2021 digital edition - XXIVth ISPRS Congress
Preliminary Programme
(June 1, 2021)

Monday 5 July
Scientific Track

08:00 - 08:50: Spatial Analysis
Chairpersons: Mahmoud Delavar and Wu Hao
- MO.1.4: #487 An improved temperature spatial interpolation method for spaceborne lidar atmospheric correction. Mei Zhou, Kuangyu Li, Miaomiao Pan, Jiuying Chen, Chuanrong Li, Linsheng Chen.

09:00 - 09:50: Advanced applications for Smart Cities
Chairpersons: Giorgio Agugiaro and Margarita Kokla
- MO.2.3: #238 Accuracy investigation on image-based change detection for BIM compliant indoor models. Theresa Meyer, Ansgar Brunn, Uwe Still.

10:00 - 10:50: Thematic Information Extraction
Chairperson: Xinlian Liang
- MO.3.1: #279 Towards fine-grained road maps extraction using sentinel-2 imagery. Christian Ayala, Carlos Aranda, Mikel Galar.
- MO.3.3: #596 Germany’s first cloud-based web service for land monitoring using Copernicus Sentinel-2 data. Patrick Werner Knoefel, David Herrmann, Marcus Sindram, Michael Hovenbitter.
11:00 - 11:50: Microwave Remote Sensing
Chairperson: Batuhan Osmanoglu
- MO.4.1: #444 Using generative adversarial networks for extraction of InSAR signals from large-scale Sentinel-1 interferograms by improving tropospheric noise correction. Binayak Ghosh, Mahmud Haghshenas Haghhighi, Mahdi Motagh, Setareh Maghsudi.
- MO.4.3: #628 Exploring cloud-based platforms for rapid InSAR time series analysis. Andreas Piter, Magdalena Vassileva, Mahmud Haghshenas Haghhighi, Mahdi Motagh.

12:00 - 12:30: Opening and award ceremony

12:30 - 13:30: Keynote Speaker #1
Emmanuel Flory (Airbus). Pléiades Neo 30cm-resolution satellite constellation: enhanced data access and geospatial application

13:30 - 15:00: Interactive poster session
Details coming soon. Full list of posters provided at the end of this document.

15:15 - 16:15: Keynote Speaker #2
Claudio Almeida (INPE, Brazil). Vegetation monitoring in Brazilian biomes. Legacies, challenges and future perspectives.

16:30 - 17:20: Sensor Calibration
Chairpersons: Jan Skaloud, Francesco Nex
- MO.5.3: #741 A review of the one-parameter division undistortion model. Bastian Erdnuess.
- MO.5.4: #551 Sentinel-2 Surface Reflectance Products Generated By CNES And DLR: Methods, Validation And Applications. Olivier Hagolle, Jérome Colin, Sophie Coustance, Peter Kettig, Pablo d'Angelo, Stefan Auer, Georgia Doxani, Camille Desjardins.

17:30 - 18:20: Object Monitoring in Remote Sensing
Chairpersons: Michael Schmitt, Rupert Müller
• MO.6.4: #419 Convolutional neural networks for detecting bridge crossing events with ground-based interferometric radar data. Matthias Arnold, Mareike Hoyer, Sina Keller.

18:30 - 19:20: Mobile Mapping
Chairpersons: Naser El-Sheimy, Stephan Nebiker
• MO.7.3: #423 3D Modeling and GIS analysis for aerodrome forest obstacle monitoring. Liudmila Mitsevich, Natalia Zhukovskaya.

Tuesday 6 July
Scientific Track

08:00 - 08:50: Data integration
Chairpersons: Zhizhong Kang, Arzu Cöltekin
• TU.1.1: #694 Region adaptive adjustment strategy based on information entropy for remote sensing image segmentation. Xiaoli Li, Jinsong Chen.
• TU.1.2: #100 Classification and identification of artificial lakes based on national geographic-conditions data. Zhiwu Zhou, Shengyuan Jing, Yinxing Gong, Hui Zhao.
• TU.1.3: #801 Combining terrestrial scanned datasets with UAV point cloud for mining operations. Megan Fotheringham, Dev Raj Paudyal.
• TU.1.4: #451 A platform for multilayered documentation of cultural heritage. Marko Radanovic, Kourosh Khoshelham, Clive Fraser.

09:00 - 09:50: Data processing and simulation
Chairpersons: Maria Brovelli and Martin Breunig
• TU.2.1: #259 A two-level approach for the crowd-based collection of vehicles from 3D point clouds. Volker Walter, Michael Koelle, David Collmar, Yongxiang Zhang.
• TU.2.2: #644 Point cloud based 3D models for agent-based simulation in social distancing and evacuation. Shayan Nikoohemat, Paula Godoy, Nienke Valkhoff, Marlies Wouters, Robert Voute, Ville Lehtola.
• TU.2.3: #242 An experimental analysis of spatial indexing algorithms for real-time safety-critical map application. Furkan Cetin, M.Oguzhan Kulekci.
• TU.2.4: #466 Detection of the spatial variations of local populations from the viewpoint of urban structure analysis. Kiichiro Kumagai, Yuki Kameda.

10:00 - 10:50: Surface Modelling
Chairpersons: Uwe Soergel, Kaichang Di
• TU.3.1: #214 Segmentation of buildings based on high resolution persistent scatterer point clouds. Philipp Schneider, Uwe Soergel.
● TU.3.3: #630 3D multi-resolution mapping of Mars using CASP-GO on HRSC, CRISM, CTX and HiRISE. Jan-Peter Muller, Yu Tao, Alfiah Ritzky Diana Putri, Susan Conway.
● TU.3.4: #266 Evaluating an Automated Object-Oriented Method to Delineate Drumlins from both Terrestrial and Submarine Digital Elevation Models. Kakoli Saha, Katrien J. J. Van Landeghem.

