GmbH & Co. KG (Germany); **Bacia Marcin,** Wroclaw Univ. of Science and Technology (Poland)

16:00: **Passive microwave remote discriminator for the marine applications**, Alexander G. Denisov, Hao Liu, Jinghui Qiu, Kateryna Denisova, Harbin Institute of Technology (China); Francesco Soldovieri, Istituto per il Rilevamento Elettromagnetico dell'Ambiente, CNR (Italy); Lijia Chen, Harbin Institute of Technology (China) . . . . . [9993-15]

SESSION 5
LOCATION: ROOM CARRICK 2-3 . . . . . THU 16:20 TO 17:20

Devices and Enabling Technology

Session Chairs: **Amir Abramovich,** Ariel Univ. (Israel); **Charmaine Cisneros Franck,** NASA Langley Research Ctr. (United States); **Sherif Sayed Ahmed,** Rohde & Schwarz GmbH & Co. KG (Germany); **Bacia Marcin,** Wroclaw Univ. of Science and Technology (Poland)

16:20: **Sensitivity and noise performance of GaAsSb/InAlAs/InGaAs tunnel diodes for millimeter wave detection**, Mikhail Patrashin, Norihiko Sekine, Issei Watanabe, Akifumi Kasamatsu, Iwao Hosako, National Institute of Information and Communications Technology (Japan) . . . . . [9993-16]

16:40: **Terahertz waveguides based on multichannel sapphire shaped crystals**, Gleb Katyba, Bauman Moscow State Technical Univ. (Russian Federation) and Institute of the Solid State Physics RAS (Russian Federation); Kirill I. Zaytsev, Bauman Moscow State Technical Univ. (Russian Federation); Irina Shikunova, Institute of the Solid State Physics (Russian Federation); Sergei N Rossolenko, Institute of Solid State Physics of Russian Academy of Sciences (Russian Federation); Nikita V Chernomyrdin, Bauman Moscow State Technical University (Russian Federation) and Institute of Improvement of Professional Skill of the Federal Medico-Biological Agency of Russia (Russian Federation) and Sechenov First Moscow State Medical University (Russian Federation); Valeriy E Karasik, Elena E Mukhina, Bauman Moscow State Technical University (Russian Federation); Igor V Reshetov, Institute of Improvement of Professional Skill of the Federal Medico-Biological Agency of Russia (Russian Federation) and Sechenov First Moscow State Medical University (Russian Federation); Stanislav O. Yurchenko, Bauman Moscow State Technical Univ. (Russian Federation); Vladimir Kurlov, Institute of the Solid State Physics (Russian Federation) . . . . . [9993-17]

17:00: **A passive terahertz video camera based on kinetic inductance detectors for industrial applications**, Sam Rowe, Simon M. Doyle, Christopher J. Dunscombe, Peter C. Hargrave, Enzo Pascale, Cardiff Univ. (United Kingdom); Ken Wood, QMC Instruments Ltd. (United Kingdom). . . . . [9993-21]

CONFERENCE 9994
LOCATION: ROOM CARRICK 1

Wednesday–Thursday 28–29 September 2016 • Proceedings of SPIE Vol. 9994

Optical Materials and Biomaterials in Security and Defence Systems Technology

Conference Chairs: **Roberto Zamboni,** Istituto per la Sintesi Organica e la Fotoreattività (Italy); **François Kajzar,** Univ. Politehnica of Bucharest (Romania); **Attila A. Szep,** Air Force Research Lab. (United States); **Katarzyna Matczyszyn,** Wroclaw Univ. of Technology (Poland)

Programme Committee: **Chantal Andraud,** Ecole Normale Supérieure de Lyon (France); **André-Jean Attias,** Univ. Pierre et Marie Curie (France); **Carrie M. Bartsch,** Air Force Research Lab. (United States); **Werner J. Blau,** Trinity College Dublin (Ireland); **Fabrice Charra,** Commissariat à l'Énergie Atomique (France); **Larry R. Dalton,** Univ. of Washington (United States); **Beata J. Derkowska,** Torun Univ. (Poland); **Manfred Eich,** Technische Univ. Hamburg-Harburg (Germany); **Patrick Feneyrou,** Thales Research & Technology (France); **Barrett Flake; James G. Grote,** Air Force Research Lab. (United States); **Emily M. Heckman,** Air Force Research Lab. (United States); **Charles Y. C. Lee,** Air Force Office of Scientific Research (United States); **Antoni C. Mitus,** Wroclaw Univ. of Technology (Poland); **Jaroslaw Mysliwiec,** Wroclaw Univ. of Technology (Poland); **Robert L. Nelson,** Air Force Research Lab. (United States); **Yoshiko Okada-Shudo,** The Univ. of Electro-Communications (Japan); **Fahima Ouchen,** Air Force Research Lab. (United States); **Agnieszka Pawlicka,** Instituto de Química de São Carlos (Brazil); **Ullrich Pietsch,** Univ. Siegen (Germany); **Ileana Rau,** Univ. Politehnica of Bucharest (Romania); **Ifor D. W. Samuel,** Univ. of St. Andrews (United Kingdom); **Marina Saphiannikova Grenzer,** Leibniz-Institut für Polymerforschung Dresdene e.V. (Germany); **Niyazi Serdar Sariciftci,** Johannes Kepler Univ. Linz (Austria); **Renato Seeber,** Univ. degli Studi di Modena e Reggio Emilia (Italy); **Kenneth D. Singer,** Case Western Reserve Univ. (United States)

WEDNESDAY 28 SEPTEMBER

OPENING REMARKS
LOCATION: ROOM CARRICK 1 . . . . . .8:45 TO 8:50

SESSION 1
LOCATION: ROOM CARRICK 1 . . . . . WED 8:50 TO 10:30

Organic Electronics and Signal Processing
Session Chair: **Attila Szep,** Air Force Research Lab. (United States)

8:50: **Organic electronics: the endless frontier** *(Invited Paper)*, Bernard Kippelen, Georgia Institute of Technology (United States) . . . . . [9994-1]

9:20: **Temporal response of protein-based artificial ganglion cell receptive field** *(Invited Paper)*, Yoshiko Okada-Shudo, The Univ. of Electro-Communications (Japan). . . . . [9994-2]

9:45: **Materials for near-IR light modulation** *(Invited Paper)*, Neil M. Robertson, Alexander M. Whyte, The Univ. of Edinburgh (United Kingdom) . . . . . [9994-3]

10:10: **Plasmonic optical sensors printed from nanoinks as intelligent labels for explosive detection**, Rafael Abargues, Pedro J. Rodríguez-Cantó, Intenanomat S.L. (Spain); Eduardo Aznar-Gadea, Juan P. Martínez-Pastor, Univ. de València (Spain) . . . . . [9994-4]

Coffee Break . . . . . .Wed 10:30 to 11:00

SESSION 2
LOCATION: ROOM CARRICK 1 . . . . . .WED 11:00 TO 12:15

Applications
Session Chair: **Roberto Zamboni,**
Istituto per la Sintesi Organica e la Fotoreattività (Italy)

11:00: **Photonic and electronic device application with DNA** *(Keynote Presentation)*, Norihisa Kobayashi, Chiba Univ. (Japan). . . [9994-5]

11:30: **DNA-based materials and their device applications** *(Invited Paper)*, Ileana Rau, François Kajzar, Univ. Politehnica of Bucharest (Romania); James G. Grote, Air Force Research Lab. (United States) . . . . . [9994-6]

11:55: **Selectivity evaluation of label-free detection of Bacillus spp spores using functionalized SERS substrates**, Antonia Lai, Salvatore Almaviva, Valeria Spizzichino, Lorella Addari, Antonio Palucci, ENEA (Italy); Domenico Luciani, Roberto Viola, Sandro Mengali, Consorzio CREO (Italy); Christophe A. Marquette, Univ. Claude Bernard Lyon 1 (France); Bartlomiej Jankiewicz, Military Univ. of Technology (Poland); Luigi Pierno, Finmeccanica (Italy) . . . . . [9994-7]

Lunch/Exhibition Break . . . . . .Wed 12:15 to 13:20

SESSION 3
LOCATION: ROOM CARRICK 1 . . . . . WED 13:20 TO 15:30

Materials
Session Chair: **Katarzyna Matczyszyn,**
Wroclaw Univ. of Science and Technology (Poland)

13:20: **The development of polymethine dyes for third-order nonlinear optical applications** *(Keynote Presentation)*, Seth R. Marder, Iryna Davydenko, Yulia A. Getmanenko, Janos Simon, Yadong Zhang, Joel M. Hales, Hyeongeu Kim, Taylor Allen, San-Hui Chi, Georgia Institute of Technology (United States); Victor Khrustalev, A.N. Nesmeyanov Institute of Organoelement Compounds (Russian Federation); Evgheni V. Jucov, New Mexico Highlands Univ. (United States); Tatiana V. Timofeeva, New Mexico Highlands Univ. (United States) and Georgia Institute of Technology (United States); Timothy C. Parker, Stephen Barlow, Joseph W. Perry, Georgia Institute of Technology (United States) . . . . . [9994-9]

13:50: **NLO chromophores based on the substituted [2,2]paracyclophanes in doped polymer films** *(Invited Paper)*, Lada N. Puntus, Institute of Radio Engineering and Electronics (Russian Federation); Kyrill Y. Suponitsky, Ivan V. Fedyanin, Konstantin A. Lyssenko, A.N. Nesmeyanov Institute of Organoelement Compounds (Russian Federation); Ana-Maria Manea, Ileana Rau, François Kajzar, Univ. Politehnica of Bucharest (Romania). . . . . [9994-10]

14:15: **Electroactive triphenylamine-s-tetrazine derivatives with unusual properties** *(Invited Paper)*, Mieczyslaw Lapkowski, Sandra Pluczyk, Pawel Zassowski, Silesian Univ. of Technology (Poland); Cassandre Quinton, Pierre Audebert, Valerie Alain-Rizzo, Ecole Normale Supérieure de Cachan (France) . . . . . [9994-11]

14:40: **Control of the molecular orientation and its critical role on the performance of organic semiconductor devices** *(Invited Paper)*, Jean-Charles Ribierre, OPERA Ctr. for Organic Photonics and Electronics Research (Japan); Toshihiko Tanaka, Fukushima College (Japan) and National Institute of Technology (Japan); Li Zhao, Kyushu Univ. (Japan); Takashi Komino, OPERA Ctr. for Organic Photonics and Electronics Research (Japan); Shinya Matsumoto, Yokohama National Univ. (Japan); Daisuke Hashizume, Kazuto Takaishi, Tsuyoshi Muto, Masanobu Uchiyama, RIKEN (Japan); Chantal Andraud, Ecole Normale Supérieure de Lyon (France); Tetsuya Aoyama, RIKEN (Japan); Chihaya Adachi, Kyushu Univ. (Japan) . . . . . [9994-12]

15:05: **Self-organized (macro)molecular materials for organic electronics and ambipolar charge transport** *(Invited Paper)*, Yiming Xiao, Xiaolu Su, Lydia Sosa Vargas, Univ. Pierre et Marie Curie (France); Benoît Heinrich, Bertrand Donnio, Institut de Physique et Chimie des Matériaux de Strasbourg (France); Jeong Weon Wu, Jean-Charles Ribierre, CNRS-Ewha International Research Ctr. (Korea, Republic of); Emmanuelle Lacaze, David Kreher, André-Jean Attias, Fabrice Mathevet, Univ. Pierre et Marie Curie (France) . . . . . [9994-13]

Coffee Break . . . . . .Wed 15:30 to 16:00

CONFERENCE 9994

LOCATION: ROOM CARRICK 1

SESSION 4

LOCATION: ROOM CARRICK 1 . . . . . WED 16:00 TO 17:10

Light Emission

Session Chair: **François Kajzar,**
Univ. Politehnica of Bucharest (Romania)

16:00: **Exciplex phenomena: an easy way to tailor OLED emitters** *(Invited Paper)*, Przemyslaw Data, Durham Univ. (United Kingdom) and Silesian Univ. of Technology (Poland) . . . . . [9994-14]

16:25: **Narrow linewidth emissions from organic crystals with diffraction gratings engraved directly on their surface**, Hiroyuki Yamamoto, Takeshi Yamao, Shu Hotta, Kyoto Institute of Technology (Japan) . . . . . [9994-15]

16:45: **Thermoluminescent detectors and their application: an overview** *(Invited Paper)*, Malgorzata Nowina-Konopka, Pawel Bilski, Barbara Obryk, Wojciech Gieszczyk, Pawel Olko, Institute of Nuclear Physics (Poland) [9994-16]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

FBG sensor of breathing encapsulated into polydimethylsiloxane, Marcel Fajkus, Jan Nedoma, VSB-Technical Univ. of Ostrava (Czech Republic); Petr Siska, VSB Technical Univ of Ostrava (Czech Republic); Vladimir Vasinek, VSB-Technical Univ. of Ostrava (Czech Republic) . . . . . [9994-8]

Frequency analysis of the new prototype of the security window sensor, Jan Nedoma, Marcel Fajkus, Ondrej Zboril, Lukas Bednarek, Vladimir Vasinek, VSB-Technical Univ. of Ostrava (Czech Republic) . . . . . [9994-24]

Influence of encapsulation of PDMS on the sensitivity and frequency range of fiberoptic Mach-Zehnder interferometer, Jan Nedoma, Marcel Fajkus, Ondrej Zboril, V?B-Technical Univ. of Ostrava (Czech Republic); Lukas Hajek, VSB-Technical Univ of Ostrava (Czech Republic); Vladimir Vasinek, V?B-Technical Univ. of Ostrava (Czech Republic) . . . . . [9994-25]

A spectroscopic study of novel azo: carbazole polymers, Ana-Maria Albu, Ileana Rau, Anca Dibla, Univ. Politehnica of Bucharest (Romania). . . . . [9994-26]

Electrochemical and spectroelectrochemical properties of 3,6-disubstituted-s-tetrazine derivatives, Sandra Pluczyk, Pawel Zassowski, Mieczyslaw Lapkowski, Silesian Univ. of Technology (Poland); Cassandre Quinton, Pierre Audebert, Valerie Alain-Rizzo, Ecole Normale Supérieure de Cachan (France) . . . . . [9994-27]

Thermoluminescence-based radiation detectors, Malgorzata Nowina-Konopka, Pawel Bilski, Barbara Obryk, Wojciech Gieszczyk, Pawel Olko, Institute of Nuclear Physics (Poland). . . . . [9994-28]

Biosilver nanoparticles with antimicrobial properties, V. Railean-Plugaru, K. Rafinska, P. Pomastowski, B. Buszewski, Nicolaus Copernicus Univ. (Poland) . . . . . [9994-29]

THURSDAY 29 SEPTEMBER

SESSION 5

LOCATION: ROOM CARRICK 1 . . . . . THU 9:00 TO 10:10

Hybrid Materials and Applications

Session Chair: **Yoshiko Okada-Shudo,**
The Univ. of Electro-Communications (Japan)

9:00: **Quantum dot-based organic-inorganic hybrid materials for optoelectronic applications** *(Keynote Presentation)*, Kwang-Sup Lee, Hannam Univ. (Korea, Republic of) . . . . . [9994-17]

9:30: **Gallium and nitrogen vacancies in the GaN/AlN heterointerface**, Yahor V. Lebiadok, SSPA "Optics, Optoelectronics & Laser Technology" (Belarus). . . . . [9994-19]

9:50: **Effectiveness of bio silver nanoparticles as a new opportunity to medical area**, V. Railean-Plugaru, K. Rafinska, P. Pomastowski, B. Buszewski, Nicolaus Copernicus Univ. (Poland) . . . . . [9994-20]

Coffee Break . . . . . Thu 10:10 to 10:40

SESSION 6

LOCATION: ROOM CARRICK 1 . . . . . THU 10:40 TO 11:55

Biomaterials and Applications

Session Chair: **Kwang-Sup Lee,** Hannam Univ. (Korea, Republic of)

10:40: **Influence of electrolyte on electrochemical devices performance** *(Keynote Presentation)*, Agnieszka Pawlicka, M, M. Silva, Instituto de Química de São Carlos (Brazil); François Kajzar, Univ. Politehnica of Bucharest (Romania); Jerzy Kanicki, Univ. of Michigan (United States) . . . . . [9994-21]

11:10: **Nanobiophotonics: DNA with photochromes, nanoparticles and other bioprobes** *(Invited Paper)*, Katarzyna Matczyszyn, Katarzyna Brach, Magdalena Klekotko, Wroclaw Univ. of Science and Technology (Poland); Ziemowit Pokladek, Marco Deiana, Marta Ziemianek, Piotr Mlynarz, Wroclaw Univ. of Technology (Poland); Marek Samoc, Wroclaw Univ. of Science and Technology (Poland) . . . . . [9994-22]

11:35: **Linear and nonlinear optical properties of new materials based on DNA-CTMA and aromatic compounds**, Cosmina Andreea Lazar, Univ. Politehnica of Bucharest (Romania); François Kajzar, Lab. de Chimie (France); Ileana Rau, Univ. Politehnica of Bucharest (Romania); Lada N. Puntus, A.N. Nesmeyanov Institute of Organoelement Compounds (Russian Federation) and Russian Academy of Sciences (Russian Federation); Ana-Maria Manea, Univ. Politehnica of Bucharest (Romania) . . . . . [9994-23]

CONFERENCE 9995

LOCATION: ROOM CROMDALE

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 9995

Optics and Photonics for Counterterrorism, Crime Fighting, and Defence

Conference Chairs: **Douglas Burgess,** Burgess Consulting (United Kingdom); **Gari Owen,** Annwvyn Solutions (United Kingdom); **Henri Bouma,** TNO (Netherlands); **Felicity Carlysle-Davies,** Univ. of Strathclyde (United Kingdom); **Robert James Stokes,** Cobalt Light Systems Ltd. (United Kingdom); **Yitzhak Yitzhaky,** Ben-Gurion Univ. of the Negev (Israel)

Programme Committee: **Benedicte Bascle,** Thales Optronique S.A.S. (France); **Stefan Becker,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Richard R. Botten,** Ministry of Defence (United Kingdom); **Deeph Chana,** Imperial College London (United Kingdom); **David J. Clarke,** Placing Value Co.,Ltd (Thailand); **Giovanni Cocca,** SELEX ES S.p.A. (Italy); **Howard J. Cummins,** Her Majesty's Government Communications Ctr. (United Kingdom); **Brian E. Foulger,** Ministry of Defence (United Kingdom); **Gillian F. Marshall,** QinetiQ Ltd. (United Kingdom); **David Muench,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Niamh Nic Daeid,** Univ. of Dundee (United Kingdom); **Salman Rosenwaks,** Ben-Gurion Univ. of the Negev (Israel); **Neil C. Shand,** Defence Science and Technology Lab. (United Kingdom); **Mauro G. Varasi,** Finmeccanica (Italy); **Peter W. Yuen,** Cranfield Univ. (United Kingdom)

MONDAY 26 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: ROOM CROMDALE . . . . . 8:25 TO 8:30

SESSION 1

LOCATION: ROOM CROMDALE . . . . . MON 8:30 TO 13:00

Detection and Identification: Falsehood and Threats I

Session Chair: **Felicity Carlysle,**
The Knowledge Transfer Network Ltd. (United Kingdom)

8:30: **Holographic interferometry for security and forensic applications**, Radhakrishna Prabhu, The Robert Gordon Univ. (United Kingdom); Sajan Ambadiyil, Ctr. for Development of Imaging Technology (India); Sreelekshmi R. C., Sarabhai Institute of Science and Technology (India); Vellara Pappukutty Mahadevan Pillai, Univ. of Kerala (India) . . . . . [9995-1]

8:50: **Optical benchmarking of security document readers for automated border control**, Kristián Valentín, Peter Wild, Svorad Stolc, Franz Daubner, Markus Clabian, AIT Austrian Institute of Technology (Austria) . . . . . [9995-2]

9:10: **Optical multiple-image authentication based on cascaded phase filtering structure**, Qu Wang, Ayman Alfalou, ISEN Brest (France); Christian Brosseau, Univ. de Bretagne Occidentale (France) . . . . . [9995-3]

9:30: **The first large-area, high-X-ray energy phase contrast prototype for enhanced detection of threat objects in baggage screening**, Alberto Astolfo, Marco Endrizzi, Univ. College London (United Kingdom); Ben Price, Ian Haig, Nikon Metrology, Inc. (United Kingdom); Alessandro Olivo, Univ. College London (United Kingdom). . . . . [9995-4]

9:50: **New capability for hazardous materials ID within Sealed Containers using a portable spatially offset Raman spectroscopy (SORS) device**, Robert J. Stokes, Mike Bailey, Cobalt Light Systems Ltd. (United Kingdom) . . . [9995-5]

10:10: **A novel biometric X-ray backscattering inspection of dangerous materials based on lobster-eye objective**, Jie Xu, Xin Wang, Baozhong Mu, Qi Zhan, Qing Xie, Yaran Li, Yifan Chen, Yanan He, Tongji Univ. (China) . . [9995-6]

Coffee Break . . . . . Mon 10:30 to 11:00

11:00: **Stand-off identification of aerosols using mid-infrared backscattering Fourier transform spectroscopy**, Luke Maidment, Heriot-Watt Univ. (United Kingdom); Zhaowei Zhang, Huazhong Univ. of Science and Technology (China); Christopher R. Howle, Defence Science and Technology Lab. (United Kingdom); Derryck T. Reid, Heriot-Watt Univ. (United Kingdom) and Defence Science and Technology Lab. (United Kingdom). . . . . [9995-7]

11:20: **A multispectral imaging system based on laser-induced fluorescence for security applications**, Luisa Caneve, Francesco Colao, Antonio Palucci, Marco Pistilli, Valeria Spizzichino, ENEA (Italy); Mario Del Franco, Istituto Nazionale di Fisica Nucleare (Italy) . . . . . [9995-8]

11:40: **Standoff laser-induced fluorescence of suspensions from different bacterial strains**, Frank Duschek, Arne Walter, Lea Fellner, Karin M. Grünewald, Carsten Pargmann, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Herbert Tomaso, Friedrich-Loeffler-Institut (Germany); Jürgen Handke, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9995-9]

12:00: **Biological threat detection identification and monitoring: combining point and standoff sensors technologies**, Sylvie Buteau, Susan Rowsell, Defence Research and Development Canada (Canada). . . . . [9995-10]

12:20: **Molecular interactions in hypersorbent materials and Infrared spectroscopy for chemical sensing of hazardous materials**, R. Andrew McGill, Robert Furstenberg, Michael R. Papantonakis, Viet K. Nguyen, Christopher A. Kendziora, Todd H. Stievater, Dmitry A. Kozak, U.S. Naval Research Lab. (United States). . . . . [9995-11]

12:40: **Data science for saving lives**, Guy T. Maskall, David J. Crawford, Cobalt Light Systems Ltd. (United Kingdom) . . . . . [9995-12]

Lunch Break . . . . . Mon 13:00 to 14:10

SESSION 2

LOCATION: ROOM CROMDALE . . . . . MON 14:10 TO 15:30

Detection and Identification: Falsehood and Threats II

Session Chair: **Felicity Carlysle,**
The Knowledge Transfer Network Ltd. (United Kingdom)

14:10: **Fast sparse Raman spectral unmixing for hazardous chemical fingerprinting and quantification**, Mehrdad Yaghoobi, Di Wu, The Univ. of Edinburgh (United Kingdom); Rhea J. Clewes, Defence Science and Technology Lab. (United Kingdom); Mike E. Davies, The Univ. of Edinburgh (United Kingdom) . . . . . [9995-13]

14:30: **Ground truth studies for trace particles of explosives for use in optical spectroscopic detection**, R. Andrew McGill, Robert Furstenberg, Thomas Fischer, U.S. Naval Research Lab. (United States); Lily Zehfus, Homeland Security (United States); Christine Mahoney, NOVA Research Corp. (United States); Nora A. Carr, Andrew Howard, ASEE Science and Engineering Apprentice (United States); Benjamin Andrews, NOVA Research Corp. (United States); Michael R. Papantonakis, Viet K. Nguyen, Christopher A. Kendziora, U.S. Naval Research Lab. (United States) . . . . . [9995-14]

14:50: **Laser desorption of explosives traces at ambient conditions**, Gennadii E. Kotkovskii, Alexander A. Chistyakov, Artem E. Akmalov, National Research Nuclear Univ. MEPhI (Russian Federation); Evgenii M. Spitsyn, Nikolai M. Buzinov, Polyus Research Institute (Russian Federation); Olga I Dubkova, National Research Nuclear Univ MEPhI (Russian Federation) . . . . . [9995-16]

15:10: **How can we distinguish between simulants and hazardous substances under real conditions?**, Vyacheslav A. Trofimov, Svetlana A. Varentsova, Igor E. Kuchik, M.V. Lomonosov Moscow SU (Russian Federation) . . . . . [9995-17]

Coffee Break . . . . . Mon 15:30 to 16:00

Security+Defence Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

CONFERENCE 9995

LOCATION: ROOM CROMDALE

TUESDAY 27 SEPTEMBER

SESSION 3

LOCATION: ROOM CROMDALE . . . . . TUE 8:40 TO 10:20

Detection, Tracking and Re-identification

Session Chair: **Henri Bouma,** TNO (Netherlands)

8:40: **The effects of camera jitter for background subtraction algorithms on fused infrared-visible video streams**, Stefan Becker, Norbert Scherer-Negenborn, Pooja Thakkar, Wolfgang Hübner, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9995-18]

9:00: **Large scale track analysis for wide area motion imagery surveillance**, Coen J. van Leeuwen, Jasper R. van Huis, Jan Baan, TNO Defence Security and Safety (Netherlands) . . . . . [9995-19]

9:20: **Object recognition using deep convolutional neural networks with complete transfer and partial frozen layers**, Maarten Kruithof, Henri Bouma, Noelle Fischer, Klamer Schutte, TNO (Netherlands) . . . . . [9995-20]

9:40: **MAD for visual tracker fusion**, Stefan Becker, Sebastian B. Krah, Wolfgang Hübner, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9995-21]

10:00: **Deep person re-identification in aerial images**, Arne Schumann, Tobias Schuchert, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9995-22]

Coffee Break . . . . . Tue 10:20 to 11:00

SESSION 4

LOCATION: ROOM CROMDALE . . . . . TUE 11:00 TO 12:20

Anomaly, Event and Behaviour Analysis

Session Chair: **Henri Bouma,** TNO (Netherlands)

11:00: **Measuring cues for stand-off deception detection based on full-body nonverbal features in body-worn cameras**, Henri Bouma, Gertjan Burghouts, Richard den Hollander, Sophie van der Zee, Jan Baan, Johan-Martijn ten Hove, Sjaak van Diepen, Paul van den Haak, Jeroen H. C. van Rest, TNO (Netherlands) . . . . . [9995-23]

11:20: **Autonomous detection of crowd anomalies in multiple-camera surveillance feeds**, Jonas Nordlöf, Maria Andersson, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9995-24]

11:40: **Detection of infrastructure manipulation with knowledge-based video surveillance**, David Muench, Barbara Hilsenbeck, Hilke Kieritz, Stefan Becker, Ann-Kristin Grosselfinger, Wolfgang Hübner, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9995-25]

12:00: **Long-term behavior understanding based on the expert-based combination of short-term observations in high-resolution CCTV**, Klamer Schutte, Gertjan Burghouts, Nanda van der Stap, Victor Westerwoudt, Henri Bouma, Maarten Kruithof, Jan Baan, Johan-Martijn ten Hove, TNO (Netherlands) . . . . . [9995-26]

Lunch/Exhibition Break . . . . . Tue 12:20 to 13:40

SESSION 5

LOCATION: ROOM CROMDALE . . . . . TUE 13:40 TO 16:10

Networks of Autonomous Sensors

Session Chair: **Henri Bouma,** TNO (Netherlands)

13:40: **Towards an autonomous sensor architecture for persistent area protection**, Gillian F. Marshall, QinetiQ Ltd. (United Kingdom); Paul A. Thomas, Daniel J. Stubbins, Defence Science and Technology Lab. (United Kingdom); David A. Faulkner, QinetiQ Ltd. (United Kingdom) . . . . . [9995-27]

14:00: **SLATE: scanning laser automatic threat extraction**, David J. Clark, Shaun L. Prickett, Ashley A. Napier, Matthew P. Mellor, Createc (United Kingdom) . . . . . [9995-28]

14:20: **Real-time classification of vehicle types within infrared imagery**, Mikolaj E. Kundegorski, Toby P. Breckon, Durham Univ. (United Kingdom) . . . . . [9995-29]

14:40: **Radar-based autonomous sensor module**, Tim Styles, AptCore Ltd. (United Kingdom) . . . . . [9995-30]

Coffee Break . . . . . Tue 15:00 to 15:30

15:30: **An autonomous sensor module based on a legacy CCTV camera**, Philip J. Kent, Gillian F. Marshall, David A. Faulkner, QinetiQ Ltd. (United Kingdom) . . . . . [9995-31]

15:50: **Threat assessment and sensor management in a modular architecture**, Scott F. Page, James Oldfield, Simon Islip, Ben Benfold, Russell A. Brandon, Cubica Technology Ltd. (United Kingdom); Paul A. Thomas, Daniel J. Stubbins, Defence Science and Technology Lab. (United Kingdom) [9995-32]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

A support vector machine approach to the automatic identification of fluorescence spectra emitted by biological agents, Michela Gelfusa, Univ. degli Studi di Roma "Tor Vergata" (Italy); Andrea Murari, Consorzio RFX-Association EURATOM-ENEA (Italy); Michele Lungaroni, Andrea Malizia, Stefano Parracino, Emmanuele Peluso, Orlando Cenciarelli, Mariachiara Carestia, Roberto Pizzoferrato, Univ. degli Studi di Roma "Tor Vergata" (Italy); Jesus Vega, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Pasquale Gaudio, Univ. degli Studi di Roma "Tor Vergata" (Italy) . . . . . [9995-33]

The image enhancement and region of interest extraction of lobster-eye X-ray dangerous material inspection system, Qi Zhan, Xin Wang, Baozhong Mu, Jie Xu, Qing Xie, Yaran Li, Yifan Chen, Yanan He, Tongji Univ. (China) . . . . . [9995-34]

CONFERENCE 9996
LOCATION: ROOM FINTRY

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 9996

Quantum Information Science and Technology

Conference Chairs: **Mark T. Gruneisen,** Air Force Research Lab. (United States); **Miloslav Dusek,** Palacky Univ. Olomouc (Czech Republic); **John G. Rarity,** Univ. of Bristol (United Kingdom)

Programme Committee: **Paul M. Alsing,** Air Force Research Lab. (United States); **Jan Bouda,** Masaryk Univ. (Czech Republic); **Robert W. Boyd,** Univ. of Ottawa (Canada); **Gerald S. Buller,** Heriot-Watt Univ. (United Kingdom); **Ryan M. Camacho,** Sandia National Labs. (United States); **Marcos Curty,** Univ. de Vigo (Spain); **Michael L. Fanto,** Air Force Research Lab. (United States); **John D. Gonglewski,** European Office of Aerospace Research and Development (United Kingdom); **Gregory S. Kanter,** NuCrypt LLC (United States); **Prem Kumar,** Northwestern Univ. (United States); **Norbert Lütkenhaus,** Univ. of Waterloo (Canada); **Vadim V. Makarov,** Univ. of Waterloo (Canada); **Ronald E. Meyers,** U.S. Army Research Lab. (United States); **Momtchil Peev,** Austrian Research Ctrs. GmbH - ARC (Austria); **Renato Renner,** ETH Zürich (Switzerland); **Andrew J. Shields,** Toshiba Research Europe Ltd. (United Kingdom); **Rupert Ursin,** Austrian Academy of Sciences (Austria)

MONDAY 26 SEPTEMBER

OPENING REMARKS
LOCATION: ROOM FINTRY . . . . . .8:35 TO 8:40

Mark T. Gruneisen, Air Force Research Lab (United States)

SESSION 1
LOCATION: ROOM FINTRY . . . . . MON 8:40 TO 9:20

Keynote Session
Session Chair: **Miloslav Dusek,** Palacky, Univ. (Czech Republic)

8:40: **Progress in quantum communications technologies at the UK Quantum Technology Hub** *(Invited Paper)*, Gerald S. Buller, Heriot-Watt Univ. (United Kingdom); Timothy Spiller, Univ. of York (United Kingdom) . [9996-1]

SESSION 2
LOCATION: ROOM FINTRY . . . . . MON 9:20 TO 11:50

Practical Quantum Cryptography
Session Chair: **Marco Lucamarini,**
Toshiba Research Europe Ltd. (United Kingdom)

9:20: **Recent experimental progress in quantum communication** *(Invited Paper)*, Qiang Zhang, Univ. of Science and Technology of China (China) [9996-2]

9:50: **Secure signatures: a practical quantum technology** *(Invited Paper)*, Erika Andersson, Heriot-Watt Univ. (United Kingdom) . . . . . [9996-3]

Coffee Break . . . . . Mon 10:20 to 10:50

10:50: **Photonic quantum digital signatures operating over kilometer ranges in installed optical fiber**, Robert J. Collins, Heriot-Watt Univ. (United Kingdom); Mikio Fujiwara, National Institute of Information and Communications Technology (Japan); Ryan Amiri, Heriot-Watt Univ. (United Kingdom); Toshimori Honjo, NTT Basic Research Labs. (Japan); Kaoru Shimizu, Kiyoshi Tamaki, Nippon Telegraph and Telephone Corp. (Japan); Masahiro Takeoka, National Institute of Information and Communications Technology (Japan); Erika Andersson, Gerald S. Buller, Heriot-Watt Univ. (United Kingdom); Masahide Sasaki, National Institute of Information and Communications Technology (Japan). . . . . [9996-4]

11:10: **Proof-of-principle test of coherent-state continuous variable quantum key distribution through turbulent atmosphere**, Ivan D. Derkach, Palacky Univ. Olomouc (Czech Republic); Christian Peuntinger, Max-Planck-Institut für die Physik des Lichts (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); László Ruppert, Palacky Univ. Olomouc (Czech Republic); Bettina Heim, Max-Planck-Institut für die Physik des Lichts (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) and Erlangen Graduate School in Advanced Optical Technologies (Germany); Kevin Gunthner, Max-Planck-Institut für die Physik des Lichts (Germany); Vladyslav C. Usenko, Palacky Univ. Olomouc (Czech Republic); Dominique Elser, Max-Planck-Institut für die Physik des Lichts (Germany); Christoph Marquardt, Max-Planck-Institut für die Physik des Lichts (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Radim Filip, Palacky Univ. Olomouc (Czech Republic); Gerd Leuchs, Max-Planck-Institut für die Physik des Lichts (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [9996-5]

11:30: **Increasing operational command and control security by the implementation of device-independent quantum key distribution**, Fabio Antonio Bovino, Finmeccanica (Italy); Angelo Messina, DSSEA – Defense & Security Software Engineers Association (Italy) . . . . . [9996-6]

Lunch Break . . . . . Mon 11:50 to 13:00

SESSION 3
LOCATION: ROOM FINTRY . . . . . MON 13:00 TO 15:30

Security and Performance of Quantum Communication Systems
Session Chair: **Erika Andersson,** Heriot-Watt Univ. (United Kingdom)

13:00: **Quantum key distribution without detector vulnerabilities in the finite-size scenario using optically-seeded lasers** *(Invited Paper)*, Marco Lucamarini, Lucian C. Comandar, Bernd Fröhlich, James F. Dynes, Andrew W. Sharpe, Simon W. B. Tam, Zhiliang L. Yuan, Toshiba Research Europe Ltd. (United Kingdom); Richard V. Penty, Univ. of Cambridge (United Kingdom); Andrew J. Shields, Toshiba Research Europe Ltd. (United Kingdom) . . . [9996-7]

13:30: **Benchmarks for secure and quantum communications** *(Invited Paper)*, Riccardo Laurenza, Stefano Pirandola, Univ. of York (United Kingdom) . [9996-8]

