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2021 CALL FOR PAPERS

2021

REMOTE SENSING

CALL FOR PAPERS

NEW EXTENDED DATE

Submit abstracts by 28 April 2021

Conferences: 13-16 September 2021

Exhibition: 14-16 September 2021

IFEMA

Madrid, Spain

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#SPIERemoteSensing

Submit Abstracts by:
31 MARCH 2021

Connect with Your Community

Participate in the international conference for researchers and scientists involved in remote sensing

Make plans to participate in the 2021 conference.

Each year scientific topics are presented in remote sensing applications, sensors, systems, and satellite platforms.

The event provides a unique opportunity for scientists, engineers, programme managers and policy makers from around the world to learn about the trends, recent developments and achievements in the area of remote sensing. Attendees exchange ideas, as well as present and discuss the most recent developments and applications

A home for your research

As an author, don't hesitate to submit an abstract. Although much in the world remains uncertain, the one constant is that your work is important. SPIE continues our commitment to providing a forum for information sharing, collaboration, and advancing research that is vital to your community. Prepare your abstract and by doing so you will guarantee that your research is ready to be shared.

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Plan to Participate

We cordially invite you to participate in the 2021 SPIE Remote Sensing symposium. Over the past 28 years SPIE Remote Sensing has become the largest and most prestigious annual international meeting on this subject in Europe.

Each year comprehensive coverage of scientific topics are presented, such as, remote sensing applications, sensors, systems, and satellite platforms. With more than 25 countries represented at every meeting, the event provides a unique opportunity for scientists, engineers, programme managers and policy makers from around the world to learn about the trends, recent developments and achievements in the area of remote sensing. Attendees exchange ideas, as well as present and discuss the most recent developments and applications.

Although we missed hosting the in-person conference in Edinburgh due to the global COVID-19 health crisis, we were grateful for the enthusiastic participation of over 1,880 academics, researchers, engineers, and scientists who were able to connect online during the Digital Forum. Amazing research was shared, products were demonstrated, and networking discussions had - thanks to your continued commitment to advancing science.

The 2021 symposium in Madrid will again offer nine conferences covering the most exciting and prosperous areas in the field of remote sensing:

- Remote Sensing for Agriculture, Ecosystems, and Hydrology
- Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions
- Sensors, Systems, and Next-generation Satellites
- Remote Sensing of Clouds and the Atmosphere
- Environmental Effects on Light Propagation and Adaptive Systems
- Microwave Remote Sensing: Data Processing and Applications
- Image and Signal Processing for Remote Sensing
- Remote Sensing for Environmental Remote Sensing/GIS Applications
- Remote Sensing Technologies and Applications in Urban Environments

The conferences are designed to meet the scientific, technical, and particularly the business needs of the remote sensing community. Each conference will include oral and poster presentations with top researchers and company representatives as invited speakers. The conferences include information that is up to date and thus represents one of the finest training opportunities and sessions in the world for practical remote sensing as well as research training.

Meanwhile Remote Sensing systems provide continuously a tremendous amount of data leading to specific "big data" applications and problems. Today machine learning and deep learning methods are widely seen as powerful instrument to solve derived problems. Thus during this 2021 symposium we specifically encourage special sessions and training related talks concerning machine learning based solutions related to all of the above conferences.

The 28th SPIE Remote Sensing symposium will be co-located with the 18th SPIE Security+Defence. Explore new opportunities to collaborate with partners from other fields of activity. Showcase your multidisciplinary research and applications in this major international forum. The Organising Committee of SPIE Remote Sensing invites you to join your colleagues and hear presentations on the latest advances impacting your area of research.

We look forward to connecting with you and hearing your research in September.

2021 SYMPOSIUM CHAIRS



Karsten Schulz
 Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB (Germany)



Lorenzo Bruzzone
 Univ. degli Studi di Trento (Italy)



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Remote Sensing for Agriculture, Ecosystems, and Hydrology XXIII (RS101)

Conference Chairs: **Christopher M. U. Neale**, Univ. of Nebraska Lincoln (United States); **Antonino Maltese**, Univ. degli Studi di Palermo (Italy)

Programme Committee: **Katja Berger**, Ludwig-Maximilians-Univ. München (Germany); **Alessandra Capolupo**, Politecnico di Bari (Italy); **María Patrocinio González-Dugo**, Instituto de Investigación y Formación Agraria y Pesquera (Spain); **Antonino Maltese**, Univ. degli Studi di Palermo (Italy); **Christopher M. U. Neale**, Univ. of Nebraska Lincoln (United States)

Remote sensing technology continues to play a significant role in the understanding of our environment. It has evolved into an integral research tool for the natural sciences. Disciplines such as climatology, hydrology, and studies of the terrestrial biosphere have all developed a strong remote sensing analysis component. Moreover, remote sensing has facilitated our understanding of the environment and its many processes over a broad range of spatial and temporal scales. This is a highly important aspect of land surface research, especially in the management of land and water resources and for the detection of environmental change.

Remote sensing applications have greatly enhanced our ability to monitor and manage our natural resources, especially in the areas of agriculture, ecosystems, and water resources. However, in spite of significant progress in recent years, there are still many areas where the potential of remote sensing has not been fully realized, and these are areas of active research.

