

SPIE. REMOTE SENSING

SPIE. SECURITY+ DEFENCE



INTERNATIONAL
YEAR OF LIGHT
2015



REMOTE SENSING. AND SECURITY+ DEFENCE.

TECHNICAL
PROGRAMME

EXHIBITION
GUIDE

WWW.SPIE.ORG/RS

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Centre de Congrès Pierre Baudis
Toulouse, France

Conferences: 21-24 September 2015

Exhibition: 22-23 September 2015

THE PREMIER EVENT FOR REMOTE SENSING

SPIE Remote Sensing is the European conference for international scientists and researchers focusing on satellite-based imaging systems and the data generated by them—an opportunity to apply technology to industry.

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CHARLES R. BOSTATER

Florida Institute of Technology,
Marine-Environmental Optics Lab & Remote Sensing Center (USA)

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EUROPE'S LEADING SECURITY AND DEFENCE MEETING

SPIE Security + Defence is a conference for international engineers, researchers, and scientists involved in optical science and applied technologies in advanced security and defence systems—bringing production to practice.

2015 SYMPOSIUM CHAIRS



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United Kingdom



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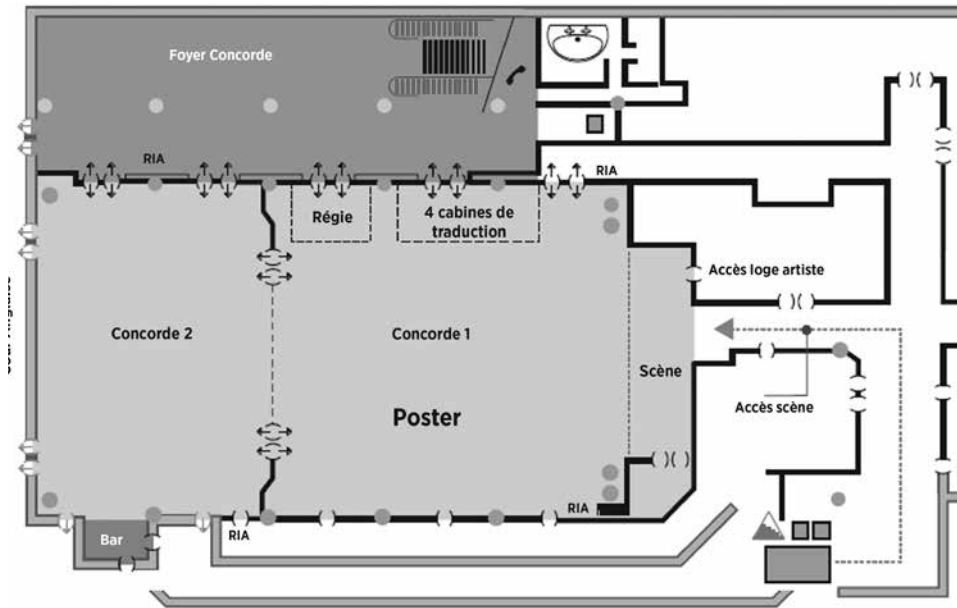
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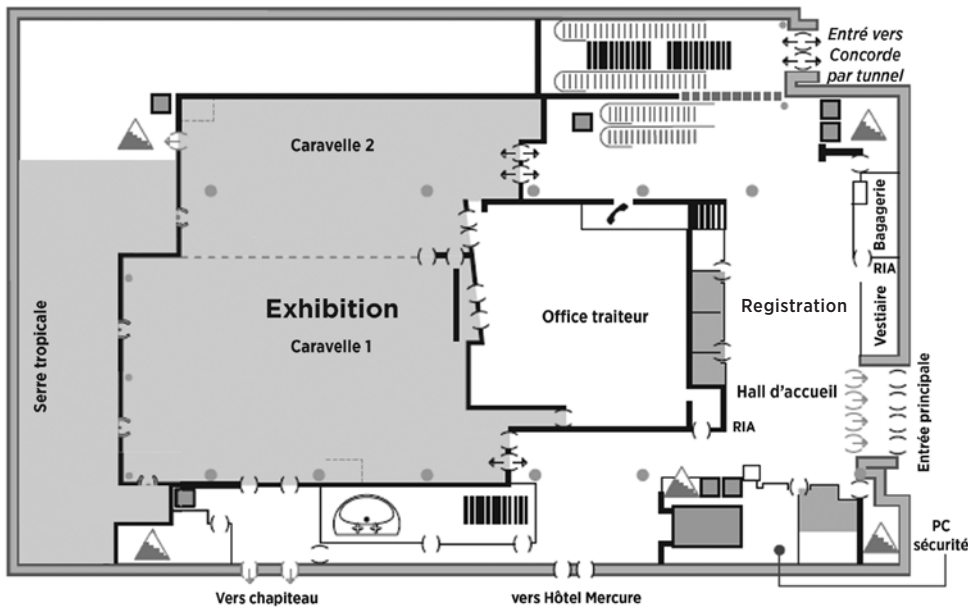
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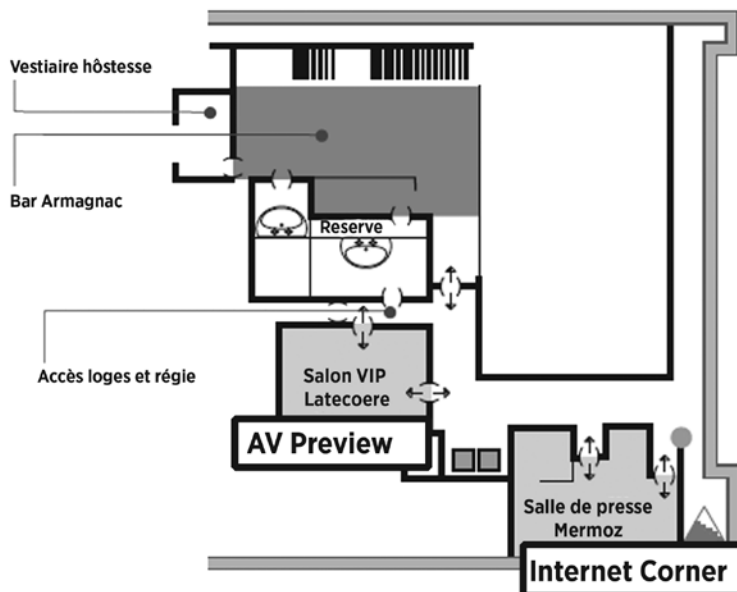
FACILITY FLOOR PLAN



LEVEL -1



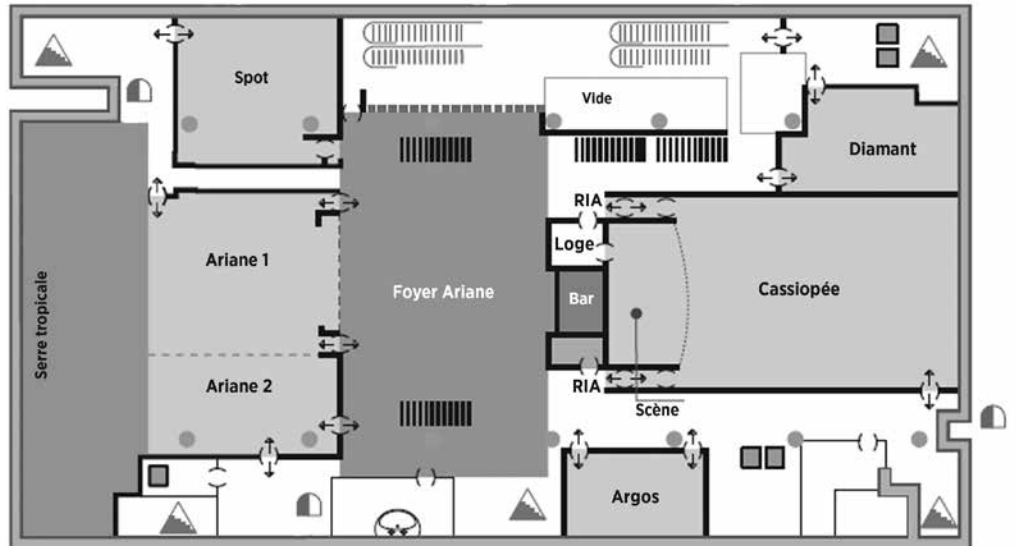
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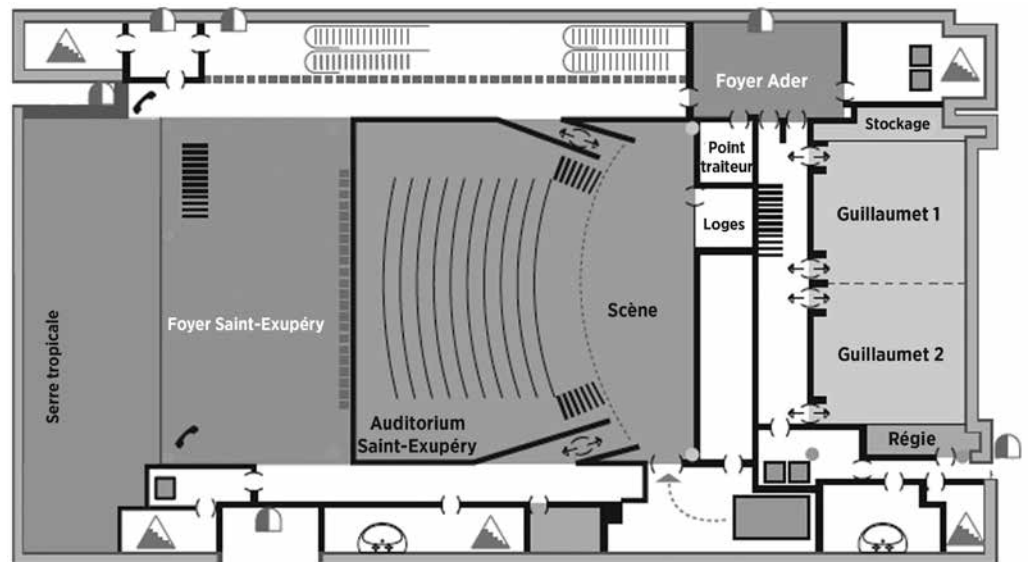
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FACILITY FLOOR PLAN

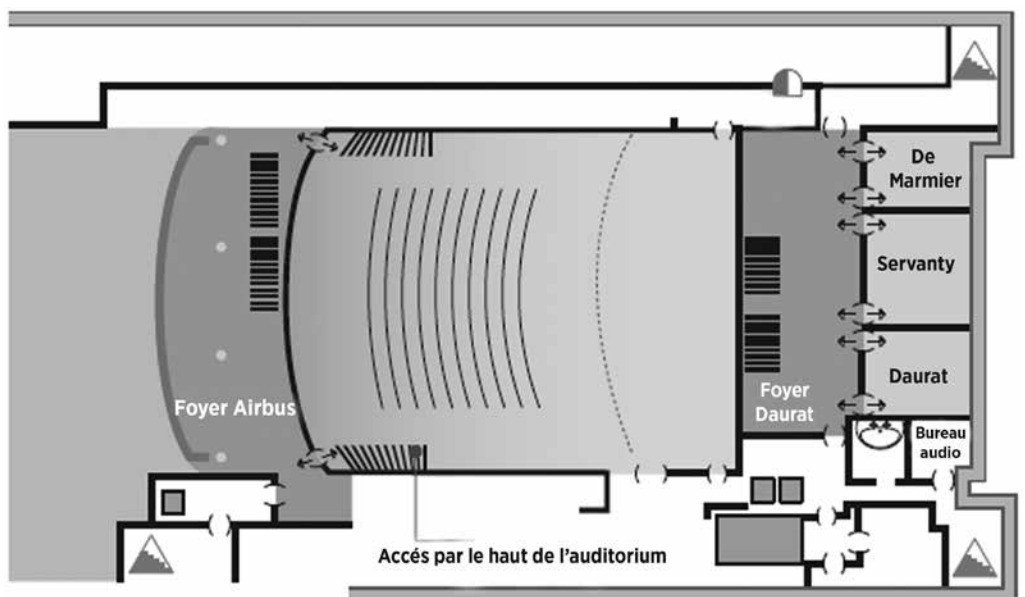
LEVEL 1



LEVEL 2



LEVEL 3





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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.

DAILY SCHEDULE

REMOTE SENSING

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
CONFERENCES			
	9637 Remote Sensing for Agriculture, Ecosystems, and Hydrology (Neale, Maltese) p. 17		
		9638 Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2011 (Bostater, Neyt, Mertikas) p. 21	
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	9646 High-Performance Computing in Remote Sensing (Huang, López, Wu) p. 43		

SECURITY+DEFENCE

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
CONFERENCES			
		9647A Unmanned/Unattended Sensors and Sensor Networks (Carapezza, Datskos, Tsamis) p. 55	9647B Advanced Free-Space Optical Communication Techniques and Applications (Laycock, White) p. 56
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	9648B Quantum Information Science and Technology (Gruneisen, Dusek, Rarity) p. 59	9650B Technologies for Optical Countermeasures (Titterton, Grasso, Richardson) p. 62	
9649 Electro-Optical Remote Sensing, Photonic Technologies, and Applications IX (Kammerman, Steinvall, Lewis, Gonglewski) p. 60		9652B Optical Materials and Biomaterials in Security and Defence Systems Technology (Zamboni, Kajzar, Szep) p. 67	
9650A High-Power Lasers 2015: Technology and Systems (Ackermann, Bohn) p. 63	9651 Millimetre Wave and Terahertz Sensors and Technology (Salmon, Jacobs) p. 51	9653 Target and Background Signatures (Stein, Schleijsen) p. 68	
9652A Optics and Photonics for Counterterrorism, Crime Fighting, and Defence (Burgess, Owen, Rana) p. 65			

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
SPECIAL EVENTS			
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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 \$4 million in support of education and outreach programs in 2014. www.spie.org

REMOTE SENSING/SECURITY + DEFENCE PLENARY SESSION

Monday 21 September 2015 • 16:00 to 19:15 • Location: Auditorium Saint Exupéry

16:00 to 16:20

Welcome and Introduction

2015 Security + Defence Symposium Chair

DAVID H. TITTERTON, UK Defence Academy,
United Kingdom

2015 Remote Sensing Symposium Chair

CHARLES R. BOSTATER, Marine-Environmental Optics Lab &
Remote Sensing Center, Florida Institute of Technology, United
States

16:20 to 16:25

Presentation of SPIE Travel Scholarship

to

Vadim Nenashev, Saint-Petersburg State Univ. of Aerospace Instru-
mentation (Russian Federation)

16:25 to 17:10

The World in a Point Cloud



Grady Tuell, Electro-Optical Systems Lab (EOSL),
Georgia Tech Research Institute (United States)

Over the past 40 years, airborne lidar has emerged as one of the most important 3D imaging technologies. It is especially valuable for surveying the coastal zone, where 3D point clouds can be used to generate continuous topographic and bathymetric elevation models. When fused with passive hyperspectral data,

the resulting spectral point clouds contain a wealth of environmental information about the beach, seafloor, and water column. These data support many communities of interest including nautical charting, beach monitoring and restoration, fisheries habitat monitoring, coral reef monitoring, and coastal and climate change detection studies. These uses are global in scale and importance, and nicely illustrate how an optical-based remote sensing technology may be used to support development of national and international products and policies.

When considering the evolution of lidar, it is interesting to note that advances in lidar usually are based on evolutions in one of the technological enablers. Specifically, advances in lasers, detectors, digitizers, navigation systems and computers make new concepts and designs in lidar possible. Importantly, the builders of lidars collaborate with, and purchase from, a global network of suppliers. In this "International Year of Light", it is interesting to examine how this global network supports the design of a new lidar system. GTRI has recently developed a novel hybrid bathymetric lidar combining a linear-mode, waveform-resolved green lidar with an infrared lidar based on a GmAPD 3D camera. Here, we will describe this hybrid lidar and illustrate how an international network of suppliers has contributed to it.

Biography: **Grady Tuell** is the Associate Director of GTRI's Electro-optical Systems Lab (EOSL). Dr. Tuell has more than 30 years experience in the design, development, and deployment of advanced imaging systems for use in coastal and marine environments. This experience spans industry, academia, and government. He has been a pioneer in the development of data fusion algorithms and paradigms for combining multi-sensor datasets for seafloor mapping, and has worked to evolve bathymetric lidar from a depth-measuring technique into an environmental mapping technology. Prior to joining GTRI, he worked at Optech International from 2002-2011, where he was the co-founder and President, and was the project manager for the Coastal Zone Mapping and Imaging Lidar (CZMIL) and the Countermine Lidar

UAV-Based System (CLUBS) projects. From 2000-2002, he was an Assistant Professor at the University of Florida, and from 1980-2000, he was a Commissioned Officer in the NOAA Corps. He retired from NOAA holding the rank of Commander, and was recognized with the U.S. Department of Commerce Gold Medal for introducing imaging spectroscopy, lidar, and SAR into NOAA's shoreline mapping program. In March 2014, Dr. Tuell was appointed to a 3-year term of the Mapping Science Committee of the U.S. National Research Council, and he is the recipient of the SPIE 2015 George W. Goddard Award.

17:10 to 17:55

Laser technology development and operational challenges on the Laser Megajoule Project



Bernard Capbern, Head of the Laser Department
at Laser Megajoule

Operational since October 2014, the Megajoule Laser facility (LMJ) near Bordeaux is a key component of CEA's program to study the behavior of materials under extreme conditions. The laser is designed to deliver, in a few billionths of a second, more than one million joules of light energy

to targets measuring a few millimeters in size. Such specifications place extreme demands on the laser and its support systems and present enormous engineering challenges. In this presentation the head of LMJ's laser department Dr. Bernard Capbern describes the development progress and continuing challenges of bringing LMJ online. His discussion will focus on the technical successes. Lessons learned, and engineering solutions deployed to successfully operate the LMJ.

Biography: **Dr. Bernard Capbern** graduated from Bordeaux University in 1987. Between the years 2008 and 2011 he led the CEA/DAM/DAN Airborne nuclear warhead Project. In 2011 Dr. Capbern became the Head of the CEA/DAM/CESTA Power Laser Department in Bordeaux. His responsibilities include: Engineering of LMJ Facility achievement: system and performance engineering, whole facility integration, commissioning and operation; Achievement of Power Laser and experiences systems – LMJ & PETAL: conception, development, industrial contracts monitoring, integration, performances control (except plasma diagnostics); Operating of LMJ & PETAL Laser Facilities: Operating staff organisation and management for CEA domestic and academics experiences programs.

17:55 to 19:15

Panel Discussion

CubeSats for Earth Remote Sensing and Security and Defence Applications

MODERATOR: **Charles R. Bostater**, Marine-Environmental Optics Lab & Remote Sensing Center, Florida Institute of Technology (United States)

PANELISTS: **Luca Maresi**, European Space Research and Technology Ctr. (Netherlands); **Jeroen Rotteveel**, Innovative Solutions In Space BV (Netherlands); **Didier Alary**, Airbus Defence and Space (France); **Doug Liddle**, Surrey Satellite Technology Ltd. (United Kingdom)

As part of the plenary talks, a special panel discussion will be held concerning CubeSats and their associated sensing technologies for earth remote sensing and security and defence applications. The symposium chairs will moderate and facilitate audience participation and discussion. The panel will present their papers followed by questions and answers. This plenary panel represents our first joint symposium plenary panel on a topic of interest to both Remote Sensing, as well as Security + Defence, attendees.

SPECIAL EVENTS



Welcome Reception

Monday 21 September 19:30 to 22:00

Location: Strandzuid, Espaces Vanel

All attendees are invited to relax, socialise, 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.

Poster Session

Tuesday 22 September 17:30 to 19:15

Location: Salle Concorde

All symposium attendees are invited to attend the Tuesday 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 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. Poster authors are requested to attend the official poster session and should be at their papers on Tuesday from 17:30 to 19:15 hrs to answer questions from attendees. Poster presenters who have not set up by 17:30 on Tuesday will be considered a “no show” and their manuscript will not be published. SPIE assumes no responsibility for posters left up after 19:15 on Tuesday. Any papers left on the boards at that time will be considered unwanted and will be discarded.

Industry Session

Tuesday 22 September 12:35 to 13:35

Location: Caravelle 2

Session Chair: **Stephen Anderson**, SPIE (United States)

Introduction to the UK Defence Solutions Centre

Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

Photonics & Defense: An Industry Update

Stephen Anderson, SPIE (United States)

Drinks and snacks will be provided.

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 recognised within each of the Security + Defence conferences.

In order to be considered for this award, the student must meet the following requirements:

- Student must be the presenting author at the conference and must make their oral presentation as scheduled
- Student must be the leading author of the manuscript
- Papers submitted by graduate and undergraduate students are eligible
- Student must enter the best student paper award by responding to an award announcement e-mail
- The best student paper award announcement will follow the acceptance notification and will include all details necessary to enter and qualify for the competition
- A panel of experts will evaluate the papers, both for quality and content.

RECIPIENTS OF THE 2014 BEST STUDENT PAPER AWARDS

REMOTE SENSING

REMOTE SENSING FOR AGRICULTURE, ECOSYSTEMS, AND HYDROLOGY

Jonathan Van Beek, Katholieke Univ. Leuven,
Belgium

Vegetation index correction to reduce background effects in orchards with high spatial resolution imagery [9239-37]

REMOTE SENSING OF THE OCEAN, SEA ICE, COASTAL WATERS, AND LARGE WATER REGIONS 2014

Laura Zotta, Univ. di Pisa, Italy

Design and validation of object recognition methodologies for underwater fluorescence lidar applications [9240-30]

REMOTE SENSING OF CLOUDS AND THE ATMOSPHERE

Robert F. Banks, Barcelona Supercomputing
Centre - Centro Nacional de Supercomputación,
Spain

Retrieval of boundary layer height from lidar using extended Kalman filter approach, classic methods, and backtrajectory cluster analysis [9242A-15]

SAR IMAGE ANALYSIS, MODELLING, AND TECHNIQUES

Francescopaolo Sica, Institute for Electromagnetic
Sensing of the Environment (IREA), CNR, Italy

Benefits of blind speckle decorrelation for InSAR processing [9243-13]

EARTH RESOURCES AND ENVIRONMENTAL REMOTE SENSING/GIS APPLICATIONS

Lia Duarte, Univ. do Porto, Portugal

Deriving phenological metrics from NDVI through an open source tool developed in QGIS [9245-35]

HIGH-PERFORMANCE COMPUTING IN REMOTE SENSING

Lucana S. Falcon, Univ. de Las Palmas de Gran
Canaria, Spain

FPGA implementation of the hyperspectral Lossy Compression for Exomars (LCE) algorithm [9247-4]

No entries were received for Conferences
9241, 9242B, and 9246.

Conference 9244 has not selected a winner.

SECURITY + DEFENCE

UNMANNED/UNATTENDED SENSORS AND NETWORKS

Swaminathan Parthasarathy, Darmstadt Univ. of
Applied Sciences, Germany

Channel modelling for free-space optical inter-HAP links using adaptive ARQ transmission [9248-20]

ELECTRO-OPTICAL AND INFRARED SYSTEMS: TECHNOLOGY AND APPLICATION

Thomas C. Dyer, Surrey Univ., United Kingdom

Optical fibre techniques for use within tamper indicating enclosures designed for arms control verification purposes [9249-5]

TECHNOLOGIES FOR OPTICAL COUNTERMEASURES

Leon Smith, Cranfield Univ., United Kingdom

Modelling a man-portable air-defence (MANPAD) system with a rosette scan two-colour infrared (IR) and ultraviolet (UV) seeker [9251A-22]

OPTICS AND PHOTONICS FOR COUNTERTERRORISM, CRIME FIGHTING AND DEFENCE

Daniel Rozban, Ariel Univ., Israel

Detection of hidden objects using a real-time 3D millimeter-wave imaging system [9253-6]

HIGH-POWER LASERS 2014: TECHNOLOGY AND SYSTEMS

Leonid V. Kotov, Moscow Institute of Physics and
Technology, Russia

Single-mode single-frequency high peak power all-fiber MOPA at 1550 nm [9251B-35]

No entries were received for Conferences
9250B, 9252, 9253B, 9254A, and 9254B.

E.

EXHIBITION

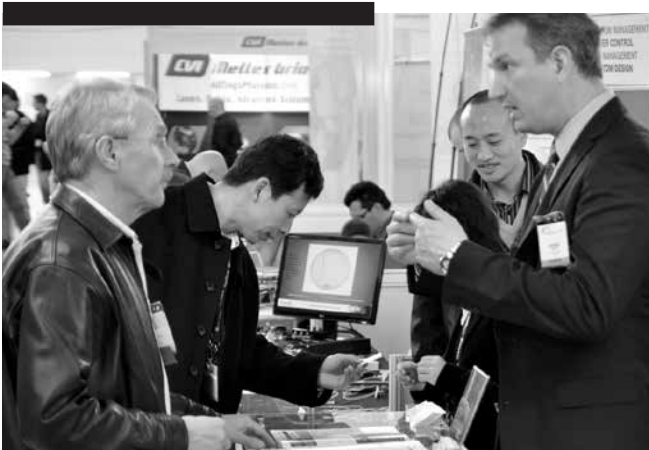


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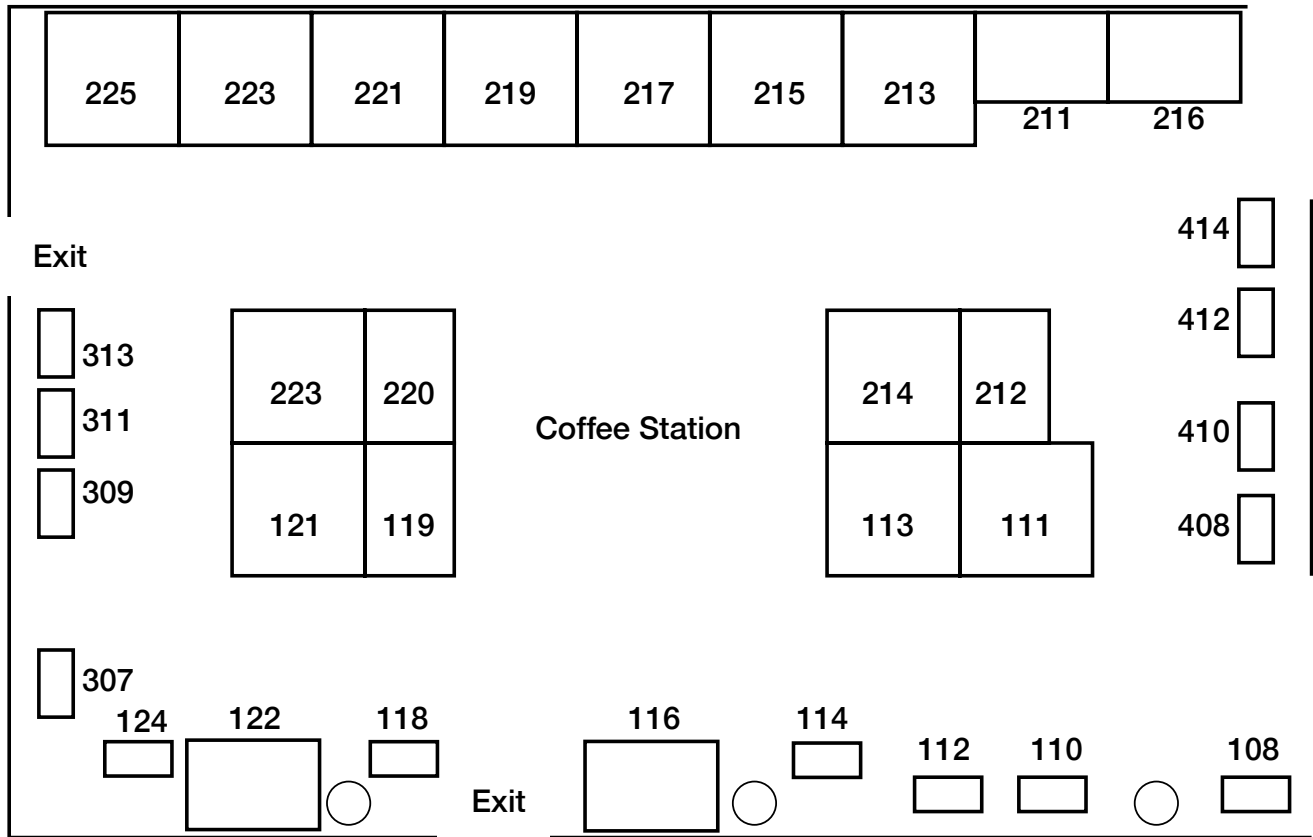
Tuesday 22 September 2015 · 10:00 to 17:00
Wednesday 23 September 2015 · 10:00 to 16:00



Talk with experts in sensing technologies—remote and defence—and see the latest advances.

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

EXHIBITION FLOORPLAN



Exhibitor Booth Index *(Current as of 8/27/2015)*

ABB Analytical Measurement . #111	New Imaging Technologies (NIT).....#108
Altechna #412	OKTAL Synthetic Environment..... #213
AMS Technologies S.A.R.L. . #309	Pixelteq, Inc..... #313
Bruker Optik GmbH #113	Princeton Lightwave, Inc. #118
DILAS Diodenlaser GmbH . . . #110	PRO-LIGHT - LABSPHERE . . #223
Electro Optics #311	Raptor Photonics #219
Enformatic #225	Rigaku Raman Technologies . #217
Fichou #410	Rikola Ltd..... #112
Fraunhofer UK Research Ltd. #408	SED-ATI Fibres Optiques . . . #122
Gooch & Housego PLC. #221	SOFRADIR #222
HGH Infrared Systems. #119	Spectrogon..... #114
HySpex, Norsk Elektro Optikk AS #216	SPIE Digital Library #124
InfraTec GmbH Infrarotsensorik und Messtechnik #214	Telops #215
IRnova AB..... #211	Thales Cryogénie S.A. #121
Laser Components S.A.S..... #116	TRIOPTICS #220
MWTECHNOLOGIES #307	Unipress & Ortech..... #212

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Attendee Pen

EXHIBITOR DIRECTORY

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Featured Product: Remote sensing technologies including the MR-I hyperspectral imaging spectroradiometer

ABB continues to set the standards for FT-IR Spectroradiometry used in atmospheric sounding, military targets IR signature characterization and gas detection. The ABB Space and Defense Systems develops solutions with reliable airborne and spaceborne optical instruments, infrared calibration systems, hyperspectral imagers, and software for ground segments and simulation. Contact: Sylviane Lelievre, Business Development Manager, Defence & Security, sylviane.lelievre@ca.abb.com; Claude Roy, Product Line Manager, clauder.roy@ca.abb.com

#111

Altechna

SPIE Corporate
Member

Mokslininku str 6A, Vilnius, Vilniaus, 08412 Lithuania
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Featured Product: Ultrafast, polarization and high energy optics, laser and nonlinear crystals, laser accessories

Altechna is a supplier of laser related products and solutions, specializing in: laser components, custom optics, manufacturing, metrology. Our top products: • Ultrafast optics: low GDD ultrafast and GTI mirrors, Ti:Sapphire, Yb:KGW, Yb:KYW • Polarizing optics: ZO air spaced and Mid-IR waveplates, high contrast thin film polarizers, s-waveplate • High energy optics: polarizing cubes, waveplates, Glan laser polarizers, low loss HR mirrors • Accessories: motorized attenuators, beam expanders. Contact: Juste Banyte, Key account manager, juste.banyte@altechna.com

#412

AMS Technologies S.A.R.L.

#309

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Bruker Optik GmbH

#113

Rudolf-Plank-Str. 27, Ettlingen, 76275 Germany
+49 7243 504 2000; fax +49 7243 504 2050
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Featured Product: Hyperspectral Imager HI 90, high-performance imaging FT spectrometer & EM27/SUN atmospheric analyzer

Bruker is the leading manufacturer and worldwide supplier of Infrared, Near Infrared and Raman Spectrometers for various industries. Bruker's broad remote sensing product line covers a complete series of active and passive FTIR systems for many applications, such as the Hyperspectral Imager HI 90, a high-performance Imaging FT Spectrometer for security, industrial and research applications. Recently the EM27/SUN, a high precision mobile atmospheric analyzer was added to round off the portfolio. Contact: Armin Gembus, Dr., Armin.Gembus@bruker.com; Peter Maas, Peter.Maas@bruker.com

DILAS Diodenlaser GmbH

#110

SPIE Corporate
Member

Galileo Galilei-Str 10, Mainz, 55129 Germany
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sales@dilas.de; www.dilas.com

DILAS is the recognized expert in High Power Diode Laser technology. Founded 1994 and based in Mainz / Germany, DILAS is serving a worldwide customer base in markets like diode-pumped solid state lasers, materials processing, reprographics, defence, medical and many more. DILAS products are based on High Power Diode Laser arrays and available in a variety of integration states ranging from single bar devices to laser diode modules to provide the industry with high-quality solutions.

Electro Optics

#311

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Enformatic

#225

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We are a distributor of hyperspectral cameras and other analytical instrumentation. Enformatic offers software development for customers in USA, Japan and Europe. Our solutions (used by NASA, US NAVY, 3M, Boeing and others) find applications in aerospace, defense, semiconductor, chemical and other industries.

Fichou

#410

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Fraunhofer UK Research Ltd.

#408

SPIE Corporate
Member

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

Featured Product: Fraunhofer Centre for Applied Photonics - Industrially Driven Professional Applied R&D Services

Fraunhofer UK, through the Fraunhofer Centre for Applied Photonics, offers industry a flexible and practical applied Research & Development resource that responds to companies needs in the development of photonic technologies. Core activities are based on novel laser source development for a range of applications and the development of systems to solve industrial needs. Fraunhofer UK is a not for profit research and technology organisation and is part of the global Fraunhofer network. Contact: Mark Goossens, Business Development Manager, mark.goossens@fraunhofer.co.uk; Paul McCartney, Business Development Manager, paul.mccartney@fraunhofer.co.uk

Gooch & Housego PLC

#221

SPIE Corporate
Member

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

Featured Product: SWIR lens assembly for surveillance, low light / night vision imaging, covert laser illumination.

Gooch & Housego provides optical system design, engineering, manufacturing and supply chain management services to the aerospace & defence sectors, including space. Manufacturing in both the UK and USA the company provides components and assemblies based on acousto-optics, fiber optics, electro-optics and precision optics. Contact: Pete Williams, Business Development Manager Precision Optics, pwilliams@goochandhousego.com; Adrian Chance, Marcomms Manager, adchance@goochandhousego.com

HGH Infrared Systems

#119

10 rue Maryse Bastié, Igny, 91430 France
+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 2015, 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 (COP!). Contact: Catherine Barrat, Sales Manager, catherine.barrat@hgh.fr; Xavier Elbaz, Sales Manager, xavier.elbaz@hgh.fr

HySpex, Norsk Elektro Optikk AS #216

Prost Stabels Vei 22, Skedsmokorset, 2019 Norway
+47 40 00 18 58; fax +47 67 97 49 00
hyspexsales@neo.no; www.hyspex.no/

Featured Product: HySpex hyperspectral cameras

HySpex, by Norsk Elektro Optikk (NEO), is a line of hyperspectral cameras offering high performance and versatile instruments for a multitude of applications, ranging from airborne to laboratory and industrial use of imaging spectroscopy. Since the establishment in 1985, NEO has grown to be the largest independent R&D organization in electro optics in Norway, and established itself as a manufacturer of advanced electro optical products for an international market.

InfraTec GmbH Infrarotsensorik und Messtechnik #214

Gostritzer Str 61-63, Dresden, 01217 Germany
+49 351 871 8620; fax +49 351 871 8727
info@infrotec.de; www.infrotec.de

Featured Product: High-end cameras ImageIR® 8300/9300 Z for long-range identification

Since 1991 InfraTec is successfully growing into the thermal camera market. Still owner-managed InfraTec offers a wide range of high-quality, innovative products related to precision thermal measurements. With modern production facilities located in Dresden (D) we can provide cooled thermal cameras featuring excellent thermal resolution, high frame rates and a modular design for individual system expansion. The outstanding camera characteristics are also supported by customized infrared lenses. Contact: Stefan Korth, Project Manager Thermal Imaging, a.krausz@infrotec.de

IRnova AB #211

SPIE Corporate Member

Electrum 236, Kista, 164 40 Sweden
+46 8 793 66 00; fax +46 8 519 02518
info@ir-nova.se; www.ir-nova.se

IRnova develops and supplies high quality, high performance infrared detectors and related components to infrared module, camera and system manufacturers all over the world. IRnova can offer you various types of IDCAs (Integrated Detector Cooler Assembly); compact integral solutions for small size/weight applications, as well as long life split cooler assemblies. IRnova has a long track record with thousands of supplied detectors and well established manufacturing with high yield and capability. Contact: Lars Karlsson, Sales Manager, lars.karlsson@ir-nova.se; Anders Gamfeldt, anders.gamfeldt@ir-nova.se

Laser Components S.A.S. #116

45 Bis rte des Gardes, Meudon, 92190 France
+33 1 39595225; fax +33 1 39595350
info@lasercomponents.fr; www.lasercomponents.fr

Featured Product: High Power Pulsed Laser Diodes and Modules, APD, PIN, Pyroelectric, Thermopiles, PbS, PbSe detector.

Provides high power laser optics from the 193nm to 10.6um, customer-made lenses, DOIs Flexpoint miniature laser modules and fiberoptic assemblies, Photon Counting Modules, Avalanche Photodiodes (APD) and arrays, IR detectors, Pulsed Laser Diodes (PLD) and CW laser diodes as well as drive electronics, hybrids, and complete modules. Laser power supplies and low cost laser diodes complete the product range. Contact: Christian Merry, General Manager, c.merry@lasercomponents.fr; Jose Bretes, Product Manager, j.bretes@lasercomponents.fr

Attendee Pen Sponsor

MWTECHNOLOGIES #307

SPIE Corporate Member

Rua Engenheiro Frederico Ulrich 2650, Maia,
4470-605 Portugal
+1 351 220 168 902
info@mw-technologies.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 in 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) #108

1-4 impasse de la noisette, Bat D 1er Etage,
Verrières le Buisson, 91370 France
+1 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

OKTAL Synthetic Environment #213

11, avenue du Lac, VIGOLET-AUZIL, 31 320 France
+ 33 (0)5 67 70 02 00; fax +33 (0)5 67 70 02 05
contact@oktal-se.fr; www.oktal-se.fr

OKTAL Syntjhetic Environment is part of the SOGECLAIR Group. OKTAL-SE is a responsive structure specialized in high scientific added value simulation based on computer generated images. Fields of expertise: COTS: computer generated environments simulation workshops; Simulation & computer generation of images; 3D modelling & creation of 3D virtual mock-ups; Software (OOP & multithreading); Physics (optics & electromagnetism); Modelling of infra-red sensors & RADAR. Specific services and training Contact: Nicolas Douchin, Sales Director, nicola.douchin@oktal-se.fr; Pierre-François Peyrard, International Business Manager, pierre-francois.peyrard@oktal-se.fr

Pixelteq, Inc. #313

SPIE Corporate Member

8060 Bryan Dairy Rd Ste A, Largo, FL, 33777 United States
+1 727 545 0741; fax 727 545 2241
info@pixelteq.com; www.pixelteq.com

Princeton Lightwave, Inc. #118

SPIE Corporate Member

2555 Rte 130 South, Cranbury, NJ, 08512 United States
+1 609 495 2600; fax 609 395 9114
sales@princetonlightwave.com; www.princetonlightwave.com

Princeton Lightwave is the expert in single-photon sensing in the infrared. We design and manufacture the highest performance Single-Photon avalanche photodiodes for the short-wavelength infrared from 0.9 to 1.6 μm. They are at the core of our Geiger-mode cameras used in LIDARs for high precision 3D mapping, imaging, or autonomous driving. Single-photon sensors also enable free-space communications in photon starved environments and are at the core of cyber-secure quantum cryptography networks.

EXHIBITOR LISTINGS

PRO-LITE – LABSPHERE

#223

Montesquieu, 2 Allee Ulysse Gayon,
MARTILLAC, 33650, France
+33(0)5 56 49 24 92 fax: 33 5 57 12 84 33
info@pro-lite.fr; http://www.pro-lite.fr/

Featured Product: Uniform Sources for Remote Sensing

Pro-Lite is a specialist photonics company and supplier of Remote Sensing test equipment, light measurement and photometry equipment. Labsphere designs, produces and sells precision standard and custom radiometric and photometric products addressing the specific needs of the aerospace, automotive, electronic imaging, laser diode, LED, lighting, medical imaging and optics industries.

Raptor Photonics

#219

SPiE Corporate
Member

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

Featured Product: OWL 640 VIS-SWIR (InGaAs) camera

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 enables high sensitivity imaging from 0.4µm to 1.7µm. The 15µm x 15µm pixel pitch enables highest resolution VIS-SWIR image and with less than 50 electrons readout noise the OWL 640 enables the highest VIS-SWIR detection limit. Available with a CameraLink output, the OWL 640 will run at up to 120Hz, enabling high speed digital video with intelligent auto AGC. Contact: Olivier Bernard, Director, ob@raptorphotonics.com; Derek Craig, Sales Co-ordinator, dcraig@raptorphotonics.com

Rigaku Raman Technologies

#217

30 Upton Dr Ste 2, Wilmington, MA, 01887 United States
+1 781 328 1024
info@rigakuraman.com; www.rigakuraman.com

Rikola Ltd.

#112

Kaitovayla 1, Oulu, 90570 Finland
+358 40 540 8794; fax +358 8 5514363
info@rikola.fi; www.rikola.fi/

Featured Product: Rikola Hyperspectral Camera

Rikola Ltd. offers small and lightweight hyperspectral camera for UAVs. This innovative product is a frame-based spectral system providing true snapshot images. The frame based approach enables an easy image stitching for the mosaics with high resolution images. The solution doesn't need IMU for its operations, which makes the system low cost and low weight. The camera enables handheld use with computers too. Rikola offers also OEM multichannel- and LED-modules as well as miniature spectrometers. Contact: Jussi Soukkamaki, CTO, jussi@rikola.fi; Raimo Rikola, CEO, raimo.rikola@rikola.fi

SED-ATI Fibres Optiques

#122

8 rue Jean Mermoz, ZA de Saint Guénault,
Courcouronnes, 91080 France
+331 69 366 432; fax +331 69 366 419
info@sedi-ati.com; www.sedi-fibres.com

Featured Product: Fiber, Hermetic feedthru, Bundle and Array, Coupler, WDM, metallized fiber, coating, collimator, ROV

SEDI-ATI Fibres Optique is the result of the merge between SEDI Fibres Optiques founded in 1972 and its sister company ATI Optiques founded in 1951. With a team of 50 people and more than 40% revenue from exportation the company has become one of the major players for the manufacturing of special fiber optic assemblies for harsh environment applications. Contact: Pascal Slobadzian, Sales Director, slobadzian.p@sedi-ati.com; Christine Randazzo, Sales Assistante, randazzo.c@sedi-ati.com

SOFRADIR

#222

364 rte de Valence, Actipole CS 10021,
Veurey-Voroize, 38113 France
+33 4 76 28 77 00; fax +33 4 76 53 85 97
communication@sofradir.com; www.sofradir.com

Sofradir is the leading developer and manufacturer of key classes of advanced infrared (IR) detectors for military, space and industrial applications. Its vast IR product portfolio covers the entire spectrum from the visible and near infrared to very far infrared. Sofradir pioneers developments in cooled IR detectors based on a sophisticated high performance technology. Contact: Claire Valentin, Marketing Director, claire.valentin@sofradir.com; Cecile Janvier, Communication Officer, communication@sofradir.com

Spectrogon

#114

SPiE Corporate
Member

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

Featured 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, sales.uk@spectrogon.com

SPiE Digital Library

#124

14 pl des Victoires, Asnieres, 92600 France
+33 140864150; fax +33 147935013
spiedlhelp@spie.org; www.spiedigitalibrary.org

Featured Product: The World's largest collection of optics and photonics applied research

The SPiE Digital Library contains more than 425,000 articles from SPiE journals and proceedings, as well as more than 210 eBooks. Abstracts are freely searchable, and an increasing number of full articles in the society's 10 peer-reviewed journals are published with open access. Approximately 18,000 new research papers, eBooks, and other publications are added each year. Contact: Philippe Martin, philippe.martin@tsp-diffusion.com

Telops

#215

SPiE Corporate
Member

100-2600 St-Jean-Baptiste Ave, Québec, QC, G2E 6J5 Canada
+1 418 864 7808; fax +1 418 864 7843
contact@telops.com; www.telops.com

Featured Product: The FAST-IR 2K: A high speed thermal imaging infrared camera

Telops is a leading supplier of high performance infrared cameras and hyperspectral imaging systems for defense and security, environmental and research applications. Telops also offers R&D services for optical system technology development. Contact: Éric Guyot, Business Development Manager, eric.guyot@telops.com

Thales Cryogénie S.A.