14:00: **Trust-free quantum key distribution at regional scales** *(Invited Paper)*, Nicolo Lo Piparo, Osama Elmabrok, Masoud Ghalaii, Christiana Panayi, Univ. of Leeds (United Kingdom); Masoome Fazelian, Jawad A. Salehi, Sharif Univ. of Technology (Iran, Islamic Republic of); William J. Munro, Nippon Telegraph and Telephone Corp. (Japan); Mohsen Razavi, Univ. of Leeds (United Kingdom). . . . . [9996-9]

14:30: **Enhancing QKD security with weak measurements**, Jacob Farinholt, Naval Surface Warfare Ctr. Dahlgren Div. (United States); James Troupe, The Univ. of Texas at Austin (United States) . . . . . [9996-10]

14:50: **Enhancing the quantum-key-distribution secure key rate using discrete-variable, high-dimensional, time-frequency states**, Nurul T. Islam, Clinton Cahall, Andres Aragoneses Aguado, Duke Univ. (United States); Charles Ci Wen Lim, Oak Ridge National Lab. (United States); Michael S. Allman, Varun B. Verma, Sae Woo Nam, National Institute of Standards and Technology (United States); Jungsang Kim, Duke Univ. (United States); Daniel J. Gauthier, The Ohio State Univ. (United States). . . . . [9996-11]

15:10: **Self-coherent phase reference sharing scheme for continuous-variable quantum key distribution**, Adrien Marie, Romain Alléaume, Télécom ParisTech (France). . . . . [9996-12]

Coffee Break . . . . . Mon 15:30 to 16:00

Security+Defence Plenary Session
LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

CONFERENCE 9996
LOCATION: ROOM FINTRY

TUESDAY 27 SEPTEMBER

SESSION 4
LOCATION: ROOM FINTRY . . . . . TUE 9:00 TO 11:40

Generation and Manipulation of Entangled States

Session Chair: **Gerald S. Buller,** Heriot-Watt Univ. (United Kingdom)

9:00: **Generation and analysis of correlated pairs of photons on board a nanosatellite** *(Invited Paper)*, Alexander Ling, Zhongkan K. Tang, Rakhitha Chandrasekara, Yue Chuan Tan, Cliff Cheng, Ctr. for Quantum Technologies (Singapore); Luo Sha, Univ. of Singapore (Singapore); Cher Hiang Goh, National Univ. of Singapore (Singapore); Daniel Oi, Univ. of Strathclyde (United Kingdom) . . . . . [9996-13]

9:30: **Heralded quantum steering with no detection loophole over a high-loss quantum channel**, Morgan M. Weston, Sergei Slussarenko, Griffith Univ. (Australia); Helen Chrzanowski, Griffith Univ. (Australia) and Univ. of Oxford (United Kingdom); Sabine Wollmann, Geoff J. Pryde, Griffith Univ. (Australia) . . . . . [9996-14]

9:50: **Polarization entangled cluster state generation in a lithium niobate chip**, Attila Szep, Air Force Research Lab. (United States); Richard S. Kim, Univ. of Dayton Research Institute (United States); Paul M. Alsing, Joseph M. Osman, Air Force Research Lab. (United States); Eunsung Shin, Univ. of Dayton Research Institute (United States); Michael L. Fanto, Air Force Research Lab. (United States) . . . . . [9996-15]

10:10: **Quantum operations on entangled photons using Lyot filters**, David H. Hughes, Air Force Research Lab. (United States); Reinhard K. Erdmann, Advanced Automation Corp. (United States); Vladimir S. Nikulin, Air Force Research Lab. (United States) . . . . . [9996-16]

Coffee Break . . . . . Tue 10:30 to 11:00

11:00: **Observation of strong continuous-variable Einstein-Podolsky-Rosen entanglement using shaped local oscillators**, Ami Shinjo, Naoyuki Hashiyama, Akane Koshio, Yujiro Eto, Takuya Hirano, Gakushuin Univ. (Japan) . . . [9996-17]

11:20: **The analysis of photon pair source at telecom wavelength based on the BBO crystal**, Andrzej Gajewski, Piotr L. Kolenderski, Nicolaus Copernicus Univ. (Poland) . . . . . [9996-18]

SESSION 5
LOCATION: ROOM FINTRY . . . . . TUE 11:40 TO 12:20

Quantum Circuits, Memories, Simulators, Randomness Generators and Sensors I

Session Chair: **Nicolo Lo Piparo,** Univ. of Leeds (United Kingdom)

11:40: **Ultraviolet integrated photonic circuits**, Michael L. Fanto, Air Force Research Lab. (United States) and Rochester Institute of Technology (United States); Jeffrey A. Steidle, Rochester Institute of Technology (United States); Tsung-Ju Lu, Massachusetts Institute of Technology (United States); Stefan F. Preble, Rochester Institute of Technology (United States); Dirk R. Englund, Massachusetts Institute of Technology (United States); Christopher C. Tison, Amos M. Smith IV, Gregory A. Howland, Kathy-Anne Soderberg, Paul M. Alsing, Air Force Research Lab. (United States) . . . . . [9996-19]

12:00: **A temporal and spatial multimode solid-state quantum memory**, ZongQuan Zhou, Univ. of Science and Technology of China (China) . . . [9996-20]

Lunch/Exhibition Break . . . . . Tue 12:20 to 14:00

SESSION 6
LOCATION: ROOM FINTRY . . . . . TUE 14:00 TO 15:20

Quantum Circuits, Memories, Simulators, Randomness Generators and Sensors II

Session Chair: **Paul M. Alsing,** Air Force Research Lab. (United States)

14:00: **A quantum Fredkin gate**, Raj B. Patel, Joseph Ho, Griffith Univ. (Australia); Franck Ferreyrol, Griffith Univ. (Australia) and Ctr. National de la Recherche Scientifique (France) and Institut d'Optique Graduate School (France); Timothy C. Ralph, The Univ. of Queensland (Australia); Geoff J. Pryde, Griffith Univ. (Australia) . . . . . [9996-21]

14:20: **Towards optical phase measurement at the Heisenberg limit**, Shakib Daryanoosh, Sergei Slussarenko, Howard M. Wiseman, Geoff J. Pryde, Griffith Univ. (Australia) . . . . . [9996-23]

14:40: **A robust approach to the generation of high-quality random numbers**, Zahra Bisadi, Giorgio Fontana, Enrico Moser, Univ. degli Studi di Trento (Italy); Georg Pucker, Fondazione Bruno Kessler (Italy); Lorenzo Pavesi, Univ. degli Studi di Trento (Italy) . . . . . [9996-24]

15:00: **Quantum lattice gas algorithmic representation of gauge field theory**, Jeffrey Yepez, Air Force Research Lab. (United States) . . . . . [9996-22]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION
LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Generation of physical random numbers by using homodyne detection, Kodai Hirakawa, Shota Oya, Yusuke Oguri, Tsubasa Ichikawa, Yujiro Eto, Takuya Hirano, Gakushuin Univ. (Japan); Toyohiro Tsurumaru, Mitsubishi Electric Corp. (Japan) . . . . . [9996-25]

A practical method to implement the theoretical concept of quantum radars by microwave polarization entangled photons, Akbar Rahmani-Nejad, Arkan Tarabar (Iran, Islamic Republic of); Amir Pourabdollah, The Univ. of Nottingham (United Kingdom) . . . . . [9996-26]

Continuous operation of four-states continuous-variable quantum key distribution, Takuto Matsubara, Motoharu Ono, Yusuke Oguri, Tsubasa Ichikawa, Takuya Hirano, Gakushuin Univ. (Japan); Kenta Kasai, Ryutaroh Matsumoto, Tokyo Institute of Technology (Japan); Toyohiro Tsurumaru, Mitsubishi Electric Corp. (Japan) . . . . . [9996-27]

The influences that spatial coherence of the pump beam imposes on the properties of entangled photon pairs, Yaseera Ismail, Univ. of KwaZulu-Natal (South Africa); Stuti Joshi, Univ. of KwaZulu Natal (South Africa); Francesco Petruccione, Univ. of KwaZulu-Natal (South Africa) . . . . . [9996-28]

Free-space optical communication alignment system, Marco Mariola, Francesco Petruccione, Univ. of KwaZulu-Natal (South Africa) . . . . . [9996-29]

Security against jamming and noise exclusion in imaging, Wojciech Roga, Daeho Electric Co., Ltd. (United Kingdom) . . . . . [9996-30]

CONFERENCE 9997
LOCATION: ROOM KILSYTH

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 9997

Target and Background Signatures

Conference Chairs: **Karin U. Stein,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Ric H. M. A. Schleijpen,** TNO Defence, Security and Safety (Netherlands)

Programme Committee: **Joanne B. Culpepper,** Defence Science and Technology Group (Australia); **Willem H. Gunter,** Institute for Maritime Technology (South Africa); **Daniela H. Heinrich,** Norwegian Defence Research Establishment (Norway); **Katrin Idla,** Tallinn Univ. of Technology (Estonia); **Hans M. Kariis,** Swedish Defence Research Agency (Sweden); **Alexander Schwarz,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Miranda van Iersel,** TNO Defence, Security and Safety (Netherlands); **Peter Wellig,** Armasuisse (Switzerland)

MONDAY 26 SEPTEMBER

WELCOME AND INTRODUCTION
LOCATION: ROOM KILSYTH . . . . . 8:30 TO 8:40

SESSION 1
LOCATION: ROOM KILSYTH . . . . . MON 8:40 TO 12:00

UAV Detection
Session Chair: **Peter Wellig,** Armasuisse (Switzerland)

8:40: **Detection of acoustic, electro-optical and RADAR signatures of small unmanned aerial vehicles** *(Invited Paper)*, Alexander Hommes, Denis Nötel, Stephan Stanko, Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik (Germany); Martin Laurenzis, Sebastien Hengy, Frank Christnacher, Institut Franco-Allemand de Recherches de Saint-Louis (France) . . . . . [9997-1]

9:10: **Detection of mini-UAVs in the presence of strong topographic relief: a multisensor perspective**, Urs Böniger, Beat Ott, Peter Wellig, Armasuisse (Switzerland); Uwe Aulenbacher, Ingenieurbüro für Sensorik und Signalverarbeitung (Germany); Jens Klare, Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik (Germany); Thomas Nussbaumer, RUAG Defence (Switzerland); Yusuf Leblebici, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9997-2]

9:30 : **High infrasonic goniometry applied to the detection of helicopter in high-activity environment**, Vincent Chritin, Eric Van Lancker, IAV Engineering (Switzerland); Peter Wellig, Beat Ott, Armasuisse (Switzerland) . . . . . [9997-3]

9:50: **Numerical RCS and micro-Doppler investigations of a consumer UAV**, Arne Schröder, Univ. Bern (Switzerland); Uwe Aulenbacher, Ingenieurbüro für Sensorik und Signalverarbeitung (Germany); Matthias Renker, Urs Böniger, Roland Öchslin, Armasuisse (Switzerland); Axel Murk, Univ. Bern (Switzerland); Peter Wellig, Armasuisse (Switzerland) . . . . . [9997-4]

Coffee Break . . . . . Mon 10:10 am to 10:40 am

10:40: **Spurious RF signals emitted by mini-UAVs**, Ric H. M. A. Schleijpen, Vincent Voogt, Peter Zwamborn, Jaap van den Oever, TNO Defence, Security and Safety (Netherlands) . . . . . [9997-5]

11:00: **Near-infrared high-resolution real-time omnidirectional imaging platform for drone detection**, Vladan Popovic, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Beat Ott, Peter Wellig, Armasuisse (Switzerland); Yusuf Leblebici, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9997-6]

11:20: **Visual signature reduction of unmanned aerial vehicles**, Zhao-Wei Zhong, Nanyang Technological Univ. (Singapore) . . . . . [9997-7]

11:40: **Evaluation of experimental UAV video change detection**, Jan Bartelsen, Günter Saur, Christian Teutsch, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9997-8]

Lunch Break . . . . . Mon 12:00 pm to 1:30 pm

SESSION 2
LOCATION: ROOM KILSYTH . . . . . MON 13:30 TO 15:20

Camouflage Effectiveness
Session Chair: **Hans M. Kariis,**
FOI-Swedish Defence Research Agency (Sweden)

13:30: **Camouflage research in Estonia: R&D overview 2006-2016 and ideas for the future** *(Invited Paper)*, Katrin Idla, Tallinn Univ. of Technology (Estonia) . . . . . [9997-9]

14:00: **Disruptive coloration in woodland camouflage: evaluation of camouflage effectiveness due to minor disruptive patches**, Gorm Krogh Selj, Daniela H. Heinrich, Norwegian Defence Research Establishment (Norway) . . . . . [9997-10]

14:20: **Modelling vehicle colour and pattern for multiple deployment environments**, Eric Liggins, QinetiQ Ltd. (United Kingdom); Daniel A. C. Pearce, QinetiQ Group plc (United Kingdom); Ian R. Moorhead, sciVision (United Kingdom); Christopher J. Baker, QinetiQ Group plc (United Kingdom); William P. Serle, Defence Science and Technology Lab. (United Kingdom) . . . . . [9997-12]

14:40: **Camouflage in thermal IR: spectral design**, Anna C. M. Pohl, FOI-Swedish Defence Research Agency (Sweden); Herman Högström, Spectrogon AB (Sweden); Jan Fagerström, Hans M. Kariis, Tomas Hallberg, Roland Lindell, FOI-Swedish Defence Research Agency (Sweden) . . . . . [9997-13]

15:00: **Mission-specific rapid camouflage development for Australian Defence Force**, Mark Ryan, Defence Science and Technology Group (Australia) . . . . . [9997-14]

Coffee Break . . . . . Mon 15:20 to 16:00

Security+Defence Plenary Session
LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

TUESDAY 27 SEPTEMBER

SESSION 3
LOCATION: ROOM KILSYTH . . . . . TUE 9:00 TO 11:20

Multi-/Hyperspectral Signatures
Session Chair: **Katrin Idla,** Tallinn Univ. of Technology (Estonia)

9:00: **Tasks and tools for battlefield reconnaissance** *(Invited Paper)*, Sebastian Strecker, Wehrtechnische Dienststelle für Waffen und Munition (Germany) . . . . . [9997-15]

9:30: **High-dynamic range hyperspectral imaging for camouflage performance test and evaluation**, Daniel A. C. Pearce, Joseph F. Feenan, QinetiQ Group plc (United Kingdom) . . . . . [9997-16]

9:50: **Pixelated camouflage patterns from the perspective of hyperspectral imaging**, Frantisek Racek, Univ. of Defence (Czech Republic); Adam Jobánek, Military Research Institute (Czech Republic); Teodor Baláz, Jaroslav Krejcí, Univ. of Defence (Czech Republic) . . . . . [9997-17]

Coffee Break . . . . . Tue 10:10 to 10:40

10:40: **Determination of target detection limits in hyperspectral data using band selection and dimensionality reduction**, Wolfgang Gross, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Jonas Böhler, Univ. Zürich (Switzerland); Andreas Lenz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Mathias Kneubühler, Univ. Zürich (Switzerland); Wolfgang Middelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Roland Öchslin, Peter Wellig, Armasuisse (Switzerland) . . . . . [9997-18]

11:00: **Multiwaveband simulation-based signature analysis of camouflaged human dismounts in cluttered environments with TAIThermIR and MuSES**, Corey D. Packard, Mark D. Klein, Timothy S. Viola, Mark A. Hepokoski, ThermoAnalytics, Inc. (United States) . . . . . [9997-19]

CONFERENCE 9997
LOCATION: ROOM KILSYTH

SESSION 4
LOCATION: ROOM KILSYTH . . . . . TUE 11:20 TO 12:00

Image Interpretation I
Session Chair: **Joanne B. Culpepper,**
Defence Science and Technology Group (Australia)

11:20: **Multiscale image fusion through guided filtering**, Alexander Toet, Maarten A. Hogervorst, TNO Defence, Security and Safety (Netherlands) . . . . . [9997-20]

11:40: **Asynchronous threat awareness by observer trials using crowd simulation**, Patrick Dunau, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Samuel W. Huber, Forventis-GmbH (Switzerland); Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Peter Wellig, Armasuisse (Switzerland). . . . [9997-21]

Lunch/Exhibition Break . . . . . Tue 12:00 pm to 13:40

SESSION 5
LOCATION: ROOM KILSYTH . . . . . TUE 13:40 TO 14:20

Image Interpretation II
Session Chair: **Joanne B. Culpepper,**
Defence Science and Technology Group (Australia)

13:40: **Computationally efficient target classification in multispectral image data with deep neural networks**, Lukas Cavigelli, Dominic Bernath, ETH Zürich (Switzerland); Michele Magno, Luca Benini, ETH Zürich (Switzerland) and Univ. degli Studi di Bologna (Italy) . . . . . [9997-22]

14:00: **Multiagent system for line detection on images**, Boris A. Alpatov, Pavel V. Babayan, Nikita Y. Shubin, Ryazan State Radio Engineering Univ. (Russian Federation) . . . . . [9997-23]

SESSION 6
LOCATION: ROOM KILSYTH . . . . . TUE 14:20 TO 16:30

Signature and Scene Modelling
Session Chair: **Daniela H. Heinrich,**
Norwegian Defence Research Establishment (Norway)

14:20: **Modelling and simulation of heat pipes with TAIThermIR,** Max E. Winkelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9997-24]

14:40: **A study design to investigate the effect of movement on target detectability using Virtual Battle Space 3**, Jay Yu, Benjamin Steer, Bin Lee, Geoffrey W. Stuart, Chris J. Woodruff, Defence Science and Technology Group (Australia). . . . . [9997-26]

Coffee Break . . . . . Tue 15:00 pm to 15:30 pm

15:30: **Utilising E-on Vue and Unity 3D scenes to generate synthetic images and videos for visible signature analysis**, Christopher S. Madden, Defence Science and Technology Group (Australia); Noel Richards, YTEK Pty Ltd (Australia); Joanne B. Culpepper, Defence Science and Technology Group (Australia). . . . . [9997-27]

15:50: **Atmospheric visibility estimation and image contrast calibration**, Patrik Hermansson, Klas Edstam, BAE Systems Bofors (Sweden) . . . . [9997-28]

16:10: **Development of an atmospheric infrared radiation model with high clouds for target detection**, Christophe Bellisario, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Claire Malherbe, ONERA (France); Caroline Schweitzer, Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9997-29]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION
LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Security + Defence poster session held on Wednesday 17:45 to 19:30. Posters will be on display after 13:00 hrs on Monday in the Cromdale Hall. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Thermal transmission of camouflage nets revisited, Johan Jersblad, Saab Barracuda (Sweden); Pieter A. Jacobs, Private Consultant (Netherlands) . . . . . [9997-30]

A novel approach to simulate human body surface micromotion for life detection purpose, Qiang An, Zhao Li, Fulai Liang, Hao Lv, Fuming Chen, Jianqi Wang, Fourth Military Medical Univ. (China). . . . . [9997-31]

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SPIE. SECURITY+ DEFENCE
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PROCEEDINGS VOLUMES

Product Order Number		Volume Title/Volume Editors	Price for separate Print purchase
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SPIE. REMOTE SENSING

Remote Sensing for Agriculture, Ecosystems, and Hydrology

9637-45

Sameh Saadi, Institut National Agronomique de Tunis (Tunisia)

Monitoring irrigation volumes using high-resolution NDVI image time series: calibration and validation in the Kairouan plain (Tunisia)

Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2015

9638-16

Milad Niroumand Jadidi, Univ. degli Studi di Trento (Italy)

Subpixel mapping of water boundaries using pixel swapping algorithm (case study: Tagliamento River, Italy)

Remote Sensing of Clouds and the Atmosphere

9640-29

Pedro J. Benevides, Univ. de Lisboa (Portugal).

Inclusion of high resolution MODIS maps on a 3D tropospheric water vapour GPS tomography model

Optics in Atmospheric Propagation and Adaptive Systems

9641-4

Lydia I. Yatcheva, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

Ultimate turbulence experiment: simultaneous measurements of Cn2 near the ground using six devices and eight methods

SAR Image Analysis, Modelling, and Techniques

(Conference has not selected a winner)

Image and Signal Processing for Remote Sensing

9643-12

Swapnesh Panigrahi, Institut de Physique de Rennes (France)

Noise correlation-based adaptive polarimetric image representation for contrast enhancement of a polarized beacon in fog

Earth Resources and Environmental Remote Sensing/GIS Applications

9644-35

Maria Kakavas, Univ. of Patras (Greece)

Karst features detection and mapping using airphotos, DSMs and GIS techniques

Lidar Technologies, Techniques, and Measurements for Atmospheric Remote Sensing

9645-17

Gregori de Arruda Moreira, Instituto de Pesquisas Energéticas e Nucleares (Brazil)

Detecting the planetary boundary layer height from low level jet

High-Performance Computing in Remote Sensing

(Conference has not selected a winner)

SPIE. SECURITY+ DEFENCE

Electro-Optical and Infrared Systems: Technology and Applications

9648-3

Luke Maidment, Heriot-Watt University (United Kingdom) and Defence Science and Technology Laboratory (United Kingdom)

Stand-off detection of liquid thin films using active mid-infrared hyperspectral imaging

High-Power Lasers 2015: Technology and Systems

9650-14

Eyal Yacoby, Ben-Gurion Univ. of the Negev (Israel)

3D CFD modeling of subsonic and transonic flowing-gas DPALs with different pumping geometries

Millimetre Wave and Terahertz Sensors and Technology

9651-9

Joyce Bou Sleiman, Univ. of Bordeaux (France)

Discrimination and identification of RDX/PETN explosives by chemometrics applied on terahertz time-domain spectral imaging

Optics and Photonics for Counterterrorism, Crime Fighting and Defence

9252-3

Mariachiara Carestia, Univ. degli Studi di Roma "Tor Vergata" (Italy)

Multispectral analysis of biological agents to implement a quick tool for stand-off biological detection

NB:

(Conferences 9639, 9647A, 9647B, 9649, 9650B, 9652B, 9653 received no entries.)

SPIE. REMOTE SENSING

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Klaus Schäfer
Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research (Germany)-*retired*

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Iain H. Woodhouse
The University of Edinburgh, Geography and the Lived Environment Research Institute (United Kingdom)

Technical Conference Contents

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Remote Sensing Symposium

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Iain H. Woodhouse, The University of Edinburgh, Geography and the Lived Environment Research Institute (United Kingdom)

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Remote Sensing

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Remote Sensing Symposium

10000: SENSORS, SYSTEMS, AND NEXT-GENERATION SATELLITES

MONDAY 26 SEPTEMBER

Location: Room Pentland

11:50: **Flight model performances of HISUI hyperspectral sensor onboard ISS (International Space Station)** [10000-9]
12:10: **Case studies for observation planning algorithm of a Japanese spaceborne sensor: Hyperspectral Imager Suite (HISUI)** [10000-10]

TUESDAY 27 SEPTEMBER

Location: Room Pentland

12:10: **A novel 120dB hyperspectral platform for Earth observation** [10000-26]

WEDNESDAY 28 SEPTEMBER

Location: Room Pentland

14:40: **Low-loss interference filter arrays made by plasma-assisted reactive magnetron sputtering (PARMS) for high-performance multispectral imaging** [10000-49]

10004: IMAGE AND SIGNAL PROCESSING FOR REMOTE SENSING

TUESDAY 27 SEPTEMBER

Location: Room Moorfoot

14:00: **Accuracy assessment of blind and semi-blind restoration methods for hyperspectral images** [10004-27]
14:20: **Unsupervised component reduction of hyperspectral images and clustering without performance loss: application to marine algae identification** [10004-28]
14:40: **Exploring the impact of wavelet-based denoising in the classification of remote sensing hyperspectral images** [10004-29]
15:30: **Spectral-spatial classification of hyperspectral images with semisupervised graph learning** [10004-30]
15:50: **Ship classification in terrestrial hyperspectral data** [10004-31]
16:10: **M-estimation for robust sparse unmixing of hyperspectral images** [10004-32]
16:30: **Spectral-spatial hyperspectral image classification using superpixel-based spatial pyramid representation** [10004-33]

10008: REMOTE SENSING TECHNOLOGIES AND APPLICATIONS IN URBAN ENVIRONMENTS

MONDAY 26 SEPTEMBER

Location: Room Ochill 1-2-3

8:40: **Improved MODIS aerosol retrieval in urban areas using a land-classification approach and empirical orthogonal functions** *(Invited Paper)* [10008-1]
9:00: **Pollutant monitoring of aircraft exhaust with multispectral imaging** [10008-2]
9:50: **Air quality estimates in the city using ground-based measurements and satellite technology: greater Tel-Aviv as a case study** [10008-4]
10:10: **High-grade, compact spectrometers for Earth observation from SmallSats** *(Invited Paper)* [10008-6]

TUESDAY 27 SEPTEMBER

Location: Room Ochill 1-2-3

10:30: **Synergistic use of multispectral satellite imagery and hyperspectral endmember libraries for urban land cover mapping at the metropolitan scale** [10008-20]
14:00: **ICARE-HS: atmospheric correction of airborne hyperspectral urban images using 3D information** [10008-27]

9999: REMOTE SENSING OF THE OCEAN, SEA ICE, COASTAL WATERS, AND LARGE WATER REGIONS 2016

TUESDAY 27 SEPTEMBER

Location: Room Harris 1

9:00: **Neural network retrievals of Karenia brevis harmful algal blooms in the West Florida Shelf** *(Invited Paper)* [9999-15]
9:30: **Mapping of coral reefs using the combined hyperspectral image and bathymetric lidar data** [9999-16]
9:50: **Enhancing moderate-resolution ocean color products over coastal/inland waters** [9999-17]
10:10: **Field measurements in the northern Yellow sea using a portable laser-induced fluorescence lidar** [9999-18]
11:00: **Airborne hyperspectral sensor radiometric self-calibration using near-infrared properties of deep water and vegetation** *(Invited Paper)* [9999-19]
11:30: **Hyperspectral reflectance signatures for predicting subsurface bottom reflectance in water: in-situ and analytical methods** [9999-20]
11:50: **Lyzenga multispectral bathymetry formula for Indonesian shallow coral reef: evaluation and proposed generalized coefficient** [9999-21]
12:10: **An improved atmospheric correction method for nearshore shallow water bathymetry** [9999-22]
12:30: **Improving the accuracies of bathymetric models based on step-wise multiple regression for calibration (case study: Sarca River, (Italy)** [9999-23]

10005: EARTH RESOURCES AND ENVIRONMENTAL REMOTE SENSING/GIS APPLICATIONS

TUESDAY 27 SEPTEMBER

Location: Room Sidlaw

13:40: **Close-range environmental remote sensing with 3D hyperspectral technologies** [10005-2]

9998: REMOTE SENSING FOR AGRICULTURE, ECOSYSTEMS, AND HYDROLOGY

WEDNESDAY 28 SEPTEMBER

Location: Room Carrick 2-3

13:40: **Assessing the ratio of leaf carbon to nitrogen in wheat and barley based on hyperspectral data** [9998-39]
14:20: **Detection of chlorophyll and leaf area index dynamics from sub-weekly hyperspectral imagery** [9998-41]
14:40: **Detecting subtle environmental change: a multitemporal airborne imaging spectroscopy approach** [9998-42]
16:30 **Effect of land-use change on hydropower potential in Eastern Negros Oriental River Basin** [9998-47]

10001: REMOTE SENSING OF CLOUDS AND THE ATMOSPHERE

WEDNESDAY 28 SEPTEMBER

Location: Room Ochill 1-2-3

14:20: **New Shortwave Array Spectroradiometer-Hemispheric (SAS-He): hyperspectral design and initial applications** [10001-12]

10007: HIGH-PERFORMANCE COMPUTING IN GEOSCIENCE AND REMOTE SENSING

WEDNESDAY 28 SEPTEMBER

Location: Room Harris 1

10:40: **Parallel hyperspectral image reconstruction using random projections** [10007-6]
11:00: **A new semi-supervised classification strategy combining active learning and spectral unmixing of hyperspectral data** [10007-7]
11:20: **Parallel implementation of the linear SVM for hyperspectral images on RVC-CAL** [10007-8]
12:00: **OpenCL-library-based Implementation of SCLSU algorithm for remotely sensed hyperspectral data exploitation: clMAGMA versus viennaCL** [10007-10]
13:40: **A multiple criteria-based spectral partitioning method for remotely sensed hyperspectral image classification** [10007-11]
14:00: **A new comparison of hyperspectral anomaly detection algorithms for real-time applications** [10007-12]
14:40: **A new hyperspectral image compression paradigm based on fusion** [10007-14]
15:50: **Parallelism exploitation of a PCA algorithm for hyperspectral images using RVC-CAL** [10007-16]

POSTER SESSION

WEDNESDAY 28 SEPTEMBER, 17:45 TO 19:30

Location: Cromdale Hall

Mapping paddy biomass with multiple vegetation indexes by using multispectral remotely sensed image [9998-60]
Removal of clouds, dust and shadow pixels from hyperspectral imagery using a non-separable and stationary spatio-temporal covariance model [9998-91]
A spaceborne visible-NIR hyperspectral imager for coastal phenology [10000-67]
Supper-resolution of hyperspectral image using advanced nonlocal means filter and iterative back-projection [10004-80]
Methodology for band selection of hyperspectral images using genetic algorithms and Gaussian maximum likelihood classifier [10004-81]
Experimental study of hyperspectral responses of plants grown on mud pit soils [10005-52]
Software for hyperspectral, joint photographic experts group (.JPG), portable network graphics (.PNG) and tagged image file format (.TIFF) segmentation [10008-45
Estimating leaf nitrogen in maize based on canopy hyperspectrum data [9998-65]
Shadow extraction for urban area based on hyperspherical color sharpening information distortion [10004-73]

CONFERENCE 9998

LOCATION: ROOM CARRICK 1-2-3 (MONDAY-TUESDAY); ROOM CARRICK 2-3 (WEDNESDAY)

Monday–Wednesday 26–28 September 2016 • Proceedings of SPIE Vol. 9998

Remote Sensing for Agriculture, Ecosystems, and Hydrology

Conference Chairs: **Christopher M. U. Neale,** Univ. of Nebraska Lincoln (United States); **Antonino Maltese,** Univ. degli Studi di Palermo (Italy)

Programme Committee: **Wim G. M. Bastiaanssen,** UNESCO-IHE Institute for Water Education (France); **Antonino Maltese,** Univ. degli Studi di Palermo (Italy); **Christopher M. U. Neale,** Univ. of Nebraska Lincoln (United States)

The conference will produce an addendum to the final program.
The addendum will be available in print onsite and as a pdf document online.

IN MEMORIAM: MANFRED OWE

Conference Chair and Senior Scientist Emeritus at NASA Goddard Space Flight Center

The 2016 Conference on Remote Sensing for Agriculture, Ecosystems, and Hydrology (9998) will be dedicated to honoring Manfred Owe, former Remote Sensing for Agriculture, Ecosystems, and Hydrology conference chair and conference committee member. Through his decade-long involvement from 2000 to 2009, Manfred made considerable contributions to the success of the event. We will greatly miss our dear friend and colleague.

MONDAY 26 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: ROOM CARRICK 1-2-3 . . . . . 12:55 TO 13:00

SESSION 1

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 13:00 TO 14:20

Radar and Lidar Applications in Agriculture

Session Chair: **Antonino Maltese,** Univ. degli Studi di Palermo (Italy)

13:00: **Using RADARSAT-2 and TerraSAR-X satellite data for identification of canola crop phenology**, Anna M. Pacheco, Heather McNairn, Agriculture and Agri-Food Canada (Canada); Yifeng Li, George A. Lampropoulos, A.U.G. Signals Ltd. (Canada); Jarrett Powers, Agriculture and Agri-Food Canada (Canada) . . . . . [9998-1]

13:20: **Satellite-based monitoring of grassland: assessment of harvest dates and frequency using SAR**, Kerstin Grant, Bavarian State Research Ctr. for Agriculture (Germany); Melanie Wagner, Robert Siegmund, GAF AG (Germany); Stephan Hartmann, Bavarian State Research Ctr. for Agriculture (Germany). . . . . [9998-2]

13:40: **Statistical analysis of microwave radar backscattering coefficient based on land cover type and season using X-band data**, Pietro Guccione, Angela Lombardi, Politecnico di Bari (Italy); Davide Giudici, ARESYS s.r.l. (Italy) [9998-3]

14:00: **Grapevine phenological monitoring over a heterogenous vineyard area with multitemporal optical and SAR images**, Perrine Loussert, Univ. Rennes 2 (France) and LETG-Rennes (France); Frédéric Baup, Ctr. d'Etudes Spatiales de la Biosphère (France); Samuel Corgne, Hervé Quénol, Univ. Rennes 2 (France); Alejandro Ortega, Univ. Nacional de Cuyo (Argentina) . . . . . [9998-4]

SESSION 2

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 14:20 TO 15:40

Precipitation, Runoff and Flooding

Session Chair: **Antonino Maltese,** Univ. degli Studi di Palermo (Italy)

14:20: **Glacier stagnant in central Karakorum during 2003 to 2008 derived from DEOS Mass Transport Model GRACE data and one monthly degree-day model**, Xiaowen Zhang, Northwest Univ. (China) and College of Urban and Environmental Sciences (China); Shiqiang Zhang, Cold and Arid Regions Environmental and Engineering Research Institute (China) and Northwest Univ. (China) and College of Urban and Environmental Sciences (China); Junli Xu, Chinese Academy of Sciences (China) and Cold and Arid Regions Environmental and Engineering Research Institute (China) . . . . . [9998-6]

14:40: **Land cover/use scenario building and its impact on runoff process inside the Iligan river basin**, Peter D. Suson, Stephanie Mae B Salcedo, Alan E. Milano, Ma. Teresa T. Ignacio, Mindanao State Univ. (Philippines) and Iligan Institute of Technology (Philippines) . . . . . [9998-7]

15:00: **An assessment of the Height Above Nearest Drainage terrain descriptor for the thematic enhancement of automatic SAR-based flood monitoring services**, Candace Chow, Univ. Bern (Switzerland); André Twele, Sandro Martinis, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9998-8]

15:20: **GIS-based flood risk model evaluated by Fuzzy Analytic Hierarchy Process (FAHP)**, Tharapong Sukcharoen, Jingnong Weng, Beihang Univ. (China); Charoenkalunyuta Teetat, Chulalongkorn Univ. (Thailand) . . . . . [9998-9]

Coffee Break . . . . . Mon 15:40 to 16:00

Remote Sensing Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

The conference will produce an addendum to the final program.
The addendum will be available in print onsite and electronically online.