11:00 - 11:50: Hyperspectral Image Processing and Data Fusion
Chairperson: Eija Honkavaara

● TU.4.2: #530 Detection of methane plumes in hyperspectral images from Sentinel-5p by coupling anomaly detection and pattern recognition. Elyes Ouerghi, Thibaud Ehret, Carlo de Franchis, Gabriele Facciolo, Thomas Lauvaux, Enric Meinhardt, Jean-Michel Morel.
● TU.4.3: #539 Analysis and detection of wildfires by using PRISMA hyperspectral imagery. Dario Spiller, Luigi Ansalone, Stefania Amici, Alessandro Piscini, Pierre Philippe Mathieu.
● TU.4.4: #401 Marrying deep learning and data fusion for accurate semantic labeling of sentinel-2 images. Guillemette Fonteix, Michael Swaine, Maxime Leras, Yuliya Tarabalka, Sébastien Tripodi, Frédéric Trastour, Anne Giraud, Lionel Laurore, Justin Hyland.

12:30 - 13:30: Keynote Speaker #3
Kiran Kumar (ISRO, India). Collection of scientific data of the Moon with the Chandrayaan satellites.

13:30 - 15:00: Interactive poster session
Details coming soon. Full list of posters provided at the end of this document.

15:15 - 16:15: Keynote Speaker #4
Marc Pollefeys (ETH Zürich & Microsoft, Switzerland). Computer Vision for Mixed Reality with Hololens2.

16:30 - 17:20: 3D Change Detection
Chairperson: Belén Riveiro

● TU.5.3: #645 Automated and permanent long-range terrestrial laser scanning in a high mountain environment: setup and first results from error identification. Annelies Voordendag, Brigitta Goger, Christoph Klug, Rainer Prinz, Martin Rutzinger, Georg Kaser.
● TU.5.4: #307 Change detection of time-series 3d point clouds using robust principal component analysis. Takashi Fuse, Toshiki Yamano.

17:30 - 18:20: 3D Instance Detection
Chairperson: Michael Ying Yang


• TU.6.3: #542 Roadside tree extraction and diameter estimation with MMS LiDAR by using point-cloud image. Genki Takahashi, Hiroshi Masuda.

• TU.6.4: #322 Segmentation of traffic signs from poles with mathematical morphology applied to point clouds. Jesús Balado, Mario Soilán, Lucía Díaz-Vilarriño, Peter van Oosterom.

18:30 - 19:20: 3D Semantic Segmentation
Chairperson: Norbert Haala

• TU.7.1: #790 Weakly supervised pseudo-label assisted learning for als point cloud semantic segmentation. Puzuo Wang, Wei Yao.


• TU.7.3: #188 Which 3D data representation does the crowd like best? Crowd-based active learning for coupled semantic segmentation of point clouds and textured meshes. Michael Kölle, Dominik Laupheimer, Volker Walter, Norbert Haala, Uwe Soergel.

• TU.7.4: #111 Tesserae3D: A benchmark for tesserae semantic segmentation in 3D point clouds. Abderrazzaq Kharroubi, Line Van Wersh, Roland Billen, Florent Poux.

Wednesday 7 July
Scientific Track

08:00 - 08:50: Education and Outreach
Chairpersons: Senthil Kumar, Sheryl Rose Reyes

• WE.1.1: #633 Creative strategies in navigating the new normal: advancing the contributions of the ISPRS Student Consortium as an international organization. Sheryl Rose Reyes, Charmaine Cruz, Mustafa Ustuner, Sona Guliyeva, Charles Jjuuko.


• WE.1.3: #152 Regression analysis of errors of SAR-based DEMs and controlling factors. Yen-Yi Wu, Hsuan Ren.

• WE.1.4: #538 Towards gender equality in education and career in the Earth observation and GI sector. Barbara Riedler, Nathalie Stéphenne, Estefanía Aguilar-Moreno, Marie Jagaille, Aida Monfort-Muriach, Grazia Fiore, Natassa Antoniou.

09:00 - 09:50: Landuse and Landcover Change Detection
Chairpersons: Ammatzia Peled, Yongnian Zeng

• WE.2.1: #547 Adversarial discriminative domain adaptation for deforestation detection. Javier Noa Turnes, Pedro Juan Soto Vega, Gilson Alexandre Ostwald Pedro Costa, Dennis Wittich, Raul Queiroz Feitosa, Franz Rottensteiner.

• WE.2.2: #356 Contribution index of land cover and land surface temperature changes in upper hill Nairobi, Kenya. Patricia Wanjiku Mwangi, Faith Njoki Karanja, Peter Kariuki Kamau, Sammy Letema.

● WE.2.4: #365 Graph Neural Network Based Multi-feature Fusion for Building Change Detection. Wei Yuan, Xiuxiao Yuan, Zipei Fan, Zhiling Guo, Xiaodan Shi, Jianya Gong, Ryosuke Shibasaki.

10:00 - 10:50: Application of Remote Sensing Data
Chairpersons: Mitsunori Yoshimura, Fazlay S. Faruque


● WE.3.2: #380 Estimation of optimal crown coverage and canopy shape for shadow estimation on tropical moist broadleaf forest. Takumi Fujiwara, Wataru Takeuchi.

● WE.3.3: #325 Automated building segmentation and damage assessment from satellite images for disaster relief. Xiangtian Yuan, Seyed Majid Azimi, Corentin Henry, Veronika Gstaiger, Marco Cadestefano, Michael Manalili, Stefano Cairo, Sirio Modugno, Marc Wieland, Anne Schneibel, Nina Merkle.

● WE.3.4: #726 Evaluating the impact of LaSRC and Sen2cor atmospheric correction algorithms on Landsat-8/OLI and Sentinel-2/MSI data over AERONET stations in Brazilian territory. Rennan de Freitas Bezerra Marujo, José Guilherme Fronza, Anderson Reis Soares, Gilberto Ribeiro de Queiroz, Karine Reis Ferreira.

11:00 - 11:50: Best Paper session
Chairperson: Christian Heipke

● WE.4.1: #462 Robust estimation in robot vision and photogrammetry: A general model and its applications. Jiayuan Li, Yongjun Zhang, Qingwu Hu

● WE.4.2: #717 Towards efficient indoor/outdoor registration using planar polygons. Rahima Djahel, Bruno Vallet, Pascal Monasse

● WE.4.3: #572 Water quality retrieval and algal bloom detection using high-resolution CubeSat imagery. Milad Niroumand-Jadidi, Francesca Bovolo

● WE.4.4: #653 Joint estimation of road roughness from crowd-sourced bicycle acceleration measurements. Oskar Wage, Monika Sester

● WE.4.5: #118 Knowledge and skills related to active optical sensors in the body of knowledge for earth observation and geoinformation (EO4GEO BoK). Clémence Dubois, Boris Jutzi, Marc Olijslagers, Carsten Pathe, Christiane Schmullius, Martyna Anna Stelmasczuk-Górsk, Danny Vandebroucke, Martin Weinmann.