#121

4 rue Marcel Doret, BP 70022, Blagnac Cedex, 31701 France
+33 56 274 58 47; fax +33 56 274 58 58
www.thales-cryogenics.com

Thales Cryogenics has been designing and manufacturing rotary and linear cryo-coolers for various applications for the last 3 decades. A large variety of coolers is available for demanding applications such as 24/7, low vibration, high reliability, compactness, price.

TRIOPTICS

SPiE Corporate Member

Hafenstr 35-39, Wedel, 22880 Germany
+49 4103 18006 0; fax +49 4103 180062 0
marketing@trioptics.com; www.trioptics.com

We have the largest spectrum of optical measurement technology and supply test systems for R&D and production for every manufacturing step in optics: From a system for refractive index measurement, via various lens test systems, up to MTF test systems and camera module testers, we can supply the appropriate optical measurement system for every process step. Our field of activity comprises the development and production of optical and precision instruments. Contact: Jean-Marc Lioutier, jeanmarc.lioutier@trioptics.fr; Nadine Ferber, n.ferber@trioptics.com

#220

Unipress & Orteh

ul Sokolowska 29/37, Warszawa, 01-142 Poland
+48 22 632 5010; fax +48 22 632 4218
dyrekcja@unipress.waw.pl; www.unipress.waw.pl

Featured Product: The Fast THz post scanner for up to A4 envelopes, provides monochromatic scans of objects inside.

Orteh and Unipress are Polish entities which cooperate to fabricate high tech THz demonstrators. Orteh is growing high-tech company and Unipress is a research Institute of the Polish Academy of Sciences. Cooperation works resulted in creation of the first fast THz scanner demonstrator for A4 envelopes, which could be alternative solution to X-ray machines for security purposes. Contrary to X-ray scanners, THz scanner do not affect to any biological material, so it is completely safe for operator. Contact: Wojciech Knap, Prof., wknap@unipress.waw.pl; Maciej Sypek, Prof., maciej.sypek@orteh.pl

#212

PRODUCT CATEGORIES

Astronomy

ABB Analytical Measurement
Raptor Photonics
Spectrogon UK Ltd.
TRIOPTICS GmbH

Basic Research, Science

Altechna
Bruker Optik GmbH
Fraunhofer UK Research Ltd.
Rikola Ltd.

Biomedical, Medical Imaging, Health Care

InfraTec GmbH Infrarotsensorik und Messtechnik
Laser Components S.A.S.
Raptor Photonics
Rikola Ltd.
Spectrogon UK Ltd.

Cameras and Imaging Systems

ABB Analytical Measurement
HGH Infrared Systems
HySpex, Norsk Elektro Optikk AS
InfraTec GmbH Infrarotsensorik und Messtechnik
New Imaging Technologies (NIT)
Raptor Photonics
Rikola Ltd.
Unipress & Orteh

Chemical and Biological Analysis

ABB Analytical Measurement
Bruker Optik GmbH
Fraunhofer UK Research Ltd.
Laser Components S.A.S.

Communications & Networking

MWTECHNOLOGIES

Computing, Data Processing Hardware

ABB Analytical Measurement

Consulting Services

ABB Analytical Measurement
Fraunhofer UK Research Ltd.
OKTAL Synthetic Environment

Defence, Security, Law Enforcement

ABB Analytical Measurement
Altechna
Bruker Optik GmbH
Fraunhofer UK Research Ltd.

Gooch & Housego PLC
HGH Infrared Systems
HySpex, Norsk Elektro Optikk AS
InfraTec GmbH Infrarotsensorik und Messtechnik
Laser Components S.A.S.
MWTECHNOLOGIES
New Imaging Technologies (NIT)
OKTAL Synthetic Environment
Raptor Photonics
Rikola Ltd.
Spectrogon UK Ltd.
TRIOPTICS GmbH
Unipress & Orteh

Detectors, Sensors

ABB Analytical Measurement
Laser Components S.A.S.
New Imaging Technologies (NIT)
Raptor Photonics
Rikola Ltd.
Unipress & Orteh

Earth Sciences, Environmental Monitoring, Climate

Bruker Optik GmbH
InfraTec GmbH Infrarotsensorik und Messtechnik
Rikola Ltd.
Spectrogon UK Ltd.

Electrical/Signal Analysis Equipment

HGH Infrared Systems

Electronic Components

Rikola Ltd.

Electronic, Digital Imaging

InfraTec GmbH Infrarotsensorik und Messtechnik
New Imaging Technologies (NIT)

Fiber Optics and Accessories

ABB Analytical Measurement
Gooch & Housego PLC

Industrial Sensing and Measurement

ABB Analytical Measurement
Bruker Optik GmbH
HGH Infrared Systems
HySpex, Norsk Elektro Optikk AS
InfraTec GmbH Infrarotsensorik und Messtechnik

New Imaging Technologies (NIT)
Rikola Ltd.
Spectrogon UK Ltd.
TRIOPTICS GmbH

Laser Components and Accessories

Altechna
Gooch & Housego PLC
Laser Components S.A.S.
MWTECHNOLOGIES

Laser Industry

Altechna
Laser Components S.A.S.
MWTECHNOLOGIES

Lasers and Systems

Fraunhofer UK Research Ltd.
Laser Components S.A.S.
MWTECHNOLOGIES

Machine Vision, Factory Automation

InfraTec GmbH Infrarotsensorik und Messtechnik
Laser Components S.A.S.
New Imaging Technologies (NIT)

Materials Processing, Lasers in Manufacturing

MWTECHNOLOGIES
New Imaging Technologies (NIT)

Microscopes

InfraTec GmbH Infrarotsensorik und Messtechnik
Raptor Photonics

Optical Coatings, Thin Films

Altechna
Laser Components S.A.S.
Spectrogon UK Ltd.

Optical Communication, Networking Devices

MWTECHNOLOGIES

Optical Components - Filters, Mirrors, Other

Laser Components S.A.S.
Spectrogon UK Ltd.

Optical Components - Lenses

Altechna
Gooch & Housego PLC

Optical Design and Engineering

ABB Analytical Measurement
New Imaging Technologies (NIT)
Raptor Photonics

Optical Fabrication Equipment

TRIOPTICS GmbH

Optics Manufacturing

Altechna
TRIOPTICS GmbH

Software

HGH Infrared Systems
InfraTec GmbH Infrarotsensorik und Messtechnik
OKTAL Synthetic Environment

Solar & Alternative Energy

MWTECHNOLOGIES

Spectroscopy Devices and Equipment

Bruker Optik GmbH
HySpex, Norsk Elektro Optikk AS
InfraTec GmbH Infrarotsensorik und Messtechnik
Raptor Photonics
Rikola Ltd.

Test and Measurement, Metrology

Altechna
HGH Infrared Systems
New Imaging Technologies (NIT)
Raptor Photonics
Rikola Ltd.
TRIOPTICS GmbH

Vehicle Sensing and Control

OKTAL Synthetic Environment
Raptor Photonics

2015 REMOTE SENSING.

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Marine-Environmental Optics Lab & Remote Sensing Center (USA)

SYMPOSIUM CO-CHAIR



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Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research (Germany)

TECHNICAL CONFERENCES

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2015 TECHNICAL COMMITTEE

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Zhensen Wu, Xidian Univ. (China)

Remote Sensing

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Remote Sensing Symposium

9646 - HIGH-PERFORMANCE COMPUTING IN REMOTE SENSING

MONDAY 21 SEPTEMBER

Location: Diamant

- 9:30 Dimensionality reduction and endmember extraction for hyperspectral imaging using an RVC-CAL library [9646-4]
11:20 Embedded GPU implementation of anomaly detection for hyperspectral images [9646-8]
11:40 RVC-CAL library for endmember and abundance estimation in hyperspectral image analysis [9646-9]
12:00 Robust hyperspectral vegetation indices to estimate leaf chlorophyll content [9646-10]
14:30 FAPEC-based lossless and lossy hyperspectral data compression [9646-13]

TUESDAY 22 SEPTEMBER

- 9:10 A novel hardware-friendly algorithm for hyperspectral linear unmixing [9646-18]
9:50 Parallel implementation of the multiple endmember spectral mixture analysis algorithm for hyperspectral unmixing [9646-20]
11:40 Performance portability study of an automatic target detection and classification algorithm for hyperspectral image analysis using OpenCL [9646-24]
Location: Auditorium
13:50 Parallel hyperspectral compressive sensing method on GPU [9646-27]
14:50 Hyperspectral unmixing based on local collaborative sparse regression [9646-30]

9637: REMOTE SENSING FOR AGRICULTURE, ECOSYSTEMS, AND HYDROLOGY

TUESDAY 22 SEPTEMBER

Location: Argos

- 8:40 An assessment of vegetation degradation in the semi-arid lands of Sudan using vegetation indices of multispectral imagery . . . [9637-1]
11:00 Determination of pasture quality using airborne hyperspectral imaging [9637-6]
11:40 Estimation of leaf chlorophyll content using variable importance for projection (VIP) with hyperspectral data [9637-8]
14:20 The inversion model of soil organic matter of cultivated land based on hyperspectral technology [9637-13]

9639: SENSORS, SYSTEMS, AND NEXT-GENERATION SATELLITES

TUESDAY 22 SEPTEMBER

Location: Cassiopée

- 14:40 NGP, a new large format infrared detector for observation, hyperspectral and spectroscopic space missions in VISIR, SWIR and MWIR wavebands [9639-27]

9643: IMAGE AND SIGNAL PROCESSING FOR REMOTE SENSING

TUESDAY 22 SEPTEMBER

Location: Ariane 1

- 8:30 Automatic estimation of noise model parameters in hyperspectral images using probabilistic region growing . . . [9643-16]
8:50 Using hyperspectral image enhancement method for small size object detection on the sea surface [9643-17]
9:10 A new method for spatial resolution enhancement of hyperspectral images using sparse coding and linear spectral unmixing [9643-18]

- 9:30 Development of Bayesian-based transformation method of Landsat imagery into pseudo-hyperspectral imagery [9643-19]
9:50 Striping noise mitigation: performance evaluation on real and simulated hyperspectral images [9643-20]
10:40 Low-dimensional representations of hyperspectral data for use in CRF-based classification [9643-21]
11:00 Unsupervised hierarchical partitioning of hyperspectral images: application to marine algae identification [9643-22]
11:20 Hyperspectral anomaly detection method based on autoencoder [9643-23]
11:40 Post-processing for improving hyperspectral anomaly detection accuracy [9643-24]
12:00 Hyperspectral classification with reduced bands by using HMM and entropy [9643-25]
16:50 Local hyperspectral data multisharpening based on linear/linear-quadratic nonnegative matrix factorization by integrating lidar data [9643-34]

9640: REMOTE SENSING OF CLOUDS AND THE ATMOSPHERE

WEDNESDAY 23 SEPTEMBER

Location: Caravelle 2

- 14:10 Development of a multispectral Raman and fluorescence lidar to study the atmospheric aerosols chemical composition for defence applications [9640-49]

9637: REMOTE SENSING FOR AGRICULTURE, ECOSYSTEMS, AND HYDROLOGY

THURSDAY 24 SEPTEMBER

Location: Argos

- Application of a regularized model inversion system (REGFLEC) to multitemporal Hyperion and RapidEye imagery for retrieving vegetation characteristics (*Invited Paper*) [9637-52]

9638: REMOTE SENSING OF THE OCEAN, SEA ICE, COASTAL WATERS, AND LARGE WATER REGIONS

WEDNESDAY 23 SEPTEMBER

Location: Servanty

- 17:30 Studying flow variability through narrow straits via satellite multispectral and hyperspectral data: the Kerch Strait case. [9638-28]
14:50 Optical multispectral remote sensing of ocean surface [9638-14]

9644: EARTH RESOURCES AND ENVIRONMENTAL REMOTE SENSING/GIS APPLICATIONS

WEDNESDAY 23 SEPTEMBER

Location: Diamant

- 13:00 Concept of an advanced hyperspectral remote system for pipeline monitoring [9644-18]
14:20 Detection of chromite bearing mineralized zones within the Zagros Suture Zone ophiolite, northern Iraq using new multispectral specifications of Landsat8 Imagery with high resolution images [9644-22]
14:40 Lithological mapping using multispectral ASTER and Landsat 8 data in Moroccan Anti Atlas [9644-23]

THURSDAY 24 SEPTEMBER

- 11:30 High-spatial resolution multispectral and panchromatic satellite imagery for mapping perennial desert plants [9644-36]

Remote Sensing

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

Overview of presentations on hyperspectral sensing throughout the Remote Sensing Symposium

POSTER SESSION

TUESDAY 22 SEPTEMBER, 17:30 TO 19:15

Location: Concorde 1

- Monitoring the ratio of leaf carbon to nitrogen in winter wheat with hyperspectral measurements** [9637-66]
- Endmember identification from EO-1 Hyperion L1_R hyperspectral data to build saltmarsh spectral library in Hunter Wetland, NSW, Australia.** [9637-67]
- Fires detection from hyperspectral data using neural network approach** [9637-83]
- Winter wheat growth spatial variation monitoring through hyperspectral remote sensing image** [9637-95]
- Estimating canopy water content of wetland vegetation using hyperspectral and multispectral remote sensing data** [9637-115]
- Multisensor satellite survey of surface oil pollution in the Caspian Sea** [9638-27]
- Studying flow variability through narrow straits via satellite multispectral and hyperspectral data: the Kerch Strait case** [9638-28]
- Simulation with hyperspectral data of new Earth observation satellite missions.** [9639-79]
- Measurements of parabolic mirrors aberrations in hyperspectral microscope.** [9641-22]
- Lossy compression of hyperspectral images using shearlet transform and 3D- SPECK** [9643-55]
- A fast sparse unmixing method for hyperspectral images using iterative detection and estimation** [9643-65]
- A hyperspectral imagery anomaly detection algorithm based on local three-dimensional orthogonal subspace projection** [9643-68]
- Lossy compression of hyperspectral images using block coordinate descent search and compress sensing methods** [9643-69]
- Fusion of multispectral satellite images by using IHS and local fractal dimension.** [9643-70]
- Calibration of mirror angle error for hyperspectral imagery with motion compensation model.** [9643-73]
- Applied noncentral Chi-squared distribution in CFAR detection of hyperspectral projected images** [9643-83]
- Modified wavelet kernel methods for hyperspectral image classification** [9643-85]
- Hyperspectral imaging for landmine detection** [9643-89]
- Object detection in rural areas using hyperspectral imaging** [9643-97]
- Utilizing hyperspectral remote sensing imagery for afforestation planning of partially covered areas** [9643-98]
- Limestone distribution based on spectral reflectance value of multispectral satellite imagery, in Timor-Leste area** [9644-63]
- Using airborne hyperspectral imaging spectroscopy to study land degradation processes in Mediterranean area.** . . . [9644-64]
- Semi-supervised classification tool for DubaiSat-2 multispectral images** [9646-22]
- GPU implementation of the discrete artificial bee colony for hyperspectral unmixing** [9646-35]
- Fault tolerance of SVM algorithm for hyperspectral image** [9646-36]
- A lossless compression algorithm for aurora spectral data using online regression prediction** [9646-37]

CONFERENCE 9637 - ROOM: ARGOS

Tuesday - Thursday 22-24 September 2015 • Proceedings of SPIE Vol. 9637

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: **Shahid Habib**, NASA Goddard Space Flight Ctr. (United States); **Antonino Maltese**, Univ. degli Studi di Palermo (Italy); **Christopher M. U. Neale**, Univ. of Nebraska Lincoln (United States)

TUESDAY 22 SEPTEMBER

OPENING REMARKS

LOCATION: ARGOS 8:30 TO 8:40

SESSION 1

LOCATION: ARGOS TUE 8:40 TO 10:00

Natural Resources Monitoring

Session Chair: **Christopher M. U. Neale**, Univ. of Nebraska Lincoln (United States)

8:40: **An assessment of vegetation degradation in the semi-arid lands of Sudan using vegetation indices of multispectral imagery**, Majdaldin Rahamtallah Abualgasim, GWT-TUD GmbH (Germany); Babatunde A. Osunmadewa, Check Abdel Kader Baba, Elmar Csaplovics, Technische Univ. Dresden (Germany) [9637-1]

9:00: **Estimation of crop parameters using multitemporal optical and radar polarimetric satellite data**, Julie Betbeder, Remy Fieuzal, Ctr. d'Etudes Spatiales de la Biosphère (France); Yannick Philippets, Ctr. d'Etudes Spatiales de la Biosphère (France) and Ecole Nationale des Sciences Géographiques (France); Laurent Ferro-Famil, Univ. de Rennes 1 (France); Frederic Baup, Ctr. d'Etudes Spatiales de la Biosphère (France) [9637-2]

9:20: **Seasonal parameter extraction of paddy rice fields in west Java, using multitemporal MODIS imagery datasets**, Riswan S. Sianturi, Willem Nieuwenhuis, International Institute for Geo-Information Science and Earth Observation (Netherlands) [9637-3]

9:40: **A remote sensing approach to calculate plant available nitrogen at the sprayfield and subwatershed scales from swine concentrated animal feeding operations in North Carolina**, Elizabeth Christenson, Marc Serre, The Univ. of North Carolina at Chapel Hill (United States) [9637-4]

Coffee Break Tue 10:00 to 10:30

SESSION 2

LOCATION: ARGOS TUE 10:30 TO 12:20

Hyperspectral, Spectroscopy and Fluorescence

Session Chair: **Antonino Maltese**, Univ. degli Studi di Palermo (Italy)

10:30: **A critique of field spectroscopy and the challenges and opportunities it presents for remote sensing for agriculture, ecosystems, and hydrology (Invited Paper)**, Alasdair Mac Arthur, The Univ. of Edinburgh (United Kingdom) [9637-5]

11:00: **Determination of pasture quality using airborne hyperspectral imaging**, Rajasheker Reddy Pullanagari, Gabor Kereszturi, Ian J. Yule, Mathew E. Irwin, Massey Univ. (New Zealand) [9637-6]

11:20: **An advanced fluorescence lidar system for the acquisition of interleaved active (LIF) and passive (SIF) fluorescence measurements on vegetation**, Valentina Raimondi, Lorenzo Palombi, Paola Di Ninni, Istituto di Fisica Applicata Nello Carrara (Italy) [9637-7]

11:40: **Estimation of leaf chlorophyll content using variable importance for projection (VIP) with hyperspectral data**, Peng He, Xingang Xu, Xiaoyu Song, National Engineering Research Ctr. for Information Technology in Agriculture (China) [9637-8]

12:00: **Disease stress detection on citrus using a leaf optical model and field spectroscopy**, Mrunalini R. Badnakhe, Surya S. Durbha, Jagarlapudi Adinarayana, Indian Institute of Technology Bombay (India) [9637-9]

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

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 3

LOCATION: ARGOS TUE 13:20 TO 15:00

UAV and High Spatial Resolution Imagery

Session Chair: **Antonino Maltese**, Univ. degli Studi di Palermo (Italy)

13:20: **Complementing airborne laser bathymetry with UAV-based lidar for capturing alluvial landscapes**, Gottfried Mandlbürger, Technische Univ. Wien (Austria); Martin Pfennigbauer, Alexander Haring, Peter Rieger, Ursula Riegl, RIEGL Laser Measurement Systems GmbH (Austria); Martin Wieser, Philipp Glira, Technische Univ. Wien (Austria) [9637-10]

13:40: **Olive trees LAI estimation using TLS and UAV**, Rosanna Sciortino, Tiziano Caruso, Francesco Paolo Marra, Mauro Lo Brutto, Univ. degli Studi di Palermo (Italy) [9637-11]

14:00: **Evaluation of estimation of vegetation index by drones for different crops**, Lúcio A. C. Jorge, Ricardo Y. Inamasu, Ziany N. Brandão, EMBRAPA (Brazil) [9637-12]

14:20: **The inversion model of soil organic matter of cultivated land based on hyperspectral technology**, Xiaohu Gu, Yancang Wang, Xiaoyu Song, Xingang Xu, National Engineering Research Ctr. for Information Technology in Agriculture (China) [9637-13]

14:40: **Mangrove species mapping in Kuala Sepetang Mangrove Forest, Perak using high-resolution airborne data**, Mohamad Zubir Mat Jafri, Beh Boon Chun, Hwee San Lim, Univ. Sains Malaysia (Malaysia) [9637-14]

Coffee Break Tue 15:30 to 16:00

SESSION 4

LOCATION: ARGOS TUE 15:30 TO 17:50

Image Classification

Session Chair: **Christopher M. U. Neale**, Univ. of Nebraska Lincoln (United States)

15:30: **Introduction of a multifunctional tool for the evaluation of uncertainty and accuracy in multitemporal object-based land use classification**, Patrick W. K. Knoefel, Fabian Löw, Julius-Maximilians-Univ. Würzburg (Germany); Henning Gerstmann, Markus Moeller, Martin-Luther Univ. Halle-Wittenberg (Germany); Xingmei Xu, Helmholtz-Zentrum für Umweltforschung GmbH (Germany); Christopher Conrad, Julius-Maximilians-Univ. Würzburg (Germany) [9637-16]

15:50: **A fast and versatile algorithm for object generic classification in RapidEye images**, Salvador L. Esparza-Govea, Colegio de Postgraduados (Mexico); Fermin Pascual-Ramirez, Univ. Nacional Autonoma de Mexico (Mexico); Jose-Luis Oropeza-Mota, Mario R. Martinez-Menes, Colegio de Postgraduados (Mexico) [9637-17]

16:10: **An object-based image analysis approach for developing a green cadastre for monitoring of private urban gardens: case study of Hashemieh district, Mashhad, Iran**, Hossein Vahidi, Wanglin Yan, Keio University (Japan) [9637-18]

16:30: **Likelihood-based image segmentation and classification of agricultural fields: monitoring agricultural landcover in the Biddinghuizen study area, the Netherlands**, Ali Ghofrani Esfahani, Univ. Twente (Netherlands); Ali Akbar Abkar, K.N. Toosi Univ. of Technology (Iran, Islamic Republic of); Mehnoush Ghofrani Esfahani, Vrije Univ. Amsterdam (Netherlands) ... [9637-21]

CONFERENCE 9637 - ROOM: ARGOS

16:50: **RGB picture vegetation indexes for High-Throughput Phenotyping Platforms (HTPPs)**, Shawn C. Kefauver, Univ. de Barcelona (Spain); George El-Haddad, Expert Software Engineering Consultant (Lebanon); Omar Vergara-Diaz, José Luis Araus, Univ. de Barcelona (Spain) [9637-22]

17:10: **Land usage analysis: a random forest approach**, Nasru Minallah, Hidayat U. Rehman, Univ. of Engineering & Technology, Peshawar (Pakistan) [9637-20]

17:30: **Comparing maximum likelihood, support vector machine, and neural networks classification algorithms for classifying tobacco Crops in Northwestern Pakistan**. Shahbaz Khan, Aziz Ahmed, Muhammad Muaz, Nasru Minallah, Manzoor Ali, Muhammad Yasir, Univ. of Engineering & Technology, Peshawar (Pakistan) [9637-23]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Estimation spatiotemporal distribution of evapotranspiration using MODIS images and SEBS algorithm in Ghorveh and Dehghan district, Kwestan Jalali, Islamic Azad Univ. (Iran, Islamic Republic of); Mohammad Hossein Mokhtari, Islamic Azad Univ. (Iran, Islamic Republic of); Soodabeh Namdari, Jalal Karami, Islamic Azad Univ. (Iran, Islamic Republic of) [9637-61]

Analysis of principal elements of land surface temperature retrieval from AVHRR over Tibetan Plateau, Qingni Huang, Guangzhen Cao, Lixin Dong, China Meteorological Administration (China) [9637-62]

Validation of land surface temperature products of Modis and FY3C over Tibetan Plateau, Qingni Huang, Guangzhen Cao, Guicai Li, Lixin Dong, China Meteorological Administration (China) [9637-63]

Winter wheat GPC estimation with fluorescence-based sensor measurements of canopy (Stand-by Oral Presentation), Xiaoyu Song, National Engineering Research Ctr. for Information Technology in Agriculture (China); Jihua Wang, Beijing Research Ctr. for Agricultural Standards and Testing (China); Xiaohu Gu, Xin-Gang Xu, National Engineering Research Ctr. for Information Technology in Agriculture (China) [9637-64]

Performance of fluorescence retrieval methods and fluorescence spectrum reconstruction under various sensor spectral configurations, Rong Li, Feng Zhao, BeiHang Univ. (China) [9637-65]

Monitoring the ratio of leaf carbon to nitrogen in winter wheat with hyperspectral measurements, Xin-Gang Xu, Xiao-Dong Yang, Xiaoyu Song, National Engineering Research Ctr. for Information Technology in Agriculture (China) [9637-66]

Endmember identification from EO-1 Hyperion L1_R hyperspectral data to build saltmarsh spectral library in Hunter Wetland, NSW, Australia, Sikdar M. Rasel, Hsing-Chung Chang, Macquarie Univ. (Australia); Timothy C. Ralph, The Univ. of Queensland (Australia); Neil Saintilan, Macquarie Univ. (Australia) [9637-67]

The impact of different reference panels on spectral reflectance coefficients of some biological water pollutants, Agnieszka Jenerowicz, Piotr Walczykowski, Military Univ. of Technology (Poland) [9637-68]

Flow estimation using satellite-derived rainfall on inaccessible area, Joo-Hun Kim, Yun-Seok Choi, Kyung-Tak Kim, Korea Institute of Construction Technology (Korea, Republic of) [9637-72]

Water level and SWH variations in the water reservoirs of the Volga river cascade on the base of SARAL/AltiKa satellite observations, Galina Rybushkina, Institute of Applied Physics (Russian Federation); Yuliya Troitskaya, Institute of Applied Physics (Russian Federation) and A.M. Obukhov Institute of Atmospheric Physics (Russian Federation) [9637-73]

The applicability of FORMOSAT-2 images to coastal waters/bodies classification, Ana C. Teodoro, Lia Duarte, Pedro Silva, Univ. do Porto (Portugal) [9637-74]

Drought assessment using satellite-derived meteorological parameters and NDVI in Potohar region, Saad Ul Haque, Institute of Space Technology (Pakistan) [9637-75]

Multisatellite data for estimating total discharge in the Volta River basin of West Africa, Wagner G. Ferreira, Hohai Univ. (China) [9637-76]

Optimizing the impact of saline irrigation on water productivity in Rechna Doab (Pakistan) using RS, GIS and hydrological models under different irrigation scenarios, Qaisar Saddique, Northwest A&F Univ. (China) [9637-77]

Integration of remote sensing technology to geographic information system for sustainable planning of water resources, Nejat Evsahiboglu, Ankara Üniv. (Turkey); Egnar Ozdikililer, Istanbul Technical Univ. (Turkey) [9637-78]

Changing planfoarm of Ichamati River and land use/land cover using RS and GIS techniques, Bikesh Sharma, Vidyasagar Univ. (India) [9637-79]

Comparisons of precipitation data from satellites and ground measurements over the North Korea, Yu-Ri Lee, Hyo-Jin Park, Dong-Bin Shin, Yonsei Univ. (Korea, Republic of); Joo-Hun Kim, Kyung-Tak Kim, Korea Institute of Construction Technology (Korea, Republic of) [9637-80]

Using remote sensing to determine spatial and temporal variability of interception storage capacity in wetlands ecosystems in Biebrza Valley, Poland, Joanna Suliga, Vrije Univ. Brussel (Belgium); Jarosław Chormański, Warsaw Univ. of Life Sciences SGGW (Poland); Ann van Griensven, Vrije Univ. Brussel (Belgium) and UNESCO-IHE Institute for Water Education (Belgium); Boud Verbeiren, Vrije Univ. Brussel (Belgium) [9637-81]

Processing of airborne laser scanning data to generate accurate DTM for surface waterfed wetlands overgrown by dense vegetation, Dorota Mirosław-Swiątek, Sylwia Szporak-Wasilewska, Mateusz Grygoruk, Warsaw Univ. of Life Sciences SGGW (Poland) [9637-82]

Fires detection from hypespectral data using neural network approach, Alessandro Piscini, Stefania Amici, Istituto Nazionale di Geofisica e Vulcanologia (Italy) [9637-83]

Assessment of the forest restoration process after a fire using decoding of high-resolution satellite images, Yurij P. Rozhkov, State Nature Reserve Olekminsky (Russian Federation); Maria Y. Kondakova, Hydrochemical Institute (Russian Federation) [9637-86]

Mapping areas invaded by Prosopis Juliflora in Somaliland on Landsat 8 imagery, Felix Rembold, European Commission Joint Research Ctr. (Italy); Ugo Leonardi, Food and Agriculture Organization of the United Nations (Kenya); Wai-Tim Ng, Univ. für Bodenkultur Wien (Austria); Hussein Gadain, Food and Agriculture Organization of the United Nations (Kenya); Michele Meroni, European Commission Joint Research Ctr. (Italy); Clement Atzberger, Univ. für Bodenkultur Wien (Austria) [9637-87]

Ecological changes detection in southern Algeria using remote sensing techniques: case of Oasis of Brezina, Taouaf Lakhdar, Ecole normale supérieure de Laghouat (Algeria) [9637-88]

Spatio-temporal distribution of desert locust in Sudan, Mohammed A. Eltoum, Mohamedsalih D. Mohammed, Univ. of Khartoum (Sudan); Amna Ahmed Salih, Sudan national RemoteSensing authority (Sudan) [9637-89]

Dielectric properties of marsh vegetation, Tatiana D. Kochetkova, Valentin I. Suslyayev, Anna S. Shcheglova, National Research Tomsk State Univ. (Russian Federation) [9637-90]

Altimetry backscattering signatures at Ku and S bands over land and ice sheets, Fabien Blarel, Frédéric Frappart, Benoît Legrésy, Denis Blumstein, Frédérique Rémy, Christophe Fatras, Eric Mougouin, Fabrice Papa, Observatoire Midi-Pyrénées (France); Catherine Prigent, Observatoire de Paris (France); Fernando Niño, Observatoire Midi-Pyrénées (France); Pierre Borderies, ONERA (France); Sylvain Biancamaria, Stéphane Calmant, Observatoire Midi-Pyrénées (France) [9637-92]

Comparing Citrus Tristeza Virus (CTV) and Phytophthora nicotianae infections on citrus plants using proximal sensing measurements, Stefania Gualano, Politecnico di Bari (Italy) and L'Istituto Agronomico Mediterraneo di Bari (Italy); Franco Santoro, L'Istituto Agronomico Mediterraneo di Bari (Italy); Eufemia Tarantino, Politecnico di Bari (Italy); Hanan Rafik, Anna Maria D'Onghia, L'Istituto Agronomico Mediterraneo di Bari (Italy) [9637-93]

Forecasting of cereals yields in a semi-arid area using the agrometeorological model «SAFY» combined to optical SPOT/HRV images, Aicha Chahbi, Institut de Recherche pour le Développement (Tunisia) and Institut National Agronomique de Tunis (Tunisia); Mehrez Zribi, Ctr. d'Etudes Spatiales de la Biosphère (France); Zohra Lili Chabaane, Institut National Agronomique de Tunis (Tunisia); Bernard Mougouin, Gilles Boulet, Ctr. d'Etudes Spatiales de la Biosphère (France) [9637-94]

Winter wheat growth spatial variation monitoring through hyperspectral remote sensing image, Xiaoyu Song, National Engineering Research Ctr. for Information Technology in Agriculture (China); Jihua Wang, Beijing Research Ctr. for Agricultural Standards and Testing (China); Xin-Gang Xu, Xiaohu Gu, National Engineering Research Ctr. for Information Technology in Agriculture (China); Ting Li, Hainan Normal Univ. (China) [9637-95]

Application of agrometeorological spectralmodel in rice area in southern Brazil, Janice F. Leivas, Antônio Heriberto C. de Castro Teixeira, Ricardo G. Andrade, Daniel C. Victoria, Edson L. Bofe, Gustavo Bayma-Silva, Embrapa Monitoramento por Satélite (Brazil) [9637-96]

Investigation and assessment of space and time changes of biomass using remote sensing data on mountain ecosystems, Armenia, Vahagn Muradyan, The Center for Ecological-Noosphere Studies of the (Armenia) [9637-97]

Study of monitoring the freezing injury of winter wheat at over-wintering period based on HJ1A-HSI image, Junling Li, Henan Institute of Meteorological Science (China) and Key Lab. of Agrometeorological Safeguard and Applied Technique (China); Shuyang Li, Henan Institute of Meteorological Science (China) [9637-98]

Improving spatial heterogeneity of spring maize yield simulation at field scale by assimilating time series HJ-1 CCD data into WOFOST model, Zhiqiang Cheng, Jihua Meng, Institute of Remote Sensing and Digital Earth (China) [9637-99]

WEDNESDAY 23 SEPTEMBER

SESSION 5

LOCATION: ARGOS WED 8:30 TO 10:10

Agricultural Applications

Session Chair: **Shahid Habib**,
NASA Goddard Space Flight Ctr. (United States)

8:50: **Study on drivers of cultivated land change in urban fringe area based on the multiple regression model: a case study in Tiruverkadu, Chennai metropolitan area**, Manonmani R, Anna Univ. Chennai (India) [9637-26]

9:10: **Evaluating and predicting water consumption by irrigated agriculture and spread of agricultural fields in the semi-arid regions of the northwestern Negev, Israel**, Assaf Chen, Ben-Gurion Univ. of the Negev (Israel); Itzhak Benenson, Tel Aviv Univ. (Israel); Arnon Karnieli, Ben-Gurion Univ. of the Negev (Israel) [9637-27]

9:30: **Analysing the impact of natural and anthropogenic stresses on crop production in Iraq using time series of remote sensing data**, Sarchil Hama Qader, University of Southampton (United Kingdom); Jadunandan Dash, Peter Atkinson, Univ. of Southampton (United Kingdom) [9637-28]

9:50: **Investigation and assessment of space and time changes of biomass using remote sensing data on mountain ecosystems, Armenia**, Vahagn Muradyan, The Center for Ecological-Noosphere Studies of the Armenia [9637-97]

Coffee Break Wed 10:10 to 10:40

SESSION 6

LOCATION: ARGOS WED 10:40 TO 12:00

Evapotranspiration and Energy Balance I

Session Chair: **Antonino Maltese**, Univ. degli Studi di Palermo (Italy)

10:40: **Water balance indicators from MODIS images and agrometeorological data in Minas Gerais state, Brazil**, Antônio Heriberto C. de Castro Teixeira, Janice F. Leivas, Ricardo G. Andrade, Daniel C. Victoria, Edson L. Bolfe, Gerardo B. Silva, Embrapa Monitoramento por Satélite (Brazil) [9637-30]

11:00: **Evaluation of disaggregated thermal images for evapotranspiration estimation in Barrax test site**, Mar Bisquert, Juan Manuel Sánchez, Univ. de Castilla-La Mancha (Spain); Vicente Caselles, Univ. de València (Spain); Ramón López-Urea, ITAP-FUNDESCAMP (Spain) [9637-31]

11:20: **Study on spatial variations of surface parameters and heat fluxes during the HiWATER-MUSOEXE campaign**, Zhi Qing Peng, Institute of Remote Sensing and Digital Earth (China) and Univ. of Chinese Academy of Sciences (China); XiaoZhou Xin, Institute of Remote Sensing and Digital Earth (China); Ti Zhou, Institute of Remote Sensing and Digital Earth (China) and Univ. of Chinese Academy of Sciences (China) [9637-33]

11:40: TBA
Lunch/Exhibition Break Wed 12:00 to 13:40

SESSION 7

LOCATION: ARGOS WED 13:40 TO 15:00

Evapotranspiration and Energy Balance II

Session Chair: **Antonino Maltese**, Univ. degli Studi di Palermo (Italy)

13:40: **Testing two temporal upscaling schemes for the estimation of the time variability of the actual evapotranspiration**, Antonino Maltese, Fulvio Capodici, Giuseppe Ciraolo, Goffredo La Loggia, Univ. degli Studi di Palermo (Italy) [9637-34]

14:00: **Generation of eight-day evapotranspiration at 30m resolution by fusion of MODIS and Landsat-8 data**, Yinghai Ke, Capital Normal Univ. (China); Junggho Im, Sunyeong Park, Ulsan National Institute of Science and Technology (Korea, Republic of) [9637-36]

14:20: **Modelling radiation and energy balances with Landsat 8 images under different thermohydrological conditions in the Brazilian semi-arid region**, Antônio Heriberto C. de Castro Teixeira, Janice F. Leivas, Ricardo G. Andrade, Embrapa Monitoramento por Satélite (Brazil); Fernando B. Tangerino Hernandez, Renato Alberto M. Franco, São Paulo State Univ. (Brazil) . . [9637-37]

14:40: **Assessment of crop evapotranspiration and irrigation water demand in the lower Niobrara River, Nebraska (USA) by combining remote sensing-based energy and water balances**, Christopher M. U. Neale, Univ. of Nebraska-Lincoln (United States); Isidro Campos, Patricio Grassini, Univ. of Nebraska-Lincoln (United States) [9637-38]

Coffee Break Wed 15:00 to 15:30

Delay-tolerant mobile network protocol for rice field monitoring using wireless sensor networks, Alexandre Guitton, LIMOS CNRS (France); Frederic Andres, National Institute of Informatics (Japan); Jarbas Lopes Cardoso Jr., Ctr. de Tecnologia da Informacao Renato Archer (Brazil); Asanee Kawtrakul, Kasetsart Univ. (Thailand); Silvio E. Barbin, University of Sao Paulo (Brazil) [9637-100]

Supporting precision agriculture with comprehensive application of satellite remote sensing, Jihua Meng, Jin Xu, Zhiqiang Cheng, Wenquan Dong, Institute of Remote Sensing and Digital Earth (China); Yafang Li, China Univ. of Geosciences (China) [9637-101]

Mapping crop based on phenological characteristics using time-series NDVI of operational land imager data in Tadla irrigated perimeter, Morocco, Jamal-eddine Ouzemou, Abderrazak El Harti, Faculté des Sciences et Techniques Béni-Mellal (Morocco); Ali EL Moujahid, Naima Bouch, Rabii El Ouazzani, COSUMAR SUTA (Morocco); Rachid Lhissou, El mostafa Bachaoui, Faculté des Sciences et Techniques Béni-Mellal (Morocco) [9637-102]

Identification and characterization of agro-ecological infrastructures by remote sensing, Danielle Ducrot, Ctr. d'Etudes Spatiales de la Biosphère (France); Sylvie Duthoit, Ecole d'Ingénieurs de PURPAN (France); Alexandre d'Abzac, Ctr. d'Etudes Spatiales de la Biosphère (France); Claire Marais-sicre, CESBIO (France); Véronique Cheret, Ecole d'Ingénieurs de PURPAN (France); Christophe Sausse, CETIOM (France) [9637-104]

Early pest detection in soybean plantations from UAV: a case study for caterpillar detection, Pablo Musé, Matías Tailanián, Gabriel Lema, Pedro Mastrángelo, Mónica Almansa, Germán Fernández Flores, CSI Ingenieros (Uruguay); Enrique Castiglioni, Univ. de la República (Uruguay); Ignacio Fernández Liñares, Germán Fernández Liñares, CSI Ingenieros (Uruguay) [9637-105]

Optical remote sensing of salt-affected soils, Rumiana Kancheva, Denitsa Borisova, Georgi Georgiev, Space Research and Technology Institute (Bulgaria) [9637-106]

Validation of FPAR product inverted by DnD model and evaluation of the agreement between several kinds of FPAR products, Li Li, Hailong Zhang, Institute of Remote Sensing and Digital Earth (China) [9637-107]

Assessing the quality of in-situ measurements of vegetation albedo for validating remote sensing products, Jennifer S. Adams, Jean-Luc Widlowski, Nadine Gobron, Corrado Mio, European Commission Joint Research Ctr. (Italy) [9637-108]

Correlation between the recreational activities and productivity of coastal areas: a case study in the low-lying coastal stretch in the Bay of Bengal coast, India, Srikantha Sannigrahi, Indian Institute of Technology Kharagpur (India) [9637-110]

Monitoring regional winter wheat late frost injury using remote sensing data, WOFOST model and SHAW model, Nian Wang, Junming Liu, China Agricultural Univ. (China) [9637-111]

Investigation variation of carbon dioxide based on GOSAT data in peninsular Malaysia, Mohamad Zubir Mat Jafri, Chong Keat Sim, Hwee San Lim, Univ. Sains Malaysia (Malaysia) [9637-112]

An assessment of the impact of climate change effects on forest land cover based on satellite data, Maria A. Zoran, National Institute of Research and Development for Optoelectronics (Romania); Adrian I. Dida, Univ. Transilvania Brasov (Romania) [9637-113]

NDVI trend at a global scale from 1982-2012 with climate changes, Meng Guo, Northeast Normal Univ. (China) [9637-114]

Estimating canopy water content of wetland vegetation using hyperspectral and multispectral remote sensing data, Yonghua Sun, Capital Normal Univ. (China); Yihan Wang, Capital Normal University (China); Jin Huang, Capital Normal Univ. (China) [9637-115]

The investigation of the relation between NDVI image data and forest management: site index data, the case of Bartin Department of Forestry, Turkey, Ayhan Atesoglu, Metin Tunay, Bartin Univ. (Turkey); Hüseyin Simsek, Bartin Forest District (Turkey) [9637-116]

CONFERENCE 9637 - ROOM: ARGOS

SESSION 8

LOCATION: ARGOS WED 15:30 TO 17:50

Hydrology and Irrigation

Session Chair: **Christopher M. U. Neale**,
Univ. of Nebraska Lincoln (United States)

15:30: **Determination of water body structures for small rivers using remote sensing data**, Pierre Karrasch, Daniel Henzen, Sebastian Hunger, Max Hörold, Technische Univ. Dresden (Germany) [9637-40]

15:50: **Analysis of spatial dynamics of drought in southern Africa**, Alzira G. Ramos, Rogers Hansine, Maria João Pereira, Amílcar Soares, Instituto Superior Técnico (Portugal) [9637-41]

16:10: **Inter-annual response of the rainfall-runoff relationship to wildfire in a Mediterranean forested watershed**, Noa Ohana-Levi, Ben-Gurion Univ. of the Negev (Israel); Amir Givati, Water Authority (Israel); Arnon Karnieli, Ben-Gurion Univ. of the Negev (Israel) [9637-42]

16:30: **Analysis of water supply and demand in the Ghataprabha River basin**, Rajat K. Panda, Nagarajan Ramakrishna, Indian Institute of Technology Bombay (India) [9637-43]

16:50: **A multilevel and multiscale soil moisture and temperature regular monitoring network aim at multisatellite remote sensing application in Tibet Plateau**, Lixin Dong, National Satellite Meteorological Ctr. (China) [9637-44]

17:10: **Monitoring irrigation volumes using high-resolution NDVI image time series: calibration and validation in the Kairouan plain (Tunisia)**, Sameh Saadi, Institut National Agronomique de Tunis (Tunisia); Vincent Simonneau, Gilles Boulet, Bernard Mougnot, Ctr. d'Etudes Spatiales de la Biosphère (France); Zohra Lili Chabaane, Univ. of Carthage (Tunisia) and Institut National Agronomique de Tunis (Tunisia) [9637-45]

17:30: **Assessment of drought in savannah region of Nigeria using geospatial techniques**, Olusola Gbolahun Odunayo, Univ. of Lagos (Nigeria); Oluwatola Adedeji, Obafemi Awolowo Univ. (Nigeria); Linda Abegunde, NCRS (Nigeria) [9637-46]

THURSDAY 24 SEPTEMBER

SESSION 9

LOCATION: ARGOS THU 8:50 TO 10:10

Vegetation and Carbon Monitoring

Session Chair: **Shahid Habib**,
NASA Goddard Space Flight Ctr. (United States)

8:50: **Carbon cycle and ecosystem priorities for the next decade: outcomes of a workshop on earth science remote sensing needs**, Scott Goetz, Woods Hole Research Ctr. (United States); Forrest G. Hall, NASA Goddard Space Flight Ctr. (United States) [9637-47]

9:10: **Monitoring carbon stocks and change in Miombo woodlands using remotely-sensed reflected and emitted energy**, Harun A. Makandi, Univ. of Dar Es Salaam (Tanzania, United Republic of) [9637-48]

9:30: **The variation of crop phenology in North China from 1982 to 2011: impacts on crop productivity**, Xin Du, Institute of Remote Sensing and Digital Earth (China) [9637-49]