TUESDAY 27 SEPTEMBER

SESSION 3

LOCATION: ROOM CARRICK 1-2-3 . . . . . TUE 9:00 TO 10:00

Agricultural Monitoring

Session Chair: **Wim G. M. Bastiaanssen,** UNESCO (Netherlands)

9:00: **Options for using Landsat and RapidEye satellites aiming the water productivity assessments in mixed agro-ecosystems**, Antônio Heriberto C. de Castro Teixeira, Janice F. Leivas, Gustavo Bayma-Silva, Embrapa Monitoramento por Satélite (Brazil) . . . . . [9998-11]

9:20: **Identification of crop rotation systems in the Sudanian savanna zone of West Africa utilizing a multisensor approach**, Michael Thiel, Julius-Maximilians-Univ. Würzburg (Germany); Gerald Forkuor, West African Science Service Ctr. on Climate Change and Adapted Land Use (Burkina Faso); Alejandra Navaez-Vallejo, Julius-Maximilians-Univ. Würzburg (Germany); Stefan W. Dech, Julius-Maximilians-Univ. Würzburg (Germany) and Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [9998-12]

9:40: **Remote sensing applications for sustainable agriculture in South Africa**, Caren Jarmain, Adriaan Van Niekerk, Stellenbosch Univ. (South Africa); Ruben Goudriaan, eLEAF Competence Ctr. (Netherlands) . . . . . [9998-13]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 4

LOCATION: ROOM CARRICK 1-2-3 . . . . . TUE 10:30 TO 12:15

Special Session Honoring Dr. Manfred Owe: Remote Sensing of Soil Moisture

Session Chair: **Christopher M. U. Neale,**
Univ. of Nebraska Lincoln (United States)

In Memoriam of Dr. Manfred Owe

2000-2009 Remote Sensing for Agriculture, Ecosystems, and Hydrology Conference Chair

Opening Remarks

Christopher M. U. Neale, Univ. of Nebraska Lincoln (United States)

10:35: **Deriving reliable soil moisture using passive microwave satellite instruments: a tribute to Dr. Manfred Owe** *(Invited Paper)*, Richard A.M. de Jeu, Vrije Univ. Amsterdam (Netherlands). . . . . [9998-15]

11:05: **Pixel-based surface runoff based on soil moisture variability as an input for global surface water accounting** *(Invited Paper)*, Wim Bastiaanssen, UNESCO-IHE, Institute for Water Education, Delft Univ. of Technology (Netherlands); Ate Poortinga, Winrock International (Vietnam); Gonzalo Espinoza, UNESCO-IHE, Institute for Water Education (Netherlands); Gijs Simons, Delft Univ. of Technology, FutureWater (Netherlands) . . . . . [9998-16]

11:35: **Soil water content assessment: seasonal effects on the triangle method**, Antonino Maltese, Fulvio Capodici, Giuseppe Ciraolo, Goffredo La Loggia, Univ. degli Studi di Palermo (Italy); Carmelo Cammalleri, European Commission Joint Research Ctr. (Italy) . . . . . [9998-17]

11:55: **Remote sensing assisted modeling of soil water content for center pivot variable rate irrigation prescriptions**, Christopher M. U. Neale, Univ. of Nebraska Lincoln (United States); Wayne Woldt, Univ. of Nebraska-Lincoln (United States); Laurens Heeren, KU Leuven (Belgium) . . . . . [9998-18]

Lunch/Exhibition Break . . . . . Tue 12:15 to 13:20

SESSION 5

LOCATION: ROOM CARRICK 1-2-3 . . . . . TUE 13:20 TO 15:00

Vegetation Patterns and Dynamics

Session Chair: **Christopher M. U. Neale,**
Univ. of Nebraska Lincoln (United States)

13:20: **Assessment of sixteen years of vegetation condition index (VCI) derived at 250m in cropland area of the Bío-Bío region of Chile to monitor agro-drought**, Francisco Zambrano, Mario F. Lillo-Saavedra, Octavio Lagos, Univ. de Concepción (Chile); Koen Verbist, UNESCO (Chile) . . . . . [9998-19]

13:40: **Comparison of different spatial sampling methods for validation of GEOV1 FVC product over heterogeneous and homogeneous surfaces**, Yanling Ding, Hongyan Zhang, Northeast Normal Univ. (China) and School of Geographical Sciences (China) . . . . . [9998-20]

14:00: **Permanent protected area determination in Brazil**, Sergio Rosim, Silvia S. Leonardi, João R. de Freitas Oliveira, Henrique R. de Azeredo Freitas, Instituto Nacional de Pesquisas Espaciais (Brazil) . . . . . [9998-21]

14:20: **Aerial image mosaics built using images with vegetation index pre-calculated**, Leandro Rosendo Candido, Escola de Engenharia de São Carlos (Brazil); Lúcio André Castro Jorge, Empresa Brasileira de Pesquisa Agropecuária (Brazil); Maximiliam Luppe, Escola de Engenharia de São Carlos (Brazil)[9998-22]

14:40: **Mapping prosopis spp. within the Tarach water basin, Turkana, Kenya using Sentinel-2 imagery**, Wai-Tim Ng, Markus Immitzer, Francesco Vuolo, Univ. für Bodenkultur Wien (Austria); Luigi Luminari, Chrisgone Adede, National Drought Management Authority (Kenya); Raphael Wahome, Univ. of Nairobi (Kenya); Clement Atzberger, Univ. für Bodenkultur Wien (Austria) . . . . . [9998-23]

Coffee Break . . . . . Tue 15:00 to 15:30

SESSION 6

LOCATION: ROOM CARRICK 1-2-3 . . . . . TUE 15:30 TO 17:50

Energy Balance and Evapotranspiration

Session Chair: **Antonino Maltese,** Univ. degli Studi di Palermo (Italy)

15:30: **Energy balances in sugar cane, coffee and natural vegetation in the Mogi-Guaçu and Pardo river basins, São Paulo state, Brazil**, Antônio Heriberto C de Castro Teixeira, Janice F. Leivas, Carlos C. Ronquim, Gustavo Bayma-Silva, Embrapa Monitoramento por Satélite (Brazil); Daniel C. Victoria, Empresa Brasileira de Pesquisa Agropecuária (Brazil); Aline A. Lopes, Embrapa Monitoramento por Satélite (Brazil) . . . . . [9998-24]

15:50: **Continuous evapotranspiration monitoring and water stress impact at watershed scale in a Mediterranean savanna**, Elisabet Carpintero, María Patrocinio González-Dugo, Instituto de Investigación y Formación Agraria y Pesquera (Spain); Martha Anderson, Agricultural Research Service (United States) and Hydrology and Remote Sensing Lab. (United States); Christopher R. Hain, Earth System Science Interdisciplinary Ctr. (United States); Feng Gao, Agricultural Research Service (United States) and Hydrology and Remote Sensing Lab. (United States) . . . . . [9998-25]

16:10: **Energy balance in the watershed of Ipê, Northwestern of São Paulo State, Brazil**, Fernando B. Tangerino Hernandez, Diego G. Feitosa, Renato Alberto M. Franco, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Antônio Heriberto C. de Castro Teixeira, Embrapa Monitoramento por Satélite (Brazil) . . . . . [9998-26]

16:30: **Evaluating a remote sensing model to estimate cropland evapotranspiration in Southern Brazil**, Anderson L. Ruhoff, Univ. Federal do Rio Grande do Sul (Brazil) . . . . . [9998-27]

16:50: **Vineyard spectra under nocturnal stable boundary conditions**, John H. Prueger, Joesph G. Alfieri, Agricultural Research Service (United States); Lawrence E. Hipps, Utah State Univ. (United States); William P. Kustas, Agricultural Research Service (United States); Christopher M. U. Neale, Univ. of Nebraska Lincoln (United States) . . . . . [9998-28]

17:10: **Discrepancies between eddy covariance and lysimeter measurements in the assessment of energy balance modeling in vineyards**, Juan Manuel Sánchez, Univ. de Castilla-La Mancha (Spain); Ramón López-Urrea, ITAP-FUNDESCAM (Spain); Carolina Doña, Univ. de València (Spain); Amelia Montoro, ITAP-FUNDESCAM (Spain); Vicente Caselles Miralles, Joan M. Galve, Univ. de València (Spain) . . . . . [9998-29]

17:30: **Measuring evapotranspiration using an eddy covariance system over a subtropical thicket of the Eastern Cape, South Africa**, Onalenna Gwate, Sukhmani K. Mantel, Rhodes Univ. (South Africa); Anthony R. Palmer, Animal Production Institute and Rhodes University, (South Africa), Lesley A. Gibson, Glasgow Caledonian Univ. (United Kingdom) . . . . . [9998-30]

CONFERENCE 9998

LOCATION: ROOM CARRICK 1-2-3 (MONDAY-TUESDAY); ROOM CARRICK 2-3 (WEDNESDAY)

The conference will produce an addendum to the final program.
The addendum will be available in print onsite and electronically online.

WEDNESDAY 28 SEPTEMBER

SESSION 7

LOCATION: ROOM CARRICK 2-3 . . . . . WED 9:00 TO 10:20

Hydrology

Session Chair: **Wim G. M. Bastiaanssen,** UNESCO (France)

9:00: **Validation points generation for LiDAR-Extracted hydrologic features**, Anjillyn Mae C. Perez, UP Training Ctr. for Advanced Geodesy and Photogrammetry (Philippines) and Phil-LiDAR 2 (Philippines); Roel M. de la Cruz, Machele M. Felicen, Phil-LiDAR 2 (Philippines); Noel Jerome B. Borlongan, Phil-LiDAR 2 - Development of the Philippine Hydrologic Dataset for Watersheds from LiDAR Surveys (Philippines); Nestor T. Olfindo II, David Jeffrey R. Ebreo, Phil-LiDAR 2 (Philippines). . . . . [9998-32]

9:20: **Water resource monitoring in semi-arid environment through the synergic use of SAR data and hydrological models**, Donato Amitrano, Gerardo Di Martino, Antonio Iodice, Univ. degli Studi di Napoli Federico II (Italy); Francesco Mitidieri, Maria Nicolina Papa, Univ. degli Studi di Salerno (Italy); Daniele Riccio, Univ. degli Studi di Napoli Federico II (Italy) and Univ. degli Studi di Salerno (Italy); Giuseppe Ruello, Univ. degli Studi di Napoli Federico II (Italy). . . . . [9998-33]

9:40: **Impact of dynamically changing land cover on runoff process: the case of Iligan river basin**, Stephanie Mae B. Salcedo, Alan E. Milano, Peter D. Suson, Ma. Teresa T. Ignacio, Mindanao State Univ. (Philippines) and Iligan Institute of Technology (Philippines) . . . . . [9998-56]

10:00: **Integrated watershed management and GIS: a case study**, Sabita M. Singh, Amity Univ. (India) and Indian Institute of Technology (India) and Banaras Hindu Univ. (India); Pabitra R. Maiti, Anurag Ohri, Institute of Technology, Banaras Hindu Univ. (India) . . . . . [9998-34]

Coffee Break . . . . . Wed 10:20 to 10:50

SESSION 8

LOCATION: ROOM CARRICK 2-3 . . . . . WED 10:50 TO 12:10

Irrigation Water Management

Session Chair: **Christopher M. U. Neale,**
Univ. of Nebraska Lincoln (United States)

10:50: **A synergistic approach using optical and SAR data to estimate crop's irrigation requirements**, João Rolim, Univ. de Lisboa (Portugal); Ana Navarro Ferreira, Cátia Saraiva, Fundacão da Faculdade de Ciências da Univ. de Lisboa (Portugal); João Catalão Fernandes, Univ. de Lisboa (Portugal) . . . . . [9998-35]

11:10: **Irrigation network extraction methodology from LiDAR DTM using whitebox GAT and ArcGIS**, Margarita Andrea P. Mahor, Roel M. de la Cruz, Phil-LiDAR 2 (Philippines); Anjillyn Mae C. Perez, Univ. of the Philippines Diliman (Philippines); Nestor T. Olfindo II, Phil-LiDAR 2 (Philippines). . . . . [9998-36]

11:30: **Remote sensing for developing world agriculture: opportunities and areas for technical development**, Mark N. Jeunnette, Douglas P. Hart, Massachusetts Institute of Technology (United States) . . . . . [9998-37]

11:50: **Mobile short message remote control for automatic irrigation system**, Yubin Zhang, Xi'an Jiaotong Univ. (China) . . . . . [9998-38]

Lunch/Exhibition Break . . . . . Wed 12:10 to 13:40

SESSION 9

LOCATION: ROOM CARRICK 2-3 . . . . . WED 13:40 TO 15:00

Spectroradiometry and Hyperspectral Applications

Session Chair: **Antonino Maltese,** Univ. degli Studi di Palermo (Italy)

13:40: **Assessing the ratio of leaf carbon to nitrogen in wheat and barley based on hyperspectral data**, Xin-Gang Xu, Xiaohe Gu, Xiaoyu Song, National Engineering Research Ctr. for Information Technology in Agriculture (China) . . . . . [9998-39]

14:00: **Disease index: hyperspectral algorithm for detection of crown choke disease severity in arecanut crops**, Bhojaraja Benkipura, National Institute of Technology Karnataka (India); Amba Shetty, National Institute of Technology Karnataka, Surathkal (India); Nagaraj M.K., National Institute of Technology Karnataka (India) . . . . . [9998-40]

14:20: **Detection of chlorophyll and leaf area index dynamics from sub-weekly hyperspectral imagery**, Rasmus M. Houborg, Matthew F. McCabe, Yoseline Angel, King Abdullah Univ. of Science and Technology (Saudi Arabia); Elizabeth M. Middleton, NASA Goddard Space Flight Ctr. (United States) . . . . . [9998-41]

14:40: **Detecting subtle environmental change: a multitemporal airborne imaging spectroscopy approach**, Ian Yule, Rajasheker Reddy Pullanagari, Gabor Kereszturi, Massey Univ. (New Zealand). . . . . [9998-42]

Coffee Break . . . . . Wed 15:00 to 15:30

SESSION 10

LOCATION: ROOM CARRICK 2-3 . . . . . WED 15:30 TO 17:30

Rivers and Lakes

Session Chair: **Christopher M. U. Neale,**
Univ. of Nebraska Lincoln (United States)

15:30: **Determination of bank structures and river width variations using remote sensing data**, Pierre Karrasch, Sebastian Hunger, TU Dresden (Germany) . . . . . [9998-44]

15:50: **Estimating the Great Lakes net basin supply using satellite remote sensing and MERRA reanalysis: implications for the Great Lakes water level fluctuations**, Sitthisak Moukomla, Geo-Informatics and Space Technology Development Agency (Thailand) . . . . . [9998-45]

16:10: **Analyses of climate change impacts under IPCC RCP scenarios on stream flow in mountainous Bayblk watershed, Northwest China**, Yue Huang, Chinese Academy of Sciences (China); Tie Liu, Xinjiang Univ. (China); Yonggang Ma, Xinjiang Univ. (China) and College of Resources and Environment Science (China) . . . . . [9998-46]

16:30: **Effect of land-use change on hydropower potential in Eastern Negros Oriental River Basin**, Jodel L. Cuasay, Greyland C. Agno, Dindo Karl Mari A. Malonzo, Rowane May A. Fesalbon, Loureal Camille V. Inocencio, Ma. Rosario Concepcion O. Ang, Univ. of the Philippines Diliman (Philippines). . . . . [9998-47]

16:50: **Operational monitoring of turbidity in rivers: how satellites can contribute**, Dorothee Hucke, Björn Baschek, Susanne Kranz, Axel Winterscheid, Gudrun Hillebrand, Bundesanstalt für Gewässerkunde (Germany) . . . . . [9998-48]

17:10: **Evaluating the potential of image fusion of multispectral and radar remote sensing data for the assessment of water body structure**, Sebastian Hunger, Pierre Karrasch, Christine Wessollek, TU Dresden (Germany) . . . . . [9998-49]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Evaluation of UAV based crop height retrievals against 3D laser scanning, Stephen D. Parkes, Matthew F. McCabe, Jorge Rosas, Samir Al-Mashhawari, King Abdullah Univ. of Science and Technology (Saudi Arabia). . . . . [9998-5]

Energy balance model applied to pasture experimental areas in São Paulo state, Brazil, Gustavo Bayma-Silva, Antônio Heriberto C. de Castro Teixeira, Embrapa Monitoramento por Satélite (Brazil); Daniel C. Victoria, Embrapa Instrumentação Agropecuária (Brazil); Sandra F. Nogueira, Janice F. Leivas, Embrapa Monitoramento por Satélite (Brazil); Valdo R. Herling, Univ. de São Paulo (Brazil) . . . . . [9998-50]

CONFERENCE 9998

LOCATION: ROOM CARRICK 1-2-3 (MONDAY-TUESDAY); ROOM CARRICK 2-3 (WEDNESDAY)

Modelling evapotranspiration using the modified Penman-Monteith equation and MODIS data over a subtropical thicket in South Africa, Onalenna Gwate, Sukhmani K. Mantel, Rhodes Univ. (South Africa), Anthony R. Palmer, Animal Production Institute and Rhodes Univ. (South Africa), Lesley A. Gibson, Glasgow Caledonian Univ. (United Kingdom) . . . . . [9998-51]

Evapotranspiration and biomass production acquired from Landsat 8 images in hydrological basins with growing irrigated areas in the northwest side of the São Paulo state, Brazil, Antônio Heriberto C. de Castro Teixeira, Janice F. Leivas, Embrapa Monitoramento por Satélite (Brazil); Fernando B. Tangerino Hernandez, Renato Alberto M. Franco, Daniel N. Coaguila, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil) . . . . . [9998-52]

Annual variability of water productivity components in the watershed of Cabeceira Comprida stream, Santa Fé do Sul, Brazil, Daniel N. Coaguila, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil) and Univ. Nacional de San Agustín (Peru); Fernando Braz T. Hernandez, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Antônio Heriberto C. de Castro Teixeira, Embrapa Monitoramento por Satélite (Brazil); Renato Alberto M. Franco, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Janice F. Leivas, Embrapa Monitoramento por Satélite (Brazil) . . . . . [9998-53]

Integration of manual channel initiation and flow path tracing in extracting stream features from lidar-derived DTM, Roel M. de la Cruz, Phil-LiDAR 2 (Philippines); Anjillyn Mae C. Perez, Univ. of the Philippines Diliman (Philippines); Noel Jerome B. Borlongan, Melanie C. Gaspa, Nestor T. Olfindo II, Phil-LiDAR 2 (Philippines) . . . . . [9998-58]

Tracking four-decade inundation changes with multitemporal satellite images in China's largest freshwater lake, Guiping Wu, Chinese Academy of Sciences (China) and Nanjing Institute of Geography and Limnology (China) . . . . [9998-59]

Mapping paddy biomass with multiple vegetation indexes by using multispectral remotely sensed image, Xiaohe Gu, Youbo Fan, Xiaoyu Song, Xingang Xu, National Engineering Research Ctr. for Information Technology in Agriculture (China) . . . . . [9998-60]

Water productivity mapping using Landsat 8 satellite together with agro-meteorological stations, Renato Alberto M. Franco, Fernando Braz T. Hernandez, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Antônio Heriberto C. de Castro Teixeira, Janice F. Leivas, Embrapa Monitoramento por Satélite (Brazil); Daniel N. Coaguila, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil) . . . . . [9998-61]

Dynamics modeling for sugar cane sucrose estimation using time series satellite imagery, Yu Zhao, Hitachi, Ltd. (Japan); Diego D. Justine, Univ. Estadual de Campinas (Brazil); Yoriko Kazama, Hitachi, Ltd. (Japan); Jansle V. Rocha, Paulo S. Graziano, Rubens A. C. Lamparelli, Univ. Estadual de Campinas (Brazil) . . . . . [9998-62]

Sentinel-1 backscatter time series analysis for inter-annual mapping of the European rice cropland, Duy B. Nguyen, Technische Univ. Wien (Austria) and Hanoi Univ. of Mining and Geology (Viet Nam); Vahid Naeimi, Wolfgang Wagner, Giang Thi Huong Tran, Technische Univ. Wien (Austria). . . . . [9998-63]

Rice identification at the early stage of the rice growth season with single fine quad Radarsat-2 data, Xiaoqian Zhang, Pengbin Zhang, Kejian Shen, Chinese Academy of Agricultural Engineering (China); zhiyuan pei, Chinese Academy of Agricultural Engineering(CAAE), (China) . . . . . [9998-64]

Estimating leaf nitrogen accumulation in maize based on canopy hyperspectrum data, Xiaohe Gu, Lizhi Wang, Xiaoyu Song, Xingang Xu, National Engineering Research Ctr. for Information Technology in Agriculture (China) . . . . . [9998-65]

The role of spatial and spectral resolution on the effectiveness of satellite-based vegetation indices, Emmanouil Psomiadis, Nicholas Dercas, Agricultural Univ. of Athens (Greece); Nicolaos R. Dalezios, Univ. of Thessaly (Greece); George D. Spyropoulos, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) [9998-66]

Mapping species distributions of Canarian Monteverde forest using field spectroradiometry and satellite imagery, Antonio Martin-Luis, Manuel Arbelo, Pedro A. Hernandez-Leal, Univ. de La Laguna (Spain). . . . . [9998-67]

Biophysical indicators based on satellite images in an irrigated area at the São Francisco River Basin, Brazil, Janice F. Leivas, Antônio Heriberto C. de Castro Teixeira, Gustavo Bayma-Silva, Embrapa Monitoramento por Satélite (Brazil); Carlos Cesar Ronquim, Embrapa Satellite Monitoring (Brazil) . . . . . [9998-68]

Continuous data assimilation for downscaling large-footprint soil moisture retrievals, Muhammad U. Altaf, Raghavendra Jana, Ibrahim Hoteit, Matthew F. McCabe, King Abdullah Univ. of Science and Technology (Saudi Arabia) . . . . . [9998-69]

AMSR-E retrieved spatial variation of surface soil moisture over Poyang Lake sub-basins of China in recent decade, Huihui Feng, Nanjing Institute of Geography and Limnology (China). . . . . [9998-70]

Monitoring of artificial water reservoirs in the southern Brazilian Amazon with remote sensing data, Damien Arvor, Ctr. National de la Recherche Scientifique (France); Felipe Daher, Univ. Rennes 2 (France); Thomas Corpetti, Ctr. National de la Recherche Scientifique (France); Marianne Laslier, Vincent Dubreuil, Univ. Rennes 2 (France) . . . . . [9998-71]

Application of agricultural subsidy inspection using UAV image, Jin-Ki Park, Amrita Das, Jong-Hwa Park, Chungbuk National Univ. (Korea, Republic of) . . . . . [9998-72]

Remote sensing in precision farming: real-time monitoring of water and fertilizer requirements of agricultural crops, Arkadi Zilberman, Ben-Gurion Univ. of the Negev (Israel) and Katif R&D Ctr. for Coastal Deserts Development (Israel); Jiftah Ben Asher, Ben-Gurion Univ. of the Negev (Israel); Benayahu Bar-Yosef, Katif R&D Ctr. for Coastal Deserts Development (Israel); Norman S. Kopeika, Ben-Gurion Univ. of the Negev (Israel) . . . . . [9998-73]

High-resolution sensing for precision agriculture: from Earth-observing satellites to unmanned aerial vehicles, Matthew F. McCabe, Rasmus M. Houborg, King Abdullah Univ. of Science and Technology (Saudi Arabia); Arko Lucieer, Univ. of Tasmania (Australia) . . . . . [9998-74]

The pan-sharpening of satellite and UAV imagery for agricultural applications, Agnieszka Jenerowicz, Malgorzata Woroszkiewicz, Military Univ. of Technology (Poland) . . . . . [9998-76]

Assessment of carbon sequestration associated to the land use and land cover changes of forestry sector in southern Brazil, Carlos C. Ronquim, Embrapa Monitoramento por Satélite (Brazil); Ramon F. B. Da Silva, Univ. Estadual de Campinas (Brazil); Eduardo B. De Figueiredo, Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil); Ricardo O. Bordonal, Lab. Nacional de Ciência e Tecnologia do Bioetanol (CTBE) (Brazil); Antônio Heriberto C. de Castro Teixeira, Thomas C. D. Cochasrk, Embrapa Monitoramento por Satélite (Brazil); Janice Freitas Leivas, Brazilian Agricultural Research Corporation - Embrapa Satellite Monitoring (Brazil) . . . . . [9998-77]

Retrieval of vertical leaf water content profile using terrestrial full-waveform lidar, Xi Zhu, Andrew K. Skidmore, Roshanak Darvishzadeh, Tiejun Wang, Univ. Twente (Netherlands) and ITC (Netherlands) . . . . . [9998-78]

Forest vegetation dynamics and its response to climate changes, Maria A. Zoran, National Institute of Research and Development for Optoelectronics (Romania); Liviu-Florin V. Zoran, Univ. Politehnica of Bucharest (Romania); Adrian I. Dida, Univ. Transylvania of Brasov (Romania) . . . . . [9998-79]

Identification of biogeographic regions through remote sensing data, Tiago Leal, Univ. do Porto (Portugal); Ana C. Teodoro, Univ. do Porto (Portugal) and Instituto de Ciências da Terra (Portugal); Neftali P. Sillero, Univ. do Porto (Portugal) and Ctr. de Investigação em Ciências Geo-Espaciais (Portugal). . . . . [9998-80]

Remote sensing-based vegetation indices for monitoring vegetation change in the semi-arid region of Sudan, Majdaldin Rahamtallah Abualgasim, Babatunde A. Osunmadewa, Elmar Csaplovics, TU Dresden (Germany) . . . . . [9998-82]

Regional assessment of trends in vegetation change dynamics using principal component analysis, Babatunde A. Osunmadewa, Majdaldin Rahmtallah Abualgasim, Elmar Csaplovics, TU Dresden (Germany); Clement O. Adeofun, Federal Univ. of Agriculture (Nigeria); Dildora Aralova, TU Dresden (Germany) . . . . . [9998-83]

Remote sensing as a tool to analyse lizard's behaviour, Remi Dos Santos, Univ. do Porto (Portugal); Ana C. Teodoro, Univ. do Porto (Portugal) and Instituto de Ciências da Terra (Portugal); Miguel Carretero, Univ. do Porto (Portugal) and Centro de Investigação em Biodiversidade e Recursos Genéticos (Portugal); Neftali P. Sillero, Univ. do Porto (Portugal) and Ctr. de Investigação em Ciências Geo-Espaciais (Portugal). . . . . [9998-84]

Snow cover detection algorithm using dynamic time warping method and reflectance of MODIS solar spectrum channels, Kyeongsang Lee, Kyung-soo Han, Sungwon Choi, Minji Seo, Chang-Suk Lee, Pukyong National Univ. (Korea, Republic of); Noh-hun Seong, Pukyong National Univ (Korea, Republic of) . . . . . [9998-86]

Drought assessment using satellite derived meteorological parameters and NDVI in Potohar region, Saad Ul Haque, Badar Ghauri, Institute of Space Technology (Pakistan). . . . . [9998-87]

Satellite image-based methods for forest fuel maps updating, Alfonso Alonso Benito, Manuel Arbelo, Pedro A. Hernandez Leal, Alejandro Gonzalez-Calvo, Univ. de La Laguna (Spain); Jose A. Moreno-Ruiz, Jose R. Garcia-Lazaro, Univ. de Almería (Spain) . . . . . [9998-88]

Void point correction in the SRTM 30 m data set, Sergio Rosim, Instituto Nacional de Pesquisas Espaciais (Brazil). . . . . [9998-89]

Evaluating satellite-derived long historical precipitation datasets for drought monitoring in Chile, Francisco Zambrano, Univ. de Concepción (Chile); Brian D. Wardlow, Ctr. for Advanced Land Management Information Technologies (United States); Tsegaye Tadesse, National Drought Mitigation Ctr. (United States) . . . . . [9998-90]

Removal of clouds, dust and shadow pixels from hyperspectral imagery using a non-separable and stationary spatio-temporal covariance model, Yoseline Angel, Rasmus M. Houborg, Matthew F. McCabe, King Abdullah Univ. of Science and Technology (Saudi Arabia) . . . . . [9998-91]

CONFERENCE 9999

LOCATION: ROOM HARRIS 1

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 9999

Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2016

Conference Chairs: **Charles R. Bostater Jr.,** Florida Institute of Technology (United States); **Stelios P. Mertikas,** Technical Univ. of Crete (Greece); **Xavier Neyt,** Royal Military Academy (Belgium); **Caroline Nichol,** The Univ. of Edinburgh (United Kingdom); **David C. Cowley,** Royal Commission on the Ancient and Historical Monuments of Scotland (United Kingdom)

Programme Committee: **Richard J. Breitlow,** Agfa Corp. (United States); **Jean-Paul Bruyant,** ONERA (France); **Alexander Gilerson,** The City College of New York (United States); **Carlton R. Hall,** NASA Kennedy Space Ctr. (United States); **Frederic Lamy,** ONERA (France); **Ana M. Martins,** Univ. dos Açores (Portugal); **Petri Pellikka,** Univ. of Helsinki (Finland)

MONDAY 26 SEPTEMBER

SESSION 1

LOCATION: ROOM HARRIS 1 . . . . . MON 8:30 TO 10:20

Radar Sensing of the Oceans

Session Chair: **David C. Cowley,** Royal Commission on the Ancient and Historical Monuments of Scotland (United Kingdom)

8:30: **A note on radar altimeter signatures of internal solitary waves in the ocean** *(Invited Paper)*, Jose C. B. da Silva, Ana L. F. Cerqueira, Univ. do Porto (Portugal) . . . . . [9999-1]

9:00: **Damping of short gravity-capillary waves due to oil derivatives film on the sea surface**, Irina A. Sergievskaya, Stanislav A. Ermakov, Tatiana Lazareva, Institute of Applied Physics of the RAS (Russian Federation). . . . . [9999-2]

9:20: **ICESat-2 bathymetry: an empirical feasibility assessment using MABEL**, Nick Forfinski, Christopher Parrish, Oregon State Univ. (United States). . . . . [9999-3]

9:40: **Doppler shifts of radar return from the sea surface**, Stanislav A. Ermakov, Ivan A. Kapustin, Irina A. Sergievskaya, Olga V. Shomina, Institute of Applied Physics of the RAS (Russian Federation). . . . . [9999-4]

10:00: **SAR image simulation from composite sea-ship scene based on a weighted multipath model**, Min Zhang, Ye Zhao, Ding Nie, Xidian Univ. (China) . . . . . [9999-5]

Coffee Break . . . . . Mon 10:20 to 10:50

SESSION 2

LOCATION: ROOM HARRIS 1 . . . . . MON 10:50 TO 12:30

Active and Passive Sensing of the Ocean

Session Chair: **Xavier Neyt,** Royal Military Academy (Belgium)

10:50: **Internal solitons in the Andaman Sea: a new look at an old problem**, Jose C. B. da Silva, Jorge M. Magalhaes, Univ. do Porto (Portugal) . . . . [9999-6]

11:10: **Analysis of the ice gyre extent in a sequence of Cosmo-SkyMed images**, Fiorigi F. Parmiggiani, Istituto di Scienze dell'Atmosfera e del Clima (Italy); Miguel Moctezuma, Univ. Nacional Autónoma de México (Mexico). . . . . [9999-7]

11:30: **Mathematical models of radar signals, reflected from underlying surface of earth and sea**, Vadim A. Nenashev, Alexander P. Shepeta, Saint-Petersburg State Univ. of Aerospace Instrumentation (Russian Federation) . . . . . [9999-51]

11:50: **Radar probing of surfactant films on the water surface using dual co-polarized SAR**, Stanislav A. Ermakov, Institute of Applied Physics of the RAS (Russian Federation); Jose C. B. da Silva, Univ. do Porto (Portugal); Ivan A. Kapustin, Irina A. Sergievskaya, Institute of Applied Physics of the RAS (Russian Federation) . . . . . [9999-9]

12:10: **A decade of changing surface energy balance components over a large water region**, Pakorn Petchprayoon, Geo-Informatics and Space Technology Development Agency (Thailand); Peter Blanken, Khalid Hussein, Univ. of Colorado Boulder (United States); Waleed Abdalati, Cooperative Institute for Research in Environment Sciences (United States); Siam Lawavirotwong, Geo-Informatics and Space Technology Development Agency (Thailand). . . . . [9999-10]

Lunch Break . . . . . Mon 12:30 to 13:50

SESSION 3

LOCATION: ROOM HARRIS 1 . . . . . MON 13:50 TO 15:20

Infrared and Visible Sensing of Water

Session Chair: **David B. Chenault,** Polaris Sensor Technologies, Inc. (United States)

13:50: **Infrared polarimetric sensing of oil on water** *(Invited Paper)*, David B. Chenault, Justin P. Vaden, Polaris Sensor Technologies, Inc. (United States) . . . . . [9999-11]

14:20: **Correction and evaluation of thermal infrared data acquired with two different airborne systems at the Elbe estuary**, Katharina Fricke, Björn Baschek, Bundesanstalt für Gewässerkunde (Germany); Alexander Jenal, Caspar Kneer, Immanuel Weber, Jens Bongartz, Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik (Germany); Jens Wyrwa, Andreas Schöl, Bundesanstalt für Gewässerkunde (Germany) . . . . . [9999-12]

14:40: **Applications of SMAP data to retrieval of ocean surface wind and salinity**, Simon Yueh, Alexander Fore, Wenqing Tang, Akiko Hayashi, California Institute of Technology (United States); Yonghui Weng, Fuqing Zhang, The Pennsylvania State Univ. (United States); Bryan W. Stiles, California Institute of Technology (United States); Nicolas Real, Institut Français de Recherche et d'Exploitation de la MER (France). . . . . [9999-13]

15:00: **River plumes investigation using MSI Sentinel-2A and OLI/TIRS Landsat-8 data**, Olga Y. Lavrova, Space Research Institute (Russian Federation); Dmitry M. Soloviev, Marine Hydrophysical Institute (Russian Federation); Mikhail A. Strochkov, E?o-Polygon (Russian Federation); Ksenia R. Nazirova, Space Research Institute (Russian Federation) . . . . . [9999-14]

Coffee Break . . . . . Mon 15:20 to 16:00

Remote Sensing Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

TUESDAY 27 SEPTEMBER

SESSION 4

LOCATION: ROOM HARRIS 1 . . . . . TUE 9:00 TO 10:30

Multispectral and Hyperspectral Sensing I

Session Chair: **Caroline Nichol,** The Univ. of Edinburgh (United Kingdom)

9:00: **Neural network retrievals of Karenia brevis harmful algal blooms in the West Florida Shelf** *(Invited Paper)*, Samir Ahmed, Ahmed El-Habashi, The City College of New York (United States). . . . . [9999-15]

9:30: **Mapping of coral reefs using the combined hyperspectral image and bathymetric lidar data**, Charmaine A. Cruz, Univ. of the Philippines (Philippines); Ayin M. Tamondong, Univ. of the Philippines Diliman (Philippines); Gay Amabelle G. Go, Univ. of the Philippines (Philippines) . . . . . [9999-16]

9:50: **Enhancing moderate-resolution ocean color products over coastal/ inland waters**, Nima Pahlevan, NASA Goddard Space Flight Ctr. (United States); John R. Schott, Rochester Institute of Technology (United States); Giuseppe Zibordi, European Commission Joint Research Ctr. (Italy) . . . . . [9999-17]

10:10: **Field measurements in the northern Yellow sea using a portable laser-induced fluorescence lidar**, Lanjun Sun, Yanchao Zhang, Harbin Institute of Technology in Weihai (China) and Shandong Institute of Shipbuilding Technology (China); Shanshan Zhang, Yanjia Pan, Guoxin Pei, Shandong Institute of Shipbuilding Technology (China); Zhaoshuo Tian, Shiyou Fu, Harbin Institute of Technology in Weihai (China) and Shandong Institute of Shipbuilding Technology (China) . . . . . [9999-18]

Coffee Break . . . . . Tue 10:30 to 11:00

SESSION 5

LOCATION: ROOM HARRIS 1 . . . . . TUE 11:00 TO 12:50

Multispectral and Hyperspectral Sensing II: Water

Session Chair: **Samir Ahmed,**
The City College of New York (United States)

11:00: **Airborne hyperspectral sensor radiometric self-calibration using near-infrared properties of deep water and vegetation** *(Invited Paper)*, Kévin Barbieux, Vincent Nouchi, Bertrand Merminod, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9999-19]

11:30: **Hyperspectral reflectance signatures for predicting subsurface bottom reflectance in water: in-situ and analytical methods**, Charles R. Bostater Jr., Florida Institute of Technology (United States) . . . . . [9999-20]

11:50: **Lyzenga multispectral bathymetry formula for Indonesian shallow coral reef: evaluation and proposed generalized coefficient**, Masita D. M. Manessa, Ariyo Kanno, Masahiko Sekine, Yamaguchi Univ. (Japan); Muhammad Haidar, Geospatial Information Agency of Indonesia (Indonesia); Nurjannah Nurdin, Hasanuddin Univ. (Indonesia). . . . . [9999-21]

12:10: **An improved atmospheric correction method for nearshore shallow water bathymetry**, Christopher Ilori, Simon Fraser Univ. (Canada); Anders J. Knudby, Univ. of Ottawa (Canada) . . . . . [9999-22]

12:30: **Improving the accuracies of bathymetric models based on step-wise multiple regression for calibration (case study: Sarca River, Italy)**, Milad Niroumand-Jadidi, Univ. degli Studi di Trento (Italy) and Freie Univ. Berlin (Germany); Alfonso Vitti, Univ. degli Studi di Trento (Italy) . . . . . [9999-23]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Satellite survey of the Black Sea surface pollution, Marina I. Mityagina, Olga Y. Lavrova, Space Research Institute (Russian Federation) . . . . . [9999-8]