12:30 - 13:30: Keynote Speaker #5

13:30 - 15:00: Interactive poster session
Details coming soon. Full list of posters provided at the end of this document.

15:15 - 16:15: Keynote Speaker #6
Christoph Stiller (Univ. Karlsruhe & KIT, Germany). Automated driving with and without maps.

16:30 - 17:20: 2D Segmentation and Classification
Chairperson: Ribana Roscher


WE.5.3: #153 Remote sensing image classification with the SEN12MS dataset. Michael Schmitt, Yu-Lun Wu.

WE.5.4: #142 Detecting Cracks and Spalling Automatically in Extreme Events by End-to-end Deep Learning Frameworks. Yongsheng Bai, Halil Sezen, Alper Yilmaz.

17:30 - 18:20: 3D Registration
Chairperson: Franz Rottensteiner
- WE.6.3: #337 Photogrammetry and computed tomography point cloud registration using virtual control points. Kun Zhan, Dieter Fritsch, Joerg F Wagner. (asking for earlier session)
- WE.6.4: #733 Registration optimization of mobile handheld scanner point clouds with static scans. Victor Alteirac, Hélène Macher, Tania Landes.

18:30 - 19:20: Stereo Matching
Chairperson: Ewelina Rupnik
- WE.7.2: #151 Real-time depth map estimation from infrared stereo images of RGB-D cameras. Jiageng Zhong, Ming Li, Xuan Liao, Jiangying Qin, Hanqi Zhang, Qi Guo. (asking for earlier session)
- WE.7.3: #333 3D Surface Reconstruction From Multi-Date Satellite Images. Bullinger, Sebastian, Christoph Bodensteiner, Michael Arens.

Thursday 8 July
Thematic Sessions

08:00 - 08:50: Digital Twins
Chairpersons: Arzu Çoltekin (FHNW), Sidonie Christophe (LASTIG)
- TH.1.2: #382 Creating 3D indoor first responder situation awareness in real-time through a head-mounted AR device. Bart-Peter Smit, Robert Voûte, Edward Verbree.
- TH.1.3: #671 Embodied digital twins for environmental applications. Pejman Sajjadi, Jiayan Zhao, Jan Oliver Wallgrien, Jiawei Huang, Mahda Bagher, Alexander Klippel.
**TH.1.4:** #578 Hybrid GIS-BIM approach for the Torino Digital-Twin: the implementation of a 3D city geodatabase for floor-level urban analysis. **Giulia Sammartano**, Marco Avena, Marco Cappellazzo, Antonia Spanò.

**09:00 - 09:50:** Unconventional applications for geospatial deep learning  
*Chairpersons: Matthieu Molinier (VTT), Devis Tuia (EPFL)*
- **TH.2.1:** #306 Deep learning for vessel detection and identification from spaceborne optical imagery. **Giona Matasci**, Jonathan Plante, Kevin Kasa, Payam Mousavi, Andrew Stewart, Andrew Macdonald, Anne Webster, Jennifer Busler.
- **TH.2.2:** #512 Deep no learning approach for unsupervised change detection in hyperspectral images. **Saha, Sudipan**; Kondmann, Lukas; Zhu, Xiao Xiang.
- **TH.2.4:** #708 End-to-end physics-informed representation learning from and for satellite ocean remote sensing data. **Ronan Fablet**, Mohamed-Mahmoud Amar, Quentin Febvre, Maxime Beauchamp, Bertrand Chapron.

**10:00 - 10:50:** AI for Knowledge Discovery in Geosciences  
*Chairpersons: Anca Popescu (ESA), Diego Fernandez-Prieto (ESA)*
- **TH.3.1:** #252 AI4EO: Reasoning, Uncertainty, Ethics and Beyond. **XiaoXiang Zhu**
- **TH.3.2:** #258 Causal inference in Earth system sciences. **Jakob Runge**
- **TH.3.3:** #316 Explainable Deep Learning: Paradigms for Earth Observation. **Mihai Datcu**
- **TH.3.4:** #317 Asking questions to Sentinel images: a deep learning perspective. **Devis Tuia**, Sylvain Lobry
- **TH.3.5:** #730 Remote sensing, AI and innovative prediction methods for adapting cities to the impacts of the climate change. **Beril Sirmacek**
- **TH.3.6:** #253 Earth system data cubes: towards a multivariate understanding of regional to global land surface dynamics. **Miguel Mahecha**, Fabian Gans, Gunnar Brandt, Markus Reichstein, Carsten Bruckmann

**11:00 - 11:50:** Towards resilient & ubiquitous navigation  
*Chairperson: Charles Toth (OSU)*
- **TH.4.1:** #775 Cubesat onboard algorithm for space debris motion determination by processing stereo images. **Sergei Petrovich Simakov**, Igor Vitalevich Belokonov
- **TH.4.2:** #417 Image-based orientation determination of mobile sensor platforms. **Oliver Hasler**, Stephan Nebiker
- **TH.4.3:** #479 Analysis of positioning deviation between Beidou and GPS based on National Reference Stations in China. **Ming Chen**, Qinglan Zhang
- **TH.4.4:** #513 Feasibility Verification of Virtual Reference Station Technology in Geological Hazard Monitoring. **Qinglan Zhang**, Ming Chen, Junli Wu, Chaoqian Xu, Fan Wang
- **TH.4.5:** #745 Assessment of car collaborative positioning with UWB and vision. **Andrea Masiero**, Charles Toth, Jelena Gabela, Guenther Retscher
- **TH.4.6:** #146 Dynamic routing for navigation in changing unknown maps using deep reinforcement learning. **Yuci Han**, Alper Yimaz

**12:00 - 15:00:** Forum #1
15:15 - 16:15: Keynote Speaker #7
Sarah Gallagher (Univ. of Western Ontario and Canadian Space Agency, Canada).
Space-based Earth observations. Challenges and new opportunities.