9:50: **GLORI: a new airborne GNSS reflectometry instrument for land surface monitoring**, Erwan Motte, Pascal Fanise, Mehrez Zribi, Ctr. d'Etudes Spatiales de la Biosphère (France) [9637-50]

Coffee Break Thu 10:10 to 10:40

SESSION 10

LOCATION: ARGOS THU 10:40 TO 12:10

Vegetation Modelling

Session Chair: **Christopher M. U. Neale**,
Univ. of Nebraska Lincoln (United States)

10:40: **Application of a regularized model inversion system (REGFLEC) to multi-temporal RapidEye imagery for retrieving vegetation characteristics (Invited Paper)**, Rasmus M. Houborg, Matthew F. McCabe, King Abdullah Univ. of Science and Technology (Saudi Arabia) [9637-52]

11:10: **Modelling canopy reflectance through multiple scattering approximation: a case study of coniferous forest in the Mexico Valley**, Jose L. Silvan Cardenas, Nirani Corona-Romero, Ctr. de Investigacion en Geografia y Geomatica "Ing. Jorge L. Tamayo" A. C. (Mexico) [9637-53]

11:30: **A robust sugarcane yield prediction method using time series satellite imagery**, Yu Zhao, Hitachi, Ltd. (Japan) [9637-54]

11:50: **Algorithm developing of gross primary production from its capacity and canopy conductance index using FLUX data and satellite data for global observing satellite data**, Kanako Muramatsu, Nara Women's Univ. (Japan); Shinobu Furumi, Nara Saho College (Japan); Motomasa Daigo, Doshisha Univ. (Japan) [9637-55]

Lunch Break Thu 12:10 to 13:20

SESSION 11

LOCATION: ARGOS THU 13:20 TO 15:00

Snow and Ice Hydrology

Session Chair: **Antonino Maltese**, Univ. degli Studi di Palermo (Italy)

13:20: **Evaluation of Tb response to snowpack by multiple microwave radiative transfer models**, Do Hyuk Kang, NASA Goddard Space Flight Ctr. (United States); Shurun Tang, University of Michigan, Ann Arbor (United States); Edward J. Kim, NASA Goddard Space Flight Ctr. (United States) [9637-56]

13:40: **Country-wide analysis of TRMM data in monitoring rainfall during two consecutive years of anomalous floods in Pakistan**, Shamsa Kanwal, The Hong Kong Polytechnic Univ. (Hong Kong, China); Bilal A. Munir, National Univ. of Sciences and Technology (Pakistan) [9637-57]

14:00: **Extracting fields snow coverage information with HJ-1A and HJ-1B satellites data**, Wenquan Dong, Jihua Meng, Institute of Remote Sensing and Digital Earth (China) [9637-58]

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); Shiqiang Zhang, Northwest Univ. (China) and Cold and Arid Regions Environmental and Engineering Research Institute (China); Junli Xu, Cold and Arid Regions Environmental and Engineering Research Institute (China) [9637-59]

14:40: **Mapping of bare soil surface moisture from TerraSAR-X radar images over a semi-arid region**, Azza Gorraab, Mehrez Zribi, Ctr. d'Etudes Spatiales de la Biosphère (France); Nicolas Baghdadi, Institut National de Recherche en Sciences et Technologies Pour l'Environnement et l'Agriculture (France); Zohra Lili Chabaane, Institut National Agronomique de Tunis (Tunisia) and Univ. of Carthage (Tunisia) [9637-60]

CONFERENCE 9638 - ROOM: SERVANTY

Wednesday 23 September 2015 • Proceedings of SPIE Vol. 9638

Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2015

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)

Programme Committee: **Richard J. Breitlow**; **Jean-Paul Bruyant**, ONERA (France); **Alexander Gilerson**, The City College of New York (United States); **Carlton R. Hall**, Dynamac Corp. (United States); **Heinz-Detlef Kronfeldt**, Technische Univ. Berlin (Germany); **Frederic Lamy**, ONERA (France); **Ana M. Martins**, Univ. dos Açores (Portugal); **Caroline Nichol**, The Univ. of Edinburgh (United Kingdom); **Petri Pellikka**, Univ. of Helsinki (Finland)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Ssession Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Mangrove density mapping with multitemporal remote sensing data and mangrove development impact analysis seen from environmental and society aspects: case study in Sidoarjo, east Java, Akbar Cahyadi Pratama Putra, M. Randy Aswin, Tantri Utami Widhaningtyas, Univ. Gadjah Mada (Indonesia) [9638-20]

Study on the seasonal migration of surface suspended sediment in the Taiwan Strait based on remote sensing, Xiaohui Xu, Jian Chen, The Third Institute of Oceanography, SOA (China) [9638-21]

Restoration of cloud contaminated ocean color images using sediment transport model, Xuefei Yang, Shanghai Institute of Technical Physics (China); Zhihua Mao, The Second Institute of Oceanography, SOA (China) and Shanghai Institute of Technical Physics (China); Jianyu Chen, Haiqing Huang, Qiankun Zhu, Fang Gong, The Second Institute of Oceanography, SOA (China). [9638-22]

The spatial-temporal distribution of particulate organic carbon in the Pearl River Estuary, Dong Liu, Zhejiang Univ. (China); Jianyu Chen, Fang Gong, JiAn Wei, Qiankun Zhu, The Second Institute of Oceanography, SOA (China)[9638-23]

Investigation of mechanisms of generation, development and evolution of vortex structures in the northeastern part of the Black Sea and in the southeastern part of the Baltic Sea, Olga Y. Lavrova, Space Research Institute (Russian Federation); Evgeny V. Krayushkin, Lomonosov Moscow State Univ. (Russian Federation); Nikolay N. Golenko, Maria N. Golenko, P.P. Shirshov Institute of Oceanology (Russian Federation) [9638-24]

Observations of SST diurnal variability in the South China Sea, Qianguang Tu, Delu Pan, Zengzhou Hao, Jianyu Chen, Fang Gong, The Second Institute of Oceanography, SOA (China) [9638-25]

Estimation of marine primary production from MODIS data using phytoplankton absorption-based model, Ma Sheng, Wu Bin, Aerospace DongFangHong Satellite Co., Ltd. (China); Tao Zui, Institute of Remote Sensing and Digital Earth (China) [9638-26]

Multisensor satellite survey of surface oil pollution in the Caspian Sea, Marina I. Mityagina, Olga Y. Lavrova, Space Research Institute (Russian Federation) [9638-27]

Studying flow variability through narrow straits via satellite multispectral and hyperspectral data: the Kerch Strait case, Marina I. Mityagina, Olga Y. Lavrova, Space Research Institute (Russian Federation) [9638-28]

Sea waves backscattering statistical characteristics experimental researches results in microwave band, Michael V. Potipak, Vladimir T. Lobach, Southern Federal Univ. (Russian Federation) [9638-29]

Dynamic of mangrove cover change with anthropogenic factors on Tanakeke Island, Spermonde Archipelago, Indonesia, Nurjannah Nurdin, Hasanuddin Univ. (Indonesia) [9638-30]

Controlling factors analysis of CO₂ distribution in Western Arctic Ocean, Xuelian Song, Yan Bai, Zengzhou Hao, Qiankun Zhu, Jianyu Chen, Fang Gong, The Second Institute of Oceanography, SOA (China) [9638-31]

Spectral separation of wind sea and swell based on buoy observations, Yan Liu, Zengzhou Hao, Fang Gong, Tianyu Wang, Jianyu Chen, The Second Institute of Oceanography, SOA (China) [9638-32]

Evolutionary detectability of ocean and inland water variation from multidecadal satellite altimetry, Kuo-Hsin (Steven) Tseng, Guan-Ting Liu, National Central Univ. (Taiwan); C. K. Shum, The Ohio State Univ. (United States) [9638-33]

Study on extracting and verifying internal wave parameter of SAR image, Juan Wang, Jingsong Yang, Lin Ren, Gang Zheng, The Second Institute of Oceanography, SOA (China) [9638-34]

GEOBIA and ontology-based sea area usage monitoring using remotely sensed imageries, Helingjie Huang, Jianyu Chen, The Second Institute of Oceanography, SOA (China) [9638-35]

Comparison of three airborne laser bathymetry data sets for monitoring the German Baltic Sea Coast, Yujin Song, Joachim Niemeier, Leibniz Univ. Hannover (Germany); Wilfried Ellmer, Bundesamt für Seeschifffahrt und Hydrographie (Germany); Uwe Soergel, Technische Universität Darmstadt (Germany); Christian Heipke, Leibniz Univ. Hannover (Germany) [9638-36]

Laboratory investigation of wind wave breaking modulation in the inhomogeneous current field, Victor V. Bakhanov, Nikolai A. Bogatov, Alexei V. Ermoshkin, Vasily I. Kazakov, Olga N. Kemarskaya, Institute of Applied Physics (Russian Federation) [9638-37]

Field study of inhomogeneous currents, related to bottom topography, display on radar and satellite images, Nikolay A. Bogatov, Victor V. Bakhanov, Alexei V. Ermoshkin, Olga N. Kemarskaya, Institute of Applied Physics (Russian Federation) [9638-38]

Prediction models for CO₂ emission in Malaysia, Mohamad Zubir Mat Jafri, Chun Ho Tan, Hwee San Lim, Univ. Sains Malaysia (Malaysia) [9638-40]

Combining bathymetric lidar and WorldView-2 satellite imagery for classifying benthic habitats using OBIA A, Ayin M. Tamondong, Mia Shaira Estabillo, Ivy Elaine Cadalzo, Charmaine Cruz, Julius Michael Hipolito, Gay Amabelle Go, Ariel Blanco, Univ. of the Philippines (Philippines) [9638-41]

CONFERENCE 9638 - ROOM: SERVANTY

WEDNESDAY 23 SEPTEMBER

OPENING REMARKS

LOCATION: SERVANTY 8:30 TO 8:40

SESSION 1

LOCATION: SERVANTY WED 8:40 TO 10:10

Radar Remote Sensing

Session Chair: **Xavier Neyt**, Royal Military Academy (Belgium)

8:40: **Analysis of bistatic EM scattering by a polluted sea surface (Invited Paper)**, Helmi Ghanmi, Ali Khenchaf, Fabrice Comblet, Ecole Nationale Supérieure de Techniques Avancées Bretagne (France) [9638-1]

9:10: **Assessment of the corrected CMOD5.n ocean backscatter model using ERS scatterometer data**, Anis El Younda, Xavier Neyt, Royal Military Academy (Belgium) [9638-2]

9:30: **On the measure of sea ice area from sea ice concentration data sets**, Mauro Bocculari, Univ. degli Studi di Modena e Reggio Emilia (Italy); Fiorigi F. Parmiggiani, Istituto di Scienze dell'Atmosfera e del Clima (Italy) [9638-3]

9:50: **Monitoring of landfast sea ice in West Antarctica using multisensor data and machine learning approaches**, Miae Kim, Jungho Im, Hyangsun Han, Ulsan National Institute of Science and Technology (Korea, Republic of); Hyun-Cheol Kim, Korea Polar Research Institute (Korea, Republic of) [9638-4]

Coffee Break Wed 10:10 to 10:40

SESSION 2

LOCATION: SERVANTY WED 10:40 TO 12:00

Sea Surface Modelling

Session Chair: **Nicolas Pinel**, ALYOTECH France (France)

10:40: **Simulation of infrared emissivity and reflectivity of oil films on sea surfaces**, Nicolas Pinel, Goulven Monnier, ALYOTECH France (France); Irina Sergievskaya, Institute of Applied Physics (Russian Federation); Christophe Bourlier, L'Univ. Nantes Angers Le Mans (France) [9638-5]

11:00: **Spreading of oil films on the sea surface: radar/optical observations and physical mechanisms**, Stanislav A. Ermakov, Institute of Applied Physics (Russian Federation) and Volga State Univ. of Water Transport (Russian Federation); Ivan Kapustin, Institute of Applied Physics (Russian Federation); Eugeny Makarov, Baseride Technologies Pte Ltd. (Singapore); Irina Sergievskaya, Institute of Applied Physics (Russian Federation); Jose da Silva, Univ. do Porto (Portugal) [9638-6]

11:20: **On discrimination between film slicks and "look-alikes" on the sea surface in multifrequency radar images**, Irina Sergievskaya, Stanislav A. Ermakov, Ivan Kapustin, Institute of Applied Physics (Russian Federation) [9638-7]

11:40: **Application of compressive sensing to radar altimeter design**, Yunhua Zhang, Wenshuai Zhai, Xiao Dong, Xiang Gu, Xiaojin Shi, Ctr. for Space Science and Applied Research (China) [9638-8]

Lunch/Exhibition Break Wed 12:00 to 13:20

SESSION 3

LOCATION: SERVANTY WED 13:20 TO 15:00

Optical and Thermal Remote Sensing

Session Chair: **Alexander Gilerson**,
The City College of New York (United States)

13:20: **Multiband algorithm for the estimation of chlorophyll concentration in the Chesapeake Bay**, Alexander Gilerson, The City College of New York (United States); Michael Ondrusek, NOAA National Environmental Satellite, Data, and Information Service (United States); Maria Tzortziou, Robert Foster, Ahmed El-Habashi, The City College of New York (United States); Surya Prakash Tiwari, Red Sea Research Ctr. (Saudi Arabia); Samir Ahmed, The City College of New York (United States) [9638-9]

13:40: **Neural network algorithms for retrieval of Harmful Algal Blooms in the West Florida Shelf from VIIRS satellite observations and comparisons with other techniques, without the need for a fluorescence**, Ahmed El-Habashi, Samir Ahmed, The City College of New York (United States) . [9638-10]

14:00: **Detection of ocean thermal fronts using thermal IR imagery**, Irina Gladkova, Fazlul Shahriar, The City College of New York (United States); Alexander Ignatov, NOAA National Environmental Satellite, Data, and Information Service (United States); Yury Kihai, Global Science & Technology, Inc. (United States) [9638-11]

14:20: **Revealing of various factors influence on concentration and spatial distribution of suspended matter based on remote sensing data**, Olga Y. Lavrova, Space Research Institute (Russian Federation); Dmitry M. Soloviev, Marine Hydrophysical Institute (Russian Federation); Marina I. Mityagina, Alexey Y. Strochkov, Space Research Institute (Russian Federation) [9638-13]

14:40: **Optical multispectral remote sensing of ocean surface**, Victor I. Titov, Institute of Applied Physics (Russian Federation) [9638-14]

Coffee Break Wed 15:00 to 15:30

SESSION 4

LOCATION: SERVANTY WED 15:30 TO 16:50

Coastal and Inland Remote Sensing

Session Chair: **Charles R. Bostater Jr.**,
Florida Institute of Technology (United States)

15:30: **Surface and subsurface optical and acoustic sensing in support of coastal waterway dredging**, Charles R. Bostater Jr., Florida Institute of Technology (United States) [9638-15]

15:50: **Subpixel mapping of water boundaries using pixel swapping algorithm (case study: Tagliamento River, Italy)**, Milad Niroumand Jadidi, Alfonso Vitti, Univ. degli Studi di Trento (Italy) [9638-16]

16:10: **Estimation of river discharge based on remote sensing of a river plume**, Alexander Osadchiv, P.P. Shirshov Institute of Oceanology (Russian Federation) [9638-18]

16:30: **Coastal water quality monitoring using geostationary ocean color imager (GOCI) satellite data and machine learning approaches**, Eunna Jang, Jungho Im, Sunghyun Ha, Ulsan National Institute of Science and Technology (Korea, Republic of) [9638-19]

CONFERENCE 9639 - ROOM: CASSIOPÉE

Monday - Thursday 21-24 September 2015 • Proceedings of SPIE Vol. 9639

Sensors, Systems, and Next-Generation Satellites

Conference Chairs: **Roland Meynart**, European Space Research and Technology Ctr. (Netherlands); **Steven P. Neeck**, NASA Headquarters (United States); **Haruhisa Shimoda**, Tokai Univ. (Japan)

Conference Co-Chair: **Toshiyoshi Kimura**, Japan Aerospace Exploration Agency (Japan)

Programme Committee: **Olivier Saint-Pe**, Airbus Defence and Space (France); **Xiaoxiong J. Xiong**, NASA Goddard Space Flight Ctr. (United States)

MONDAY 21 SEPTEMBER

OPENING REMARKS

LOCATION: CASSIOPÉE 8:30 TO 8:40

SESSION 1

LOCATION: CASSIOPÉE MON 8:40 TO 10:30

European Missions

Session Chair: **Roland Meynart**,

European Space Research and Technology Ctr. (Netherlands)

8:40: **Overview of ESA Earth observation missions (Invited Paper)**, Roland Meynart, European Space Research and Technology Ctr. (Netherlands) [9639-1]

9:10: **The flexible combined imager onboard MTG: from design to calibration**, Yannig Durand, Pascal Hallibert, Mark Wilson, Mounir Lekouara, Semen Grabarnik, Donny M. Aminou, Paul Blythe, European Space Agency (Netherlands); Bruno Napierala, Jean-Louis Canaud, Olivier Pigouche, Julien Ouaknine, Bernard Verez, Thales Alenia Space (France) [9639-2]

9:30: **CNES Cal/Val expertise centre for Sentinel-2 in orbit tests (TEC-S2): architecture and data processing**, Julien Nosavan, Thierry Trémas, Jean-Louis Raynaud, Ctr. National d'Études Spatiales (France) [9639-3]

9:50: **Sentinel-2 radiometric image quality commissioning: first results**, Sophie Lachéradé, Vincent Lonjou, Ctr. National d'Études Spatiales (France); Morgan Farges, Capgemini Technology Services (France); Philippe Gamet, Sébastien Marcq, Jean-Louis Raynaud, Thierry Trémas, Ctr. National d'Études Spatiales (France); Philippe Martimort, Claudia Isola, François Spoto, European Space Research and Technology Ctr. (Netherlands) [9639-4]

10:10: **Sentinel-2/MSI absolute calibration: first results**, Vincent Lonjou, Sophie Lachéradé, Bertrand Fougny, Philippe Gamet, Sébastien Marcq, Jean-Louis Raynaud, Thierry Trémas, Ctr. National d'Études Spatiales (France); Philippe Martimort, Claudia Isola, François Spoto, European Space Research and Technology Ctr. (Netherlands) [9639-5]

Coffee Break Mon 10:30 to 11:00

SESSION 2

LOCATION: CASSIOPÉE MON 11:00 TO 12:30

US Missions

Session Chair: **Steven P. Neeck**, NASA Headquarters (United States)

11:00: **The NASA Earth Science Flight Program: an update (Invited Paper)**, Steven P. Neeck, NASA Headquarters (United States) [9639-6]

11:30: **Landsat-8: status and on-orbit performance**, Brian L. Markham, NASA Goddard Space Flight Ctr. (United States); Julia A. Barsi, NASA Goddard Space Flight Ctr. (United States) and Science Systems and Applications, Inc. (United States); Ron A. Morfitt, U.S. Geological Survey (United States); Matthew Montanaro, Center for Imaging Science, Rochester Institute of Technology (United States) [9639-7]

11:50: **The Global Ecosystem Dynamics Investigation-GEDI**, Ralph Dubayah, Univ. of Maryland, College Park (United States); Scott Goetz, Woods Hole Research Ctr. (United States); J. Bryan Blair, NASA Goddard Space Flight Ctr. (United States) [9639-8]

12:10: **Earth radiation budget continuity observations: the Radiation Budget Instrument (RBI)**, Kory J. Priestley, NASA Langley Research Ctr. (United States); Mohan Shankar, Science Systems and Applications, Inc. (United States); Anum Barki, NASA Langley Research Ctr. (United States); Elena M. Georgieva, NASA Goddard Space Flight Ctr. (United States); Melissa Yang, Barry Dunn, NASA Langley Research Ctr. (United States) [9639-9]

Lunch Break Mon 12:30 to 14:00

SESSION 3

LOCATION: CASSIOPÉE MON 14:00 TO 15:30

Japanese Missions I

Session Chairs: **Haruhisa Shimoda**, Tokai Univ. (Japan); **Toshiyoshi Kimura**, Japan Aerospace Exploration Agency (Japan)

14:00: **Overview of Japanese Earth observation programs (Invited Paper)**, Haruhisa Shimoda, Tokai Univ. (Japan) [9639-10]

14:30: **ASTER VNIR 15 years growth to the standard imaging radiometer in remote sensing**, Masaru Hiramatsu, Hitomi Inada, NEC Corp. (Japan); Fumihiro Sakuma, Masakuni Kikuchi, Japan Space Systems (Japan) [9639-11]

14:50: **ALOS-2 initial results**, Yukihiko Kankaku, Shinichi Suzuki, Masanobu Shimada, Japan Aerospace Exploration Agency (Japan) [9639-13]

15:10: **On-orbit performance of the Compact Infrared Camera (CIRC) onboard ALOS-2**, Michito Sakai, Haruyoshi Katayama, Eri Kato, Yasuhiro Nakajima, Toshiyoshi Kimura, Japan Aerospace Exploration Agency (Japan); Koji Nakau, Hokkaido Univ. (Japan) [9639-14]

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Remote Sensing 2015

For details, please see special events section in the printed programme or visit <http://spie.org/remote-sensing-europe.xml>

TUESDAY 22 SEPTEMBER

SESSION 4

LOCATION: CASSIOPÉE TUE 9:00 TO 10:20

Japanese Missions II

Session Chairs: **Haruhisa Shimoda**, Tokai Univ. (Japan); **Toshiyoshi Kimura**, Japan Aerospace Exploration Agency (Japan)

9:00: **Current status of the Global Change Observation Mission 1st-Water "SHIZUKU" (GCOM-W1) and the Advanced Microwave Scanning Radiometer 2 (AMSR2)**, Takashi Maeda, Keiji Imaoka, Misako Kachi, Hiroyuki Tsutsui, Marehito Kasahara, Norimasa Ito, Taikan Oki, Haruhisa Shimoda, Japan Aerospace Exploration Agency (Japan) [9639-15]

9:20: **Current status of the dual-frequency precipitation radar on the global precipitation measurement core spacecraft**, Kinji Furukawa, Tomomi Nio, Toshiyuki Konishi, Riko Oki, Takeshi Masaki, Takuji Kubota, Japan Aerospace Exploration Agency (Japan); Toshio Iguchi, Hiroshi Hanado, National Institute of Information and Communications Technology (Japan) [9639-16]

9:40: **EarthCARE/CPR design results and PFM development status**, Kenta Maruyama, Eichi Tomita, Hirotaka Nakatsuka, Yoshihisa Aida, Yoshihiro Seki, Kazuyuki Okada, Yoshiya Iide, Gaku Kadosaki, Japan Aerospace Exploration Agency (Japan); Nobuhiro Takahashi, Yuichi Ohno, Hiroaki Horie, Kenji Sato, National Institute of Information and Communications Technology (Japan) and Japan Aerospace Exploration Agency (Japan) [9639-17]

10:00: **Development and pre-launch test status of Second Generation Global Imager (SGLI)**, Yoshihiko Okamura, Kazuhiro Tanaka, Japan Aerospace Exploration Agency (Japan); Takahiro Amano, Koichi Shiratama, Tamiki Hosokawa, NEC Corp. (Japan) [9639-18]

Coffee Break Tue 10:20 to 10:50

SESSION 5

LOCATION: CASSIOPÉE TUE 10:50 TO 12:30

Japanese Missions III

Session Chairs: **Haruhisa Shimoda**, Tokai Univ. (Japan); **Toshiyoshi Kimura**, Japan Aerospace Exploration Agency (Japan)

10:50: **The results of the critical design of GOSAT-2: mission and satellite**, Masakatsu Nakajima, Hiroshi Suto, Kazuhiko Yotsumoto, Takehiro Miyakawa, Kei Shiomi, Yukie Yajima, Japan Aerospace Exploration Agency (Japan) [9639-19]

CONFERENCE 9639 - ROOM: CASSIOPÉE

11:10: **Concept study of a vegetation lidar on International Space Station**, Toshiyoshi Kimura, Tadashi Imai, Daisuke Sakaizawa, Takashi Kobayashi, Junpei Murooka, Japan Aerospace Exploration Agency (Japan) [9639-20]

11:30: **Planned submillimeter limb sounder (SMILES-2) for measurement of temperature, wind, and chemical species in the middle atmosphere**, Satoshi Ochiai, Yoshinori Uzawa, Yoshihisa Irimajiri, Philippe Baron, National Institute of Information and Communications Technology (Japan); Toshiyuki Nishibori, Japan Aerospace Exploration Agency (Japan); Takeshi Manabe, Osaka Prefecture Univ. (Japan); Akira Mizuno, Tomoo Nagahama, Nagoya Univ. (Japan); Yasunori Fujii, National Astronomical Observatory of Japan (Japan); Makoto Suzuki, Japan Aerospace Exploration Agency (Japan); Masato Shiotani, Kyoto Univ. (Japan) [9639-21]

11:50: **Sensitivity study of SMILES-2 for chemical species**, Naohiro Manago, Chiba Univ. (Japan); Hiroyuki Ozeki, Toho Univ. (Japan); Satoshi Ochiai, Philippe Baron, National Institute of Information and Communications Technology (Japan); Makoto Suzuki, Japan Aerospace Exploration Agency (Japan) [9639-22]

12:10: **Measurement of stratospheric and mesospheric winds with a submillimeter wave limb sounder: results from JEM/SMILES and simulation study for SMILES-2**, Philippe Baron, National Institute of Information and Communications Technology (Japan); Naohiro Manago, Chiba Univ. (Japan); Hiroyuki Ozeki, Toho Univ. (Japan); Yoshihisa Irimajiri, Yoshinori Uzawa, National Institute of Information and Communications Technology (Japan); Donal Murtagh, Chalmers Univ. of Technology (Sweden); Satoshi Ochiai, National Institute of Information and Communications Technology (Japan); Makoto Suzuki, Institute of Space and Astronautical Science (Japan) and Japan Aerospace Exploration Agency (Japan) [9639-23]

Lunch/Exhibition Break Tue 12:30 to 13:40

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 6

LOCATION: CASSIOPÉE TUE 13:40 TO 15:20

Focal Plane Assemblies I

Session Chair: **Olivier Saint-Pe**, Airbus Defence and Space (France)

13:40: **Visible and infrared detector developments supported by the European Space Agency**, Nick Nelms, Kyriaki Minoglou, Christoph Voland, Yves Levillain, Roland Meynard, Jean-Loup Bézy, Mustapha Zahir, Bruno Leone, Alessandra Ciapponi, Pierre-Elie Crouzet, European Space Agency (Netherlands) [9639-24]

14:00: **Low dark current MCT-based focal plane detector arrays for the LWIR and VLWIR developed at AIM**, Kai-Uwe Gassmann, Sebastian Kaspar, Dettler Eich, Wolfgang P. Fick, Heinrich Figgemeier, Stefan Hanna, Karl-Martin Mahlein, Wilhelm Schirmacher, Richard Thöt, Joachim C. Wendler, AIM INFRAROT-MODULE GmbH (Germany) [9639-25]

14:20: **Infrared detectors development and characterization at Sofradir/LETI/SAP for scientific and space missions in SWIR**, Bruno Fiègue, SOFRADIR (France); Pierre Castelein, Olivier Gravrard, CEA-LETI (France); Olivier Boulade, Vincent Moreau, CEA-SAP (France) [9639-26]

14:40: **NGP, a new large format infrared detector for observation, hyperspectral and spectroscopic space missions in VISIR, SWIR and MWIR wavebands**, Anne Delannoy, Céline Riuné, Bruno Fiègue, Philippe Chorier, SOFRADIR (France) [9639-27]

15:00: **multiband CMOS sensor simplify FPA design**, Bill W. Wang, CMOS Sensor Inc. (Taiwan); Jer Ling, National Space Organization (Taiwan) . . [9639-28]

Coffee Break Tue 15:20 to 15:50

SESSION 7

LOCATION: CASSIOPÉE TUE 15:50 TO 17:30

Focal Plane Assemblies II

Session Chair: **Olivier Saint-Pe**, Airbus Defence and Space (France)

15:50: **A high-line rate 2048-pixel modular SWIR linear array for Earth observation applications**, Ankur Anchlia, Rosa M. Vinella, Koen van der Zanden, Xenics NV (Belgium); Patrick J. Merken, Xenics NV (Belgium) and Royal Military Academy (Belgium); Jan P. Vermeiren, Kristof Wouters, Xenics NV (Belgium); Pieter D. Deroo, Xenics NV (Belgium); Peter Hooylaerts, Wouter Ruythooren, Daphne Gielen, Xenics NV (Belgium) [9639-29]

16:10: **Sensor system development for the WSO-UV (World Space Observatory-Ultraviolet) space-based astronomical telescope**, Chris Hayes-Thakore, Stephen N. Spark, Steve Hurrell, Paul Trinder, e2v technologies plc (United Kingdom) [9639-30]

16:30: **InAs photodiode for low temperature sensing**, Xinxin Zhou, Jo Shien Ng, Chee Hing Tan, Univ of Sheffield (United Kingdom) [9639-31]

16:50: **Extended scene wavefront sensor for space application**, Thierry T. Bomer, Karen Ravel, Gilles Corlay, SODERN (France) [9639-32]

17:10: **Quantum efficiency performances of the NIR European Large Format Array detectors tested at ESTEC**, Pierre-Elie Crouzet, Ludovic Duvet, Fritz De Wit, Thierry Beaufort, S. Blommaert, Bart Butler, G. Van Duinkerken, Joerg Terhaar, J. Heijnen, Cornelis van der Luitj, Hans Smit, European Space Research and Technology Ctr. (Netherlands) [9639-33]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Overview of test and application of the multispectral camera on ZY-3 Satellite, Weijun Cai, Beijing Institute of Space Mechanics and Electricity (China) [9639-51]

ASTER 15 years challenging trail on-orbit operation, Masakuni Kikuchi, Fumihiro Sakuma, Kenji Tatsumi, Japan Space Systems (Japan); Hitomi Inada, Yoshiyuki Itou, NEC Corp. (Japan); Shigeki Akagi, Mitsubishi Electric Corp. (Japan); Hidehiko Ono, Fujitsu Ltd. (Japan) [9639-73]

The laser array generator for the Chang'E-3 lunar rover, Chunhui Wang, Hui Zhang, Beijing Institute of Space Mechanics and Electricity (China) . . . [9639-74]

ASTER System operating achievement for 15 years on orbit, Hitomi Inada, Yoshiyuki Itou, NEC Corp. (Japan); Masakuni Kikuchi, Fumihiro Sakuma, Kenji Tatsumi, Japan Space Systems (Japan); Shigeki Akagi, Mitsubishi Electric Corp. (Japan); Hidehiko Ono, Fujitsu Ltd. (Japan) [9639-75]

Comparison of thermal infrared emissivity retrieved with the absolute emissivity method and the TES method with theoretical model, JiAn Wei, Difeng Wang, Yan Bai, Jianyu Chen, The Second Institute of Oceanography, SOA (China) [9639-76]

Aurora activities observed by SNPP VIIRS day night band during a long period geomagnetic storm event on April 29-30, 2014, Xi Shao, Univ. of Maryland, College Park (United States); Changyong Cao, NOAA National Environmental Satellite, Data, and Information Service (United States); Bin Zhang, Univ. of Maryland, College Park (United States); Wenhui Wang, ERT, Inc. (United States); Shing F. Fung, NASA Goddard Space Flight Ctr. (United States) [9639-77]

A improved method of fuzzy support degree based on uncertainty analysis, Yuan Huang, Jing Wu, Lihua Wu, Dong Wei Sheng, National Univ. of Defense Technology (China) [9639-78]

Simulation with hyperspectral data of new Earth observation satellite missions, Drazen Skoković, José A. Sobrino, Juan Carlos Jimenez-Muñoz, Guillem P. Soria, Yves Julien, Univ. de València (Spain) [9639-79]

Rugged: an operational, open-source solution for Sentinel-2 mapping, Luc Maisnonobe, Jean Seyral, Guylaine Prat, Jonathan Guinet, Aude Espeset, CS Systèmes d'information (France) [9639-80]

Pixel partition method using Markov random field for measurements of closely spaced objects by optical sensors, Xueying Wang, Jun Li, Weidong Sheng, Wei An, National Univ. of Defense Technology (China) [9639-81]

Calibration of the videospectral system for the space experiment "Uragan" onboard the ISS, Yury Krot, Leonid V. Katkovsky, Boris Beliaev, Belarusian State Univ. (Belarus) [9639-82]

Monte Carlo-based multiphysics coupling analysis of X-ray pulsar telescope, Sheng Lian Li, Beijing Institute of Control Engineering (China) [9639-83]

Application of high-precision matching about multisensor in fast stereo imaging, Hui Jing Zhang, Academy of Opto-Electronics (China) and Chinese Academy of Sciences (China); Mei Zhou, Haohao Wu, Dandan Zhang, Academy of Opto-Electronics (China) [9639-84]

Applicability research of smart camera for the application of unmanned aerial vehicle, Ho Hyun Jeong, Dong Yoon Shin, Chou Uong Choi, Pukyong National University (Korea, Republic of) [9639-85]

S-NPP VIIRS day-night band on-orbit calibration and performance update, Kwofu V Chiang, Hongda Chen, Science Systems and Applications, Inc. (United States); Chengbo Sun, Global Science and Technology, Inc. (United States); Samuel Anderson, Science Systems and Applications, Inc. (United States); Xiaoxiong Xiong, NASA/GSFC (United States) [9639-86]

ROOM: CASSIOPEE - CONFERENCE 9639

WEDNESDAY 23 SEPTEMBER

SESSION 8

LOCATION: CASSIOPEE WED 8:30 TO 10:10

Calibration I

Session Chair: **Xiaoxiong J. Xiong**,
NASA Goddard Space Flight Ctr. (United States)

8:30: **Comparison of S-NPP VIIRS and PLEIADES lunar observations**, Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States); Sophie Lachérade, Bertrand Fougny, Ctr. National d'Études Spatiales (France); Jon P. Fulbright, Zhipeng Wang, Science Systems and Applications, Inc. (United States) [9639-33]

8:50: **Vicarious calibration of KOMPSAT-3 AEISS**, Ho Yong Ahn, Pukyong National Univ. (Korea, Republic of); Jinsoo Kim, Inje Univ. (Korea, Republic of); Chulung Choi, Dong Yoon Shin, Pukyong National Univ. (Korea, Republic of) [9639-46]

9:10: **A summary of the joint GSICS –CEOS/IVOS lunar calibration workshop: moving towards intercalibration using the Moon as a transfer target**, Sebastien C. Wagner, Tim J. Hewison, EUMETSAT (Germany); Thomas C. Stone, U.S. Geological Survey (United States); Sophie Lachérade, Bertrand Fougny, Ctr. National d'Études Spatiales (France); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) [9639-35]

9:30: **Assessment of MODIS on-orbit spatial performance**, Daniel Link, Zhipeng Wang, Science Systems and Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) . . . [9639-36]

9:50: **Cross-calibration of the reflective solar bands of Terra MODIS and Landsat 7 Enhanced Thematic Mapper plus over PICS using different approaches**, Amit Angal, Jake Brinkmann, Science Systems and Applications, Inc. (United States); Nischal Mishra, South Dakota State Univ. (United States); Daniel Link, Science Systems and Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States); Dennis L. Helder, South Dakota State Univ. (United States) [9639-37]

Coffee Break Wed 10:10 to 10:40

SESSION 9

LOCATION: CASSIOPEE WED 10:40 TO 12:20

Calibration II

Session Chair: **Xiaoxiong J. Xiong**,
NASA Goddard Space Flight Ctr. (United States)

10:40: **Evaluation of VIIRS and MODIS thermal emissive band calibration consistency using Dome C**, Sriharsha Madhavan, Aisheng Wu, Jake Brinkmann, Brian N. Wenny, Science Systems and Applications, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) [9639-38]

11:00: **Tracking Terra MODIS on-orbit Polarization Sensitivity Using Pseudo-Invariant Desert Sites**, Aisheng Wu, Xu Geng, Science and Systems Applications, Inc. (United States); Andrew Wald, Global Science & Technology, Inc. (United States); Xiaoxiong J. Xiong, NASA Goddard Space Flight Ctr. (United States) [9639-39]

11:20: **Radiometric calibration and performance trends of the Clouds and Earth's Radiant Energy System (CERES) instruments onboard the Terra and Aqua spacecraft**, Mohan Shankar, Susan Thomas, Natividad M. Smith, Dale R. Walikainen, Science Systems and Applications, Inc. (United States); Kory J. Priestley, NASA Langley Research Ctr. (United States) [9639-40]

11:40: **Landsat-8 calibration inter-consistency with ocean color missions**, Nima Pahlevan, NASA Goddard Space Flight Ctr. (United States) and Sigma Space Co. (United States); John R. Schott, Rochester Institute of Technology (United States) [9639-41]

12:00: **The geostationary operational environmental satellite R-series advanced baseline imager: detector spectral response effects on thermal emissive band calibration**, Aaron J. Pearlman, ERT, Inc. (United States); Francis P. Padula, GeoThinkTank, LLC (United States); Xiangqian Wu, National Oceanic and Atmospheric Administration (United States); Changyong Cao, NOAA National Environmental Satellite, Data, and Information Service (United States) [9639-42]

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

SESSION 10

LOCATION: CASSIOPEE WED 13:40 TO 15:00

Calibration III

Session Chair: **Xiaoxiong J. Xiong**,
NASA Goddard Space Flight Ctr. (United States)

13:40: **Selenographic coordinate mapping of lunar observations by GOES Imager**, Xi Shao, ERT, Inc. (United States) and Univ. of Maryland, College Park (United States); Xiangqian Wu, National Oceanic and Atmospheric Administration (United States); Fangfang Yu, ERT, Inc. (United States). [9639-43]

14:00: **Preparation of a new autonomous instrumented radiometric calibration site: Gobabeb, Namib Desert**, Claire L. Greenwell, Agnieszka Bialek, Amelia Marks, Emma R. Woolliams, National Physical Lab. (United Kingdom); Béatrice Berthelot, Magellium (France); Aimé Meygret, Sébastien Marcq, Ctr. National d'Études Spatiales (France); Marc Bouvet, European Space Research and Technology Ctr. (Netherlands); Nigel Fox, National Physical Lab. (United Kingdom) [9639-44]

14:20: **Development of a sensor web for vicarious-sites measurement based on self-calibrating LED radiometers**, Roberto Filippo, Emanuele Taralli, Mauro Rajteri, Giorgio Brida, Istituto Nazionale di Ricerca Metrologica (Italy); Simon R. G. Hall, Agnieszka Bialek, Claire L. Greenwell, Nigel Fox, National Physical Lab. (United Kingdom) [9639-45]

14:40: **S-NPP VIIRS SDR calibration assessment and improvement**, Kwofu V Chiang, Ning Lei, Jon Fulbright, Samuel Anderson, Science Systems and Applications, Inc. (United States); Sergey Gusev, Chengbo Sun, Global Science and Technology, Inc. (United States); Xiaoxiong Xiong, NASA/GSFC (United States) [9639-34]

Coffee Break Wed 15:00 to 15:30

SESSION 11

LOCATION: CASSIOPEE WED 15:30 TO 16:30

Calibration IV

Session Chair: **Xiaoxiong J. Xiong**,
NASA Goddard Space Flight Ctr. (United States)

15:30: **The Traceable Radiometry Underpinning Terrestrial and Helio Studies (TRUTHS) mission**, Paul Green, Nigel Fox, National Physical Lab. (United Kingdom); Daniel R. Lobb, Surrey Satellite Technology Ltd. (United Kingdom) [9639-48]

15:50: **Creation and validation of Spectralon BRDF targets and standards**, Christopher N. Durell, Labsphere, Inc. (United States) [9639-49]

16:10: **China radiometric calibration sites ground-based automatic observing systems for CAL/VAL**, Yong Zhang, Zhiguo Rong, Xiuqing Hu, National Satellite Meteorological Ctr. (China); Xiutian Ba, Dunhuang Meteorological Bureau (China) [9639-50]

SESSION 12

LOCATION: CASSIOPEE WED 16:30 TO 16:50

Missions and Technologies I

Session Chair: **Steven P. Neeck**, NASA Headquarters (United States)

16:30: **Deployment simulation of a deployable reflector for earth science application**, Xiaokai Wang, Houfei Fang, Bei Cai, Xiaofei Ma, Shanghai YS Information Technology Co., Ltd. (China) [9639-53]

CONFERENCE 9639 - ROOM: CASSIOPÉE

THURSDAY 24 SEPTEMBER

SESSION 13

LOCATION: CASSIOPÉE THU 9:00 TO 10:20

Missions and Technologies II

9:00: **Radiometric uncertainty per pixel for the Sentinel-2 L1C products**, Javier Gorroño, National Physical Lab. (United Kingdom); Ferran Gascon, European Space Agency (Italy); Nigel Fox, National Physical Lab. (United Kingdom) [9639-54]

9:20: **G-MAP: a novel night vision system for satellites**, Thomas Miletto, European Space Research and Technology Ctr. (Netherlands) and Univ. degli Studi di Trieste (Italy); Luca Maresi, Alessandro Zuccaro Marchi, European Space Research and Technology Ctr. (Netherlands); Giorgia Pontetti, G & A Engineering S.r.l. (Italy) [9639-55]

9:40: **Photonic front-end for the next-generation of space SAR applications**, Miguel A. Piqueras, Teresa Mengual, DAS Photonics (Spain); Bartos Chmielak, AMO GmbH (Germany); Alfredo Catalani, Space Engineering S.p.A (Italy); Peter G. Huggard, RAL Space (United Kingdom); Rubén Ortuño, Univ. Politècnica de València (Spain) [9639-56]

10:00: **Two conceptual designs for optical system of next-generation small satellites**, Sayyed Ashkan Adibi, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of); Azam Karami, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of) and Univ. Antwerpen (Belgium) [9639-57]

Coffee Break Thu 10:20 to 10:50

SESSION 14

LOCATION: CASSIOPÉE THU 10:50 TO 12:10

Missions and Technologies III

10:50: **Material choices and resulting dimensional stability of optical systems in orbit**, Tony B. Hull, The Univ. of New Mexico (United States); Thomas Westerhoff, SCHOTT AG (Germany) [9639-58]

11:10: **Research on Dyson imaging spectrometer based on Fery prism**, Linlin Pei Jr., Academy of Opto-Electronics (China) [9639-60]

11:30: **Visible spectral imager for occultation and nightglow (VISION) for the PICASSO Mission**, Heikki Saari, Antti Näsälä, Christer Holmlund, Rami Mannila, Harri J. Ojanen, Ismo Näkki, VTT Technical Research Ctr. of Finland Ltd. (Finland); Didier Fussen, Didier Pieroux, Philippe Demoulin, Emmanuel Dekemper, Filip Vanhellefont, Belgian Institute for Space Aeronomy (Belgium) [9639-61]

11:50: **The ESA RADGLASS activity: a radiation study of non rad-hard glasses**, Ilias G. Manolis, Jean-Loup Bézy, European Space Research and Technology Ctr. (Netherlands); Alessandra Costantino, European Space Agency / ESTEC (Netherlands); Ramon J. Vink, Atul Deep, Munadi Ahmad, Emmanuel Amorim, European Space Research and Technology Ctr. (Netherlands); Micael D Miranda, European Space Agency / ESTEC (Netherlands); Roland Meynart, European Space Research and Technology Ctr. (Netherlands) [9639-62]

Lunch Break Thu 12:10 to 13:40

SESSION 15

LOCATION: CASSIOPÉE THU 13:40 TO 15:00

Missions and Technologies IV

13:40: **Design tradeoffs for a high-resolution, wide-field camera for a small-satellite Earth observation mission**, Denis P. Naughton, CGS S.p.A. (Italy); Stefano Pieraccini, CGS S.p.A (Italy); Paolo Sandri, CGS S.p.A. (Italy) [9639-64]

14:00: **A new service support tool for COSMO-SkyMed: civil user coordination service and civil request management optimization**, Maria Girolamo Daraio, Patrizia Sacco, Maria Libera Battagliere, Luca Fasano, Alessandro Coletta, Agenzia Spaziale Italiana (Italy) [9639-65]

14:20: **The COSMO-SkyMed ground and ILS+OPS segments upgrades for full civilian capacity exploitation**, Luca Fasano, Giuseppe Francesco De Luca, Mauro Cardone, Rosa Loizzo, Patrizia Sacco, Maria Girolamo Daraio, Agenzia Spaziale Italiana (Italy) [9639-66]

14:40: **OPTIMA: advanced methods for the analysis, integration and optimization of PRISMA mission products**, Donatella Guzzi, Ivan Pippi, Bruno Aiazzi, Stefano Baronti, Roberto Carlà, Cinzia Lastrì, Vanni Nardino, Valentina Raimondi, Leonardo Santurri, Massimo Selva, Istituto di Fisica Applicata Nello Carrara (Italy); Luciano Alparone, Istituto di Fisica Applicata Nello Carrara (Italy) and Univ. degli Studi di Firenze (Italy); Andrea Garzelli, Istituto di Fisica Applicata Nello Carrara (Italy) and Univ. degli Studi di Siena (Italy); Ettore Lopinto, Cristina Ananasso, Agenzia Spaziale Italiana (Italy); Alessandro Barducci, SOFASI S.R.L. (Italy) [9639-67]

Coffee Break Thu 15:00 to 15:20

SESSION 16

LOCATION: CASSIOPÉE THU 15:20 TO 16:40

Missions and Technologies V

15:20: **Visible and near-infrared imaging spectrometer (VNIS) for in-situ lunar surface measurements**, Zhiping He, Rui Xu, Chunlai Li, Gang Lv, Liyin Yuan, Binyong Wang, Rong Shu, Jianyu Wang, Shanghai Institute of Technical Physics (China) [9639-68]

15:40: **Positioning accuracy improvement of three-line mapping satellite after using laser altimeter**, Qiang Dou, Qipeng Cao, Jun Zhu, Yan Li, Aerospace DongFangHong Satellite Co., Ltd. (China) [9639-69]

16:00: **Low-mass planar photonic imaging technique with high-resolution and wide spatial frequency**, Yue Zhang, Jianchao Jiao, Baohua Wang, Yun Su, Cheng Jiang, Beijing Institute of Space Mechanics and Electricity (China) [9639-70]

16:20: **An on-orbit spectral calibration method for dispersive spectral imaging system**, YU DAI, Chinese Academy of Science (China) [9639-71]

CONFERENCE 9640 - ROOM: CARAVELLE 2

Wednesday - Thursday 23-24 September 2015 • Proceedings of SPIE Vol. 9640

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-Chair: **Richard H. Picard**, ARCON Corp. (United States)

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); **Konradin Weber**, Fachhochschule Düsseldorf (Germany)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: CARAVELLE 2 TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. 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 Tuesday 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>.

