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ASIA-PACIFIC REMOTE SENSING

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Kaohsiung, Taiwan

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2 - 4 December 2024
Kaohsiung Exhibition Center (KEC)
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Remote Sensing of the Atmosphere, Clouds, and Precipitation VIII (ARS01)

Conference Chairs: **Eastwood Im,** Jet Propulsion Lab. (United States); **Song Yang,** U.S. Naval Research Lab. (United States); **Cheng-Yung Huang,** Taiwan Space Agency (TASA) (Taiwan)

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Advanced remote sensing instruments provide the vital component of global observing systems for planet Earth. New and emerging methods for atmospheric remote sensing, including clouds, precipitation, aerosol, pollutants, trace gases, greenhouse gases, atmospheric winds, etc., that combine different types of observations spanning over a huge range of the electromagnetic spectrum are now beginning to emerge with the maturation of global observing systems. Towards this, there are emerging developments taking place in the areas of atmospheric chemistry instruments involving advanced spectroscopy, high spectral resolution atmospheric sounders, cloud profiling and precipitation radars, as well as advanced optical and microwave imagers and earth radiation budget radiometers. Developments of such instrumentations bring challenging applications, not only in developing newer techniques to analyze them but new approaches to integrate the observations from the different sensors.

This conference will focus on the current accomplishments and future advancements of the remote sensing techniques and instrumentations to optimize the use of new and upcoming satellite data aimed at advancing our understanding of processes important for understanding on global environmental change. Community members are invited to bring to the meeting their interests in elements such as instrumentation, technology, modeling, algorithm, processing, information distribution, application, and the synergy among them. With individual and invited expert presentations and hallway informal discussions, this meeting will foster international, institutional, and personal collaboration and interaction to advance remote sensing knowledge and skill to meet increasing demands for understanding and management of our environment. Papers are solicited in the following and related topics:

- cloud, precipitation, and aerosol remote sensing and retrieval techniques including profiling approaches
- trace, greenhouse, and pollutant species remote sensing
- remote sensing of snowfall, tropical cyclones, convective storms, tornadoes, hail, graupel, lightning, and other extreme weather events
- recent advances on intra-seasonal variability and monsoon systems
- atmospheric sounding methods including next-generation sounders and GNSS methods
- orbital, suborbital, and ground-based atmospheric remote sensing instruments, including characteristics, calibration, algorithm development, data processing, and applications
- recent advances in radiative transfer modeling, especially for cloud and aerosol simulations
- data assimilation and data fusion methods, especially as applied to 'non-traditional' atmospheric data
- multi-sensor methods particularly emphasizing combined active and passive remote sensing techniques
- novel sensor and sensor data processing and compression techniques
- new intelligent sensors, intelligent/smart sensing methods, and emerging machine learning-based information processing technologies
- validation field campaign, in-situ data analysis
- recent advances in Arctic (Antarctic) research and strategy
- current and future operational and research remote sensing systems and missions, such as FY-4B, FY-3E, GPM, TROPICS, PACE, EWS-G, GISAT-1, MTG-FCI, JPSS-2, EarthCARE, Metop-SG, OceanSat3, WSF-M, TEMPO, PREFIRE, MAIA, INCUS, JPSS-3, FORMOSAT-7/COSMIC-2, and TRITON.
- new and proposed observing systems and mission concepts, such as AOS and PBL
- emerging techniques and technologies on distributed satellite constellations for atmospheric remote sensing, especially those utilizing low-cost, miniaturized instruments on smallsat/cubesat platforms
- studies of meteorological impacts on spread of infectious diseases such as COVID-19
- recent advances on machine learning-based research and applications: detection and forecast of unique weather phenomena such as severe storms and lightning; numerical weather prediction modeling systems (data assimilation and parameterization etc.).

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Land Surface and Cryosphere Remote Sensing V (ARS02)

Conference Chairs: **Jing M. Chen,** Univ. of Toronto (Canada); **Cheinway Hwang,** National Yang Ming Chiao Tung Univ. (Taiwan)

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The dynamics of Earth's surface and the cryosphere stand at the forefront of our collective efforts to understand and mitigate the impacts of climate change and human activity on our planet. The interplay between these elements underscores the urgency of advancing our knowledge and technological capabilities in remote sensing. The 2024 APRS conference, set to convene in Taiwan, is dedicated to showcasing cutting-edge research and innovations in the remote sensing of land surfaces and cryospheres. This year, we place a significant emphasis on integrating recent events, such as unprecedented wildfire seasons, rapid ice melt rates, and the introduction of novel satellite missions and sensors, into our discussions and presentations.