Mass balance of the mountain glacier detecting by InSAR method, Jianmin Zhou, Zhen Li, Institute of Remote Sensing and Digital Earth (China) . . [9999-24]

Analysis on long-term variability of sea ice albedo and its relationship with sea ice concentration over Antarctica, Minji Seo, Kyung-Soo Han, Noh-hun Seong, Chaeyoung Kwon, Honghee Kim, Pukyong National Univ. (Korea, Republic of); Hyun-Cheol Kim, Korea Polar Research Institute (Korea, Republic of) . . . . . [9999-26]

Validation of the satellite retrieval algorithm of chlorophyll concentrantion under weak solar irradiance, Hao Li, Xianqiang He, The Second Institute of Oceanography, SOA (China) . . . . . [9999-27]

Retrieval of chlorophyll in Hangzhou Bay based on hyperspectral satellite, Qiankun Zhu, Haiqing Huang, The Second Institute of Oceanography, SOA (China) . . . . . [9999-28]

Impact of sea surface temperature on satellite retrieval of sea surface salinity, Jin Xuchen, Qiankun Zhu, Xianqiang He, Peng Chen, Difeng Wang, Zengzhou Hao, Haiqing Huang, The Second Institute of Oceanography, SOA (China) . . . . . [9999-29]

Effects of ocean products variability from PSF blurring in NIR band, Eunsong Oh, Korea Institute of Ocean Science & Technology (Korea, Republic of) and Yonsei Univ. (Korea, Republic of); Jae-Hyun Ahn, Seong-Ick Cho, Korea Institute of Ocean Science & Technology (Korea, Republic of); Ki-Beom Ahn, Korea Institute of Ocean Science & Technology (Korea, Republic of) and Yonsei Univ. (Korea, Republic of); Young-Je Park, Korea Institute of Ocean Science & Technology (Korea, Republic of); Sug-Whan Kim, Yonsei Univ. (Korea, Republic of) . . . . . [9999-30]

A temperature calibration method for CDOM fluorescence LIF lidar, Peng Chen, Zhihua Mao, Haiqing Huang, Yan Bai, Tianyu Wang, The Second Institute of Oceanography, SOA (China) . . . . . [9999-31]

Satellite views of the massive algal bloom in the Persian Gulf and the Gulf of Oman during 2008-2009, Shujie Yu, Fang Gong, Xianqiang He, Yan Bai, Qiankun Zhu, Difeng Wang, Peng Chen, The Second Institute of Oceanography, SOA (China). . . . . [9999-32]

Assessing the ecological state of the Barents and Kara Seas from satellite remote sensing data, Olga Y. Lavrova, Marina I. Mityagina, Tatiana Y. Bocharova, Alexey Y. Strochkov, Space Research Institute (Russian Federation) . . . . . [9999-34]

Development of electrodynamic model for backscattered HF band radio signal from fully arisen sea, Vladimir T. Lobach, Michael V. Potipak, Southern Federal Univ. (Russian Federation) . . . . . [9999-35]

Verification of electrodynamic model for backscattered HF band radio signal from fully arisen sea, Michael V. Potipak, Vladimir T. Lobach, Southern Federal Univ. (Russian Federation) . . . . . [9999-36]

Investigation of electromagnetic backscattering from nearshore sea surfaces modulated by shoaling effect, Ding Nie, Min Zhang, Jinxing Li, Xidian Univ. (China) . . . . . [9999-37]

A coordinated retrieval method for sea surface salinity based on SMOS and ocean color data, Peng Chen, Tianyu Wang, Zhihua Mao, Yan Bai, Zengzhou Hao, The Second Institute of Oceanography, SOA (China) . . . . . [9999-38]

An improved profiling method for the measurement of hyperspectral diffuse attenuation coefficents in shallow turbid waters, Li Ma, Bangyi Tao, Zhihua Mao, LiangLiang Shi, TianCheng Huang, Qiankun Zhu, The Second Institute of Oceanography, SOA (China) . . . . . [9999-40]

Spatial-temporal distribution of CDOM molecular weight in Qiandao Lake, Zhang Yiwei, Shanghai Institute of Technical Physics of the Chinese Academy of Sciences (China); Zhihua Mao, Peng Chen, The Second Institute of Oceanography, SOA (China); Shi L. Liangliang, State Key Lab. of Satellite Ocean Environment Dynamics (China) . . . . . [9999-41]

Comparative study on atmospheric correction methods of QUAC, DOS and FLAASH for HICO imagery, Shi L. Liang, Ocean College, Zhejiang Univ. (China) and State Key Lab. of Satellite Ocean Environment Dynamics (China) . [9999-42]

Relationship of the wind-wave from HY2A radar altimeter data, Zengzhou Hao, The Second Institute of Oceanography, SOA (China); Siqi Zhang, Ocean Univ. of China (China); Fang Gong, Difeng Wang, Qiankun Zhu, The Second Institute of Oceanography, SOA (China) . . . . . [9999-43]

Evaluating of the rain effect on tropical rainfall mapping mission precipitation radar backscatter at low incidence angles, Lin Ren, Jingsong Yang, Gang Zheng, Juan Wang, The Second Institute of Oceanography, SOA (China) . . . . . [9999-44]

The vertical distribution of the beam attenuation coefficient and its correlation to the particulate organic carbon in the north South China Sea, Wansong Cui, Difeng Wang, Fang Gong, Yan Bai, Lin Zhang, Qiankun Zhu, Peng Chen, The Second Institute of Oceanography, SOA (China) . . . . . [9999-45]

Results of the Caspian Sea satellite survey: internal wave climate, Marina I. Mityagina, Olga Y. Lavrova, Space Research Institute (Russian Federation) . . . . . [9999-46]

A new mapping method of underwater bottom topography in the shallow sea by using SAR images, Juan Wang, Hua-Guo Zhang, Jingsong Yang, Lin Ren, The Second Institute of Oceanography, SOA (China) . . . . . [9999-47]

Underwater sky image as remote sensing instrument of sea roughness parameters and its variability, Irina A. Sergievskaya, Alexander Molkov, Lev Dolin, Ivan A. Kapustin, Olga V. Shomina, Institute of Applied Physics of the RAS (Russian Federation) . . . . . [9999-48]

Monitoring thermal discharge from nuclear plant through Landsat-8, Difeng Wang, Delu Pan, Fang Gong, Qiankun Zhu, Peng Chen, The Second Institute of Oceanography, SOA (China) . . . . . [9999-50]

CONFERENCE 10000

LOCATION: ROOM PENTLAND

Monday–Wednesday 26–28 September 2016 • Proceedings of SPIE Vol. 10000

Sensors, Systems, and Next-Generation Satellites

Conference Chairs: **Roland Meynart,** European Space Research and Technology Ctr. (Netherlands); **Steven P. Neeck,** NASA Headquarters (United States); **Toshiyoshi Kimura,** Japan Aerospace Exploration Agency (Japan)

Conference Co-Chair: **Haruhisa Shimoda,** Tokai Univ. (Japan)

Programme Committee: **Olivier Saint-Pe,** Airbus Defence and Space (France); **Xiaoxiong J. Xiong,** NASA Goddard Space Flight Ctr. (United States)

MONDAY 26 SEPTEMBER

OPENING REMARKS

LOCATION: ROOM PENTLAND . . . . . .8:25 TO 8:30

SESSION 1

LOCATION: ROOM PENTLAND . . . . . .MON 8:30 TO 10:20

Japanese Missions I

Session Chair: **Toshiyoshi Kimura,**
Japan Aerospace Exploration Agency (Japan)

8:30: **Overview of Japanese Earth observation Programmes** *(Invited Paper)*, Haruhisa Shimoda, Tokai Univ. (Japan) . . . . . [10000-1]

9:00: **Current status of the dual-frequency precipitation radar on the global precipitation measurement core spacecraft and the new version of GPM standard products**, Kinji Furukawa, Tomomi Nio, Toshiyuki Konishi, Takeshi Masaki, Takuji Kubota, Riko Oki, Japan Aerospace Exploration Agency (Japan); Toshio Iguchi, National Institute of Information and Communications Technology (Japan). . . . . [10000-2]

9:20: **Current status of the Global Change Observation Mission 1st, Water 'SHIZUKU' (GCOM-W) and the Advanced Microwave Scanning Radiometer 2 (AMSR2)**, Takashi Maeda, Misako Kachi, Marehito Kasahara, Japan Aerospace Exploration Agency (Japan) . . . . . [10000-3]

9:40: **The Earthcare Cloud Profiling Radar, its PFM development status**, Hirotaka Nakatsuka, Eichi Tomita, Yoshihisa Aida, Yoshihiro Seki, Kazuyuki Okada, Kenta Maruyama, Yasuyuki Ishii, Nobuhiro Tomiyama, Japan Aerospace Exploration Agency (Japan); Yuichi Ohno, Hiroaki Horie, Kenji Sato, National Institute of Information and Communications Technology (Japan). . . . . [10000-4]

10:00: **Validation of burst overlapping for ALOS-2 PALSAR-2 ScanSAR-ScanSAR interferometry**, Ryo Natsuaki, Takeshi Motohka, Masato Ohki, Manabu Watanabe, Shinichi Suzuki, Japan Aerospace Exploration Agency (Japan). . . . . [10000-5]

Coffee Break . . . . . Mon 10:20 to 10:50

SESSION 2

LOCATION: ROOM PENTLAND . . . . . .MON 10:50 TO 12:50

Japanese Missions II

Session Chair: **Toshiyoshi Kimura,**
Japan Aerospace Exploration Agency (Japan)

10:50: **Radiometric performance of Second-generation Global Imager (SGLI) using integrating spheres**, Taichiro Hashiguchi, Yoshihiko Okamura, Kazuhiro Tanaka, Yukinori Nakajima, Japan Aerospace Exploration Agency (Japan); Koichi Suzuki, JASTECS Corp. (Japan); Takashi Sakashita, Takahiro Amano, NEC Corp. (Japan). . . . . [10000-6]

11:10: **The development status of the mission instruments of GOSAT-2**, Masakatsu Nakajima, Hiroshi Suto, Hiroko Imai, Kazuhiko Yotsumoto, Yukie Yajima, Makiko Hashimoto, Kei Shiomi, Japan Aerospace Exploration Agency (Japan). . . . . [10000-7]

11:30: **Design and qualification of the FTS-2 interferometer in GOSAT-2 spacecraft**, Yan Montembault, Michel Roux, Henry L. Buijs, Louis M. Moreau, Marc-André Soucy, ABB Analytical Measurement (Canada) . . . . . [10000-8]

11:50: **Flight model performances of HISUI hyperspectral sensor onboard ISS (International Space Station)**, Jun Tanii, Japan Space Systems (Japan); Akira Iwasaki, The Univ. of Tokyo (Japan). . . . . [10000-9]

12:10: **Case studies for observation planning algorithm of a Japanese spaceborne sensor: Hyperspectral Imager Suite (HISUI)**, Kenta Ogawa, Yukiko Konno, Rakuno Gakuen Univ. (Japan); Satoru Yamamoto, National Institute for Environmental Studies (Japan); Tsuneo Matsunaga, National Institute for Environmental Studies (Japan) and Rakuno Gakuen Univ. (Japan); Tetsushi Tachikawa, Mako Komoda, Osamu Kashimura, Japan Space Systems (Japan); Shuichi Rokugawa, The Univ. of Tokyo (Japan) . . . . . [10000-10]

12:30: **Japanese vegetation lidar (MOLI) on ISS**, Toshiyoshi Kimura, Tadashi Imai, Daisuke Sakaizawa, Junpei Murooka, Japan Aerospace Exploration Agency (Japan) . . . . . [10000-11]

Lunch Break . . . . . Mon 12:50 to 14:00

SESSION 3

LOCATION: ROOM PENTLAND . . . . . .MON 14:00 TO 15:30

European Missions

Session Chair: **Roland Meynart,**
European Space Research and Technology Ctr. (Netherlands)

14:00: **Status of ESA Earth observation missions** *(Invited Paper)*, Roland Meynart, European Space Research and Technology Ctr. (Netherlands) . . . . . [10000-12]

14:30: **Sentinel-3A: commissioning phase results of its optical payload**, Jens Nieke, Constantin Mavrocordatos, European Space Research and Technology Ctr. (Netherlands) . . . . . [10000-13]

14:50: **Sentinel-2A image quality commissioning phase final results: geometric calibration and performances**, Florie Languille, Cécile Dechoz, Angélique Gaudel, Daniel Greslou, Françoise de Lussy, Thierry L. Trémas, Ctr. National d'Études Spatiales (France); Vincent Poulain, Thales Services (France); Stéphane Massera, Institut Géographique National (France) . . . . . [10000-14]

15:10: **PRISMA mission overview and main technological innovations**, Luigi Ansalone, Rocchina Guarini, Silvia Mari, Roberto Formaro, Rosa Loizzo, Francesco Longo, Giancarlo Varacalli, Agenzia Spaziale Italiana (Italy); Marco Meini, Massimo Cosi, Finmeccanica (Italy); Tommaso Fossati, Cristiano Contini, CGS S.p.A. Compagnia Generale per lo Spazio (Italy) . . . . . [10000-15]

Coffee Break . . . . . Mon 15:30 to 16:00

Remote Sensing Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

TUESDAY 27 SEPTEMBER

SESSION 4

LOCATION: ROOM PENTLAND . . . . . TUE 8:30 TO 10:40

US Missions

Session Chair: **Steven P. Neeck,** NASA Headquarters (United States)

8:30: **Overview of the NASA Earth Science Flight Programme** *(Invited Paper)*, Steven P. Neeck, NASA Headquarters (United States). . . . . [10000-17]

9:00: **Implementing the Surface Water and Ocean Topography (SWOT) Mission**, Steven P. Neeck, Eric J. Lindstrom, NASA Headquarters (United States); Parag V. Vaze, Lueng-Fu Lee, Jet Propulsion Lab. (United States) . . . . . [10000-18]

9:20: **The Sentinel-6 High Precision Altimetry Mission**, Steven P. Neeck, Eric J. Lindstrom, NASA Headquarters (United States); Parag V. Vaze, Jet Propulsion Lab. (United States). . . . . [10000-19]

9:40: **Continuing the Earth Radiation Budget Record: CERES FM-6 and RBI**, Kory J. Priestley, NASA Langley Research Ctr. (United States); George L. Smith, Mohan Shankar, Phillip C. Hess, Science Systems & Applications, Inc. (United States) . . . . . [10000-20]

10:00: **Mistic winds, a microsatellite constellation approach to high-resolution observations of the atmosphere using infrared sounding and 3d winds measurements**, Kevin R. Maschhoff, John J. Polizotti, BAE Systems (United States); Hartmut H. Aumann, Jet Propulsion Lab. (United States); Joel Susskind, NASA Goddard Space Flight Ctr. (United States) . . . . . [10000-21]

10:20: **TIRCIS: thermal infrared compact imaging spectrometer for small satellite applications**, Robert Wright, Paul G. Lucey, Sarah T. Crites, Mark Wood, Harold Garbeil, Casey I. Honniball, Andrea Gabrieli, Univ. of Hawai'i at Manoa (United States). . . . . [10000-22]

Coffee Break . . . . . Tue 10:40 to 11:10

SESSION 5

LOCATION: ROOM PENTLAND ..... TUE 11:10 TO 12:50

FPA

Session Chair: **Olivier Saint-Pe,** Airbus Defence and Space (France)

11:10: **Space activity and Programmes at Sofradir**, Philippe Chorier, Nicolas Jamin, Bruno Fièque, Cédric Leroy, Patricia Pidancier, Laurent Vial, Anne Delannoy, SOFRADIR (France) . . . . . [10000-23]

11:30: **Dark current measurements at low focal plane temperature**, Lilian Martineau, Jocelyn Berthoz, Laurent Rubaldo, SOFRADIR (France) . . [10000-24]

11:50: **Low dark current LWIR and VLWIR HgCdTe focal plane arrays at AIM**, Stefan Hanna, Detlef Eich, Heinrich Figgemeier, Martin Mahlein, Wilhelm Schirmacher, Richard Thöt, W. Fick, AIM INFRAROT-MODULE GmbH (Germany) . . . . . [10000-25]

12:10: **A novel 120dB hyperspectral platform for Earth observation**, Benoit Dupont, Pyxalis (France) . . . . . [10000-26]

12:30: **Leonardo developments of MCT focal plane array sensors for remote sensing and Earth observation applications**, Stuart A. Cripps, Les G. Hipwood, Ian M. Baker, Chris D. Maxey, Harald J. Weller, Leonardo-Finmeccanica (United Kingdom) . . . . . [10000-73]

Lunch/Exhibition Break . . . . . Tue 12:50 to 13:50

SESSION 6

LOCATION: ROOM PENTLAND ..... TUE 13:50 TO 15:10

Calibration I

Session Chair: **Xiaoxiong J. Xiong,**
NASA Goddard Space Flight Ctr. (United States)

13:50: **Overview of calibration and validation activities for the EUMETSAT polar system: second generation (EPS-SG) visible/infrared imager (METimage)**, Pepe L. Phillips, Roberto Bonsignori, Peter Schlüssel, European Organisation for the Exploitation of Meteorological Satellites (Germany); Isabel Zerfowski, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Philip D Watts, Loredana Spezzi, EUMETSAT (Germany); Frank Schmülling, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [10000-27]

14:10: **Calibration/validation strategy for GOES-R**, Jon P. Fulbright, Arctic Slope Technical Services Inc. (United States); Elizabeth J. McMichael, Science and Technology Corp. (United States); David R. Pogorzala, Integrity Applications, In.c (United States); Wayne MacKenzie, National Oceanic and Atmospheric Adminstration (United States); Ryan Williams, Stellar Solutions Inc. (United States); Kathryn W. Miretzky, Science and Technology Corp. (United States); Dawn A. Carter, Raytheon Co. (United States); Randall Race, Arctic Slope Technical Services Inc. (United States); Matthew Seybold, National Oceanic and Atmospheric Adminstration (United States). . . . . [10000-28]

14:30: **Application of new techniques in the calibration of the TROPOMI-SWIR instrument**, Paul Tol, Richard M. van Hees, Tim van Kempen, SRON Netherlands Institute for Space Research (Netherlands); Matthijs Krijger, SRON Netherlands Institute for Space Research (Netherlands) and Earth Space Solutions (Netherlands); Sidney Cadot, SRON Netherlands Institute for Space Research (Netherlands) and Jigsaw B.V. (Netherlands); Ilse Aben, SRON Netherlands Institute for Space Research (Netherlands); Antje Ludewig, Royal Netherlands Meteorological Institute (Netherlands); Jos Dingjan, Airbus Defence and Space Netherlands B.V. (Netherlands); Stefan T. Persijn, VSL Dutch Metrology Institute (Netherlands); Ruud W. M. Hoogeveen, SRON Netherlands Institute for Space Research (Netherlands). . . . . [10000-29]

14:50: **Sixteen years of Terra MODIS on-orbit operation, calibration, and performance**, Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States); William L. Barnes, Univ. of Maryland, Baltimore County (United States); Amit Angal, Science Systems & Applications, Inc. (United States). . . . [10000-31]

Coffee Break . . . . . Tue 15:10 to 15:40

SESSION 7

LOCATION: ROOM PENTLAND .....TUE 15:40 TO 17:20

Calibration II

Session Chair: **Xiaoxiong J. Xiong,**
NASA Goddard Space Flight Ctr. (United States)

15:40: **SPECTRALON BRDF and DHR calibration in support of satellite instruments operating through shortwave infrared**, Georgi T. Georgiev, NASA Goddard Space Flight Ctr. (United States) and Science Systems and Applications, Inc. (United States); James J. Butler, NASA Goddard Space Flight Ctr. (United States); Catherine C. Cooksey, National Institute of Standards and Technology (United States); Leibo Ding, Science Systems & Applications, Inc. (United States) and NASA Goddard Space Flight Ctr. (United States) . [10000-32]

16:00: **MODIS solar diffuser on-orbit degradation characterization using improved SDSM screen modeling**, Hongda Chen, Amit Angal, Aisheng Wu, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . . . [10000-33]

16:20: **Simulating the directional, spectral and textural properties of a large-scale scene at high resolution using a MODIS BRDF product**, Rajagopalan Rengarajan, Adam A. Goodenough, John R. Schott, Rochester Institute of Technology (United States) . . . . . [10000-34]

16:40: **BRDF characterization and calibration inter-comparison between Terra MODIS, Aqua MODIS, and S-NPP VIIRS**, Tiejun Chang, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States); Amit Angal, Aisheng Wu, Science Systems & Applications, Inc. (United States) . . . . . [10000-35]

17:00: **Calibration procedures for imaging spectrometers: improving data quality from satellite missions to UAV campaigns**, Johannes Brachmann, Andreas Baumgartner, Thomas Schwarzmaier, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [10000-58]

WEDNESDAY 28 SEPTEMBER

SESSION 8

LOCATION: ROOM PENTLAND .....WED 8:30 TO 10:10

Calibration III

Session Chair: **Xiaoxiong J. Xiong,**
NASA Goddard Space Flight Ctr. (United States)

8:30: **Scheduling observations of celestial objects for Earth observing sensor calibration**, Truman Wilson, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . . . [10000-36]

8:50: **Suomi-NPP VIIRS unscheduled lunar observations**, Zhipeng Wang, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . . . [10000-37]

9:10: **Using the Moon to evaluate S-NPP VIIRS thermal emissive bands radiometric calibration stability**, Zhipeng Wang, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States); Yonghong Li, Science Systems & Applications, Inc. (United States). . . . . [10000-38]

9:30: **JPSS-1 VIIRS reflective solar band on-orbit calibration performance impacts due to SWIR nonlinearity artifacts**, David I. Moyer, Frank J. De Luccia, The Aerospace Corp. (United States); Evan Haas, Aerospace Corp (United States). . . . . [10000-39]

9:50: **Reprocessing VIIRS sensor data records from the early SNPP mission**, Slawomir Blonski, Univ. of Maryland, College Park (United States); Changyong Cao, NOAA National Environmental Satellite, Data, and Information Service (United States). . . . . [10000-40]

Coffee Break . . . . . Wed 10:10 to 10:40

CONFERENCE 10000

LOCATION: ROOM PENTLAND

SESSION 9

LOCATION: ROOM PENTLAND . . . . . .WED 10:40 TO 12:20

Calibration IV

Session Chair: **Xiaoxiong J. Xiong,** NASA Goddard Space Flight Ctr. (United States)

10:40: **Validation of NASA, NOAA and ESA thermal infrared satellite measurements using the Lake Thaoe and Slaton Sea automated validation sites**, Simon J. Hook, William R. Johnson, Robert G. Radocinski, Gerardo Rivera, Jet Propulsion Lab. (United States). . . . . [10000-41]

11:00: **Vicarious calibration of the multiviewing channel polarisation imager (3MI) of the EUMETSAT Polar System-Second Generation (EPS-SG)**, Thierry Marbach, European Organisation for the Exploitation of Meteorological Satellites (Germany); Bertrand Fougnie, Ctr. National d'Études Spatiales (France); Antoine Lacan, European Organisation for the Exploitation of Meteorological Satellites (Germany); Peter Schlüssel, EUMETSAT (Germany). . . . . [10000-42]

11:20: **Assessment of S-NPP VIIRS day/Night band on-orbit calibration**, Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States); Zhipeng Wang, Science Systems & Applications, Inc. (United States). . . . . [10000-43]

11:40: **Vicarious absolute radiometric calibration of GF-2 PMS sensor using permanent artificial targets in China**, Yaokai Liu, Chuanrong Li, Lingling Ma, Ning Wang, Yonggang Qian, Lingli Tang, Academy of Opto-Electronics, CAS (China) . . . . . [10000-44]

12:00: **Five-year operation of GOCI in-orbit radiometric calibration**, Seong-Ick Cho, Young Je Park, Ki-Beom Ahn, Eunsong Oh, Korea Institute of Ocean Science & Technology (Korea, Republic of); Sug-Whan Kim, Yonsei Univ. (Korea, Republic of) . . . . . [10000-45]

Lunch/Exhibition Break . . . . . .Wed 12:20 to 13:40

SESSION 10

LOCATION: ROOM PENTLAND . . . . . .WED 13:40 TO 15:20

Mission and Sensing Technologies I

Session Chair: **Steven P. Neeck,** NASA Headquarters (United States)

13:40: **Development and operation plan of the next geostationary ocean color remote sensing mission in Korea**, Seong-Ick Cho, Young Je Park, Ki-Beom Ahn, Eunsong Oh, Korea Institute of Ocean Science & Technology (Korea, Republic of) . . . . . [10000-46]

14:00: **SeaHawk: An advanced CubeSat mission for sustained ocean colour monitoring**, John M. Morrison, Univ. of North Carolina, Wilmington (United States); Alan Holmes, Cloudland Instruments (United States); Hessel Gorter, Hazel Jeffrey, Clyde Space Ltd. (United Kingdom) and Univ of North Carolina, Wilmington (United States); Gene C. Feldman, NASA Goddard Space Flight Ctr. (United States); Pamela Anderson, Clyde Space Ltd. (United Kingdom); Craig Clark, Clyde Space Ltd. (United Kingdom) and Univ of North Carolina, Wilmington (United States); Frederick S. Patt, NASA Goddard Space Flight Ctr. (United States). . . . . [10000-47]

14:20: **HATS (High Altitude Thermal Sounder): a passive sensor solution to 3D high-resolution mapping of upper atmosphere dynamics**, Larry Gordley, Benjamin T. Marshall, GATS, Inc. (United States); Richard L. Lachance, Gas Plume Imaging, LLC (Canada). . . . . [10000-48]

14:40: **Low-loss interference filter arrays made by plasma-assisted reactive magnetron sputtering (PARMS) for high-performance multispectral imaging**, Jan Broßmann, Thorsten Best, Thomas E. Bauer, Stefan Jakobs, Optics Balzers Jena GmbH (Germany); Thomas Eisenhammer, Optics Balzers AG (Liechtenstein) . . . . . [10000-49]

15:00: **A comparison between data processing techniques for FTS based on high frequency interferogram sampling**, Roberto Panzeri, Bortolino Saggin, Diego Scaccabarozzi, Marco Tarabini, Politecnico di Milano (Italy) . . . [10000-50]

Coffee Break . . . . . .Wed 15:20 to 15:50

SESSION 11

LOCATION: ROOM PENTLAND . . . . . WED 15:50 TO 17:10

Mission and Sensing Technologies II

Session Chairs: **Toshiyoshi Kimura,** Japan Aerospace Exploration Agency (Japan); **Roland Meynart,** European Space Research and Technology Ctr. (Netherlands)

15:50: **Novel techniques for the analysis of the TOA radiometric uncertainty**, Javier Gorroño, Andrew Banks, National Physical Lab. (United Kingdom); Ferran Gascon, ESRIN (Italy); Nigel Fox, National Physical Lab. (United Kingdom); Craig I. Underwood, Univ. of Surrey (United Kingdom) . . . . . [10000-51]

16:10: **Compact polarimetric SAR product and calibration considerations for target analysis**, Ramin Sabry, Defence Research and Development Canada (Canada) . . . . . [10000-52]

16:30: **A fast RCS accuracy assessment method for passive radar calibrators**, Yongsheng Zhou, Chuanrong Li, Lingli Tang, Lingling Ma, Academy of Opto-Electronics, CAS (China) . . . . . [10000-53]

16:50: **Analysis of smear in high-resolution remote sensing satellites**, Walid A. Wahballah, Taher M. Bazan, Fawzy El-Tohamy, Egyptian Armed Forces (Egypt); Mahmoud Fathy, Benha Univ. (Egypt) . . . . . [10000-55]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Method of stray-light correction and prediction for S-NPP VIIRS day-night band, Hongda Chen, Science Systems & Applications, Inc. (United States); Chengbo Sun, Global Science Technology, Inc. (United States); Kwofu V. Chiang, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . . . [10000-57]

Active structural vibration control for high-performance space optical payload, Bowen Zhang, Xiaoyong Wang, Dewei Sun, Beijing Institute of Space Mechanics and Electricity (China) . . . . . [10000-59]

The study of 700mm diameter primary mirror based on topology optimization and sensitivity analysis, Xin Wang, Jinsong Zhou, Juanjuan Jing, Lei Feng, Academy of Opto-Electronics, CAS (China); Wei Wang, Xi'an Institute of Optics and Precision Mechanics (China); Yacan Li, Academy of Opto-Electronics, CAS (China) . . . . . [10000-60]

Monolithic sensors for low-frequency motion measurement and control of spacecrafts and satellites, Fabrizio Barone, Gerardo Giordano, Fausto Acernese, Rocco Romano, Univ. degli Studi di Salerno (Italy) . . . . . [10000-61]

Optimal link budget to maximize data receiving from remote sensing satellite at different ground stations, Vinay Godse, Manipal Institute of Technology (India); Rukmini Banda, Research Ctr. Imarat (India). . . . . [10000-62]

A miniature design of imaging spectrometer with fery prism, Lei Feng, Jinsong Zhou, Juanjuan Jing, Academy of Opto-Electronics, CAS (China) . . . . . [10000-63]

Model development for MODIS thermal band electronic cross-talk, Tiejun Chang, Aisheng Wu, Xu Geng, Yonghong Li, Jake Brinkmann, Graziela Keller, Science Systems & Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . . . [10000-64]

Radiometric modelling and calibration of RBI, Elena M. Georgieva, Craig Turczynski, Barry Dunn, NASA Langley Research Ctr. (United States); Christopher Randall, Science Systems & Applications, Inc. (United States); Kory J. Priesley, NASA Langley Research Ctr. (United States) . . . . . [10000-65]

Software and mathematical support of Kazakhstani star tracker, Daulet Akhmedov, Suleimen Yelubayev, Institute of Space Techniques and Technology (Kazakhstan); Vladimir Ten, NC Kazakhstan Gharysh Sapary (Kazakhstan); Timur Bopeyev, Kuanysh Alipbayev, Anna Sukhenko, Institute of Space Techniques and Technology (Kazakhstan) . . . . . [10000-66]

A spaceborne visible-NIR hyperspectral imager for coastal phenology, Steven N. Osterman, Johns Hopkins Univ. Applied Physics Lab., LLC (United States); Frank E. Muller-Karger, Univ. of South Florida (United States); David C. Humm, Matthew W. Noble, Kim Strohbehn, William Jeffrey Lees, Shawn M. Begley, Mary R. Keller, Noam R. Izenberg, Johns Hopkins Univ. Applied Physics Lab., LLC (United States); M. Frank Morgan, Johns Hopkins Univ. Applied Physics Lab, LLC (United States); Adam S. Magruder, Nu-Tek Precision Optical Corp. (United States). . . . . [10000-67]

The multisensor payload 'Structura' for the observation of atmospheric night glows from the ISS board, Yury Krot, Boris Beliaev, Leonid V. Katkovsky, Aliaksandr Paseniuk, Belarusian State Univ. (Belarus) . . . . . [10000-68]

ISRD (inter-slot radiometric discrepancy) simulation based on end-to-end sray tracing for GOCI, Ki-Beom Ahn, Seong-Ick Cho, Eunsong Oh, Korea Institute of Ocean Science & Technology (Korea, Republic of) and Yonsei Univ. (Korea, Republic of); Young Je Park, Korea Institute of Ocean Science & Technology (Korea, Republic of); Sug-Whan Kim, Yonsei Univ. (Korea, Republic of) . . . . . [10000-69]

A line rate calculation method for arbitrary directional imaging of an Earth observing satellite, Moon-Jin Jeon, Eunghyun Kim, Seong-Bin Lim, Seok-Weon Choi, Korea Aerospace Research Institute (Korea, Republic of). . . . . [10000-70]

Remote sensing for chemicals based on whispering gallery modes using micro-optical sensors, Amir R. Ali, German Univ. in Cairo (Egypt) and Southern Methodist Univ. (United States); Catherein Noshy, Sara Morbil, German Univ. in Cairo (Egypt) . . . . . [10000-71]

High definition 3D imaging lidar system using CCD, Sung Eun Jo, Hong Jin Kong, Hyochoong Bang, KAIST (Korea, Republic of) . . . . . [10000-72]

CONFERENCE 10001

LOCATION: ROOM OCHILL 1-2-3

Wednesday–Thursday 28–29 September 2016 • Proceedings of SPIE Vol. 10001

Remote Sensing of Clouds and the Atmosphere

Conference Chairs: **Adolfo Comerón,** Univ. Politècnica de Catalunya (Spain); **Evgueni I. Kassianov,** Pacific Northwest National Lab. (United States); **Klaus Schäfer,** Karlsruher Institut für Technologie (Germany)

Conference Co-Chairs: **James W. Jack,** The Univ. of Edinburgh (United Kingdom); **Richard H. Picard,** ARCON Corp. (United States); **Konradin Weber,** Fachhochschule Düsseldorf (Germany)

Programme Committee: **Aldo Amodeo,** Istituto di Metodologie per l'Analisi Ambientale (Italy); **Christoph C. Borel-Donohue,** Air Force Institute of Technology (United States); **Young Joon Kim,** Gwangju Institute of Science and Technology (Korea, Republic of)

WEDNESDAY 28 SEPTEMBER

OPENING REMARKS

LOCATION: ROOM OCHILL 1-2-3 . . . . . 8:55 TO 9:00

SESSION 1

LOCATION: ROOM OCHILL 1-2-3 . . . . . WED 9:00 TO 12:40

Atmospheric Profiling of Aerosol, Trace Gases, and Meteorological Parameters of Remote Sensing

Session Chair: **Adolfo Comerón,** Univ. Politècnica de Catalunya (Spain)

9:00: **Ground-based remote sensing of clouds within ACTRIS** *(Invited Paper)*, Ewan O'Connor, The Univ. of Reading (United Kingdom) . . . . . [10001-1]

9:30: **Methane distributions and transports in the nocturnal boundary layer at a rural station**, Klaus Schäfer, Stefan Emeis, Caroline Brosy, Benjamin Wolf, Benjamin Fersch, Matthias Zeeman, Matthias Mauder, Karlsruher Institut für Technologie (Germany); Christoph Münkel, Vaisala GmbH (Germany) . [10001-2]

9:50: **Disposable falling sensors to monitor atmospheric parameters**, Silvano Bertoldo, Politecnico di Torino (Italy) and CINFAI (Italy); Claudio Lucianaz, Politecnico di Torino (Italy); Marco Allegretti, CINFAI (Italy); Giovanni Perona, Politecnico di Torino (Italy) and CINFAI (Italy) . . . . . [10001-3]

10:10: **Monitoring atmospheric aerosols by using AHI (Advanced Himawari Imager) on the Japanese satellite Himawari-8**, Itaru Sano, Akihito Yoshida, Kinki Univ. (Japan); Sonoyo Mukai, Kyoto College of Graduate Studies for Informatics (Japan); Makiko Nakata, Kinki Univ. (Japan) . . . . . [10001-4]

Coffee Break . . . . . Wed 10:30 to 11:00

11:00: **Remote sensing solutions for when spectrometers no longer are affordable**, Hedser H. van Brug, TNO Science and Industry (Netherlands); Huib Visser, Technisch Physische Dienst-TNO (Netherlands). . . . . [10001-5]

11:20: **MAJA Sentinel-2 atmospheric corrections**, Vincent Lonjou, Camille Desjardins, Olivier Hagolle, Beatrice Petrucci, Thierry L. Trémas, Sophie Lachérade, Ctr. National d'Études Spatiales (France); Aliaksei Makarau, Stefan Auer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . [10001-6]

11:40: **Comparison of unfiltered CERES radiances measured in the minor plane during summer solstices**, Z. Peter Szewczyk, George L. Smith, Science Systems and Applications, Inc. (United States); Kory J. Priestley, NASA Langley Research Ctr. (United States) . . . . . [10001-7]