Influence of urban agglomerations on optical properties of aerosols based on remote sensing observations, Olga Zawadzka, Krzysztof M. Markowicz, Univ. of Warsaw (Poland) [9640-36]

Geoinformation system for prediction of forest fire danger caused by solar radiation using remote sensing data, Nikolay V. Baranovskiy, Elena P. Yankovich, Tomsk Polytechnic Univ. (Russian Federation) [9640-37]

Quantitative interpretation of MODIS cloud mask: impact on cloud amount estimation, Andrzej Kotarba, Space Research Ctr. (Poland) [9640-38]

Solar radiation environment study of near-space atmosphere in China area, Dongdong Fan, Aerospace DongFangHong Satellite Co., Ltd. (China); Xingfeng Chen, Zhengqiang Li, Institute of Remote Sensing and Digital Earth (China); Xiaodong Mei, Ocean Univ. of China (China) [9640-39]

The estimation of surface solar radiation considering the distortion of the cloud shadow on complex terrain, Bin Li, Institute of Remote Sensing and Digital Earth (China) [9640-40]

Detection of severe air pollution from multidirectional perspectives, Sonoyo Mukai, Kyoto College of Graduate Studies for Informatics (Japan); Itaru Sano, Makiko Nakata, Masayoshi Yasumoto, Kinki Univ. (Japan) [9640-41]

Air quality assessment from surface and space, Itaru Sano, Makiko Nakata, Kinki Univ. (Japan); Sonoyo Mukai, Kyoto College of Graduate Studies for Informatics (Japan) [9640-42]

Estimation of solar radiation by using modified Heliosat-II method and COMS-MI imagery, Wonseok Choi, Ahran Song, Yongil Kim, Seoul National Univ. (Korea, Republic of) [9640-43]

Exploiting the structure of microwave radiometer-derived temperature profile for stable boundary layer height estimation, Umar Saeed, Univ. Politècnica de Catalunya (Spain); Francesc Rocadenbosch, Univ. Politècnica de Catalunya (Spain) and Institut d'Estudis Espacials de Catalunya (Spain); Susanne Crewell, Univ. zu Köln (Germany) [9640-44]

Synergy of remote sensing and UAV measurements in retrieval of vertical structure of the aerosol absorbing properties, Michal T. Chlilinski, Krzysztof M. Markowicz, Univ. of Warsaw (Poland) [9640-45]

Improvement of PM2.5 density distribution visualization system using ground-level sensor network and Mie lidar, Hiroshi Okumura, Taiga Ahaho, Yu Kojiro, Shinya Okano, Saga Univ. (Japan); Osamu Uchino, National Institute for Environmental Studies (Japan) and Meteorological Research Institute (Japan); Isamu Morino, Tatsuya Yokota, National Institute for Environmental Studies (Japan); Tomohiro Nagai, Tetsu Sakai, Takashi Maki, Akihiro Yamazaki, Meteorological Research Institute (Japan); Kohei Arai, Saga Univ. (Japan) [9640-46]

Time-series MODIS satellite and in-situ data for spatio-temporal distribution of aerosol pollution assessment over Bucharest metropolitan area, Maria A. Zoran, Roxana S. Savastru, Dan M. Savastru, National Institute of Research and Development for Optoelectronics (Romania) [9640-47]

Development of new shipborne aureolemeter to measure the intensities of direct and scattered solar radiation on rolling and pitching vessel, Hiroshi Kobayashi, Univ. of Yamanashi (Japan); Masataka Shiobara, National Institute of Polar Research (Japan) [9640-48]

WEDNESDAY 23 SEPTEMBER

OPENING REMARKS

Room: Caravelle 2 8:50 to 9:00

SESSION 1

LOCATION: CARAVELLE 2 WED 9:00 TO 12:20

Lidar, Radar, and Passive Atmospheric Measurements I

Session Chair: **Klaus Schäfer**, Karlsruher Institut für Technologie (Germany)

9:00: **Aerosol properties from combined oxygen A-band radiances and lidar (Invited Paper)**, David Winker, NASA Langley Research Ctr. (United States); Pengwang Zhai, Univ. of Maryland, Baltimore County (United States); Yongxiang Hu, NASA Langley Research Ctr. (United States) [9640-1]

9:30: **The ESA-JAXA EarthCARE clouds, aerosol and radiation explorer mission: overview and development status**, Dulce Lajas, European Space Research and Technology Ctr (Netherlands); Michael Eisinger, European Space Agency - European Centre for Space Applications and Telecommunications (ESA-ECSAT) (United Kingdom); Tobias Wehr, Robert Koopman, Alain Lefebvre, European Space Research and Technology Ctr (Netherlands); Rob Koppman, European Space Research and Technology Ctr. (Netherlands) [9640-2]

9:50: **94 GHz doppler wind radar satellite mission concept**, Chung-Chi Lin, Björn Rommen, Christopher Buck, Dirk Schüttemeyer, European Space Research and Technology Ctr. (Netherlands) [9640-3]

10:10: **Deriving aerosol properties from measurements of the Atmosphere-Surface Radiation Automatic Instrument (ASRAI)**, Hua Xu, Donghui Li, Zhengqiang Li, Xingfeng Chen, Institute of Remote Sensing and Digital Earth (China); Xiaobing Zheng, Xin Li, Anhui Institute of Optics and Fine Mechanics (China) [9640-4]

Coffee Break Wed 10:30 to 11:00

11:00: **Comparison of unfiltered Ceres radiances measured from the S-NPP and Aqua Satellites over matched sites**, Zbigniew P. Szewczyk, Science Systems and Applications, Inc. (United States) [9640-5]

11:20: **Design and performances of microcameras and photometers instruments on TARANIS satellite for an advanced characterization of transient luminous event in the upper atmosphere**, Fanny Le Mer-Dachard, Elodie Cansot, Philippe-Jean Hébert, Thomas Farges, Ctr. National d'Études Spatiales (France); Karen Ravel, SODERN (France); Stéphanie Gaillac, Bertin Technologies (France) [9640-6]

11:40: **Performance test of the synergetic use of simulated lidar and microwave radiometer observations for mixing-layer height detection**, Umar Saeed, Univ. Politècnica de Catalunya (Spain); Francesc Rocadenbosch, Univ. Politècnica de Catalunya (Spain) and Institut d'Estudis Espacials de Catalunya (Spain); Susanne Crewell, Univ. zu Köln (Germany) [9640-7]

12:00: **Use of the fragmentary spectrum registration method for Raman spectroscopy**, Alexander V. Fadeyev, Vitold E. Pozhar, Vladislav I. Pustovoi, Scientific and Technological Ctr. for Unique Instrumentation (Russian Federation) [9640-8]

Lunch/Exhibition Break Wed 12:20 to 13:30

CONFERENCE 9640 - ROOM: CARAVELLE 2

SESSION 2

LOCATION: CARAVELLE 2 WED 13:50 TO 14:30

Lidar, Radar, and Passive Atmospheric Measurements II

Session Chair: **Klaus Schäfer**,
Karlsruher Institut für Technologie (Germany)

13:50: **Doppler capable FMCW cloud detection radar**, Salih Coskun, Middle East Technical Univ. (Turkey) and ASELSAN Inc. (Turkey); Mert Celik, Middle East Technical Univ. (Turkey) and Meteksan Defense Ind. Inc. (Turkey); Ali Ozgur Yilmaz, Sencer Koc, Middle East Technical Univ. (Turkey) [9640-9]

14:10: **Preventing the saturation phenomenon of detectors used in environmental remote sensing**, Abdelkrim Kedadra, Mohammed Traïche, Ctr. de Développement des Technologies Avancées (Algeria) [9640-11]

SESSION 3

LOCATION: CARAVELLE 2 WED 14:30 TO 17:00

Remote Sensing of Clouds

Session Chair: **Evgueni I. Kassianov**,
Pacific Northwest National Lab. (United States)

14:30: **Comparing different methods to retrieve cloud top height from Meteosat satellite data**, Ilaria Tabone, Univ. degli Studi di Torino (Italy); Susana Briz, Antonio Jesus de Castro González, Univ. Carlos III de Madrid (Spain); Claudio Cassardo, Silvia Ferrarese, Roberto Cremonini, Mario Bertaina, Univ. degli Studi di Torino (Italy); Anna Anzalone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Francesco Isgrò, Univ. degli Studi di Napoli Federico II (Italy) [9640-12]

14:50: **On the reliability of satellite observations for diagnosing indirect aerosol effects**, Daniel Merk, Hartwig Deneke, Leibniz Institut für Troposphärenforschung (Germany); Bernhard Pospichal, Univ. Leipzig (Germany); Patric Seifert, Leibniz-Institut für Atmosphärenphysik e.V. (Germany) [9640-13]

15:10: **Study of the widespread haze clouds over China with A-Train satellite observations**, Minghui Tao, Liangfu Chen, Zifeng Wang, Institute of Remote Sensing and Digital Earth (China) [9640-14]

Coffee Break Wed 15:30 to 16:00

16:00: **Clouds observations with high resolution FMCW cloud profiling radar**

FALCON-A at the arctic station in Ny-Alesund, Toshiaki Takano, Yohei Kawamura, Hiroyuki Nakata, Tamio Takamura, Chiba Univ. (Japan); Masataka Shiobara, National Institute of Polar Research (Japan) [9640-15]

16:20: **Numerical modeling of polarization properties of the return signals in ground-based lidar cloud sensing**, Evgeniya G. Kablukova, Institute of Computational Mathematics and Mathematical Geophysics (Russian Federation); Boris A. Kargin, Institute of Computational Mathematics and Mathematical Geophysics (Russian Federation) and Novosibirsk State Univ. (Russian Federation); Andrey A. Lisenko, V.E. Zuev Institute of Atmospheric Optics (Russian Federation) and National Research Tomsk State Univ. (Russian Federation) [9640-16]

16:40: **Analysis of heavy precipitation caused by the vortices in the lee of the Tibetan Plateau from TRMM (the Tropical Rainfall Measuring Mission) observations**, Guoping Li, Chengdu Univ. of Information Technology (China) [9640-17]

THURSDAY 24 SEPTEMBER

SESSION 4

LOCATION: CARAVELLE 2 THU 9:00 TO 11:40

Radiative Transfer

Session Chair: **Evgueni I. Kassianov**,
Pacific Northwest National Lab. (United States)

9:00: **Characterization of optical properties, microphysical properties and vertical structure of aerosols using passive and active remote-sensing observations over the Mediterranean during the ChArMEx/ADRIMED experiment (Invited Paper)**, Marc Mallet, CNRS-Laboratoire d'Aérodologie (France) [9640-19]

9:30: **Estimation of aerosol direct radiative forcing in Barcelona and Lecce during the 2013 ADRIMED campaign**, Rubén Barragan, Univ. Politècnica de Catalunya (Spain); Salvatore Romano, Univ. del Salento (Italy); Michaël Sicard, Univ. Politècnica de Catalunya (Spain); Pasquale Burlizzi, Maria-Rita Perrone, Univ. del Salento (Italy); Adolfo Comerón, Univ. Politècnica de Catalunya (Spain) [9640-20]

9:50: **How well can we estimate areal-averaged spectral surface albedo from ground-based transmission in the Atlantic coastal area?**, Evgueni I. Kassianov, Connor Flynn, Laura Riihimäki, Duli Chand, Pacific Northwest National Lab. (United States); James Barnard, Univ. of Nevada, Reno (United States); Cristina Marinovici, Kyo-Sun Lim, Pacific Northwest National Lab. (United States) [9640-21]

10:10: **Cloud radiative characteristic parameter calculation for space-based remote sensing sensors**, Hongxia Wang, Xiaojian Xu, BeiHang Univ. (China) [9640-22]

Coffee Break Thu 10:30 to 11:00

11:00: **The thermal infrared radiance properties of dust aerosol over ocean**, Zengzhou Hao, Delu Pan, Fang Gong, Jianyu Chen, Tianyu Wang, The Second Institute of Oceanography, SOA (China) [9640-24]

11:20: **Modeling the adjacency effects in Earth observation data with different viewing geometry over mountainous area**, Cheng Jiang, Hongyan He, Yunfei Bao, China Academy of Space Technology (China) [9640-25]

Lunch Break Thu 11:40 to 13:10

SESSION 5

LOCATION: CARAVELLE 2 THU 13:10 TO 17:00

Remote Sensing of Aerosols, Trace Gases, and Meteorological Parameters

Session Chair: **Adolfo Comerón**,
Univ. Politècnica de Catalunya (Spain)

13:10: **Mixing layer height measurements determine influence of meteorology on air pollutant concentrations in urban area**, Klaus Schäfer, Thomas Blumenstock, Karlsruher Institut für Technologie (Germany); Boris Bonn, Institute for Advanced Sustainability Studies e.V. (Germany); Holger Gerwig, Umweltbundesamt (Germany); Frank Hase, Karlsruher Institut für Technologie (Germany); Christoph Münkler, Vaisala GmbH (Germany); Rainer Nothard, Senatsverwaltung für Stadtentwicklung und Umwelt (Germany); Erika von Schneidemesser, Institute for Advanced Sustainability Studies e.V. (Germany) [9640-26]

13:30: **Open-path quantum cascade laser-based system for simultaneous remote sensing of methane, nitrous oxide, and water vapor using chirped-pulse differential optical absorption spectroscopy**, Fred Moshary, NOAA-CREST (United States); Paulo C. Castillo, Brookhaven National Lab. (United States); Adrian Diaz Fortich, NOAA-CREST (United States); Abdou S. Diba, The City College of New York (United States); Benjamin P. Thomas, NOAA-CREST (United States); Barry M. Gross, NOAA-CREST (United States) and The City College of New York (United States) [9640-27]

13:50: **Impacts of surface albedo models on high-resolution AOD retrieval**, Barry M. Gross, NOAA-CREST (United States) [9640-28]

14:10: **Inclusion of high resolution MODIS maps on a 3D tropospheric water vapour GPS tomography model**, Pedro J. Benevides, João Catalão Fernandes, Univ. de Lisboa (Portugal); Giovanni Nico, Consiglio Nazionale delle Ricerche (Italy); Pedro M. A. Miranda, Univ. de Lisboa (Portugal) [9640-29]

14:30: **Intercomparison between MODIS 3km aerosol optical depth product and ground PM10 measurements over Athens-Greece**, Adríanos Retalis, Dimitris Paronis, Dimitris Katsanos, National Observatory of Athens (Greece) [9640-30]

14:50: **Remote sensing for studying atmospheric aerosols in Malaysia**, Kasturi D. Kanniah, Hui Qi Lim, Nurul Amalin Fatimah Kamarul Zaman, Univ. Teknologi Malaysia (Malaysia) [9640-31]

Coffee Break Thu 15:10 to 15:40

15:40: **Satellite and ground based seasonal variability of NO₂ and SO₂ over New Delhi, India**, Alok K. Pandey, Ram P. Kumar, Jawaharlal Nehru Univ. (India); Krishan Kumar, Jawaharlal Nehru University (India) [9640-32]

16:00: **Retrieval of aerosol optical depth from an airborne cross-track polarimeter in north China**, Zhengqiang Li, Lili Qie, Institute of Remote Sensing and Digital Earth (China); Xiaobing Sun, Bin Sun, Anhui Institute of Optics and Fine Mechanics (China) [9640-33]

16:20: **Determination of nocturnal aerosol properties from a combination of lunar photometer and lidar observations**, Donghui Li, Zhengqiang Li, Yang Lv, Ying Zhang, Kaitao Li, Hua Xu, Institute of Remote Sensing and Digital Earth (China) [9640-34]

16:40: **Estimation of air pollution in Ulaanbaatar city, Mongolia using the satellite data**, Bilguunmaa Myagmardulam, Mongolian Univ. of Science and Technology (Mongolia) [9640-35]

CONFERENCE 9641 - ROOM: SERVANTY

Tuesday 22 September 2015 • Proceedings of SPIE Vol. 9641

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); **Gregory C. Dente**, Air Force Research Lab. (United States); **Denis Dion Jr.**, Defence Research and Development Canada, Valcartier (Canada); **Stephen M. Hammel**, Space and Naval Warfare Systems Command (United States); **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); **Jim Riker**, Air Force Research Lab. (United States); **Marc J. F. Séchaud**, ONERA (France); **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)

TUESDAY 22 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: SERVANTY 8:50 TO 9:00

Karin U. Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

SESSION 1

LOCATION: SERVANTY TUE 9:00 TO 10:30

Characterization of the Environment I

Session Chair: **Karin U. Stein**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

9:00: **Overview of remote sensing activities at the Institute of Maritime Technology, South Africa** (*Invited Paper*), Willem H Gunter, IMT (South Africa) [9641-1]

9:30: **Estimation of the refraction index structure parameter C_n^2 via image analysis of a point source**, Leif Humbert, Ivo Buske, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9641-2]

9:50: **Shortwave infrared for night vision applications: illumination levels and sensor performance**, Uwe Adomeit, Jürgen Krieg, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9641-3]

10:10: **Ultimate turbulence experiment: simultaneous measurements of C_n^2 near the ground using six devices and eight methods**, Lydia I. Yatcheva, Rui Almeida de Sa Barros, Max Segel, Detlev Sprung, Erik Sucher, Christian Eisele, Szymon Gladysz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9641-4]

Coffee Break Tue 10:30 to 11:00

SESSION 2

LOCATION: SERVANTY TUE 11:00 TO 12:20

Characterization of the Environment II

Session Chair: **Karin U. Stein**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

11:00: **Influence of aerosols on atmospheric transmission at the Baltic Sea: comparison of experimental results with model simulations using MODTRAN**, Silke Vogelbacher, Detlev Sprung, Karin Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9641-5]

11:20: **The shower curtain effect paradoxes**, Gregoire Tremblay, AEREX avionique inc. (Canada); Robert Bernier, Les Instruments Optiques du St-Laurent Inc. (Canada); Gilles Roy, Defence Research and Development Canada, Valcartier (Canada) [9641-6]

11:40: **Polarimetric active imaging in dense fog**, Robert Bernier, Les Instruments Optiques du St-Laurent Inc. (Canada); Xiaoying Cao, Lidar (Canada); Gregoire Tremblay, AEREX avionique inc. (Canada); Gilles Roy, Defence Research and Development Canada, Valcartier (Canada) [9641-7]

12:00: **Effect of geometrical focusing on femtosecond laser filamentation at high altitude**, Haitao Wang, Chunhong Qiao, Honghua Huang, Chengyu Fan, Anhui Institute of Optics and Fine Mechanics (China) [9641-24]

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

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 3

LOCATION: SERVANTY TUE 13:40 TO 15:00

Laser Beam Propagation

13:40: **Investigation of dual-wavelength laser beam propagation along the in-door atmospheric path**, Vladimir Y. Venediktov, Alina V. Gorelaya, Elena V. Shubenkova, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [9641-11]

14:00: **Prediction of optical communication link availability: real-time observation of cloud patterns using a ground-based thermal infrared camera**, Clément Bertin, IRT A. de Saint Exupéry (France) and Reuniwatt (France); Sylvain Cros, Reuniwatt (France); Laurent Saint-Antonin, IRT A. de Saint Exupéry (France); Nicolas Schmutz, Reuniwatt (France) [9641-9]

14:20: **Laser beam propagation through turbulence and adaptive optics for beam delivery improvement**, Stephane Nicolas, Norwegian Defence Research Establishment (Norway) [9641-10]

14:40: **Turbulent phase noise on asymmetric two-way ground-satellite coherent optical links**, Clélia Robert, Jean-Marc Conan, ONERA (France); Peter Wolf, Observatoire de Paris (France) [9641-12]

Coffee Break Tue 15:00 to 15:30

SESSION 4

LOCATION: SERVANTY TUE 15:30 TO 16:50

Optical Systems

Session Chair: **John D. Gonglewski**, European Office of Aerospace Research and Development (United Kingdom)

15:30: **Analysis of perspective elongation for sodium laser guide star**, Feng Wang, China Academy of Engineering Physics (China) [9641-13]

15:50: **TOPTICA's robust sodium guide star laser system**, Martin Enderlein, Robin Schwerdt, Bernhard Ernstberger, Wilhelm Kaenders, TOPTICA Photonics AG (Germany); Daoping Wei, Vladimir Karpov, Wallace R. L. Clements, MPB Communications Inc. (Canada) [9641-14]

16:10: **Residual distortions caused by the size of a reference source**, Vladimir P. Lukin, V.E. Zuev Institute of Atmospheric Optics (Russian Federation) [9641-15]

16:30: **Enhanced monolithic diffraction gratings with high efficiency and reduced polarization sensitivity for remote sensing applications**, Peter Triebel, Torsten Diehl, Tobias Moeller, Carl Zeiss Microscopy GmbH (Germany); Alexandre Gatto, Alexander Pesch, Lars Erdmann, Matthias Burkhardt, Alexander Kalies, Carl Zeiss Jena GmbH (Germany) [9641-16]

CONFERENCE 9641 - ROOM: SERVANTY

SESSION 5

LOCATION: SERVANTY TUE 16:50 TO 18:10

Turbulence Deconvolution

Session Chair: **John D. Gonglewski**, European Office of Aerospace Research and Development (United Kingdom)

16:50: **Fast PSF estimation under anisoplanatic conditions**, Francisco de Asís Molina Martel, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Roberto Baena Gallé, Univ. de Barcelona (Spain); Szymon Gladysz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9641-17]

17:10: **Image enhancement methods for turbulence mitigation and the influence of different color spaces**, Claudia S. Huebner, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9641-18]

17:30: **The real-time atmospheric turbulence modeling and compensation with use of adaptive optics**, Anna Lylova, Moscow State Univ. of Mechanical Engineering (Russian Federation); Alexis Kudryashov, Moscow State Univ. of Mechanical Engineering (Russian Federation); Julia Sheldakova, Moscow State Univ. of Mechanical Engineering (Russian Federation) [9641-19]

17:50: **Bumps of the wave structure function in non-Kolmogorov turbulence**, Chunhong Qiao, Lu Lu, Pengfei Zhang, Haitao Wang, Honghua Huang, Chengyu Fan, Anhui Institute of Optics and Fine Mechanics (China) [9641-25]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>. **New optical receiving system design for portable camera lidar**, Laian Qin, Chunhong Qiao, Xiaoqin Liu, Zaihong Hou, Xu Jing, Anhui Institute of Optics and Fine Mechanics (China) [9641-8]

Flipped mode's scintillation-expression for Kolmogorov turbulence under Rytov theory, Ángel M. Fernández Alvarez, Univ. d'Angers (France) and Univ. Técnica Federico Santa María (Chile) and Pontificia Univ. Católica de Valparaíso (Chile); Darío G. Pérez, Pontificia Univ. Católica de Valparaíso (Chile); Régis Barillé, Univ. d'Angers (France) [9641-21]

Measurements of parabolic mirrors aberrations in hyperspectral microscope, Anna Lylova, Moscow State Univ. of Mechanical Engineering (Russian Federation); Sergey Kalenkov, Moscow State Univ. of Mechanical Engineering (Russian Federation); Alexander Shtanko, Moscow State Univ. of Mechanical Engineering (Russian Federation); Julia Sheldakova, Moscow State Univ. of Mechanical Engineering (Russian Federation) [9641-22]

Airborne experiment results for spaceborne atmospheric synchronous correction system, Wenyu Cui, Weining Yi, Lili Du, Xiao Liu, Anhui Institute of Optics and Fine Mechanics, CAS (China) [9641-23]

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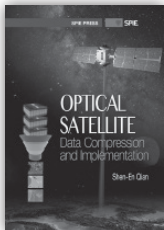
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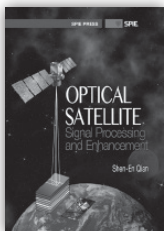
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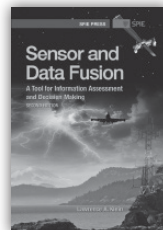
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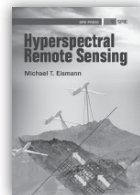
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CONFERENCE 9642 - ROOM: GUILLAUMET 2

Wednesday - Thursday 23-24 September 2015 • Proceedings of SPIE Vol. 9642

SAR Image Analysis, Modeling, and Techniques

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)

Programme Committee: **Richard Bamler**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Fabio Bovenga**, CNR ISSIA (Italy); **Fabio Covelto**, 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); **Linda E. Marchese**, INO (Canada); **Antonio Moccia**, Univ. degli Studi di Napoli Federico II (Italy); **Francesco Nirchio**, Agenzia Spaziale Italiana (Italy); **Luca Pasolli**, EURAC research (Italy); **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)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

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An efficient despeckling method for SAR images using combined NSCT and SWT transforms, Soumya Ourabia, Youcef Smara, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria) [9642-14]

A new MIMO SAR system based on Alamouti space-time coding scheme and OFDM-LFM waveform design, Xiaojin Shi, National Space Science Ctr. (China) [9642-23]

Spatial-temporal heterogeneity of land subsidence evolution in Beijing based on InSAR and cluster analysis, Yinghai Ke, Yingchen Li, Zeng Deng, Dan Li, Capital Normal Univ. (China) [9642-25]

Refocusing of ground moving targets for range migration algorithm in FMCW SAR, Pu Cheng, Qin Xin, Zhan Wang, Jianwei Wan, National Univ. of Defense Technology (China) [9642-26]

Classification accuracy of urban LULC map based on SAR dual polarimetric data, Ahmed I. Ramzi, National Authority for Remote Sensing and Space Sciences (Egypt) [9642-27]

A comparison of feature extraction methods for Sentinel-1 images: Gabor and Weber Transforms, Mihaela Stan, Anca-Andreea Popescu, Dan Alexandru Stoichescu, Univ. Politehnica of Bucharest (Romania) [9642-28]

Estimation of physical and inorganic chemical indicators of water quality by using SAR images, Muntadher A. Shareef, Abdelmalek Toumi, Ali Khenchaf, Ecole Nationale Supérieure de Techniques Avancées Bretagne (France) [9642-29]

Speckle filtering in PolSAR images by bilateral distance, Souhila Boutarfa, National High School of Technology (ENST) (Algeria) and Univ. des Sciences et de la Technologie Houari Boumediene (Algeria); Youcef Smara, Lamia Bensalem, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria) [9642-30]

Robust optical and SAR multisensor image registration, Yingdan Wu, Hubei Univ. of Technology (China); Hongxiao Zheng, Zhongwei Surveying and Planning Information Engineering Co., Ltd. (China); Yang Ming, CCCC Second Highway Consultants Co., Ltd. (China) [9642-31]

Modeling algorithm for SAR image based on fluctuations of echo signal of the Earth's surface, Vadim Nenashv, Alexander Shepeta, Saint-Petersburg State Univ. of Aerospace Instrumentation (Russian Federation) [9642-32]

Extraction of building areas from high-resolution SAR images based on tensor locality preserving projection, Bo Cheng, Institute of Remote Sensing and Digital Earth (China) [9642-33]

Effect of Faraday rotation angle and the orientation angle on the polarimetric decomposition, Houda Latrache, Mounira Ouarzeddine, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria) [9642-34]

A methodology for outperforming filtering results in the interferometric process, Vassilia Karathanassi, Arlinda Saqellari-Likoka, National Technical Univ. of Athens (Greece) [9642-35]

Monitoring of "urban villages" in Shenzhen, China from high-resolution GF-1 and TerraSAR-X data, Chunzhu Wei, Thomas Blaschke, Univ. Salzburg (Austria) [9642-36]

Comparison of SAR image segmentation by Gaussian and Rayleigh mixture models, Emre Akyilmaz, Middle East Technical Univ. (Turkey) and SDT Uzay & Savunma Teknolojileri (Turkey); Ugur M. Leloglu, Middle East Technical Univ. (Turkey) [9642-38]

WEDNESDAY 23 SEPTEMBER

OPENING REMARKS

LOCATION: GUILLAUMET 2 8:30 TO 8:40

SESSION 1

LOCATION: GUILLAUMET 2 WED 8:40 TO 10:00

SAR Application I

Session Chair: **Simonetta Paloscia**, Istituto di Fisica Applicata Nello Carrara (Italy)

8:40: **Multitemporal retrieval of soil moisture from SMAP radar data**, Fabio Fascetti, Nazzareno Pierdicca, Sapienza Univ. di Roma (Italy); Luca Pulvirenti, CIMA Research Foundation (Italy) and Sapienza Univ. di Roma (Italy) . . . [9642-1]

9:00: **Application of machine learning algorithms for soil moisture retrieval in view of the future EPS-SGA mission**, Emanuele Santi, Simonetta Paloscia, Simone Pettinato, Istituto di Fisica Applicata Nello Carrara (Italy); Felix Greifeneder, Claudia Notarnicola, EURAC (Italy); Wolfgang Wagner, Sebastian Hahn, Mariette Vreugdenhil, Christoph Reimer, Technische Univ. Wien (Austria) [9642-2]

9:20: **Large area robust identification of snow cover from multitemporal COSMO-SkyMed images**, Simone Pettinato, Emanuele Santi, Simonetta Paloscia, Bruno Aiuzzi, Stefano Baronti, Istituto di Fisica Applicata Nello Carrara (Italy); Enrico Palchetti, Istituto di Fisica Applicata "Nello Carrara" (Italy); Andrea Garzelli, Univ. degli Studi di Siena (Italy) [9642-3]

9:40: **Land-cover classification in SAR Images using dictionary learning**, Gizem Aktas, Fatih Nar, Çagdas Bak, Nigar ?en, SDT Uzay & Savunma Teknolojileri (Turkey) [9642-4]

Coffee Break Wed 10:00 to 10:30

SESSION 2

LOCATION: GUILLAUMET 2 WED 10:30 TO 12:20

SAR Application II

Session Chair: **Emanuele Santi**, Istituto di Fisica Applicata Nello Carrara (Italy)

10:30: **Cosmo-SkyMed and RADARSAT image investigation for the monitoring of agricultural areas (Invited Paper)**, Simonetta Paloscia, Simone Pettinato, Emanuele Santi, Istituto di Fisica Applicata Nello Carrara (Italy); Claudia Notarnicola, Felix Greifeneder, Giovanni Cuozzo, EURAC (Italy); Irene Nicolini, B. Demir, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) . . [9642-5]

11:00: **The contribution of ALOS PALSAR data for land cover mapping in central Kalimantan, Indonesia**, Yan Gao, Univ. Nacional Autónoma de México (Mexico); Kazuyo Hirose, Japan Space Systems (Japan); Mitsuru Osaki, Hokkaido Univ. (Japan) [9642-6]

11:20: **Multitemporal intensity and coherence analysis of SAR images for land cover change detection on the Island of Crete**, Elena Nikolaeva, Olga Sykioti, Panagiotis Elias, Charalambos C. Kontoes, National Observatory of Athens (Greece) [9642-7]

11:40: **MODIS VCF data (2000 - 2010) for deforestation and forest degradation hotspots detection and its validation with multi-temporal Landsat TM and ALOS PALSAR data**, Yan Gao, Jean Francois Mas, Univ. Nacional Autónoma de México (Mexico); Kazuyo Hirose, Japan Space Systems (Japan); Mitsuru Osaki, Hokkaido Univ. (Japan) [9642-8]

12:00: **Canonical Huynen decomposition of radar targets**, Dong Li, Yunhua Zhang, Ctr. for Space Science and Applied Research (China) [9642-9]

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

CONFERENCE 9642 - ROOM: GUILLAUMET 2

SESSION JS1

LOCATION: GUILLAUMET 2 WED 13:40 TO 15:20

Joint Session 1: SAR Data Processing I

Session Chair: **Lorenzo Bruzzone**, Univ. degli Studi di Trento (Italy)

Joint Session of Conference 9642 and Conference 9632

13:40: **Understanding target delineation using simple probabilistic modelling**, Christopher J. Willis, BAE Systems (United Kingdom) [9643-46]

14:00: **Reducing scalloping in synthetic aperture radar images using a composite image transform**, Knut Landmark, Norwegian Defence Research Establishment (Norway); Anne H. S. Solberg, Univ. I Oslo (Norway) . . . [9643-47]

14:20: **Curvelet-based compressive sensing for InSAR raw data**, Marcello G. Costa, Marcelo S. da Silva Pinho, David Fernandes, Instituto Tecnológico de Aeronáutica (Brazil) [9643-48]

14:40: **Modelling backscattering of adjacent buildings in VHR SAR images for complex urban area analysis**, Davide Pirrone, Francesca Bovolo, Fondazione Bruno Kessler (Italy); Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) [9643-49]

15:00: **Azimuth sidelobe suppression technique for near-field MIMO radar imaging**, Yongze Liu, Xiaojian Xu, BeiHang Univ. (China) [9643-50]

Coffee Break Wed 15:20 to 15:50

SESSION JS2

LOCATION: GUILLAUMET 2 WED 15:50 TO 17:10

Joint Session 2: SAR Data Processing II

Session Chair: **Claudia Notarnicola**, EURAC (Italy)

Joint Session of Conference 9642 and Conference 9643

15:50: **Implementation of a fast-time domain processor for FMCW Synthetic Aperture Radar data**, Max Frioud, Univ. of Zürich (Switzerland); Peter Wellig, Armaturesuisse (Switzerland); Stephan Stanko, Fraunhofer FHR (Germany); Erich H. Meier, Univ. of Zürich (Switzerland) [9642-10]

16:10: **An object oriented approach to detect earthquake damage in urban area: application to Cosmo SkyMed imagery of L'Aquila earthquake**, Roberta Anniballe, Sapienza Univ. di Roma (Italy); Marco Chini, Luxembourg Institute of Science and Technology (Luxembourg); Nazzareno Pierdicca, Sapienza Univ. di Roma (Italy); Christian Bignami, Salvatore Stramondo, Istituto Nazionale di Geofisica e Vulcanologia (Italy); Fabrizio Noto, METIS S.r.l. (Italy); Tanya Scalia, D'Appolonia Rome (Italy); Antonio Martinelli, Antonio Mannella, CNR Istituto per le Tecnologie della Costruzione (Italy) [9642-11]

16:30: **On the geolocation accuracy of COSMO-SkyMed products**, Davide O. Nitti, Raffaele Nutricato, GAP S.r.l. (Italy); Rino Lorusso, Nunzia Lombardi, Agenzia Spaziale Italiana (Italy); Fabio Bovenga, CNR ISSIA (Italy); Maria F. Bruno, Maria T. Chiaradia, Politecnico di Bari (Italy); Giovanni Milillo, Agenzia Spaziale Italiana (Italy) [9642-12]

16:50: **Visual analytics for semantic queries of TerraSAR-X image content**, Daniela Espinoza-Molina, Kevin Alonso, Mihai P. Datcu, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9642-13]

THURSDAY 24 SEPTEMBER

SESSION 3

LOCATION: GUILLAUMET 2 THU 8:40 TO 10:00

SAR Interferometry

Session Chair: **Fabio Bovenga**, CNR ISSIA (Italy)

8:40: **Detection of land subsidence at natural gas extraction sites using Persistent Scatterer Interferometry**, Andre C. Kalia, Michaela Frei, Thomas Lege, Bundesanstalt für Geowissenschaften und Rohstoffe (Germany) [9642-15]

9:00: **Sparsity driven autofocus for multipass SAR tomography**, Fiona Muirhead, Bernard Mulgrew, Iain H. Woodhouse, The Univ. of Edinburgh (United Kingdom); David Greig, Selex ES (United Kingdom) [9642-16]

9:20: **An integrated remote sensing approach for landslide susceptibility mapping at the volcanic islands of Vulcano and Lipari (Eolian Island, Italy)**, Maria Marsella, Silvia Scifoni, Sapienza Univ. di Roma (Italy); José A. Palenzuela Baena, Univ. de Granada (Spain); Susi Pepe, Eugenio Sansosti, Giuseppe Solaro, Piero Tizzani, Istituto per il Rilevamento Elettromagnetico dell'Ambiente (Italy) [9642-17]

9:40: **The PSIG procedure to Persistent Scatterer Interferometry (PSI) using X-band and C-band Sentinel-1 data**, María Cuevas-González, Michele Crossetto, Núria Devanthéry, Oriol Monserrat, Ctr. Tecnològic de Telecomunicacions de Catalunya (Spain); Bruno Crippa, Univ. degli Studi di Milano (Italy) [9642-18]

Coffee Break Thu 10:00 to 10:30

SESSION 4

LOCATION: GUILLAUMET 2 THU 10:30 TO 12:10

SAR Processing and Interferometry

Session Chair: **Nazzareno Pierdicca**, Sapienza Univ. di Roma (Italy)

10:30: **Analysis of the geometric accuracy of spaceborne SAR systems**, Carlos Villamil Lopez, Rainer Speck, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9642-19]

10:50: **Multitemporal SAR interferometry for landslide analysis: requirements and prospects from recent satellite missions**, Fabio Bovenga, Alberto Refice, Guido Pasquariello, CNR ISSIA (Italy); Raffaele Nutricato, Davide O. Nitti, GAP S.r.l. (Italy); Janusz Wasowski, Consiglio Nazionale delle Ricerche (Italy) [9642-20]

11:10: **Advanced DInSAR analysis for building damage assessment in large urban areas: an application to the city of Roma, Italy**, Maria Marsella, Peppe J. V. D'Aranno, Silvia Scifoni, Marianna Scutti, Alberico Sonnessa, Sapienza Univ. di Roma (Italy); Stefania Arangio, Stronger S.r.l. (Italy); Manuela Bonano, Istituto per il Rilevamento Elettromagnetico dell'Ambiente (Italy) [9642-21]

11:30: **Interferometric SAR imaging by transmitting stepped frequency chaotic noise signals**, Yunhua Zhang, Xiang Gu, Xiao Dong, Wenshuai Zhai, Xiaojin Shi, Xueyan Kang, Ctr. for Space Science and Applied Research (China) [9642-22]

11:50: **Extraction of building areas from high-resolution SAR images based on tensor locality preserving projection**, Bo Cheng, Institute of Remote Sensing and Digital Earth (China) [9642-33]

Lunch Break Thu 12:10 to 13:00

SESSION 5

ROOM: GUILLAUMET 2 THU 13:10 TO 15:00

Tutorial: Introduction to SAR Interferometry for Ground Motion Analysis

Fabio Bovenga, National Research Council, ISSIA (Italy)

Synthetic aperture radar (SAR) multi-temporal interferometry (MTI) is one of the most promising satellite-based remote sensing techniques for promoting new research opportunities on ground instability hazards caused by e.g., landsliding, subsidence, active faulting. MTI is attractive because it can provide millimetric precision measurements of slow ground surface displacements over large areas (<1000 km²) with limited vegetation cover.

Nowadays, interferometric SAR datasets are available from either historical archive (ex. ERS-1/2, ENVISAT) or satellite operational missions, acquired with different wavelengths, spatial resolutions, look angles, and polarizations. MTI processing algorithms are continuously evolving according to the new SAR data characteristics which open new application opportunities.

The tutorial introduces the theoretical aspects of radar interferometry and the basics of MTI processing, and provides examples of applications to ground surface motion detection and monitoring, as detailed in the following:

- Introduction to Synthetic Aperture RADAR (SAR) satellite system: Range and Azimuth resolution, scattering mechanisms (speckle noise, layover, foreshortening and shadow effects), acquisition modes, satellite missions and SAR data availability.

- Theoretical basis of SAR Interferometry (InSAR): SAR principles, InSAR acquisition configurations, InSAR phase content (height, displacements) and noise (coherence and error sources), processing steps.

- Multi-temporal Interferometry (MTI): coherent target detection, processing schemes (Persistent Scatterers, SBAS and similar), measurement precision and limitations (number of images, deformation model, aliasing, geometrical distortions).

- Examples of InSAR applications to ground surface motion detection and monitoring.

- InSAR satellite missions: past, present, future, L/C/X band sensors.

The tutorial is addressed also to researchers without advanced knowledge in SAR interferometry.