16:30 - 17:20: ISPRS Scientific Initiatives & Education and Capacity Building Initiatives (I)
Chairperson: Songnian Li (Ryerson University)
- TH.5.1: The ISPRS Benchmark Test on Indoor Modelling. Kourosh Khoshelham, Ha Tran, Debadiya Acharya, Lucia Díaz Vilarino, Zhizhong Kang, Sagi Dalyot
- TH.5.2: GeoBIM benchmark: reference study on software support for open standards of city and building models. Francesca Noardo, Ken Arroyo Ohori, Filip Biljecki, Claire Ellul, Lars Harrie, Thomas Krijnen, Margarita Kokla, Jantien Stoter
- TH.5.3: International Benchmarking of terrestrial Image-based Point Clouds for Forestry. Markus Hollaus, Martin Mokroš, Yunsheng Wang

17:30 - 18:20: ISPRS Scientific Initiatives & Education and Capacity Building Initiatives (II)
Chairperson: Songnian Li (Ryerson University)
- TH.6.1: Development of an Online Spectral Library for Pigments of Paintings. Shuqiang Lyu, Miaole Hou, Ahmed Shaker Abdelrahman, Jeffrey Lee
- TH.6.2: #411 UP4DREAM capacity building project: UAS based mapping in developing countries. Alessio Calantropio, Filiberto Chiabrando, Jessica Comino, Andrea Lingua, Paolo Maschio, Tautvydas Juskauskas
- TH.6.4: LightCam: Enlightening the camera obscura - Where photogrammetry, computer and robotic vision meet. Erica Nocerino, Fabio Menna, Ronny Hänsch

18:30 - 19:20: Cultural Heritage
Chairpersons: Michael Younan (GSEC), Fulvio Rinaudo (Politecnico di Torino)
- TH.7.1: Modelling the evolution of the archeological works developed in Qubbet El Hawa (Aswan, Egypt). Jose Luis Pérez-García, Antonio T. Mozos-Calvache, Jose Miguel Gómez-López, Alejandro Jiménez-Serrano
- TH.7.2: #707 Integrating topographic, photogrammetric and laser scanning techniques for a Scan-to-BIM process. Mauro Lo Brutto, Emanuele Luculano, Paolo Lo Giudice
- TH.7.4: #302 The reliability assessment of the TLS registration methods - the case study of the Royal Castle in Warsaw. Jakub Markiewicz, Sławomir Łapiński, Agnieszka Bocheńska, Patryk Kot
8:30 - 11:00: Remote Sensing

Chairperson: Uwe Sörgel (University of Stuttgart)

8:30 – 9:30: Timo Balz (Wuhan University). *PS-InSAR for surface motion estimation*

9:30 – 10:30: Gottfried Mandlburger (TU Wien). *State and Trends in Airborne LiDAR*

10:30 – 11:00: coffee break & discussion chats

11:00 Deep learning

Chairperson: Ribana Roscher (University of Bonn)

11:00 – 12:00: Loïc Landrieu (IGN-ENSG). *Deep learning for 3D Point Cloud Analysis*

12:00 – 13:00: Charlotte Pelletier (UBS Vannes) & Marc Rußwurm (TUM). *Deep Learning for time series classification*

13:00 – 14:00: lunch break & discussion chats

14:00 Photogrammetry

Chairperson: Erica Nocerino (Aix Marseille Université)

14:00 – 15:00: Ewelina Rupnik (IGN-ENSG, Univ. Gustave Eiffel), Marc Pierrot-Deseilligny (IGN-ENSG, Univ. Gustave Eiffel), Yilin Zhou (Amadeus), Mehdi Daakir (CERN). *High-precision mapping with UAVs*

15:00 – 16:00: Davide Cucci (EPFL). *Dynamic networks*

16:00 – 16:30: coffee break & discussion chats

16:30 GIS & OGC

Chairperson: Margarita Kokla (National Technical University of Athens)


17:30 – 18:30: Peter Baumann (Jacobs University). *Federated Earth Datacubes: Concepts, Standards, Services*
Interactive oral sessions
Posters

We are currently designing the interactive oral session program. The day each poster will be presented is not yet ready.

Annals

Technical Commission I: Sensor Systems

- #135 Drone-Based Container Crane Inspection: Concept, Challenges and Preliminary Results. Mehdi Maboudi, Ahmed Alamouri, Vanessa De Arriba López, Mohammad Shafi Bajauri, Cosima Berger, Markus Gerke.
- #236 Individual tree extraction from uav lidar point clouds based on self-adaptive mean shift segmentation. Zhenyang Hui, Na Li, Yuanping Xia, Penggen Cheng, Yating He.
- #618 Terrestrial mobile mapping based on a microwave radar sensor. Application to the localization of mobile robots. Raphaël Rouvreure, Patrice Faure, Marie-Odile Monod.

Technical Commission II: Photogrammetry


Technical Commission III: Remote Sensing

- #102 Monitoring of Time-Series Soil Moisture Based on Advanced DInSAR. Chia-Hsiang Yang, Andreas Müterthies.
- #122 Updating landslide inventory maps using high resolution digital orthophotos and Digital Surface and Elevation modeling: the case study of Brusque city, Santa Catarina State, Brazil. Liliana Sayuri Osako.
- #185 Eelgrass Mapping with Sentinel-2 and UAV Data in Prince Edward Island (Canada). Eleanor Gallant, Armand LaRocque, Brigitte Leblon, Angela Douglas.

● #352 Positive and negative roughness according to local differences between DEM surface and 3D reference planes. Jean Francois Parrot, Carolina Ramirez Nunez.


● #418 Forest cover mapping and Pinus species classification using very high-resolution satellite images and random forest. Laura Alonso, Juan Picos, Julia Armesto.

● #442 Deep Bayesian active learning in high-resolution satellite images for change detection in urban and suburban areas. Lemonia Ragia, Antigoni Panagiotopoulos.


● #486 Research on quality control method of land cover classification data oriented to national geographic condition monitoring. Wenjuan Mao, Haitao Zhao, Wenchao Gao, Hongjing Tu, Yongmin Xu.