12:00: **PICASSO VISION instrument design, EM test results and FM development status**, Antti Näsilä, Christer Holmlund, Rami Mannila, Ismo Näkki, Harri J. Ojanen, Heikki Saari, VTT Technical Research Ctr. of Finland Ltd. (Finland); Didier Fussen, Didier Pieroux, Philippe Demoulin, Belgian Institute for Space Aeronomy (Belgium). . . . . [10001-8]

12:20: **Measurements of profiles of aerosol/cloud in the lower atmosphere using lidar system**, Khaled Gasmi, King Fahd Univ. of Petroleum & Minerals (Saudi Arabia) . . . . . [10001-9]

Lunch/Exhibition Break . . . . . Wed 12:40 to 13:40

SESSION 2

LOCATION: ROOM OCHILL 1-2-3 . . . . . WED 13:40 TO 16:30

Radiative Transfer

Session Chair: **Evgueni I. Kassianov,**
Pacific Northwest National Lab. (United States)

13:40: **Accuracy of RT code SORD for realistic atmospheric profiles**, Sergey V. Korkin, Universities Space Research Association (United States); Alexei Lyapustin, NASA Goddard Space Flight Ctr. (United States); Aliaksandr Sinyuk, Sigma Space Corp. (United States); Brent Holben, NASA Goddard Space Flight Ctr. (United States) . . . . . [10001-10]

14:00: **CAPER: coherence and polarization in Earth radiation budget measurement**, J. R. Mahan, Virginia Polytechnic Institute and State Univ. (United States); Anum R. Barki, Kory J. Priestley, NASA Langley Research Ctr. (United States). . . . . [10001-11]

14:20: **New Shortwave Array Spectroradiometer-Hemispheric (SAS-He): hyperspectral design and initial applications**, Evgueni I. Kassianov, Connor Flynn, Pacific Northwest National Lab. (United States); James Barnard, Univ. of Nevada, Reno (United States); Brian Ermold, Larry K. Berg, Pacific Northwest National Lab. (United States). . . . . [10001-12]

14:40: **The impact of upgrading the background covariance matrices in NOAA Microwave Integrated Retrieval System (MIRS)**, Junye Chen, Univ. of Maryland, College Park (United States); Quanhua Liu, National Oceanic and Atmospheric Administration (United States); Mohar Chattopadhyay, Atmospheric and Environmental Research, Inc. (United States); Kevin L. Garrett, Riverside Technology, Inc. (United States); Christopher Grassotti, Univ. of Maryland, College Park (United States); Shuyan Liu, Cooperative Institute for Research in the Atmosphere (United States) and National Environmental Satellite, Data, and Information Service (United States) and Ctr. for Satellite Applications and Research (United States); Sid Boukabara, STAR/NESDIS/NOAA (United States) . . . . . [10001-13]

15:00: **Accurate and efficient correction of adjacency effects for high resolution imagery: comparison to the Lambertian correction for Landsat**, Alain Sei, Northrop Grumman Aerospace Systems (United States) . . . [10001-14]

Coffee Break . . . . . Wed 15:20 to 15:50

15:50: **Efficient and accurate atmospheric correction for high-resolution heterogeneous terrain**, Alain Sei, Northrop Grumman Aerospace Systems (United States). . . . . [10001-15]

16:10: **High-resolution aerosol data for air pollution mapping in Malaysian cities**, Kasturi D. Kanniah, Nurul Amalin F. Kamarul Zaman, Univ. Teknologi Malaysia (Malaysia) . . . . . [10001-16]

CONFERENCE 10001

LOCATION: ROOM OCHILL 1-2-3

SESSION 3

LOCATION: ROOM OCHILL 1-2-3 . . . . . WED 16:30 TO 18:10

Lidar, Radar and Passive Atmospheric Measurements I

Session Chair: **Klaus Schäfer,**
Karlsruher Institut für Technologie (Germany)

16:30: **Statistical performances of infrared satellite sensor in cloudy atmosphere**, Mouna Petitjean, Claire Lavigne, Karine Caillault, ONERA (France); Frédéric Parol, Univ. des Sciences et Technologies de Lille (France). . [10001-17]

16:50: **Statistical study of day and night hourly patterns of columnar aerosol properties using sun and star photometry measurements**, Daniel Perez Ramirez, Hassan Lyamani, Univ. de Granada (Spain); Alexander Smirnov, NASA Goddard Space Flight Ctr. (United States); Norman T. O´Neill, Univ. de Sherbrooke (Canada); Igor A. Veselovskii, Physics Instrumentation Ctr. (Russian Federation); Ariel Stein, National Oceanic and Atmospheric Administration (United States); David N. Whiteman, NASA Goddard Space Flight Ctr. (United States); Francisco José Olmo-Reyes, Lucas Alados-Arboledas, Univ. de Granada (Spain). . . . . [10001-18]

17:10: **Atmospheric dispersion of airborne pollen evidenced by near-surface and columnar measurements in Barcelona, Spain**, Michaël Sicard, Rebeca Izquierdo, Marta Alarcón, Jordina Belmonte, Adolfo Comerón, José Maria Baldasano, Univ. Politècnica de Catalunya (Spain) . . . . . [10001-19]

17:30: **Assimilation of microwave, infrared, and radio occultation satellite observations with a weather research and forecasting model for heavy rainfall forecasting**, Pakornpop Boonyuen, Falin Wu, Beihang Univ. (China); Parwapath Phunthirawuth, Weather Forecast Bureau (Thailand); Yan Zhao, Beihang Univ. (China) . . . . . [10001-20]

17:50: **Analysis of the atmospheric upward radiation in low latitude area**, Haiying Li, Zhensen Wu, Xidian Univ. (China); Leke Lin, China Research Institute of Radiowave Propagation (China); Changsheng Lu, Xidian Univ. (China) . . . . . [10001-25]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml .

Model of lidar return from remote aerosol formation, Valentina V. Bryukhanova, Ignatii V. Samokhvalov, National Research Tomsk State Univ. (Russian Federation) . . . . . [10001-27]

Camera-based forecasting of cloud coverage for optimization of energy grids, Daniel Manger, Frank Pagel, Alexander Arnoldt, Oliver Warweg, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10001-28]

An exceptionally elevated PBL as well as free troposphere aerosol observations during August 2015 summer heat wave over Racibórz, Poland, Artur Szkop, Aleksander Pietruczuk, Institute of Geophysics (Poland). [10001-29]

Analysis of a vortex precipitation process over Southwest China using AIRS/AQUA, Guoping Li, Chengdu Univ. of Information Technology (China); Chengcheng Ni, Chengdu Meteorological Bureau (China); Xiaozhen Xiong, Ctr. for Satellite Applications and Research (United States) . . . . . [10001-30]

Analysis of functional dependence polarization characteristics double scattering lidar return from water content drip clouds, Yevgeniy Nee, Valentina V. Bryukhanova, Anton A. Doroshkevich, National Research Tomsk State Univ. (Russian Federation) . . . . . [10001-31]

Preliminary assessment of GOSAT CO2 retrieval algorithm based on aerosol information, Tae-Young Goo, National Institute of Meteorological Research (Korea, Republic of). . . . . [10001-32]

Web-GIS platform for forest fire danger prediction in Ukraine: prospects of RS technologies, Nikolay V. Baranovskiy, Tomsk Polytechnic Univ. (Russian Federation); Marina V. Zharikova, Kherson National Technical Univ. (Ukraine) . . . . . [10001-33]

Optical properties of the cirrus cloud ice crystals with preferred azimuthal orientation for polarization lidars with azimuthal scanning, Alexander V. Konoshonkin, National Research Tomsk State Univ. (Russian Federation) and V.E. Zuev Institute of Atmospheric Optics (Russian Federation); Natalia V. Kustova, Sergey V. Nasonov, V.E. Zuev Institute of Atmospheric Optics (Russian Federation); Ilia D. Bryukhanov, National Research Tomsk State Univ. (Russian Federation); Viktor A. Shishko, V.E. Zuev Institute of Atmospheric Optics (Russian Federation); Anatoli G. Borovoi, V.E. Zuev Institute of Atmospheric Optics (Russian Federation) and National Research Tomsk State Univ. (Russian Federation) . . . . . [10001-34]

Retrieval of background surface reflectance with BRD components from pre-running BRDF, Sungwon Choi, Kyung-Soo Han, Kyeongsang Lee, Donghyun Jin, Darae Lee, Pukyong National Univ. (Korea, Republic of) . . . . . [10001-35]

Correlation analysis between Variability pattern of TPW and climate variables, Darae Lee, Kyung-Soo Han, Chaeyoung Kwon, Minji Seo, Kyeongsang Lee, Pukyong National Univ. (Korea, Republic of) . . . . . [10001-36]

Estimation of sulphur dioxide emission rate from a power plant based on the remote sensing measurement with an imaging DOAS instrument, Jihyo Chong, Young Joon Kim, Gwangju Institute of Science and Technology (Korea, Republic of); Jongho Baek, Univ. of New South Wales (Australia); Hanlim Lee, Pukyong National Univ. (Korea, Republic of) . . . . . [10001-37]

Joint processing of RS and WWLLN data for forest fire danger estimation: new concept, Nikolay V. Baranovskiy, Tomsk Polytechnic Univ. (Russian Federation); Svetlana Y. Krechetova, Marina Y. Belikova, Nina A. Kocheeva, Gorno-Altaisk State Univ. (Russian Federation); Elena P. Yankovich, Tomsk Polytechnic Univ. (Russian Federation). . . . . [10001-38]

Impact of soil moisture and soil temperature assimilation on thunderstorm, Dinesh Kumar, Central Univ. of Jammu (India); Osuri K. Krishna, National Institute of Technology, Rourkela (India); Uma C. Mohanty, Indian Institute of Technology Bhubaneswar (India); Krishan K. Kumar, Jawaharlal Nehru Univ. (India) and Central Univ. of Jammu (India) . . . . . [10001-39]

Ten years of ozone and halogens monitoring with ground based observations in the South Western region of the Iberian Peninsula, Daniele Bortoli, Maria Joao Costa, Pavan Kumar S. Kulkarni, Miguel Potes, André Albino, Ana Maria Silva, Univ. de Évora (Portugal) . . . . . [10001-40]

THURSDAY 29 SEPTEMBER

SESSION 4

LOCATION: ROOM OCHILL 1-2-3 . . . . . THU 9:00 TO 10:40

Lidar, Radar and Passive Atmospheric Measurements II

Session Chair: **Klaus Schäfer,**
Karlsruher Institut für Technologie (Germany)

9:00: **Improved ground-based FTS measurement for column abundance CO_2 retrievals**, Tae-Young Goo, National Institute of Meteorological Research (Korea, Republic of). . . . . [10001-21]

9:20: **A low-cost digital holographic imager for the study of cloud particles**, Thomas Chambers, Murray Hamilton, Iain Reid, The Univ. of Adelaide (Australia). . . . . [10001-22]

9:40: **Validation of CERES Flight Model 5 in-orbit calibrations using lunar observations**, Janet L. Daniels, George L. Smith, Susan Thomas, Science Systems and Applications, Inc. (United States); Kory J. Priestley, NASA Langley Research Ctr. (United States) . . . . . [10001-23]

10:00: **An improved cloud detection method based on relationship between objects of cloud and its shadow for HJ-1/CCD like imagery**, Bo Zhong, Wuhan Chen, Shanlong Wu, Qinhuo Liu, Institute of Remote Sensing and Digital Earth (China) . . . . . [10001-24]

10:20: **Estimation of the adjacency effect with multiple scattering in the simulated signals observed over rugged areas**, Cheng Jiang, Yunfei Bao, Kun Xing, Long Gao, Fangqi Li, Beijing Institute of Space Mechanics and Electricity (China) . . . . . [10001-26]

CONFERENCE 10002

LOCATION: ROOM HARRIS 2

Wednesday–Thursday 28–29 September 2016 • Proceedings of SPIE Vol. 10002

Optics in Atmospheric Propagation and Adaptive Systems

Conference Chairs: **Karin U. Stein,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **John D. Gonglewski,** European Office of Aerospace Research and Development (United Kingdom)

Programme Committee: **Ivo Buske,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Sylvain Cheinet,** Institut Franco-Allemand de Recherches de Saint-Louis (France); **David C. Dayton,** Applied Technology Associates (United States); **Denis Dion Jr.,** Defence Research and Development Canada, Valcartier (Canada); **Vladimir P. Lukin,** V.E. Zuev Institute of Atmospheric Optics (Russian Federation); **Cheryl Matson,** Univ. of California, San Diego (United States); **Sergio R. Restaino,** U.S. Naval Research Lab. (United States); **Alexander M. J. van Eijk,** TNO Defence, Security and Safety (Netherlands); **Arthur D. van Rheenen,** Norwegian Defence Research Establishment (Norway); **Mikhail A. Vorontsov,** Univ. of Dayton (United States); **Szymon Gladysz,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

WEDNESDAY 28 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: ROOM HARRIS 2 . . . . . 8:30 TO 8:40

SESSION 1

LOCATION: ROOM HARRIS 2 . . . . . WED 8:40 TO 11:20

Characterization of the Environment

Session Chair: **Alexander M. J. van Eijk,** TNO Defence, Security and Safety (Netherlands)

8:40: **A world-wide comparison of aerosol data** *(Invited Paper)*, Suzanne van Zyl, Institut Méditerranéen d'Océanologie (France); Jacques J. Piazzola, Gilles Tedeschi, Mediterranean Institute of Oceanography (France); Alexander M. van Eijk, TNO Defence, Security and Safety (Netherlands) and Ecole Centrale de Nantes (France) and Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10002-1]

9:10: **Comparison of MODTRAN simulations and transmission measurements by path-integrated and in-situ techniques over a rural site in northwestern Germany**, Silke Vogelbacher, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Alexander M. van Eijk, Leo H. Cohen, TNO Defence, Security and Safety (Netherlands); Erik Sucher, Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10002-2]

9:30: **Comparison of instruments investigating vertical profiles of optical turbulence and wind speed in the lower atmospheric boundary layer during frontal passages in northwestern Germany**, Detlev Sprung, Karin U. Stein, Erik Sucher, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Omer Porat, Avraham Englander, Shlomo Fastig, Soreq Nuclear Research Ctr. (Israel) . . . . . [10002-3]

9:50: **Characterization of optical turbulence at the GREGOR solar telescope: temporal and local behavior and its influence on the solar observations**, Detlev Sprung, Erik Sucher, Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Oskar F. von der Lühe, Thomas Berkefeld, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [10002-4]

Coffee Break . . . . . Wed 10:10 to 10:40

10:40: **Sensing the daytime profile of atmospheric turbulence for solar observations**, Oskar F. von der Lühe, Lars Bielak, M. Thomann, Torsten A. Waldmann, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [10002-5]

11:00: **Electro-optic testbed utilizing a dynamic range gated Rayleigh beacon for atmospheric turbulence profiling**, Steven M. Zuraski, Nathan M. Figlewski, Jason D. Scmidt, Steven T. Fiorino, Elizabeth A. Beecher, Jack E. McCrae, U.S. Air Force (United States). . . . . [10002-6]

SESSION 2

LOCATION: ROOM HARRIS 2 . . . . . WED 11:20 TO 12:00

The First European South African Transmission Experiment (FESTER) I

Session Chair: **Karin U. Stein,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

11:20: **FESTER: a propagation experiment, overview and first results**, Christian Eisele, Dirk P. Seiffer, Erik Sucher, Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Willie Gunter, Carl K. Wainman, Benita Maritz, Institute for Maritime Technology (South Africa); Alexander M. .J. van Eijk, TNO Defence, Security and Safety (Netherlands) . . . . . [10002-7]

11:40: **First results on the Experiment FESTER on optical turbulence over False Bay South Africa: dependencies and consequences**, Detlev Sprung, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Alexander M. van Eijk, TNO Defence, Security and Safety (Netherlands) and Ecole Centrale de Nantes (France); Christian Eisele, Erik Sucher, Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10002-8]

Lunch/Exhibition Break . . . . . Wed 12:00 to 13:30

SESSION 3

LOCATION: ROOM HARRIS 2 . . . . . WED 13:30 TO 14:30

The First European South African Transmission Experiment (FESTER) II

Session Chair: **Karin U. Stein,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

13:30: **Path homogeneity along a horizontal line-of-sight path during the FESTER experiment: first results**, Willem H. Gunter, Benita Maritz, M. Koago, Carl K. Wainman, M. E. Gardener, Institute for Maritime Technology (South Africa); F. February, Daeho Electric Co., Ltd. (South Africa); Alexander M. J. van Eijk, TNO Defence, Security and Safety (Netherlands) . . . . . [10002-9]

13:50: **Vertical atmospheric variability measured above water during the FESTER experiment: first results**, Benita Maritz, M. Koago, Carl K. Wainman, M. E. Gardener, Willem H. Gunter, Institute for Maritime Technology (South Africa); Alexander M. J. van Eijk, TNO Defence, Security and Safety (Netherlands) . . . . . [10002-10]

14:10: **Static and dynamic thermal infrared signatures measured during the FESTER experiment: first results**, Willem H. Gunter, F. February, Institute for Maritime Technology (South Africa); Dirk P. Seiffer, Christian Eisele, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . [10002-11]

SESSION 3

LOCATION: ROOM HARRIS 2 . . . . . WED 14:30 TO 16:40

Propagation through Optical Turbulence

Session Chair: **Szymon Gladysz,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

14:30: **Neural network simulation of the atmospheric point spread function for the adjacency effect research**, Xiaoshan Ma, Ctr. for Space Science and Applied Research (China); Haidong Wang, Ligang Li, National Space Science Ctr., CAS (China); Zhen Yang, Ctr. for Space Science and Applied Research (China); Xin Meng, Wei Ni, Yulun Ll, National Space Science Ctr., CAS (China) . . . . . [10002-12]

14:50: **Measurement of optical blurring in a turbulent cloud chamber**, Corey D. Packard, ThermoAnalytics, Inc. (United States); David S. Ciochetto, Will H. Cantrell, Michael C. Roggemann, Raymond A. Shaw, Michigan Technological Univ. (United States) . . . . . [10002-13]

CONFERENCE 10002

LOCATION: ROOM HARRIS 2

15:10: **Absolute and differential G-tilt in turbulence: theory and applications**, Szymon Gladysz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10002-14]

Coffee Break . . . . . .Wed 15:30 to 16:00

16:00: **Laboratory synthesis of atmospheric anisotropic turbulence characterized by twin beam correlations**, Gustavo Funes, Univ. de los Andes (Chile); Felipe Olivares, Darío G. Pérez, Pontificia Univ. Católica de Valparaíso (Chile); Camilo Weinberg, Pontificia Univ. Católica de Valparaiso (Chile) and Univ. de los Andes (Chile); Yeraldiinne Carrasco, Pontificia Univ. Católica de Valparaiso (Chile); Leandro Nuñez, Pontificia Univ. Católica de Valparaiso (Chile) and Univ. de los Andes (Chile) . . . . . [10002-16]

16:20: **Modelling of propagation and spreading of a laser beam through atmospheric turbulence**, Fedor V. Shugaev, Ludmila S. Shtemenko, Oxana A. Nikolaeva, Dmitri Y. Cherkasov, Olga I. Dokukina, M.V. Lomonosov Moscow SU (Russian Federation) . . . . . [10002-17]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Performance analysis of MRC spatial diversity receiver system for satellite-to-ground downlink optical transmissions, Kangning Li, Jing Ma, Liying Tan, Siyuan Yu, Yubin Cao, Harbin Institute of Technology (China). . . . . [10002-21]

THURSDAY 29 SEPTEMBER

SESSION 5

LOCATION: ROOM HARRIS 2 . . . . . THU 9:00 TO 10:30

Mitigation of Atmospheric Effects

Session Chair: **John D. Gonglewski,** European Office of Aerospace Research and Development (United Kingdom)

9:00: **Local motion compensation in image sequences degraded by atmospheric turbulence: a comparative analysis of optical flow vs. block matching methods** *(Invited Paper)*, Claudia S. Hübner, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10002-18]

9:30: **Performance of wavefront-sensorless adaptive optics using modal and zonal correction**, Esdras Anzuola, Max Segel, Szymon Gladysz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Karin Stein, Fraunhofer IOSB (Germany). . . . . [10002-19]

9:50: **Fourier holography in holographic optical sensors**, Sergey B. Odinokov, Bauman Moscow State Technical Univ. (Russian Federation); Vladimir Y. Venediktov, Saint Petersburg Electrotechnical Univ. “LETI” (Russian Federation) . . . . . [10002-20]

CONFERENCE 10003

LOCATION: ROOM MOORFOOT

Wednesday 28 September 2016 • Proceedings of SPIE Vol. 10003

Active and Passive Microwave Remote Sensing for Environmental Monitoring

Conference Chairs: **Claudia Notarnicola,** EURAC research (Italy); **Simonetta Paloscia,** Istituto di Fisica Applicata Nello Carrara (Italy); **Nazzareno Pierdicca,** Univ. degli Studi di Roma La Sapienza (Italy); **Edward Mitchard,** The Univ of Edinburgh (United Kingdom)

Programme Committee: **Richard Bamler,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Fabio Bovenga,** CNR ISSIA (Italy); **Fabio Covello,** Agenzia Spaziale Italiana (Italy); **Mihai P. Datcu,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Fabio Del Frate,** Univ. degli Studi di Roma "Tor Vergata" (Italy); **Dara Entekhabi,** Massachusetts Institute of Technology (United States); **Carlos Lopez-Martinez,** Univ. Politècnica de Catalunya (Spain); **Luca Pulvirenti,** CIMA Research Foundation (Italy); **Emanuele Santi,** Istituto di Fisica Applicata Nello Carrara (Italy); **Stefan Schneiderbauer,** EURAC research (Italy); **David Small,** Univ. of Zürich (Switzerland)

WEDNESDAY 28 SEPTEMBER

JOINT SESSION 1

LOCATION: ROOM MOORFOOT . . . . . WED 13:30 TO 15:10

SAR Data Processing I

Session Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

Joint Session between
Conference 10003 and Conference 10004

13:30: **Estimation of radar power losses in ice by using radar sounder and ice core data**, Ana-Maria Ilisei, Univ. degli Studi di Trento (Italy); Jilu Li, Sivaprasad Gogineni, The Univ. of Kansas (United States); Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-44]

13:50: **A bat-inspired technique for clutter reduction in radar sounder systems**, Leonardo Carrer, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-45]

14:10: **Integration of Radarsat-2 and TerraSAR-X polarimetric data for crop growth stages estimation**, Yifeng Li, George A. Lampropoulos, A.U.G. Signals Ltd. (Canada) . . . . . [10004-46]

14:30: **An approach for SLAR images denoising based on removing regions with low visual quality for oil spill detection**, Beatriz Alacid Soto, Pablo Gil, Univ. de Alicante (Spain) . . . . . [10004-47]

14:50: **Full-aspect 3D target reconstruction of interferometric circular SAR**, Yun Lin, Qian Bao, Institute of Electronics (China); Liying Hou, Lingjuan Yu, Chinese Academy of Sciences (China); Wen Hong, Institute of Electronics (China) . . . . . [10004-48]

Coffee Break . . . . . Wed 15:10 to 15:40

JOINT SESSION 2

LOCATION: ROOM MOORFOOT . . . . . WED 15:40 TO 17:20

SAR Data Processing II

Session Chair: **Claudia Notarnicola,** EURAC (Italy)

Joint Session between
Conference 10003 and Conference 10004

15:40: **Automatic GCP extraction with high resolution COSMO-SkyMed products**, Davide O. Nitti, GAP S.r.l. (Italy); Alberto Morea, Politecnico di Bari (Italy); Raffaele Nutricato, GAP S.r.l. (Italy); Maria T. Chiaradia, Politecnico di Bari (Italy); Claudio La Mantia, Luigi Agrimano, Sergio Samarelli, Planetek Italia S.r.l. (Italy) . . . . . [10003-1]

16:00: **Automatic SAR/optical cross-matching for GCP monograph generation**, Raffaele Nutricato, GAP S.r.l. (Italy); Alberto Morea, Politecnico di Bari (Italy); Davide O. Nitti, GAP S.r.l. (Italy); Claudio La Mantia, Luigi Agrimano, Sergio Samarelli, Maria T. Chiaradia, Planetek Italia S.r.l. (Italy). . . . . [10003-2]

16:20: **Contextual descriptors ad neural networks for scene analysis in VHR SAR images**, Fabio Del Frate, Matteo Picchiani, Alessia Falasco, Giovanni Schiavon, Univ. degli Studi di Roma "Tor Vergata" (Italy). . . . . [10003-3]

16:40: **Tropical forest heterogeneity from TanDEM-X InSAR and LiDAR observations in Indonesia**, Elsa Carla De Grandi, Edward T. A. Mitchard, The Univ of Edinburgh (United Kingdom). . . . . [10003-4]

17:00: **Detection and quantification of precipitations signatures on synthetic aperture radar imagery at X band**, Saverio Mori, Sapienza Univ. di Roma (Italy) and CETEMPS (Italy); Mario Montopoli, Consiglio Nazionale delle Ricerche (Italy) and CETEMPS (Italy); Luca Pulvirenti, CIMA Research Foundation (Italy) and CETEMPS (Italy); Frank S. Marzano, Sapienza Univ. di Roma (Italy) and CETEMPS (Italy); Nazzareno Pierdicca, Sapienza Univ. di Roma (Italy) . [10003-5]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Interferometric COSMO-SkyMed spotlight DEM generation and validation, Nunzia Lombardi, Rino Lorusso, Agenzia Spaziale Italiana (Italy) and Univ. degli Studi della Basilicata (Italy); Giovanni Millilo, Agenzia Spaziale Italiana (Italy) . . . . . [10003-19]

Characterization and discrimination of evolving mineral and plant oil slicks based on L-band synthetic aperture radar (SAR), Cathleen E. Jones, Jet Propulsion Lab. (United States); Martine Espeseth, UiT The Arctic Univ. of Norway (Norway); Benjamin M. Holt, California Institute of Technology (United States); Camilla Brekke, Stine Skrunes, UiT The Arctic Univ. of Norway (Norway) . . . . . [10003-20]

Research on the method of correcting atmospheric disturbance for GBInSAR based on permanent scatterer points, Jianping Yue, Shun Yue, Zhiwei Qiu, Leping Guo, Yi Pan, Hohai Univ. (China) . . . . . [10003-21]

Rheticus: an automatic cloud-based geo-information service platform for territorial monitoring, Sergio Samarelli, Antonio P. Lorusso, Luigi Agrimano, Planetek Italia S.r.l. (Italy); Raffaele Nutricato, GAP S.r.l. (Italy); Fabio Bovenga, CNR ISSIA (Italy); Davide O. Nitti, GAP S.r.l. (Italy); Maria T. Chiaradia, Politecnico di Bari (Italy) . . . . . [10003-22]

Structural health monitoring of engineered structures using a spaceborne synthetic aperture radar multitemporal approach: from cultural heritage sites to war zones, Pietro Milillo, Jet Propulsion Lab. (United States); Deodato Tapete, Francesca Cigna, British Geological Survey (United Kingdom); Daniele Perissin, Purdue Univ. (United States); Jacqueline Salzer, Helmholtz-Zentrum Potsdam Deutsches GeoForschungsZentrum GFZ (Germany); Paul Lundgren, Eric Fielding, Jet Propulsion Lab. (United States); Roland Burgmann, Univ. of California, Berkeley (United States); Filippo Biondi, Ministero Della Difesa (Italy); Giovanni Millilo, Agenzia Spaziale Italiana (Italy); Carmine Serio, Univ. degli Studi della Basilicata (Italy) . . . . . [10003-23]

Coastal saline soil identification with Radarsat-2 full-polarization data using SVM method, Tingting Zhang, Kaixin Xie, Shao Yun, Institute of Remote Sensing and Digital Earth (China) . . . . . [10003-24]

PROTHEGO: a harmonized approach to assess geohazards in areas of cultural heritage in Europe using remote sensing technologies, Francesca Cigna, British Geological Survey (United Kingdom); Claudio Margottini, Daniele Spizzichino, Istituto di Scienze dell'Atmosfera e del Clima (Italy); Giovanni B. Crosta, Paolo Frattini, Univ. degli Studi di Milano-Bicocca (Italy); Kyriacos Themistocleous, Cyprus Univ. of Technology (Cyprus); José A. Fernandez Merodo, Instituto Geologico y Minero de Espana (Spain). . . . . [10003-25]

25 years of satellite InSAR monitoring of ground instability and coastal geohazards in the archaeological site of Capo Colonna, Italy, Francesca Cigna, British Geological Survey (United Kingdom); Pierluigi Confuorto, Univ. degli Studi di Napoli Federico II (Italy); Alessandro Novellino, Geomatic Ventures Ltd. (United Kingdom); Deodato Tapete, British Geological Survey (United Kingdom); Diego Di Martire, Massimo Ramondini, Domenico Calcaterra, Univ. degli Studi di Napoli Federico II (Italy); Simon Plank, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Fabio Letto, Univ. della Calabria (Italy); Antonio Brigante, Brigante Engineering s.r.l. (Italy); Andrew Sowter, The Univ. of Nottingham (United Kingdom). . . . . [10003-26]

CONFERENCE 10003

LOCATION: ROOM MOORFOOT

Use of DEM, optical and radar images to identify geomorphological features for the paleoclimatic and paleoenvironmental reconstruction of the middle region of the Salado River Basin, Pampean Plain, Argentina, Nicole Nadín Pommarés, Univ. Nacional de la Plata (Argentina) and Ctr. de Estudios Integrales de la Dinámica Exógena (Argentina) and Consejo Nacional de Investigaciones Científicas y Técnicas (Argentina); Graciela Salinas de Salmuni, Comision Nacional de Actividades Espaciales (Argentina) and Consejo Nacional de Investigaciones Científicas y Técnicas (Argentina); Enrique E. Fucks, Univ. Nacional de la Plata (Argentina) . . . . . [10003-27]

Use of remote sensing for the preservation of coastal zones of the Rio de La Plata estuary, between Berisso and Punta Rasa, Argentina, Gabriela D'Amico, Univ. Nacional de la Plata (Argentina); Graciela Salinas de Salmuni, Comision Nacional de Actividades Espaciales (Argentina) and Consejo Nacional de Investigaciones Científicas y Técnicas (Argentina); Enrique E. Fucks, Claudia Carut, Univ. Nacional de la Plata (Argentina) . . . . . [10003-28]

THURSDAY 29 SEPTEMBER

SESSION 1

LOCATION: ROOM MOORFOOT . . . . . THU 9:00 TO 10:20

SAR Interferometry Techniques and Applications I

Session Chair: **Fabio Bovenga,** CNR ISSIA (Italy)

9:00: **Property-scale assessment of urban geohazards in the UNESCO WHL sites of Greater London (UK) using geological data and satellite remote sensing**, Francesca Cigna, Deodato Tapete, British Geological Survey (United Kingdom) . . . . . [10003-6]

9:20: **X-band airborne SAR tomography for forest volumes**, Fiona Muirhead, Iain H. Woodhouse, Bernard Mulgrew, The Univ. of Edinburgh (United Kingdom) . . . . . [10003-7]

9:40: **3D velocity field time series using synthetic aperture radar: application to tidal-timescale ice-flow variability in Rutford Ice Stream, West Antarctica**, Pietro Milillo, Jet Propulsion Lab. (United States); Brent Minchew, British Antarctic Survey (United Kingdom); Piyush Agram, Jet Propulsion Lab. (United States); Bryan Riel, Mark Simons, California Institute of Technology (United States) . . . . . [10003-8]

10:00: **Sensing urban dynamics with COSMO-SkyMed Persistent Scatterer interferometry in Naples, Italy**, Deodato Tapete, Francesca Cigna, British Geological Survey (United Kingdom); Pietro Milillo, Jet Propulsion Lab. (United States); Carmine Serio, Univ. degli Studi della Basilicata (Italy); Daniele Perissin, Purdue Univ. (United States); Giovanni Millilo, Agenzia Spaziale Italiana (Italy) . . . . . [10003-9]

Coffee Break . . . . . Thu 10:20 to 10:50

SESSION 2

LOCATION: ROOM MOORFOOT . . . . . THU 10:50 TO 11:50

SAR Interferometry Techniques and Applications II

Session Chair: **Emanuele Santi,**
Istituto di Fisica Applicata "Nello Carrara" (Italy)

10:50: **Comparative analysis of recent satellite missions for multi-temporal SAR interferometry**, Fabio Bovenga, Alberto Refice, Antonella Belmonte, Guido Pasquariello, CNR ISSIA (Italy) . . . . . [10003-10]

11:10: **High-resolution remote sensing data to monitor active volcanic areas: an application to the 2011-2015 eruptive activity of Mount Etna (Italy)**, Maria Marsella, Sapienza Univ. di Roma (Italy) . . . . . [10003-11]

11:30: **Contextual filtering method applied to sub-bands of interferometric image decomposition**, Sawssen Belhadj-Aissa, Faiza Hocine, Mohamed-Salah Boughacha, Aichouche Belhadj-Aissa, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria) . . . . . [10003-13]

Lunch Break . . . . . Thu 11:50 to 13:20

SESSION 3

LOCATION: ROOM MOORFOOT . . . . . THU 13:20 TO 15:10

Retrieval of Bio-geophysical Parameters from Microwave Data

Session Chair: **Edward Mitchard,**
The Univ of Edinburgh (United Kingdom)

13:20: **Advances in Satellite Altimetry and GNSS-Reflectometry for monitoring world's oceans and coasts,** Paolo Cipollini, Francisco M. Calafat, National Oceanography Ctr. (United Kingdom); Maria Paola Clarizia, Univ. of Michigan (United Kingdom); Christine Gommenginger, National Oceanography Ctr. (United Kingdom); Marcello Passaro, TU München (Germany); Helen Snaith, British Oceanographic Data Ctr. (United Kingdom) . . . . . [10003-29]

13:50: **Integration of radar and radiometric data from SMAP and Sentinel-1 sensors for soil moisture and vegetation monitoring**, Simonetta Paloscia, Emanuele Santi, Simone Pettinato, Istituto di Fisica Applicata "Nello Carrara" (Italy); Dara Entekhabi, Massachusetts Institute of Technology (United States) . . . . . [10003-15]

14:10: **A multitemporal probabilistic error correction approach to SVM classification of alpine glacier exploiting sentinel-1 images**, Mattia Callegari, Carlo Marin, Claudia Notarnicola, EURAC (Italy); Luca Carturan, Univ. degli Studi di Padova (Italy); Federico Covi, Stephan Galos, Univ. of Innsbruck (Austria); Roberto Seppi, Univ. degli Studi di Pavia (Italy) . . . . . [10003-16]

14:30: **Soil moisture retrieval at regional scale from AMSR2 data**, Simonetta Paloscia, Emanuele Santi, Simone Pettinato, Istituto di Fisica Applicata "Nello Carrara" (Italy); Luca Brocca, Luca Ciabatta, Istituto di Ricerca per Protezione Idrogeologica (Italy) . . . . . [10003-17]

14:50: **SMOS, ASCAT, SMAP and ISMN soil moisture comparison through the triple and quadruple collocation technique**, Nazzareno Pierdicca, Fabio Fascetti, Sapienza Univ. di Roma (Italy); Luca Pulvirenti, CIMA Research Foundation (Italy); Raffaele Crapolicchio, Serco SpA (Italy) . . . . . [10003-18]

CONFERENCE 10004

LOCATION: ROOM MOORFOOT

Monday–Wednesday 26–28 September 2016 • Proceedings of SPIE Vol. 10004

Image and Signal Processing for Remote Sensing

Conference Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

Conference Co-Chairs: **Jon Atli Benediktsson,** Univ. of Iceland (Iceland); **Francesca Bovolo,** Fondazione Bruno Kessler (Italy)

