

# **IAF Earth Observation Symposium**

Held at the 75th International Astronautical Congress  
(IAC 2024)

Milan, Italy  
14-18 October 2024

Volume 1 of 2

ISBN: 979-8-3313-1213-8

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2024) by International Astronautical Federation  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact International Astronautical Federation  
at the address below.

International Astronautical Federation  
100 Avenue de Suffren  
75015 Paris  
France

Phone: +33 1 45 67 42 60

Fax: +33 1 42 73 21 20

[www.iafastro.org](http://www.iafastro.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

### **INTERNATIONAL COOPERATION AND BUSINESS VENTURES IN EARTH OBSERVATIONS**

Leveraging Earth Observation for Marine Environment and Blue Economy: Insights from the ESA-Funded GDA-AID Activity .....	1
<i>Antonello Aiello, Daniela Drimaco, Maurizio Laterza, Giulio Ceriola, Gamal A. A. Abouzied, Leonardo Amoruso</i>	
ASI – ISRO Cooperation in Earth Observation: Status, Achievements and New Avenues .....	11
<i>Deodato Tapete, Rajeew Jaiswal, Giorgio Licciardi, Patrizia Sacco, Maria Virelli, Praveen K. Gupta, Pokkuluri V. Raju, Babu G. Raj, Anand S. Sahadevan, Touseef Ahmad, Shefali Agrawal, Mamta Chauhan, Vinay Kumar, Tarik Mitran, Karun Choudhary, Arindam Guha, A. Vidya, Jayant Singhal, B. Santhi Sree, Rosly B. Lyngdoh</i>	
The Atlantic Constellation: Addressing Global Markets of Sustainability and Security .....	23
<i>Andre Dias, Emir Sirage, Andre Oliveira</i>	
The New Space Portugal Project – Challenges and Opportunities for EO .....	29
<i>Helena C. Mendonça, João B. De Jesus, João Campos, Inês Girão, Ana Oliveira</i>	
How EO Open Data Programs Developed by New Space Companies Are Shaping the Future of the Earth Observation Industry .....	44
<i>Miriam A. Gonzalez Sánchez</i>	
The Africa Earth Observation Challenge – A Vehicle for Growing the African Downstream Space Entrepreneurial Ecosystem. ....	46
<i>Maheen Parbhoo, Imraan Saloojee, Kerry McKay</i>	
Applying the EVDT Decision Support Model to Manage Water Resources in Angola: Lessons from Systems Architecture .....	53
<i>Katlyn Turner, Zolana Joao, Dara Entekhabi, Yusuke Kuwayama, Osvaldo Porto, M. Sariful Islam, Catherine Lu, Luciano C. D. Lupedia, Ivandro Rodrigues, Vangiliya F. Pereira, Danielle Wood</i>	
The ASI-NASA PLATiNO-2/MAIA Mission a New Tool to Monitor the Airborne Particulate Matter from Satellite and to Study Its Impact on Human Health .....	63
<i>Vincenzo Pulcino, Luigi Ansalone, Francesco Longo, Roberto Luciani, Giovanni Rum, Matteo Picchiani, Giovanni P. Blasone, David J. Diner, Stacey Boland, Kevin A. Burke, Saagar Patel, Sina Hasheminassab, Lori Bator, Scott Gluck</i>	
Surface Water Ocean Topography Mission (SWOT), Observing Earth’s Precious Water from Space.....	70
<i>Parag Vaze</i>	

### **EARTH OBSERVATION SYSTEMS**

Status of Copernicus Hyperspectral Imaging Mission for the Environment (CHIME) with Focus on End User Products Development and International Collaboration .....	77
<i>Valentina Boccia, Kevin Alonso, Marco Celesti, Ivan Di Lodovico, Ignacio Fernandez, Antonio Gabriele, Adrian Garcia, Ferran Gascon, Claudia Isola, Anke Schickling, Jens Nieke</i>	

Cyclops: A New Rapid Revisit, High-Resolution Earth Observation Constellation for Land Management .....	83
<i>Andrew Carrel, Phillip Webster, Enes Erdogan</i>	
Paving the Way for Operational Constellations in Very Low Earth Orbit: The ELITE Small Satellite Demonstrator .....	89
<i>Kashyapa N. Athreyas, Erick Lansard, Wee S. Lim</i>	
Status Update for GNSS-RO/R Constellation Mission in Taiwan.....	94
<i>Yung-Fu Tsai, Wen-Hao Yeh, Jyh-Ching Juang, Chen-Tsung Lin, Ming-Yu Hsieh, Chunchi Cheng</i>	
Flight Results of Super Low Altitude Test Satellite "TSUBAME/SLATS" and Follow-On Plan .....	99
<i>Kazuya Konoue, Shunsuke Imamura, Tomotaka Yamamoto, Asami Hayato, Takashi Ohtani</i>	
ALADIN Laser Transmitter Test Results in the Frame of AEOLUS Mission End of Life Activities .....	108
<i>Valeria De Sanctis, Paolo Bravetti, Alessandro D'Ottavi, Adalberto Sapia, Trismono C. Krisna, Denny Wernham, Christian Lemmerz, Oliver Lux, Oliver Reitebuch, Sebastian T. Andersen, David Patterson, Viet D. Tran, Jon Marshall, Didier Bon, Annkatrin Schaube, Geraud De Villele, Sophie Jallade, Valentina Sacchieri, Guglielmo Landi, Alessia Mondello, Emanuele Capuano, Alberto Cosentino, Paolo Mosciarello, Alessandro Perna, Georgios Tzeremes, Tommaso Parrinello</i>	
NEMO-HD Microsatellite for Agile Real Time Acquisitions of Video and Multispectral Data for Digital Twin Modelling of Ecosystems .....	119
<i>Tomaz Rodic, Ana Urbas, Hubert Fröhlich, Jan Tomec, Janez Langus, Tomaz Šuštar, Tomaz Rodic</i>	
QPS-SAR 2nd Generation - Mission Architecture and Operational Outcomes.....	126
<i>Masahiko Uetsuhara, Yusuke Fukai, Dmytro Faizullin, Ryosuke Takahira, Shunsuke Onishi</i>	
SAR SmallSat Constellation: System Trade off Across Multiple Inclinations .....	131
<i>Luca Soli, Vanessa Mastroddi, Alice Nervo, Annamaria Nassisi, Carlo Ciancarelli</i>	
Adding Dimensions to Sentinel-1 Data: Constellation of Bistatic Passive Receiver Satellites for Operational Applications .....	143
<i>Martin Jüssi, Erik Kulu</i>	
Optimization Study on Earth Observation and Communication of Satellite Constellation and Ground Station .....	146
<i>Kimoon Lee, Dongjin Kim, Seonho Lee</i>	