● #599 Comparison of classification algorithms of images for the mapping of the land covering in Tasso Fragoso municipality, Brazil. Paulo Roberto Mendes Pereira, Francisco Wendell Dias Costa, Edson Luis Bolfe, Lucrecio Silvestre Macarringe, Adielson Corrêa Botelho.

● #605 Toward a multi-source remote sensing wetland inventory of the us: preliminary results on wetland inventory of minnesota. Sarina Adeli, Bahram Salehi, Masoud Mahdianpari, Lindi J. Quackenbush.


● #656 Use of landsat-8 oli imagery and local indigenous knowledge for eelgrass mapping in eeyou istchee. Kevin Clyne, Brigitte Leblon, Armand LaRocque, Maycira Costa, Mélanie-Louise Leblanc, Ernie Rabbitskin, Marc Dunn.


● #691 Water quality monitoring over Finger Lakes region using Sentinel-2 imagery on Google Earth Engine cloud computing platform. Rabia Munsaf Khan, Bahram Salehi, Masoud Mahdianpari, Fariba Mohammadimanesh.


● #810 An unsupervised method based on fire index enhancement and GRNN for automated burned area mapping from single-period remote sensing imagery. Qi Zhang, Yao Xiao.

**Technical Commission IV: Spatial Information Science**

● #150 Geometric enhancement of the openstreetmap road network. Fatima Zohra Belhouari, Issam Boukerch, Kamel Siyoucef.
• **#420** Plastic surgery for 3d city models: a pipeline for automatic geometry refinement and semantic enrichment. Olaf Wysocki, Benedikt Schwab, Ludwig Hoegner, Thomas Heinrich Kolbe, Uwe Stilla.

• **#676** Accessing and processing Brazilian earth observation data cubes with the Open Data Cube platform. Vitor Conrado Faria Gomes, Felipe Menino Carlos, Gilberto Ribeiro Queiroz, Karine Reis Ferreira, Rafael Santos.

• **#701** Earthquake prediction evaluation based on VLF data using a novel "intersection-union" method. Wrya Barghi, Mahmoud Reza Delavar, Mahmoud Shahabadi, Mehdi Zare, Seyed Ahmad Eslaminezhad, Hadi Bayat.

• **#714** 2-Dimensional Geometric Analysis of a Simple Free Network. Bryan Sluis, Charles Toth.

• **#742** Effects of geospatial data sources on the identification and characterization of burnt areas in Portugal. Cidália Costa Fonte, Joaquim Patriarca, Diogo Duarte.

• **#787** Suitable dem assessment study for data scarce cities towards urban extreme and nuisance flood mapping. Anjaneyulu Akkimi, Sibashisa Dutta.

**Thematic Sessions**

*AI for Knowledge Discovery in Geoscience*

• **#128** Image to Point Cloud Translation using Conditional Generative Adversarial Network for Airborne LiDAR data. Takayuki Shinhara, Haoyi Xiu, Masashi Matsuoka.

*Visualization of complex spatio-temporal data and phenomena on Earth*


• **#658** Image-Based Reality-Capturing and 3d Modelling for The Creation of VR Cycling Simulations. Wissam Wahbeh, Manuela Ammann, Stephan Nebiker, Michael Van Eggermond, Alexander Erath.

**Archives**

*Technical Commission I: Sensor Systems*

• **#133** Towards more efficient UAS data acquisition: camera auto mount pivoting oblique survey. Igor Sales Da Gama Campos.

• **#163** On the classifier performance for simulation based debris detection in SAR imagery. Silvia Kuny, Horst Hammer, Karsten Schulz.

• **#191** RPAS based tracking of machinery used in asphalt paving process. Guido Martin Staub, Henry Diverth Montecino, José Esteban Díaz, Mauricio Alejandro Pradena, Seirgei Miller, Marcos Alfonso Díaz.

• **#221** Analysis and bias improvement of height models based on satellite images. Karsten Jacobsen, Ricardo Passini.

• **#234** A Procedure for Identifying Invasive Wild Parsnip Plants based on Visible Bands from UAV Images. Jingyi Liu, Mohammad Dalower Hossain, Dongmei Chen.

• **#283** Cooperative localisation using image sensors in a dynamic traffic scenario. Philipp Trusheim, Yajie Chen, Franz Rottensteiner, Christian Heipke.