Programme Committee: **Selim Aksoy,** Bilkent Univ. (Turkey); **Luciano Alparone,** Univ. degli Studi di Firenze (Italy); **José M. Bioucas-Dias,** Univ. Técnica de Lisboa (Portugal); **Gustavo Camps-Valls,** Univ. de València (Spain); **Jocelyn Chanussot,** Lab. des Images et des Signaux (France); **Chi-Hau Chen,** Univ. of Massachusetts Dartmouth (United States); **Fabio Dell'Acqua,** Univ. degli Studi di Pavia (Italy); **Begüm Demir,** Univ. degli Studi di Trento (Italy); **Peijun Du,** Nanjing Univ. (China); **Giles M. Foody,** The Univ. of Nottingham (United Kingdom); **Andrea Garzelli,** Univ. degli Studi di Siena (Italy); **Jordi Inglada,** Ctr. d'Etudes Spatiales de la Biosphère (France); **Gabriele Moser,** Univ. degli Studi di Genova (Italy); **Allan A. Nielsen,** Technical Univ. of Denmark (Denmark); **Ryuei Nishii,** Kyushu Univ. (Japan); **Antonio J. Plaza Miguel,** Univ. de Extremadura (Spain); **John A. Richards,** The Australian National Univ. (Australia); **Josiane B. Zerubia,** INRIA Sophia Antipolis - Méditerranée (France)

MONDAY 26 SEPTEMBER

OPENING REMARKS

LOCATION: ROOM MOORFOOT . . . . . 9:10 TO 9:20

SESSION 1

LOCATION: ROOM MOORFOOT . . . . . MON 9:20 TO 10:20

Geocoding and Coregistration

Session Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

9:20: **Geocoding uncertainty analysis for the automated processing of Sentinel-1 data using Sentinel-1 Toolbox software**, Alena Dostalova, Vahid Naeimi, Wolfgang Wagner, Stefano Elefante, Senmao Cao, Technische Univ. Wien (Austria); Henrik Persson, Swedish Univ. of Agricultural Sciences (Sweden) . . . . . [10004-1]

9:40: **Statistical power of intensity- and feature-based similarity measures for registration of multimodal remote sensing images**, Mikhail L. Uss, National Aerospace Univ. (Ukraine); Benoit Vozel, Univ. de Rennes 1 (France); Vladimir V. Lukin, National Aerospace Univ. (Ukraine); Kacem Chehdi, Univ. de Rennes 1 (France) . . . . . [10004-3]

10:00: **Evaluation of georeferencing methods with respect to their suitability to address unsimilarity between the image to be referenced and the reference image**, Stefan Bruestle, Bastian Erdnuess, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10004-5]

Coffee Break . . . . . Mon 10:20 to 10:50

SESSION 2

LOCATION: ROOM MOORFOOT . . . . . MON 10:50 TO 12:30

Pre-processing and Resolution Enhancement

Session Chair: **Andrea Garzelli,** Univ. degli Studi di Siena (Italy)

10:50: **A new single band atmospheric correction tool for thermal infrared data: application to Landsat 7-ETM+**, Joan M. Galve, César Coll, Univ. de València (Spain); Juan Manuel Sánchez, Univ. de Castilla-La Mancha (Spain); Enric Valor, Raquel R. Niclòs, Lluis Pérez-Planells, Carolina Doña, Vicente Caselles Miralles, Univ. de València (Spain) . . . . . [10004-6]

11:10: **Efficiency analysis for 3D filtering of multichannel images**, Ruslan A. Kozhemiakin, Oleksii S. Rubel, Sergey K. Abramov, Vladimir V. Lukin, National Aerospace Univ. (Ukraine); Benoit Vozel, Kacem Chehdi, Univ. de Rennes 1 (France) . . . . . [10004-7]

11:30: **Pansharpening remotely sensed data by using nonnegative matrix factorization and spectral-spatial degradation models**, Nezha Farhi, Moussa Sofiane Karoui, Khelifa Djerriri, Issam Boukerch, Ctr. National des Techniques Spatiales (Algeria) . . . . . [10004-8]

11:50: **Scatter-plot-based method for noise characteristics evaluation in remote sensing images using adaptive image clustering procedure**, Victoriya V. Abramova, Sergey K. Abramov, Vladimir V. Lukin, National Aerospace Univ. (Ukraine); Benoit Vozel, Kacem Chehdi, Univ. de Rennes 1 (France) . . . . . [10004-9]

12:10: **Resolution enhancement of tri-stereo remote sensing images by super resolution methods**, Çaglayan Tuna, Alper Akoguz, Gozde Unal, Elif Sertel, Istanbul Technical Univ. (Turkey) . . . . . [10004-10]

Lunch Break . . . . . Mon 12:30 to 13:50

SESSION 3

LOCATION: ROOM MOORFOOT . . . . . MON 13:50 TO 15:30

Target and Object Detection

Session Chair: **Benoit Vozel,** Univ. de Rennes 1 (France)

13:50: **A novel method to detect shadows on multispectral images**, Hazan Daglayan Sevim, Atilim Üniv. (Turkey); Yasemin Yardimci Çetin, Didem Ozisik Baskurt, Middle East Technical Univ. (Turkey) . . . . . [10004-11]

14:10: **Individual tree detection in orchards from VHR satellite images using scale-space theory**, Milad Mahour, Univ. of Twente (Netherlands); Valentyn A. Tolpekin, Alfred Stein, Univ. Twente (Netherlands) . . . . . [10004-12]

14:30: **Clairvoyant fusion: a new methodology for designing robust detection algorithms**, Alan P. Schaum, U.S. Naval Research Lab. (United States) . . . . . [10004-13]

14:50: **Demonstration of multispectral target locator using collocated RF antenna/LWIR joint sensor system and datacube**, Woo-Yong Jang, Univ. of Dayton Research Institute (United States); James Park, George Kakas, Michael Noyola, Air Force Research Lab. (United States) . . . . . [10004-14]

15:10: **Iterative matched filtering for detection of non-rare target materials in hyperspectral imagery**, Kwang-Eun Kim, Sung Soon Lee, Korea Institute of Geoscience & Mineral Resources (Korea, Republic of); Hyun-Seob Baik, Univ. of Science & Technology (Korea, Republic of) . . . . . [10004-15]

Coffee Break . . . . . Mon 15:30 to 16:00

Remote Sensing Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

CONFERENCE 10004

LOCATION: ROOM MOORFOOT

TUESDAY 27 SEPTEMBER

SESSION 4

LOCATION: ROOM MOORFOOT . . . . . TUE 8:50 TO 10:30

Lidar Data Analysis

Session Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

8:50: **A rule-based classification from a region-growing segmentation of airborne lidar**, Jorge Martínez Sánchez, Francisco Fernández Rivera, José Carlos Cabaleiro Domínguez, David López Vilariño, Tomás Fernández Pena, Ctr. Singular de Investigación en Tecnoloxías da Información (Spain) . . . . [10004-16]

9:10: **A novel feature extraction methodology for region classification in lidar data**, Nina M. Varney, ENVIEW (United States); Garrett C. Sargent, Vijayan K. Asari, Univ. of Dayton (United States). . . . . [10004-17]

9:30: **A novel approach to internal crown characterization for coniferous tree species classification**, Aravind Harikumar, Francesca Bovolo, Fondazione Bruno Kessler (Italy); Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-18]

9:50: **Graph-based segmentation of airborne lidar point clouds**, David López Vilariño, Jorge Martínez Sánchez, Francisco Fernández Rivera, José Carlos Cabaleiro Domíngez, Tomás Fernández Pena, Univ. de Santiago de Compostela (Spain) . . . . . [10004-19]

10:10: **Building footprint extraction from digital surface models using neural networks**, Ksenia Davydova, Shiyong Cui, Peter Reinartz, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [10004-20]

Coffee Break . . . . . Tue 10:30 to 11:00

SESSION 5

LOCATION: ROOM MOORFOOT . . . . . TUE 11:00 TO 12:40

Image Classification

Session Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

11:00: **Domain adaptation based on deep denoising auto-encoders for classification of remote sensing images**, Emanuele Riz, Begüm Demir, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-21]

11:20: **Classification of remote sensed images using random forests and CRF-RNN framework**, Sankaranarayanan Piramanayagam, Yilong Liang, Yansong Liu, Rochester Institute of Technology (United States); Wade Schwartzkopf, Frederick W. Koehler, National Geospatial-Intelligence Agency (United States); Eli Saber, Rochester Institute of Technology (United States) . . . . . [10004-22]

11:40: **True false ground truth data: what interest?**, Kacem Chehdi, Claude Cariou, Univ. de Rennes 1 (France). . . . . [10004-23]

12:00: **Regions-of-interest extraction from remote sensing imageries using visual attention modelling**, Hui Li Tan, Jiayuan Fan, Institute for Infocomm Research (Singapore); Maria Toomik, University College London (United Kingdom) and Institute for Infocomm Research (Singapore); Shijian Lu, Institute for Infocomm Research (Singapore) . . . . . [10004-24]

12:20: **Estimation of urban surface water at subpixel level from neighborhood pixels using multispectral remote sensing image**, Huan Xie, Xin Luo, Xiong Xu, Tongji Univ. (China); Chen Wang, The James Hutton Institute (United Kingdom); Haiyan Pan, Xiaohua Tong, Tongji Univ. (China); Shijie Liu, Tongji University (China) . . . . . [10004-25]

Lunch/Exhibition Break . . . . . Tue 12:40 to 14:00

SESSION 6

LOCATION: ROOM MOORFOOT . . . . . TUE 14:00 TO 15:20

Hyperspectral Image Analysis I

Session Chair: **Begüm Demir,** Univ. degli Studi di Trento (Italy)

14:00: **Accuracy assessment of blind and semi-blind restoration methods for hyperspectral images**, Mo Zhang, Benoit Vozel, Kacem Chehdi, Univ. de Rennes 1 (France); Mikhail L. Uss, Sergey K. Abramov, Vladimir V. Lukin, National Aerospace Univ. (Ukraine). . . . . [10004-27]

14:20: **Unsupervised component reduction of hyperspectral images and clustering without performance loss: application to marine algae identification**, Baiyang Chen, EDF Recherche & Développement (France); Kacem Chehdi, Univ. de Rennes 1 (France); Eric De Oliveria, EDF Recherche & Développement (France); Claude Cariou, Univ. de Rennes 1 (France); Bruno Charbonnier, EDF Recherche & Développement (France) . . . . . [10004-28]

14:40: **Exploring the impact of wavelet-based denoising in the classification of remote sensing hyperspectral images**, Pablo Quesada Barriuso, Univ. de Santiago de Compostela (Spain) and Ctr. Singular de Investigación en Tecnoloxías da Información (Spain); Dora Blanco Heras, Univ. de Santiago de Compostela (Spain) and Centro Singular de Investigación en Tecnoloxías da Información (Spain); Francisco Argüello, Univ. de Santiago de Compostela (Spain) . . . . . [10004-29]

15:00: **Shadow extraction for urban area based on hyperspherical color sharpening information distortion**, Qing Guo, Institute of Remote Sensing and Digital Earth (China); Qu Wang, Guangdong Univ. of Technology (China); Hongqun Zhang, Chinese Academy of Sciences (China) . . . . . [10004-73]

Coffee Break . . . . . Tue 15:20 to 15:50

SESSION 7

LOCATION: ROOM MOORFOOT . . . . . TUE 15:50 TO 17:10

Hyperspectral Image Analysis II

Session Chair: **Allan A. Nielsen,** Technical Univ. of Denmark (Denmark)

15:50: **Spectral-spatial classification of hyperspectral images with semisupervised graph learning**, Renbo Luo, Univ. Gent (Belgium) and South China Univ. of Technology (China); Wenzhi Liao, Univ. Gent (Belgium); Hongyan Zhang, Univ. Gent (Belgium) and Wuhan Univ. (China); Wilfried Philips, Univ. Gent (Belgium); Youguo Pi, South China Univ. of Technology (China) . [10004-30]

16:10: **Ship classification in terrestrial hyperspectral data**, Göksu Keskin, Hendrik Schilling, Wolfgang Gross, Wolfgang Middelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany). . . . . [10004-31]

16:30: **M-estimation for robust sparse unmixing of hyperspectral images**, Maria Toomik, Univ. College London (United Kingdom) and Agency for Science, Technology and Research (A*STAR) (Singapore); Shijian Lu, Agency for Science, Technology and Research (A*STAR) (Singapore); James D. B. Nelson, Univ. College London (United Kingdom) . . . . . [10004-32]

16:50: **Spectral-spatial hyperspectral image classification using superpixel-based spatial pyramid representation**, Jiayuan Fan, Hui Li Tan, Institute for Infocomm Research (Singapore); Maria Toomik, University College London (United Kingdom); Shijian Lu, Institute for Infocomm Research (Singapore) . . . . . [10004-33]

WEDNESDAY 28 SEPTEMBER

SESSION 8

LOCATION: ROOM MOORFOOT . . . . . WED 8:30 TO 10:10

Multitemporal Analysis and Change Detection

Session Chair: **Francesca Bovolo,** Fondazione Bruno Kessler (Italy)

8:30: **A novel multitemporal approach to wet snow retrieval with Sentinel-1 images**, Carlo Marin, Mattia Callegari, Claudia Notarnicola, EURAC (Italy) . . . . . [10004-34]

8:50: **An end-user-oriented framework for RGB representation of multitemporal SAR images and visual data mining**, Donato Amitrano, Univ. degli Studi di Napoli Federico II (Italy); Francesca Cecinati, ESRIN (Italy) and European Space Agency (Italy); Gerardo Di Martino, Antonio Iodice, Univ. degli Studi di Napoli Federico II (Italy); Pierre-Philippe Mathieu, ESRIN (Italy) and European Space Agency (Italy); Daniele Riccio, Giuseppe Ruello, Univ. degli Studi di Napoli Federico II (Italy) . . . . . [10004-35]

9:10: **A novel approach to change detection in bi-temporal polarimetric SAR images**, Davide Pirrone, Univ. degli Studi di Trento (Italy) and Fondazione Bruno Kessler (Italy); Francesca Bovolo, Fondazione Bruno Kessler (Italy); Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-37]

9:30: **A segmentation-based approach to SAR change detection and mapping**, Andrea Garzelli, Claudia Zoppetti, Univ. degli Studi di Siena (Italy) . . . . . [10004-38]

9:50: **Change detection in time series of polarimetric SAR data by an omnibus test statistic and its factorization**, Allan A. Nielsen, Knut Conradsen, Henning Skriver, Technical Univ. of Denmark (Denmark) . . . . . [10004-36]

Coffee Break . . . . . Wed 10:10 to 10:40

SESSION 9

LOCATION: ROOM MOORFOOT ..... WED 10:40 TO 12:00

Analysis of SAR Data

Session Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

10:40: **A real-time focused SAR algorithm on the Jetson TK1 board**, Krzysztof Radecki, Piotr Samczynski, Krzysztof S. Kulpa, Jedrzej Drozdowicz, Warsaw Univ. of Technology (Poland) . . . . . [10004-39]

11:00: **A simulation-based approach towards automatic target recognition of high-resolution spaceborne radar signatures**, Harald Anglberger, Timo M. Kempf, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . [10004-40]

11:20: **Oil spill characterization in the hybrid-polarity SAR domain using log-cumulants**, Martine M. Espeseth, Stine Skrunes, Camilla Brekke, UiT The Arctic Univ. of Norway (Norway); Arnt-Børre Salberg, Norsk Regnesentral (Norway); Cathleen E. Jones, Benjamin M. Holt, Jet Propulsion Lab. (United States) . . . . . [10004-42]

11:40: **Capability of geometric features to classify ships in SAR imagery**, Haitao Lang, Siwen Wu, Beijing Univ. of Chemical Technology (China); Quan Lai, Inner Mongolia Normal Univ. (China); Li Ma, China Three Gorges Corp. (China) . . . . . [10004-43]

Lunch Break . . . . . Wed 12:20 to 13:30

JOINT SESSION 1

LOCATION: ROOM MOORFOOT ..... WED 13:30 TO 15:10

SAR Data Processing I

Session Chair: **Lorenzo Bruzzone,** Univ. degli Studi di Trento (Italy)

Joint Session between Conference 10003 and Conference 10004

13:30: **Estimation of radar power losses in ice by using radar sounder and ice core data**, Ana-Maria Ilisei, Univ. degli Studi di Trento (Italy); Jilu Li, Sivaprasad Gogineni, The Univ. of Kansas (United States); Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-44]

13:50: **A bat-inspired technique for clutter reduction in radar sounder systems**, Leonardo Carrer, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . . . . [10004-45]

14:10: **Integration of Radarsat-2 and TerraSAR-X polarimetric data for crop growth stages estimation**, Yifeng Li, George A. Lampropoulos, A.U.G. Signals Ltd. (Canada) . . . . . [10004-46]

14:30: **An approach for SLAR images denoising based on removing regions with low visual quality for oil spill detection**, Beatriz Alacid Soto, Pablo Gil, Univ. de Alicante (Spain) . . . . . [10004-47]

14:50: **Full-aspect 3D target reconstruction of interferometric circular SAR**, Yun Lin, Qian Bao, Institute of Electronics (China); Liying Hou, Lingjuan Yu, Chinese Academy of Sciences (China); Wen Hong, Institute of Electronics (China) . . . . . [10004-48]

Coffee Break . . . . . Wed 15:10 to 15:40

JOINT SESSION 2

LOCATION: ROOM MOORFOOT ..... WED 15:40 TO 17:20

SAR Data Processing II

Session Chair: **Claudia Notarnicola,** EURAC (Italy)

Joint Session between Conference 10003 and Conference 10004

15:40: **Automatic GCP extraction with high resolution COSMO-SkyMed products**, Davide O. Nitti, GAP S.r.l. (Italy); Alberto Morea, Politecnico di Bari (Italy); Raffaele Nutricato, GAP S.r.l. (Italy); Maria T. Chiaradia, Politecnico di Bari (Italy); Claudio La Mantia, Luigi Agrimano, Sergio Samarelli, Planetek Italia S.r.l. (Italy) . . . . . [10003-1]

16:00: **Automatic SAR/optical cross-matching for GCP monograph generation**, Raffaele Nutricato, GAP S.r.l. (Italy); Alberto Morea, Politecnico di Bari (Italy); Davide O. Nitti, GAP S.r.l. (Italy); Claudio La Mantia, Luigi Agrimano, Sergio Samarelli, Maria T. Chiaradia, Planetek Italia S.r.l. (Italy) . . . . . [10003-2]

16:20: **Contextual descriptors ad neural networks for scene analysis in VHR SAR images**, Fabio Del Frate, Matteo Picchiani, Alessia Falasco, Giovanni Schiavon, Univ. degli Studi di Roma "Tor Vergata" (Italy) . . . . . [10003-3]

16:40: **Tropical forest heterogeneity from TanDEM-X InSAR and LiDAR observations in Indonesia**, Elsa Carla De Grandi, Edward T. A. Mitchard, The Univ of Edinburgh (United Kingdom) . . . . . [10003-4]

17:00: **Detection and quantification of precipitations signatures on synthetic aperture radar imagery at X band**, Saverio Mori, Sapienza Univ. di Roma (Italy) and CETEMPS (Italy); Mario Montopoli, Consiglio Nazionale delle Ricerche (Italy) and CETEMPS (Italy); Luca Pulvirenti, CIMA Research Foundation (Italy) and CETEMPS (Italy); Frank S. Marzano, Sapienza Univ. di Roma (Italy) and CETEMPS (Italy); Nazzareno Pierdicca, Sapienza Univ. di Roma (Italy) . [10003-5]

POSTER SESSION

LOCATION: CROMDALE HALL ..... WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Adaptive sidelobe reduction in SAR and INSAR COSMO-SkyMed image processing, Rino Lorusso, Nunzia Lombardi, Giovanni Milillo, Agenzia Spaziale Italiana (Italy) . . . . . [10004-41]

Analysis of the electronic crosstalk effect in Terra MODIS long-wave infrared photovoltaic bands using Lunar images, Truman Wilson, Aisheng Wu, Xu Geng, Zhipeng Wang, Science Systems and Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . . . [10004-49]

Processing of high spatial resolution information obtained from satellites of "Resource-P" series according to the level 1, Andrei Kochergin, Vasiliy Poshekhonov, Victor Eremeev, Alexey Kuznetcov, Ryazan State Radio Engineering Univ. (Russian Federation); Oleg Presniakov, Pavel Svetelkin, Viktor Zenin, Ryazan State Radio Engineering University (Russian Federation) . . . . . [10004-50]

Investigating the performance of a low-cost thermal imager for forestry applications, Magdalena Smigaj, Rachel Gaulton, Stuart L. Barr, Newcastle Univ. (United Kingdom); Juan C. Suarez, Forest Research (United Kingdom) . . . . . [10004-52]

An adaptive window approach to the analysis of radar sounder data, Mahdi Khodadadzadeh, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) [10004-53]

A star identification algorithm for large FOV observations, Yu Duan, Zhaodong Niu, Zengping Chen, National Univ. of Defense Technology (China) . . . . . [10004-54]

Towards real-time change detection in videos on an existing 3d model, Boitumelo Ruf, Tobias Schuchert, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10004-56]

Remote sensing imagery classification using multi-objective gravitational search algorithm, Aizhu Zhang, China Univ. of Petroleum (China) and Heriot-Watt Univ. (United Kingdom); Genyun Sun, Zhenjie Wang, East China Univ. of Petroleum (China) . . . . . [10004-57]

Water bodies extraction from high-resolution satellite images using water indices and optimal threshold, Alya AlMaazmi, Mohammed Bin Rashid Space Ctr. (United Arab Emirates) . . . . . [10004-58]

Vegetation extraction from high-resolution satellite imagery using the Normalized Difference Vegetation Index (NDVI), Meera AlShamsi, Mohammed Bin Rashid Space Ctr. (United Arab Emirates) . . . . . [10004-59]

Use of remote sensing for the preservation of costal zones of the Rio de La Plata estuary, between Berisso and Punta Rasa, Argentina, Gabriela M. D'Amico, Univ. Nacional de la Plata (Argentina); Graciela G. Salinas de Salmuni, Comision Nacional de Actividades Espaciales (Argentina) and Consejo Nacional de Investigaciones Científicas y Técnicas (Argentina); Enrique E. Fucks, Claudia Carut, Univ. Nacional de la Plata (Argentina) . . . . . [10004-60]

Characteristics of the laser intensity by the difference of the reflective materials, Mitsuharu Tokunaga, Kanazawa Institute of Technology (Japan) . . . . . [10004-61]

GLM image navigation and registration performance, Roel W. van Bezooijen, Howard Demroff, Lockheed Martin Space Systems Co. (United States); Donald Chu, NASA Goddard Space Flight Ctr. (United States) . . . . . [10004-62]

A particle filter for multitarget tracking in track before detect context, Naima Amrouche, Ecole Nationale Supérieure de Techniques Avancées Bretagne (Algeria) and Ecole Nationale Polytechnique (France); Ali Khenchaf, Ecole Nationale Supérieure de Techniques Avancées Bretagne (France); Daoud Berkani, Ecole Nationale Polytechnique (Algeria) . . . . . [10004-63]

Monitoring of surface movement in a large area of the open pit iron mines (Carajás, Brazil) based on a-DInSAR techniques using TerraSAR-X data, José C. Mura, Waldir R. Paradella, Fabio F. Gama, Guilherme G. Silva, Instituto Nacional de Pesquisas Espaciais (Brazil) . . . . . [10004-64]

An experimental comparison of standard stereo matching algorithms applied to cloud top height estimation from satellite IR images, Francesco Isgro, Univ. degli Studi di Napoli Federico II (Italy); Anna Anzalone, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [10004-65]

Modeling the coupling effect of jitter and attitude control on TDICCD camera imaging, Yulun LI, Zhen Yang, Xiaoshan Ma, National Space Science Ctr. (China); Wei Ni, National Space Science Ctr (China) . . . . . [10004-67]

Development of image processing method to detect noise in geostationary imagery, Konstantin V. Khlopenkov, Science Systems and Applications, Inc. (United States); David R. Doelling, NASA Langley Research Ctr. (United States) . . . . . [10004-68]

CONFERENCE 10004

LOCATION: ROOM MOORFOOT

CONFERENCE 10005

LOCATION: ROOM SIDLAW

Tuesday–Thursday 27–29 September 2016 • Proceedings of SPIE Vol. 10005

Earth Resources and Environmental Remote Sensing/GIS Applications

Conference Chairs: **Ulrich Michel,** Jade Univ. of Applied Sciences Oldenburg (Germany); **Karsten Schulz,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

Conference Co-Chairs: **Manfred Ehlers,** Univ. Osnabrück (Germany); **Konstantinos G. Nikolakopoulos,** Univ. of Patras (Greece); **Daniel Civco,** Univ. of Connecticut (United States)

Programme Committee: **Thomas Blaschke,** Univ. Salzburg (Austria); **Markus Boldt,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Tilman U. Bucher,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Dimitri Bulatov,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Ni-Bin Chang,** Univ. of Central Florida (United States); **Garik Gutman,** NASA Headquarters (United States); **Marguerite M. Madden,** The Univ. of Georgia (United States); **Derya Maktav,** Istanbul Technical Univ. (Turkey); **Matthias S. Moeller,** Univ. of Applied Sciences Berlin (Germany); **Pablo H. Rosso,** RapidEye AG (Germany); **Florian Savopol,** Natural Resources Canada (Canada); **Jochen Schiewe,** HafenCity Univ. Hamburg (Germany); **Wenzhong Shi,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Karl Staenz,** Univ. of Lethbridge (Canada); **Christiane H. Weber,** Ecole Nationale Supérieure de Physique de Strasbourg (France)

TUESDAY 27 SEPTEMBER

OPENING REMARKS

LOCATION: ROOM SIDLAW . . . . . 13:05 TO 13:10

SESSION 1

LOCATION: ROOM SIDLAW . . . . . TUE 13:10 TO 15:00

Sensors and Platforms

Session Chair: **Karsten Schulz,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

13:10: **Synthetic aperture ladar based on a MOPAW laser** *(Invited Paper)*, Simon Turbide, Linda E. Marchese, Alain Bergeron, Louis Desbiens, Patrick Paradis, INO (Canada). . . . . [10005-1]

13:40: **Close-range environmental remote sensing with 3D hyperspectral technologies**, Olli Nevalainen, Eija Honkavaara, Teemu Hakala, Sanna Kaasalainen, Niko Viljanen, Tomi Rosnell, Ehsan Khoramshahi, Roope Näsi, Finnish Geospatial Research Institute (Finland) . . . . . [10005-2]

14:00: **Waveform fitting and geometry analysis for full-waveform LiDAR feature extraction**, Fuan Tsai, Jhe-Syuan Lai, Yi-Hsiu Cheng, National Central Univ. (Taiwan) . . . . . [10005-3]

14:20: **Modelling and studies of the spectral response of some optoelectronic components**, André Albino, Mouhaydine Tlemçani, Univ. de Évora (Portugal) and Institute of Earth Sciences (Portugal); Daniele Bortoli, Univ. de Évora (Portugal); António Joyce, LNEG (Portugal). . . . . [10005-4]

14:40: **Drone-based smart monitoring system in environment**, Pandit Mulay, Univ. de Évora (Portugal). . . . . [10005-5]

Coffee Break . . . . . Tue 15:00 to 15:30

SESSION 2

LOCATION: ROOM SIDLAW . . . . . TUE 15:30 TO 17:30

Hazard Mitigation Geologic Applications

Session Chair: **Kyriacos Themistocleous,** Cyprus Univ. of Technology (Cyprus)

15:30: **Remote sensing and GIS analysis for demarcation of coastal hazard line along the highly eroding Krishna-Godavari delta front**, Akhil Kallepalli, Cranfield Univ. (United Kingdom); Nageswara Rao Kakani, Andhra Univ. (India); David James, Cranfield Univ. (United Kingdom). . . . . [10005-6]

15:50: **Analyzing land surface temperature variations during Fogo Island (Cape Verde) 2014-2015 eruption with Landsat-8 images**, Diogo Vieira, Univ. do Porto (Portugal); Ana C. Teodoro, Univ. do Porto (Portugal) and Instituto Ciências da Terra (Portugal); Alberto Gomes, Univ. do Porto (Portugal) and CEGOT (Portugal) . . . . . [10005-7]

16:10: **Flood mapping using VHR satellite imagery: a comparison between different classification approaches**, Francesca Franci, Gabriele Bitelli, Univ. degli Studi di Bologna (Italy); Piero Boccardo, Politecnico di Torino (Italy); Emanuele Mandanici, Elena Roveri, Univ. degli Studi di Bologna (Italy). [10005-8]

16:30: **Earthquake signature revealed by time series satellite and ground-based data**, Maria A. Zoran, Roxana S. Savastru, Dan M. Savastru, National Institute of Research and Development for Optoelectronics (Romania). [10005-9]

16:50: **The magnitude and direction movement in Thailand based on Global Positioning System (GPS)**, Uthen Jamrus, Hui Deng, Beihang Univ. (China) . . . . . [10005-10]

17:10: **Remote sensing structural analysis of the Bentong-Raub suture zone, Peninsular Malaysia**, Amin Beiranvand Pour, Univ. Teknologi Malaysia (Malaysia). . . . . [10005-11]

WEDNESDAY 28 SEPTEMBER

SESSION 3

LOCATION: ROOM SIDLAW . . . . . WED 9:00 TO 10:00

Processing Methodologies I

Session Chair: **Markus Boldt,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

9:00: **MicMac GIS application: free open source**, Lia Duarte, Óscar Moutinho, Ana C. Teodoro, Univ. do Porto (Portugal) . . . . . [10005-12]

9:20: **Integrating satellite imagery-derived data and GIS-based solar radiation algorithms to map solar radiation in high temporal and spatial resolutions for the province of Salta, Argentina**, Luis Ramirez Camargo, Technische Hochschule Deggendorf (Germany) and Univ of Natural Resources and Life Sciences (Austria); Wolfgang Dorner, Technische Hochschule Deggendorf (Germany) . . . . . [10005-13]

9:40: **On the performance analysis of artificial neural network based land-cover classification**, Nasru Minallah, Univ. of Engineering & Technology, Peshawar (Pakistan) . . . . . [10005-15]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 4

LOCATION: ROOM SIDLAW . . . . . WED 10:30 TO 12:10

Processing Methodologies II

Session Chair: **Markus Boldt,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

10:30: **Knowledge-based modelling of historical surfaces using lidar data**, Veit Höfler, Christine Wessollek, Pierre Karrasch, TU Dresden (Germany) . . . . . [10005-16]

10:50: **Estimation of forest surface fuel load using lidar**, Yang Chen, Monash Univ. (Australia) and Bushfire & Natural Hazards CRC (Australia); Xuan Zhu, Monash Univ. (Australia); Marta Yebra, The Australian National Univ. (Australia) and Bushfire & Natural Hazards CRC (Australia); Sarah Harris, Nigel Tapper, Monash Univ. (Australia) and Bushfire & Natural Hazards CRC (Australia). . . . . [10005-17]

11:10: **Spectral identification and quantification of salts in the Atacama Desert**, Jennifer K. Harris, Birkbeck, Univ. of London (United Kingdom); Claire R. Cousins, Mark Claire, Univ. of St. Andrews (United Kingdom). . . . . [10005-18]

11:30: **Research on massive tile data management based on Hadoop**, Xuemin Mao, Kun Gao, Hefei Univ. of Technology (China). . . . . [10005-19]

11:50: **Research on remote sensing identification of rural abandoned homesteads using multiparameter characteristics method**, Saiping Xu, Qianjun Zhao, Kai Yin, Bei Cui, Xiupeng Zhang, Institute of Remote Sensing and Digital Earth (China). . . . . [10005-20]

Lunch/Exhibition Break . . . . . Wed 12:10 to 13:20

CONFERENCE 10005

LOCATION: ROOM SIDLAW

SESSION 5

LOCATION: ROOM SIDLAW . . . . . WED 13:20 TO 15:00

Remote Sensing for Archaeology, Cultural and Natural Heritage

Session Chair: **Ulrich Michel,** Jade Hochschule (Germany)

13:20: **Educational activities of remote sensing archaeology**, Diofantos G. Hadjimitsis, Athos Agapiou, Vasilki Lysandrou, Kyriacos Themistocleous, Branka Cuca, Argyro Nisantzi, Cyprus Univ. of Technology (Cyprus); Rosa Lasaponara, Istituto di Metodologie per l'Analisi Ambientale (Italy); Nicola Masini, Istituto per i Beni Archeologici e Monumentali (Italy); Thomas Krauss, Daniele Cerra, Ursula Gessner, Gunter Schreier, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) . . . . . [10005-21]

13:40: **Methodology for locale-scale monitoring for the PROTHEGO project: the Choirokoitia case study**, Kyriacos Themistocleous, Cyprus Univ. of Technology (Cyprus); Francesca Cigna, British Geological Survey (United Kingdom); Athos Agapiou, Branka Cuca, Vasiliki Lysandrou, Marios Tzouvaras, Chris Danezis, Cyprus Univ. of Technology (Cyprus) . . . . . [10005-22]

14:00: **The Past beneath the Present: GPR as a remote sensor in archaeology and cultural heritage management**, Pier Matteo Barone, Carlotta Ferrara, The American Univ. of Rome (Italy) . . . . . [10005-23]

14:20: **Investigation of water storage change over North India region using GRACE satellite & GLDAS data**, Anil Kumar Singh, Kamalesh Kumar Singh, India Meteorological Dept. (India); Jayant N Tripathi, allahabad university (India); Suresh Kannaujjya, Indian Space Research Organisation (India); Anil K. Soni, M. Sateesh, Indian Meteorological Dept. (India) . . . . . [10005-24]

14:40: **Research on the evaluation method of rural hollowing based on RS and GIS technology: a case study of the Ningxia Hui autonomous region in China**, Kai Yin, Xiupeng Zhang, Feifei Zhang, Chao Yuan, Qiang Chen, Institute of Remote Sensing and Digital Earth (China) . . . . . [10005-25]

Coffee Break . . . . . Wed 15:00 to 15:30

SESSION 6

LOCATION: ROOM SIDLAW . . . . . WED 15:30 TO 17:30

Environmental Monitoring Concepts I

Session Chair: **Christine Wessollek,** TU Dresden (Germany)

15:30: **Monitoring of vegetation dynamics on the former military training area Königsbrücker heath using remote sensing time series**, Christine Wessollek, Pierre Karrasch, TU Dresden (Germany). . . . . [10005-26]

15:50: **Environmental resilience of rangeland ecosystems: estimation soil moisture availability and fractional vegetation cover on arid and semi-arid zones of Central Asia**, Dildora Aralova, TU Dresden (Germany) and Samarkand State Univ (Uzbekistan); Jahan Kariyeva, Univ. of Arizona (United States); Kristina Toderich, International Ctr. of Biosaline Agriculture (Uzbekistan); Babatunde A. Osunmadewa, Majdaldin Rahamtallah Abualgasim, TU Dresden (Germany). . . . . [10005-27]

16:10: **Monitoring soil aggregates dynamics at a plot scale using multitemporal image texture and colour analysis**, Irena Ymeti, International Institute for Geo-Information Science and Earth Observation (Netherlands); Harald van der Werff, ITC (Netherlands); Freek J. van der Meer, Victor G. Jetten, International Institute for Geo-Information Science and Earth Observation (Netherlands) . . . . . [10005-28]

16:30: **Investigating the capabilities of new microwave ALOS-2/PALSAR-2 data for biomass estimation**, Anh V. Le, The Univ. of New South Wales (Australia) and Vietnamese Academy of Science and Technology (Viet Nam); David J. Paull, Amy L. Griffin, The Univ. of New South Wales (Australia) . . . . . [10005-29]

16:50: **Natural and environmental vulnerability analysis through remote sensing and GIS techniques: A case study of Indigirka River basin, Eastern Siberia, Russia**, Mukesh S. Boori, Samara State Aerospace Univ. (Russian Federation) . . . . . [10005-30]

17:10: **Application of ASTER and PALSAR satellite remote sensing data for geological mapping in Antarctic Peninsula**, Amin Beiranvand Pour, Univ. Teknologi Malaysia (Malaysia). . . . . [10005-31]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Experimental study of hyperspectral responses of plants grown on mud pit soils, Anthony Credoz, Rémy Hédacq, Christophe Barreau, Pôle d'Etudes et de Recherche de Lacq (France) and TOTAL S.A. (France); Dominique Dubucq, TOTAL S.A. (France) . . . . . [10005-52]