This conference seeks to explore and expand the horizons of remote sensing in capturing and analyzing the nuances of land surface processes and cryospheric dynamics. We are particularly interested in submissions that leverage the latest in satellite technology, including new missions launched to monitor Earth's surface and atmosphere with unprecedented accuracy and detail. The incorporation of data from these missions is crucial for enhancing our understanding of surface energy budgets, vegetation dynamics, topographical changes, biogeochemical and hydrological cycles, as well as the state of snow and ice cover.

We encourage contributions that delve into the application of remote sensing across a broad spectrum of environmental and societal challenges. This includes but is not limited to water resource management, agricultural optimization, forest management, ecosystem preservation, disaster preparedness and response, and climate change mitigation. Papers that explore the integration of active and passive remote sensing technologies, from visible and infrared to microwave sensors, and their applications in monitoring land and cryosphere are welcomed.

Specific topics of interest for this conference include, but are not limited to:

- advanced methodologies in water resource management
- innovative remote sensing applications in agriculture and crop yield optimization
- strategies for combating deforestation and managing forest resources
- detailed monitoring of vegetation health and biophysical parameters
- biomass estimation and carbon cycle insights
- precise mapping and monitoring of ice sheets, sea ice, and glaciers
- insights into ice and snow hydrology and its global implications
- monitoring and understanding evapotranpiration and water cycle
- addressing land degradation, desertification, and soil moisture variability
- enhancements in surface temperature and emissivity measurements
- SAR imaging techniques and their evolving applications
- exploration of data from recent and forthcoming satellite missions, both governmental and commercial
- novel approaches to wildfire detection and the assessment of its environmental impacts
- techniques for the data assimilation of surface parameters for improved accuracy
- remote sensing applications in natural hazard detection and management
- contributions to mineral and petroleum exploration through remote sensing technologies
- developments in novel sensor technologies
- contributions toward monitoring and understanding global change through new sensor developments and methodologies.

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Active and Passive Remote Sensing of Oceans, Seas, and Lakes (ARS03)

Conference Chairs: **Robert J. Frouin,** Scripps Institution of Oceanography (United States); **Hiroshi Murakami,** Japan Aerospace Exploration Agency (Japan); **Jong-Kuk Choi,** Korea Institute of Ocean Science & Technology (Republic of Korea); **Kuo-Hsin Tseng,** National Central Univ. (Taiwan)

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A diverse array of remote sensing instruments, both passive and active, deployed on space-borne, air-borne, and ship-borne platforms, provide invaluable insights into water composition and related environmental parameters. These instruments, ranging from visible and infrared radiometers to scatterometers and altimeters, enable comprehensive assessments of aquatic environments, encompassing factors like surface temperature, chlorophyll concentration, sea level, wind stress, wave height, and salinity. Such data interpretation aids in detecting and monitoring phenomena such as oil spills, pollution, and navigational hazards, while also advancing our understanding of ocean dynamics, marine ecosystems, and climatic changes.

This conference aims to explore the advancements in remote sensing technologies and their applications in studying and monitoring marine environments and inland waters, including oceans, seas, bays, estuaries, river networks, lakes and reservoirs, lagoons, and reefs. It will provide a platform to investigate both current and future systems tailored for understanding and safeguarding our marine environments and inland waters. The thematic focus includes:

- tackling challenges posed by optically complex waters and addressing atmospheric correction issues in coastal regions and over inland waters
- exploring the contributions of polarized, hyper-spectral, and bidirectional observations
- investigating innovative applications and opportunities presented by both historical and current satellite missions, with attention to recent endeavors (e.g., GCOM, EnMAP, PRISMA, GOCI-2, HY-Series, PACE), as well as forthcoming missions (e.g., FLEX, GLIMR, SABIA-MAR, SBG, GISAT-2)
- strengthening the efficacy of remote sensing techniques in the study of aquatic environments through the synergistic integration of diverse methodologies.

We invite submissions on the following and related topics:

- advances in inversion of the electromagnetic signal
- scientific applications derived from past/existing satellite missions
- expected benefits from upcoming and future satellite missions
- technologies aimed at enhancing current measurement capabilities
- novel environmental research and operational applications
- integration of active and passive remote sensing techniques
- exploration of new sensors and measurement concepts.

