

IAF Symposium on Integrated Applications

Held at the 73rd International Astronautical Congress
(IAC 2022)

Paris, France
18-22 September 2022

ISBN: 978-1-7138-7407-2

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© (2022) by International Astronautical Federation
All rights reserved.

Printed with permission by Curran Associates, Inc. (2023)

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

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
Web: www.proceedings.com

TABLE OF CONTENTS

TOOLS AND TECHNOLOGY IN SUPPORT OF INTEGRATED APPLICATIONS

Earthbit: A Desktop Tool to Ingest and Process PRISMA Hyperspectral Data	1
<i>L. Agrimano, L. Amoruso, E. Lopinto, C. Abbattista, M. Iacobellis, F. Santoro</i>	
Skyrider Haps for Integrated Applications	5
<i>Jiri Pavlik</i>	
Lynk - A Mobile Application for the Democratization of Space Explorations	12
<i>Leonardo Delleani, Andrea Zanetti, Gabriele Marra, Federico Miglioni, Maurizio Vetere, Paolo Secci</i>	
Creation Integrate and Digital Processing System for Intellegent Control of Azerspace Satellite Information	17
<i>Sevda R. Ibrahimova</i>	
Open Planet Facts: Space and in Situ Data to Empower Citizens for a Sustainable Planet, a Proposition of French Institutions (CNES, ADEME and OFB)	18
<i>Francois Jocteur Monrozier, Fabio Mainolfi, Antoine Barrau, Gaëlle Deronzier, Martin Regnier</i>	
Edge Computing in Space: A Machine Learning Approach for Anomaly Detection.....	23
<i>Carmen Misa Moreira, Andreas M. Hein</i>	
Use of Satellite Imagery for the Construction of 3D Environments Applied to Maritime Navigation Simulators.....	34
<i>Yoseli Guaramato, Juan Ruiz, Miguel Bencomo, Jose Carrizales, Alfredo Calderón</i>	
Modelling and Analysis of Acquisition, Pointing and Tracking and Atmospheric Turbulence on the Optical QKD Channel Between a Cube-Satellite Transmitter and Optical Ground Receiver for Indian Sub-Continent.....	35
<i>Anand Nagesh, J. S. Nayana</i>	
Geo-Referencing Crop Labels from Street-Level Images Using Structure from Motion.....	48
<i>Sneha Manimurugan, Ravi Singaram, Catherine Nakalembe, Hannah Kerner</i>	
MSMO Multi Service Missions Opportunities.....	59
<i>Carmen Velarde, Stephan Holsten, Fabio Curreli, Alvaro Sanz, Gabriele Infantolino, Shahrzad Afroozeh, Paolo Madonia, Oscar Luengo</i>	
Outcome and Lessons Learnt from the HEMERA Balloon Infrastructure – New and Innovative Approach for Science, Technology and Preparation for New Space and Earth Observation Missions	70
<i>Kristine Dannenberg, Felix Friedl-Vallon, André Vargas, Philippe Raizonville</i>	
Satellite Video Target Tracking Based on Improved YOLOv3 and Deep Sort.....	74
<i>Ruihao Zhou</i>	
Leveraging Earth Observation Data for Mitigating the Adverse Effects of Global Warming and Climate Change - Predicting the Rapid Melting of Sea Ice and Glaciers.....	75
<i>Wale Adelanwa, Anna Aikohi, Mustapha Iderawumi</i>	

The GOLDCREST Mission and the On-Board Computing Requirements Necessary to Generate the Delay-Doppler Maps Required to Determine Soil Moisture Content.....	90
<i>Michele Jamrozik, Jan Thoemel, Sajad Tabibi, Tonie Van Dam</i>	