Structural geology and topographic mapping of Kelantan river basin using PALSAR remote sensing data for high-risk area delineation, Amin Beiranvand Pour, Univ. Teknologi Malaysia (Malaysia). . . . . [10005-54]

Flash flood area mapping utilizing SENTINEL-1 radar data, Emmanouil Psomiadis, Agricultural Univ. of Athens (Greece) . . . . . [10005-55]

Multitemporal analysis of Landsat images to detect land use land cover changes for monitoring soil sealing in the Nola area (Naples, Italy), Michaela De Giglio, Maria Allocca, Francesca Franci, Univ. degli Studi di Bologna (Italy) . . . . . [10005-56]

Mapping growing stock at 1 km spatial resolution for Spanish forest areas from ground forest inventory data and GLAS canopy height, Sergio Sánchez-Ruiz, Univ. de València (Spain); Marta Chiesi, Fabio Maselli, Istituto di Biometeorologia (Italy); Maria A. Gilabert Navarro, Univ. de València (Spain) . . . . . [10005-57]

Land cover change detection in Chinese Zhejiang Province based on object-oriented approach, Dong Liu, The Second Institute of Oceanography, SOA (China); Yan Li, Nanjing Univ. (China) . . . . . [10005-58]

Remote sensing of climate changes effects on urban green biophysical variables, Maria A. Zoran, National Institute of Research and Development for Optoelectronics (Romania); Adrian I. Dida, Univ. Transylvania Brasov (Romania) . . . . . [10005-59]

Development of habitat mapping technology using spatial information, Moung-Jin Lee, Korea Environment Institute (Korea, Republic of); Chang-Wook Lee, Kangwon National Univ. (Korea, Republic of); Kwan-Young Oh, KEI (Korea, Republic of) . . . . . [10005-60]

Remote sensing contribution to the reconstruction of sea level fluctuations related to climate change during the Quaternary in the Samborombón Bay, Buenos aires, Argentina, Mariel Samanta Luengo, Univ. Nacional de la Plata (Argentina); Nelida G. Salinas de Salmuni, Comision Nacional de Actividades Espaciales (Argentina); Enrique E. Fucks, Isabel Vilanova, Univ. Nacional de la Plata (Argentina) . . . . . [10005-61]

Environmental monitoring in peat bog areas by change detection methods, Ulrich Michel, Wiebke Mildes, Jade Hochschule (Germany). . . . . [10005-62]

THURSDAY 29 SEPTEMBER

SESSION 7

LOCATION: ROOM SIDLAW . . . . . THU 8:40 TO 10:00

Infrastructures and Urban Areas

Session Chair: **Gisela Häufel,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

8:40: **Automation of lidar-based hydrologic feature extraction workflows using GIS**, Noel Jerome B. Borlongan, Anjillyn Mae C. Perez, Roel M. De la Cruz, Nestor T. Olfindo Jr., Univ. of the Philippines Diliman (Philippines) . . . . . [10005-32]

9:00: **An iterative approach to optimize change classification in SAR time series data**, Markus Boldt, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Antje Thiele, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) and Karlsruher Institut für Technologie (Germany); Karsten Schulz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Stefan Hinz, Karlsruher Institut für Technologie (Germany) . . . . . [10005-33]

9:20: **Comparison of multiple methods for detecting changes in urban areas in TerraSAR-X data**, Clémence Dubois, Karlsruher Institut für Technologie (Germany); Erich Cadario, Silvia Kuny, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Horst Hammer, Fraunhofer-Gesellschaft (Germany); Antje Thiele, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) and KIT- Karlsruhe Institute of Technology (Germany) . . . . . [10005-34]

9:40: **Application of spectral and spatial indices for specific class identification in Airborne Prism EXperiment (APEX) imaging spectrometer data for improved land cover classification**, Akhil Kallepalli, Cranfield Univ. (United Kingdom); Anil Kumar, Indian Institute of Remote Sensing (India); Kourosh S. Khoshelham, The Univ. of Melbourne (Australia); David James, Cranfield Univ. (United Kingdom) . . . . . [10005-35]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 8

LOCATION: ROOM SIDLAW . . . . . THU 10:30 TO 11:50

Environmental Monitoring Concepts II

Session Chair: **Christine Wessollek,** TU Dresden (Germany)

10:30: **Accounting for ecosystem assets using remote sensing in the Colombian Orinoco River basin lowlands**, Leonardo Vargas, Wageningen Univ. (Netherlands); Lars Hein, Roy Paco Remme, Wageningen university (Netherlands) . . . . . [10005-36]

10:50: **A webmapping platform for publishing, sharing and managing remote sensing-derived data for forest protection**, Karin M. Viergever, Ecometrica (United Kingdom); Pedro R. Andrade, Manoel Cardoso, INPE (Brazil); Miguel Castillo, El Colegio de la Frontera Sur (Mexico); Jean-Francois Exbrayat, The Univ. of Edinburgh (United Kingdom); Sarah Middlemiss, Ecometrica (United Kingdom); David Milodowski, The Univ. of Edinburgh (United Kingdom); Edward T. A. Mitchard, The Univ of Edinburgh (United Kingdom); Jean Ometto, INPE (Brazil); Veronique Morel, Richard Tipper, Ecometrica (United Kingdom); Mathew Williams, The Univ. of Edinburgh (United Kingdom) . . . . . [10005-37]

11:10: **Monitoring of vegetation condition using the NDVI/ENSO anomalies in Central Asia and their relationships with ONI (very strong and moderate) warm events**, Aralova Dildora, TU Dresden (Germany) and Samarkand State Univ. (Germany) . . . . . [10005-38]

11:30: **Estimated post-flood effects through Sentinel and Landsat data to support civil protection**, Cesario Vincenzo Angelino, Luca Cicala, Ctr. Italiano Ricerche Aerospaziali (Italy); Nicomino Fiscante, GeosLab Srl (Italy); Mariano Focareta, Mapsat Srl (Italy) . . . . . [10005-39]

Lunch Break . . . . . Thu 11:50 to 13:00

SESSION 9

LOCATION: ROOM SIDLAW . . . . . THU 13:00 TO 15:00

Environmental Monitoring Concepts III

Session Chair: **Ulrich Michel,** Jade Hochschule (Germany)

13:00: **Using TanDEM data for forest height estimation and change detection**, Antje Thiele, KIT - Karlsruhe Institute of Technology (Germany) and Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Clémence Dubois, Stefan Hinz, Karlsruher Institut für Technologie (Germany) . . . . . [10005-40]

13:20: **Influence of pansharpening techniques in obtaining accurate vegetation thematic maps**, Edurne Ibarrola Ulzurrun, Univ. de Las Palmas de Gran Canaria (Spain) and Univ. Politécnica de Madrid (Spain); Consuelo Gonzalo Martín, Univ. Politécnica de Madrid (Spain) and Univ. de Las Palmas de Gran Canaria (Spain); Francisco Javier Marcello Ruiz, Univ. de Las Palmas de Gran Canaria (Spain) . . . . . [10005-41]

13:40: **Catastrophic shifts in drylands: a case study of the Randi Forest in Cyprus**, Christiana Papoutsa, Demetris Kouhartsiouk, Kyriacos Themistocleous, Michalis Christoforou, Diofantos G. Hadjimitsis, Cyprus Univ. of Technology (Cyprus) . . . . . [10005-42]

14:00: **Deforestation analysis using multitemporal Landsat images in Pyeongyang, North Korea**, Sunmin Lee, Hyung-Sup Jung, Sung-Hwan Park, The Univ. of Seoul (Korea, Republic of) . . . . . [10005-43]

14:20: **A new approach to calculate plant area density (PAD) using 3D ground-based lidar**, Leila Taheriazad, G. Arturo Sanchez-Azofeifa, Hamid Moghadas, Univ. of Alberta (Canada) . . . . . [10005-44]

14:40: **Dissolved organic matter in the headstream of the Changjiang River**, Dong Liu, Difeng Wang, Qiankun Zhu, The Second Institute of Oceanography, SOA (China) . . . . . [10005-45]

Coffee Break . . . . . Thu 15:00 to 15:30

SESSION 10

LOCATION: ROOM SIDLAW . . . . . THU 15:30 TO 16:50

Environmental Monitoring Concepts IV

Session Chair: **Karsten Schulz,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

15:30: **Effect of horizontal and vertical resolution on Weather Research and Forecasting (WRF) model for wind resource assessment in Metro Manila, Philippines**, Jerome Tolentino, Victoria Rejuso, Loureal Camille V. Inocencio, Univ. of the Philippines (Philippines); Ma. Rosario Concepcion O. Ang, Univ. of the Philippines Diliman (Philippines); Gerry Bagtasa, Institute of Environmental Science & Metrology (Philippines) . . . . . [10005-46]

15:50: **Mangrove classification through the use of object oriented classification and support machine vector of lidar datasets: a case study in Naawan and Manticao, Misamis Oriental, Philippines**, Rey Jalbuena, Ayin Tamondong, Rudolph Peralta, Univ. of the Philippines (Philippines) . . [10005-48]

16:10: **Effective site selection for urban solid waste disposal and route optimization using remote sensing and GIS techniques for Krishnagiri district, Tamil Nadu**, Karthiheyan Natarajan, Vinithra Raravichandran, Yeshodha Yeshodha, Adhiyamaan College of Engineering (India) . . . . . [10005-49]

16:30: **Tropical forest cover mapping in Malaysia using multisensor satellite data**, Kasturi D. Kanniah, Nazarin E. Mohd Najib, Univ. Teknologi Malaysia (Malaysia) . . . . . [10005-51]

CONFERENCE 10006

LOCATION: ROOM SIDLAW

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 10006

Lidar Technologies, Techniques, and Measurements for Atmospheric Remote Sensing

Conference Chairs: **Upendra N. Singh,** NASA Langley Research Ctr. (United States); **Doina Nicoleta Nicolae,** National Institute of Research and Development for Optoelectronics (Romania)

Programme Committee: **Arnoud Apituley,** Rijksinstituut voor Volksgezondheid en Milieu (Netherlands); **Lucas Alados-Arboledas,** Univ. de Granada (Spain); **Andreas Behrendt,** Univ. Hohenheim (Germany); **Gerhard Ehret,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Barry M. Gross,** NOAA-CREST (United States); **Philippe L. Keckhut,** LATMOS (France); **George J. Komar,** NASA Headquarters (United States); **Eduardo Landulfo,** Instituto de Pesquisas Energéticas e Nucleares (Brazil); **Kohei Mizutani,** National Institute of Information and Communications Technology (Japan); **Lucia Mona,** Istituto di Metodologie per l'Analisi Ambientale (Italy); **Alexandros D. Papayannis,** National Technical Univ. of Athens (Greece); **Gelsomina Pappalardo,** Istituto di Metodologie per l'Analisi Ambientale (Italy); **Vincenzo Rizi,** Univ. degli Studi dell'Aquila (Italy); **Laurent Sauvage,** Leosphere France (France); **Georgios D. Tzeremes,** European Space Agency (Netherlands); **Ulla Wandinger,** Leibniz Institut für Troposphärenforschung (Germany); **Jirong Yu,** NASA Langley Research Ctr. (United States)

MONDAY 26 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: ROOM SIDLAW . . . . . 8:30 TO 8:40

Upendra N. Singh, NASA Langley Research Ctr. (United States)

SESSION 1

LOCATION: ROOM SIDLAW . . . . . MON 8:40 TO 10:10

Greenhouse Gas Measurements

Session Chair: **Upendra N. Singh,** NASA Langley Research Ctr. (United States)

8:40: **Airborne lidar for simultaneous measurement of column CO_2 and water vapor in the atmosphere** *(Invited Paper)*, Upendra N. Singh, Mulugeta Petros, Tamer F. Refaat, Jirong Yu, NASA Langley Research Ctr. (United States) . . . . . [10006-1]

9:10: **Er:YAG laser technology for remote sensing applications**, Moran Chen, Patrick M. Burns, Slava Litvinovitch, Mark Storm, Nicholas W. Sawruk, Fibertek, Inc. (United States) . . . . . [10006-2]

9:30: **A differential absorption lidar instrument for the measurment of CO2 and CH4 in the lower troposphere: initial results**, Daniel Budinov, Robert Clements, The Univ. of Edinburgh (United Kingdom); Cameron F. Rae, Univ. of St. Andrews (United Kingdom); John B. Moncrieff, James W. Jack, The Univ. of Edinburgh (United Kingdom) . . . . . [10006-3]

9:50: **Differential absorption lidar measurements of H_2O and O_2 using a coherent white light continuum**, Toshihiro Somekawa, Institute for Laser Technology (Japan); Naohiro Manago, Chiba Univ. (Japan); Masayuki Fujita, Institute for Laser Technology (Japan); Hirokazu Kuze, Chiba Univ. (Japan) . . . . . [10006-4]

Coffee Break . . . . . Mon 10:10 to 10:40

SESSION 2

LOCATION: ROOM SIDLAW . . . . . MON 10:40 TO 12:30

Aerosol/Cloud Measurements I

Session Chair: **Kevin B. Strawbridge,** Environment Canada (Canada)

10:40: **Optical depth distribution and surface elevation variability derived from multiple years CALIPSO lidar measurements** *(Invited Paper)*, Zhaoyan Liu, Science Systems and Applications, Inc. (United States) and NASA Langley Research Ctr. (United States); Bing Lin, Michael D. Obland, Joel Campbell, NASA Langley Research Ctr. (United States) . . . . . [10006-5]

11:10: **TBA**

11:30: **DUSTER lidar: transatlantic transport of aerosol particles from the Sahara and other sources: first results from the recently installed lidar and sunphotometer basis in Natal/Brazil**, Eduardo Landulfo, Fábio J. S. Lopes, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Elena Montilla, Anderson G. Guedes, Juidth J. Hoelzemann, José Henrique Fernandez, Univ. Federal do Rio Grande do Norte (Brazil); Lucas Alados-Arboledas, Juan Luis Guerrero-Rascado, Univ. de Granada (Spain) . . . . . [10006-7]

11:50: **Monitoring the impact on environment of aerosol loading and dispersion due distinct industrial sources in Cubatao, Brazil, using a scanning lidar**, Renata F. da Costa, Escola Politécnica da Univ. de São Paulo (Brazil); Eduardo Landulfo, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Roberto Guardani, Escola Politécnica da Univ. de São Paulo (Brazil); Maria Lucia G. Guardani, Companhia ambiental do Estado de Sao Paulo (Brazil); Marcia Talita A. Marques, Fernanda D. M. Macedo, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [10006-8]

12:10: **Aerosol measurements by Raman-Mie-Rayleigh lidar in Nanjng, China**, Nianwen Cao, Nanjing Univ. of Information Science & Technology (China) . . . . . [10006-9]

Lunch Break . . . . . Mon 12:30 to 13:50

SESSION 3

LOCATION: ROOM SIDLAW . . . . . MON 13:50 TO 15:00

Aerosol/Cloud Measurements II

Session Chair: **Eduardo Landulfo,** Instituto de Pesquisas Energéticas e Nucleares (Brazil)

13:50: **Autonomous ozone and aerosol lidar profiling of the troposphere: first results** *(Invited Paper)*, Kevin B. Strawbridge, Environment Canada (Canada) . . . . . [10006-10]

14:20: **Performance of a compact elastic 355 nm airborne lidar in tropical and mid-latitude clouds**, Konstantin Baibakov, Mengistu Wolde, Cuong Nguyen, National Research Council Canada (Canada); Alexei Korolev, Environment and Climate Change Canada (Canada); Zhien Wang, Perry Wechsler, Alpenglow Instruments LLC (United States) . . . . . [10006-11]

14:40: **Analysis of the influence of system parameters on the measurement accuracy of a high spectral resolution lidar**, Changbo Song, Univ. degli Studi di Napoli Federico II (Italy) and China-Italy Joint Research Ctr. for Laser Remote Sensing (China); Antonella Boselli, China-Italy Joint Research Ctr. for Laser Remote Sensing (Italy) and Istituto di Metodologie per l'Analisi Ambientale (Italy) and Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia (Italy); Alessia Sannino, Univ. degli Studi di Napoli Federico II (Italy); Yiming Zhao, China-Italy Joint Research Ctr. for Laser Remote Sensing (China) and Beijing Research Institute of Telemetry (China); Nicola Spinelli, Univ. degli Studi di Napoli Federico II (Italy) and China-Italy Joint Research Center for Laser Remote Sensing (Italy) and Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia (Italy); Xuan Wang, Univ. degli Studi di Napoli Federico II (Italy) and CNR-SPIN (Italy) and China-Italy Joint Research Center for Laser Remote Sensing (Italy) . . . . . [10006-12]

SESSION 4

LOCATION: ROOM SIDLAW . . . . . MON 15:00 TO 15:20

Coherent Wind Lidar for Space

Session Chair: **Tatsuo Shiina,** Chiba Univ. (Japan)

15:00: **Research on the 2μm spaceborne coherent wind lidar technique and the prototype experiment**, Long Gao, Beijing Institute of Space Mechanics and Electricity (China); Yu L. Tao, Beijing Institute of Space Mechanics & Electricity (China); Chao An, Garry J. Du, Beijing Institute of Space Mechanics and Electricity (China) . . . . . [10006-14]

Coffee Break . . . . . Mon 15:20 to 16:00

Remote Sensing Plenary Session

LOCATION: ROOM CARRICK 1-2-3 ..... MON 16:00 TO 18:30

WELCOME AND INTRODUCTION ..... 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

TUESDAY 27 SEPTEMBER

SESSION 5

LOCATION: ROOM SIDLAW ..... TUE 9:00 TO 10:10

LED/Microchip Lidar for Space

Session Chair: **Zhaoyan Liu,**
NASA Langley Research Ctr. (United States)

9:00: **LED minilidar for Mars Rover** *(Invited Paper)*, Tatsuo Shiina, Sonoko Yamada, Chiba Univ. (Japan); Horoki Senshu, Chiba Institute of Technology (Japan); Naohito Otobe, Fukuoka Univ. (Japan); George L. Hashimoto, Okayama Univ. (Japan); Yasuhiro Kawabata, Meteorological Research Institute (Japan) . . . . . [10006-15]

9:30: **Dynamic analysis of sea wave data measured by LED lidar**, Yasukuni Mori, Shohei Shimada, Tatsuo Shiina, Chiba Univ. (Japan); Hiroyuki Baji, Furuno Electric Co., Ltd (Japan); Sae Takemoto, Furuno Electric Co., Ltd. (Japan) . . . . . [10006-16]

9:50: **Development and validation of a microchip pulsed laser for ESA space altimeters**, Bruno Couto, Hernâni Abreu, Paulo R. S. Gordo, António Amorim, Fundacão da Faculdade de Ciências da Univ. de Lisboa (Portugal) . . [10006-17]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL ..... WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session.. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml .

Laser polarization sensing of high-level clouds: problem of interpretation of experimental data, Ignatii V. Samokhvalov, Ilia D. Bryukhanov, National Research Tomsk State Univ. (Russian Federation); Sergey V. Nasonov, National Research Tomsk State Univ. (Russian Federation) and V.E. Zuev Institute of Atmospheric Optics (Russian Federation) . . . . . [10006-20]

Effect of collisional lines broadening and calibration functions in the pure rotational Raman lidar technique, Vladislav V. Gerasimov, Vladimir V. Zuev, Institute for Monitoring of Climatic and Ecological Systems (Russian Federation) . . . . . [10006-21]

Remote sensing of atmospheric turbulence profiles by laser guide stars, Xiwen Qiang, Xi'an Jiaotong Univ. (China) and Northwest Institute of Nuclear Technology (China); Junwei Zhao, Shuanglian Feng, Min Wu, Jinyong Chang, Fei Zong, Northwest Institute of Nuclear Technology (China); Jianping Song, Xi'an Jiaotong Univ. (China) . . . . . [10006-22]

An all-fiber spectroscopic Raman lidar system for atmospheric water vapor measurements, Yufeng Wang, Meina Zhao, Xi'an Univ. of Technology (China); Qiang Fu, Xi'an University of Technology (China); Zhao Li, Shaanxi Qinbang Environment Technology Inc (China); Huige Di, Li Wang, Dengxin Hua, Xi'an Univ. of Technology (China) . . . . . [10006-23]

A point cloud modeling method based on geometric constraints mixing the robust least squares method, JIanping Yue, Hohai Univ. (China); Yi Pan, Hohai University (China); Dapeng Liu, Bin Liu, Nan Huang, Shun Yue, Hohai Univ. (China) . . . . . [10006-24]

A new algorithm for boundary layer height determination based on gravity wave theory, Ting Yang, Institute of Atmospheric Physics (China) . . . [10006-25]

The study of the evolution of aerosol concentrations at altitudes of civil aviation, Alex Mamontov, Alexander S. Gurvich, A.M. Obukhov Institute of Atmospheric Physics (Russian Federation) . . . . . [10006-26]

CONFERENCE 10007

LOCATION: ROOM HARRIS 1

Wednesday 28 September 2016 • Proceedings of SPIE Vol. 10007

High-Performance Computing in Geoscience and Remote Sensing

Conference Chairs: **Bormin Huang,** Univ. of Wisconsin-Madison (United States); **Sebastián López,** Univ. de Las Palmas de Gran Canaria (Spain); **Zhensen Wu,** Xidian Univ. (China)

Conference Co-Chairs: **Jose M. Nascimento,** Instituto de Telecomunicações (Portugal); **Jun Li,** Sun Yat-Sen Univ. (China); **Valeriy V. Strotov,** Ryazan State Radio Engineering Univ. (Russian Federation)

Programme Committee: **Saeed H. Al-Mansoori,** Emirates Institution for Advanced Science and Technology (United Arab Emirates); **Boris A. Alpatov,** Ryazan State Radio Engineering Univ. (Russian Federation); **Chein-I Chang,** Univ. of Maryland, Baltimore County (United States); **Yang-Lang Chang,** National Taipei Univ. of Technology (Taiwan); **Mingmin Chi,** Fudan Univ. (China); **Qian Du,** Mississippi State Univ. (United States); **Dustin Feld,** Univ. zu Köln (Germany); **Carlos E. Garcia Gonzalez,** Univ. Complutense de Madrid (Spain); **Lixin Guo,** Xidian Univ. (China); **Eduardo Juarez,** Univ. Politécnica de Madrid (Spain); **Francesco Leporati,** Univ. degli Studi di Pavia (Italy); **Qiguang Miao,** Xidian Univ. (China); **Caner Özcan,** Karabük Üniv. (Turkey); **Enrique S. Quintana-Orti,** Univ. Jaume I (Spain); **Jarno Mielikainen,** Univ. of Wisconsin-Madison (United States); **Antonio J. Plaza,** Univ. de Extremadura (Spain); **Sergio Sanchez Martinez,** Masdar Institute of Science & Technology (United Arab Emirates); **Roberto Sarmiento,** Univ. de Las Palmas de Gran Canaria (Spain); **Yuliya Tarabalka,** INRIA Sophia Antipolis - Méditerranée (France); **Carole Thiebaut,** Ctr. National d'Études Spatiales (France); **Tanya Vladimirova,** Univ. of Surrey (United Kingdom); **Shih-Chieh Wei,** Tamkang Univ. (Taiwan); **Jiaji Wu,** Xidian Univ. (China); **Yuanfeng Wu,** Institute of Remote Sensing and Digital Earth (China)

WEDNESDAY 28 SEPTEMBER

SESSION 1

LOCATION: ROOM HARRIS 1 . . . . . WED 8:30 TO 10:10

High Performance Computing I

Session Chair: **Bormin Huang,**
Univ. of Wisconsin-Madison (United States)

8:30: **A new tool for supervised classification of satellite images available on web servers: Google Maps as a case study**, Agustín García Flores, Univ. de Extremadura (Spain) and Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain) and Ctr. Extremeño de Tecnologías Avanzadas (Spain); Abel Paz Gallardo, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain); Jun Li, Sun Yat-Sen Univ. (China) . . . . . [10007-1]

8:50: **A study on computation optimization method for three-dimensional scene light field radiation simulation in visible light band**, Ligang Li, Wei Ni, Xin Meng, Zhen Yang, Feifei Shen, Xiaoshan Ma, National Space Science Ctr. (China) . . . . . [10007-2]

9:10: **Increasing the object recognition distance of compact open air onboard vision system**, Valeriy V. Strotov, Sergey N. Kirillov, Ivan V. Kostkin, Vadim M. Berdnikov, Eduard V. Akopov, Aleksei V. Elyutin, Ryazan State Radio Engineering Univ. (Russian Federation). . . . . [10007-3]

9:30: **Performance of the dot product function in radiative transfer code SORD**, Sergey V. Korkin, Universities Space Research Association (United States); Alexei Lyapustin, NASA Goddard Space Flight Ctr. (United States); Alexander Sinyuk, Sigma Space Corp. (United States); Brent Holben, NASA Goddard Space Flight Ctr. (United States) . . . . . [10007-4]

9:50: **Performance tuning Fu-Liou-Gu radiative transfer scheme on Intel Xeon Phi**, Jarno Mielikainen, Bormin Huang, Univ. of Wisconsin-Madison (United States). . . . . [10007-5]

Coffee Break . . . . . Wed 10:10 to 10:40

SESSION 2

LOCATION: ROOM HARRIS 1 . . . . . WED 10:40 TO 12:20

High Performance Computing II

Session Chair: **Sebastián López,**
Univ. de Las Palmas de Gran Canaria (Spain)

10:40: **Parallel hyperspectral image reconstruction using random projections**, Jorge Sevilla, Gabriel Martin, José M. Nascimento, Instituto de Telecomunicações (Portugal) . . . . . [10007-6]

11:00: **A new semi-supervised classification strategy combining active learning and spectral unmixing of hyperspectral data**, Yanli Sun, Institute of Remote Sensing and Digital Earth (China) and Univ. de Extremadura (Spain); Xia Zhang, Institute of Remote Sensing and Digital Earth (China); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain); Jun Li, Sun Yat-Sen Univ. (China); Inmaculada Dópido, Yi Liu, Univ. de Extremadura (Spain) . . . . . [10007-7]

11:20: **Parallel implementation of a hyperspectral image linear SVM classifier using RVC-CAL**, Daniel Madroñal Quintín, Raquel Lazcano López, Univ. Politécnica de Madrid (Spain); Gustavo Marrero Callico, Himar Fabelo Gómez, Univ. de Las Palmas de Gran Canaria (Spain); Eduardo Juárez Martínez, César Sanz Álvaro, Univ. Politécnica de Madrid (Spain). . . . . [10007-8]

11:40: **The implementation of contour-based object orientation estimation algorithm in FPGA-based on-board vision system**, Valeriy V. Strotov, Boris A. Alpatov, Pavel V. Babayan, Ryazan State Radio Engineering Univ. (Russian Federation) . . . . . [10007-9]

12:00: **OpenCL-library-based Implementation of SCLSU algorithm for remotely sensed hyperspectral data exploitation: clMAGMA versus viennaCL**, Sergio Bernabé García, Guillermo Botella, Carlos Orueta, José M. R. Navarro, Manuel Prieto-Matías, Univ. Complutense de Madrid (Spain); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain) . . . . . [10007-10]

Lunch/Exhibition Break . . . . . Wed 12:20 to 13:40

SESSION 3

LOCATION: ROOM HARRIS 1 . . . . . WED 13:40 TO 15:20

High Performance Computing III

Session Chair: **José M. Nascimento,**
Instituto de Telecomunicações (Portugal)

13:40: **A multiple criteria-based spectral partitioning method for remotely sensed hyperspectral image classification**, Yi Liu, Univ. de Extremadura (Spain); Jun Li, Sun Yat-Sen Univ. (China); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain); Yanli Sun, Institute of Remote Sensing and Digital Earth (China) . . . . . [10007-11]

14:00: **A new comparison of hyperspectral anomaly detection algorithms for real-time applications**, María Díaz, Sebastián López, Roberto Sarmiento, Univ. de Las Palmas de Gran Canaria (Spain) . . . . . [10007-12]

14:20: **Fast lossless prediction model for all-sky aurora videos**, Jiaji Wu, Wanqiu Kong, Xidian Univ. (China); Zejun Hu, Polar Research Institute of China (China) . . . . . [10007-13]

14:40: **A new hyperspectral image compression paradigm based on fusion**, Raúl Guerra, José Andrés Melián, Institute of Applied Microelectronics (Spain); Sebastián López, Roberto Sarmiento, Univ. de Las Palmas de Gran Canaria (Spain) . . . . . [10007-14]

15:00: **Toward an optimisation process for dynamically monitored environment**, Orabi M. Shurrab, Univ. of Bradford (United Kingdom) and Taibah Univ. (Saudi Arabia) . . . . . [10007-15]

Coffee Break . . . . . Wed 15:20 to 15:50

SESSION 4

LOCATION: ROOM HARRIS 1 . . . . . WED 15:50 TO 17:30

High Performance Computing IV

Session Chair: **Valeriy V. Strotov,** Ryazan State Radio Engineering Univ. (Russian Federation)

15:50: **Parallelism exploitation of a PCA algorithm for hyperspectral images using RVC-CAL**, Raquel Lazcano López, Ignacio Sidrach-Cardona Martínez, Daniel Madroñal Quintín, Univ. Politécnica de Madrid (Spain); Karol Desnos, Maxime Pelcat, Institut National des Sciences Appliquées de Rennes (France); Eduardo Juárez Martínez, César Sanz Álvaro, Univ. Politécnica de Madrid (Spain) [10007-16]

16:10: **Parallel computing implementation for haze removal based on dark channel**, Xianyun Wu, Yunsong Li, Xidian Univ. (China); Bormin Huang, Univ. of Wisconsin-Madison (United States); Ru Wang, Kai Liu, Xidian Univ. (China) . . . . . [10007-17]

16:30: **Optimizing the rapid radiative transfer model (RRTM) radiation scheme for Intel Many Integrated Core (MIC) architecture**, Jarno Mielikainen, Bormin Huang, Univ. of Wisconsin-Madison (United States) . . . . . [10007-18]

16:50: **GPU-based parallel design of discrete particle swarm optimization endmember extraction algorithm**, Chaoyin Yu, Zhengwu Yuan, Chongqing Univ. of Posts and Telecommunications (China); Yuanfeng Wu, Institute of Remote Sensing and Digital Earth (China) . . . . . [10007-19]

17:10: **Spatial-spectral preprocessing for endmember extraction on GPU's**, Luis Ignacio Jimenez, Javier Plaza, Antonio J. Plaza Miguel, Univ. de Extremadura (Spain); Jun Li, Sun Yat-Sen Univ. (China) . . . . . [10007-20]

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

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Fast DPCM scheme for lossless compression of aurora spectral images, Wanqiu Kong, Jiaji Wu, Xidian Univ. (China) . . . . . [10007-22]

Generation of OAM waves using metamaterials substrate antenna, Xiangshuai Meng, Jiaji Wu, Zhensen Wu, Tan Qu, Xidian Univ. (China)[10007-23]

Hardware design and implementation of fast DOA estimation method based on multicore DSP, Rui Guo, Yingxiao Zhao, Yue Zhang, Qianqiang Lin, Zengping Chen, National Univ. of Defense Technology (China) . . . . . [10007-24]

Coastline change mapping using a spectral band method and Sobel edge operator, Saeed H. Al-Mansoori, Mohammed Bin Rashid Space Ctr. (United Arab Emirates) . . . . . [10007-25]

Characteristic of remote sensing of soil moisture on rugged surface, Lu Bai, Haiying Li, Zhensen Wu, Xidian Univ. (China) . . . . . [10007-26]

CONFERENCE 10008

LOCATION: ROOM OCHILL 1-2-3

Monday–Tuesday 26–27 September 2016 • Proceedings of SPIE Vol. 10008

Remote Sensing Technologies and Applications in Urban Environments

Conference Chairs: **Thilo Erbertseder,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Thomas Esch,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Nektarios Chrysoulakis,** Foundation for Research and Technology-Hellas (Greece)

Programme Committee: **Matthias Budde,** Karlsruhe Institute of Technology (Germany); **Christopher Small,** The Earth Institute (United States); **Carlos Tavares Calafate,** Univ. Politécnica de Valencia (Spain)

MONDAY 26 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: ROOM OCHILL 1-2-3 . . . . . .8:35 TO 8:40

SESSION 1

LOCATION: ROOM OCHILL 1-2-3 . . . . . MON 8:40 TO 10:40

Urban Air Quality

Session Chair: **Thilo Erbertseder,**
Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

8:40: **Improved MODIS aerosol retrieval in urban areas using a land-classification approach and empirical orthogonal functions** *(Invited Paper)*, Nathaniel Levitan, The City College of New York (United States); Barry Gross, The City Univ. of New York (United States) . . . . . [10008-1]

9:10: **Pollutant monitoring of aircraft exhaust with multispectral imaging**, Emily E. Berkson, David W. Messinger, Rochester Institute of Technology (United States). . . . . [10008-2]

9:30: **Estimative of turbulence production by nocturnal low-level jets in Sao Paulo (Brazil)**, Eduardo Landulfo, Cassia Beu, Márcia Martins Amorim Marques, Walter M. Nakaema, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Yoshiaki Sakagami, Pedro Santos, Univ. Federal de Santa Catarina (Brazil); Andrea Moreira, Petróleo Brasileiro S.A. (Brazil) . . . . . [10008-3]

9:50: **Air quality estimates in the city using ground-based measurements and satellite technology: greater Tel-Aviv as a case study**, Alexandra Chudnovsky, Tel Aviv Univ. (Israel); Alexander B. Kostinski, Michigan Technological Univ. (United States); Lee Sever, Tel Aviv Univ. (Israel) and NASA Goddard Space Flight Ctr. (United States); Saaroni Hadas, Alexi Lyapustin, NASA Goddard Space Flight Ctr. (United States); Yujie Wang, Univ. of Maryland, Baltimore County (United States) . . . . . [10008-4]

10:10: **High-grade, compact spectrometers for Earth observation from SmallSats** *(Invited Paper)*, Len van der Wal, Bryan T. G. de Goeij, TNO (Netherlands); Rob Jansen, TNO Science and Industry (Netherlands); Han J.A.J. Oosterling, Bart Snijders, TNO (Netherlands) . . . . . [10008-6]

Coffee Break . . . . . Mon 10:40 to 11:00

SESSION 2

LOCATION: ROOM OCHILL 1-2-3 . . . . . MON 11:00 TO 12:40

Smart Cities

Session Chair: **Nektarios Chrysoulakis,**
Foundation for Research and Technology-Hellas (Greece)

11:00: **Gas detection by using transmittance estimation and segmentation approaches**, Didem Ozisik Baskurt, Yusuf Gür, Fatih Omruuzun, Yasemin Yardimci Çetin, Middle East Technical Univ. (Turkey). . . . . [10008-5]

11:20: **Aerial thermography for energy efficiency of buildings: the ChoT project**, Emanuele Mandanici, Paolo Conte, Univ. degli Studi di Bologna (Italy) . . . . . [10008-7]

11:40: **Assessing the urban solar energy resource potential of Davao City, Philippines, using lidar Digital Surface Model (DSM) and GRASS GIS**, Justine G. Teves, Eula Fae D. Sola, Ben Hur S. Pintor, Ma. Rosario Concepcion O. Ang, Univ. of the Philippines (Philippines) . . . . . [10008-8]

12:00: **The measurement of carbon dioxide levels in a city canyon**, Jenny Boyd, Daniel Budinov, James W. Jack, John B. Moncrieff, The Univ. of Edinburgh (United Kingdom). . . . . [10008-9]

12:20: **Spatio-temporal analysis of preterm birth in Portugal and its relation with environmental variables**, Mariana Oliveira, Ana C. Teodoro, Univ. do Porto (Portugal); José Alberto da Silva Freitas, Ctr. de Investigação em Tecnologias e Sistemas de Informação em Saúde (Portugal) and Univ. do Porto (Portugal); João Bernardes, Ctr. de Investigação em Tecnologias e Sistemas de Informação em Saúde (Portugal) and Univ. do Porto (Portugal) and Hospital de São João (Portugal); Hernâni Gonçalves, Ctr. de Investigação em Tecnologias e Sistemas de Informação em Saúde (Portugal) . . . . . [10008-10]