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Lidar and Optical Remote Sensing for Environmental Monitoring XVII (ARS04)

Conference Chairs: **Upendra N. Singh,** NASA Langley Research Ctr. (United States); **Nobuo Sugimoto,** National Institute for Environmental Studies (Japan); **Li-Hsueh Chang,** Taiwan Space Agency (TASA) (Taiwan); **Tee-Ann Teo,** National Yang Ming Chiao Tung Univ. (Taiwan)

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Optical remote sensing techniques are being widely used for continuous, systematic monitoring of atmospheric constituents and meteorological parameters using ground-, air-, and satellite-based remote sensing instruments. The ability of laser/telescope systems to reach out to great distances in the atmosphere has opened up a major field of applied optics that now attracts the efforts of scientists and engineers from many countries.

This technology makes it possible to rapidly obtain profiles of atmospheric properties (e.g. temperature and wind) and constituents (e.g. H_2O, O_3, and CO_2). Time-dependent 3D mapping of the atmosphere has now become a reality through the international development of the lidar technique. Lidar practice now incorporates a wide variety of optical phenomena (absorption, fluorescence, etc.). Applications are increasing in the areas of meteorology, urban and industrial air pollution, aircraft safety, global monitoring of ozone and climate change, and the basic processes of atmospheric dynamics. Global wind profiling and CO_2 measurement from space requires high-energy and high-power lasers for extended operation. Laser risk reduction, technology maturation and lifetime testing at component and system level has become an important issue for space deployment. Similarly, thermal, contamination, and radiation effects need to be fully understood for developing highly efficient, long-life, high-power laser sources for long-term operation in space. As the world moves towards increased population and industrial development, laser remote sensing will become more and more important as the method of choice for obtaining the environmental data needed in intelligent decision-making for resource management. This conference focuses on current and future laser remote sensing technologies, techniques, applications, and observations related to environmental monitoring.

To allow maximum participation, a wide range of topics will be considered for presentation and discussion at the conference. The suggested list of topics to be covered in this conference is:

- solid-state and fiber laser developments for lidar applications
- high-power laser diodes for space lidar applications
- innovative lidar detector and receiver technologies
- efficient, compact, ground-, air-, and space-borne lidar systems
- laser ranging and imaging
- space reliability and thermal, contamination, and radiation effects on components and systems for space
- lidar methods for constituent monitoring (DIAL, Raman, Raman/DIAL, Resonance)
- lidar methods for natural resource management (vegetation, fishery)
- laser-based remote chemical and biological detection and analysis
- tunable IR to mid-IR lidar for chemical/pollution detection
- wind field profiling (coherent, direct)
- atmospheric aerosols and cloud studies lidar applications to global issues (ozone depletion, climate change, global transport of pollutants)
- lidar applications to regional issues (urban pollution, dust transport)
- polar cloud monitoring (PSCs, NLCs, PMCs)
- atmospheric dynamics (boundary layer, gravity waves, tides, etc.)
- multi-sensor stations and campaigns for comprehensive atmospheric characterization
- affordable lidar for cloud, aerosol, and pollution monitoring
- global scale monitoring by satellite-borne lidars.

Multispectral, Hyperspectral, and Ultraspectral Remote Sensing Technology, Techniques, and Applications VIII (ARS05)

Conference Chairs: **Ryoichi Imasu,** The Univ. of Tokyo (Japan); **Li-Hsueh Chang,** Taiwan Space Agency (TASA) (Taiwan); **Fuan Tsai,** National Central Univ. (Taiwan)

Program Committee: **Prakash Chauhan,** Indian Institute of Remote Sensing (India); **Mitchell D. Goldberg,** The City College of New York (United States); **Allen M. Larar,** NASA Langley Research Ctr. (United States); **Thomas S. Pagano,** Jet Propulsion Lab. (United States); **Jeffery J. Puschell,** Northrop Grumman Corp. (United States); **Henry E. Revercomb,** Univ. of Wisconsin-Madison (United States); **William L. Smith Sr.,** Univ. of Wisconsin-Madison (United States), Hampton Univ. (United States); **Makoto Suzuki,** National Institute for Environmental Studies (Japan), Chiba Univ. (Japan); **Robert Wright,** Hawai'i Institute of Geophysics and Planetology (United States); **Ming-Der Yang,** National Chung Hsing Univ. (Taiwan)