• **#284** Setup of a CORONA camera and image co-registration/calibration. Noah Kunz, Peter Bochmann, Gerhard Kemper.
● #293 Improving the Internal Accuracy of UAV-Image Blocks using Local Low-Altitude Flights and Scale-Bars. Mehdi Maboudi, Ahmed Elbillehy, Yahya Ghassoun, Markus Gerke.
● #338 Investigating the performance of a handheld mobile mapping system in different outdoor scenarios. Eleonora Maset, Sara Cucchiario, Federico Cazorzi, Fabio Crosilla, Andrea Fusiello, Alberto Beinat.
● #378 Accuracy validation of tilted camera setups in open skies project and mapping applications. Mathias Motz, Dr. Gerhard Kemper, Doru Ciobanu.
● #409 Open urban and forest datasets from a high-performance mobile mapping backpack – a contribution for advancing the creation of digital city twins. Stefan Blaser, Jonas Meyer, Stephan Nebiker.
● #433 Object tracking control using a RPAS gimbal mechanism applied to industrial photogrammetry inspection. Daniel Juchem Regner, José Dueñas Salazar, Pedro Vieira Buschinelli, Michael Machado, Diogo Oliveira, João Marcio Santos, Carla Alves Marinho, Tiago Da Costa Pinto.
● #437 Development of a low-cost, hand-held multi-sensor system for the monitoring of small water bodies. Robert Blasikow, Ellen Schwalbe.
● #438 An efficient deep learning approach for ground point filtering in aerial laser scanning point clouds. Abdul Awal Md Nurunnabi, Felix Norman Teferle, Jonathan Li, Roderik C. Lindenbergh, Addisu Hunegnaw.
● #449 Automatic integration of laser scanning and photogrammetric point clouds: from acquisition to co-registration. Tahmineh Partov, Marc Daehne, Mehdi Maboudi, Daniel Krueger, Markus Gerke.
● #498 The iPad Pro built-in LiDAR sensor: 3D rapid mapping tests and quality assessment. Alessandra Spreatffico, Filiberto Chiabrando, Lorenzo Teppati Losè, Fabio Giulio Tonolo.
● #521 Predicting the infrared UAV imagery over the coast. Antoine Collin, Dorothée James, Antoine Mury, Mathilde Letard, Benoit Guillot.
● #526 An accurate real-time uav mapping solution for the generation of orthomosaics and surface models. Alexander Kern, Phillipp Fanta-Jende, Philipp Glira, Felix Bruckmüller, Christoph Sulzbachner.
● #534 Analysis of geometric and orthogonal correction accuracy for cas-500 satellite images. Yoo Jin Lee, Taejung Kim.
● #537 Automated reflectance target detection for automated vicarious radiometric correction of uav images. Seung Hwan Ban, Tae Jung Kim.
● #647 Evaluation of 3D UAS flight path planning algorithms. Paul Debus, Volker Rodehorst.
● #747 UAV UWB positioning close to building facades: a case study. Myrto Bouloukou, Andrea Masiero, Antonio Vettore, Vassilis Gikas.
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● #761 A case study of pedestrian positioning with UWB and UAV cameras. Andrea Masiero, Paolo Dabove, Vincenzo Di Pietra, Marco Piragnolo, Antonio Vettore, Sara Cucchiario, Alberto
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- **#204** Water turbidity estimation from LiDAR bathymetry data by full-waveform analysis - comparison of two approaches. Katja Richter, David Mader, Patrick Westfeld, Hans-Gerd Maas.
- **#207** Ambiguity concept in stereo matching pipeline. Emmanuelle Sarrazin, Myriam Cournet, Loïc Dumas, Véronique Defonte, Quentin Fardet, Yoann Steux, Natalia Jimenez Diaz, Emmanuel Dubois, David Youssefi, Fabrice Buffe.
- **#208** Determination of parking space and its concurrent usage over time using semantically segmented mobile mapping data. Artem Leichter, Udo Feuerhake, Monika Sester.
- **#210** Identification of misclassified pixels in semantic segmentation with uncertainty evaluation. Lina Emilie Budde, Dimitri Bulatov, Dorota Iwaszcuk.
- **#218** Automatic object segmentation to support crisis management of large-scale events. Seyed Majid Azimi, Ralph Kiefl, Veronika Gstaiger, Reza Bahmpanyar, Nina Merkle, Corentin Henry, Dominik Rosenbaum, Franz Kurz.
- **#223** Citywide estimation of parking space using aerial imagery and OSM data fusion with deep learning and fine-grained annotation. Corentin Henry, Jens Helleges, Nina Merkle, Seyed Majid Azimi, Franz Kurz.
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● #255 Calibration and validation of the intel t265 for visual localisation and tracking underwater. Tim Appelt, Joschka Van Der Lucht, Michael Bleier, Andreas Nüchter.

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● #310 A digital archive of Borobudur based on 3D point clouds. Masanori Kawato, Liang Li, Kyoko Hasegawa, Motoaki Adachi, Hiroshi Yamaguchi, Fadjar Thufail, Sugeng Riyanto, Brahmantraya Yk, Satoshi Tanaka.

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● #342 Data fusion of historical photographs with modern 3D data for an archaeological excavation – concept and first results. Paul Kalinowski, Frank Both, Thomas Luhmann, Ursula Warnke.
• #342 Random noise assessment in aerial and satellite images. **Aleksandr Chibunichev**, Irina Anikeeva.
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• #346 Requirements for aerial images quality, obtained for mapping purposes. **Aleksandr Chibunichev**, Irina Anikeeva.
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• #364 A concept for the segmentation of individual urban trees from dense MLS point clouds.
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• #440 Rpa positioning error influence on close range photogrammetry for industrial inspection. **Michael Batista Machado**, Guilherme Canarin Marcellino, Jose Duefas Salazar, Pedro Vieira Buschinelli, Daniel Juchem Regner, Joao Marcio Santos, Carla Alves Marinho, Tiago Da Costa Pinto.
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• #480 Automatic detection and vectorization of roadway elements in point cloud and panoramic images from mobile mapping system. **Étienne Barçon**, Arthur Picard.
• #514 MAGO approach for semantic segmentation: the case study of UAVid benchmark dataset. **Sara Gagliolo**, Domenico Sguerso.
• #516 Photogrammetric underwater and UAS surveys of archaeological sites: the case study of the Roman shipwreck of Torre Santa Sabina. **Alessio Calantropio**, Filiberto Chiabrando, Rita Aurriemma.
• #532 A portable opto-acoustic survey solution for mapping of underwater targets. **Bertrand Chemisky**, Erica Nocerino, Fabio Menna, Mohamad Motasem Nawaf, Pierre Drap.
- **#540** A comparison between 3D reconstruction using NeRF neural networks and mvs algorithms on cultural heritage images. Francesca Condorelli, Fulvio Rinaudo, Francesco Salvadore, Stefano Tagliaventi.

- **#544** Incremental map refinement of building information using LiDAR point clouds. Qianqian Zou, Monika Sester.

- **#545** Real-time dense 3d reconstruction from monocular video data captured by low-cost uavs. Max Hermann, Boitumelo Ruf, Martin Weinmann.


- **#553** First assessments into the use of commercial-grade solid state lidar for low cost heritage documentation. Arnadi Murtiyoso, Pierre Grussenmeyer, Tania Landes, Hélène Macher.


- **#566** Influence of illumination changes on image-based 3D surface reconstruction. Nazarena Bruno, Anna Giacomini, Riccardo Roncella, Klaus Thoeni.

- **#570** Road type classification of MLS point clouds using deep learning. Qian Bai, Roderik Lindenbergh, Julien Vijverberg, Jeroen Guelen.

- **#579** Unsupervised object-based clustering in support of supervised point-based 3D point cloud classification. Eleonora Grilli, Florent Poux, Fabio Remondino.

- **#602** Automatic segmentation of point clouds in the architecture environment. Rocío Romero - Jarén, Jose Juan Arranz, Laura Navas-Sánchez, Emrah Erduran, Sandra Martínez-Cuevas, Belén Benito.