## **EARTH OBSERVATION SENSORS AND TECHNOLOGY**

Profiling the Planetary Boundary Layer from Space: A Review of Capabilities, Limitations, and Future Perspectives.....	157
<i>Domenico Cimini</i>	
Design of a Custom Optical Payload to Monitor Ocean Color by an Educational 3U CubeSat.....	163
<i>Serena Campioli, Luisa Iossa, Sabrina Corpino, Fabrizio Stesina, Martina Bruno, Fabrizio Fornasiero, Chiara My, Flaminia Guerra, Damiano Prezioso, Elvira D'Argenio, Alvise Franceschini, Maria C. Salvemini, Monica A. Cortigiano, Marco Del Sordo, Luca Liotta, Ernesto Belluardo, Enrico Pittatore, Mai V. H. Nguyen, Mokhinur Avarjonova</i>	

The Lightning Imager First Flight Model, on Board of the Meteosat Third Generation Mission, Provides First Flight Data for Weather Nowcasting During Its First Year in Orbit.....	176
<i>A. S. Viglione, Guia Pastorini, Beatrice Ponticelli, Simone Brilli, Enrico Suetta, Lorenzo Bolsi, Stefano Lorenzini, Giuseppe Agresta, Riccardo Bardazzi, Pierre Kokou, Pieter Van Den Braembussche</i>	
The CHIME Spectrometers: Development and Qualification Status.....	188
<i>Etienne Renotte</i>	
The Tools and Workflow of LEO Earth Observation Optical Payload: Case Study THEOS-3 Satellite.....	195
<i>Tananiti Promwongsa</i>	
Effect of Drag-Free Control on the Next-Generation Gravity Mission's Measurement Performance.....	201
<i>David B. Berguno, Adriano Pansini, Francesco Simeoni, Stefano Cesare, Luca Massotti, Roberto Bogiatto</i>	
Expanding Horizons in LEO Earth Observation: A Novel Freeform Wide FOV Reflective Telescope Design Incorporating Freeform Surfaces and Integrated Mirror Systems.....	216
<i>Craig Ingram, Joshua Pease, Stephen Gensemer</i>	
Design of SAR Operation and Observation Modes of CAS500-5.....	222
<i>Hyeon-Cheol Lee</i>	
The Radar Cluster for Earth Remote Sensing (RaCERS) Cubesat Mission.....	229
<i>Andrea Bergamasco, Giorgio Taiano, Thomas Yunck, Isabella Rosso, Alessandro Patelli, Elisa Giusti, Marco Martorella, Alessandro Santoni</i>	

## **EARTH OBSERVATION DATA SYSTEMS AND TECHNOLOGY**

A High Throughput Software Acceleration to On-Board Artificial Intelligence for Earth Observation.....	238
<i>Pablo Ghiglini, Mandar Harshe, Guillermo Sarabia</i>	
A Multi-Service Edge-AI Architecture Based on Self-Supervised Learning.....	243
<i>E. Magli, S. Angarano, S. Bassetti, T. Bianchi, P. Boccardo, S. Bucci, M. Chiaberge, G. Inzerillo, D. Lisi, G. Mascetti, M. Mergè, C. Monaco, M. Pasturensi, D. Piccinini, D. Valsesia, G. Zema</i>	
Big Data Cloud Computing for the Surface Water and Ocean Topography Project.....	252
<i>Parag Vaze</i>	
Digital Twin Factory: A New Library Connected to EO Portals for Earth Monitoring.....	260
<i>Céline Tison, Jean-Marc Delvit, Pierre-Marie Brunet, Erwin Bergsma, Vincent Lonjou, Marjorie Robert, Benjamin Husson, Olivier Melet</i>	
Exploring Quantum Machine Learning for Remote Sensing-Based Land Cover Classification: Case Test in Portugal.....	270
<i>Andrea Carbone, Dario Spiller, Giovanni Laneve</i>	
In-Orbit Demonstration Operations of the High-Performance On-Board Processing Capabilities of C3SatP.....	277
<i>Marc O. Playà, Juan J. Ramos-Castro, Ian Blanes, Joan Serra-Sagrasta, Màrius Montón, José M. G. Cama, Daniel Ferrer, Jan Gómez, Carles Sierra, Lucas Juvero, Helena C. Martell, Roger Ribas, Jordi Portell</i>	