Accurately calibrated multi-, hyper-, and ultra-spectral remote sensing measurement systems are rapidly becoming the instruments of choice for observing a wide variety of geophysical variables from ground-, aircraft- and satellite-based platforms. New data processing and analysis techniques are emerging for the optimum interpretation of resultant radiance measurements obtained by these spectrometer systems, covering a spectral range from the visible to the far infrared, to enable a wide range of research and operational applications; geophysical applications include, for example, surface and cloud property characterizations along with retrievals of atmospheric state, dynamics, and composition, all at high spatial resolution while simultaneously covering large areas. Geophysical remote sensing data products from multi- to ultra-spectral remote sensing systems promise to accelerate scientific research on environmental processes, enable efficient monitoring of environmental variables, and lead to improved predictive capability for such parameters and how they respond to natural and anthropogenic external forcings. New and improved technologies and techniques promise smaller and lighter next-generation sensor systems for enhancing current and enabling new future measurement capabilities. This conference will bring together the scientific, engineering, and data user communities to provide an international forum for exchanging information about the development, application of, and experimental results from multi-, hyper- and ultra-spectral resolution remote sensing measurement systems. Papers are solicited on all aspects associated with the design, development, and implementation of, as well as analysis and usage of data from, such remote sensing systems intended for environmental monitoring applications. These include the following and related topics:

- new measurement techniques and instrument concepts
- enabling spectrometer system technologies
- calibration and characterization techniques (spatial, spectral, and radiometric)
- laboratory instrument testing and demonstrations
- ground-, balloon-, aircraft-, rocket-, and satellite-based measurements
- data sampling, processing, compression, and telemetry approaches
- retrieval of atmospheric state, dynamics, and composition
- radiative transfer modeling for efficient state parameter retrieval
- characterization of ecosystem physical and radiative properties
- remote sensing applications for environmental research and operations (e.g., weather, air quality, and climate; agriculture, land use and land cover, water resources and marine science; and disaster management).

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Earth Observing Missions and Sensors: Development, Implementation, and Characterization VI (ARS06)

Conference Chairs: **Xiaoxiong Xiong,** NASA Goddard Space Flight Ctr. (United States); **Toshiyoshi Kimura,** Japan Aerospace Exploration Agency (Japan); **Po-Hsuan Huang,** Taiwan Space Agency (TASA) (Taiwan)

Conference Co-Chair: **Changyong Cao,** NOAA National Environmental Satellite, Data, and Information Service (United States)

Program Committee: **Sachidananda R. Babu,** NASA Earth Science Technology Office (United States); **Holly A. Bender,** Jet Propulsion Lab. (United States); **Jill Chou,** Taiwan Space Agency (TASA) (Taiwan); **Philippe Goryl,** ESRIN (Italy); **Jens Nieke,** European Space Research and Technology Ctr. (Netherlands); **Yoshihiko Okamura,** Japan Aerospace Exploration Agency (Japan); **Thomas S. Pagano,** Jet Propulsion Lab. (United States); **Dong-Bin Shin,** Yonsei Univ. (Republic of Korea); **Kazuhiro Tanaka,** Japan Aerospace Exploration Agency (Japan); **Lihang Zhou,** Ctr. for Satellite Applications and Research (United States)