Of unique importance are those efforts that are focused on gaining a better understanding of what sensors are actually measuring as well as new applications and inverse modelling techniques. For this Conference, contributions using visible, near- and thermal infrared, microwave and other wavebands are solicited, as well as applications using laser/LiDAR or hyperspectral imaging. The conference is especially interested in papers, which emphasize the use of data from satellite, nanosatellites, airborne and Unmanned Aerial Systems (UAS) platforms, describing recent research results in the hydrological, agricultural and ecosystems sciences. Contributions are sought for state-of-the-art research and operational applications, in particular related to water cycle research and climate change. Invited keynote speakers will present overviews of problems, progress and prospects in key areas. Supporting papers are requested that review the

latest contributions of Earth Observations (EO) to water cycle and soil-vegetation-atmosphere sciences from global to basin to field scales (e.g., precipitation, soil water content, water levels, surface water, groundwater, land and water mass and heat exchanges). Also assessing the advances and identify the needs in physical modeling, including uncertainties and consistency quantification and data assimilation of EO-based observations to improve our knowledge of water, vegetation and ecosystems processes and our ability to assess future changes in water cycle, extreme events and hydrological hazards.

The understanding of small-scale complex environmental systems is still a challenging problem due to interface between global and regional data sets. This is driven by the lack of in situ observations and the variety of downscaling techniques used to model the regional issues. These are the pre-requisites for addressing urban to regional problems such as agriculture health, water resource management, drought and food security.

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Remote Sensing for Agriculture, Ecosystems, and Hydrology XXIII continued (RS101)

In recent years, opportunities for big data analysis in food and agricultural production are arising. Technological advancements in remote sensing coupled with advances in IT, mobile/cloud computing (smart phones, wearable devices), wide spread adoption of GPS, internet of things and all advanced digital technologies have created a unique opportunity for implementing smarter solutions for large and smallholder farmers globally, leading to increased productivity, reduced resource consumption, and improved food security.

Moreover, geomatic engineering is a rapidly developing discipline that focuses on principles of spatial information and incorporating land surveying also for hydrological and agricultural remote sensing. These techniques allow for the delivery of high-tech agricultural services and precision agriculture based on remote sensing.

In addition, distributed networks provide the opportunity for setting up integrated processing for near real-time regional or global monitoring products for hydrology; agriculture; and ecosystems: e.g., HF radar networks, ground stations, GPS networks, flux towers, etc.

Modern technique for image processing and data analysis, with promising results and large potential, include deep learning and machine learning. These classes of algorithms have been successfully applied in various ecosystems.

Papers related to the above mentioned and the following topics are solicited:

HYDROLOGICAL SCIENCES

- hydro-geomatics (surveying work carried out above the surface areas of water and for hydrological applications)
- hydrological modelling
- sensors for monitoring in hydrology and water resources
- data assimilation in hydrology (interpolation, smoothing and filtering applications)
- data scaling
- water balance applications
- soil water content
- satellite-based rainfall estimation and modeling (e.g., meteorological RADAR, thermal infrared)
- surface temperature estimation and modelling

- radiative transfer modelling
- precipitation, snow and ice hydrology
- water resource management
- drought monitoring, analysis and prediction
- sedimentation and erosion
- radar applications in hydrology (interferometry for land slide detection; canopy, soil moisture and soil roughness characterization; flooding)
- lidar applications in hydrology
- remote sensing in depth to ground water modeling and detection (passive and active microwaves, thermal infrared, gravimetry, ground penetrating radar)
- remote sensing in surface water topography and hydrodynamic
- water quality
- estuarine and coastal applications
- remote sensing applied to hydrodynamics
- flood mapping and modeling.

AGRICULTURAL BIOSPHERE

- agro-geomatics (geomatics techniques application for a precise management of agriculture)
- smarter solutions for farmers based on IT, cloud computing, mobile technology, GPS
- reflectance properties of soils
- soil organic carbon content
- bi-directional reflectance function for bare soil and vegetated surfaces
- crop yield modelling
- food production, energy and water nexus
- open data for agriculture and food production
- agri-food remote sensing systems
- water securing for food
- agriculture disease detection
- fluorescence applications in agriculture
- wildfire applications
- forestry dynamics and carbon cycle studies
- canopy and leaf optical models
- vegetation indices applications
- biomass monitoring
- photosynthetically active radiation
- evapotranspiration and energy balance (EB) applications

- eddy covariance, surface renewal, Bowen ratio systems, scintillometry etc.
- unmanned aerial systems (UAS) applications.

ECOSYSTEMS AND ENVIRONMENTAL CHANGE

- ecosystem and ecological management
- climate modeling, prediction and environmental change
- forecasting techniques
- long-term data records for water cycle and climate
- big data for sustainable development
- regional and global vegetation monitoring early warning techniques
- shallow and deep learning algorithms for ecosystems mapping.

JOINT SESSION

The conference will organize a joint session with the Microwave Remote Sensing: Data Processing and Applications Conference.

Contributions are solicited for the following topic:

- monitoring and modelling flood events by using optical and radar data.