Natural Language Exploration of Satellite Data with Artificial Intelligence, Large Language Models, and the Planetary Computer.....	292
<i>Juan C. Lopez, Nelli Babayan, Rob Emanuele, Taylor Corbett, Minh Nguyen</i>	
PRISMA HYPERPANSHARPENING: A Methodology to Create an Enhanced Hyperspectral Databcube.....	298
<i>Alessia Tricomi, Riccardo Musto, Roberta Bruno, Giorgio Pasquali</i>	
Space Edge Computing Change Detection Through an Unsupervised Trained U-Net.....	305
<i>A. Bettio, F. Sansone, A. Francesconi</i>	
Verification of the Onboard SAR Ship Detection using YOLO .....	311
<i>Tatsuyuki Sekine, Akihiro Yamanaka, Takeharu Eda, Takuro Udagawa, Monikka Busto</i>	

## **EARTH OBSERVATION SOCIETAL AND ECONOMIC APPLICATIONS, CHALLENGES AND BENEFITS**

EO Digital Transformation and Sustainability: Challenges & Opportunities.....	317
<i>Carla Filotico, Larissa Mussarelli, Marco Borghi</i>	
An Attractive European Earth Observation Ecosystem of Services: Flexible, Scalable, and Cost-Effective Data Spaces Empowering Downstream Business Opportunities .....	322
<i>Elisabetta Lamboglia, Giulia Cambone, Fabio Del Frate, Giorgia Guerrisi</i>	
Environmental Sustainability from Earth Observation: Outcomes from Case Studies in EC R&D Projects for Copernicus Services Evolution .....	330
<i>Cecilia Sciarretta, Massimo Sernicola, Valerio Botteghelli, Marco Corsi</i>	
X.URBE: Radar Basic Examination and AI Based Model to Support Urban Health & Wellbeing.....	335
<i>Iliara Pennino, Michele Boella, Emanuele Giorgi, Francesco Delogu</i>	
HeatScape Resolve – Integrating Earth Observation of Urban Heat Island Effects into Urban Planning Practices .....	342
<i>Roland Nemeth, Reka Sarkozi, Laszlo Mucsi, Boudewijn Van Leeuwen, Zalan Tobak, Peter Burai, Gergely Hunyadi, Horváth K. Roland, Emese Lakatos, Szilárd B. Likó, Gergely Paulinyi</i>	
Flood Risk Assessment and Early Warning Systems Integrating Earth Observation Technologies for Improved Resilience in Pakistan .....	360
<i>Talha Noor, Anupam Kumar, Muhammad Najeeb, Sonalli Madhanraj, Nazmus Sadat, Andrea Staffieri, Zain Ahmad, Roshaan Nadeem</i>	
Development of a Methodology for Quantifying Downstream Induced and Avoided Green House Gases from Earth Observation Missions: A Case Study Based on Variable Rate Application in Agriculture.....	377
<i>Alexandre Corral, Steffen Harm, Elisabetta Lamboglia, Andrea Vena</i>	
Harnessing Earth Observation for Societal and Economic Benefits in Eritrea: Challenges and Opportunities .....	385
<i>Helen Haile</i>	
Detecting Artisanal Small-Scale Mining Activities in Angola using Very High-Resolution Imagery.....	390
<i>Luciano C. D. Lupedia, Joao Junior, Atanilson T. Cachinjumba, Selina Hayes, Zolana Joao, Osvaldo Porto, Amilcar Feliciano</i>	

## **ASSESSING AND MITIGATING THE GLOBAL FRESHWATER CRISIS**

Update on SWOT: Transformative Data from Revolutionary Technology, and Implications for Hydrology and Water Intelligence.....	397
<i>Parag Vaze</i>	
Accurate Flood Mapping via Colorized SAR Images .....	405
<i>Nour Aburaed, Mina Al-Saad, Mohammed Alkhatib, Mohammad S. Zitouni, Saeed Al Mansoori, Hussain Al Ahmad</i>	
Assessing Vulnerability to Drought in Angola using Multisource Satellite Earth Observations and Socioeconomic Data .....	411
<i>M. Sariful Islam, Yusuke Kuwayama, Dara Entekhabi, Katlyn Turner, Catherine Lu, Zolana Joao, Vangiliya F. Pereira, Osvaldo Porto, Luciano C. D. Lupedia, Ivandro Rodrigues, Danielle Wood</i>	
Initial Field Evaluation of an On-Water Radiometry Robot for Water Quality and Satellite Validation .....	418
<i>Sivert Bakken, Artur Zolich, Kai Sørensen, Sabine Marty, Therese Harvey, Stephen D. Grant, Joseph L. Garrett, Janina Osanen, Vishnu P. Suseelan, Pipatthra Saesin, Tor A. Johansen</i>	
HiVE, a Commercial Earth Observation System Measuring Temperature and Water from Space, for Better Resource Accountability in Agriculture and Beyond.....	426
<i>Riccardo Benvenuto, Daniel Spengler, Lina Hollender</i>	
Remote Sensing for Improved Irrigation Efficiency in Soybean Farming .....	434
<i>Giovanni Trevisanuto, Federico Toson, Sebastiano Chiodini, Irene Terlizzi, Giacomo Colombatti, Carlo Bettanini</i>	
Advancing Artificial Intelligence for Precise Water Leak Detection using L-Band SAR .....	442
<i>Yuval Lorig, Rita Zaslavsky, Inon Sharony</i>	
Monitoring Water Quality of Lake Chivero in Zimbabwe using Digital Earth Africa .....	444
<i>Muongeni T. Manda, Kenneth Mubea</i>	
Monitoring Inland Water Storage using Radar Altimetry Data. A Case Study: Colombian Lakes and Reservoirs.....	448
<i>Maria P. B. Moreno, Tilo Schöne, Najibullah Kakar</i>	
A Method of Preventing the Pollution of the Caspian Sea, which is Being Polluted, Through the Application of the SAR System.....	456
<i>Rahil Aghabayli, Khadija Huseynli</i>	