CLOSING REMARKS

LOCATION: GUILLAUMET 2 15:00 TO 15:10

CONFERENCE 9643 - ROOM: ARIANE 1

Monday - Wednesday 21-23 September 2015 • Proceedings of SPIE Vol. 9643

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 Valencia (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'Études 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 21 SEPTEMBER

OPENING REMARKS

Room: Ariane 1 8:45 to 8:50

SESSION 1

LOCATION: ARIANE 1 MON 8:50 TO 10:10

Remote Sensing Missions, Techniques, and Products

Session Chair: **Lorenzo Bruzzone**, Univ. degli Studi di Trento (Italy)

8:50: **Bulk processing of the Landsat MSS/TM/ETM+ archive of the European Space Agency**, Roberto Biasutti, Ferran Gascon, Peggy Fischer, Bianca Hoersch, European Space Agency (Italy); Marco Meloni, Alessandra Paciucci, Serco SpA (Italy); Luca Galli, Sergio Mica, Advanced Computer Systems S.p.A. (Italy); Amy Northrop, Samantha Lavender, Telespazio Vega UK (United Kingdom); Sébastien Saunier, Magellium (France) [9643-6]

9:10: **Star-based defocus computing technique for PLEIADES-HR satellites**, Virginie Amberg, Ctr. National d'Études Spatiales (France); Laurent Bernard, Magellium (France); Christophe Latry, Ctr. National d'Études Spatiales (France) [9643-7]

9:30: **ScaRaB: first results of absolute and cross calibration**, Thierry L. Trémas, Ctr. National d'Études Spatiales (France); Ouahid Aznan, CS Systèmes d'information (France); Michel Dejup, Ctr. National d'Études Spatiales (France); Olivier Chomette, Lab. de Météorologie Dynamique (France) [9643-8]

9:50: **End-to-end performance analysis using engineering confidence models and a ground processor prototype**, Klaus Kruse, Maximilian Sauer, Thomas Jäger, Michael Schmitt, Markus Huchler, Airbus Defence and Space (Germany); Kotska Wallace, Arnaud Helière, Michael Eisinger, Alain Lefebvre, European Space Agency (Netherlands); Mat Maher, Mark Chang, Traqcy Phillips, Surrey Satellite Technology Ltd. (United Kingdom); Bryan T. G. de Goeij, Frits van der Knaap, Adriaan Van't Hof, TNO (Netherlands) [9643-9]

Coffee Break Mon 10:10 to 10:40

SESSION 2

LOCATION: ARIANE 1 MON 10:40 TO 12:20

Sentinel-2 Mission

Session Chair: **Jordi Inglada**, Ctr. d'Études Spatiales de la Biosphère (France)

10:40: **Sentinel-2 geometric image quality commissioning: first results**, Florie Languille, Cécile Dechoz, Angélique Gaudel, Daniel Greslou, Françoise de Lussy, Thierry Trémas, Ctr. National d'Études Spatiales (France); Claudia Isola, Philippe Martimort, European Space Research and Technology Ctr. (Netherlands); Vincent Poulain, Thales Services (France) [9643-1]

11:00: **MACCS : Multi-Mission Atmospheric Correction and Cloud Screening tool for high-frequency revisit data processing**, Beatrice Petrucci, Mireille Huc, Ctr. National d'Études Spatiales (France); Thomas Feuvrier, Caroline Ruffel, CS Systèmes d'information (France); Olivier Hagolle, Vincent Lonjou, Camille Desjardins, Ctr. National d'Études Spatiales (France) [9643-2]

11:20: **The ground prototype processor: Level-1 production during Sentinel-2 in-orbit acceptance**, Beatrice Petrucci, Cécile Dechoz, Sophie Lachéradé, Céline L'Helguen, Ctr. National d'Études Spatiales (France); Cécile Picard, Thales Services (France); Jean-Louis Raynaud, Julien Nosavan, Ctr. National d'Études Spatiales (France); Amandine Rolland, Thales Services (France); Thierry L. Trémas, Ctr. National d'Études Spatiales (France); Claudia Isola, Philippe Martimort, François Spoto, European Space Research and Technology Ctr. (Netherlands) [9643-3]

11:40: **Sentinel-2A: presentation of the CAL/VAL commissioning phase, first images**, Thierry L. Trémas, Cécile Dechoz, Sophie Lachéradé, Julien Nosavan, Beatrice Petrucci, Ctr. National d'Études Spatiales (France); Claudia Isola, Philippe Martimort, European Space Research and Technology Ctr. (Netherlands) [9643-4]

12:00: **Sentinel-2 global reference image**, Cécile Dechoz, Florie Languille, Ctr. National d'Études Spatiales (France); Stéphane Massera, Institut Géographique National (France); Angélique Gaudel, Ctr. National d'Études Spatiales (France); Vincent Poulain, Thales Services (France); Céline L'Helguen, Ctr. National d'Études Spatiales (France); Cécile Picard, Thales Services (France); Philippe Martimort, Claudia Isola, European Space Agency (Netherlands); Thierry Trémas, Ctr. National d'Études Spatiales (France) [9643-5]

Lunch Break Mon 12:20 to 13:40

SESSION 3

LOCATION: ARIANE 1 MON 13:40 TO 15:20

Image Enhancement and Filtering

Session Chair: **Andrea Garzelli**, Univ. degli Studi di Siena (Italy)

13:40: **Multiscale statistical image destriping algorithm**, Vincent Martin, Ctr. National d'Études Spatiales (France); Arnaud Kelbert, Thales Services (France) [9643-11]

14:00: **Noise correlation-based adaptive polarimetric image representation for contrast enhancement of a polarized beacon in fog**, Swapnesh Panigrahi, Julien Fade, Mehdi Alouini, Institut de Physique de Rennes (France) [9643-12]

14:20: **Performance prediction for 3D filtering of multichannel images**, Oleksii S. Rubel, Ruslan A. Kozhemiakin, Sergey K. Abramov, Vladimir V. Lukin, National Aerospace Univ. (Ukraine); Benoit Vozel, Kacem Chehdi, Univ. de Rennes 1 (France) [9643-13]

14:40: **Advanced signal processing based on support vector regression for lidar applications**, Michela Gelfusa, Univ. degli Studi di Roma "Tor Vergata" (Italy); Andrea Murari, Consorzio RFX-Association EURATOM-ENEA (Italy); Andrea Malizia, Michele Lungaroni, Emmanuele Peluso, Stefano Parracino, Univ. degli Studi di Roma "Tor Vergata" (Italy); Saeed Talebzadeh, Univ. degli Studi di Roma Tor Vergata (Italy); Jesus Vega, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Pasqualino Gaudio, Univ. degli Studi di Roma "Tor Vergata" (Italy) [9643-14]

15:00: **An improved mutual information similarity measure for registration of multimodal remote sensing images**, Maha Shadaydeh, Tamás Szirányi, Hungarian Academy of Sciences (Hungary) [9643-15]

Coffee Break Mon 15:20 to 16:00

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Remote Sensing 2015

For details, please see special events section in the printed programme or visit <http://spie.org/remote-sensing-europe.xml>

CONFERENCE 9643 - ROOM: ARIANE 1

TUESDAY 22 SEPTEMBER

SESSION 4

LOCATION: ARIANE 1 TUE 8:30 TO 10:10

Hyperspectral Image Analysis I

Session Chair: **Donatella Guzzi**,
Istituto di Fisica Applicata Nello Carrara (Italy)

8:30: **Automatic estimation of noise model parameters in hyperspectral images using probabilistic region growing**, Can Demirkesen, TÜBITAK UZAY (Turkey); Ugur M. Leloglu, Middle East Technical Univ. (Turkey) [9643-16]

8:50: **Using hyperspectral image enhancement method for small size object detection on the sea surface**, Lu Yan, Masahiro Yamaguchi, Tokyo Institute of Technology (Japan); Naoki Noro, Yohei Takara, Fuminori Ando, EBA Japan Co., Ltd. (Japan) [9643-17]

9:10: **A new method for spatial resolution enhancement of hyperspectral images using sparse coding and linear spectral unmixing**, Zahra Hashemi, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of); Azam Karami, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of) and Univ. Antwerp (Belgium) [9643-18]

9:30: **Development of Bayesian-based transformation method of Landsat imagery into pseudo-hyperspectral imagery**, Nguyen Tien Hoang, Kyoto Univ. Graduate School of Engineering (Japan) and Hue Univ. (Viet Nam); Katsuaki Koike, Kyoto Univ. Graduate School of Engineering (Japan) [9643-19]

9:50: **Striping noise mitigation: performance evaluation on real and simulated hyperspectral images**, Donatella Guzzi, Cinzia Lastrì, Vanni Nardino, Ivan Pippi, Valentina Raimondi, Istituto di Fisica Applicata Nello Carrara (Italy); Alessandro Barducci, SOFASI S.R.L. (Italy) [9643-20]

Coffee Break Tue 10:10 to 10:40

SESSION 5

LOCATION: ARIANE 1 TUE 10:40 TO 12:20

Hyperspectral Image Analysis II

Session Chair: **Begüm Demir**, Univ. degli Studi di Trento (Italy)

10:40: **Low-dimensional representations of hyperspectral data for use in CRF-based classification**, Yang Hu, Nathan D. Cahill, Sildomar T. Monteiro, Eli Saber, Rochester Institute of Technology (United States) [9643-21]

11:00: **Unsupervised hierarchical partitioning of hyperspectral images: application to marine algae identification**, Baiyang Chen, EDF Recherche & Développement (France) and Univ. de Rennes 1 (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) [9643-22]

11:20: **Hyperspectral anomaly detection method based on autoencoder**, Emre Can Bati, Akin Çalı?kan, Alper Koz, Aydin A. Alatan, Middle East Technical Univ. (Turkey) [9643-23]

11:40: **Post-processing for improving hyperspectral anomaly detection accuracy**, Jee-Cheng Wu, Chi-Ming Jiang, Chen-Liang Huang, National Ilan Univ. (Taiwan) [9643-24]

12:00: **Hyperspectral classification with reduced bands by using HMM and entropy**, Samir Y. W. Arabi, Instituto Federal de Educação, Ciência e Tecnologia de Goiás (Brazil) and Instituto Tecnológico de Aeronáutica (Brazil); David Fernandes, Instituto Tecnológico de Aeronáutica (Brazil); Marco A. Pizarro, Instituto Nacional de Pesquisas Espaciais (Brazil) [9643-25]

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

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 6

LOCATION: ARIANE 1 TUE 13:40 TO 15:20

Image Classification

Session Chair: **Lorenzo Bruzzone**, Univ. degli Studi di Trento (Italy)

13:40: **Feature learning for multilabel land cover classification**, Konstantinos T. Karalas, Technical Univ. of Crete (Greece) and Foundation for Research & Technology-Hellas (Greece); Grigorios Tsagkatakis, Foundation for Research and Technology-Hellas (Greece); Michalis Zervakis, Technical Univ. of Crete (Greece); Panagiotis Tsakalides, Foundation for Research and Technology-Hellas (Greece) and Univ. of Crete (Greece) [9643-26]

14:00: **Compressed histogram attribute profiles for the classification of VHR remote sensing images**, Romano Battiti, Begüm Demir, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) [9643-27]

14:20: **Multipath sparse coding for scene classification in very high resolution satellite imagery**, Jiayuan Fan, Hui Li Tan, Shijian Lu, Institute for Infocomm Research (Singapore) [9643-28]

14:40: **Correlation between segmentation evaluation metrics and land cover classification accuracy according to different input imagery**, Andreja Vab Lenar?i?, Nata?a ?uri?, Slovenian Ctr. of Excellence for Space Sciences and Technologies (Slovenia); Klemen Ritlop, Univ. of Ljubljana (Slovenia); Klemen ?otar, Slovenian Ctr. of Excellence for Space Sciences and Technologies (Slovenia); Kri?tof O?tir, Research Ctr. of the Slovenian Academy of the Sciences and Arts (Slovenia) and Slovenian Ctr. of Excellence for Space Sciences and Technologies (Slovenia) [9643-29]

15:00: **SMV: an algorithm to calculate the simplex of maximal volume in Rⁿ based upon Gram-Schmidt process**, Jairo Salazar, Ctr. de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (Mexico); Andres Mendez, Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (Mexico) [9643-30]

Coffee Break Tue 15:20 to 15:50

SESSION 7

LOCATION: ARIANE 1 TUE 15:50 TO 17:30

Data Fusion

Session Chair: **Andrea Garzelli**, Univ. degli Studi di Siena (Italy)

15:50: **Are spectral or spatial methods better for pansharpening? An evaluation for four sample methods based on spatial modulation of pixel spectra**, Andrea Garzelli, Univ. degli Studi di Siena (Italy); Luciano Alparone, Univ. degli Studi di Firenze (Italy); Gemine Vivone, STO-CMRE (Italy) . . [9643-31]

16:10: **Potential accuracy of translation estimation between radar and optical 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) [9643-32]

16:30: **Multiresolution fusion of radar sounder and altimeter data for the generation of high resolution DEMs of ice sheets**, Ana-Maria Ilisei, Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) [9643-33]

16:50: **Local hyperspectral data multisharpening based on linear/linear-quadratic nonnegative matrix factorization by integrating lidar data**, Fatima Zohra F. Benhalouche, Univ. Des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Algeria) and Institut de Recherche en Astrophysique et Planétologie (France); Moussa Sofiane Karoui, Univ. Des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Algeria) and Ctr. National des Techniques Spatiales (Algeria) and Institut de Recherche en Astrophysique et Planétologie (France); Yannick Deville, Institut de Recherche en Astrophysique et Planétologie (France); Abdelaziz Ouamri, Univ. Des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Algeria) [9643-34]

17:10: **An approach for combining aerial lidar and high-resolution imagery using Gaussian processes**, Yansong Liu, Sildomar T. Monteiro, Eli Saber, Rochester Institute of Technology (United States) [9643-35]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Enhancement on spotlight COSMO-SkyMed SAR products, Rino Lorusso, Agenzia Spaziale Italiana (Italy) and Univ. degli Studi della Basilicata (Italy); Giovanni Milillo, Agenzia Spaziale Italiana (Italy) [9643-10]

Error analysis of remote sensing image field stitching based on virtual focal plane, Chunyu Yue, Hongyan He, Yunfei Bao, Kun Xing, Nan Zhou, Beijing Institute of Space Mechanics and Electricity (China) [9643-51]

- Designing an efficient LT-code with unequal error protection for image transmission**, Fabio da Silva Marques, Ctr. Federal de Educação Tecnológica de Goiás (Brazil) and Instituto Tecnológico de Aeronáutica (Brazil); Christof Schwartz, Marcelo S. da Silva Pinho, Instituto Tecnológico de Aeronáutica (Brazil); Weiler A. Finamore, UFJF (Brazil) [9643-52]
- Unsupervised and stable LBG algorithm for data classification: application on aerial multicomponent images**, Akar Taher, Koya Univ. (Iraq) and Univ. de Rennes 1 (France); Kacem Chehdi, Claude Cariou, Univ. de Rennes 1 (France) [9643-54]
- Lossy compression of hyperspectral images using shearlet transform and 3D SPECK**, Azam Karami, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of) [9643-55]
- An image matching method based on closed edges incorporated with vertex angles**, Baoming Zhang, Xiaowei Chen, Jun Lu, Zhihui Gong, Haitao Guo, Zhengzhou Institute of Surveying and Mapping (China) [9643-56]
- Fast geometric processing for unmanned aerial vehicle images of large area**, Haitao Guo, Baoming Zhang, Jun Lu, Chunxue Jiang, Junfeng Xu, Zhengzhou Institute of Surveying and Mapping (China) [9643-57]
- Size-varying small target detection for infrared image processing**, Miao Li, Ran Zhu, YunLi Long, Wei An, Yiyu Zhou, National Univ. of Defense Technology (China) [9643-58]
- Remote sensing in the categorization of the urban sprawl in metropolitan zones**, Omar Ortiz Meraz, Clemencia Santos Cerquera, Univ. Nacional Autónoma de México (Mexico) [9643-59]
- Semi-auto assessment system on building damage caused by landslide disaster with high-resolution satellite and aerial images**, Bo Sun, Qihua Xu, Jun He, Fengxiang Ge, Ying Wang, Beijing Normal Univ. (China) [9643-60]
- The research of land covers classification based on waveform features correction of full-waveform lidar**, Mei Zhou, Academy of Opto-Electronics (China); Meng H. Liu, Zheng Zhang, Lian Ma, Hui Jing Zhang, Academy of Opto-Electronics (China) and Chinese Academy of Sciences (China) [9643-61]
- Mapping the urban area extent with a nighttime imagery of OLS and ISS**, Andrzej Z. Kotarba, Sebastian R. Aleksandrowicz, Space Research Ctr. (Poland) [9643-62]
- A PSF equalization technique for the Multi-Order Solar Extreme-ultraviolet Spectrograph (MOSES)**, Shane Atwood, Charles C. Kankelborg, Montana State Univ. (United States) [9643-63]
- A novel scheme for automatic nonrigid image registration using deformation invariant feature and geometric constraint**, Zhipeng Deng, Lin Lei, Shilin Zhou, National Univ. of Defense Technology (China) [9643-64]
- A fast sparse unmixing method for hyperspectral images using iterative detection and estimation**, Mohammad Saleh Hasani, Azam Karami, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of) [9643-65]
- A new polarimetric active radar calibrator and calibration technique**, Jianguo Tang, Xiaojian Xu, BeiHang Univ. (China) [9643-66]
- A landmark matching algorithm using the improved generalised Hough transform**, Binbin Chen, Xin-Pu Deng, National Univ. of Defense Technology (China) [9643-67]
- A hyperspectral imagery anomaly detection algorithm based on local three-dimensional orthogonal subspace projection**, Xing Zhang, Gongjian Wen, National Univ. of Defense Technology (China) [9643-68]
- Lossy compression of hyperspectral images using block coordinate descent search and compress sensing methods**, Shirin Hassanzadeh, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of); Azam Karami, Shahid Bahonar Univ. of Kerman (Iran, Islamic Republic of) and Univ. Antwerp (Belgium) [9643-69]
- Fusion of multispectral satellite images by using IHS and local fractal dimension**, Mohamed Khider, Soumya Ourabia, Youcef Smara, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria) [9643-70]
- Local correlation tracking to recover doppler shifts from solar observations with an EUV slitless spectrograph**, Hans T. Courrier, Charles C. Kankelborg, Montana State Univ. (United States) [9643-71]
- Colored coded-apertures for spectral image unmixing**, Hector M. Vargas, Henry Arguello, Univ. Industrial de Santander (Colombia) [9643-72]
- Calibration of mirror angle error for hyper spectral imagery with motion compensation model**, Zhiwen Liu, Hei Baoqing, Chinese Academy of Sciences (China) [9643-73]
- Small target detection based on human visual system utilizing distance information**, Linna Yang, Wei An, Zai-ping Lin, An-dong Li, National Univ. of Defense Technology (China); Jundu Ye, Xi'an satellite control center (China) [9643-75]
- Self-adaptive infrared small target detection in compressive domain**, An-dong Li, Zai-ping Lin, Wei An, Linna Yang, National Univ. of Defense Technology (China) [9643-76]
- Accurate multisource forest species mapping using the multiple spectral-spatial classification approach**, Dimitris G. Stavrakoudis, Ioannis Z. Gitas, Christos G. Karydas, Aristotle Univ. of Thessaloniki (Greece); Polychronis Kolokoussis, Vassilia Karathanassi, National Technical Univ. of Athens (Greece) [9643-77]
- Introduction of a generic INR architecture and its ultimate form**, Handol Kim, Korea Aerospace Research Institute (Korea, Republic of) [9643-78]
- Space-based infrared scanning sensor LOS determination and calibration using star observation**, Jun Chen, Zhan Xu, Xin-Pu Deng, Wei An, Jun-Gang Yang, National Univ. of Defense Technology (China) [9643-79]
- A study of selected textural features usefulness for impervious surface coverage estimation using Landsat images**, Katarzyna K. Bernat, Wojciech Drzewiecki, AGH Univ. of Science and Technology (Poland) [9643-80]
- Unsupervised change detection from multitemporal SAR images based on a detail preserving approach and a robust threshold estimation**, Boulerbah Chabira, Takieddine Skanderi, Aichouche Belhadj Aissa, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria) [9643-81]
- Method for infrared image background suppression based on sparse decomposition**, Lihua Wu, Weidong Sheng, National Univ. of Defense Technology (China) [9643-82]
- Applied noncentral Chi-squared distribution in CFAR detection of hyperspectral projected images**, Zhiyong Li, Dong Chen, Gongtao Shi, National Univ. of Defense Technology (China); Guopeng Yang, Wuhan Univ. (China); Gang Wang, National Univ. of Defense Technology (China) [9643-83]
- A comparative study of Landsat TM and RapidEye imagery for two-stage impervious surface coverage estimation**, Katarzyna K. Bernat, Wojciech Drzewiecki, AGH Univ. of Science and Technology (Poland) [9643-84]
- Modified wavelet kernel methods for hyperspectral image classification**, Pai-Hui Hsu, Xiu-Man Huang, National Taiwan Univ. (Taiwan) [9643-85]
- Inshore ship detection in high-resolution satellite image: approximation of harbors using sea-land segmentation**, Beril Besbinar, Aydin A. Alatan, Middle East Technical Univ. (Turkey) and Ctr. for Image Analysis (OGAM) (Turkey) [9643-86]
- A new method to obtain uniform distribution of ground control points based on regional statistical information**, Chao Ma, Wei An, Xin-Pu Deng, National Univ. of Defense Technology (China) [9643-87]
- Fuzzy ontologies for semantic interpretation of remotely sensed images**, Khelifa Djerrir, Ctr. National des Techniques Spatiales (Algeria); Mimoun Malki, Univ. de Sidi-Bel-Abbes (Algeria) [9643-88]
- Nonlinear sparse separation and semantic source identification**, Hela Elmannai, Ecole Supérieure des Communications de Tunis (Tunisia); Mohamed Anis Loghmari, Mohamed Saber Naceur, Ecole Nationale d'Ingenieurs de Tunis (Tunisia) [9643-91]
- Comparison of ARSIS concept with Fourier domain methods for VHR images**, Alper Akoguz, Melih Hayirsever, Ahmet H. Kayran, Sedef Kent Pinar, Istanbul Technical Univ. (Turkey) [9643-92]
- The use of extreme learning machines in land changes classification: a case study of Novo Progresso, Brazil**, Helder A. Louzada, Ana C. Quintão Siravenha, Evaldo Goncalves Pelaes, Univ. Federal do Pará (Brazil) [9643-93]
- A research of selected textural features for detection of asbestos-cement roofing sheets using orthoimages**, Judyta Ksiazek, AGH Univ. of Science and Technology (Poland) [9643-94]
- Statistical and structural pattern recognition techniques for single pulse detection of fire smoke by lidar**, Cherifa Sabrina Amrouche, Basma El Amel Boussaha, Ecole Nationale Supérieure d'Informatique (Algeria); Mohammed Traïche, Ctr. de Développement des Technologies Avancées (Algeria); Karima Benatchba, Ecole Nationale Supérieure d'Informatique (Algeria); Riad Guehaz, Abdelkrim Kedadra, Ctr. de Développement des Technologies Avancées (Algeria) [9643-95]
- Unsupervised methodology for change detection and analysis: a comparison of classifier models**, Ana C. Quintão Siravenha, Evaldo Goncalves Pelaes, Univ. Federal do Pará (Brazil) [9643-96]
- Object detection in rural areas using hyperspectral imaging**, Yusuf Artan, Yunus Emre Esin, ?afak Ozturk, HAVELSAN A.S. (Turkey) [9643-97]
- Utilizing hyperspectral remote sensing imagery for afforestation planning of partially covered areas**, Fatih Omruuzun, Didem Ozisik Baskurt, Middle East Technical Univ. (Turkey); Hazan Daglayan, Atılım Univ. (Turkey); Yasemin Yardimci Cetin, Middle East Technical Univ. (Turkey) [9643-98]
- An effective band selection approach for classification in remote sensing imagery**, Huseyin Cukur, Hamidullah Binol, Faruk S. Uslu, Abdullah Bal, Yildiz Technical Univ. (Turkey) [9643-99]

CONFERENCE 9643 - ROOM: ARIANE 1

WEDNESDAY 23 SEPTEMBER

SESSION 8

LOCATION: ARIANE 1 WED 8:30 TO 10:10

Multitemporal Analysis and Change Detection

Session Chair: **Francesca Bovolo**, Fondazione Bruno Kessler (Italy)

8:30: **Analysis on the effectiveness of multitemporal COSMO-SkyMed images for crop classification**, Rocchina Guarini, Agenzia Spaziale Italiana (Italy); Lorenzo Bruzzone, Massimo Sarton, Univ. degli Studi di Trento (Italy); Luigi Dini, Agenzia Spaziale Italiana (Italy) [9643-36]

8:50: **A fast and reliable change detection feature from bi-temporal amplitude SAR images**, Andrea Garzelli, Claudia Zoppetti, Univ. degli Studi di Siena (Italy) [9643-37]

9:10: **Fully polarimetric high-resolution airborne SAR image change detection with morphological component analysis**, Elias Mendez Dominguez, Univ. Zürich (Switzerland); Daniel Henke, Univ. Zurich (Switzerland); David Small, Erich H. Meier, Univ. Zürich (Switzerland) [9643-38]

9:30: **Change detection in quad and dual pol, single- and bi-frequency SAR data**, Allan A. Nielsen, Knut Conradsen, Henning Skriver, Technical Univ. of Denmark (Denmark) [9643-39]

9:50: **Change detection in UAV video mosaics combining a feature-based approach and extended image differencing**, Günter Saur, Wolfgang Krüger, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9643-40]

Coffee Break Wed 10:10 to 10:40

SESSION 9

LOCATION: ARIANE 1 WED 10:40 TO 12:20

Object Detection

Session Chair: **Allan A. Nielsen**, Technical Univ. of Denmark (Denmark)

10:40: **A game-theoretic tree matching approach for object detection in high-resolution remotely sensed images**, Yilong Liang, Nathan D. Cahill, Eli Saber, David W. Messinger, Rochester Institute of Technology (United States) [9643-41]

11:00: **Object-based detection of vehicles in airborne data**, Hendrik Schilling, Dimitri Bulatov, Wolfgang Middelman, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9643-42]

11:20: **A GUI visualization system for airborne lidar image data to reconstruct 3D city model**, Yoshiyuki Kawata, Kohei Koizumi, Kanazawa Institute of Technology (Japan) [9643-43]

11:40: **L-shaped corner detector for rooftop extraction from satellite/aerial imagery**, Hui Li Tan, Jiayuan Fan, Shijian Lu, Institute for Infocomm Research (Singapore) [9643-44]

12:00: **Information theoretic boundary detection based on user interaction and cubic splines**, Can Demirkesen, TÜBITAK UZAY (Turkey); Ugur M. Leloglu, Middle East Technical Univ. (Turkey) [9643-45]

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

SESSION JS1

LOCATION: GUILLAUMET 2 WED 13:40 TO 15:20

Joint Session 1: SAR Data Processing I

**Please note the room change.
The session will take place in room Guillaumet 2**

Session Chair: **Lorenzo Bruzzone**, Univ. degli Studi di Trento (Italy)

Joint Session of Conference 9642 and Conference 9632

13:40: **Understanding target delineation using simple probabilistic modelling**, Christopher J. Willis, BAE Systems (United Kingdom) [9643-46]

14:00: **Reducing scalloping in synthetic aperture radar images using a composite image transform**, Knut Landmark, Norwegian Defence Research Establishment (Norway); Anne H. S. Solberg, Univ. I Oslo (Norway) ... [9643-47]

14:20: **Curvelet-based compressive sensing for InSAR raw data**, Marcello G. Costa, Marcelo S. da Silva Pinho, David Fernandes, Instituto Tecnológico de Aeronáutica (Brazil) [9643-48]

14:40: **Modelling backscattering of adjacent buildings in VHR SAR images for complex urban area analysis**, Davide Pirrone, Francesca Bovolo, Fondazione Bruno Kessler (Italy); Lorenzo Bruzzone, Univ. degli Studi di Trento (Italy) [9643-49]

15:00: **Azimuth sidelobe suppression technique for near-field MIMO radar imaging**, Yongze Liu, Xiaojian Xu, BeiHang Univ. (China) [9643-50]

Coffee Break Wed 15:20 to 15:50

SESSION JS2

LOCATION: GUILLAUMET 2 WED 15:50 TO 17:10

Joint Session 2: SAR Data Processing II

**Please note the room change.
The session will take place in room Guillaumet 2**

Session Chair: **Claudia Notarnicola**, EURAC (Italy)

Joint Session of Conference 9642 and Conference 9643

15:50: **Implementation of a fast-time domain processor for FMCW Synthetic Aperture Radar data**, Max Frioud, Univ. of Zürich (Switzerland); Peter Wellig, Armasuisse (Switzerland); Stephan Stanko, Fraunhofer FHR (Germany); Erich H. Meier, Univ. of Zürich (Switzerland) [9642-10]

16:10: **An object oriented approach to detect earthquake damage in urban area: application to Cosmo SkyMed imagery of L'Aquila earthquake**, Roberta Anniballe, Sapienza Univ. di Roma (Italy); Marco Chini, Luxembourg Institute of Science and Technology (Luxembourg); Nazzareno Pierdicca, Sapienza Univ. di Roma (Italy); Christian Bignami, Salvatore Stramondo, Istituto Nazionale di Geofisica e Vulcanologia (Italy); Fabrizio Noto, METIS S.r.l. (Italy); Tanya Scalia, D'Appolonia Rome (Italy); Antonio Martinelli, Antonio Mannella, CNR Istituto per le Tecnologie della Costruzione (Italy) [9642-11]

16:30: **On the geolocation accuracy of COSMO-SkyMed products**, Davide O. Nitti, Raffaele Nutricato, GAP S.r.l. (Italy); Rino Lorusso, Nunzia Lombardi, Agenzia Spaziale Italiana (Italy); Fabio Bovenga, CNR ISSIA (Italy); Maria F. Bruno, Maria T. Chiaradia, Politecnico di Bari (Italy); Giovanni Milillo, Agenzia Spaziale Italiana (Italy) [9642-12]

16:50: **Visual analytics for semantic queries of TerraSAR-X image content**, Daniela Espinoza-Molina, Kevin Alonso, Mihai P. Datcu, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9642-13]

CONFERENCE 9644 - ROOM: DIAMANT

Tuesday - Thursday 22-24 September 2015 • Proceedings of SPIE Vol. 9644

Earth Resources and Environmental Remote Sensing/GIS Applications

Conference Chairs: **Ulrich Michel**, MU Consulting (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**, Austrian Academy of Sciences (Austria); **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); **Alexander Siegmund**, University of Education Heidelberg (Germany); **Karl Staenz**, Univ. of Lethbridge (Canada); **Kerstin Voss**, University of Education Heidelberg (Germany); **Christiane H. Weber**, Ecole Nationale Supérieure de Physique de Strasbourg (France)

TUESDAY 22 SEPTEMBER

SESSION 2

LOCATION: DIAMANT TUE 15:30 TO 17:30

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

OPENING REMARKS

LOCATION: DIAMANT 13:50 TO 14:00

SESSION 1

LOCATION: DIAMANT TUE 14:00 TO 15:00

Sensors and Platforms

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

14:00: **Solar diffusers in Earth observation instruments with an illumination angle of up to 70 degrees: design and verification of performance in BSDF**, Bilgehan Gür, Hans Bol, TNO Technical Sciences (Netherlands) and SINO Holland Optical Joint Lab. (China); Pengmei Xu, Bicen Li, Beijing Institute of Space Mechanics and Electricity (China) and SINO Holland Optical Joint Lab. (China) [9644-1]

14:20: **Analysis of spectral data and images for assessing state of vegetables**, Denitsa Borisova, Valentin Atanassov, Georgi Jeleu, Space Research and Technology Institute (Bulgaria); Kiril Alexiev, Petia Koprinkova-Hristova, Institute of Information and Communication Technologies (Bulgaria) [9644-2]

14:40: **A comparative study between Landsat-8 OLI and Landsat-7 ETM+, for sensor signal-to-noise performance, spectral distortion, spectral signature matching and land surface temperature: a study in the Iraq landscape**, Shaheen M. Alhirmizej, Kirkuk Univ. (Iraq) [9644-3]

Coffee Break Tue 15:00 to 15:30

Environmental Monitoring Concepts I

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

15:30: **Flood mapping from Sentinel-1 and Landsat-8 data. a case study from river Evros, Greece**, Aggeliki Kyriou, Konstantinos G. Nikolakopoulos, Univ. of Patras (Greece) [9644-4]

15:50: **Height estimation of boreal and deciduous forests from interferometric TanDEM-X coherence data**, Aire Olesk, Regio, Ltd. (Estonia); Kaupo Voormansik, Tarmo Tamm, Univ. of Tartu (Estonia); Jaan Praks, Aalto Univ. School of Science and Technology (Finland) [9644-5]

16:10: **Aboveground forest biomass estimation combining information from optical and SAR remotely sensed imagery**, Dimitris G. Stavroudis, Aristotle Univ. of Thessaloniki (Greece); Kleanthis Karamvassilakis, National Technical Univ. of Athens (Greece); Dimitris Zianis, National Agricultural Research Foundation (Greece); Ioannis Z. Gitas, Aristotle Univ. of Thessaloniki (Greece); Vassilia Karathanassi, National Technical Univ. of Athens (Greece); Gavriil Spyrogliou, National Agricultural Research Foundation (Greece); Vassilis Andronis, National Technical Univ. of Athens (Greece); Kalliopi Radoglou, Democritus Univ. of Thrace (Greece) [9644-6]

16:30: **Results of long-term oil spill monitoring in the Black Sea and the Caspian Sea with synthetic aperture radars**, Andrei Y. Ivanov, P.P. Shirshov Institute of Oceanology (Russian Federation); Alexey A. Kucheiko, RISKSAT (Russian Federation); Natalia Evtushenko, ScanEx Research and Development Ctr. (Russian Federation); Nadezhda Terleeva, P.P. Shirshov Institute of Oceanology (Russian Federation) [9644-7]

16:50: **Application of remote sensing in wetland monitoring: case study Hamoun wetland**, Saeideh Maleki, Alireza Soffianian, Isfahan Univ. of Technology (Iran, Islamic Republic of); Sassan Saatchi, Jet Propulsion Lab. (United States); Vahid Rahdary, Isfahan Univ. of Technology (Iran, Islamic Republic of) [9644-9]

17:10: **Rangeland mapping and monitoring for Bayankhongor aimag of Mongolia case study: Buutsagaan, Khureemarl and Dzag soums**, Sanjaa Tuya, Mongolian Univ. of Science and Technology (Mongolia); Doljinsuren Naymdorj, Establishment of Climate Resilient Rural Livelihoods Project (JFPR9164-MON) (Mongolia) [9644-10]

CONFERENCE 9644 - ROOM: DIAMANT

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Study of spatial-temporal variation of evapotranspiration estimation in urban green area using high-resolution remote sensing technology, Ning Zhang, Ministry of Housing and Urban-Rural Development of the People's Republic of China (China); Liuzhong Yang, Ministry of Housing and Urban-Rural Development of the People's Republic of China (China); Jing Yu, Ministry of Housing and Urban-Rural Development of the People's Republic of China (China); Liqiao Guo, Ministry of Housing and Urban-Rural Development of the People's Republic of China (China) [9644-40]

Remote sensing technology in combination with geographic information system (GIS) for rare vegetation conservation in Azerbaijan, Yelena M. Gambarova, Adil Gambarov, R.I.S.K. Co. (Azerbaijan) [9644-43]

A scale-up method of ground truth reference data for global land products: Using middle-resolution satellite data ALOS/AVNIR-2, Noriko Soyama, Tenri Univ. (Japan); Kanako Muramatsu, Nara Women's Univ. (Japan); Itsuko Ohashi, Japan Aerospace Exploration Agency (Japan); Motomasa Daigo, Doshisha Univ. (Japan); Fumio Ochiai, Nara Women's Univ. (Japan); Takeo Tadono, Kenro Nasahara, Japan Aerospace Exploration Agency (Japan) [9644-44]

Diachronic analysis of the occupation of the steppe area of the Wilaya of Sidi Bel'Abbès (Western Algeria), Abbassia Ayache, Univ. Djillali Liabes (Algeria) [9644-45]

Development of the Philippine Hydrologic Dataset (PHD) from LiDAR and other remotely-sensed data, Anjillyn Mae C. Perez, Melanie C. Gaspa, Dominic S. Aloc, Univ. of the Philippines, Diliman (Philippines); Margarita Andrea P. Mahor, Kevin Angelo C. Gonzalez, Phil-LiDAR 2 Program, Training Center for Applied Geodesy and Photogrammetry (Philippines); Noel Jerome B. Borlongan, Roel M. De la Cruz, Nestor T. Olfindo Jr., Ariel C. Blanco, Univ. of the Philippines, Diliman (Philippines) [9644-46]

Detecting of soil salinization dynamics in irrigated Tadla Plain using Landsat TM/OLI imagery, Abderrazak El Harti, Rachid Lhissou, Asma Dakir, Basma Naouil, Jamal-eddine Ouzemou, El Mostafa Bachaoui, Abderrahmène El Ghmari, Faculty of Science and Technology Beni Mellal (Morocco); Mohammed Hassouna, Office Régional de Mise en Valeur Agricole du Tadla (Morocco) [9644-47]

Headward erosion and deep erosion estimations in the wider area of Nemea, Greece, using GIS and freely available DSM, Konstantina K. Mexia, Univ. of Patras (Greece) [9644-48]

Study of the climate change of Northeast China over hundred years and its Influence, Nanping Xu, Meteorological Bureau of Heilongjiang (China) [9644-49]

Diachronic analysis of salt-affected areas in Biskra area (Algeria) using remote sensing techniques, Gabriela M. Afrasinei, Maria T. Melis, Cristina Buttau, Univ. degli Studi di Cagliari (Italy); Claudio Arras, Univ. degli Studi di Cagliari (Italy) and Univ. degli Studi di Sassari (Italy); John M. Bradd, Univ. of Wollongong (Australia); Giorgio Ghiglieri, Univ. degli Studi di Cagliari (Italy) and Univ. degli Studi di Sassari (Italy) [9644-50]

MODIS dust detection on the Mediterranean area: a web application for data sharing, Maria T. Melis, Univ. degli Studi di Cagliari (Italy); Francesco Dessi, Istituto di Scienze dell'Atmosfera e del Clima (Italy); Paolo Loddo, Paolo Loddo (Italy); Luca Naitza, Luca Naitza (Italy) [9644-51]

Detecting land cover changes from overgrazing using remote sensing techniques: a case study of Randi Forest, Cyprus, Kyriacos Themistocleous, Cyprus Univ. of Technology (Cyprus); Giorgos C. Papadavid, Agricultural Research Institute (Cyprus); Diofantos G. Hadjimitsis, Cyprus Univ. of Technology (Cyprus) [9644-52]

A disparity between erosional hazard and accretion of the sundarbans with its adjacent east coast, Bangladesh: a remote sensing and GIS approach, Ershad U. D. Pahlowan, A.T.M. Shakhawat Hossain, Jahangirnagar Univ. (Bangladesh) [9644-53]

Spatio-temporal pattern of eco-environmental parameters in Jharia Coal Field, India, Varinder Saini, R. P. Gupta, Indian Institute of Technology Roorkee (India); Manoj K. Arora, PEC Univ. of Technology (India) [9644-54]

Water quality assessment using satellite remote sensing, Saad Ul Haque, Institute of Space Technology (Pakistan) [9644-55]

Automatic landslide and mudflow detection method via multichannel sparse representation, Chen Chao, Jianjun Zhou, Beijing Normal Univ. (China) and Naval Academy of Armament (China); Zhuo Hao, Bo Sun, Jun He, Fengxiang Ge, Beijing Normal Univ. (China) [9644-57]

Continuum removed band depth analysis for waste detecting in the north of Tunisia, Faten Alayet, Nouha Mezned, Saadi Abdeljaoued, Faculté des Sciences de Tunis (Tunisia) [9644-58]

Remote sensing and GIS for monitoring the progress of national housing program, Bouhadjar Meguenni, Khelifa Djerriri, Ctr. National des Techniques Spatiales (Algeria) [9644-59]

Application of remote sensing technique and development of optical algorithms suitable for inland water in Korea, JongCheol Pyo, KyungHwa Cho, Ulsan National Institute of Science and Technology (Korea, Republic of) [9644-60]

Ground truth and mapping capability of urban areas in large scale ?using GE images, Ahmed I. Ramzi V, National Authority for Remote Sensing and Space Sciences (Egypt) [9644-61]

Assessment of coastline exploitation using multitemporal Landsat images: Jintang Island, China, Xiaoping Zhang, Hunan Univ. of Science and Technology (China); Delu Pan, Jianyu Chen, State Key Lab. of Satellite Ocean Environment Dynamics (China); Chaokui Li, Hao Chen, Shifeng Jia, Hunan Univ. of Science and Technology (China) [9644-62]

Limestone distribution based on spectral reflectance value of multispectral satellite imagery, in Timor-Leste area, Sung Soon Lee, Sung-Ja Choi, Korea Institute of Geoscience & Mineral Resources (Korea, Republic of) [9644-63]

Urban green spatio- temporal changes assessment through time-series satellite data, Maria A. Zoran, Roxana S. Savastru, Dan M. Savastru, Marina N. Tautan, Laurentiu V. Baschir, National Institute of Research and Development for Optoelectronics (Romania) [9644-65]

An Integrated Geospatial System for earthquake precursors assessment in Vrancea tectonic active zone in Romania, Maria A. Zoran, Roxana S. Savastru, Dan M. Savastru, National Institute of Research and Development for Optoelectronics (Romania) [9644-66]

Impact of climate and anthropogenic changes on urban surface albedo assessed from time-series MODIS satellite data, Maria A. Zoran, National Institute of Research and Development for Optoelectronics (Romania); Adrian I. Dida, Transilvania Univ. of Brasov (Romania); Liviu-Florin V. Zoran, Univ. Politehnica of Bucharest (Romania) [9644-67]

Radiometric cross-calibration of KOMPSAT-3 AEISS with Landsat-8 OLI, Cheong-Gil Jin, Korea Aerospace Research Institute (Korea, Republic of); Ho Yong Ahn, Dong Yoon Shin, Chuluong Choi, Pukyong National Univ. (Korea, Republic of) [9644-68]

Case study: mapping mangroves and coastal wetlands, Christopher Dubia, Kent Lewis, Andy Long, MapWorks Learning (United States) [9644-69]

Evaluation of satellite-based precipitation using APHRODITE and observed station over diverse topography of Pakistan, Muhammad Farooq Iqbal, COMSATS Institute of Information Technology (Pakistan) [9644-70]

Slope adjustment of runoff curve number (CN) using Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (GDEM) for Kuantan River Basin, Abolghasem Akbari, University Malaysia Pahang (Malaysia) [9644-71]

WEDNESDAY 23 SEPTEMBER

SESSION 3

LOCATION: DIAMANT WED 9:00 TO 10:00

Remote Sensing for Archaeology, Cultural and Natural Heritage

Session Chair: **Valentina Raimondi**,
Istituto di Fisica Applicata Nello Carrara (Italy)

9:00: **Modelling prehistoric terrain Models using LiDAR-data - a geomorphological approach**, Veit Höfler, Christine Wessollek, Pierre Karrasch, Technische Univ. Dresden (Germany) [9644-11]

9:20: **An integrated multimedial approach to cultural heritage conservation and documentation: from remotely-sensed lidar imaging to historical archive data**, Valentina Raimondi, Lorenzo Palombi, Istituto di Fisica Applicata Nello Carrara (Italy); Annalisa Morelli, SO.IN.G Strutture e Ambiente S.r.l (Italy); Massimo Chimenti, Culturanoova s.r.l. (Italy); Sara Penoni, FABERestaurato s.n.c. (Italy); Ute Dercks, Kunsthistorisches Institut in Florenz (Italy); Alessia Andreotti, Univ. di Pisa (Italy); Giovanni Bartolozzi, Istituto di Fisica Applicata Nello Carrara (Italy); Marco Bini, ELab Scientific s.r.l. (Italy); Ilaria Bonaduce, Univ. di Pisa (Italy); Susanna Bracci, Emma Cantisani, Maria Perla Colombini, CNR-Istituto per la Conservazione e la Valorizzazione dei Beni Culturali (Italy); Costanza Cucci, Istituto di Fisica Applicata Nello Carrara (Italy); Laura Fenelli, Kunsthistorisches Institut in Florenz (Italy); Monica Galeotti, Opificio delle Pietre Dure (Italy); Irene Malesci, CNR-Istituto per la Conservazione e la Valorizzazione dei Beni Culturali (Italy); Alessandra Malquori, Scuola di Studi Umanistici e della Formazione (Italy); Emanuela Massa, Art-Test s.a.s. (Italy); Marco Montanelli, AK Innovation s.r.l. (Italy); Roberto Olmi, Marcello Picollo, Istituto di Fisica Applicata Nello Carrara (Italy); Louis D. Pierelli, NIKE Restauro Opere D'Arte Snc (Italy); Daniela Pinna, Opificio delle Pietre Dure (Italy); Cristiano Rimesi, CNR-Istituto per la Conservazione e la Valorizzazione dei Beni Culturali (Italy); Sara Rutigliano, Culturanoova s.r.l. (Italy); Barbara Sacchi, CNR-Istituto per la Conservazione e la Valorizzazione dei Beni Culturali (Italy); Sergio Stella, Bel Chimica S.r.l (Italy); Gabriella Tonini, NIKE Restauro Opere D Arte Snc (Italy) [9644-12]

9:40: **Remote sensing modelling of cellulose, lignin and wax content of Pistacia for phylogenetic analysis**, Giorgi Kozhoridze, Nikolai Orlovsky, Leah Orlovsky, Dan G. Blumberg, Avi Golan-Goldhirsh, Ben-Gurion Univ. of the Negev (Israel) [9644-13]

Coffee Break Wed 10:00 to 10:30

SESSION 4

LOCATION: DIAMANT WED 10:30 TO 11:30

Hazard Mitigation Geologic Applications I

Session Chair: **Konstantinos G. Nikolakopoulos**,
Univ. of Patras (Greece)

10:30: **Active landslide monitoring using remote sensing data, GPS measurements and cameras on board UAV**, Konstantinos G. Nikolakopoulos, Katerina Kavoura, Nikolaos Depountis, Nikolaos Argyropoulos, Ioannis Koukouvelas, Nikolaos Sabatakakis, Univ. of Patras (Greece) [9644-14]

10:50: **Lithological mapping of igneous and metamorphic rocks in the Central Eastern Desert of Egypt using remote sensing data**, Mohamed Fouad Sadek, National Authority for Remote Sensing and Space Sciences (Egypt) [9644-15]

11:10: **WebGIS for calculation of main geomagnetic field parameters on the basis of ESRI ArcGIS API**, Andrei V. Vorobei, Gulnara R. Shakirova, Ufa State Aviation Technical Univ. (Russian Federation) [9644-16]

Lunch/Exhibition Break Wed 11:30 to 13:20

SESSION 5

LOCATION: DIAMANT WED 13:20 TO 15:00

Hazard Mitigation Geologic Applications II

Session Chair: **Konstantinos G. Nikolakopoulos**,
Univ. of Patras (Greece)

13:20: **Concept of an advanced hyperspectral remote system for pipeline monitoring**, Göksoy Keskin, Caroline Teutsch, Andreas Lenz, Wolfgang Middelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9644-18]