INTEGRATED APPLICATIONS END-TO-END SOLUTIONS

Football Networks by Galileo GNSS Jacket: The Data Work Flow to Manage Players	99
<i>Djamel Metmati</i>	
Satellite-Based Air Traffic Management (ATM) Systems' Impact on CO2 Emission.....	102
<i>E. Montanari, O. Nunez, R. Flohr, G. Martin de Mercado</i>	
Federating Space, Air, and Ground Air Quality Data to Improve Outcomes in Cities Around the World.....	114
<i>Jeanne Holm, Jacqueline Le Moigne, Mohammad Pourhomayoun, Dawn Comer</i>	
Connectivity for Green Value	124
<i>Roberta Mugellesi Dow, Davide Coppola, Rita Rinaldo, Kavitha Muthu, Asimina Syriou</i>	
Supervised Machine Learning Applications on Meteors and Meteorites	132
<i>A. Al-Owais, M. E. Sharif, I. Fernini, H. M. Al-Nuaimi</i>	
Satellite-Based Earth Cognitive Decision Support System for COVID-19 Pandemic Management	140
<i>Softiane Atek, Cristiano Pesaresi, Marco Eugeni, Corrado De Vito, Vincenzo Cardinale, Massimo Mecella, Antonello Rescio, Luca Petronzio, Aldo Vincenzi, Pasquale Pistillo, Filippo Bianchini, Gianfranco Giusto, Giorgio Pasquali, Paolo Gaudenzi</i>	
WatcherCatcher: A Real-Time Function of SPACEMAP to Predict Spy Satellites in Timeline.....	155
<i>Peter J. Ryu, Shawn S. Choi, Chanyoung Song, Sangwon Lee, Sukyeong Park, Douglas Kim</i>	
Integrating Satellite Applications in Disaster Risk Management	160
<i>Corneel Bogaert, Annalisa Donati</i>	
Space in Support of Security Missions: An Evolving Landscape with Untapped Potential	171
<i>Mathieu Bataille, Tomas Hrozensky, Sebastien Moranta, Aleix Nadal Campos</i>	
Integrating Satellite Imagery and Social Media Data to Study the Socio-Economic Aftermaths of 2021 Hurricane Ida.....	179
<i>Swarnajyoti Mukherjee, Krittanon Sirorattanakul, Vera Schalles</i>	
The NARAS Approach to Earth Observation and GNSS Data Fusion to Improve Navigation Risk Assessment.....	189
<i>Chiara Brighenti, Sara Marcu, Francesco Brighenti, Erwin Van Iperen, Marjolein Hermans, Angelo Amodio, Francesca Santoro, Paolo Zoccarato</i>	
The Environment-Vulnerability-Decision-Technology Framework: A Process for Developing Multi-Disciplinary Decision Support Systems for Sustainable Development Applications.....	197
<i>Jack Reid, Seamus Lombardo, Ufuoma Oviemhada, Caroline Jaffe, Danielle Wood</i>	
The Social and Technical Impact of Education and Access to Open Space Data: A Case Study of the Africa Open Data Collaboratives	214
<i>Kaitlyn Holm, Oniosun Temidayo Isaiah</i>	

SATELLITE COMMERCIAL APPLICATIONS

The Italian Space Agency Satellite Data Exploitation Programmes in Support of the Downstream Sector.....	216
<i>Giorgio A. Licciardi, Rocchina Guarini, Maria L. Battagliere, Deodato Tapete, Laura Candela, Alessandro Coletta</i>	
An Intelligent Alliance: Satellite-Drone Network to Enhance Precision Agriculture.....	222
<i>Fatemeh Enayatollahi, Jamie Campos, Alina Toidjanov, Shaylyn Pelikys, Ali Barari, Aref Asgari, Sajad Saraygordafshari, Philip Ferguson</i>	
Satellite Based Night Image: New Applications Bringing Social Economic Benefits from Space	235
<i>Alexandre Carayon, Wei Sun</i>	
Towards the Construction of Smart Cities in Latin America and the Caribbean Through the Use of Space Technology.....	238
<i>Cristina Pérez-Ramos, Brandon U. Casanova-Galán, Alexis León-Venegas</i>	
SATCOM in the Connectivity Mix for the Car of the Future	244
<i>Teodora Secara, Polyzois Kokkonis, Christopher Topping, Frank Salzgeber</i>	
Space Systems, Services and Applications in Support of Large National Infrastructures	245
<i>Luigi D'Amato, Maria L. Battagliere, Alessandro Coletta</i>	
The Cross-Fertilization Process to Connect Space with No-Space: The Strategy and the Experience of Fondazione E. Amaldi as Italian Copernicus Relay	252
<i>Giorgia D'Agostinis, Lorenzo Scatena, Eleonora Lombardi</i>	
Business Cases of the New Space Economy: The Experience of ESA Business Applications and InCubed+ Ambassador Platform for Italy as Enabler	260
<i>Valerio Roscani, Lorenzo Scatena, Eleonora Lombardi</i>	
Airborne-Based Services for the Development of New Earth Observation Payloads for Small Satellite Missions	269
<i>Alexander Kläser, Phil Daro Krummrich, Madlen Behnisch, Wilfried Wetjen</i>	

INTERACTIVE PRESENTATIONS - IAF SYMPOSIUM ON INTEGRATED APPLICATIONS

Adaptive Positioning and Localization for Satellite Attitude for Industry 4.0 - A Systematic Review of Cloud Computing Platform	273
<i>Raja Munusamy, T. Badirinadh Reddy, C. Deepil, G. Venkatasai</i>	
Automatic Detection Model of Floating Macroalgae Blooms Based on Deep Learning Using GOCI Images	282
<i>Yeonju Choi, JoonMin Choi</i>	
Prediction of Air Pollution and Environmental Factors Using Machine Learning, Data from Space Agency Satellites and from Ground Devices.....	288
<i>Axel Núñez-Arzola, Itzcoatl Nunez San Miguel</i>	
Above Ground Forest Carbon Stock Assessment Using GF-1 Satellite Data.....	294
<i>Atif Shahzad</i>	

Advanced Space Service Access Application Tool "ASTRAX Universal User Interface (ASTRAX U2U)" 295
Taichi Yamazaki, Taiko Kawakami

LATE BREAKING ABSTRACTS

Wanted: Business Ideas for Lunar Economy Applications 304
Christian Walter, David Gomez Otero, Francesco Liucci, Javier Ventura-Traveset

Satellite-Based Air Traffic Management (ATM) Systems' Impact on CO2 Emissions.....311
E. Montanari, O. Nunez, R. Flohr, G. Martin de Mercado

Author Index