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- **#615** Quality evaluation of 3D building models based on low altitude imagery and airborne laser scanning point clouds. Grzegorz Gabara, Piotr Sawicki.

- **#636** Multi-temporal image co-registration of UAV blocks: a comparison of different approaches. Pietro Garieri, Massimo Riboloni, Gianfranco Forlani, Riccardo Roncella.

- **#646** Synthetic data generation pipeline for geometric deep learning in architecture. Stanislava Federova, Alberto Tono, Meher Shashwat Nigam, Jiayao Zhang, Amirhossein Ahmadnia, Cecilia Maria Bolognesi, Dominik L. Michels.

- **#650** Validation of a uav-derived point cloud by semantic classification and comparison with tls data. Marica Franzini, Vittorio Casella, Paolo Marchese, Mattia Marini, Giovanna Della Porta, Fabrizio Felletti.

- **#652** Large scale segmentation of virtual environments to facilitate corrosion management. Robinson Luiz García, Patrick Nigri Happ, Raul Queiroz Feitosa.

- **#661** Building outline extraction from aerial images and digital surface models with a frame field learning framework. Xiaoyu Sun, Wufan Zhao, Raian V. Maretto, Claudio Persello.

- **#663** Evaluating tie points distribution, multiplicity and number on the accuracy of uav photogrammetry blocks. Vahid Mousavi, Masood Varshosaz, Fabio Remondino.

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• #749 Enhancing geometric edge details in mvs reconstruction. Elisavet Konstantina Stathopolou, Simone Rigon, Roberto Battisti, Fabio Remondino.


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• #131 Determination of regions suitable for agriculture in the gordon cosens forest of ontario by means of analytical hierarchy process with fuzzy logic inference. Rory Clifford Pittman, Baoxin Hu, Gunho Sohn.
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• #157 Automated structural forest changes using LiDAR point clouds and GIS analyses. Ana Novo, Higinio González-Jorge, Joaquín Martínez-Sánchez, José María Fernández-Alonso, Henrique Lorenzo.
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• #187 The potential of Sentinel-1 data to supplement high resolution earth observation data for monitoring green areas in cities. Anna Iglleder, Moritz Bruggisser, Alena Dostálková, Norbert Pfeifer, Stefan Schlaffer, Wolfgang Wagner, Markus Hollaus.
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● #329 Exploitation of spectral and temporal information for mapping plant species in a former industrial site. Rollin Gimenez, Guillaume Lassalle, Rémy Hédacq, Arnaud Elger, Dominique Dubucq, Anthony Credoz, Christelle Jennet, Sophie Fabre.
● #345 A Comparative Study of Point Clouds Semantic Segmentation Using Three Different Neural Networks on the Railway Station Dataset. Yustisi Ardhitasari Lumban-Gaol, Zhaiyu Chen, Mels Smit, Xiaoi Li, Mihai-Alexandru Erbasu, Edward Verbree, Jesús Balado, Martijn Meijers, Niels Van Der Vaart.
● #350 Deep learning based roof type classification using very high resolution aerial imagery. Mehmet Buyukdemircioglu, Recep Can, Sultan Kocaman.
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● #383 The combined use of remote sensing and spatial modelling: when surface water impacts african buffalo (syncerus caffer caffer) movements in savanna environments. Florent Rumiano, Cédric Gaucherel, Pascal Degenne, Eve Miguel, Simon Chamaillé-Jammes, Hugo
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- #384 The use of spectral and textural features in crop type mapping using Sentinel-2A images: A case study, Çukurova Region, Turkey. Aylin Tuzcu Kokal, Filiz Sunar, Adalet Dervisoglu, Suha Berberoglu.

- #386 Use of very high spatial resolution imagery for mapping wood energy potential from tropical managed forest stands, Reunion Island. Hélène Bley-Dalouman, François Broust, Jean Prevost, Annelise Tran.

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- #388 comparison of multi-image deep-learning super-resolution for passive microwave images of arctic sea ice. Xiaofan Shen, Xiaomin Liu, Yuan Yao, Tiantian Feng.


- #398 Rocky shoreline extraction using a Deep Learning model and Object-Based Image Analysis. Soumia Bengoufa, Simona Niculescu, Mustapha Kamel Mihoubi, Rabah Belkessa, Katia Abbad.


- #405 A review of surge-type glaciers. Zixiang Sun, Gang Qiao.

- #406 Unmanned aerial vehicle derived 3D model evaluation based on ICESat-2 for ice surface micro-topography analysis in east antarctica. Youquan He, Gang Qiao, Hongwei Li, Xiaohan Yuan, Yanjun Li.

- #407 Comparision of CryoSat-2 and ICESat-2 on water level monitoring of Nam Co lake. Haonan Zhao, Ruguo Xu, Gang Qiao.

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- #415 Surface urban heat island effects on bio-productive rural land covers surrounding a low density urban center. Michael Burnett, Dongmei Chen.


- #431 Aerial photogrammetry and machine learning based regional landslide susceptibility assessment for an earthquake prone area in turkey. Gizem Karakaş, Sultan Kocaman, Candan Gökçeoğlu.

- #434 How to start gentrification process using interferometric stack of sentinel-1. Nur Yagmur, Esra Erten, Nebiye Musaoglu.

- #441 Zonation of subalpine lakes based on remotely sensed water quality parameters. Chiara Gerosa, Mariano Bresciani, Giulia Luciani, Carlo Andrea Biraghi, Daniela Carrion, Michela Rogora, Maria Antonia Brovelli.


- #458 Research on the network map service technology of remote sensing image intelligent conversion based on gan model. Dejin Tang, Wei Huang, Zhuhua Zha, Jing Yang, Xiaoming Zhou, Cong Wang.

- #459 Analysis on the area changes and its influencing factors of the lakes in Wuhan city based on Google Earth Engine. Tiantian Gong, Shuangyu Xie, Haonan Zhao.


● **#481** Coral reefs on inhabited and uninhabited small islands, Spermonde archipelago, Indonesia. **Nurjannah Nurdin**, Khairul Amri, Abd Rachman Rasyid, Dwia Aries Tina Pulubuhu, Nurlijah Nurdin, Teruhisa Komatsu.