13:40: **Hydrocarbon microseepage mapping using signature based target detection techniques**, Hilal Soydan, Alper Koz, Sebnem Düzgün, Aydin A. Alatan, Middle East Technical Univ. (Turkey) [9644-19]

14:00: **Quarry monitoring using GPS measurements and UAV photogrammetry**, Konstantinos G. Nikolakopoulos, Ioannis Koukouvelas, Nikolaos Argyropoulos, Vasileios Megalookonomou, Univ. of Patras (Greece) [9644-20]

14:20: **Soil volume estimation in debris flow areas using lidar data in the 2014 Hiroshima, Japan rainstorm**, Hiroyuki Miura, Hiroshima Univ. (Japan) [9644-21]

14:40: **Lithological mapping using multispectral ASTER and Landsat 8 data in Moroccan Anti Atlas**, Zakaria Adiri, Abderrazak El Harti, Amine Jellouli, Faculty of Science and Technology Beni Mellal (Morocco); Lhou Maacha, MANAGEM Group (Morocco); Hamzaoui Abderrazak, National Bureau of Petroleum and Mines (Morocco); El Mostafa Bachaoui, Faculty of Science and Technology Beni Mellal (Morocco) [9644-23]

Coffee Break Wed 15:00 to 15:30

SESSION 6

LOCATION: DIAMANT WED 15:30 TO 17:30

Environmental Monitoring Concepts II

Session Chair: **Christine Wessollek**,
Technische Univ. Dresden (Germany)

15:30: **Introducing a rain-adjusted vegetation index (RAVI) for improvement of long-term trend analyses in vegetation dynamics**, Christine Wessollek, Pierre Karrasch, Babatunde A. Osunmadewa, Technische Univ. Dresden (Germany) [9644-24]

15:50: **The use of UAV to document sloping landscapes to produce digital elevation models To examine environmental degradation**, Kyriacos Themistocleous, Athos Agapiou, Cyprus Univ. of Technology (Cyprus); Myrna de Hoop, Utrecht Univ. (Netherlands); Angeles Garcia-Mayor, Wageningen Univ. (Netherlands); Max Rietkerk, Stefan C. Dekker, Utrecht Univ. (Netherlands); Diofantos G. Hadjimitsis, Cyprus Univ. of Technology (Cyprus) [9644-25]

16:10: **Evaluation of multitemporal percent tree cover data for detection of deforestation and forest degradation**, Yan Gao, Jean F. Mas, Jaime Paneque-Galvez, Margaret Skutsch, Univ. Nacional Autónoma de México (Mexico) [9644-26]

16:30: **Hazard zone mapping of Kedarnath region using remote sensing and FR method**, Hrishabh Gupta, Shashank Bhushan, Jigyasa Agrawal, Indian School of Mines (India) [9644-27]

16:50: **Developing a sustainable satellite-based environmental monitoring system In Nigeria**, Joseph O. Akinyede, The Federal Univ. of Technology, Akure (Niger); K. A. Adepoju, Obafemi Awolowo Univ. (Nigeria); Francis O. Akinluyi, A. Y. B. Anifowose, Federal Univ. of Technology, Owerri (Nigeria) [9644-28]

17:10: **Estimation of evapotranspiration in Mongolian steppe area of Mongolia combining satellite and ground data**, Sanjaa Tuya, Nas-Urt Tugjsuren, Mongolian Univ. of Science and Technology (Mongolia); Jadamba Batbayar, National Agency of Meteorology and Environmental Monitoring (Mongolia); Battumur Azzaya, Mongolian Univ. of Science and Technology (Mongolia) [9644-29]

17:30: **Using Landsat data for spatial-temporal ecological monitoring of mountainous ecosystems: Armenia case study**, Vahagn Muradyan, The Center for Ecological-Noosphere Studies of the (Armenia) [9644-56]

CONFERENCE 9644 - ROOM: DIAMANT

THURSDAY 24 SEPTEMBER

SESSION 7

LOCATION: DIAMANT THU 9:00 TO 10:00

Processing Methodologies I

Session Chair: **Kyriacos Themistocleous**,
Cyprus Univ. of Technology (Cyprus)

9:00: **The use of UAVs for remote sensing applications: case studies in Cyprus**, Kyriacos Themistocleous, Diofantos G. Hadjimitsis, Cyprus Univ. of Technology (Cyprus) [9644-30]

9:20: **An integrated and open source GIS environmental management system for a protected area in the south of Portugal**, Ana C. Teodoro, Lia Duarte, Earth Sciences Institute (ICT) (Portugal); Neftali P. Sillero, Ctr. de Investigação em Ciências Geo-Espaciais (Portugal); José A. Goncalves, CIIMAR (Portugal); João Fonte, Instituto de Ciencias del Patrimonio (Spain); Luis Seco, Ctr. de Investigação em Ciências Geo-Espaciais (Portugal); Luis Pinheiro da Luz, Nuno Beja, Instituto Politécnico de Beja (Portugal) [9644-31]

9:40: **Estimation of regional-scale forest resources using ICESat/GLAS spaceborne lidar**, Masato Hayashi, Nobuko Saigusa, Habura Borjgin, Yoshito Sawada, Yoshiaki Yamagata, National Institute for Environmental Studies (Japan); Takashi Hirano, Hokkaido Univ. (Japan); Kazuhito Ichii, Japan Agency for Marine-Earth Science and Technology (Japan) and National Institute for Environmental Studies (Japan) [9644-32]

Coffee Break Thu 10:00 to 10:30

SESSION 8

LOCATION: DIAMANT THU 10:30 TO 11:50

Processing Methodologies II

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

10:30: **Quality evaluation of different fusion techniques applied on Worldview-2 data**, Aristides D. Vaiopoulos, National Technical Univ. of Athens (Greece); Konstantinos G. Nikolakopoulos, Univ. of Patras (Greece) ... [9644-33]

10:50: **Superpixel-based active learning classification of endemic species of Teide National Park**, Angel M. García-Pedrero, Consuelo Gonzalo Martín, Univ. Politécnica de Madrid (Spain); Dionisio Rodríguez Esparragón, Univ. de Las Palmas de Gran Canaria (Spain); Mario F. Lillo-Saavedra, Univ. de Concepción (Chile); Francisco Javier Marcello Ruiz, Univ. de Las Palmas de Gran Canaria (Spain) [9644-34]

11:10: **Karst features detection and mapping using airphotos, DSMs and GIS techniques**, Maria Kakavas, Konstantinos G. Nikolakopoulos, Helen Zagana, Univ. of Patras (Greece) [9644-35]

11:30: **High-spatial resolution multispectral and panchromatic satellite imagery for mapping perennial desert plants**, Saad Alsharrah, David Bruce, Sekhar Somenahalli, Univ. of South Australia (Australia); Rachid Bouabid, Ecole Nationale d'Agriculture de Meknès (Morocco); Paul Corcoran, University of South Australia (Australia) [9644-36]

Lunch Break Thu 11:50 to 13:00

SESSION 9

LOCATION: DIAMANT THU 13:00 TO 14:40

Infrastructure and Urban Areas

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

13:00: **Feature extraction for change analysis in SAR time series**, 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) [9644-37]

13:20: **Updating road databases from shape-files using aerial images**, Gisela Häufel, Dimitri Bulatov, Melanie Pohl, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9644-38]

13:40: **Future prediction of urban growth in OMR (IT expressway of Chennai) by using Markov Chain approach**, Kiran N. S., Anna Univ. (India) [9644-39]

14:00: **Effect of land cover and green space on land surface temperature of a fast growing economic region in Malaysia**, Afsaneh Sheikhi, Kasturi D. Kanniah, Univ. Teknologi Malaysia (Malaysia); Chin Siong Ho, Univ. Teknologi Malaysia (Malaysia) [9644-41]

14:20: **Integrated method of water column correction technique for satellite-based benthic habitats mapping**, Pramaditya Wicaksono, Projo Danoedoro, Hartono Hartono, Univ. Gadjah Mada (Indonesia) [9644-42]

CONFERENCE 9645 - ROOM: SPOT

Monday - Tuesday 21-22 September 2015 • Proceedings of SPIE Vol. 9645

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 21 SEPTEMBER

OPENING REMARKS

LOCATION: SPOT8:35 TO 8:40

SESSION 1

LOCATION: SPOT MON 8:40 TO 10:30

New Developments in Lidar Technology I

8:40: **Double-pulsed 2-micron IPDA lidar validation for atmospheric CO₂ measurements** (*Invited Paper*), Upendra N. Singh, Tamer F. Refaat, Jirong Yu, Mulugeta Petros, Ruben G. Remus, NASA Langley Research Ctr. (United States) [9645-1]

9:10: **Atmospheric CO₂ remote sensing system based on high brightness semiconductor lasers and single photon counting detection**, Antonio Perez-Serrano, Maria Fernanda Viera Suárez, Ignacio Esquivias, Univ. Politécnica de Madrid (Spain); Mickael Faugeron, Michel Krakowski, Frédéric van Dijk, III-V Lab. (France); Gerd Kochem, Martin Traub, Fraunhofer-Institut für Lasertechnik (Germany); Pawel Adamiec, Juan Barbero, Alter Technology (Spain); Xiao Ai, John G. Rarity, Univ. of Bristol (United Kingdom); Mathieu Quatrevalet, Gerhard Ehret, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9645-2]

9:30: **Advanced intensity-modulation continuous-wave lidar techniques for ASCENDS CO₂ column measurements**, Joel F. Campbell, Bing Lin, Amin R. Nehrir, Fenton W. Harrison, Michael D. Obland, Byron L. Meadows, NASA Langley Research Ctr. (United States) [9645-3]

9:50: **Developing the CO₂ Sounder lidar as a candidate for the ASCENDS Mission: an update**, James B. Abshire, NASA Goddard Space Flight Ctr. (United States); Anand K. Ramanathan, Univ. of Maryland, College Park (United States); Haris Riris, NASA Goddard Space Flight Ctr. (United States); Graham R. Allan, Sigma Space (United States); Jeffrey R. Chen, Anthony W. Yu, Xiaoli Sun, NASA Goddard Space Flight Ctr. (United States) [9645-4]

10:10: **Signal to noise ratio estimation of the ASCENDS CarbonHawk Experiment Simulator (ACES) for Atmospheric CO₂ Measurement**, Songsheng Chen, Amin R. Nehrir, Larry B. Petway, NASA Langley Research Ctr. (United States); Yingxin Bai, Science Systems and Applications, Inc. (United States); Fenton W. Harrison, Joel F. Campbell, Byron L. Meadows, Bing Lin, Michael D. Obland, NASA Langley Research Ctr. (United States); Edward V. Browell, Science, Technology, and Research Support Services (United States) [9645-5]

Coffee Break Mon 10:30 to 11:00

SESSION 2

LOCATION: SPOT MON 11:00 TO 12:00

New Developments in Lidar Technology II

Session Chair: **Upendra N. Singh**, NASA Langley Research Ctr. (United States)

11:00: **Multispecies transmitter for DIAL sensing of atmospheric water vapour, methane and carbon dioxide in the 2 µm region**, Dominique Mammez, Erwan Cadiou, Jean-Baptiste Dherbecourt, Myriam Raybaut, Jean-Michel Melkonian, Antoine Godard, Guillaume Gorju, ONERA (France); Jacques R. Pelon, Univ. Pierre et Marie Curie (France); Michel Lefebvre, ONERA (France) [9645-6]

11:20: **Langley Mobile Ozone Lidar (LMOL) results from the Denver, CO DISCOVER-AQ campaign**, Russell J. De Young, NASA Langley Research Ctr. (United States); Denis Pliutau, Science Systems and Applications, Inc. (United States); William Carrion, Coherent Applications, Inc. (United States); Rene Ganoë, Science Systems and Applications, Inc. (United States) [9645-8]

11:40: **LED mini-Raman lidar for hydrogen gas detection**, Tatsuo Shiina, Chiba Univ. (Japan); Kazuo Noguchi, Kenji Tsuji, Chiba Institute of Technology (Japan) [9645-9]

Lunch/Exhibition Break Mon 12:00 to 13:40

SESSION 3

LOCATION: SPOT MON 13:40 TO 15:30

New Developments in Lidar Technology III

Session Chair: **Upendra N. Singh**, NASA Langley Research Ctr. (United States)

13:40: **Design study for an airborne multi-wavelength, multi-depolarization high-spectral resolution lidar** (*Invited Paper*), Ilya Serikov, Max-Planck-Institut für Meteorologie (Germany); Doina N. Nicolae, National Institute of Research and Development for Optoelectronics (Romania); Vasilis Amiridis, National Observatory of Athens (Greece); Holger Linné, Björn Brüggemann, Max-Planck-Institut für Meteorologie (Germany) [9645-11]

14:10: **Long range wind lidars based on novel high spectral brilliance all-fibered sources**, Laurent Lombard, Béatrice Augère, Agnès Dolfi-Bouteyre, Didier Goular, Matthieu Valla, William Renard, Julien Le Gouët, Anne Durecu, Christophe Planchat, Pierre Bourdon, Guillaume Canat, Claudine Besson, Onera (France) [9645-12]

14:30: **CW Lidar for wind sensing featuring numerical range scanning and strong inherent suppression of disturbing reflections**, Ernst Brinkmeyer, Technische Univ. Hamburg-Harburg (Germany) [9645-13]

14:50: **An innovative rotational Raman lidar to measure the temperature profile from the surface to 30 km altitude**, Alain Hauchecorne, Philippe L. Keckhut, Jean Francois Mariscal, Eric D'Almeida, Pierre-Richard Dahoo, Jacques Porteneuve, LATMOS (France) [9645-14]

15:10: **ALART: a novel lidar system for vegetation height retrieval from space**, Pierluigi Foglia Manzillo, Chris van Dijk, Simon S. Conticello, Marco Esposito, cosine Research B.V. (Netherlands); Rudi Lussana, Federica Villa, Davide Tamborini, Franco Zappa, Alberto Tosi, Politecnico di Milano, Dipartimento di Elettronica, Informazione e Bioingegneria (Italy); Andreas Roncat, Norbert Pfeifer, TU Wien, Department of Geodesy and Geoinformation (Austria); Dimitris Lampridis, Logikon Labs (Greece); Thomas Entner, Entner Electronics KG (Austria) [9645-15]

Coffee Break Mon 15:30 to 16:00

CONFERENCE 9645 - ROOM: SPOT

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Remote Sensing 2015

For details, please see special events section in the printed programme or visit <http://spie.org/remote-sensing-europe.xml>

TUESDAY 22 SEPTEMBER

SESSION 4

LOCATION: SPOT TUE 9:00 TO 10:00

Lidar Applications to Regional and Global Issues I

Session Chair: **Doina Nicoleta Nicolae**, National Institute of Research and Development for Optoelectronics (Romania)

9:00: **Detecting the planetary boundary layer height from low level jet**, Gregori de Arruda Moreira, Márcia Talita Amorim Marques, Eduardo Landulfo, Instituto de Pesquisas Energéticas e Nucleares (Brazil) [9645-17]

9:20: **Use of lidar water vapor retrieval for assessment of model capability to simulate water vapor profiles**, Lev Labzovskii, National Institute of Research and Development for Optoelectronics (Romania) and Univ. of Bucharest (Romania); Ioannis Biniotoglou, National Institute for Research and Development for Optoelectronics (Romania); Alexandros D. Papayannis, National Technical Univ. of Athens (Greece); Robert F. Banks, José María Baldasano, Barcelona Supercomputing Ctr. - Ctr. Nacional de Supercomputación (Spain) [9645-18]

9:40: **A comparison and evaluation between ICESat/GLAS altimetry and mean sea level in Thailand**, Didsaphan Naksen, Royal Thai Survey Dept (Thailand) and Beihang Univ. (China); Dong Kai YANG, Beihang Univ. (China) [9645-19]

Coffee Break Tue 10:00 to 10:30

SESSION 5

LOCATION: SPOT TUE 10:30 TO 12:20

Lidar Applications to Regional and Global Issues II

Session Chair: **Doina Nicoleta Nicolae**, National Institute of Research and Development for Optoelectronics (Romania)

10:30: **EARLINET quality assurance efforts building up to the ACTRIS Lidar Calibration centre (Invited Paper)**, Volker Freudenthaler, Ludwig-Maximilians-Univ. München (Germany) [9645-20]

11:00: **Aerosol variability in Romania from combined remote sensing data**, Doina N. Nicolae, Anca V. Nemuc, Simona Andrei, National Institute of Research and Development for Optoelectronics (Romania); Alexandru Dandocsi, National Institute of Research and Development for Optoelectronics (Romania) and Univ. Politehnica of Bucharest (Romania); Horatiu Stefanie, National Institute of Research and Development for Optoelectronics (Romania) and Univ. Babeş-Bolyai (Romania) [9645-21]

11:20: **Spatial mapping of greenhouse gases using laser absorption spectrometers at local scales of interest**, Jeremy T Dobler, Nathan Blume, Michael Braun, Exelis Inc (United States); T. Scott Zaccheo, Timothy Pernini, Christopher Botos, Atmospheric Environmental Research, Inc. (United States) [9645-22]

11:40: **Aerosol classification study by lidar**, Nianwen Cao, Nanjing Univ. of Information Science & Technology (China) [9645-23]

12:00: **One-year monitoring of the atmosphere over Penang Island using a ground-based lidar**, Mohamad Zubir Mat Jafri, Wei Ying Khor, Hwee San Lim, Wan Shen Hee, Univ. Sains Malaysia (Malaysia) [9645-24]

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Aerosol cloud interaction: a multiplatform-scenario-based methodology, Eduardo Landulfo, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Fabio Juliano S. da Silva Lopes, Univ. de São Paulo (Brazil); Juan Luis Guerrero-Rascado, Lucas Alados-Arboledas, Univ. de Granada (Spain) [9645-16]

Estimation of particle mass concentration from eight-year lidar measurements in Seoul, Korea and its application to Asian dust and pollution events, Sang-Woo Kim, Man-Hae Kim, Huidong Yeo, Seoul National Univ. (Korea, Republic of); Nobuo Sugimoto, National Institute for Environmental Studies (Japan) [9645-26]

Calibrated depolarization retrievals using lidar, Livio Belegante, National Institute of Research and Development for Optoelectronics (Romania); Volker Freudenthaler, Ludwig-Maximilians-Univ. München (Germany); Anca V. Nemuc, Jeni G. Vasilescu, National Institute of Research and Development for Optoelectronics (Romania); Ioannis Biniotoglou, National Institute of Research and Development for Optoelectronics (Romania); Cristian M. Radu, Valentin F. Benciu, Doina N. Nicolae, National Institute of Research and Development for Optoelectronics (Romania) [9645-30]

DIAL measurements of the vertical ozone distribution at the Siberian lidar station, Oleg A. Romanovskii, V.E. Zuev Institute of Atmospheric Optics (Russian Federation) and Tomsk State Univ. (Russian Federation); Sergei S. I. Dolgii, Alexey A. Nevzorov, Vladimir D. Burlakov, Alexey A. Nevzorov, V.E. Zuev Institute of Atmospheric Optics (Russian Federation); Olga V. Kharchenko, VE Zuev Institute of Atmospheric Optics (Russian Federation) [9645-27]

A portable imaging lidar for lower boundary layer atmospheric measurement, Xiaoqin Liu, Anhui Institute of Optics and Fine Mechanics (China) [9645-29]

A method of precision airborne laser scanning and collaborative design in expressway reconstruction, Fei Yu, Chujiang Chen, YANG MING, Shaohuai Yu, Liyuan Wang, Xiao Zhang, CCCC Second Highway Consultant Co. Ltd, (China) [9645-31]

Remote sensing solutions using GIS with mobile or land laser scanning, Ahmet Erdo?du, Engineer (Turkey) [9645-32]

CONFERENCE 9646 - ROOM: DIAMANT (MON-TUE AM), AUDITORIUM SAINT EXUPÉRY (TUE PM)

Monday - Tuesday 21-22 September 2015 • Proceedings of SPIE Vol. 9646

High-Performance Computing in Remote Sensing

Conference Chairs: **Bormin Huang D.D.S.**, 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); **Lizhe Wang**, Institute of Remote Sensing and Digital Earth (China); **Jun Li**, Sun Yat-Sen Univ. (China)

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); **Tsengdar J. Lee**, NASA Headquarters (United States); **Francesco Loporati**, Univ. degli Studi di Pavia (Italy); **Qiguang Miao**, Xidian Univ. (China); **Caner Özcan**, Karabük Üniv. (Turkey); **Enrique S. Quintana-Orti**, Univ. Jaume I (Spain); **Prashanth Reddy Marpu**, Masdar Institute of Science & Technology (United Arab Emirates); **Jarno Mielikainen**, Univ. of Wisconsin-Madison (United States); **Antonio J. Plaza**, Univ. de Extremadura (Spain); **Jeffery J. Puschell**, Raytheon Space & Airborne Systems (United States); **Shen-En Qian**, Canadian Space Agency (Canada); **Sergio Sanchez Martinez**, Masdar Institute of Science & Technology (United Arab Emirates); **Roberto Sarmiento**, Univ. de Las Palmas de Gran Canaria (Spain); **Valeriy V. Strotov**, Ryazan State Radio Engineering Univ. (Russian Federation); **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)

MONDAY 21 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: DIAMANT8:45 TO 8:50

SESSION 1

LOCATION: DIAMANT MON 8:50 TO 10:10

High Performance Computing I

Session Chair: **Bormin Huang**,
Univ. of Wisconsin-Madison (United States)

8:50: **The implementation of multiple object tracking algorithm based on partition of bipartite graph in FPGA-based onboard vision systems**, Valeriy V. Strotov, Boris A. Alpatov, Ryazan State Radio Engineering Univ. (Russian Federation) [9646-1]

9:10: **Connected Component Labeling algorithm for very complex and high-resolution images on an FPGA platform**, Kurt Schwenk, Felix Huber, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9646-3]

9:30: **Dimensionality reduction and endmember extraction for hyperspectral imaging using an RVC-CAL library**, Daniel Madroñal, Raquel Lazcano, Eduardo Juárez, César Sanz, Univ. Politécnica de Madrid (Spain) [9646-4]

9:50: **Revisiting Intel Xeon Phi optimization of Thompson cloud microphysics scheme in Weather Research and Forecasting (WRF) model**, Jarno Mielikainen, Bormin Huang, Hung-Lung A. Huang, Univ. of Wisconsin-Madison (United States) [9646-5]

Coffee Break Mon 10:10 to 10:40

SESSION 2

LOCATION: DIAMANT MON 10:40 TO 12:20

High Performance Computing II

Session Chair: **Sebastián López**,
Univ. de Las Palmas de Gran Canaria (Spain)

10:40: **GPU-based ray tracing algorithm for high-speed propagation prediction in typical indoor environments**, Lixin Guo, Xiaowei Guan, Zhongyu Liu, Xidian University (China) [9646-6]

11:00: **GPU Implementation of the simplex identification via split augmented Lagrangian**, Jorge Sevilla Cedillo, Jose M. Nascimento, Instituto de Telecomunicações (Portugal) [9646-7]

11:20: **Embedded GPU implementation of anomaly detection for hyperspectral images**, Yuanfeng Wu, Lianru Gao, Bing Zhang, Institute of Remote Sensing and Digital Earth (China); Bin Yang, Central South Univ. (China); Zhengchao Chen, Institute of Remote Sensing and Digital Earth (China) [9646-8]

11:40: **RVC-CAL library for endmember and abundance estimation in hyperspectral image analysis**, Raquel Lazcano, Daniel Madroñal, Eduardo Juárez, César Sanz, Univ. Politécnica de Madrid (Spain) [9646-9]

12:00: **Robust hyperspectral vegetation indices to estimate leaf chlorophyll content**, Shan Lu, Northeast Normal Univ. (China) [9646-10]

Lunch Break Mon 12:20 to 13:50

SESSION 3

LOCATION: DIAMANT MON 13:50 TO 15:30

High Performance Computing III

Session Chair: **Zhensen Wu**, Xidian Univ. (China)

13:50: **Fault-tolerant NAND-flash memory module for next-generation scientific instruments**, Tobias Lange, Holger Michel, Björn Fiethe, Technische Univ. Braunschweig (Germany); Dietmar Walter, DSI GmbH (Germany); Harald Michalik, Technische Univ. Braunschweig (Germany) [9646-11]

14:10: **APES-based procedure for super-resolution SAR imagery with GPU parallel computing**, Weiwei Jia, Xiaojian Xu, Guangyao Xu, BeiHang Univ. (China) [9646-12]

14:30: **FAPEC-based lossless and lossy hyperspectral data compression**, Jordi Portell de Mora, Univ. de Barcelona (Spain); Gabriel Artigues, Institut de Ciències de l'Espai (Spain); Enrique García-Berro, Univ. Politécnica de Catalunya (Spain); Riccardo Iudica, Sergi García-Almoril, Univ. de Barcelona (Spain) [9646-13]

14:50: **GPU-accelerated computation of faced-based investigation on electromagnetic scattering from the dynamic ocean surface with volume scattering**, Longxiang Ling-Hu, Xidian Univ (China) [9646-14]

15:10: **Application of Intel Many Integrated Core (MIC) accelerators to the Pleim-Xiu land surface scheme**, Melin Huang, Bormin Huang, Hung-Lung A. Huang, Univ. of Wisconsin-Madison (United States) [9646-15]

Coffee Break Mon 15:30 to 16:00

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Remote Sensing 2015

For details, please see special events section in the printed programme or visit <http://spie.org/remote-sensing-europe.xml>

TUESDAY 22 SEPTEMBER

SESSION 4

LOCATION: DIAMANT TUE 8:50 TO 10:10

High Performance Computing IV

Session Chair: **Jose M. Nascimento**,
Instituto de Telecomunicações (Portugal)

8:50: **GPU-Based ray tracing algorithm for high-speed propagation prediction in multiroom indoor environments**, Xiaowei Guan, Lixin Guo, Zhongyu Liu, Xidian University (China) [9646-16]

9:10: **Performance tuning Weather Research and Forecasting (WRF) Goddard longwave radiative transfer scheme on Intel Xeon Phi**, Jarno Mielikainen, Bormin Huang, Hung-Lung A. Huang, Univ. of Wisconsin-Madison (United States) [9646-17]

9:30: **A novel hardware-friendly algorithm for hyperspectral linear unmixing**, Raúl Guerra, Lucana Santos, Sebastián López, Roberto Sarmiento, Univ. de Las Palmas de Gran Canaria (Spain) [9646-18]

CONFERENCE 9646 - ROOM: DIAMANT

9:50: **Parallel implementation of the multiple endmember spectral mixture analysis algorithm for hyperspectral unmixing**, Sergio Bernabé García, Francisco D. Igual, Guillermo Botella, Manuel Prieto-Matías, Univ. Complutense de Madrid (Spain); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain) [9646-20]
Coffee Break Tue 10:10 to 10:40

SESSION 5

LOCATION: DIAMANT TUE 10:40 TO 12:00

High Performance Computing V

Session Chair: **Lizhe Wang**,
Institute of Remote Sensing and Digital Earth (China)

10:40: **MESMA based on collaborative sparse unmixing**, Xiang Xu, Jun Li, Sun Yat-Sen Univ. (China) [9646-21]

11:00: **Region of interest detection in remote sensing images based on integer wavelet transform and color opponent mechanism**, Libao Zhang, Jie Chen, Jue Zhang, Beijing Normal Univ. (China) [9646-23]

11:20: **Performance portability study of an automatic target detection and classification algorithm for hyperspectral image analysis using OpenCL**, Sergio Bernabé García, Francisco D. Igual, Guillermo Botella, Carlos E. Garcia Gonzalez, Manuel Prieto-Matías, Univ. Complutense de Madrid (Spain); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain) [9646-24]

11:40: **Accelerating the prediction-based lower triangular transform for data compression using Intel MIC**, Shih-Chieh Wei, Tamkang Univ. (Taiwan); Bormin Huang, University of Wisconsin-Madison (United States) [9646-25]

Lunch/Exhibition Break Tue 12:00 to 13:30

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 6

LOCATION: AUDITORIUM SAINT EXUPÉRY TUE 13:30 TO 15:10

High Performance Computing VI

Please note the room change. The session will take place in Auditorium Saint Exupéry.

Session Chair: **Jun Li**, Sun Yat-Sen Univ. (China)

13:30: **Optimizing the Betts-Miller-Janjic cumulus parameterization on the Intel Xeon Phi Many-Core coprocessor**, Melin Huang, Bormin Huang, Hung-Lung A. Huang, Univ. of Wisconsin-Madison (United States) [9646-26]

13:50: **Parallel hyperspectral compressive sensing method on GPU**, Sergio Bernabé García, Gabriel Martín Hernández, Jose M. Nascimento, Instituto de Telecomunicações (Portugal) [9646-27]

14:10: **Bistatic scattering characteristics of the vegetation base on the second-order vector radiative transfer theory**, Yuanyuan Zhang, Xidian Univ (China); Zhensen Wu, Xidian Univ. (China); Kaiyuan Fu, Xidian Univ (China) [9646-28]

14:30: **GPU-based parallel clustered different pulse code modulation**, Wenzhe Li, Jiaji Wu, Wanqiu Kong, Xidian Univ (China) [9646-29]

14:50: **Hyperspectral unmixing based on local collaborative sparse regression**, Shaoquan Zhang, Jun Li, Sun Yat-Sen Univ. (China); José M. Bioucas-Dias, Univ. de Lisboa (Portugal); Antonio J. Plaza Miguel, Univ. de Extremadura (Spain) [9646-30]

Coffee Break Tue 15:10 to 15:30

SESSION 7

LOCATION: AUDITORIUM SAINT EXUPÉRY TUE 15:30 TO 16:30

High Performance Computing VII

Please note the room change. The session will take place in Auditorium Saint Exupéry.

Session Chair: **Valeriy V. Strotov**,

Ryazan State Radio Engineering Univ. (Russian Federation)

15:30: **Differential evolution algorithm-based kernel parameter selection for Fukunaga-Koontz Transform Subspaces Construction**, Abdullah Bal, Huseyin Cukur, Yildiz Technical Univ (Turkey) [9646-31]

15:50: **Accelerated ray tracing algorithm under urban macro cell**, Zhongyu Liu, Lixin Guo, Xiaowei Guan, Xidian Univ. (China) [9646-32]

16:10: **Region of saliency detection based on low-level contrast features for remote sensing images**, Libao Zhang, Shuang Wang, Beijing Normal Univ. (China) [9646-33]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Remote Sensing poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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 scale effects of anisotropic land surface reflectance: an analysis with Landsat and Modis imagery, Lu Bai, Xun Huang, Zhensen Wu, Lixin Guo, Xidian Univ (China) [9646-19]

Semi-supervised classification tool for DubaiSat-2 multispectral images, Saeed H. Al-Mansoori, Emirates Institution for Advanced Science and Technology (United Arab Emirates) [9646-22]

Parallel algorithm of real-time infrared image restoration based on total variation theory, Ran Zhu, Wei An, YunLi Long, Yaoyuan Zeng, Miao Li, National Univ. of Defense Technology (China) [9646-34]

GPU implementation of the discrete artificial bee colony for hyperspectral unmixing, Yuanchao Su, Sun Yat-Sen Univ. (China); Sun Xu, Institute of Remote Sensing and Digital Earth (China); Jun Li, Sun Yat-Sen Univ. (China); Lianru Gao, Institute of Remote Sensing and Digital Earth (China) [9646-35]

Fault tolerance of SVM algorithm for hyperspectral image, Yabo Cui, Institute of Remote Sensing and Digital Earth (China); Zhengwu Yuan, College of Computer Science and Technology, Chongqing Univ. of Posts and Telecommunications (China); Yuanfeng Wu, Lianru Gao, Hao Zhang, Key laboratory of Digital Earth Science, Institute of Remote Sensing and Digital Earth (China) [9646-36]

A lossless compression algorithm for aurora spectral data using online regression prediction, Wanqiu Kong, Mingxia Dang, Jiaji Wu, Xidian University (China) [9646-37]

An empirical model for the prediction of the bistatic scattering characteristics from soil surface in microwave band, Zhensen Wu, Yuanyuan Zhang, Xidian Univ (China); Yunhua Cao, Xidian Univ. (China) [9646-38]

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2015 SECURITY+ DEFENCE.

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Security + Defence

HYPERSPECTRAL SENSING: VIRTUAL PROGRAMME TRACK

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

9652: OPTICS AND PHOTONICS FOR COUNTER-TERRORISM, CRIME FIGHTING, AND DEFENCE

MONDAY 21 SEPTEMBER 2015

Location: Guillaumet 2

9:30 Hyperspectral detection and scalable LTE technology-based alerting for CBRNE threats [9652-2]

9:50 Multispectral analysis of biological agents to implement a quick tool for stand-off biological detection [9652-3]

9649: ELECTRO-OPTICAL REMOTE SENSING, PHOTONIC TECHNOLOGIES, AND APPLICATIONS

TUESDAY 22 SEPTEMBER 2015

Location: Guillaumet 1

16:00 Compact full-motion video hyperspectral cameras: development, image processing, and applications (Invited Paper) [9649-27]

16:30 Inter-instrument registration for the airborne hyperspectral system, Sysiphe [9649-28]

16:50 Airborne thermal infrared hyperspectral imaging of buried objects [9649-29]

17:10 Design of a compact hyperspectral imaging spectrometer for mid-infrared applications [9649-30]

9648: ELECTRO-OPTICAL AND INFRARED SYSTEMS: TECHNOLOGY AND APPLICATIONS

TUESDAY 22 SEPTEMBER

Location: Spot

13:40 Simulation of a multispectral, multicamera, off-road autonomous vehicle perception system with Virtual Autonomous Navigation Environment (VANE) (Invited Paper) [9648-1]

14:10 Time-resolved multispectral imaging of combustion reaction [9648-2]

14:30 Stand-off detection of liquid thin films using active mid-infrared hyperspectral imaging [9648-3]

WEDNESDAY 23 SEPTEMBER

14:00 A multiscale contrast direction adaptation approach for the fusion of multispectral and multifocus infrared images [9648-19]

9647: UNMANNED/UNATTENDED SENSORS AND SENSOR NETWORKS

WEDNESDAY 23 SEPTEMBER

Location: Auditorium

10:10 Preprocessing and compression of hyperspectral images captured onboard UAVs [9647-3]

9653: TARGET AND BACKGROUND SIGNATURES

THURSDAY 24 SEPTEMBER

Location: Guillaumet 1

9:00 An approach to optimal hyperspectral and multispectral signature and image data fusion for detecting hidden targets on shorelines (Invited Paper) [9653-18]

9:30 Assessment of target detection limits in hyperspectral data [9653-19]

9:50 Utilization of hyperspectral camera for determination of camouflage surfaces spectral characteristics homogeneity [9653-20]

10:10 Analysis of exploitable spectral features of target and background materials [9653-21]

CONFERENCE 9647A - ROOM: AUDITORIUM

Wednesday 23 September 2015 • Proceedings of SPIE Vol. 9647

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); **Pierre J. Corriveau**, Naval Undersea Warfare Ctr. (United States); **Sachi V. Desai**, U.S. Army Armament Research, Development and Engineering Ctr. (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); **Nino Srour**, U.S. Army Research Lab. (United States); **Huib A.J.M. van Hoof**, TNO Defence, Security and Safety (Netherlands)

WEDNESDAY 23 SEPTEMBER

OPENING REMARKS

LOCATION: AUDITORIUM 8:20 TO 8:30
Edward M. Carapezza, EMC Consulting LLC (United States)

SESSION 1

LOCATION: AUDITORIUM WED 8:30 TO 9:50

Keynote Session I

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

8:30: **Next-generation sensors and sensor networks** (Keynote Presentation), George C. McNamara, Naval Undersea Warfare Ctr. (United States) [9647-1]
9:10: **Recent breakthroughs in quantum cascade lasers** (Keynote Presentation), Manijeh Razeghi, Northwestern Univ. (United States) [9647-19]

SESSION 2

LOCATION: AUDITORIUM WED 9:50 TO 12:40

Detectors, Devices, Sensors and Sensor Processing

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

9:50: **Chemical detection using IR quantum cascade lasers**, Panos G Datskos, Marissa E. Morales-Rodríguez, Lawrence R Senesac, Oak Ridge National Lab (United States) [9647-2]
10:10: **Preprocessing and compression of hyperspectral images captured onboard UAVs**, Rolando R. Herrero, Northeastern Univ. (United States); Martin Cadirola, Ecotronics Ventures, LLC (United States); Vinay K. Ingle, Northeastern Univ. (United States) [9647-3]
Coffee Break Wed 10:30 to 11:00
11:00: **Anomaly detection and situation assessment in indoor location using symbolic pattern recognition**, Pristley Sathyaraj Selvakumar Samraj, Univ. of Calgary (Canada) [9647-4]
11:20: **The use of composite fence with integrated sensors in security systems**, Mieczyslaw Szustakowski, Piotr Markowski, Wieslaw Czurapi?ski, Marek Zyczkowski, Mateusz Karol, Military Univ. of Technology (Poland) [9647-5]
11:40: **Doppler microsense and radar**, Ashok Gorwara, Planar Monolithic Industries, Inc. (United States); Pavlo A. Molchanov, Planar Monolithic Industries (United States); Olha V. Asmolova, U.S. Air Force Academy (United States) [9647-6]
12:00: **Small arms corrosion protection comparison study**, Slobodan Rajic, William R. Lawrence, Panos G. Datskos, Oak Ridge National Lab. (United States) [9647-7]

12:20: **Unattended and remote inertial sensors on surface acoustic waves**, Sergey Y. Shevchenko, Alexander S. Kukaev, Dmitry Lukyanov, Maria Khivrich, Roman Telichkin, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [9647-8]
Lunch/Exhibition Break Wed 12:40 to 13:50

SESSION 3

LOCATION: AUDITORIUM WED 13:50 TO 15:10

Keynote Session II

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

13:50: **Robotics and robot-assisted search and rescue** (Keynote Presentation), John G. Blich, Colorado State Univ. (United States) [9647-10]
14:30: **Cost efficient unmanned aircraft systems in crisis management and modern hybrid warfare: Ukrainian case study** (Keynote Presentation), Andre Samberg, EU IMG-S TA7 (Finland) [9647-11]

Coffee Break Wed 15:10 to 15:40

SESSION 4

LOCATION: AUDITORIUM WED 15:40 TO 17:00

Unmanned and Unattended Sensor Systems

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

15:40: **Developing command and control for cross-domain unmanned vehicle operations**, Lynn Ewart, Naval Undersea Warfare Ctr. (United States) [9647-12]
16:00: **A system concept for persistent, unmanned, local-area Arctic surveillance**, Bruce McArthur, Defence Research and Development Canada, Atlantic (Canada) [9647-15]
16:20: **Detection and tracking of drones using advanced acoustic cameras**, Joel Busset, Florian Perrodin, Distran GmbH (Switzerland); Peter Wellig, Beat Ott, Armasuisse (Switzerland); Kurt Heutschi, EMPA (Switzerland); Torben Rühl, Thomas Nussbaumer, RUAG Defence (Switzerland) [9647-16]
16:40: **UAS network testbed in national civil protection in Ukraine**, Andre Samberg, EU IMG-S TA7 (Finland); Sergey G. Chumachenko, Ukrainian Research Institute of Civil Protection (Ukraine); Stanislav Valuisky, Nokia Networks (Ukraine); Sergiy Kashuba, Bogdan Trach, Technische Univ. Dresden (Germany) [9647-17]

CONFERENCE 9647B - ROOM: ARIANE 2

Thursday 24 September 2015 • Proceedings of SPIE Vol. 9647

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: **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)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Security+Defence poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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/ix32234.xml>.