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Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2021 (RS102)

Conference Chairs: **Charles R. Bostater Jr.**, Florida Institute of Technology (United States); **Xavier Neyt**, Royal Military Academy (Belgium); **Françoise Viallefont-Robinet**, ONERA (France)

Programme Committee: **Samir Ahmed**, The City College of New York (United States); **Jean-Paul Bruyant**, ONERA (France); **Alexander Gilerson**, The City College of New York (United States); **Carlton R. Hall**, NASA Kennedy Space Ctr. (United States); **Frederic Lamy**, ONERA (France); **Ana M. Martins**, Univ. dos Açores (Portugal); **Stelios P. Mertikas**, Technical Univ. of Crete (Greece); **Petri Pellikka**, Univ. of Helsinki (Finland)

Remote sensing science is one of the most modern approaches for studying oceans, littoral regions, seas and large lakes, as well as sea ice covered regions. An important aspect of remote sensing science is the ability to monitor complex environmental media (air, land, water) and their interfaces (water surface wave, air-sea interaction, water-sediment, and internal interfaces). Understanding complex environmental system phenomena is key to scientific understanding of oceans, littoral zones, estuaries, coastal areas, large lakes, ports and waterways as well as sea ice dynamics since remote sensing data provides valuable monitoring information. This information often serves as input to complex numerical models of environmental systems, such as climate change models, coupled oceanic-atmosphere models at the global (planetary) scale as well as at the mesoscale space and time scales. Remote sensing techniques also provide the most valuable tool set and techniques for monitoring and mapping different bottom features in aquatic systems, such as coral reefs, submerged aquatic vegetation and other "targets" of interest to the oceanographic and aquatic community. Also of interest are robotic and mechatronic platforms for in-situ sensing of interfaces and unique sensing systems & platforms for coastal and ocean monitoring and associated data assimilation into predictive models.

There is a need to improve the accuracy and precision of retrieved geophysical parameters from remote sensing data, and a need to use optical signal processing or filtering of remotely sensed signals from instruments to help improve underwater visibility and atmospheric aerosol influences that affect mapping subsurface water properties, features, and targets. In this context, it is often necessary to integrate data from different sensors as well as to include the knowledge of different disciplines. This is especially important in remote sensing of water quality, submerged aquatic vegetation and coupled ocean-atmosphere models.

From a remote sensing point of view, these data are mainly extracted from active or passive sensor systems, and models of complex phenomena are important. Techniques important to the above include radar, acoustic, optical, sensing systems and resulting data and EO sensing of aerosols and turbulence.

With reference to the above, this conference will address the above remote sensing systems and platforms with special emphasis on areas such as:

- detection of coastal & ocean currents and oceanic frontal features; radar and altimeter uses
- subsurface sensing using acoustics, optical, laser and magnetic systems, hyperspectral systems
- ocean sensing techniques and systems including microwave, acoustic and magnetic sensing and EO modeling
- ocean wave measurement & altimetry as well as coastal imaging systems and analysis including remote sensing of breaking waves, whitecaps, foam, bubbles, and aerosol exchanges
- use of remote sensing data in global and regional ocean observing platforms
- use of satellite & airborne data in ocean, coastal & coastal lagoon water quality assessments
- coastal ocean, estuarine and large lake water-quality monitoring (suspended sediments, dissolved organic matter, phytoplankton pigments and biomass, submerged aquatic vegetation) as well as other bottom feature and target recognition studies
- oceanic photochemistry and hyperspectral remote sensing; coupled oceanic and mesoscale models at the air-sea boundary, remote sensing input and data assimilation into atmospheric sea breeze models, weather forecasting uses of marine remote sensing data & imagery

- sensors, imaging and modeling of microwave signatures of ocean and coastal waves and sea ice
- studies of glaciers, shore-fast ice; polar regions, sea ice prediction monitoring and modeling
- **cubesats**, international space station (ISS) and multisatellite sensor configurations, georegistration and sensor integration from various platforms aboard the ISS
- data fusion, image fusion, **deep learning & artificial intelligence**, optical signature analysis and modeling, hyperspectral imaging
- sensor calibrations, airborne sensors & systems and data analysis
- radar and related active-passive (Raman) sensing theory, applications, systems and techniques
- regional and global sea and ice monitoring in climate change research, particularly work related to new satellite and suborbital missions with the new SAR instruments designed to investigate continental and marine sea ice thickness change
- novel use of GNSS signals in large water regions, lakes & coastal regions sensing and deep learning
- operational glacier, sea ice, ice sheets monitoring and systems **Cryosat, ICESat, IceBridge, GRACE, IceCube**
- active and passive remote sensing and techniques for improving underwater imaging for mapping ports, waterways and harbors, and effects of aerosols and turbulence in retrieving geophysical variables
- airborne (**manned, UAV's, drones**) remote sensing missions for observation of oceanic, coastal, sea ice and large water regions, and nearby urban environments; natural disasters; sensor design and calibrations.

NOTE: SPECIAL SESSIONS AND VOLUNTEER SESSION CHAIR CALL:

- (a) Hyperspectral remote sensing, modeling & applications related to breaking waves, foam, whitecaps, bubbles, air-sea gas and aerosol exchange phenomena
- (b) Coupled Ocean-Atmosphere Sea-breeze modeling with satellite & EO data assimilation, weather forecasting and climate change related satellite data use in marine environments
- (c) AI and Deep Learning techniques
- (d) CubeSats, Unmanned Aerial Vehicles or Drones

Abstracts and papers concerning the above topics and special sessions are invited for review and acceptance for presentation at the conference & publication in the proceedings. Those interested in developing the special session or joint sessions may contact the session chairs, members of the technical committee or contact Charles Bostater at Florida Institute of Technology: bostater@fit.edu.