## **EARTH OBSERVATIONS TO ADDRESS EARTH'S ENVIRONMENT AND CLIMATE CHALLENGES**

Low Earth Orbit Satellite Data from NOAA Satellites for Environmental and Climate Applications .....	459
<i>Satya Kalluri, Ravan Ahmadov, Ivan Csiszar, Eric James, Pedro Jiménez, Cheng-Zhi Zou</i>	
On the Horizon- What's to Come for Canadian Satellite Earth Observation to Help Address Climate Change Challenges .....	465
<i>Mays Ahmad, Eric Dubuc, Stephane Chalifoux, Stephane Martens, Miriam Micael, Julie Beaulac, Jamie Sevigny, Kathleen Bohan</i>	

Earth Observations from Space for the Sustainable Development of the Planet: The Perspective of Space it Up! .....	469
<i>Domenico Cimini</i>	
CARIOQA: A Pathfinder Mission for Quantum Space Gravimetry .....	478
<i>Christine Fallet</i>	
Cloud Characterization by Computed Tomography Methods using a Satellite Formation of 10 Small Satellites for Improved Climate Prediction .....	485
<i>Lisa Elsner, Alexander Kleinschrodt, Timon Petermann, Ilham Mammadov, Orit Altaratz, Vadim Holodovsky, Alex Frid, Ilan Koren, Yoav Schechner, Klaus Schilling</i>	
CubeSats for Contrail Monitoring and Environmental Impact Reduction.....	493
<i>Nishanth Pushparaj, Luis Cormier, Chantal Cappelletti, Vilius Portapas</i>	
Assessing and Validating Spectral Unmixing of Hyperspectral PRISMA Imagery in Milano with Implications for Urban Climate .....	508
<i>Matej Zgela, Alberto Vavassori, Pol Kolokoussis, Maria A. Brovelli</i>	
Case Study Applying Earth Observation for Monitoring Soot in Port Harcourt. ....	516
<i>Veronica C. Obodozie, Margaret M. Osimobi, Chidinma I. Joy</i>	
Investigation of the Correlation Between Wildfires and Flash Floods .....	522
<i>Marialina Tsinidis</i>	

### **IAF EARTH OBSERVATION SYMPOSIUM - EXTRA SESSION**

KEYNOTE: INGV Center for Space Observations of Earth (COS): The PEOS ICT-Platform to Manage Integrated Space Products to Monitor and Mitigate Natural Hazards.....	530
<i>Maria F. Buongiorno, Vincenzo Romano, Giorgiana De Franceschi, Carlo Marcocci, Simone Atzori, Stefano Corradini, Simona Scollo, Giuseppe Puglisi, Massimo Musacchio</i>	
PLATiNO-1 Mission: A Compact X-Band Monostatic and Bistatic SAR.....	536
<i>V. Pulcino, L. Ansalone, F. Longo, G. P. Blasone, M. Picchiani, R. Luciani, S. Zoffoli, D. Tapete, M. Virelli, M. Rinaldi, C. Altarozzi, S. Natalucci</i>	
Bistatic Observation Opportunities in PLATiNO-1 SAR Mission .....	544
<i>Antonio Gigantino, Alfredo Renga, Maria D. Graziano, Antonio Moccia, Antimo Verde, Laura Tedesco, Giovanni P. Blasone, Simona Zoffoli, Deodato Tapete, Vincenzo Pulcino</i>	
PLATiNO-3: The Compact Very High Resolution Payload Program of the Italian Space Agency .....	551
<i>R. Luciani, M. Picchiani, F. Longo, V. Pulcino, L. Ansalone, G. P. Blasone, C. Simoncelli, M. Baroni, C. Simonelli, F. Sarti, E. Costa, M. Tofanari, A. Fanfani, D. Passalacqua, S. Livi, G. Impiccihè, M. Materassi, P. Lombardi, O. Nannucci, S. Grella, A. Pilesi, F. Era</i>	
PLATiNO-4: The Compact Hyperspectral Payload Program of the Italian Space Agency .....	554
<i>L. Ansalone, M. Picchiani, F. Longo, V. Pulcino, R. Luciani, G. P. Blasone, C. A. Mastrandrea, L. Ribechini, M. D. Vitolo, C. Bencini, C. Simoncelli</i>	
Multi-Temporal SAR Interferometry Service for the Monitoring of Seismic Wide Areas .....	560
<i>Davide O. Nitti, Simone Atzori, Christian Bignami, Giulio Ceriola, Claudio La Mantia, Vincenzo Massimi, Alberto Morea, Raffaele Nutricato, Alessandro Parisi, Edouard Royer, Khalid Tijani, Cristiano Tolomei</i>	



Tower-Check: Designing a Real-Time Monitoring Architecture for High Voltage Overhead Power Lines using SAR On-Board Processing Techniques.....	567
<i>Enrico Sain, Alberto Bigazzi, Vito Fortunato, Carmela A. De Donno, Luigi Agrimano, Leonardo Amoruso, Cristoforo Abbattista, Daniela Drimaco, Raffaele Nutricato, Alessandro Parisi, Tommaso Di Noia, Giuseppe Fasano, Francesco Giordano</i>	

3MI (Multi-Viewing, Multi-Channel, Multi-Polarization Imaging) for MetOp Second Generation.....	578
<i>Federico La China, Giuseppe Impiccichè, Guglielmo Landi, Riccardo Gabrieli, Paolo Mosciarello, Barbara Grandclaude, Inés Fuente</i>	

## **INTERACTIVE PRESENTATIONS - IAF EARTH OBSERVATION SYMPOSIUM**

Major Challenges and Opportunities to Accelerate Space-Based Earth Observation Activities; A Case Study of Türkiye.....	588
<i>Tamer Özalp</i>	

International Cooperation and Business Ventures in Earth Observations.....	601
<i>Yusif Imanov, Fidan Ahmadova</i>	