Lunch Break . . . . . Mon 12:40 to 13:50

SESSION 3

LOCATION: ROOM OCHILL 1-2-3 . . . . . MON 13:50 TO 15:40

Urban Climate

Session Chair: **Thomas Esch,**
Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

13:50: **Anthropogenic heat flux estimation from space: results of the first phase of the URBANFLUXES Project** *(Invited Paper)*, Nektarios Chrysoulakis, Foundation for Research and Technology-Hellas (Greece); Mattia Marconcini, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Jean-Philippe Gastellu-Etchegorry, Ctr. d'Etudes Spatiales de la Biosphère (France); C.S.B. Grimmond, The Univ. of Reading (United Kingdom); Christian Feigenwinter, Univ. Basel (Switzerland); Fredrik Lindberg, Göteborgs Univ. (Sweden); Fabio Del Frate, GEO-K s.r.l. (Italy); Judith Klostermann, Alterra B.V. (Netherlands); Zina Mitraka, Foundation for Research and Technology-Hellas (Greece); Thomas Esch, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Lucas Landier, Ctr. d'Etudes Spatiales de la Biosphère (France); Andrew Gabey, Univ. of Reading (United Kingdom); Eberhard Parlow, Univ. Basel (Switzerland); Frans Olofson, Göteborgs Univ. (Sweden) . . . . . [10008-11]

14:20: **Study on urban heat island effect and its response to the vegetation eco-environmental quality**, Saiping Xu, Qianjun Zhao, Kai Yin, Bei Cui, Xiupeng Zhang, Institute of Remote Sensing and Digital Earth (China) . . . . . [10008-12]

14:40: **Dynamics of thermal inertia over highly urban city: a case study of Delhi**, Shivesh Berwal, Jawaharlal Nehru Univ. (India); Dinesh Kumar, Central Univ. of Jammu (India); Alok Kumar Pandey, Vinay Pratap Singh, Ritesh Kumar, Krishan Kumar, Jawaharlal Nehru Univ. (India) . . . . . [10008-13]

15:00: **Using remote sensing data analyze LST's changes in Hainan Island in China and Its urban heat island effect during 2001 to 2015**, Yalan Liu, Chang Qu, Yuhuan Ren, Institute of Remote Sensing and Digital Earth (China) . . . . . [10008-14]

15:20: **Assessment of urban heat island formation in Bathinda City, Punjab, India**, Puneeta Pandey, Central Univ. of Punjab (India) . . . . . [10008-15]

Coffee Break . . . . . Mon 15:40 to 16:00

Remote Sensing Plenary Session

LOCATION: ROOM CARRICK 1-2-3 . . . . . MON 16:00 TO 18:30

WELCOME AND INTRODUCTION . . . . . 16:00 TO 16:15

16:15 to 17:00: High-Power Fibre Lasers for Beam Combination, David Payne, University of Southampton, Optoelectronics Research Center (United Kingdom)

17:00 to 17:45: Earth Observations for Improving Water and Food Security, Wim Bastiaanssen, UNESCO-IHE Institute for Water Education and Delft Univ. of Technology (Netherlands)

17:45 to 18:30: Quantum Technology for a Networked World, Peter Knight, Blackett Laboratory, Imperial College (United Kingdom)Center (United Kingdom)

TUESDAY 27 SEPTEMBER

SESSION 4

LOCATION: ROOM OCHILL 1-2-3 . . . . . TUE 9:00 TO 11:10

Urban Land Cover and Biodiversity

Session Chair: **Thomas Esch,**
Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

9:00: **Extraction of urban vegetation with Pléiades multiangular images**, Antoine Lefebvre, IRISA / INRIA Rennes (France); Jean Nabucet, Thomas Corpetti, Univ. Rennes 2 (France); Nicolas Courty, IRISA / INRIA Rennes (France); Laurence Hubert-Moy, Univ. Rennes 2 (France) . . . . . [10008-16]

9:20: **Evaluation of bispectral lidar data for urban vegetation mapping**, Jean Nabucet, Thomas Corpetti, Hervé Quenol, Univ. Rennes 2 (France); Launeau Patrick, Univ. de Nantes (France); Dimitry Lague, Univ. de Rennes 1 (France); Cyril Michon, FIT CONSEIL (France); Laurence Hubert-Moy, Univ. Rennes 2 (France) . . . . . [10008-17]

9:40: **LUISA: learning urban image spectral archive**, Marianne Jilge, Ruhr-Univ. Bochum (Germany); Uta Heiden, Martin Habermeyer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Carsten Jürgens, Ruhr-Univ. Bochum (Germany) . . . . . [10008-18]

Coffee Break . . . . . Tue 10:00 to 10:30

10:30: **Synergistic use of multispectral satellite imagery and hyperspectral endmember libraries for urban land cover mapping at the metropolitan scale**, Frederik Priem, Vrije Univ. Brussel (Belgium); Akpona Okujeni, Sebastian van der Linden, Humboldt-Univ. zu Berlin (Germany); Frank Canters, Vrije Univ. Brussel (Belgium). . . . . [10008-20]

10:50: **Spectral unmixing of urban land cover using a generic spectral library approach**, Jeroen Degerickx, KU Leuven (Belgium); Akpona Okujeni, Sebastian van der Linden, Humboldt-Univ. zu Berlin (Germany); Marian-Daniel Iordache, VITO NV (Belgium); Martin Hermy, Ben Somers, KU Leuven (Belgium) [10008-21]

SESSION 5

LOCATION: ROOM OCHILL 1-2-3 . . . . . TUE 11:10 TO 12:10

Urban Morphology and Infrastructures I

Session Chair: **Thilo Erbertseder,**
Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

11:10: **Effective delineation of urban flooded areas based on aerial orthophoto imagery**, Ying Zhang, Bert Guindon, Don Raymond, Gang Hong, Natural Resources Canada (Canada). . . . . [10008-39]

11:30: **Airborne SAR on circular trajectories to reduce layover and shadow effects of urban scenes**, Stephan Palm, Rainer Sommer, Nils Pohl, Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik (Germany); Uwe Stilla, Technische Univ. München (Germany) . . . . . [10008-23]

11:50: **An improved automated procedure for informal and temporary dwellings detection and enumeration, using mathematical morphology operators on VHR satellite data**, Malgorzata Jenerowicz, Space Research Ctr. (Poland); Thomas Kemper, European Commission Joint Research Ctr. (Italy) . . . . . [10008-47]

Lunch/Exhibition Break . . . . . Tue 12:10 to 13:20

SESSION 6

LOCATION: ROOM OCHILL 1-2-3 . . . . . TUE 13:20 TO 15:00

Urban Morphology and Infrastructures II

Session Chair: **Thilo Erbertseder,**
Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

13:20: **Systematic infrared image quality improvement using deep learning based technique**, Huaizhong Zhang, Pablo Casaseca, Univ. of the West of Scotland (United Kingdom); Chunbo Luo, Univ. of Exeter (United Kingdom); Qi Wang, Univ. of the West of Scotland (United Kingdom); Matthew R. Kitchin, Thales Optronics Ltd. (United Kingdom); Andrew Parmley, Thales UK (United Kingdom); Jesús Monge-Álvarez, Univ. of Exeter (United Kingdom) and Univ. of the West of Scotland (United Kingdom) . . . . . [10008-24]

13:40: **Building block extraction and classification by means of Markov random fields using aerial imagery and lidar data**, Emmanuel Bratsolis, National and Kapodistrian Univ. of Athens (Greece); Marc Sigelle, Télécom ParisTech (France); Eleni Charou, National Ctr. for Scientific Research Demokritos (Greece) . . . . . [10008-48]

14:00: **ICARE-HS: atmospheric correction of airborne hyperspectral urban images using 3D information**, Xavier Ceamanos, Xavier Briottet, Guillaume Roussel, Hugo Gilardy, ONERA (France) . . . . . [10008-27]

14:20: **Incremental road discovery from aerial imagery using curvilinear spanning tree (CST) search**, Guozhi Wang, Yuchun Huang, Rongchang Xie, Wuhan Univ. (China) . . . . . [10008-28]

14:40: **Automatic pole-like object modeling via 3D part-based analysis of point cloud**, Liu He, Haoxiang Yang, Yuchun Huang, Wuhan Univ. (China) . . . . . [10008-42]

Coffee Break . . . . . Tue 15:00 to 15:30

SESSION 7

LOCATION: ROOM OCHILL 1-2-3 . . . . . TUE 15:30 TO 17:10

Urban Morphology and Infrastructures III

Session Chair: **Nektarios Chrysoulakis,**
Foundation for Research and Technology-Hellas (Greece)

15:30: **Galaxy a new state of the art airborne lidar system**, Daryl Hartsell, Paul E. LaRocque, Jeffrey Tripp, Teledyne Optech (Canada). . . . . [10008-29]

15:50: **Identification and correction of road courses by merging successive segments and using improved attributes**, Dimitri Bulatov, Fraunhofer-Institut für Optronik Systemtechnik und Bildauswertung (Germany); Melanie Pohl, Gisela Häufel, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [10008-30]

16:10: **Detection of asphalt pavement cracks using remote sensing techniques**, Christodoulos Mettas, Athos Agapiou, Kyriacos Themistocleous, Kyriacos Neocleous, Diofantos G. Hadjimitsis, Cyprus Univ. of Technology (Cyprus) . . . . . [10008-31]

16:30: **Tunable mechanical monolithic sensors for real-time broadband monitoring of large civil infrastructures**, Fabrizio Barone, Gerardo Giordano, Univ. degli Studi di Salerno (Italy) . . . . . [10008-32]

16:50: **Vehicle detection from very-high-resolution (VHR) aerial imagery using attribute belief propagation (ABP)**, Yanli Wang, Yingguang Li, Yuchun Huang, Wuhan Univ. (China) . . . . . [10008-33]

WEDNESDAY 28 SEPTEMBER

POSTER SESSION

LOCATION: CROMDALE HALL . . . . . WED 17:45 TO 19:30

Conference attendees are invited to attend the Remote Sensing poster session held on Wednesday 17:30 to 19:30. Posters will be on display after 10:00 Tuesday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Wednesday Poster Session. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/x32234.xml.

Investigation of air pollution and regional climate change due to anthropogenic aerosols, Makiko Nakata, Itaru Sano, Kinki Univ. (Japan); Sonoyo Mukai, The Kyoto College of Graduate Studies for Informatics (Japan) . . . . . [10008-36]

Landcover change and light pollution in Kota Bandar Lampung, Akmal F. Rohman, Muhammad Hafidz, Azra Q. Hazairin, Fitri Riadini, Univ. of Indonesia (Indonesia) . . . . . [10008-37]

Improvement of retrieval algorithms for heavy air pollutions, Sonoyo Mukai, The Kyoto College of Graduate Studies for Informatics (Japan); Itaru Sano, Makiko Nakata, Kinki Univ. (Japan). . . . . [10008-38]

Remote sensing image adaptive fusion based on visual saliency analysis, Libao Zhang, Jie Chen, Beijing Normal Univ. (China) . . . . . [10008-40]

Impacts of urban growth and heat waves events on the urban heat island in Bucharest city, Maria A. Zoran, Roxana S. Savastru, Dan M. Savastru, National Institute of Research and Development for Optoelectronics (Romania); Adrian I. Dida, Transilvania Univ. of Brasov (Romania) . . . . . [10008-43]

Synergy use of satellite remote sensing and in-situ monitoring data for air pollution impacts on urban climate, Dan M. Savastru, Maria A. Zoran, Roxana S. Savastru, National Institute of Research and Development for Optoelectronics (Romania) . . . . . [10008-44]

Software for hyperspectral, joint photographic experts group (.JPG), portable network graphics (.PNG) and tagged image file format (.TIFF) segmentation, Bruno Lucas dos Santos, Rodrigo Brassi Piassi, Embrapa Instrumentação Agropecuária (Brazil); Lucio André de Castro Jorge, EMBRAPA (Brazil) . . . . . [10008-45]

Efficient fall detection system, Naeem Ramzan, Univ. of the West of Scotland (United Kingdom). . . . . [10008-46]

Earth observation techniques for the geo-environment of the cities of Igoumenitsa and Volos, Greece, M. Stefouli, Institute of Geology and Mineral Exploration (Greece); Eleni Charou, National Ctr. for Scientific Research Demokritos (Greece); P. Krasakis, Institute of Geology and Mineral Exploration (Greece); S. Gyftakis, National Ctr. for Scientific Research Demokritos (Greece) . . . . . [10008-49]

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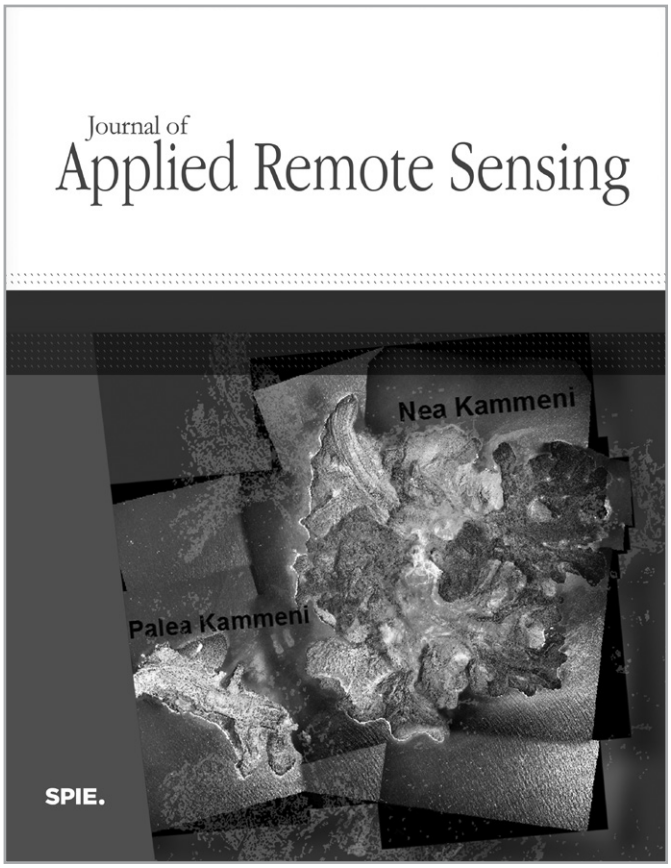

Ni-Bin Chang

University of Central Florida, USA

Editor-in-Chief

The *Journal of Applied Remote Sensing* (JARS), covers the concepts, information, and progress of the remote sensing community.

RemoteSensing.SPIEDigitalLibrary.org

SPIE. REMOTE SENSING PROCEEDINGS

Proceedings.

Full paid registration includes your choice of Proceedings of SPIE. See the attached list for product order numbers for proceedings options from this meeting. You will need a product order number when you make your proceedings choice on the registration form.

Available as part of registration:

Online Proceedings Collection—access to multiple related proceedings volumes via the SPIE Digital Library. Available as papers are published.

Online Proceedings Volume—access to single conference proceedings volumes via the SPIE Digital Library. Available as papers are published.

You may also purchase additional proceedings products beyond what you choose with your registration plan. See below for pricing and product order numbers.

Paid Conference Attendees: You may purchase additional online proceedings volume for £42/$60 each.

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Access to purchased online proceedings will be ongoing using your SPIE login credentials; papers are available as they are published.

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- Go to **http://spiedigitallibrary.org** and sign in with your SPIE account credentials. If you do not have an SPIE account, create one using the email address you used to register for the conference.
- Once you have signed in, click the My Account link at the top of the page. You can access your proceedings in the My Conference Proceedings tab.

Note: If your organization subscribes to the SPIE Digital Library, you can also access this content via your organization's account when using your institution's network.

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Phone (North America): +1 888 902 0894
Phone (Rest of World): +1 360 685 5580

The price for additional online proceedings volumes is £42/$60 each. Paid Conference Attendees.

ONLINE PROCEEDINGS COLLECTIONS

Product Order Number	Collection Title/Included Volumes (See next page for volume titles and editors)	Price for separate purchase
		Meeting Attendees
DLC630	**Remote Sensing 2016** *Volumes #: 9998, 9999, 10000, 10001, 10002, 10003, 10004, 10005, 10006, 10007, and 10008*	**£107/$155**

PROCEEDINGS VOLUMES

Product Order Number		Volume Title/Volume Editors	Price for separate Print purchase
Print Volume	**Online Volume**		**Meeting Attendees**
9998	DL9998	**Remote Sensing for Agriculture, Ecosystems, and Hydrology XVIII** *Christopher M. U. Neale, Antonino Maltese*	£72/$105
9999	DL9999	**Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2016** *Charles R. Bostater, Stelios P. Mertikas, Xavier Neyt, Caroline Nichol, David C. Cowley*	£55/$80
10000	DL10000	**Sensors, Systems, and Next-Generation Satellites XX** *Roland Meynart, Steven P. Neeck, Toshiyoshi Kimura, Harushisa Shimoda*	£69/$100
10001	DL10001	**Remote Sensing of Clouds and the Atmosphere XXI** *Adolfo Comerón, Evgueni I. Kassianov, Klaus Schäfer*	£41/$60
10002	DL10002	**Optics in Atmospheric Propagation and Adaptive Systems XIX** *Karin U. Stein, John D. Gonglewski*	£37/$53
10003	DL10003	**SAR Image Analysis, Modeling, and Techniques XVI** *Claudia Notarnicola, Simonetta Paloscia, Nazzareno Pierdicca, Edward Mitchard*	£37/$53
10004	DL10004	**Image and Signal Processing for Remote Sensing XXII** *Lorenzo Bruzzone*	£69/$100
10005	DL10005	**Earth Resources and Environmental Remote Sensing/GIS Applications VII** *Ulrich Michel, Karsten Schulz*	£62/$90
10006	DL10006	**Lidar Technologies, Techniques, and Measurements for Atmospheric Remote Sensing XII** *Upendra N. Singh, Doina Nicoleta Nicolae*	£37/$53
10007	DL10007	**High-Performance Computing in Remote Sensing VI** *Bormin Huang, Sebastián López, Zhensen Wu*	£37/$53
10008	DL10008	**Remote Sensing Technologies and Applications in Urban Environments** *Thilo Erbertseder, Thomas Esch, Nektarios Chrysoulakis*	£48/$70

GENERAL INFORMATION

Registration

Onsite Registration and Badge Pick-up Hours

Location: Strathblane Hall

Sunday 25 September . . . . . .15:00 to 18:00 hrs.
Monday 26 September . . . . . .7:30 to 17:00 hrs.
Tuesday 27 September. . . . . 8:00 to 17:00 hrs.
Wednesday 28 September . . . . . .8:30 to 17:00 hrs.
Thursday 29 September. . . . . 8:30 to 16:00 hrs.

Exhibition Hours

Tuesday 27 September. . . . . .10:00 to 17:00 hrs.
Wednesday 28 September . . . . . 10:00 to 16:00 hrs.

Conference Registration

Includes admission to all conference sessions, plenaries, panels, and poster sessions, admission to the Exhibition and Industry Sessions, Welcome Reception, coffee breaks, and a choice of online proceedings.

Exhibition Registration

Exhibition-Only registration is complimentary.

Early Registration Pricing and Details

Conference registration prices increase by £105/$150 (Students, £35/$50) after 9 September 2016. The online form will automatically display the increased prices.

SPIE Member, SPIE Student Member, and Student Pricing

- SPIE Members receive conference and course registration discounts. Discounts are applied at the time of registration.
- Student registration rates are available only to undergraduate and graduate students who are enrolled full time and have not yet received their Ph.D. Post-docs may not register as students. A student ID number or proof of student status is required with your registration.

Press Registration

For credentialed press and media representatives only. Please email contact information, title, and organisation to media@spie.org.

SPIE Cashier

Registration Area | Open during registration hours

Registration Payments

If you are paying by cash or cheque as part of your onsite registration, wish to add a course, workshop, or special event requiring payment, or have questions regarding your registration, visit the SPIE Cashier.

Receipt and Certificate of Attendance

Preregistered attendees who did not receive a receipt or attendees who need a Certificate of Attendance may obtain those from the SPIE Cashier.

Badge Corrections

Badge corrections can be made by the SPIE Cashier. Please have your badge removed from the badge holder and marked with your changes before approaching the counter.

Refund Information

There is a €40 service charge for processing refunds. Requests for refunds must be received by 15 September 2016; all registration fees will be forfeited after this date. Membership dues, SPIE Digital Library subscriptions, or Special Events purchased are not refundable.

Author / Presenter Information

Speaker Check-In and Preview Station

Location: Lomond Foyer

Monday through Thursday . . . . . .08:00 to 17:00 hrs

All conference rooms have a computer workstation, projector, screen, lapel microphone, and laser pointer.

All presenters are requested to come to Speaker Check-In (in your conference room) during the breaks with their memory devices or laptops to confirm their presentation display settings.

Poster Setup Instructions

Poster presenters may begin posting their poster papers starting at 10:00 hrs on Monday in the Conference Area Hallway. Each poster presenter is provided a space 0.95 x 1.20m in which to display a summary of the paper. (The boards are designed to accommodate A4 size in portrait orientation.) Poster authors are requested to attend the official poster session and should be at their papers on Wednesday from 17:45 to 19:30 hrs to answer questions from attendees. Poster presenters who have not set up by 17:45 on Tuesday will be considered a "no show" and their manuscript will not be published. SPIE assumes no responsibility for posters left up after 19:30 pm on Wednesday. Any papers left on the boards at that time will be considered unwanted and will be discarded.

Onsite Services

Internet Access

Wireless Internet

Complimentary Wireless Internet will be available. Connection speeds will depend on the number of users. Please read the SPIE Wireless Internet Service Policy.

SPIE Conference and Exhibition App

Download the free SPIE Conference App, available for iPhone and Android phones. Search and browse the Programme, special events, participants, exhibitors, and more.

Urgent Message Line

An urgent message line is available during registration hours: +44 29 2089 4747. Attendees should check the message board in the registration area for any messages held for them.

Business Centre

Location: Strathblane Hall

Open during Registration Hours

Services include copying, and printing options. For directions please contact the registration desk.

SPIE Luggage + Coat Check

Location: Strathblane Hall

Open during Registration Hours

Luggage, package, and coat storage are available free of charge. Please note opening hours.

Urgent Message Line

An urgent message line is available during registration hours: +44 29 2089 4747. Attendees should check the message board in the registration area for any messages held for them.

Food and Beverage Services

Coffee Breaks

Location: Conference Room Foyers

Monday/Thursday . . . . . 10:00 and 15:00 hrs.

Location: Strathblane Hall

Tuesday/Wednesday . . . . . 10:00 and 15:00 hrs.

Complimentary coffee will be served twice daily, at 10:00 and 15:00 hrs. Check individual conference listings for exact times and locations.

Food and Refreshments for Purchase

Strathblane Hall

Open during Registration Hours

There is a coffee stand in the Registration area where small snacks and coffee can be purchased. A wider selection of food can be found in the surrounding restaurants.

About Edinburgh

Frequently named as one of the best places to live and work in the UK, Edinburgh is without doubt the jewel in Scotland's crown. This beautiful and cosmopolitan city, with its many wonderful attractions, makes an immediate and favourable impression on the many visitors who travel here. Surrounded by stunning scenery, historic buildings and wonderful architecture. With three universities, the most famous of which is the University of Edinburgh the city has a sizeable student population drawn from all corners of the globe. This helps to give Edinburgh an energetic buzz, but with quietness and tranquility always within easy reach.

It has been the Scottish capital since the 15th century and has two distinct areas, the Old Town, dominated by the medieval Castle; and the neoclassical New Town, whose development from the 18th century onwards has had a far-reaching influence on European urban planning. It is the wonderful juxtaposition of these two contrasting historic areas, each with their own important buildings, that gives the city its own unique character.

GENERAL INFORMATION

TRAVEL

Travel to Edinburgh
With an excellent internal air, rail and road network, getting to Edinburgh from within the UK has never been easier.

By Plane
Edinburgh has one of the UK's fastest growing airports and new flights are always being added. At the EICC, we have the luxury of being located right in the heart of the city and within 10km (6 miles) of Edinburgh International Airport (www.edinburghairport.com). For more information on what flights fly to Edinburgh visit Edinburgh Airport. For information on transfers from the airport to the city centre, see Local Buses below.

By Train
Edinburgh has two railway stations – Waverley and Haymarket. Waverley is the main station and has direct routes to many cities across the country, including over 25 daily departures from London. For more information on the rail network within the UK click here or visit National Rail (www.nationalrail.co.uk).

By Bus
Edinburgh's main bus terminal is located near to St Andrew Square. Bus connections stretch right across the UK. For details of these routes visit: National Express (www.nationalexpress.com) or City Link (www.citylink.co.uk). For information on local bus services throughout Edinburgh visit: Lothian Buses (https://lothianbuses.co.uk).

By Local Bus
Marketing Edinburgh, Convention Bureau have negotiated on behalf of all attendees a special discount for bus travel with Edinburgh & Lothian buses (https://lothianbuses.co.uk). Not only are delegates entitled to reduced fares on the Airlink bus ticket, but also on the exciting city sightseeing bus tours (http://bit.ly/2bBehPC). The link allows delegates to book and print their Airlink bus tickets as well as their sightseeing ticket, before they arrive in the city!

The Airlink 100 operates a frequent bus service (every 10 minutes at peak times) between Edinburgh Airport and the city centre, with designated stops en route. Regular bus services start at 04.45 and run until 00.22 at night. Journey time is 20 minutes with tickets costing £4.50 single and £7.50 return (prices correct at the time of publication).

A tram system has also been put into place which runs from the airport into the city centre. Tickets are £5.50 from the airport into the city centre (£8.50 return, Day Ticket £9.00), and £1.60 for City Zone travel (£3.20 return, Day Ticket £4.00). The stop nearest to the EICC is the Haymarket stop. For routes and times, please use this link: Tram Information (http://edinburghtrams.com).

Delegates are advised to disembark at Haymarket for both Airlink and Tram and to follow signs for EICC on foot (5 minute walk). See City Centre Map for directions (http://eicc.co.uk/attending/city-centre-map/).

The N22 bus also departs from STAND 19 and runs every half an hour through the night until the Airlink service starts again. For more information about these services visit Airlink.

By Taxi
There is an excellent taxi service direct from the airport to the city. You'll find official airport taxis at the taxi rank outside the terminal building (follow the signs within the airport). It costs approximately £15 to get a taxi from the airport to the city centre and the journey takes 20 minutes depending on traffic flow and time of day.

By Car
The EICC is right in the centre of Edinburgh. The main entrance is on Morrison Street. For directions from your home or office visit Bing Maps and input EH38EE for the destination postcode.

Parking
There are many car parks in close walking distance to the EICC.
National Car Parks (NCP) Central Edinburgh

Sheraton Grand Hotel & Spa, Edinburgh Car Park Parking is available on the bottom two floors of the adjacent One Spa building which can be accessed from West Approach Road.

Semple Street Car Park (300 meters from EICC)
http://edinburgh.cdmf.info/public/carparks/list.htm

Things to Do
Surprises around every corner

It's a waterfront city dominated by steep, volcanic crags. It's an ancient and elegant city, with a vibrant and youthful cultural life. It's a granite city with a warm heart and a legendary sense of Scottish hospitality. Edinburgh is full of delightful contradictions waiting to surprise you around every corner. There is so much to see and do while you are here in Edinburgh.

To help you decide what to take in during your stay visit 'Visit Scotland' (www.visitscotland.com). Here you can make up an itinerary based on your length of stay, city highlights, top beaches, or best views.

An alternative site is 'Experience Edinburgh' (www.experienceedinburgh.co.uk). This site is packed with information on what you can see and do while you are in the city, featuring listings for bus tours, pubs & restaurants, shopping and golf courses and adventure packed activities and many more activities.

Whatever you do, we believe you will quickly discover why Edinburgh is called the 'Inspiring Capital'.

Walking Tours · Auld Reekie Tours · Mercat Tours · The Real Mary King's Close · Saints & Sinners Tours · Theatres · Edinburgh Festival & King's Theatre · Edinburgh Playhouse · Usher Hall · Scottish Bus Tours · Rabbies Trail Burners · Timberbush Tours · Boat Tour · Sporting Activities · Edinburgh International Climbing Arena · Fishing in Scotland · Scottish Golf Courses · Edinburgh Pass

See more and save more with the Edinburgh Pass; the essential sightseeing pass for visitors to Edinburgh. Pre-plan your trip to Scotland's capital city, experience quick and hassle-free entrance to attractions whilst saving money. Whether you are into history, haunted tours, culture, nature or full-on fun, the Edinburgh Pass is a must-have for a visit to Edinburgh. When purchasing an Edinburgh Pass, you qualify for a free Airlink bus ticket. For more information visit www.edinburghpass.com

Car Rental
Hertz Car Rental is the official car rental agency for SPIE Remote Sensing and Defence + Security. To reserve a car, identify yourself as a conference attendee using the Hertz Meeting Code PC#137480. The PC# must be on your advance reservation to receive this special offer. You must present this COUPON at the time of rental in order to receive this discount.

When booking from International Hertz locations, the PC # must be entered with the letters PC before the number, i.e. PC#137480. You will receive 15% off qualifying Affordable rates at participating locations in Edinburgh, Scotland.

Contact Hertz via phone:

- In the United States call the Hertz International Reservation Center at 1-800-654-3001
- In Europe and Asia call a Hertz Reservation Center or travel agent.
- This special offer is available for rentals from September 20 - October 15, 2016.

Acceptance of Policies and Registration Conditions

The following Policies and Conditions apply to all SPIE Events. As a condition of registration, you will be required to acknowledge and accept the SPIE Registration Policies and Conditions contained herein.

Granting Attendee Registration and Admission

SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry or remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, who in their sole opinion are not, or whose conduct is not, in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to any attendee, exhibitor, representative, or vendor who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

Misconduct Policy

SPIE is a professional, not-for-profit society committed to providing valuable conference and exhibition experiences. SPIE is dedicated to equal opportunity and treatment for all its members and meeting attendees. Attendees are expected to be respectful to other attendees, SPIE staff, and contractors. Harassment and other misconduct will not be tolerated; violators will be asked to leave the event.

Identification

To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued Photo ID at registration to collect registration materials.

Individuals are not allowed to pick up badges for attendees other than themselves. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

Capture and Use of a Person's Image

By registering for an SPIE event, I grant full permission to SPIE to capture, store, use, and/or reproduce my image or likeness by any audio and/or visual recording technique (including electronic/digital photographs or videos), and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE marketing or promotional purpose.

By registering for an SPIE event, I waive any right to inspect or approve the use of the images or recordings or of any written copy. I also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, I release, defend, indemnify and hold harmless SPIE from and against any claims, damages or liability arising from or related to the use of the images, recordings or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion or use in composite form that may occur or be produced in taking, processing, reduction or production of the finished product, its publication or distribution.

Payment Method

Registrants for paid elements of the event, who do not provide a method of payment, will not be able to complete their registration. Individuals with incomplete registrations will not be able to attend the conference until payment has been made. SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks and wire transfers. Onsite registrations can also pay with Cash.

Authors/Coauthors

By submitting an abstract, you agree to the following conditions:

- An author or coauthor (including keynote, invited, and solicited speakers) will register at the author registration rate, attend the meeting, and make the presentation as scheduled.
- A full-length manuscript (minimum 6 pages) for any accepted oral or poster presentation will be submitted for publication in the SPIE Digital Library, printed conference Proceedings, and CD. (Some SPIE events have other requirements that the author is made aware of at the time of submission.)
- Only papers presented at the conference and received according to publication guidelines and timelines will be published in the conference Proceedings and SPIE Digital Library (or via the requirements of that event).

Audio, Video, Digital Recording Policy

Conferences, courses, and poster sessions: For copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter or instructor. Attendees may not capture or use the materials presented in any meeting/course room or in course notes on display without written permission. Consent forms are available at Speaker Check-In. Individuals not complying with this policy will be asked to leave a given session and/or asked to surrender their recording media.

EXHIBITION HALL: For security and courtesy reasons, recordings of any kind are prohibited unless one has explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their recording media and to leave the exhibition hall.

Your registration signifies your agreement to be photographed or videotaped by SPIE in the course of normal business. Such photos and video may be used in SPIE marketing materials or other SPIE promotional items.

Laser Pointer Safety Information/Policy

SPIE supplies tested and safety-approved laser pointers for all conference meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers.

Use of a personal laser pointer represents user's acceptance of liability for use of a non-SPIE-supplied laser pointer. If you choose to use your own laser pointer, it must be tested to ensure <5 mW power output. Laser pointers in Class II and IIIa (<5mW) are eye safe if power output is correct, but output must be verified because manufacturer labeling may not match actual output. Come to Speaker Check-In and test your laser pointer on our power meter. You are required to sign a waiver releasing SPIE of any liability for use of potentially non-safe, personal laser pointers. Misuse of any laser pointer can lead to eye damage.

SPIE EVENT POLICIES

Access to Technical and Networking Events

Persons under the age of 18 including babies, carried or in strollers, and toddlers are not allowed in technical or networking events. Anyone 18 or older must register as an attendee. All technical and networking events require a valid conference badge for admission.

Underage Persons on Exhibition Floor Policy

For safety and insurance reasons:

- Children 14 and older, accompanied by an adult, will be allowed in the exhibition area during open exhibition hours only.
- No persons under the age of 18 will be allowed in the exhibition area during move-in and move-out.
- All children younger than 14, including babies in strollers and toddlers, are not allowed in the exhibition area at any time.

Unauthorized Solicitation Policy

Unauthorized solicitation in the Exhibition Hall is prohibited. Any non-exhibiting manufacturer or supplier observed to be distributing information or soliciting business in the aisles, or in another company's booth, will be asked to leave immediately.

Unsecured Items Policy

Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

Wireless Internet Service Policy

At SPIE events where wireless is included with your registration, SPIE provides wireless access for attendees during the conference and exhibition but cannot guarantee full coverage in all locations, all of the time. Please be respectful of your time and usage so that all attendees are able to access the internet.

Excessive usage (e.g., streaming video, gaming, multiple devices) reduces bandwidth and increases cost for all attendees. No routers may be attached to the network. Properly secure your computer before accessing the public wireless network. Failure to do so may allow unauthorized access to your laptop as well as potentially introduce viruses to your computer and/or presentation. SPIE is not responsible for computer viruses or other computer damage.

Mobile Phones and Related Devices Policy

Mobile phones, tablets, laptops, pagers, and any similar electronic devices should be silenced during conference sessions. Please exit the conference room before answering or beginning a phone conversation.

Smoking

For the health and consideration of all attendees, smoking, including e-cigarettes, is not permitted at any event elements, such as but not limited to: plenaries, conferences, workshops, courses, poster sessions, hosted meal functions, receptions, and in the exhibit hall. Most facilities also prohibit smoking and e-cigarettes in all or specific areas. Attendees should obey any signs preventing or authorizing smoking in specified locations.

Hold Harmless

Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Event Cancellation

If for some unforeseen reason SPIE should have to cancel the event, registration fees processed will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.

Confidential Reporting of Unethical or Inappropriate Behavior

SPIE is an organization with strong values of responsibility and integrity. Our Ethics Statement and Code of Professional Conduct contain general guidelines for conducting business with the highest standards of ethics. SPIE has established a confidential reporting system for staff & other stakeholders to raise concerns about possible unethical or inappropriate behavior within our community. Complaints may be filed by phone or through the website, and, if preferred, may be made anonymously. The web address is www.SPIE.ethicspoint.com and the toll free hotline number is 1-888-818-6898.

SPIE INTERNATIONAL HEADQUARTERS

PO Box 10
Bellingham, WA 98227-0010 USA
Tel: +1 360 676 3290
Fax: +1 360 647 1445
help@spie.org • www.SPIE.org

SPIE EUROPE OFFICES

2 Alexandra Gate
Ffordd Pengam, Cardiff, CF24 2SA UK
Tel: +44 29 2089 4747
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2017

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11–14 September 2017
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Warsaw, Poland