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Sensors, Systems, and Next-Generation Satellites XXV (RS103)

Conference Chairs: **Sachidananda R. Babu**, NASA Earth Science Technology Office (United States); **Arnaud Hélière**, European Space Research and Technology Ctr. (Netherlands); **Toshiyoshi Kimura**, Japan Aerospace Exploration Agency (Japan)

Conference Co-Chair: **Steven P. Neeck**, NASA Headquarters (United States)

Programme Committee: **Philippe Martimort**, European Space Research and Technology Ctr. (Netherlands); **Josep Rosello**, European Space Research and Technology Ctr. (Netherlands); **Xiaoxiong J. Xiong**, NASA Goddard Space Flight Ctr. (United States)

Many new remote sensing programs are under way throughout the world, in the U.S., Europe, Japan, and elsewhere. NASA's Earth Science Division is developing and implementing a broad range of Earth spaceborne remote sensing missions to answer fundamental scientific questions requiring the view from space and to meet societal needs. These include missions and new program elements from the National Research Council's Earth Science Decadal Survey, missions and selected instruments to assure continuity of long-term key data sets, missions to ensure sustained land imaging provided by the Landsat system, and small-sized competitively-selected small satellite and constellation missions and instruments belonging to the Earth Venture Program. The Japan Aerospace Exploration Agency (JAXA) is developing and operating the ALOS series, GOSAT-2, GCOM series, GPM/DPR, and EarthCARE/CPR series of programmes. The European Space Agency (ESA) is developing and implementing a wide range of Earth Observation missions, encompassing the Earth Explorer missions addressing key scientific issues, as well as operational missions including the Copernicus Sentinels in partnership with the European Union (EU), and the meteorological missions in partnership with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). A number of new remote sensing programmes are also under development by other organisations and nations for research and operational use. Many of the above are contributing to the Global Earth Observation System of Systems (GEOSS) as envisioned by the intergovernmental Group on Earth Observations (GEO). Each of these programs comprises a set of remote sensing systems to address their science and applications objectives.

Papers are solicited on the following and related topics:

- sensors being developed
- satellites being developed
- enabling technologies for sensors and satellites
- new design concepts for sensors, systems and satellites
- hyperspectral sensors
- sensor calibration techniques
- in-situ sensor measurement assimilation
- modeling and simulation techniques for sensor concept development
- focal plane assemblies including detectors and spectral filters
- future LIDAR missions
- system precursors including test beds and airborne simulators
- data systems being developed
- new data processing techniques (applications to Big Data and remote sensing, sensor and data interoperability).

Sessions on the following topics are being planned:

- Japanese missions and technologies
- European missions and technologies
- US missions and technologies
- small satellites (nano/cubesats, microsats) and constellations for Earth observation
- NASA Decadal Survey Designated Observable (DO), Venture Continuity, and Incubation studies
- commercial Earth observing constellations
- UAV systems for Earth observation
- sensor calibration
- focal plane technologies.

Remote Sensing of Clouds and the Atmosphere XXVI (RS104)

Conference Chairs: **Adolfo Comerón**, Univ. Politècnica de Catalunya (Spain); **Evgueni I. Kassianov**, Pacific Northwest National Lab. (United States); **Klaus Schäfer**, Atmospheric Physics Consulting (Germany)

Conference Co-Chairs: **Richard H. Picard**, ARCON Corp. (United States); **Konradin Weber**, Fachhochschule Düsseldorf (Germany); **Upendra N. Singh**, NASA Langley Research Ctr. (United States)

Programme Committee: **Lucas Alados-Arboledas**, Univ. de Granada (Spain); **Aldo Amodeo**, Istituto di Metodologie per l'Analisi Ambientale (Italy); **Christoph C. Borel-Donohue**, U.S. Army Research Lab. (United States); **Young Joon Kim**, Gwangju Institute of Science and Technology (Korea, Republic of)

This conference focuses on methods, underlying technologies, and applications of remote sensing of clouds and Earth and planetary atmospheres, including the following topics:

REMOTE SENSING, INCLUDING PROFILING, OF CLOUDS, ATMOSPHERIC AEROSOLS, TRACE GASES AND METEOROLOGICAL PARAMETERS

- cloud detection, profiling and characterization
- cloud modelling
- cloud screening
- gas measurements and retrieval from ground, air and space
- aerosol detection, measurements and retrieval from ground, air and space
- assimilation of remote sensing data of clouds, aerosols and trace gases into meteorological, transport, and air-quality models
- remote sensing of constituents, dynamical and electrical structure, and wave motions of the upper atmosphere
- studies of middle and upper atmosphere variability and climatology
- hyperspectral data processing
- deep learning, machine learning, handling and processing big data.

RADIATIVE TRANSFER

- Earth radiation budget
- 3D radiative transfer and approximation methods
- retrieval methods, profiling, and data assimilation
- atmospheric correction
- non-LTE radiative effects and radiative transfer codes
- non-LTE retrieval methods.