Leveraging Space Information-Sharing Ecosystems for Marketplace-Like Climate Action and Sustainable Development.....	609
<i>Nathaniel Dailey, Mark Harter, Mark Mulholland</i>	

Leveraging SaaS Platform EO Discover to Optimize Operations and Make Informed Decisions that Drive Impact.....	628
<i>Yuval Lorig</i>	

Orbit Maintenance for a Repeating Ground Track Constellation.....	632
<i>Jorge Panagopoulos, Yaroslav Mashtakov, Anna Guerman</i>	

Miniaturized SAR Payload for Earth Observation with Nanosatellites.....	637
<i>Julien Marini, Paolo Falcone, Samuele Antinori, Daniele Marchisotti, Nicola Centrone, Antonio Giordano, Davide Giudici, Fabio Gerace, Davide Daria, F. Tataranni, Roberto Luciani, Vincenzo Martucci, Silvia Natalucci, Alberto Fedele</i>	

Investigation of Multiple-Satellite Formation Configurations for Single-Pass Synthetic Aperture Radar Interferometry.....	642
<i>Francesca Scala, Gerhard Krieger, Michelangelo Villano</i>	

Leo Earth Observation Small Satellites Constellation Based on Revisit Optimization.....	648
<i>Chengwei Kang, Xinsheng Wang</i>	

Hardware and Software Design for the TSC-1 Payload Flat-Sat Platform: Hyperspectral Imaging and Space Particle Weather Detection.....	656
<i>Chanon Khongprasongsiri, Sathit Piluntasopon, Noppakao Boonmun, Nawat Kittipuwadol, Phongsatorn Saisutjarit, Wasanchai Vongsantivanich</i>	

Unveiling Kenya's Inaugural Earth Observation Satellite.....	667
<i>Olivia Mwaniki, Evans Y. Kidada</i>	

## **VOLUME 2**

Rolling Collaborative Planning Method for Multi-Type Observation Tasks of Mega-Constellations.....	691
<i>Zhaoyu Li, Xia Yin, Rui Xu, Jiateng Long, Dantong Ge, Tao Nie</i>	

High Data Volume/Throughput PDT System Tasks for Next Generation COPERNICUS Missions .....	698
<i>E. Capolongo, G. Galiero, S. Mignano, S. Neglia, A. Notarantonio, F. Petullà, S. Vono</i>	
Advancing Global Environmental Monitoring: Innovative Strategies in Earth Observation Systems .....	702
<i>Gumru Sharafkhanova</i>	
Assessment of the CubeSats Capabilities for High-Resolution Earth Observation Missions.....	707
<i>Abdelmadjid Lassakeur, Imène Taleb, Mohammed A. Meghabber</i>	
CUBEHAPS. Synchronized HAPS-Satellite Earth Observation.....	721
<i>Victor Miherea, Gabriele Sartor, Lorenzo Chmet, Andrea G. Massetti, Marco Restagno, Fabio Di Benedetto, Jannis Fath</i>	
CLARREO Pathfinder Mission and Payload Overview .....	726
<i>Jonathan Mihaly, Yolanda Shea, Patrick Brown, Paul Smith, Peter Pilewskie</i>	
Earth Observation with Autonomous Systems on Board Sounding Balloons .....	734
<i>C. Bettanini, A. Aboudan, L. Olivieri, F. Toson, G. Colombatti</i>	
Geospace Observatory Canada.....	740
<i>William Archer, John Manuel, Parshati Patel</i>	
Earth Observation Systems.....	749
<i>Rakan Alshammari</i>	
HEPD-02 and EFD-02: A Key Italian Contribution to CSES-02 LEO Mission.....	756
<i>Alexandra Parmentier</i>	
A Geospatial Platform for Observing Environmental Injustice in U.S. Prison Landscapes using Satellite-Derived Data .....	762
<i>Ufuoma Oviemhada, Mia Hines, Andrew West, Ahmed Diongue, Jordan Mazurek, Adair Kovac, Richard Thomas, Brent Minchew, Danielle Wood</i>	
Spatiotemporal Analysis of Drought Vulnerability in Azerbaijan Through Satellite Data Integration.....	775
<i>Sona Guliyeva, Piero Boccardo, Elman Alaskarov</i>	
Architecture and Design Considerations of a Mass Memory Module for Small Satellite Platforms.....	781
<i>Maïke Taddiken, Daniel Smith, Ole Bischoff, Oskar Flordal, Mathias Persson, Vangelis Kollias, Nikos Pogkas, Michele Martone, Rolf Scheiber, Nicola Gollin, Marc Jäger, Jamin Naghmouchi, Carl Bondesson, Christian Spindeldreier</i>	
PRIAS: 20 Years of Trajectory-Building Research in Earth Observations for Costa Rica and the World.....	787
<i>Vanessa M. Cerdas, Stephanie M. Leitón-Ramírez, Jose Umaña-Ortiz, Esteban Montenegro-Hernández, Heileen Aguilar-Arias, Cornelia M. Granados</i>	
On-Orbit Calibration and Radiometric Performance of Alsat-1B Optical Imager Over Four Years .....	795
<i>Chahira Serief, Youcef Ghelamallah, Mohammed Ali Mebrek, Redouane Belbachir</i>	
MOCUPP: Monitoring of Change of Use in Productive Landscapes, as a Methodology for Crop Dynamics Surveillance Based on Earth Observations.....	800
<i>Heileen Aguilar-Arias, Jose Umaña-Ortiz, Vanessa M. Cerdas, Esteban Montenegro-Hernández, Stephanie M. Leitón-Ramírez, Iván Á. Pérez, Cornelia M. Granados</i>	
Machine Learning Applied to Earth Observation Data of Urban Areas for Socio-Economic Development .....	813
<i>Jack Laffey, Marc Crampe, Bernard Foing</i>	