Study on rejection characteristic of current loop to the base disturbance of optical communication system, Yao Mao, Institute of Optics and Electronics (China) and Chinese Academy of Sciences (China); Yun-Xia Xia, Qi-liang Bao, Yong-mei Huang, Institute of Optics and Electronics (China). [9647-31]

Multiloop control method for large aperture fast steering mirror, Yong-mei Huang, Tao Yang, Xiang Liu, Qiang Wang, Bo Liu, Institute of Optics and Electronics (China). [9647-32]

THURSDAY 24 SEPTEMBER

WELCOME AND INTRODUCTION

LOCATION: ARIANE 2 9:00 TO 9:10

SESSION 6

LOCATION: ARIANE 2 THU 9:10 TO 10:20

Advanced Free-Space Optical Communication I

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

9:10: **Preliminary results of Terabit-per-second long-range free-space optical transmission experiment THRUST (Invited Paper)**, Dirk Giggenbach, Juraj Poliak, Ramon Mata-Calvo, Christian Fuchs, Fabian Rein, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Nicolas Perlot, Ronald Freund, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) [9647-21]

9:40: **Ground stations for aeronautical and space laser communications at German Aerospace Center**, Florian Moll, Christian Fuchs, Amita Shrestha, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9647-22]

10:00: **LCT for EDRS: LEO to GEO optical communications at 1,8 Gbps between Alphasat and Sentinel 1A**, Herwig Zech, Frank Heine, Stefan Seel, Daniel Tröndle, Matthias Motzigemba, Tesat-Spacecom GmbH & Co. KG (Germany); Rolf Meyer, Sabine Philipp-May, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9647-23]

Coffee Break Thu 10:20 to 10:50

SESSION 7

LOCATION: ARIANE 2 THU 10:50 TO 12:10

Advanced Free-Space Optical Communication II

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

10:50: **Evaluation of Error Correcting Code performances of a free space optical communication system between LEO satellite and Ground Station**, Marcin Chochol, Angélique Rissons, Jerome Lacan, Institut Supérieur de l'Aéronautique et de l'Espace (France); Nicolas Vedrenne, ONERA (France); Geraldine Artaud, Ctr. National d'Études Spatiales (France) [9647-24]

11:10: **Code design for laser ethernet transceiver for free space optical communications**, Amita Shrestha, Julio Cesar Ramirez Molina, Dirk Giggenbach, Jorge Pacheco-Labrador, Christopher Schmidt, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9647-25]

11:30: **Solid state beam steering for optical communications with an unmanned aerial vehicle**, Yoann P. Thueux, Airbus Defence and Space (United Kingdom); Gavin R. Erry, Airbus Defence and Space (United Kingdom); Crisanto Quintana-Sanchez, Dominic C. O'Brien, Univ. of Oxford (United Kingdom) [9647-26]

11:50: **HgCdTe APDs for free-space optical communications**, Johan Rothman, Julie Baergel, CEA-LETI (France) [9647-27]

Lunch Break Thu 12:10 to 13:30

SESSION 8

LOCATION: ARIANE 2 THU 13:30 TO 14:30

Advanced Free-Space Optical Communication III

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

13:30: **Al0.52In0.48P as a detector for wireless underwater communication**, Jeng Shiuh Cheong, Liang Qiao, The Univ. of Sheffield (United Kingdom); Jennifer S. L. Ong, The Univ. of Sheffield (United Kingdom) and The Univ. of Malaya (Malaysia); Jo Shien Ng, Andrey B. Krysa, John P. R. David, The Univ. of Sheffield (United Kingdom) [9647-28]

13:50: **LiFi developments within the UPVLC project**, M. Dawson, Univ. of Strathclyde (United Kingdom); Harald Haas, Dominic C. O'Brien, The Univ. of Edinburgh (United Kingdom) [9647-29]

14:10: **A responsive space: multimission satellites, a look to 2030**, Laura Samsó Pericon, Centurion Technologies Consulting LLC (Spain) [9647-30]

CONFERENCE 9648A - ROOM: SPOT

Tuesday - Wednesday 22-23 September 2015 • Proceedings of SPIE Vol. 9648

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)

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); **G rard Dest fanis**, Commissariat   l' nergie Atomique (France); **Judith Dijk**, TNO Defence, Security and Safety (Netherlands); **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); **Jos  Manuel L pez-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)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

WELCOME AND INTRODUCTION

LOCATION: SPOT 13:30 TO 13:40

SESSION 1

LOCATION: SPOT TUE 13:40 TO 15:30

Active and Spectral Systems

Session Chairs: **Stephen T. Lee**, Thales Optronics Ltd. (United Kingdom); **Judith Dijk**, TNO Defence, Security and Safety (Netherlands); **Jose Alonso**, Univ. Complutense de Madrid (Spain); **Philip J. Soan**, Defence Science and Technology Lab. (United Kingdom)

13:40: **Simulation of a multispectral, multicamera, off-road autonomous vehicle perception system with Virtual Autonomous Navigation Environment (VANE)** (Invited Paper), David R. Chambers, Jason Gassaway, Southwest Research Institute (United States); Christopher T. Goodin, Phillip J. Durst, U.S. Army Engineer Research and Development Ctr. (United States) [9648-1]

14:10: **Time-resolved multispectral imaging of combustion reaction**, Alexandrine Huot, Marc-Andr  Gagnon, Karl-Alexandre Jahjah, Pierre Tremblay, Simon Savary, Vincent Farley, Philippe Lagueux, Telops (Canada);  ric Guyot, Telops (France); Martin Chamberland, Fr d rick Marcotte, Telops (Canada) [9648-2]

14:30: **Stand-off detection of liquid thin films using active mid-infrared hyperspectral imaging**, Luke Maidment, Heriot-Watt University (United Kingdom) and Defence Science and Technology Laboratory (United Kingdom); Zhaowei Zhang, Heriot-Watt University (United Kingdom); Christopher R Howle, Defence Science and Technology Laboratory (United Kingdom); Stephen T Lee, Alan Christie, Thales Optronics (United Kingdom); Derryck T Reid, Heriot-Watt University (United Kingdom) [9648-3]

14:50: **Performance assessment of simulated 3D laser images using Geiger-mode avalanche photodiode: tests on simple synthetic scenarios**, Antoine Coyac, Laurent Hespel, Nicolas Riviere, Xavier Briottet, ONERA (France) [9648-4]

15:10: **Long-range concealed object detection through active covert illumination**, Ian J. Hales, Univ. of the West of England (United Kingdom); David R Williamson, University of the West of England (United Kingdom); Mark F. Hansen, Univ. of the West of England (United Kingdom); Laurence Broadbent, Aralia Systems Ltd. (United Kingdom); Melvyn Smith, Univ. of the West of England (United Kingdom) [9648-5]

Coffee Break Tue 15:30 to 16:00

SESSION 2

LOCATION: SPOT TUE 16:00 TO 17:30

Broadband EO Systems

Session Chairs: **Gisele Bennett**, Georgia Institute of Technology (United States); **Armin L. Schneider**, Institut Franco-Allemand de Recherches de Saint-Louis (France); **Jan Y. Andersson**, Acreo Swedish ICT AB (Sweden)

16:00: **Use of algorithmic behavioral transfer functions in parametric EO system performance models** (Invited Paper), Duncan L. Hickman, Moira I. Smith, Tektonex Ltd. (United Kingdom) [9648-6]

16:30: **Mission configurable EO imaging system for the maritime environment**, Alex Wellman, L-3 KEO (United States) [9648-7]

16:50: **Compressive sensing applications for single detector rosette scanning infrared seekers**, Hande Uzeler, Serdar Cakir, Tayfun Ayta , T B?TAK B?LGEM ?LTAREN (Turkey) [9648-8]

17:10: **A probabilistic blur detection approach for the autofocus of infrared images**, Serdar Cakir, TUBITAK BILGEM ILTAREN (Turkey); A. Enis Cetin, Bilkent University (Turkey) [9648-9]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Security+Defence poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Test and analysis of spectral response for UV image intensifier, Yunsheng Qian, Jian Liu, Cheng Feng, Nanjing Univ. of Science and Technology (China); Yang Lv, Nanjing University of Science and Technology (China); Yijun Zhang, Nanjing Univ. of Science and Technology (China) [9648-25]

High precision of LOS stabilization of shipboard ATP system using a novel second stabilization method, Yun-Xia Xia, Qi-liang Bao, Yao Mao, Yong-mei Huang, Institute of Optics and Electronics (China); Hai-feng Yang, Southwest China Research Institute of Electronic Technology (China) [9648-26]

Adaptive inverse control for gyro stabilized platform of electro-optical tracking system, Yun-Xia Xia, Qi-liang Bao, Institute of Optics and Electronics (China); Hai-feng Yang, Southwest China Research Institute of Electronic Technology (China); Yao Mao, Yong-mei Huang, Institute of Optics and Electronics (China) [9648-27]

Some design considerations for high-performance infrared imaging seeker, Jinxiang Fan, Shanghai Mechanical-Electronic Engineering Institute (China) [9648-29]

A long life integration CES, Zhijun Tu, Beijing Institute of Control Engineering (China) [9648-30]

Fast measurement of temporal noise of digital camera's photosensors, Pavel A. Cheremkhin, Nikolay N. Evtikhiev, Vitaly V. Krasnov, Vladislav G. Rodin, Rostislav S. Starikov, Sergey N. Starikov, National Research Nuclear Univ. MEPhI (Russian Federation) [9648-31]

Modeling of digital information optical encryption system with spatially incoherent illumination, Vitaly V. Krasnov, Alyona P. Bondareva, Pavel A. Cheremkhin, Vladislav G. Rodin, Rostislav S. Starikov, Sergey N. Starikov, National Research Nuclear Univ. MEPhI (Russian Federation) [9648-32]

CONFERENCE 9648A - ROOM: SPOT

WEDNESDAY 23 SEPTEMBER

SESSION 3

LOCATION: SPOT WED 9:00 TO 10:30

Optical Technologies

Session Chairs: **David A. Huckridge**, Ridgeway Consulting (United Kingdom); **Piet Bijl**, TNO Defence, Security and Safety (Netherlands); **Gordon A. Cain**, Vision4ce Ltd. (United Kingdom); **Robert A. Lamb**, SELEX ES (United Kingdom)

9:00: **Areal density and systems implications of primary mirror material choices** (*Invited Paper*), Tony B. Hull, The Univ. of New Mexico (United States) [9648-10]

9:30: **ZERODUR®: an ideal optical material for future spaceborne**, Thomas Westerhoff, SCHOTT AG (Germany); Tony B. Hull, The Univ. of New Mexico (United States) [9648-11]

9:50: **Noncontact distance measurement for IR optical assemblies with low coherence interferometry**, Bernd Lueerss, Patrik Langehanenberg, TRIOPTICS GmbH (Germany) [9648-12]

10:10: **Digital holographic interferometer with correction of distortions**, Vladimir Y. Venediktov, Alexander A. Sevryugin, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [9648-13]

Coffee Break Wed 10:30 to 11:00

SESSION 4

LOCATION: SPOT WED 11:00 TO 12:00

Electro-Optical Detectors

Session Chairs: **Reinhard Ebert**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Rainer Breiter**, AIM INFRAROT-MODULE GmbH (Germany); **Christopher C. Alexay**, StingRay Optics, LLC (United States)

11:00: **Light harvesting structures for sensing infrared radiation**, Fernando de León-Pérez, Centro Univ. de la Defensa Zaragoza (Spain) [9648-14]

11:20: **A true differential pyroelectric IR detector with improved D***, Alan P. Doctor, Laser Components Pyro Group, Inc. (United States) [9648-15]

11:40: **A new generation of small pixel pitch SWaP cooled infrared detectors**, Laurent Espuno, Yann Reibel, Laurent Rubaldo, Alexandre Kerlain, Nicolas Péré-Laperne, SOFRADIR (France); Aurelien Petit dit Dariel, CEA-LETI (France); Gilbert Decaens, Vincent Badet, Laurent Baud, Régis Cotte, Julien Roumegoux, Antoine Kessler, Patrick Maillart, Nicolas Ricard, Olivier Pacaud, SOFRADIR (France); Olivier Gravrand, Pierre Castelein, CEA-LETI (France) [9648-16]

Lunch/Exhibition Break Wed 12:00 to 13:10

SESSION 5

LOCATION: SPOT WED 13:10 TO 14:40

Processing

Session Chairs: **Bernd Eberle**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Gérard Destéfanis**, CEA-LETI (France); **David J. Clarke**, Placing Value Co.,Ltd (Thailand)

13:10: **Vehicle tracking in wide area motion imagery from an airborne platform** (*Invited Paper*), Jasper van Huis, Adam van Eekeren, Jan Baan, Pieter T. Eendebak, TNO (Netherlands) [9648-17]

13:40: **Information hiding techniques for Infrared Images: exploring the state-of-the art and challenges**, Victor V. Pomponiu, Singapore Univ. of Technology & Design (Singapore); Davide Cavagnino, Marco Botta, Univ. degli Studi di Torino (Italy); Hossein Nejati, Singapore Univ. of Technology & Design (Singapore) [9648-18]

14:00: **A multiscale contrast direction adaptation approach for the fusion of multispectral and multifocus infrared images**, Onur A. Karali, Serdar Cakir, Tayfun Aytaç, TÜB?TAK B?LGEM ?LTAREN (Turkey) [9648-19]

14:20: **Graph Laplacian regularization-based edge-preserving background estimation for single frame small target detection**, Yuehuan Wang, Kun Bai, Qiong Song, Huazhong Univ. of Science and Technology (China); Mingna Liu, Jiandong Wu, Institute of Shanghai Aerospace Control Technology (China) [9648-21]

CONFERENCE 9648B - ROOM: CARAVELLE 2

Tuesday 22 September 2015 • Proceedings of SPIE Vol. 9648

Quantum Information Science and Technology

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

Programme Committee: **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); **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)

TUESDAY 22 SEPTEMBER

OPENING REMARKS

LOCATION: CARAVELLE 2:8:25 TO 8:30

SESSION 10

LOCATION: CARAVELLE 2 TUE 8:30 TO 10:00

Security of Quantum Information Systems

Session Chair: **Alexander Ling**, National Univ of Singapore (Singapore)

8:30: **Practical security of a quantum key distribution transmitter** (*Invited Paper*), Marco Lucamarini, James F. Dynes, Toshiba Research Europe Ltd. (United Kingdom) and Toshiba Corp. (Japan); Iris Choi, Toshiba Research Europe Ltd. (United Kingdom) and Univ. of Oxford (United Kingdom); Martin B. Ward, Toshiba Research Europe Ltd. (United Kingdom); Bernd Fröhlich, Toshiba Research Europe Ltd (United Kingdom); Zhiliang Yuan, Andrew J. Shields, Toshiba Research Europe Ltd. (United Kingdom) and Toshiba Corp. (Japan) [9648-41]

9:00: **Practical aspects of security certification for commercial quantum technologies**, Nino Walenta, Battelle Memorial Institute (United States); Mathilde Soucarros, Dario Caselunghe, Mathias Domergue, id Quantique SA (Switzerland); Michael A. Hagerman, Randall E. Hart, Don T. Hayford, Battelle Memorial Institute (United States); Raphael Houlmann, Matthieu Legré, id Quantique SA (Switzerland); Todd A. McCandlish, Battelle Memorial Institute (United States); Jean-Benoît Page, Damien Stucki, id Quantique SA (Switzerland); Maurice A. Tourville, Richard L. Wolterman, Battelle Memorial Institute (United States) [9648-42]

9:20: **Quantum hacking on practical continuous-variable quantum cryptosystem by inserting an external light**, Hao Qin, Rupesh Kumar, Romain Alléaume, Télécom ParisTech (France) [9648-43]

9:40: **Compensation of side-channel noise infusion on the receiver side in continuous-variable quantum key distribution**, Ivan D. Derkach, Vladyslav C. Usenko, Radim Filip, Palack? Univ. Olomouc (Czech Republic) [9648-44]

Coffee Break Tue 10:00 to 10:30

SESSION 11

LOCATION: CARAVELLE 2TUE 10:30 TO 12:20

Quantum Cryptography: Protocols and Implementations

Session Chair: **Marco Lucamarini**, Toshiba Research Europe Ltd. (United Kingdom) and Toshiba Corp. (Japan)

10:30: **Bridging the gap between theory and practice in quantum cryptography** (*Invited Paper*), Marcos Curty, University of Vigo (Spain); Kiyoshi Tamaki, NTT Basic Research Laboratories, NTT corporation (Japan); Feihu Xu, Research Laboratory of Electronics, Massachusetts Institute of Technology (United States); Akihiro Mizutani, Osaka Univ. (Japan); Charles Ci Wen Lim, Bing Qi, Oak Ridge National Laboratory (United States); Hoi-Kwong Lo, University of Toronto (Canada) [9648-45]

11:00: **Establishing security of quantum key distribution without monitoring disturbance** (*Invited Paper*), Masato Koashi, Univ of Tokyo (Japan) ... [9648-46]

11:30: **High-rate measurement-device-independent quantum cryptography: theory and experiment** (*Invited Paper*), Stefano Pirandola, The Univ. of York (United Kingdom) [9648-47]

12:00: **Continuous-variable quantum key distribution with a single quadrature modulation**, Vladyslav C Usenko, Palack? Univ Olomouc (Czech Republic); Frederic Grosshans, Laboratoire Aimé Cotton, UPR CNRS (France) [9648-48]

Lunch/Exhibition Break Tue 12:20 to 13:50

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 12

LOCATION: CARAVELLE 2 TUE 13:50 TO 15:30

Technologies for Quantum Information Systems

Session Chair: **Masato Koashi**, Univ of Tokyo (Japan)

13:50: **Deploying quantum light sources on nanosatellites: lessons and perspectives** (*Invited Paper*), Alexander Ling, National Univ of Singapore (Singapore) [9648-49]

14:20: **On-chip self-referenced continuous variable QKD** (*Invited Paper*), Ryan Camacho, Sandia National Labs. (United States) [9648-50]

14:50: **A low bias variation SPAD-based pixel for a quantum random number generator**, Nicola Massari, Leonardo Gasparini, Alessandro Tomasi, Fondazione Bruno Kessler (Italy); Alessio Meneghetti, Univ. degli Studi di Trento (Italy); Daniele Perenzoni, David Stoppa, Fondazione Bruno Kessler (Italy) ... [9648-51]

15:10: **Heralded single-photon source from spontaneous four-wave mixing process in lossy waveguides**, Nuno A. Silva, Instituto de Telecomunicações (Portugal) and Univ. de Aveiro (Portugal); Armando N. Pinto, Instituto de Telecomunicações (Portugal) and Unvi. de Aveiro (Portugal) [9648-52]

Coffee Break Tue 15:30 to 16:00

SESSION 13

LOCATION: CARAVELLE 2TUE 16:00 TO 17:50

Quantum Computation and Quantum Information Theory

Session Chair: **Marcos Curty**, University of Vigo (Spain)

16:00: **Benchmarking D-wave quantum annealing systems** (*Invited Paper*), Catherine McGeoch, D-Wave Systems Inc. and Amherst College (United States) [9648-53]

16:30: **Quantum annealing on Ising spin glasses** (*Invited Paper*), Troels Rønnow, Nokia Research Ctr. UK (United Kingdom) [9648-54]

17:00: **Locking capacity vs private capacity of quantum channels** (*Invited Paper*), Andreas Winter, Universitat Autònoma de Barcelona (Spain) .. [9648-55]

17:30: **A complete classification of quantum public-key encryption protocols**, Chenmiao Wu, Li Yang, Institute of Information Engineering (China) [9648-57]

CONFERENCE 9649 - ROOM: GUILLAUMET 1

Monday - Tuesday 21-22 September 2015 • Proceedings of SPIE Vol. 9649

Electro-Optical Remote Sensing, Photonic Technologies, and Applications IX

Conference Chairs: **Gary Kamerman**, FastMetrix, Inc. (United States); **Ove Steinvall**, Swedish Defence Research Agency (Sweden); **Keith L. Lewis**, Sciovis Ltd. (United Kingdom); **John D. Gonglewski**, European Office of Aerospace Research and Development (United Kingdom)

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 Stenersen**, Norwegian Defence Research Establishment (Norway); **Monte D. Turner**, Air Force Research Lab. (United States)

MONDAY 21 SEPTEMBER

OPENING REMARKS

LOCATION: GUILLAUMET 1 8:25 TO 8:30

SESSION 1

LOCATION: GUILLAUMET 1 MON 8:30 TO 10:20

Active Sensing

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

8:30: **SWIR laser gated-viewing at Fraunhofer IOSB** (*Invited Paper*), Benjamin Göhler, Peter Lutzmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9649-1]

9:00: **Accuracy evaluation of 3D lidar data from small UAV**, H. M. Tulldahl, Fredrik Bissmarck, Håkan Larsson, Christina Grönwall, Gustav Tolt, FOI-Swedish Defence Research Agency (Sweden) [9649-2]

9:20: **Pulsed, tunable, single-frequency OP-GaAs OPO for the standoff detection of hazardous chemicals in the long-wave infrared**, Quentin Clément, Jean-Michel Melkonian, Jean-Baptiste Dherbecourt, Myriam Raybaut, ONERA (France); Arnaud Grisard, Eric Lallier, Thales Research & Technology (France); Basile Faure, Grégoire Souhaité, Teem Photonics S.A. (France) [9649-3]

9:40: **Reconstruction of time-correlated single-photon counting range profiles of moving objects**, Per M. Jonsson, Julia Hedborg, Markus Henriksson, Lars J. Sjöqvist, FOI-Swedish Defence Research Agency (Sweden) [9649-4]

10:00: **Lidar measurement as support to the ocular hazard distance calculation using atmospheric attenuation**, Ove K. S. Gustafsson, Rolf Persson, Frank Gustafsson, Folke Berglund, FOI-Swedish Defence Research Agency (Sweden); Jonas Malmquist, Försvarets Materielverk (Sweden) . [9649-5]

Coffee Break Mon 10:20 to 10:50

SESSION 2

LOCATION: GUILLAUMET 1 MON 10:50 TO 12:30

Passive Sensing and Processing

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

10:50: **Evaluating uniformity of IR reference sources**, Catherine Barrat, Sébastien Violleau, HGH Systèmes Infrarouges (France) [9649-6]

11:10: **An approach to select the appropriate image fusion algorithm for night vision systems**, Gabriele Schwan, Norbert Scherer-Negenborn, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9649-7]

11:30: **Field trials for development of multiband signal processing solutions to detect disturbed soil**, Henrik Petersson, David K. J. Gustafsson, FOI-Swedish Defence Research Agency (Sweden) [9649-8]

11:50: **Classification of vegetation types in military region**, Miguel Gonçalves, Jose Silvestre Silva, Academia Militar (Portugal); José M. Bioucas-Dias, Instituto Superior Técnico (Portugal) [9649-9]

12:10: **Hue-preserving local contrast enhancement and illumination compensation for outdoor color images**, Marco Tektonidis, David Monnin, Frank Christnacher, Institut Franco-Allemand de Recherches de Saint-Louis (France) [9649-10]

Lunch Break Mon 12:30 to 13:40

SESSION 3

LOCATION: GUILLAUMET 1 MON 13:40 TO 15:30

Multisensor Systems

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

13:40: **3D sensing and imaging for UAVs** (*Invited Paper*), Christina Grönwall, FOI-Swedish Defence Research Agency (Sweden) and Linköping Univ. (Sweden); Gustav Tolt, Håkan Larsson, Patrik Lif, Fredrik Bissmarck, H. M. Tulldahl, FOI-Swedish Defence Research Agency (Sweden) [9649-11]

14:10: **Comparison of high-speed imaging technique to laser vibrometry for detection of vibration information from objects**, Gabriela Paunescu, Peter Lutzmann, Benjamin Göhler, Daniel Wegner, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9649-12]

14:30: **A multimodal digital periscope on a mobile experimental sensorplatform**, Simon Lemaire, Volker Schatz, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . [9649-13]

14:50: **MINACE filters application for recognition of objects represented by images from different sources**, Evgenii Y. Zlokazov, Rostislav S. Starikov, Dmitry V. Shaulskiy, Nikolay N. Evtikhiev, Elizaveta K. Petrova, National Research Nuclear Univ. MEPhI (Russian Federation) [9649-14]

15:10: **Approaches of combining SLAM with ATR for indoor environments**, Christina Grönwall, FOI-Swedish Defence Research Agency (Sweden) and Linköping Univ. (Sweden); Gustaf Hendeby, Linköping Univ. (Sweden); Kristian Sinivaara, Cybercom Sweden (Sweden) [9649-15]

Coffee Break Mon 15:30 to 16:00

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Security + Defence 2015

For details, please see special events section in the printed programme or visit <http://spie.org/security-defence-europe.xml>

ROOM: GUILLAUMET 1 - CONFERENCE 9649

TUESDAY 22 SEPTEMBER

SESSION 4

LOCATION: GUILLAUMET 1 TUE 8:50 TO 10:20

Maritime Sensing

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

8:50: **Active-imaging-based underwater navigation** (*Invited Paper*), David Monnin, Gwenaël Schmitt, Colin Fischer, Martin Laurenzis, Frank Christnacher, Institut Franco-Allemand de Recherches de Saint-Louis (France) [9649-16]

9:20: **Passive and active EO sensing of small surface vessels**, Ove Steinvall, Folke Berglund, Lars Allard, Johan Öhgren, Håkan Larsson, Frank Gustafsson, FOI-Swedish Defence Research Agency (Sweden); Endre Repasi, Peter Lutzmann, Benjamin Göhler, Marcus Hammer, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Kennedy McEwen, SELEX Galileo Infrared Ltd. (United Kingdom); Kenneth J. McEwan, Defence Science and Technology Lab. (United Kingdom) [9649-17]

9:40: **Experiences from long-range passive and active imaging**, Christina Grönwall, David K. J. Gustafsson, Gustav Tolt, Ove Steinvall, FOI-Swedish Defence Research Agency (Sweden) [9649-18]

10:00: **Maritime target identification in gated viewing imagery**, Marcus Hammer, Marcus Hebel, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9649-19]

Coffee Break Tue 10:20 to 10:50

SESSION 5

LOCATION: GUILLAUMET 1 TUE 10:50 TO 12:00

Processing of Electro-Optical Data

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

10:50: **Methodology for the conception of speckle reduction elements in the case of short pulse illumination** (*Invited Paper*), Yves Lutz, Jean-Michel Poyet, Institut Franco-Allemand de Recherches de Saint-Louis (France) [9649-20]

11:20: **Automatic structural matching of 3D image data**, Vadim R. Lutsiv, S.I. Vavilov State Optical Institute (Russian Federation) and Saint-Petersburg State Univ. of Aerospace Instrumentation (Russian Federation) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Igor A. Malyshev, S.I. Vavilov State Optical Institute (Russian Federation); Svyatoslav Ponomarev, S.I. Vavilov State Optical Institute (Russian Federation) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) [9649-21]

11:40: **Results of implementation of the dynamic laser goniometer for non-contact measurement of angular movement**, Yuri V. Filatov, Petr A. Pavlov, Mikhail N. Burnashev, Eugeni D. Bokhman, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [9649-22]

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

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 6

LOCATION: GUILLAUMET 1 TUE 13:40 TO 15:00

Emerging Technologies

Session Chair: **Keith L. Lewis**, Sciovis Ltd. (United Kingdom)

13:40: **Modern fibre-optic lidars for remote sensing** (*Keynote Presentation*), Chris Hill, Malvern Lidar Consultants (United Kingdom) [9649-23]

14:20: **Advances in AlGaInN laser diode technology and systems for defence and security applications**, Stephen P. Najda, Piotr Perlin, Tadek Suski, Lucja Marona, Michal Bockowski, Mike Leszczyński, Przemek Wisniewski, Robert Czernecki, George Targowski, TopGaN Ltd. (Poland); Scott Watson, T. Kelly, Univ. of Glasgow (United Kingdom) [9649-24]

14:40: **Passive ring optical gyro: state-of-the-art and prospects**, Yuri V. Filatov, Egor V. Shalymov, Vladimir Y. Venediktov, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation) [9649-25]

Coffee Break Tue 15:00 to 15:30

SESSION 7

LOCATION: GUILLAUMET 1 TUE 15:30 TO 17:00

Military Applications in Hyperspectral Imaging and High Spatial Resolution Sensing

Session Chair: **John D. Goglewski**, European Office of Aerospace Research and Development (United Kingdom)

15:30: **Compact full-motion video hyperspectral cameras: development, image processing, and applications** (*Invited Paper*), Andrey V. Kanaev, U.S. Naval Research Lab. (United States) [9649-27]

16:00: **Inter-instrument registration for the airborne hyperspectral system, Sysiphe**, Sophie Fabre, Laurent Rousset-Rouviere, ONERA (France) [9649-28]

16:20: **Airborne thermal infrared hyperspectral imaging of buried objects**, Marc-André Gagnon, Philippe Lagueux, Jean-Philippe Gagnon, Simon Savary, Pierre Tremblay, Vincent Farley, Telops (Canada); Éric Guyot, Telops France (France); Martin Chamberland, Telops (Canada) [9649-29]

16:40: **Design of a compact hyperspectral imaging spectrometer for mid-infrared applications**, Armande Pola Fossi, Nicolas Guérineau, ONERA (France); Hervé Sauer, Lab. Charles Fabry (France); Yann Ferrec, ONERA (France); Nicolas Roux, Marc Bousquet, Emmanuel Kling, Sagem (France) [9649-30]

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Security+Defence poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Range-intensity coding under triangular and trapezoidal correlation algorithms for 3D super-resolution range-gated imaging, Xinwei Wang, Yan Zhou, Institute of Semiconductors (China); Youfu Li, City Univ. of Hong Kong (Hong Kong, China) [9649-31]

A space debris removal system with solar pumped laser, Pingping Luo, Chen Li, Yuzhao Wang, Beijing Institute of Space Mechanics and Electricity (China) [9649-32]

Structural and optical properties of TiO₂-Al₂O₃ nanolaminates produced by atomic layer deposition, Igor Iatsunskyi, Adam Mickiewicz Univ. (Poland) and Odessa I.I. Mechnikov National Univ. (Ukraine); Viktoriia Fedorenko, Department of Experimental Physics, Odessa National I.I. Mechnikov University (Ukraine); Nikolay Pavlenko, Odessa I.I. Mechnikov National Univ. (Ukraine); Mariusz Jancelewicz, Adam Mickiewicz Univ. (Poland); Emerson Coy, NanoBioMedical Centre, Adam Mickiewicz University (Poland); Roman Viter, Institute of Atomic Physics and Spectroscopy, University of Latvia (Latvia) [9649-33]

CONFERENCE 9650A - ROOM: CARAVELLE 2

Monday 21 September 2015 • Proceedings of SPIE Vol. 9650

High-Power Lasers 2015: Technology and Systems

Conference Chairs: Harro Ackermann, High Energy Laser Joint Technology Office (United States); Willy L. Bohn, BohnLaser Consult (Germany)

MONDAY 21 SEPTEMBER

OPENING REMARKS

LOCATION: CARAVELLE 2 8:35 TO 8:45

SESSION 1

LOCATION: CARAVELLE 2 MON 8:45 TO 10:00

Lasers and Laser Architectures for Power Scaling

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

8:45: **Recent Advances in Er³⁺:YAG solid-state heat-capacity technology** (*Invited Paper*), Stefano Bigotta, Karsten Diener, Thierry Ibach, Lothar Geiss, Georg Stoeppler, Joerg Schoener, Michael von Salisch, Marc Eichhorn, ISL (France) [9650-1]

9:20: **Considerations of a ship defense with a pulsed COIL**, Kiwamu Takehisa, O2 Laser Laboratory (Japan) [9650-2]

9:40: **High-power sequence beam combining of pulsed lasers based on electro-optic deflection**, Yongliang Zhang, Ying Deng, Shaoqi Wang, Mingqiang Kang, China Academy of Engineering Physics (China) [9650-3]

Coffee Break Mon 10:00 to 10:30

SESSION 2

LOCATION: CARAVELLE 2 MON 10:30 TO 11:45

Advances in Fiber Lasers

Session Chair: Till Walbaum, Fraunhofer IOF (Germany)

10:30: **Power scaling and beam combination of fiber lasers** (*Invited Paper*), Till Walbaum, Thomas Schreiber, Jens Limpert, Ramona Eberhardt, Andreas Tünnermann, Fraunhofer IOF (Germany) [9650-5]

11:05: **High-power optical phased arrays for space debris tracking and manoeuvring**, Lyle E. Roberts, Robert L. Ward, The Australian National Univ. (Australia); Andrew J. Sutton, Jet Propulsion Lab. (United States); Roland Fleddermann, Shasidran Raj, The Australian National Univ. (Australia); Craig Smith, EOS Space Systems Pty. Ltd. (Australia); David E. McClelland, Daniel A. Shaddock, The Australian National Univ. (Australia) [9650-6]

11:25: **High-power near-infrared supercontinuum source generated in an ytterbium-doped fiber amplifier**, Aijun Jin, Sheng-Ping Chen, Lei Si, Bin Zhang, Jing Hou, Zong-Fu Jiang, National Univ. of Defense Technology (China) [9650-7]

SESSION 3

LOCATION: CARAVELLE 2 MON 11:25 TO 12:05

New Single Frequency/Narrow Band Solid State Lasers

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

11:25: **High-average-power narrow-line-width sum frequency generation 589 nm laser**, Yanhua Lu, Huaijin Ren, Gang Xie, Institute of Applied Electronics (China) [9650-8]

11:45: **High-energy 1064 nm single frequency long-pulse laser**, Huaijin Ren, China Academy of Engineering Physics (China) [9650-9]

Lunch Break Mon 12:05 to 13:30

SESSION 4

LOCATION: CARAVELLE 2 MON 13:30 TO 15:30

Simulations and Experiments in Diode-Pumped Alkali Lasers

Session Chair: Salman Rosenwaks, Ben-Gurion Univ. of the Negev (Israel)

13:30: **Supersonic diode pumped alkali lasers: computational fluid dynamics modeling** (*Invited Paper*), Salman Rosenwaks, Eyal Yacoby, Karol Waichman, Oren Sadot, Boris D. Barmashenko, Ben-Gurion Univ. of the Negev (Israel) [9650-10]

14:00: **Modeling of pulsed K DPAL taking into account the spatial variation of the pump and laser intensities in the transverse direction**, Boris D. Barmashenko, Ilya Auslender, Salman Rosenwaks, Ben-Gurion Univ. of the Negev (Israel); Boris Zhdanov, Matthew Rotondaro, Randall J Knize, US Air Force Academy, Laser and Optics Research Center (United States) . . . [9650-11]

14:20: **CFD assisted simulation of temperature distribution and laser power in pulsed and CW pumped static gas DPALs**, Karol Waichman, Boris D. Barmashenko, Salman Rosenwaks, Ben-Gurion Univ. of the Negev (Israel) [9650-12]

14:40: **Low pressure cesium and potassium diode-pumped alkali Lasers: pros and cons** (*Invited Paper*), Boris V. Zhdanov, Matthew Rotondaro, Michael Shaffer, Randall Knize, U.S. Air Force Academy (United States) [9650-13]

15:10: **3D CFD modeling of subsonic and transonic flowing-gas DPALs with different pumping geometries**, Eyal Yacoby, Oren Sadot, Boris D. Barmashenko, Salman Rosenwaks, Ben-Gurion Univ. of the Negev (Israel) [9650-14]

Coffee Break Mon 15:30 to 16:00

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Security + Defence 2015

For details, please see special events section in the printed programme or visit <http://spie.org/security-defence-europe.xml>

CONFERENCE 9650B - ROOM: ARIANE 1

Wednesday - Thursday 23-24 September 2015 • Proceedings of SPIE Vol. 9650

Technologies for Optical Countermeasures

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

Programme Committee: Brian Butters; Marc Eichhorn, Institut Franco-Allemand de Recherches de Saint-Louis (France); Ian F. Elder, SELEX Galileo Ltd. (United Kingdom); David B. James, Cranfield Univ. (United Kingdom); Helena Jelinkova, Czech Technical Univ. in Prague (Czech Republic); Gerald C. Manke II, Naval Surface Warfare Ctr. Crane Div. (United States); Espen Lippert, Norwegian Defence Research Establishment (Norway); Eric D. Park, Q-Peak, Inc. (United States); Ric H. M. A. Schleijsen, 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)

WEDNESDAY 23 SEPTEMBER

OPENING REMARKS

LOCATION: ARIANE 1 13:00 TO 13:10

SESSION 5

LOCATION: ARIANE 1 WED 13:10 TO 14:30

Keynote Session

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

13:10: **Technical advancement of high-power in 2-5m sources** (*Keynote Presentation*), Eric D. Park, Q-Peak, Inc. (United States) [9650-21]

13:50: **Semiconductor lasers for DIRCM** (*Keynote Presentation*), Hans-Dieter Tholl, Diehl BGT Defence GmbH & Co. KG (Germany) [9650-22]

SESSION 6

LOCATION: ARIANE 1 WED 14:30 TO 15:20

Aircraft Protection

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

14:30: **Potential of preemptive DIRCM systems** (*Invited Paper*), Ove Steinvall, FOI-Swedish Defence Research Agency (Sweden) [9650-23]

15:00: **Quantification of helicopter rotor downwash effects on electro-optical defensive aids suites**, Dirk P. Seiffer, Christian Eisele, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Markus Henriksson, Sebastian Möller, Lars J. Sjöqvist, FOI-Swedish Defence Research Agency (Sweden); Marie-Thérèse Velluet, ONERA (France); Fabio Togna, Aeronautica Militare Italiana (Italy) [9650-24]

Coffee Break Wed 15:20 to 15:50

SESSION 7

LOCATION: ARIANE 1 WED 15:50 TO 16:40

Lasers and Sources for Countermeasures

Session Chair: Ian F. Elder, SELEX Galileo Ltd. (United Kingdom)

15:50: **Tm, Ho, Op:GaAs, for high-power CW and high-pulse energy mid-IR** (*Invited Paper*), Eric D. Park, Q-Peak, Inc. (United States) [9650-25]

16:20: **High-power low divergence semiconductor laser with circular beam**, Cunzhu Tong, Lijie Wang, Lijun Wang, Changchun Institute of Optics, Fine Mechanics and Physics (China) [9650-26]

PANEL DISCUSSION

ROOM: ARIANE 1 WED 16:40 TO 17:30

Panel Discussion: IRCM-Back to the Future

Moderators: David H. Titterton, UK Defence Academy (United Kingdom); Robert J. Grasso, RJG Consulting (United States)

Threats are ever emerging. Countermeasures need to keep up. Expendables, DIRCM, Damage and Destroy, Closed Loop, Pre Emptive, or a combination of all these. What is really best to defeat all threats for all platforms, in all environments. And, what must evolve to keep pace with the ever evolving threats.

Do we find the threat pre launch? Or, defeat the threat post launch? Or keep the threat from launching in the first place? Or, find the person with hostile intent? Where is this all going? And what technology do we need to take us there?

This open discussion is an opportunity for conference attendees to compare, contrast, debate, and suggest approaches that might work and further discuss advances in technology that will have to be made to make some of these realizable. And, what limitations might exist to limit these ideas impractical, or just science fiction.

Please join us and share your thoughts, insights, experience, and knowledge. Also, and have some fun as well.

THURSDAY 24 SEPTEMBER

SESSION 8

LOCATION: ARIANE 1 THU 9:00 TO 9:40

Atmospheric and External Platform Effects upon Laser Propagation

Session Chairs: Mark A. Richardson, Cranfield Univ. (United Kingdom); Leon Smith, Cranfield Univ. (United Kingdom)

9:00: **Experimental and numerical analysis of atmospheric propagation of high-energy lasers**, Carsten Pargmann, Thomas Hall, Frank Duschek, Thomas Fischbach, Karin M. Grünewald, Kirsten Klaffki, Jim Thieser, Jürgen Handke, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [9650-27]

9:20: **Helicopter engine exhaust rotor downwash effects on laser beams**, Markus Henriksson, Lars J. Sjöqvist, FOI-Swedish Defence Research Agency (Sweden); Dirk P. Seiffer, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9650-28]

SESSION 9

LOCATION: ARIANE 1 THU 9:40 TO 10:20

Pulse Modulation and Signature Effects

Session Chairs: Ove Steinvall, FOI-Swedish Defence Research Agency (Sweden); Hans-Dieter Tholl, Diehl BGT Defence GmbH & Co. KG (Germany)

9:40: **Different pulse pattern generation by frequency detuning in pulse modulated actively mode-locked ytterbium doped fiber laser**, He Chen, Sheng-Ping Chen, Lei Si, Bin Zhang, Zong-Fu Jiang, National Univ. of Defense Technology (China) [9650-29]

10:00: **IRCM spectral signature measurements instrumentation featuring enhanced radiometric accuracy**, Florent M. Prel, ABB Analytical Measurement (Canada); Cornelius J. Willers, Airbus Defence and Space (South Africa); Stéphane M. Lantagne, Louis M. Moreau, Claude B. Roy, ABB Analytical Measurement (Canada) [9650-30]

CONFERENCE 9651 - ROOM: ARIANE 2

Tuesday 22–22 September 2015 • Proceedings of SPIE Vol. 9651

Millimetre Wave and Terahertz Sensors and Technology

Conference Chairs: **Neil Anthony Salmon**, MMW Sensors Ltd. (United Kingdom); **Eddie L. Jacobs**, The Univ. of Memphis (United States)

Programme Committee: **Amir Abramovich**, Ariel Univ. (Israel); **Sherif Sayed Ahmed**, Rohde & Schwarz GmbH & Co. KG (Germany); **Nicholas J. Bowring**, Manchester Metropolitan Univ. (United Kingdom); **Stephan Dill**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Charmaine C. Franck**, NASA Langley Research Ctr. (United States); **Marcin Kowalski**, Military Univ. of Technology (Poland); **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)

TUESDAY 22 SEPTEMBER

OPENING REMARKS

LOCATION: ARIANE 2 9:00 TO 9:10

SESSION 1

LOCATION: ARIANE 2 TUE 9:10 TO 10:10

Phenomenology and Signatures

Session Chairs: **Ata Khalid**, Univ. of Glasgow (United Kingdom); **Taylan Takan**, Middle East Technical Univ. (Turkey); **Neil A. Salmon**, MMW Sensors Ltd. (United Kingdom)

9:10: **Terahertz time-domain spectroscopy for studying the kinetics of tissue adhesives**, Marie Tobolova, Tomas Bata Univ. of Zlin (Czech Republic) and Brno Univ. of Technology (Czech Republic); Vojtech Kresalek, Tomas Bata Univ. of Zlin (Czech Republic); Zdenek Adamik M.D., Tomas Bata Regional Hospital (Czech Republic); Ivo Provaznik, Brno Univ. of Technology (Czech Republic) [9651-2]

9:30: **Examining pharmaceuticals using terahertz spectroscopy**, Katerina Sulovska, Vojtech Kresalek, Tomas Bata Univ. of Zlin (Czech Republic) . . [9651-3]

9:50: **An enhanced MMW and THz imaging system performance prediction and analysis tool for concealed weapon identification and pilotage obstacle avoidance**, Steven R. Murrill, U.S. Army Research Lab. (United States) . [9651-24]

Coffee Break Tue 10:10 to 10:40

SESSION 2

LOCATION: ARIANE 2 TUE 10:40 TO 12:10

Emerging Systems

Session Chairs: **Charmaine C. Franck**, NASA Langley Research Ctr. (United States); **Juha Hassel**, VTT Technical Research Ctr. of Finland Ltd (Finland); **Vyacheslav A. Trofimov**, Lomonosov Moscow State Univ. (Russian Federation)

10:40: **Improved design of a passive millimeter-wave synthetic aperture interferometric imager for indoor applications** (*Invited Paper*), Xianxun Yao, Kai Liu, Jungang Miao, BeiHang Univ. (China) [9651-4]

11:10: **The three-dimensional near-field aperture synthesis imaging algorithms applied to extended targets in a millimetre wave security screening portal**, Neil A Salmon, MMW Sensors Ltd (United Kingdom) and Manchester Metropolitan University (United Kingdom) [9651-5]

11:30: **Vehicle screening in three dimensions using aperture synthesis passive millimetre wave imaging**, Neil A Salmon, MMW Sensors Ltd (United Kingdom) [9651-6]

11:50: **Ultrawide band 3D microwave imaging scanner for the detection of concealed weapons**, Nacer Ddine Rezgui, David A Andrews, Nicholas J Bowring, Manchester Metropolitan Univ (United Kingdom) [9651-7]

Lunch/Exhibition Break Tue 12:10 to 13:50

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 3

LOCATION: ARIANE 2 TUE 13:50 TO 15:00

Signal and Image Processing

Session Chairs: **Ata Khalid**, Univ. of Glasgow (United Kingdom); **Xianxun Yao**, BeiHang Univ. (China); **Taylan Takan**, Middle East Technical Univ. (Turkey)

13:50: **Discrimination and identification of RDX/PETN explosives by chemometrics applied on terahertz time-domain spectral imaging** (*Invited Paper*), joyce bou sleiman, Jean-baptiste Perraud, Bruno Bousquet, Jean-paul Guillet, University of Bordeaux (France); Norbert Palka, Military University of Technology (Poland); Patrick Mounaix, University of Bordeaux (France) . . [9651-9]

14:20: **New way for concealed object detection using passive THz images without their viewing**, Vyacheslav A. Trofimov, Vladislav V. Trofimov, Lomonosov Moscow State Univ. (Russian Federation) [9651-10]

14:40: **Millimetre waves sensor modeling and simulation**, Jean Latger, Thierry Cathala, Nicolas Douchin, OKTAL Synthetic Environment (France) [9651-12]

Coffee Break Tue 15:00 to 15:30

SESSION 4

LOCATION: ARIANE 2 TUE 15:30 TO 17:20

Devices

Session Chairs: **Charmaine C. Franck**, NASA Langley Research Ctr. (United States); **Xianxun Yao**, BeiHang Univ. (China); **Neil A. Salmon**, MMW Sensors Ltd. (United Kingdom)

15:30: **Modulation and frequency response of GDDs in the millimeter wave/THz region**, Namig Alasgarzade, Taylan Takan, Ilker U. Uzun-Kaymak, Middle East Technical Univ. (Turkey); Asaf B. Sahin, Yildirim Beyazit Univ. (Turkey); Hakan Altan, Middle East Technical Univ. (Turkey) [9651-13]

16:00: **Millimeter-wave signal detection technique using a vector network analyser (VNA) for solid state sources**, Ata Khalid, Jue Wang, Khalid Alhar Alharbi, Afesomeh Ofiare, Edward Wasige, David R S Cumming, University of Glasgow (United Kingdom) [9651-14]

16:20: **High frequency resonant tunnelling diode oscillator with high output power**, Jue Wang, Khalid Alharbi, Afesomeh Ofiare, Ata Khalid, David Cumming, Edward Wasige, University of Glasgow (United Kingdom) [9651-15]

16:40: **Electrically tunable graphene-enabled THz metadevices**, Taylan Takan, Mehmet A. Nebio?lu, Middle East Technical Univ. (Turkey); Nurbek Kakenov, Osman Balci, Coskun Kocabas, Bilkent Univ. (Turkey); Hakan Altan, Middle East Technical Univ. (Turkey) [9651-16]

17:00: **Large equilibrium kinetic inductance detector arrays for radiometric imaging at 0.2 to 1.2 THz**, Juha Hassel, Andrey V. Timofeev, Visa Vesterinen, Hannu Sipola, Panu Helistö, Mika Aikio, Aki Mäyrä, VTT Technical Research Ctr of Finland Ltd (Finland); Arttu R Luukanen, Asqella Oy (Finland) [9651-17]

POSTER SESSIONS

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Security+Defence poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Comparison of objects detection capabilities in LWIR and THz ranges, Marcin Kowalski, Mariusz Kastek, Mieczyslaw Szustakowski, Military Univ. of Technology (Poland) [9651-18]

Textile influence on remote identification of explosives in the THz range, Michal J. Walczakowski, Norbert Palka, Mieczyslaw Szustakowski, Military Univ. of Technology (Poland) [9651-19]

Channel calibration for digital array radar in the presence of amplitude-phase and mutual coupling errors, Weixing Li, National Univ. of Defense Technology (China) [9651-20]

Spatio-spectral characteristics and polarization of THz radiation from two-color femtosecond filament, Vera Andreeva, Lomonosov Moscow State Univ. (Russian Federation); Mikhail Esaulkov, Institute on Laser and Information Technologies (Russian Federation); Nikolay Panov, Petr Solyankin, Vladimir Makarov, Daniil Shipilo, Alexander Shkurinov, Olga Kosareva, Lomonosov Moscow State Univ. (Russian Federation) [9651-21]

Detection of the mm-wave radiation using a low-cost LWIR microbolometer camera from a multiplied Schottky diode based source, Basak Kebapci, METU-MEMS Research and Application Center (Turkey); Firat Tankut, MikroSens Elektronik San ve Tic A S (Turkey); Hakan Altan, Middle East Technical University (Turkey); Tayfun Akin, MikroSens Elektronik San ve Tic A S (Turkey) and Middle East Technical University (Turkey) and MikroSens [9651-23]

CONFERENCE 9652A - ROOM: GUILLAUMET 2

Monday - Tuesday 21-22 September 2015 • Proceedings of SPIE Vol. 9652

Optics and Photonics for Counterterrorism, Crime Fighting, and Defence

Conference Chairs: **Douglas Burgess**, Burgess Consulting (United Kingdom); **Gari Owen**, Annwyn Solutions (United Kingdom); **Harbinder Rana**, Defence Science and Technology Lab. (United Kingdom)

Programme Committee: **Benedicte Bascle**, Thales Optronique S.A.S. (France); **Richard R. Botten**, Ministry of Defence (United Kingdom); **Henri Bouma**, TNO (Netherlands); **Felicity Carlyle**, Univ. of Strathclyde (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); **Niamh Nic Daeid**, Univ. of Dundee (United Kingdom); **Salman Rosenwaks**, Ben-Gurion Univ. of the Negev (Israel); **Andrew M. Scott**, QinetiQ Ltd. (United Kingdom); **Neil C. Shand**, Defence Science and Technology Lab. (United Kingdom); **Robert James Stokes**, Cobalt Light Systems Ltd. (United Kingdom); **Miranda van Iersel**, TNO Defence, Security and Safety (Netherlands); **Mauro G. Varasi**, Finmeccanica (Italy); **Yitzhak Yitzhaky**, Ben-Gurion Univ. of the Negev (Israel); **Peter W. Yuen**, Cranfield Univ. (United Kingdom)

MONDAY 21 SEPTEMBER

OPENING REMARKS

LOCATION: GUILLAUMET 2 9:05 TO 9:10

SESSION 1

LOCATION: GUILLAUMET 2 MON 9:10 TO 10:30

Detection and Identification of Things Dangerous, Hidden and Suspicious I

Session Chair: **Douglas Burgess**, Burgess Consulting (United Kingdom)

9:10: **Detection of munitions grade G-series nerve agents using raman excitation at 1064 nm**, Eric G. Roy, Rigaku Raman Technologies, Inc. (United States); Phillip G. Wilcox, Soren Hoffland, U.S. Army Edgewood Chemical Biological Ctr. (United States); Ian Pardoe, EXCET, Inc. (United States) . [9652-1]

9:30: **Hyperspectral detection and scalable LTE technology-based alerting for CBRNE threats**, Jaana R. Kuula, Univ. of Jyväskylä (Finland) [9652-2]

9:50: **Multispectral analysis of biological agents to implement a quick tool for stand-off biological detection**, Mariachiara Carestia, Roberto Pizzoferrato, Jessica Gabriele, Gian Marco Ludovici, Michela Gelfusa, Andrea Malizia, Orlando Cenciarelli, Pasquale Gaudio, Univ. degli Studi di Roma "Tor Vergata" (Italy) [9652-3]

10:10: **Tests of various colorants for application of a Fourier-transform infrared imaging system to deciphering obliterated writings**, Shigeru Sugawara, National Research Institute of Police Science (Japan) [9652-4]

Coffee Break Mon 10:30 to 11:00

SESSION 2

LOCATION: GUILLAUMET 2 MON 11:00 TO 12:20

Detection and Identification of Things Dangerous, Hidden and Suspicious II

Session Chair: **Douglas Burgess**, Burgess Consulting (United Kingdom)

11:00: **A laser desorption of explosives as a way to create an effective noncontact sampling device**, Gennadii Kotkovskii, Alexander A. Chistyakov, Artem E. Akmalov, National Research Nuclear Univ. MEPhI (Russian Federation) [9652-5]

11:20: **Liquid explosive detection using near infrared LED**, Hideo Itozaki, Shiori Ito, Hideo Sato-Akaba, Yuji Miyato, Osaka Univ. (Japan) [9652-6]

11:40: **CRIM-TRACK: sensor system for detection of criminal chemical substances**, Jens K. Munk, Ole T. Buus, Jan Larsen, Technical Univ. of Denmark (Denmark); Eleftheria Dossi, Cranfield Univ. (United Kingdom); Sol Tatlow, Pro Design Electronic GmbH (Germany); Lina Lässig, Securetec Detektions-Systeme AG (Germany); Lars Sandström, Gammadata Holding AB (Sweden); Mogens H. Jakobsen, Technical Univ. of Denmark (Denmark) [9652-7]

12:00: **Magnetic induction imaging with optical atomic magnetometers: applications to screening and surveillance**, Luca Marmugi, Sarah Hussain, Ferruccio Renzoni, Univ. College London (United Kingdom) [9652-8]

Lunch Break Mon 12:20 to 13:40

SESSION 3

LOCATION: GUILLAUMET 2 MON 13:40 TO 14:30

Detection, Imaging and Characterisation of Objects through Barriers. Can we do this?