LIDAR, RADAR, AND OTHER ACTIVE AND PASSIVE (MICROWAVE, INFRARED, VISIBLE AND ULTRAVIOLET) ATMOSPHERIC MEASUREMENT TECHNIQUES AND TECHNOLOGIES

- remote sensing by FTIR, DOAS and other spectroscopic techniques

- lidar (elastic backscatter, Raman, DIAL, etc.) methods for aerosol, cloud and gas measurements
- radar profiling of cloud parameters
- satellite retrievals (infrared, microwave) targeting the upper troposphere and lower stratosphere (MIPAS, ACE-FTS, MLS, OMPS, etc.)
- advances in laser sources for lidar sensing of clouds, aerosols and gases from ground, airborne and space-borne platform
- advances in detectors for remote sensing systems of clouds and the atmosphere
- advances in retrieval methods
- synergy between different types of instruments
- calibration/validation of satellite retrievals of atmospheric variables
- low-cost sensor networking and interplay with mobile devices (including unmanned aerial vehicles), trace compound retrieval and remote sensing from ground, air and space, food and water security, predicting and monitoring natural disasters (wildfire, landslides, floods, etc.), search and rescue.

APPLICATIONS

- weather forecast and climate trends
- air pollution monitoring, forecast and modelling, including data and information fusion
- measurement of industrial, agricultural, biomass, and volcanic emissions and transport, including determination of emission source strengths
- environmental, disaster, and fire monitoring
- improvement of agri-food production systems
- applications of small satellites (microsats, nanosats, cubesats) to remote sensing of the atmosphere.
- studies of ice sheets (Cryosat, ICESat, IceBridge, GRACE, IceCube, etc.) and snow cover dynamics.

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Environmental Effects on Light Propagation and Adaptive Systems IV (RS105)

Conference Chairs: **Karin Stein**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Szymon Gladysz**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

Programme Committee: **Sukanta Basu**, Technische Univ. Delft (Netherlands); **Ivo Buske**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Denis Dion**, Defence Research and Development Canada, Valcartier (Canada); **Christian Eisele**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Michael Hart**, Univ. of Arizona (United States); **Andrey V. Kanaev**, Office of Naval Research Global (United States); **Luc Labarre**, ONERA (France); **Andrew J. Lambert**, UNSW Canberra (Australia); **Vladimir P. Lukin**, V.E. Zuev Institute of Atmospheric Optics (Russian Federation); **Florian Moll**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Alexander M. J. van Eijk**, TNO Defence, Security and Safety (Netherlands); **Arthur D. van Rheenen**, Norwegian Defence Research Establishment (Norway); **Marie-Thérèse Velluet**, ONERA (France); **Vladimir Yurievich Venediktov**, Saint Petersburg Electrotechnical Univ. "LETI" (Russian Federation), St.-Petersburg State Univ. (Russian Federation); **Oskar F. von der Lühe**, Kiepenheuer-Institut für Sonnenphysik (Germany); **Henry White**, BAE Systems (United Kingdom)

The use of sensors for active and passive remote sensing of the Earth, its atmosphere and the oceans, for free-space laser communications, and for high-resolution imaging of ground-based, immersed and airborne objects are fields of growing interest for both civilian and military applications.

Such high-resolution optical sensing systems use spectral regions varying from UV to Radar. However, they all must deal with detrimental environmental influences, be it over km-long ranges in the atmosphere or even over only several meters when light propagates through very turbid media such as ocean water. Instrument and measurement analysis therefore depends crucially on a thorough understanding of all optical effects, which limit the sensor performance operating in an absorbing, scattering, and radiating random medium. Increasingly important in this area are modern methods used to ameliorate these effects through compensative hardware, algorithms, and measurements of environmental parameters performed at various locations around the World. Contributions are invited on the following topics and those related to them:

CHARACTERIZATION OF THE PROPAGATION ENVIRONMENT

- measurements of the meteorological parameters relevant to the propagation of light, such as temperature, humidity, extinction, etc.
- updates on software for transmission and radiance computations
- measurements and modelling of size distributions and optical properties of aerosols

- modelling and measurement of backgrounds in the visible and infrared spectral ranges
- prediction and measurement of scattering, absorption and turbulence in water
- instances of non-Kolmogorov turbulence.

PROPAGATION AND IMAGING THROUGH OPTICAL AND ANTHROPOGENIC TURBULENCE

- effects of atmospheric and underwater turbulence on laser beam propagation
- aero-optical and plume effects in airborne laser applications
- scintillation and surface speckle propagation
- anisoplanatism in imaging through turbulence.

LASER-BASED SENSING IN THE ATMOSPHERE AND UNDERWATER

- active imaging and gated viewing
- LIDAR and its applications
- standoff vibrometry
- supercontinuum spectroscopy.

FREE-SPACE OPTICAL (FSO) COMMUNICATION TECHNIQUES AND APPLICATIONS

- space-based, terrestrial and airborne FSO systems
- through-water and underwater optical communications
- modulation techniques and formats
- pointing, acquisition, and tracking
- transmitters, receivers, and subsystems
- quantum communications
- cyber security implications of FSO systems.