Design and Analysis of a Visible and Infrared Optical System for Precision Agriculture Satellite Payload.....	816
<i>Jeeyeon Yoon, Haeng-Pal Heo, Sang-Gyu Lee</i>	
Magnetic Field Measurements Along the Trajectory of the Ariane 6 Maiden Flight Utilizing Quantum Diamond-Based Sensors.....	819
<i>Yarne Beerden, Simon Wilmots, Joren Verdyck, Yves J. Verlaak, Dries Hendrikx, Siemen Achten, Jaroslav Hruby</i>	
Finance for a Green Transition: Rheticus Carbon Offset.....	824
<i>Maurizio Laterza, Nicola Nicastro, Matteo Villa, Mario A. Vulpio, Daniela Drimaco, Giulio Ceriola</i>	
Enhancing Earth Observation (EO) Coordination to Address Socio-Economic and Environmental Challenges.....	829
<i>L. Makapela</i>	
A Multi-Sensor Differential Evolution Approach for MEMS Gyroscope Calibration During the SamSat-ION Nanosatellite Mission.....	833
<i>Angelo E. Valles, Petr Nikolaev, Victor Romero-Alva</i>	
Empirical Correlations and Anomalies Between Geo-Ecological Factors and Skin Cancer Incidence Rates.....	840
<i>Darius Chitu, Vlad Ionescu, Paul I. Vartolomei</i>	
Assessment of YOLO's Capabilities for Object Detection in Optical Satellite Imagery.....	847
<i>Alessia Sbriglio, Giovanni B. Palmerini</i>	
Celestial Body Imaging Trajectory Planning Algorithm for Spaceborne TDI Line Scan Camera.....	856
<i>Mehmet B. Ekinci, Mustafa Ekinci</i>	
Analysis and Definition of the AI4EO Sector in Catalonia: Policies, Ecosystem and Future.....	865
<i>Marc Herrera-Giménez, Carlos López-Martínez</i>	
A Framework for Improved Ground Truthing of Space Imagery Utilizing Space IoT for Better Socio-Economic Growth.....	869
<i>Muneera Almalki, Reem Senan</i>	
A Lightweight Super-Resolution Reconstruction Method for Low-Light Space Target Observation Images.....	877
<i>Bingzan Liu, Xin Ning, Shichao Ma, Hongyu Chen, Yizhen Yang</i>	
PRISMA Toolbox, a Tool for Ingestion, Interaction and Processing of Hyperspectral EO Data.....	885
<i>Luigi Agrimano, Francesca Santoro, Leonardo Amoroso, Cristoforo Abbattista, Daniela Drimaco</i>	
Advancing Palm Tree Monitoring in the UAE: Benchmark Dataset Demonstration with AI Techniques.....	889
<i>Mina Al-Saad, Nour Aburaed, Saeed Al Mansoori, Hussain Al Ahmad, Mohammed Alkhatib, M. S. Zitouni</i>	
UEIKAP: Preliminary Results of a Ship Wake Detection Framework for Remote Sensing Imagery.....	894
<i>Andrea Mazzeo, Maria D. Graziano, Giuliano Vernengo, Davide Bonaldo, Diego Villa, Federico Franciosa, Gian M. Scarpa, Federica Braga, Paolo Vavasori, Amedeo Fadini, Stefano Menegon, Roberto Del Prete, Angela C. Cristofano, Margareth Di Vaia, Marisa Sperandeo, Sergio Iervolino</i>	

A Building Block Approach to Satellites and Its Impact on New Configurations and Changes in Late AI&T .....	901
<i>Jeffrey Mackay, Bill Crandall</i>	
Two-Stream Feature Fusion Strategy for Multimodal Remote Sensing Object Detection in Earth Observation .....	911
<i>Lingyun Gu, Eugene Popov, Ge Dong</i>	
Towards Real-Time Blind Focusing of SAR Data.....	918
<i>Cataldo Guaragnella, Raffaele Nutricato, Alberto Morea, Davide O. Nitti, Alessandro Parisi</i>	
The Role of High-Resolution Satellite Images in Determining the Degree of Mineralization.....	924
<i>Turana Binnataliyeva, Jamal Ismayilov</i>	
Super-Resolution-Based Small Object Detection for Real-Time Surveillance and Monitoring: An Onboard Satellite FPGA Implementation.....	929
<i>Giovanni M. Capuano, Salvatore Capuozzo, Antonio G. M. Strollo, Nicola Petra</i>	
Software for Planning Research using Remote Sensing Satellites .....	944
<i>Egor Kasulin, Irina Sliusareva, Anna Zharkova</i>	
Securing Earth Observation and Radio Frequency Satellites: Challenges and Strategies .....	947
<i>Sanjana N. Karkera, Satvik Annadanam</i>	
Remote Monitoring of Ground Motion Exploiting Functional Data Analysis and Nonparametric Prediction on Multi-Temporal DInSAR Data.....	967
<i>Teresa Bortolotti, Francesco Casu, Maria Virelli, Deodato Tapete, Mario S. De Cumis, Alessandra Menafoglio, Simone Vantini</i>	
Precision Agriculture: Cultivating a Smarter Future with Earth Observation and Machine Learning .....	976
<i>Alberto Y. Aguilar-Bautista, José P. Estrada-Sansores, Yael E. Castrejón-Ocampo, Joshua Hernández-Ramírez, Joelin Tshuma-Ramírez, Estefania Hernández-Falcón</i>	
Orbis: Earth Observation Mission Service for Processing Raw to Analysis-Ready Data .....	986
<i>Jan Chytry, Roman Bohovic</i>	
Innovative Web Platform for Real-Time Analysis and Dissemination of GOES-16 Satellite Data: Advances in Earth Observation Systems and Technology.....	991
<i>Sergio S. Callupe, Belyeud Prado, Germain R. Vega, Jesus A. T. Gallardo, Luis A. C. Herrera, Jhosep A. A. Laymito, Shiomara V. Urrutia, Daniel Diaz, Erica I. S. Nieves, Cesar M. Orellana</i>	
Optimizing Star Tracker Placement on Agile Satellites: Mitigating Glare for Enhanced Performance .....	999
<i>Mohammed El Amine Cheriet</i>	
Polytope: Extracting Features from Large-Scale Datacubes .....	1004
<i>Mathilde Leuridan, James Hawkes, Tiago Quintino</i>	
Probabilistic Change Detection on Satellite Images Through a Novel GLCM-PCA-SFCM Workflow.....	1011
<i>A. Bettio, F. Sansone, A. Francesconi</i>	
Estimating Methane Emissions from Metropolitan Areas using High Resolution Satellite Imagery to Complement the IPCC and Global Protocol for Community-Scale (GPC) Estimations.....	1017
<i>Frederick Ajisafe, M. Sariful Islam, Felipe Mandarino, Patricia T. De Carvalho, Priscilla Baltezar, Danielle Wood</i>	