Many earth-observing missions, with sensors covering spectral regions from ultraviolet to microwaves, have been developed and utilized over the years for studies of changes in the Earth's land, oceans, atmosphere, and their interactions. These missions include the U.S. NASA's Earth Observing System (EOS) missions, such as Terra, Aqua, and Aura missions, the TEMPO mission, the PACE mission, the Suomi-National Polar-orbiting Partnership (S-NPP) mission, the Landsat 8 and 9 missions, the NOAA's Joint Polar Satellite System (JPSS) and the Geostationary Operational Environmental Satellite (GOES) series, including JPSS-1 and -2, GOES-16, -17 and -18 missions, the ESA's MetOp and Sentinel series, the EUMETSAT's Meteosat Third Generation: Imaging mission (MTG-I), the JAXA's Greenhouse gases Observing SATellite-2 (GOSAT-2), GCOM-W and -C, the Advanced Land Observation Satellite-2 (ALOS-2), and the joint NASA/JAXA GPM mission, the JMA's Himawari-8 and -9 missions, the China's FY and HY satellite series, the Indian Remote Sensing (IRS) satellite series, and the South Korean Communication, Ocean and Meteorological Satellite (COMS) and GEO-KOMPSAT-2 missions. Successful development and operations of these missions and their applications have significantly contributed to the advances of the Global Earth Observation System of Systems (GEOSS), which is being built as a public infrastructure interconnecting a diverse and growing array of instruments and systems for monitoring and forecasting changes in the global environment. Meanwhile, with technology advancements and design improvements, various follow-on and new missions are currently underway throughout the world, such as the U.S. JPSS follow-on missions, the Landsat follow-on missions, the Geostationary Extended Observations (GeoXO) missions, the ESA's Sentinels and Earth Explorer missions, the EUMETSAT Polar System – Second Generation (EPS-SG) missions, the JAXA's GOSAT-GW and ALOS-4 missions, the joint ESA/JAXA EarthCARE mission, the Multi?footprint Observation Lidar and Imager (MOLI) mission, and the next generation of China's FY and HY satellite series. In addition to traditional research and operational missions, many efforts and advances have been continuously made for the development and operation of commercial and low-cost CubeSat and small satellites, the sub-orbital missions, including those housed by the International Space Station (ISS). As more and more satellite observations and data products are made available to the science and user community, it has become increasingly important and demanding to achieve high quality calibration and characterization of individual sensors, from pre-launch to post-launch, and accurate determination of their calibration traceability and consistency, especially for developing and extending satellite long-term data records. The establishment and extensive use of the CEOS reference calibration/validation sites and targets, including regularly scheduled lunar observations, and the efforts and progress made by the WMO Global Space-based Inter-calibration System (GSICS) and CEOS Calibration and Validation Working Group (WGCV) are such examples.

continued➡

Earth Observing Missions and Sensors: Development, Implementation, and Characterization VI (ARS06) continued

This conference welcomes papers to be submitted overall a wide range of topics related to the Earth remote sensing missions and sensors, their development, implementation, and characterization, and especially on the following and related topics:

- existing missions and sensors, including their operation status, performance, and lessons learned
- new research, operational, and commercial missions and sensors, small satellites, including their mission studies, design and calibration requirements, test concept, and system implementation
- sensor pre-launch calibration and characterization methodologies and results
- sensor post-launch calibration and characterization methodologies and results
- small satellite calibration approaches and techniques
- sensor performance validation and vicarious calibration
- calibration inter-comparison and assessment of calibration consistency among sensors
- sensor calibration accuracy, uncertainty, and traceability
- enabling technologies (e.g. optics, electronics, and detectors) for sensor system development and innovative equipment or techniques for sensor radiometric, spectral, spatial, and polarization testing
- improved test data analysis methodologies and techniques.

Advances in GNSS-based Measurements and Applications (ARS07)

Conference Chairs: **Chen-Tsung Lin,** Taiwan Space Agency (TASA) (Taiwan); **Shu-Chih Yang,** National Central Univ. (Taiwan); **Tzu-Pang Tseng,** National Cheng Kung Univ. (Taiwan)

Program Committee: **Yeh-Wen Hao,** Taiwan Space Agency (TASA) (Taiwan)

We invite researchers, scientists, and practitioners to contribute to the upcoming conference on Advances in GNSS-Based Measurements and Applications. This conference aims to explore the latest developments, challenges, and applications of Global Navigation Satellite Systems (GNSS) technology across various domains. We welcome submissions of original research papers, case studies, and review articles that delve into the multi-faceted aspects of GNSS technology and its diverse applications. Whether you are uncovering novel algorithms for GNSS data processing, presenting innovative approaches to ground-based applications, or exploring the potential of GNSS in atmospheric and space weather monitoring, we encourage you to share your insights, discoveries, and innovations in this rapidly evolving field. Join us in fostering collaboration and advancing knowledge in the realm of GNSS-based measurements and applications.

Topics of interest include, but are not limited to:

- GNSS data processing techniques and algorithms
- novel approaches for ground-based GNSS applications
- GNSS applications in atmospheric monitoring and modeling
- space weather monitoring and forecasting using GNSS
- GNSS-based navigation and positioning systems
- integration of GNSS with other sensing technologies
- real-time and high-precision GNSS positioning
- GNSS interference detection and mitigation strategies
- advances in GNSS signal processing and receiver technologies
- GNSS-based applications in agriculture, transportation, and environmental monitoring.

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Abstract submissions due	17 July 2024
Registration opens	August 2024
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What you will need to submit

- Presentation title
- Author(s) information
- Speaker biography (1000-character max including spaces)
- Abstract for technical review (200-300 words; text only)
- Summary of abstract for display in the program (50-150 words; text only)
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