TECHNIQUES FOR MITIGATION OF ATMOSPHERIC EFFECTS

- adaptive optics
- image sharpening/de-blurring
- global and local image stabilization, de-warping, optical flow methods
- tracking through turbulence
- image fusion
- applications of machine learning to wavefront sensing and image processing.

NEW DEVICES FOR ATMOSPHERIC MEASUREMENT OR COMPENSATION

- novel optical components such as liquid-crystal-, and MEMS-based devices
- novel wavefront sensors
- high-frame rate and low-noise visible and infrared detectors.

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Microwave Remote Sensing: Data Processing and Applications (RS106)

Conference Chairs: **Fabio Bovenga**, CNR ISSIA (Italy); **Claudia Notarnicola**, EURAC research (Italy); **Nazzareno Pierdicca**, Univ. degli Studi di Roma La Sapienza (Italy); **Emanuele Santi**, Istituto di Fisica Applicata Nello Carrara (Italy)

Programme Committee: **Richard Bamler**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Maria-Paola Clarizia**, Univ. of Michigan (United States); **Fabio Covello**, Agenzia Spaziale Italiana (Italy); **Katarzyna Dabrowska-Zielinska**, Institute of Geodesy and Cartography (Poland); **Mihai P. Datcu**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Fabio Del Frate**, Univ. degli Studi di Roma "Tor Vergata" (Italy); **Dara Entekhabi**, Massachusetts Institute of Technology (United States); **Carlos Lopez-Martinez**, Univ. Politècnica de Catalunya (Spain); **Simonetta Paloscia**, Istituto di Fisica Applicata "Nello Carrara" (Italy); **Luca Pulvirenti**, CIMA Research Foundation (Italy); **Stefan Schneiderbauer**, EURAC research (Italy); **David Small**, Univ. of Zürich (Switzerland)

The main objective of the conference is to present an updated view of the state-of-the-art in active and passive microwave remote sensing techniques and to provide a playground for scientists coming from different microwave sectors and final application domains. In this context, the conference will offer a platform to exchange ideas and foster applications, which may take advantage from the use of radar and microwave radiometers alone, as well as their joint exploitation and combination with other sensors to take advantage from complementarity of the different techniques (SAR, scatterometer, radiometers, altimeter, GNSS-R).

Particular attention will be given to applications and algorithms, including model based and machine learning algorithms, for exploiting data of operational sensors such as Sentinel 1, Sentinel 3, ALOS2, TerraSAR-X, COSMO-SkyMed, RADAR-SAT-2, SAOCOM, AMSR-E/AMSR2, SSMI / SSMIS, SMOS, Metop and SMAP as well as airborne and ground based experiments. Applications based on time series analysis will be addressed as well. In fact, the incoming growing capabilities of the most recent sensors, in terms of temporal revisit time and electromagnetic spectrum sampling (in active and passive mode), offer a potential tool for new environmental applications especially related to the monitoring of natural disasters (such as earthquake, flood, drought, landslides, avalanches), environmental issues, and to the food and energy challenges, which can particularly benefit from multi-temporal image analysis.

Contributions are solicited on the following and related topics for both applications and processing techniques:

- application of microwave sensing to natural hazard, risk prevention and disaster

management

- application of microwave sensing to food security, energy and biodiversity
- microwave (active and passive) electromagnetic modelling and simulation in different scenarios (land and ocean, atmosphere)
- inversion algorithms for the retrieval of biogeophysical parameters from microwave data
- microwave data (radar and radiometer) processing techniques
- active and passive data merging, disaggregation approaches
- machine learning algorithms for classification and retrieval applications
- polarimetric methods, techniques and applications
- SAR interferometry techniques and applications
- bistatic radar, including GNSS reflectometry
- radar altimeter and scatterometer techniques and applications
- microwave remote sensing from UAVs.

JOINT SESSIONS

Two joint sessions will be organized with the conferences "Image and Signal Processing" and "Remote Sensing for Agriculture, Ecosystem and Hydrology". In the latter, contributions are solicited for the topic "monitoring of soil moisture and vegetation biomass by using optical and microwave data."

Image and Signal Processing for Remote Sensing XXVII (RS107)

Conference Chairs: **Lorenzo Bruzzone**, Univ. degli Studi di Trento (Italy); **Francesca Bovolo**, Fondazione Bruno Kessler (Italy)

Conference Co-Chairs: **Jon Atli Benediktsson**, Univ. of Iceland (Iceland); **Fabio Bovenga**, Istituto per il Rilevamento Elettromagnetico dell'Ambiente (Italy); **Claudia Notarnicola**, EURAC (Italy); **Nazzareno Pierdicca**, Sapienza Univ. di Roma (Italy); **Emanuele Santi**, Istituto di Fisica Applicata "Nello Carrara" (Italy)