FACSAT-2, an Achievement that Will Contribute to the Sustainability of the Colombian Territory.....	1028
<i>Lorena Cardenas, Erick Gutiérrez, Paola Zarate, Luis G. G. Garcia, Jorge Prada, Ivan Plata, Efrain Rodriguez-Rubio, Alejandro C. Gonzalez</i>	
Hyperspectral Change Detection for Monitoring Harmful Algae Blooms in Aquatic Scenes using Independent Component Analysis .....	1036
<i>C. Penne, J. L. Garrett, M. Orlandic</i>	
Earth's Pulse, City's Breath: Enhancing Urban Land Cover Through SAR and Sentinel-2 Data Fusion.....	1042
<i>Marc Crampe, E. Picard</i>	
Optimized FPGA-Based Real-Time Onboard Processing for Enhanced Maritime Surveillance .....	1054
<i>Aysha Alharam, Yaqoob Alqassab</i>	
Multi-Scale Feature-Refined for Object Detection Algorithm of the Remote Sensing Images.....	1060
<i>Feiyao Huang, Min Hu, Rui Zhang, Shiwen Song</i>	
Investigating Amplitude and InSAR Phase from Passive and Active Artificial Reflectors .....	1067
<i>Davide O. Nitti, Raffaele Nutricato, Alessandro Parisi, Khalid Tijani, Fabio Bovenga</i>	
Exploring and Processing Large Data Sets in Earth Observation on HPC-Systems with <i>Heat</i> .....	1074
<i>Fabian Hoppe, Wadim Koslow, Kathrin Rack, Alexander Rüttgers</i>	
Analysis of Various Methods of Processing Hyperspectral Images from a Remote Sensing Satellite for Solving Civil Tasks .....	1083
<i>Irina Sliusareva, Anna Zharkova, Ivan Trofimov, Egor Kasulin</i>	
Discovering Causal Models of Cyclogenesis Through an Informed Structural Learning Approach.....	1087
<i>Allegra Farrar, B. C. Williams</i>	
Automated Coastal Zone Classification using AI: A Systematic Method to Perform Comprehensive Land Use and Land Cover Classification in Coastal Areas .....	1098
<i>Nicolo Taggio, Daniela Drimaco, Maurizio Laterza, Giulio Ceriola, Mauro Sylos Labini, George Benekos, Alberto Morea, Khalid Tijani</i>	
Enhancing Precision Agriculture for Woody Crops Through Publico-Private Collaboration.....	1105
<i>Roger H. I. Lluch, Bernat G. Skrabec, Estefania Blanch</i>	
Deep Hashing with Multi-Level Contrastive Learning Framework for Remote Sensing Image Retrieval .....	1117
<i>Mingkun Li, Zihan Yin, Manyi Guo, Wenqian Yang, Xiaoning Zhao</i>	
Fully Automated Extraction of Accurate Ground Control Points from Sentinel-1/2 Acquisitions .....	1127
<i>Davide O. Nitti, Cristoforo Abbattista, Luigi Agrimano, Leonardo Amoroso, Fabio Bovenga, Donato Chirulli, Rossella Milella, Alberto Morea, Raffaele Nutricato, Alessandro Parisi, Khalid Tijani</i>	
Leveraging Large Models for Crop Production Index Prediction Through Remote Sensing Data: A New Chapter Towards Sustainable Agriculture.....	1135
<i>Lei Tang, Zhong Ma, Zhao He, Kedi Lu, Pengcheng Huo, Haochen Zhang</i>	
HYPSO Web Portal .....	1144
<i>Hawraa A. Razzaq, Dennis Langer, Alvaro Flores-Romero, Corrado Chiatante, Roger Birkeland, Sivert Bakken, Simen Berg</i>	