Session Chair: **Gari Owen**, Annwyn Solutions (United Kingdom)

Colin Lewis Memorial Session

Presentations and Panel Discussion

13:40: **An engineering approach towards creating ubiquitous THz applications (Invited Paper)**, Stepan Lucyszyn, Imperial College London (United Kingdom) [9652-9]

14:10: **Principal limitation of standard THz time-domain spectroscopy method of the detection and identification of substance and way of its overcoming**, Vyacheslav A. Trofimov, Svetlana A. Varentsova, Lomonosov Moscow State Univ. (Russian Federation) [9652-10]

PANEL DISCUSSION

ROOM: GUILLAUMET 2 MON 14:30 TO 15:10

Panel Discussion: Detection, Imaging and Characterisation of Objects through Barriers. Can We Do This?

Colin Lewis Memorial Session

Presentations and Panel Discussion

Moderator: **Gari Owen**, Annwyn Solutions (United Kingdom)

The open discussion will debate the question of how THz and nearby frequencies can help solve the really difficult problems, and how much science and engineering progress is needed before we can confidently identify objects and activity inside a building, find hidden substances including swallowed contraband, and detect dangerous non-metallic objects such as ceramic knives.

Coffee Break Mon 15:10 to 16:00

PLENARY SESSION

ROOM: AUDITORIUM SAINT EXUPÉRY MON 16:00 TO 19:15

Security + Defence 2015

For details, please see special events section in the printed programme or visit <http://spie.org/security-defence-europe.xml>

SPIE SECURITY + DEFENCE

CONFERENCE 9652A - ROOM: GUILLAUMET 2

TUESDAY 22 SEPTEMBER

OPENING REMARKS

LOCATION: GUILLAUMET 2:8:35 TO 8:40

SESSION 4

LOCATION: GUILLAUMET 2 TUE 8:40 TO 10:20

Suspicious Activity: People, their Actions, and Objects Associated with them I

Session Chair: **Harbinder Rana**,
Defence Science and Technology Lab. (United Kingdom)

8:40: **Embedded system for multimodal surveillance for security in a railway car**, Rhalem Zouaoui, Hamid Benhadda, Thales Research & Technology (France); Romaric Audigier, CEA LIST (France); Sébastien Ambellouis, Institut Français des Sciences et Technologies des Transports de l'aménagement et des Réseaux (France); François Capman, Thales Communications S.A. (France); Stéphanie Joudrier, Thierry Lamarque, Thales Research & Technology (France) [9652-11]

9:00: **Automatic inference of geometric camera parameters and intercamera topology in uncalibrated disjoint surveillance cameras**, Richard J. M. den Hollander, Henri Bouma, Jan Baan, Pieter T. Eendebak, Jeroen H. C. van Rest, TNO (Netherlands) [9652-12]

9:20: **Incremental concept learning with few training examples and hierarchical classification**, Henri Bouma, Pieter T. Eendebak, Klamer Schutte, George Azzopardi, Gertjan J. Burghouts, TNO (Netherlands) [9652-13]

9:40: **Posture estimation for improved photogrammetric localization of pedestrians in monocular infrared imagery**, Mikolaj E. Kundegorski, Toby P. Breckon, Durham Univ. (United Kingdom) [9652-14]

10:00: **Detection of abandoned objects based on interacting multiple models**, Stefan Becker, David Münch, Hilke Kieritz, Wolfgang Hübner, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9652-15]

Coffee Break Tue 10:20 to 10:50

SESSION 5

LOCATION: GUILLAUMET 2TUE 10:50 TO 12:50

Suspicious Activity: People, their Actions, and Objects Associated with them II

Session Chair: **Harbinder Rana**,
Defence Science and Technology Lab. (United Kingdom)

10:50: **Multi-feature based robust face detection and coarse alignment method via Multiple Kernel Learning**, Bo Sun, Di Zhang, Jun He, Xuwen Wu, Lejun Yu, Beijing Normal Univ. (China) [9652-24]

11:10: **Video content analysis on body-worn cameras for retrospective investigation**, Henri Bouma, Jan Baan, Frank B. ter Haar, Pieter T. Eendebak, Richard J. M. den Hollander, Gertjan J. Burghouts, Remco Wijn, Jeroen H. C. van Rest, TNO (Netherlands) [9652-16]

11:30: **Knowledge-based video surveillance for detection of infrastructure manipulation**, David Münch, Barbara Hilsenbeck, Hilke Kieritz, Stefan Becker, Ann-Kristin Grossefinger, Wolfgang Hübner, Michael Arens, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9652-17]

11:50: **Versatile illumination platform and fast optical switch to give standard observation camera gated active imaging capacity**, Regis Grasser, Benjamin Peyronneaud, Marie Aubry, Kevin Yon, CILAS (France) [9652-18]

12:10: **Towards a real-time wide area motion imagery system**, Rob Young, Stephen B. Foulkes, QinetiQ Ltd. (United Kingdom) [9652-19]

12:30: **Sensor for real-time determining the polarization state distribution in the object images**, Barbara Kilosanidze, George Kakauridze, Institute of Cybernetics (Georgia) [9652-20]

Lunch/Exhibition Break Tue 12:50 to 14:00

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

SESSION 6

LOCATION: GUILLAUMET 2 TUE 14:00 TO 15:00

Special Session: Biometrics Research+Development at the National Institute of Technology-Durgapur, India

Session Chair: **Harbinder Rana**, Defence Science and Technology Lab. (United Kingdom)

14:00: **Robust heuristic features for face recognition**, Dakshina Ranjan R. Kisku, National Institute of Technology, Durgapur (India); Phalguni Gupta, Indian Institute of Technology Kanpur (India); Jamuna K. Sing, Jadavpur Univ. (India) [9652-21]

14:20: **SIFT fusion of kernel eigenfaces for face recognition**, Dakshina Ranjan R. Kisku, National Institute of Technology, Durgapur (India); Massimo Tistarelli, Univ. degli Studi di Sassari (Italy); Jamuna K. Sing, Jadavpur Univ. (India); Phalguni Gupta, Indian Institute of Technology Kanpur (India) [9652-22]

14:40: **FRIT characterized hierarchical kernel memory arrangement for multiband palmprint recognition**, Dakshina Ranjan R. Kisku, National Institute of Technology, Durgapur (India); Phalguni Gupta, Indian Institute of Technology Kanpur (India); Jamuna K. Sing, Jadavpur Univ. (India) [9652-23]

CLOSING REMARKS

LOCATION: GUILLAUMET 215:00 TO 15:20

Closing Remarks and Discussion of Next Year's Conference

CONFERENCE 9652B - ROOM: ARIANE 2

Wednesday 23–23 September 2015 • Proceedings of SPIE Vol. 9652

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)

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**; **Marina Saphiannikova Grenzer**, Leibniz-Institut für Polymerforschung Dresden e.V. (Germany); **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); **Jaroslav Mysliwiec**, Wroclaw Univ. of Technology (Poland); **Robert L. Nelson**, Air Force Research Lab. (United States); **Fahima Ouchen**, Air Force Research Lab. (United States); **Ullrich Pietsch**, Univ. Siegen (Germany); **Ileana Rau**, Univ. Politehnica of Bucharest (Romania); **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)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Security+Defence poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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>.

Optical properties of polymethacrylate with styrylquinoline side chains, Oksana Krupka, Oksana Kharchenko, National Taras Shevchenko Univ. of Kyiv (Ukraine); Beata J. Derkowska-Zielinska, Nicolaus Copernicus Univ. (Poland); Vitaliy Smokal, Aleksey Kolendo, National Taras Shevchenko Univ. of Kyiv (Ukraine) [9652-45]

Proposal of All-optical sensor based on nonlinear MMI coupler for security applications, Mohamad Zubir Mat Jafri, Mehdi Tajaldini, Univ. Sains Malaysia (Malaysia) [9652-46]

Controlled release of anti-cancer agents from nanoparticle surface by optimizing the prodrug designs, Yoshikazu Ikuta, Yoshitaka Koseki, Tsunenobu Onodera, Hidetoshi Oikawa, Hitoshi Kasai, Tohoku Univ. (Japan) [9652-47]

WEDNESDAY 23 SEPTEMBER

OPENING REMARKS

Room: Ariane 2 8:30 to 8:35

SESSION 5

LOCATION: ARIANE 2 WED 8:35 TO 10:15

Biotronics

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

8:35: **DNA as a novel material toward electronics and photonics** (Keynote Presentation), Norihisa Kobayashi, Chiba Univ. (Japan) [9652-30]

9:05: **Bio-mediated synthesis and spectroscopic studies of gold nanoparticles** (Invited Paper), Katarzyna Matczyszyn, Magdalena Klekotko, Irena Maliszewska, Joanna Olesiak-Banska, Wroclaw Univ. of Technology (Poland); Jakub Siednienko, Krzysztof Pawlik, Institute of Immunology and Experimental Therapy (Poland); Marek Samoc, Wroclaw Univ. of Technology (Poland) [9652-31]

9:30: **Image processing by protein-based visual receptive fields** (Invited Paper), Yoshiko Okada-Shudo, Univ. of Electro-Communications (Japan) [9652-32]

9:55: **Different strategies for the detection of bioagents using electrochemical and photoelectrochemical genosensors**, Ilaria Palchetti, Diego Voccia, Francesca Bettazi, Univ. degli Studi di Firenze (Italy) [9652-33]

Coffee Break Wed 10:15 to 10:40

SESSION 6

LOCATION: ARIANE 2 WED 10:40 TO 12:30

Optics and Electro-Optics

Session Chair: **Attila Szep**, Air Force Research Lab. (United States)

10:40: **Bio-inspired materials for electrochemical devices** (Keynote Presentation), Agnieszka Pawlicka, Univ. de São Paulo (Brazil); Maria M. Silva, Univ. do Minho (Portugal); Jerzy Kanicki, Univ. of Michigan (United States); François Kajzar, Ecole Normale Supérieure de Lyon (France) [9652-34]

11:10: **Absorption spectrum analysis based on singular value decomposition for photoisomerization and photodegradation in organic dyes** (Keynote Presentation), Yutaka Kawabe, Toshio Yoshikawa, Toshifumi Chida, Kazuhiro Tada, Chitose Institute of Science and Technology (Japan); Masaki Kawamoto, Takashi Fujihara, Takafumi Sassa, RIKEN (Japan); Naoto Tsutsumi, Kyoto Institute of Technology (Japan) [9652-35]

11:40: **Hybrid, organic-inorganic composites for applications in Vis-NIR photodiodes** (Invited Paper), Beata Luszczynska, Jacek Ulanski, Lodz University of Technology (Poland); Piotr Bujak, Adam Pron, Warsaw Univ. of Technology (Poland) [9652-36]

12:05: **Characterization of DNA biopolymer-based UV photodetector fabricated by inkjet printing** (Invited Paper), Jack P. Lombardi III, Air Force Institute of Technology (United States); Roberto S. Aga Jr., Emily M. Heckman, Carrie M. Bartsch, Air Force Research Lab. (United States) [9652-37]

Lunch/Exhibition Break Wed 12:30 to 13:40

SESSION 7

LOCATION: ARIANE 2 WED 13:40 TO 15:05

Nonlinear Optics I

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

13:40: **High sensitive magnetic sensors from organic nonlinear magneto-optic materials** (Keynote Presentation), André P. Persoons, KU Leuven (Belgium) and Univ. of Arizona (United States) [9652-38]

14:10: **Ultrafast conformational changes in biomolecules studied by time-resolved circular dichroism** (Invited Paper), Francois Hache, Lab. d'Optique et Biosciences (France) [9652-49]

14:40: **Influence of various solvents on the nonlinear optical properties of magnesium phthalocyanine** (Invited Paper), Beata J. Derkowska-Zielinska, Nicolaus Copernicus Univ. (Poland) [9652-40]

Coffee Break Wed 15:05 to 15:30

SESSION 8

LOCATION: ARIANE 2 WED 15:30 TO 17:10

Nonlinear Optics II

Session Chair: **André P. Persoons**, KU Leuven (Belgium)

15:30: **Photoisomerisation, luminescent and nonlinear optical properties of selected derivatives of pyrazoline** (Keynote Presentation), Jaroslav Mysliwiec, Adam Szukalski, Andrzej Miniewicz, Wroclaw Univ. of Technology (Poland) [9652-41]

16:00: **Plasmonic fluorophores: influence of the nanoantenna shape and crystallinity** (Invited Paper), Céline Fiorini-Debuisschert, Commissariat à l'Énergie Atomique (France) [9652-42]

16:25: **Pharmacological activities of pure nanodrugs created by the reprecipitation method**, Hitoshi Kasai, Tohoku Univ. (Japan) [9652-43]

16:45: **Enhanced nonlinearity of nonlinear optic polymers using nucleobases as charge blocking layers** (Invited Paper), François Kajzar, Univ. Politehnica of Bucharest (Romania); Fahima Ouchen, Emily M. Heckman, Air Force Research Lab. (United States); Larry R. Dalton, Univ. of Washington (United States); James G. Grote, Air Force Research Lab. (United States) [9652-44]

CONFERENCE 9653 - ROOM: GUILLAUMET 1

Wednesday - Thursday 23-24 September 2015 • Proceedings of SPIE Vol. 9653

Target and Background Signatures

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

Programme Committee: **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)

TUESDAY 22 SEPTEMBER

INDUSTRY SESSION

LOCATION: CARAVELLE 2 TUE 12:35 TO 13:35

Session Chair: **Stephen Anderson**, SPIE (United States)

12:35: **Introduction to the UK Defence Solutions Centre**, Paul Winstanley, UK Defence Solutions Centre (United Kingdom)

13:00: **Photonics & Defense: An Industry Update**, Stephen Anderson, SPIE (United States)

13:25: **Discussion**

Drinks and snacks available.

POSTER SESSION

LOCATION: SALLE CONCORDE TUE 17:30 TO 19:15

Conference attendees are invited to attend the Security+Defence poster session held on Tuesday 17:30 to 19:15. Posters will be on display after 10:00 Monday morning in the Conference Hallway. Authors of poster papers will be present to answer questions concerning their papers during the Tuesday 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 road extraction algorithm with saliency analysis in high-resolution remote sensing images, Libao Zhang, Shuang Wang, Shiyi Wang, Beijing Normal Univ. (China) [9653-32]

WEDNESDAY 23 SEPTEMBER

WELCOME AND OPENING REMARKS

LOCATION: GUILLAUMET 1 8:20 TO 8:30

Welcome Address

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

SESSION 1

LOCATION: GUILLAUMET 1 WED 8:30 TO 10:40

Camouflage Effectiveness

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

8:30: **A system approach to stealth on ground revisited** (*Invited Paper*), Kent E. Andersson, The Swedish National Defence College (Sweden); Hans Kariis, FOI-Swedish Defence Research Agency (Sweden); Gunnar Hult, The Swedish National Defence College (Sweden) [9653-1]

9:00: **Evaluation criteria for spectral design of camouflage**, Christina Åkerlind, FOI-Swedish Defence Research Agency (Sweden) and Linköping Univ. (Sweden); Tomas Hallberg, Hans Kariis, FOI-Swedish Defence Research Agency (Sweden); Kenneth Järrendahl, Linköping Univ. (Sweden) [9653-2]

9:20: **Camouflage effectiveness of static nets in SAR images**, Johan Jersblad, Saab Barracuda (Sweden); Christer Larsson, Saab Bofors Dynamics AB (Sweden) and Lund Univ. (Sweden) [9653-3]

9:50: **Discriminating between camouflaged targets by their time of detection by a human-based observer assessment method**, Gorm K. Selj, Morten Söderblom, Norwegian Defence Research Establishment (Norway) [9653-4]

10:10: **Adaptive camouflage in the VIS and IR spectral range: main principles and mechanisms** (*Invited Paper*), Alexander Schwarz, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9653-5]

Coffee Break Wed 10:40 to 11:10

SESSION 2

LOCATION: GUILLAUMET 1 WED 11:10 TO 13:10

Scene Modelling

Session Chair: **Karin U. Stein**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

11:10: **New impressive capabilities of SE-workbench for EO/IR real-time rendering of animated scenarios including flares**, Alain Y. Le Goff, DGA Maitrise de L'Information (France); Thierry Cathala, Jean Latger, OKTAL Synthetic Environment (France) [9653-6]

11:30: **Multisensors signature prediction workbench**, Jean Latger, Thierry Cathala, OKTAL Synthetic Environment (France) [9653-7]

11:50: **Image simulation for hardware in the loop simulation in EO domain**, Thierry Cathala, Jean Latger, OKTAL Synthetic Environment (France) . . . [9653-8]

12:10: **Simulation of atmospheric and terrestrial background signatures for detection and tracking scenarios**, Caroline Schweitzer, Karin Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9653-9]

12:30: **Infrared scene generator: effective use of measurement results**, Mehmet S. Tokay, Mustafa Sivasligil, TÜB?TAK B?LGEM ?LTAREN (Turkey) [9653-10]

12:50: **Modelling the combined infrared and radar signature of the wake of a vessel**, Miranda van Iersel, Bernadetta Devecchi, TNO Defence, Security and Safety (Netherlands) [9653-11]

Lunch/Exhibition Break Wed 13:10 to 14:30

SESSION 3

LOCATION: GUILLAUMET 1 WED 14:30 TO 16:40

Signature Phenomenology

Session Chair: **Ric H. M. A. Schleijsen**, TNO Defence, Security and Safety (Netherlands)

14:30: **Spectral analysis of the vegetative background in the NIR and SWIR spectral range**, Max E. Winkelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) [9653-12]

14:50: **Iranian Seijil III: extraction of gradient intensities of asymmetric exhaust plumes in boost phase**, Clifford A. Paiva, BSM Research Associates (United States) [9653-13]

Coffee Break Wed 15:10 to 15:40

15:40: **The Havemann-Taylor Fast Radiative Transfer Code (HT-FRTC) and its Application within Tactical Decision Aids (TDAs)**, Gerald J Wong, Jean-Claude Thelen, Stephan Havemann, Met Office (United Kingdom) [9653-15]

16:00: **FTOM-2D: a two-dimensional approach to model the detailed thermal behavior of nonplanar surfaces**, Berndt Bartos, Fraunhofer-IOSB (Germany) [9653-16]

16:20: **Comparison of the relative merits of the midwave and longwave infrared bands for various target types using detected thermal contrast**, Seán M. Stewart, Nazarbayev Univ. (Kazakhstan) [9653-17]

THURSDAY 24 SEPTEMBER

SESSION 4

LOCATION: GUILLAUMET 1 THU 9:00 TO 10:30

Hyperspectral Signatures

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

9:00: **An approach to optimal hyperspectral and multispectral signature and image data fusion for detecting hidden targets on shorelines** (*Invited Paper*), Charles R. Bostater Jr., Florida Institute of Technology (United States). [9653-18]

9:30: **Assessment of target detection limits in hyperspectral data**, Wolfgang Gross, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Jonas Böhrer, Jörg Weyermann, Mathias Kneubühler, Univ. Zürich (Switzerland); Peter Wellig, Roland Oechsli, Armasuisse (Switzerland); Hendrik Schilling, Wolfgang Middelman, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany). [9653-19]

9:50: **Utilization of hyperspectral camera for determination of camouflage surfaces spectral characteristics homogeneity**, František Racek, Univ. of Defence (Czech Republic); Adam Jobánek, Military Research Institute (Czech Republic); Teodor Balá?, Univ. of Defence (Czech Republic). [9653-20]

10:10: **Analysis of exploitable spectral features of target and background materials**, Max E. Winkelmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany). [9653-21]

Coffee Break Thu 10:30 to 11:00

SESSION 5

LOCATION: GUILLAUMET 1 THU 11:00 TO 12:40

Processing

Session Chair: **Miranda van Iersel**, TNO Defence, Security and Safety (Netherlands)

11:00: **Precision targeting in guided munition using IR sensor and MmW radar**, Sreeja S., Indian Institute of Technology Bombay (India); Hari B. Hablani, Indian Institute of Technology Gandhinagar (India); Hemendra Arya, Indian Institute of Technology Bombay (India). [9653-22]

11:20: **Real-time object detection and tracking in omni-directional surveillance using GPU**, Florian Depraz, Vladan Popovic, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Beat Ott, Peter Wellig, Armasuisse (Switzerland); Yusuf Leblebici, Ecole Polytechnique Fédérale de Lausanne (Switzerland). [9653-23]

11:40: **RecceMan@: an interactive recognition assistance for imaging reconnaissance: synergistic effects of human perception and computational methods for object recognition, identification and infrastructure analysis**, Nadia El Bekri, Susanne Angele, Elisabeth Peinsipp-Byma, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany). [9653-24]

12:00: **Evaluation of UAV video change detection using simulation tools**, Günter Saur, Jan Bartelsen, Fraunhofer IOSB (Germany). [9653-25]

12:20: **Spectral anomaly detection and clustering in radiological search**, John Hague, Thomas L. McCullough, National Security Technologies, LLC (United States). [9653-26]

Lunch Break Thu 12:40 to 14:00

SESSION 6

LOCATION: GUILLAUMET 1 THU 14:00 TO 15:40

Human Observer Performance

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

14:00: **Human factors of target detection tasks within heavily cluttered video scenes**, Samuel W. Huber, Forventis-GmbH (Switzerland); Peter Wellig, Armasuisse (Switzerland). [9653-27]

14:20: **Disruptive camouflage tricks the human eye: a study of detection times of two near-similar targets in natural backgrounds**, Gorm K. Selj, Norwegian Defence Research Establishment (Norway). [9653-30]

14:40: **Evaluation of statistical methods for the evaluation of observer trials for the assessment of the effectiveness of signature measures**, Patrick Dunau, Daniel Fitz, Karin Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany). [9653-28]

15:00: **Performance of target distinctness metrics evaluated against colour and monochromatic photosimulation results**, Vivienne C. Wheaton, Joanne B. Culpepper, Defence Science and Technology Organisation (Australia). [9653-29]

15:20: **A comparison between maritime field observations and photosimulation for developing and validating visible signature evaluation tools**, Joanne B. Culpepper, Vivienne C. Wheaton, Defence Science and Technology Organisation (Australia); Qi T. Shao, Defence Science and Technology Organisation (Australia) and YTEK Pty Ltd. (Australia); Alistair Furnell, Defence Science and Technology Organisation (Australia). [9653-31]

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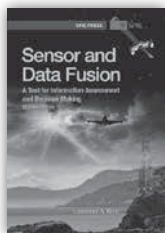
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Paul McManamon

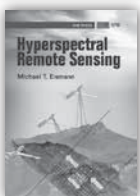
Vol. FG36
SPIE Member \$36-\$31 /
Nonmember \$42-\$36



Sensor and Data Fusion: A Tool for Information Assessment and Decision Making, Second Edition

Lawrence A. Klein

Vol. PM222
SPIE Member \$83-\$71 /
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Hyperspectral Remote Sensing

Michael T. Eismann

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Nonmember \$145-\$123



Field Guide to Infrared Systems, Detectors, and FPAs, Second Edition

Arnold Daniels

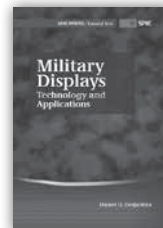
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Digital Converters for Image Sensors

Kenton T. Veeder

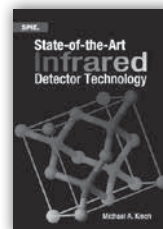
Vol. TT97
SPIE Member \$47-\$40 /
Nonmember \$55-\$47



Military Displays: Technology and Applications

Daniel D. Desjardins

Vol. TT95
SPIE Member \$56-\$48 /
Nonmember \$66-\$56



State-of-the-Art Infrared Detector Technology

Michael A. Kinch

Vol. PM248
SPIE Member \$62-\$53 /
Nonmember \$73-\$62

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Light-based technologies respond to the needs of humankind

Join us in celebrating the International Year of Light on the exhibit floor

The International Year of Light is a global initiative highlighting to the citizens of the world the importance of light and light-based technologies in their lives, for their futures, and for the development of society.

We hope that the International Year of Light will increase global awareness of the central role of light in human activities and that the brightest young minds continue to be attracted to careers in this field.

For more information on how you and your organization can participate, visit:

www.spie.org/IYL



**INTERNATIONAL
YEAR OF LIGHT
2015**



SPIE.

GENERAL INFORMATION

Registration

Onsite Registration and Badge Pick-Up Hours

Main Entrance Foyer

Sunday 20 September.....16:00 to 18:00 hrs.
Monday 21 September 7:30 to 17:00 hrs.
Tuesday 22 September.....8:00 to 17:00 hrs.
Wednesday 23 September8:30 to 17:00 hrs.
Thursday 24 September.....8:30 to 16:00 hrs.

Exhibition Hours

Tuesday 22 September.....10:00 to 17:00 hrs.
Wednesday 23 September 10:00 to 16:00 hrs.

Conference Registration

Includes admission to all conference sessions, plenaries, panels, and poster sessions, admission to the Exhibition, Welcome Reception, coffee breaks, and a choice of proceedings. Student pricing does include proceedings.

Exhibition Registration

Exhibition-Only visitor registration is complimentary.

SPIE Member, SPIE Student Member, and Student Pricing

- SPIE Members receive conference and course registration discounts. Discounts are applied at the time of registration.
- SPIE Student Members receive a 50% discount on all courses.
- 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 organization 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 special event requiring payment, or have questions regarding your registration, visit the SPIE Cashier.

Receipts 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/\$50 service charge for processing refunds. Requests for refunds must be received by 9 September 2015; 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

Room Latécoère

Monday through Thursday 8:00 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 with their memory devices or laptops to confirm their presentation display settings.

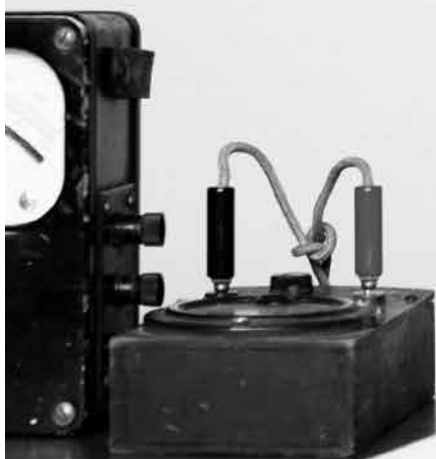
Poster Set-up Instructions

Concorde 2

Tuesday 22 September.....17:45 to 19:15 hrs.
Poster presenters can begin to post their papers at 10:00 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 19:15 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.

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Onsite Services

Internet Access

Room: Mermoz

Complimentary wired Internet access is available; in Room Mermoz, attendees can hook up their laptops or use provided workstations. Internet speed depends on the number of users.

SPiE Conference App

Search and browse the programme, special events, participants, exhibitors, and more. Free Conference Apps available for iPhone and Android phones. www.spie.org/x110919.xml

SPiE Luggage + Coat Check

Location: Entrance Foyer

Luggage, package, and coat storage are available during registration hours (Tuesday until 19:30 hrs). Please note hours; no late pickup available.

Food and Beverage Services

Coffee Breaks

Monday 21 and Thursday 24: *Foyer Ariane*

Tuesday 22 and Wednesday 23: *Salle Caravelle 1/Exhibition area*

Complimentary coffee will be served twice daily, at 10:00 and 15:00 hrs. Check individual conference listings for exact times and locations.

Food & Refreshments for Purchase

There are a number of restaurants in the immediate neighbourhood of the Pierre Baudin Congress Centre where food and drinks can be purchased. Visit www.spie.org/RestaurantGuide for information.

City Information

For further information on sightseeing and tourist information, please see the Toulouse Tourism website: <http://www.uk.toulouse-tourisme.com>

Urgent Message Line

An urgent message line is available during registration hours: +33(0) 5 62 30 40 96.

Lost and Found

Registration Desk, during registration hours

Found items will be kept at the Registration Desk until closing each day and then turned over to Pierre Baudin Conference Centre Security. At the end of the meeting, all found items will be turned over to Facility Security.

GENERAL INFORMATION

Travel

Airport Information

Toulouse-Blagnac International Airport is serviced by a number of airlines (Air France, Bmi regional, British Airways, Brussels Airlines, EasyJet, Flybe, Germanwings, KLM, Lufthansa, and others: <http://www.toulouse.aeroport.fr/en/flights/airlines>) with several direct flights a day. For price enquiries and to book your tickets, please visit the airlines' websites or speak to your travel agent.

The Toulouse-Blagnac International Airport is located 7km (4 miles) from the Centre. Call +33 (0)5-61-42-44-00 for flight information or visit the website at <http://www.toulouse.aeroport.fr/en>.

Airport shuttle service

Between 5.30am and 0.15am, the airport shuttle departs every 20 minutes from the airport and has six stops in the city centre: Pont du Bearnais - Compans Caffarelli (= Pierre Baudis Conference Centre) - Place Jeanne d'Arc - Allées Jean-Jaurès - Matabiau Gare SNCF - Train station. The journey time is approximately 20 minutes, depending on traffic. At the time of going to print, a single ticket is €8.00, and a return ticket is €15.00. For more information, please visit the website at <http://www.toulouse.aeroport.fr/en/passengers/go/access-airport/airport-shuttle> or phone +33 (0)5 34 60 64 00.

Shuttle Schedule:

Airport to Toulouse

First departure from airport: 5:30 hrs.
Last departure from airport daily: 0:15 hrs.

Toulouse to Airport

First departure from coach station daily: 5:00 hrs.
Last departure from coach station: 21:20 hrs.

For more up-to-date information, please visit the event web page.

Public Transport

By Rail

From Paris, several high-speed TGV trains take approximately 5 hours to arrive Toulouse every day. There are also regular trains from Bordeaux (2-hour trip) and from Marseille (4 1/2-hour trip). For more information, please visit the website at <http://www.sncf.com/en/passengers> or phone +33 (0)8-36-35-35-35 for rail information and schedules.

By Car

Toulouse has direct motorway connections to the main capitals of Northern and Southern Europe, and you should expect to spend 6 to 7 hours driving from Paris to Toulouse.

Take A 10 south to Bordeaux, connecting to A62 to Toulouse.

A61 (Carcassonne, Montpellier, Barcelona),

A62 (Montauban, Agen, Bordeaux, Limoges, Paris),

A64 (Foix, Lourdes, Bayonne, San Sebastian), A68 (Lavaur, Albi)

A66 (Pamiers, Foix, Andorra).

For information on the "Autoroute du Sud de la France", please call: Tel +33 (0)8 36 68 09 79 or call the South-west road information centre at: Tel +33 (0)5 56 96 33 33.

To find out about parking your car in Toulouse, please visit: <http://www.vincipark.com/en/>.

Public Transport in Toulouse

In addition to an extensive bus system, Toulouse has a modern metro system. The VAL (Véhicule Automatique Léger) metro system is made up of driverless (automatic) rubber-tired trams. The nearest stop to the congress Centre is "Compans Caffarelli" on Line B.

The underground operates from 5.15 hrs. to midnight, Monday to Thursday, and to 0.42 hrs on Fridays and Saturdays. Trains run every 6 minutes off-peak and every 1min20 at peak times.

For further information, contact Allô Tisséo, Espace Transport, 7 place Esquirol

31000 Toulouse, Tel +33 (0)5 61 41 70 70, <http://www.tisseo.fr/en/home>.

TOULOUSE

Toulouse, also known as 'Ville Rose', is France's fourth biggest city. Located in the South West region of the country between the Atlantic Ocean and Mediterranean Sea, it is also influenced by the Pyrenees. The city dates back 2,000 years with historic buildings in the central area. Toulouse is now widely recognised as the centre of cutting-edge European technology. The city and surrounding areas have a rich and diverse culture, famous for traditional produces including wine, foie gras, cheeses, and other traditional regional dishes.

For further information on sightseeing and tourist information, please see the Toulouse Tourism website: <http://www.uk.toulouse-tourisme.com> or alternatively, take a look at <http://www.toulousedefrance.com>



Proceedings.

Full paid registration includes your choice of Proceedings of SPIE (excluding student registrations). 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:

Symposium CD Collection—a searchable CD of one or multiple proceedings volumes. Available within 8 weeks of the meeting.

Symposium Online Collection—online access to multiple related proceedings volumes via the SPIE Digital Library. Available as papers are published.

Printed Proceedings Volume—a printed book of a single proceedings volume. Available 6 weeks after the meeting.

Online Proceedings Volume—online access to a single proceedings volume 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. **(Note: Online proceedings volumes not available for separate purchase).** See below for pricing and product order numbers.

Accessing Online Proceedings

Access to purchased online proceedings will be ongoing using your SPIE login credentials; papers are available as they are published.

To access your purchased proceedings:

- Go to <https://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 logging on through your institution's network.

Should you need any assistance, please contact SPIE:

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Phone (North America): +1 888 902 0894

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Single Proceedings Volumes

Product Order Number		Volume Title/Volume Editors	Price for print volume separate purchase
Printed Proceedings Volume	Online Proceedings Volume		Meeting Attendees Only
9637	DL9637	Remote Sensing for Agriculture, Ecosystems, and Hydrology XVII <i>Christopher M. U. Neale, Antonino Maltese</i>	€120/\$130
9638	DL9638	Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2015 <i>Charles R. Bostater, Stelios P. Mertikas, Xavier Neyt</i>	€65/\$70
9639	DL9639	Sensors, Systems, and Next-Generation Satellites XIX <i>Roland Meynart, Steven P. Neeck, Haruhisa Shimoda</i>	€110/\$120
9640	DL9640	Remote Sensing of Clouds and the Atmosphere XX <i>Adolfo Comerón, Evgueni I. Kassianov, Klaus Schäfer</i>	€65/\$70
9641	DL9641	Optics in Atmospheric Propagation and Adaptive Systems XVIII <i>Karin U. Stein, John D. Gonglewski</i>	€50/\$53
9642	DL9642	SAR Image Analysis, Modeling, and Techniques XV <i>Claudia Notarnicola, Simonetta Paloscia, Nazzareno Pierdicca</i>	€55/\$60
9643	DL9643	Image and Signal Processing for Remote Sensing XXI <i>Lorenzo Bruzzone</i>	€125/\$135
9644	DL9644	Earth Resources and Environmental Remote Sensing/GIS Applications VI <i>Ulrich Michel, Karsten Schulz</i>	€90/\$100

Online proceedings volumes are not available for separate purchase.

Product Order Number		Volume Title/Volume Editors	Price for print volume separate purchase
Printed Proceedings Volume	Online Proceedings Volume		Meeting Attendees Only
9645	DL9645	Lidar Technologies, Techniques, and Measurements for Atmospheric Remote Sensing XI <i>Upendra N. Singh, Doina Nicoleta Nicolae</i>	€55/\$60
9646	DL9646	High-Performance Computing in Remote Sensing V <i>Bormin Huang, Sebastián López, Zhensen Wu, Lizhe Wang</i>	€55/\$60

Proceedings Collections

Online collections are not available for separate purchase.

Product Order Number		Collection Title/Included Volumes (See next page for volume titles and editors)	Price for CD separate purchase
Symposium CD Collection	Symposium Online Collection		Meeting Attendees Only
N/A	DLC589	Remote Sensing 2015 <i>9637, 9638, 9639, 9640, 9641, 9642, 9643, 9644, 9645, 9646</i>	€130/\$145

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Full paid registration includes your choice of Proceedings of SPIE (excluding student registrations). 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.

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- 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.

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Single Proceedings Volumes

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Product Order Number		Volume Title/Volume Editors	Price for print volume separate purchase
Printed Proceedings Volume	Online Proceedings Volume		Meeting Attendees Only
9647	DL9647	Unmanned/Unattended Sensors and Sensor Networks XI; and Advanced Free-Space Optical Communication Techniques and Applications <i>Edward M. Carapezza, Panos G. Datskos, Christos Tsamis, Leslie Laycock, Henry J. White</i>	€40/\$45
9648	DL9648	Electro-Optical and Infrared Systems: Technology and Applications XII; and Quantum Information Science and Technology <i>David A. Huckridge, Reinhard Ebert, Mark T. Gruneisen, Miloslav Dusek, John G. Rarity</i>	€65/\$70
9649	DL9649	Electro-Optical Remote Sensing, Photonic Technologies, and Applications IX <i>Gary Kamerman, Ove Steinvall, Keith L. Lewis, John D. Gonglewski</i>	€55/\$60
9650	DL9650	Technologies for Optical Countermeasures XII; and High-Power Lasers 2015: Technology and Systems <i>David H. Titterton, Robert J. Grasso, Mark A. Richardson, Harro Ackermann, Willy L. Bohn</i>	€50/\$53
9651	DL9651	Millimetre Wave and Terahertz Sensors and Technology VIII <i>Neil Anthony Salmon, Eddie L. Jacobs</i>	€50/\$53

Product Order Number		Volume Title/Volume Editors	Price for print volume separate purchase
Printed Proceedings Volume	Online Proceedings Volume		Meeting Attendees Only
9652	DL9652	Optics and Photonics for Counterterrorism, Crime Fighting, and Defence XI; and Optical Materials and Biomaterials in Security and Defence Systems Technology XII <i>Douglas Burgess, Gari Owen, Harbinder Rana, Roberto Zamboni, François Kajzar, Attila A. Szep</i>	€65/\$70
9653	DL9653	Target and Background Signatures <i>Karin U. Stein, Ric H. M. A. Schleijsen</i>	€55/\$60

Proceedings Collections

Online collections are not available for separate purchase.

Product Order Number		Collection Title/Included Volumes (See next page for volume titles and editors)	Price for CD separate purchase
Symposium CD Collection	Symposium Online Collection		Meeting Attendees Only
N/A	DLC590	Security and Defence 2015 9647, 9648, 9649, 9650, 9651, 9652, 9653	€130/\$145

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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.

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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:

- No persons under the age of 18 will be allowed in the exhibition area during move-in and move-out.
- Children 14 and older, accompanied by an adult, will be allowed in the exhibition area during open exhibition hours only.
- 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

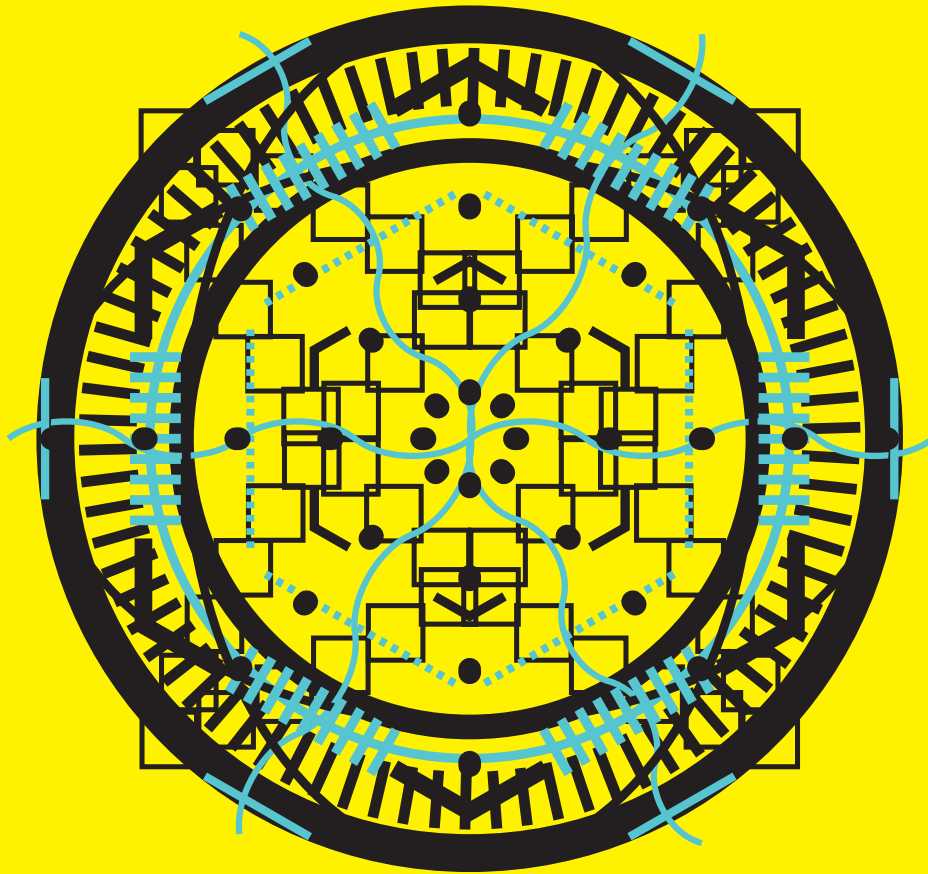
SPIE is an organization with strong values of responsibility and integrity. Our Ethics Statement and Code of Professional Conduct contain general guidelines for conducting business with the highest standards of ethics. SPIE has established a confidential reporting system for staff & other stakeholders 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.

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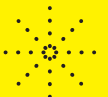
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**Conferences
26-29 September 2016**

**Exhibition
27-28 September 2016**