Programme Committee: **Selim Aksoy**, Bilkent Univ. (Turkey); **Luciano Alparone**, Univ. degli Studi di Firenze (Italy); **Gustavo Camps-Valls**, Univ. de València (Spain); **Jocelyn Chanussot**, Lab. des Images et des Signaux (France); **Chi-Hau Chen**, Univ. of Massachusetts Dartmouth (United States); **B. S. Daya Sagar**, Indian Statistical Institute, Bangalore (India); **Fabio Dell'Acqua**, Univ. degli Studi di Pavia (Italy); **Begüm Demir**, Technische Univ. Berlin (Germany); **Peijun Du**, Nanjing Univ. (China); **Andrea Garzelli**, Univ. degli Studi di Siena (Italy); **Jordi Inglada**, Ctr. d'Etudes Spatiales de la Biosphère (France); **Jun Li**, Sun Yat-Sen Univ. (China); **Sicong Liu**, Tongji Univ. (China); **Allan A. Nielsen**, Technical Univ. of Denmark (Denmark); **Claudia Paris**, Univ. degli Studi di Trento (Italy); **David Small**, Univ. Zürich (Switzerland); **Florence Tupin**, Télécom ParisTech (France); **Benoit Vozel**, Univ. de Rennes 1 (France); **Josiane B. Zerubia**, INRIA Sophia Antipolis - Méditerranée (France)

The main goal of this conference is to address advanced topics related to signal processing, image analysis, pattern recognition, machine learning and data fusion methodologies in the field of remote sensing.

Papers describing recent and original work in the following and related research topics are welcome:

- calibration and registration
- image enhancement and restoration
- edge detection and segmentation
- target detection and object recognition
- automatic classification
- estimation of geo- bio-physical parameters
- artificial intelligence
- machine learning and deep learning
- analysis of big data
- change detection and analysis of image time series
- analysis of multispectral and hyperspectral images
- analysis of SAR and LIDAR signals
- multisensor and multisource data fusion
- data mining techniques
- image coding and data compression
- remote sensing applications
- satellite, airborne and UAV remote sensing.

NOTE: To assure a high quality conference, all abstracts will be reviewed by the conference scientific committee and co-chairs for technical merit and content.

Save the date

**NEW EXTENDED DATE
ABSTRACTS DUE: 28 APRIL 2021**

**AUTHOR NOTIFICATION:
18 JUNE 2021**

The contact author will be notified of acceptance by email.

MANUSCRIPTS DUE: 16 AUGUST 2021

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Earth Resources and Environmental Remote Sensing/GIS Applications XII (RS108)

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

Conference Co-Chairs: **Ulrich Michel**, ROSEN Germany GmbH (Germany); **Konstantinos G. Nikolakopoulos**, Univ. of Patras (Greece)

Programme Committee: **Markus Boldt**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Dimitri Bulatov**, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Pierre Karrasch**, TU Dresden (Germany); **Pablo H. Rosso**, Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V. (Germany); **Ana Claudia Moreira Teodoro**, Univ. do Porto (Portugal); **Kyriacos Themistocleous**, Cyprus Univ. of Technology (Cyprus); **Christine Wessollek**, TU Dresden (Germany)

Satellite remote sensing has become a common tool to investigate the different fields of Earth and environmental sciences. The progress of the performance capabilities of the optoelectronic and radar devices mounted on-board remote sensing platforms have further improved the capability of instruments to acquire information about the Earth and its resources for global, regional and local assessments.

With the advent of new high-spatial and spectral resolution satellite and aircraft imagery new applications for large-scale mapping and monitoring have become possible. The integration with Geographic Information Systems (GIS) allows a synergistic processing of multi-source spatial data. The present conference will be an occasion to outline how scientists involved in the Earth and environmental studies can take advantage of new remote sensing techniques and the advances in spatial technology. Particular subjects are:

SENSORS AND PLATFORMS

- new sensor developments
- radiometric calibration studies
- geometric correction approaches
- mobile solutions
- simulation studies.

PROCESSING METHODOLOGIES

- fusion of multi-source and multi-scale data
- multitemporal remote sensing
- machine learning methods for remote sensing
- integration of remote sensing and GIS
- analysis of optical and thermal data
- hyperspectral analytical approaches
- 3D techniques: LIDAR and Stereo.

ENVIRONMENTAL MONITORING CONCEPTS

- land degradation studies
- natural hazards (floods, landslides)
- landscape modeling
- sustainability and planning
- coastal zone management
- interaction sea-land
- resource management
- global climate change.

HAZARD MITIGATION GEOLOGIC APPLICATIONS

- geological hazards, mine waste
- earthquakes and volcanoes
- lithological and mineral mapping
- mineral and petroleum exploration
- structural geology, tectonics
- hydrogeology.

INFRASTRUCTURES AND URBAN AREAS

- 3D urban modeling
- change detection
- remote sensing for urban information systems
- virtual city models
- urban feature extraction with high resolution SAR-sensors.

REMOTE SENSING FOR ARCHAEOLOGY, PRESERVATION OF CULTURAL AND NATURAL HERITAGE

- discovering hidden archaeological sites with remotes sensing techniques
- generating digital twins of archaeological monuments and sites
- ground penetrating sensing
- detection and monitoring of wildfires and illegal deforestation.