Machine Learning and Satellite Data for Predictive Monitoring of Tropical Orcas in the Pacific: Insights into Management Strategies.....	1157
<i>Tania Ramirez-González, Facundo Mendoza-Solano, César C. Azofeifa</i>	
Fire Prediction Modeling and Risk Mapping in North Algeria .....	1163
<i>Asma Betteka</i>	
Study of Autonomous Satellite Planning Methods using Artificial Intelligence Techniques .....	1172
<i>Sigfrido V. Bortolotti, Marco Eugeni, Paolo Gaudenzi, Filippo Bianchini, Guido Volpi</i>	
AI-Based Wildfire Risk Assessment from Low-Cost Multispectral Data: Collection, Processing, and Analysis for Sub-6U CubeSat Missions.....	1187
<i>Andras Bodrogai, Marialina Tsinidis, Giorgio Ciacchella, John Fitzgerald, Shannon Rennie, Fang J. Lim, Alvaro M. Gutierrez, Syahravindra Aziz, Sujay Patil</i>	
Hardware Design for Deep Learning in Micro Satellite Systems: A Parallel Edge Computing Approach .....	1201
<i>Jirapat Seangyong</i>	
Spiking Neural Network Design for On-Board Detection of Methane Emissions Through Neuromorphic Computing.....	1212
<i>Andrew Karim, Amel Alkholeify, Jimin Choi, Jatin Dhall, Tan Huda, Arnav Ranjekar, Yousfi Yassine, Daniel Wischert</i>	
SPECTRE: Marine Traffic Monitoring Through an Innovative AI-Powered Multi-Sensor Multi-Mission Framework.....	1224
<i>Maria D. Graziano, Alfredo Renga, Andrea Mazzeo, Roberto Del Prete, Angela C. Cristofano, Marisa Sperandeo, Margareth Di Vaia, Sergio Iervolino, Maria Salvato, Valerio Pisacane, Renato Aurigemma, Andrea L. Russo, Marco Focone, Fabiana Ravellino, Angela Volpe, Maria Virelli, Deodato Tapete</i>	
Spaceborne Artificial Intelligence (AI) for Vessel Detection Applications .....	1236
<i>Muhammad R. Mughal, Almuhammad Alkhaziri, Ahmed Albadri, Rami Al-Hmouz, Yashu Kang, Sayyid S. Al Busaidi</i>	
Satellite Telemetry Anomaly Detection Based on Machine Learning Algorithms .....	1244
<i>Yichuan Man, Tai Hu, Yurong Liu</i>	
Generative Deep Learning for Enhanced Multi-Spectral Surface Analysis and Dimensional Augmentation of Data .....	1248
<i>Sina T. S. Strathaus, Jan Loettgen</i>	
Törön I: An Autonomous, Recoverable and Reusable Platform for High-Atmospheric Studies.....	1251
<i>Rogelio Morales, William D. G. Hermoso, Ysyamel Marin, Cristóbal Alvarado-Minic, André Prialé</i>	
forEst-Fire prevention: rEmote sensing SWIR payload for an iTalian flammability mOnitoring System (EFESTO).....	1254
<i>Fabio Nichele, Giuseppe Crescenzo, Claudio Di Paola, Giuseppe D'Amore, Luca Deva</i>	
SAR-Based Leak Detection and Carbon Footprint Reduction .....	1259
<i>Yuval Lorig</i>	
The Use of Satellite Imagery in International Criminal Proceedings: The <i>Al Mahdi</i> Case .....	1263
<i>Katharina A. Harreiter</i>	

Monitoring North Atlantic Right Whales from Space .....	1272
<i>Guy Seguin, Stephen Bird, Sarah Fortune, Paris Vachon, Jay Kirkham</i>	
Fostering Space Exploration: An Innovative 3- Wavelengths Lidar Instrument Concept for Ocean, Land and Atmosphere Expanded Scientific Measurements.....	1278
<i>Valentina Sacchieri, Francesco Coppola, Pasquale Ferrara, Peter Coppo, Alessandro Perna, Guglielmo Landi, Emanuele Capuano, Gianluca Aroldi, Matteo Burresti, Paolo Mosciarello, Stefano Puccini, Stefano Nencioni, Alberto Cosentino, Valeria De Sanctis, Noemi Franco, Davide Dionisi, Marco Di Paolantonio, Donato Summa, Simone Lolli, Lucia Mona, Rosalia Santoleri, Simona Zoffoli, Francesco Tataranni, Tiziana Scopa, Raffaele Votta, Francesco Longo, Yongxiang Hu, Michael J. Behrenfeld, Chris A. Hostetler, Salvatore Scola, Charles R. Trepte, Stephen R. Hall, Paolo Di Girolamo</i>	
Securing the Future: Exploiting IRIDE Constellation for National Security and Services for the Citizens.....	1283
<i>Marco Pascale, Alfredo Renga, Daniele Biron, Federica Cotugno</i>	
Securing Earth Observation and Radio Frequency Satellites: Challenges and Strategies .....	1291
<i>Sanjana N. Karkera, Satvik Annadanam</i>	
Space as a Domain for Science Diplomacy: How New Space Became Embedded in International Relations.....	1311
<i>Aoibhín Crowley, Giancarlo Filippazzo</i>	
The Joint ASI - NASA/JPL Surface Biology and Geology Thermal Infrared (SBG-TIR) Mission .....	1317
<i>Raffaele Votta, Simona Zoffoli, Vincenzo Martucci, Rocco C. Pellegrini, Tiziana Scopa, Francesco Tataranni, Sara Venafra, Giorgio Viavattene, Francesco Longo, Maria F. Buongiorno, Gianluca Giallatini, Andrea Cici, Eliana Gargiulo, Lorenzo Franchi, Maria G. Pancalli, Demetrio Labate, Lauren S. White, Ralph Basilio, Simon Hook, Sarah Hunyadi-Lay, Melora Larson, Jennifer Cruz, Peter Xaypraseuth</i>	
Environmental Implications of Atmospheric Ammonia from Agricultural Activities and Control Strategies .....	1330
<i>Filippo Iodice, Matteo Manieri</i>	
Cloud Detection with Deep Neural Networks from Multitemporal Sentinel-2 Imagery .....	1339
<i>Hélène Savatier-Dupré</i>	
Potentialities of Prisma Imagery for Forest Mapping: First Results.....	1350
<i>Fabiana Ravellino, Maria D. Graziano, Alfredo Renga, Renato Aurigemma, Valerio Pisacane</i>	

## **Author Index**