THIS YEAR'S CONFERENCE WILL FEATURE A SPECIAL SESSION ON

Theories and Applications of Satellite Remote Sensing and Ground-Based Non-destructive Technologies in Civil and Environmental Engineering

Satellite remote sensing is becoming popular for the assessment and the routine monitoring of civil engineering structures and infrastructures, such as buildings, railways, airports and highways and the surrounding environment. The tremendous progress made recently by this technology allows to control their conditions at the network level with a very high inspection frequency and resolution as well as to identify critical sections for an early-stage detection of decays. Parallel to this, ground-based non-destructive testing (NDT) methods have become established in structure, infrastructure, and environmental management systems due to their non-invasiveness, the rapidity of data collection and the provision of reliable information. Within this context, an integration between satellite remote sensing and ground-based NDT technologies (e.g. – but not limited to – GPR, GB-SAR, UAVs, Lidar, FWD and Profilometers) can stand as a step forward in the development of new theoretical, numerical and experimental approaches towards the provision of smarter management systems in civil and environmental engineering.

Submissions related to the above mentioned, describing work in the following and related research topics are invited:

- remote sensing theories and applications in civil and environmental engineering
- medium- and high-resolution SAR sensors in civil and environmental engineering
- advanced assessment, monitoring and interpretation methods for transport infrastructures (roadways, railways, airfields), bridges, tunnels, and buildings
- design and development of new surveying protocols, equipment, and prototypes
- advances in ground-based non-destructive testing (NDT) methods, numerical developments and applications (stand-alone use of existing and state-of-the-art NDTs)
- data fusion, integration and correlation of multi-source, multi-scale, and multi-temporal data outputs for civil and environmental engineering applications.

Save the date

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Remote Sensing Technologies and Applications in Urban Environments VI (RS109)

Conference Chairs: **Thilo Erbertseder**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Nektarios Chrysoulakis**, Foundation for Research and Technology-Hellas (Greece); **Ying Zhang**, Natural Resources Canada (Canada)

Programme Committee: **Matthias Budde**, Karlsruhe Institute of Technology (Germany); **Thomas Esch**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Wieke Heldens**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Zina Mitraka**, Foundation for Research and Technology-Hellas (Greece); **Christopher Small**, The Earth Institute (United States); **Carlos Tavares Calafate**, Univ. Politécnic de Valencia (Spain)

The global urbanization constitutes an epochal transformation of the Earth. Since 2007 for the first time in human history more people have lived in cities than in the countryside. According to the United Nations in 2050, around 75% of the worldwide population will be living in cities. The population density, traffic and infrastructure, environmental and energy problems, climate change, migration, demographic change, aspects of vulnerability and sustainability, new forms of mobility and sharing--unprecedented challenges and opportunities are continuously arising. In any case, the urban environment plays a major role in the development of humanity and the quality of life of the individual citizen.

The Corona-pandemic poses an unprecedented threat to the urban society. The resulting lockdowns in 2020 affected all areas of life to a considerable extent with impacts on the urban atmosphere, environment and landscape.

Remote Sensing Technologies and Applications offer a wealth of possibilities and opportunities to monitor the urban environment, to support planning processes, to enhance the availability of relevant information, to shape the resilient and sustainable city and to improve the quality of life of citizens.

We invite papers related to advanced remote sensing technologies, applications and information systems focusing on the urban environment that push beyond the state-of-the-art. These include:

CORONA PANDEMIC (SPECIAL SESSION)

- impacts of Corona-lockdowns on urban atmosphere, environment and landscape
- EO-based analysis of public health risks.

REMOTE SENSING OF URBAN AIR QUALITY AND CLIMATE

- air pollution and greenhouse gas monitoring using satellites, aerial planes, UAV and mobile platforms
- urban atmosphere and local climate zones
- urban climate under global climate change
- CO₂ emissions, capture and sequestration
- urban energy budget and heat fluxes
- integrated urban climate services
- urban Heat Island.

REMOTE SENSING FOR URBAN RESILIENCE AND URBAN PLANNING

- urban remote sensing based on satellite, aerial plane, UAV and mobile platforms
- urban land surface information extraction
- urban morphology, infrastructure and traffic
- urban land cover and biodiversity
- urban planning indicators
- sustainable Urbanization and Adapting and transforming towards sustainability
- strategies with respect to natural disasters
- urban metabolism
- nature-based solutions.

SMART CITIES

- information services and mobile applications
- AI methods and machine learning for mapping and monitoring
- Big Data processing and modeling
- crowd sourcing and microsensors
- data assimilation (combining measurements and models)
- quality of life services and support to people at risk.

Save the date

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Note: Only original material should be submitted. Commercial papers, papers with no new research/development content, and papers with proprietary restrictions will not be accepted for presentation.

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Presenting authors, including keynote, invited, oral, and poster presenters, agree to the following conditions by submitting an abstract. An author or coauthor will:

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- Publish a 6- to 20-page manuscript in Proceedings of SPIE in the SPIE Digital Library.
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- Ensure that all clearances, including government and company clearance, have been obtained to present and publish. If you are a DoD contractor in the USA, allow at least 60 days for clearance.
- Ensure that you obtain a visa in time, if you need to do so. Visa Application Information and Invitation Requests.

Important dates

Abstracts Submission Deadline	28 April 2021
Acceptance Notification Sent to Contact Author	18 June 2021
Manuscripts Due	16 August 2021

Review and programme placement

- To ensure a high-quality conference, all submissions will be assessed by the Conference Chair/Editor for technical merit and suitability of content.
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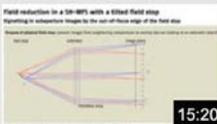
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