● **#485** Ice flow velocity mapping in East Antarctica using historical images from 1960s to 1980s: recent progress. **Shulei Luo**, Yuan Cheng, Zhen Li, Yiyu Wang, Kangle Wang, Xiaofeng Wang, Gang Qiao, Wenkai Ye, Yanjun Li, Menglian Xia, Xiaohan Yuan, Yixiang Tian, Xiaohua Tong, Rongxing Li.

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● **#495** Investigation of the changes of lake surface temperatures and areas: case study of burdur and egirdir lakes, Turkey. **Nagihan Aslan**, Dilek Koc-San.


● **#541** Analysis of different polarimetric decomposition techniques using compact polarimetric NISAR data for Ahmedabad, India. **Anjana Vyas**, Vyjayanthi Nizalapur, Parmit Chhasiya, Darshana Rawal, Gaurav Jain, Anup Kumar Das.

● **#549** Land subsidence hazard in Iran revealed by country-scale analysis of Sentinel-1 InSAR. **Mahmud Haghshehenas Haghighi**, Mahdi Motagh.

● **#554** Long-term monitoring of environmental changes along China-Europe railway express (CER Express) using multi-source remotely sensed data. **Bohong Ma**, Xian Guo, Jie Jiang, Dubravko Culibrk, Shuai Ding, Marko Vilotic, Yang Li.


● **#561** Concept to Analyze the Displacement Time Series of Individual Persistent Scatterers. **Madeline Evers**, Antje Thiele, Horst Hammer, Erich Cadario, Karsten Schulz, Stefan Hinz.


● **#565** Quality inspection for Block Adjustment of ZY3 Stereo Satellite Imagery. **Hongjing Tu**, Ying Zhao, Jing Guo, Shibiao Dou, Jin Zhou, Chunxi Chen.

● **#567** Upscaling and validation of rtk-direct georeferenced uav-based rgb image data with planet imagery using polygon grids for pasture monitoring. **Georg Bareth**, Christoph Hütt.

● **#569** The use of sentinel 1/2 vegetation indexes with gee time series data in detecting land cover changes in the sinop nuclear power plant construction site. **Emre Çolak**, Madhu Chandra, Filiz Sunar.


● **#581** Individual banana tree crown delineation using unmanned aerial vehicle (uav) images. **Sudeep Kuikel**, Binita Upadhyay, Dhruba Aryal, Sudeep Bista, Sanjeevan Shrestha, Basant Awasthi.

● **#604** UAV photogrammetry and VHR satellite imagery for emergency mapping. The October 2020 flood in Limone Piemonte (Italy). **Lorenzo Teppati Losè**, Filiberto Chiabrando, Fabio Giulio Tonolo, Andrea Lingua.

● **#606** On-site data-processing algorithm and optimization for airborne ice sounding radar configured on the “Snow Eagle 601”. **Xiangbin Cui**, Shinan Lang, Lin Li, Bo Sun.

● **#608** Performance of the support vector machine and artificial neural network classifiers for roads identification. **Alexandre Curvello De Andrade**, Mauro José Alixandrini Jr, Fernanda Puga Dos Santos Carvalho, Vivian De Fernandes.
● **#622** Horizontal accuracy assessment of google earth data over typical regions of australia using worldview. Jing Guo, Hongjing Tu, Hai Li, Ying Zhao, Jin Zhou.

● **#626** Geophysical and UAV-based observations over a flood defense structure : application to the Polder2C's experimental dike. Raphaël Antoine, Cyrille Fauchard, Vincent Guilbert, Bruno Beaucamp, Cyril Ledun, Christophe Heiniklé, Lucile Saussaye, Steven Muylaeart, Wim Vancalster, Davy Depreiter, Philippe Sergent.


● **#660** Radiometric quality assessment for maxar hd imagery. Ilyas Yalcin, Sultan Kocaman, Sebastien Saunier, Clement Albinet.


● **#672** Application of UAV surveys for evaluating the Productivity Levels of Traditional and Mechanized Farmers in a Customary Land Tenure System. Dupe Nihinlola Olayinka, Kayode Lanre Omolaye, Adewale James Ilesanmi, Chukwuma John Okolie, Ikenna Donald Arungwa.

● **#680** Using MODIS aerosol optical depth to predict PM10 over Al Ain Region, UAE. Nazmi Saleous, Salem Issa, Marwa Al Suwaidi.

● **#683** Object-based change detection on acacia xanthophloea species degradation along lake nakuru riparian reserve. Anne Achieng Osio, Sébastien Lefèvre.

● **#685** Assessment of flooded areas caused by a dam break (sardoba dam, uzbekistan). Beste Tavus, Sultan Kocaman, Candan Gokceoglu.


● **#725** Tis and short-range photogrammetric data fusion for buildings 3D modeling. Paulo Roberto Da Silva Ruiz, Cláudia Maria De Almeida, Marcos Benedito Schimalski, Veraldo Liesenberg, Edson Aparecido Mitishita.

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● **#765** Spatial resolution sensitivity analysis of classification of sentinel-2 images by pre-trained deep models from big earth net database. Forough Naali, Tayeb Alipour-Fard, Hossein Arefi.


● **#774** Time series analysis of urbanization impact on the temperature variations off mumbai coast. Sutapa Bhattacharjee, Lexkshi K, Rishikesh Bharti.

● **#778** Pixel based landslide identification using landsat 8 and gee. Pawan Singh, Vinip Maurya, Ramji Dwivedi.


● **#800** Bidirectional reflectance distribution function (brdf) of mixed pixels. Fadi Kizel, Yulia Virod.

● **#806** Spatiotemporal change analysis of the protected areas: a case study - īğneada floodplain forests. Merve Toker, Emre Çolak, Filiz Sunar.

● **#807** Multispectral and mobile mapping isprs wg iii/5 data set: first analysis of the dataset impact. Mattia Previtali, Manuel Garramone, Marco Scaioni.

● **#814** Urbanisation impact on creation of heat islands in large cities. Mateo Gašparović, Šimun Zorić, Sudhir Kumar Singh.
The validation of quality test of a traffic-based accident and organization impact on analysis of data flow. Cong Zhuhua Zha, Hongping Jing Dejin Huang, platform. System linkage geo-information system and national image implementation service on structure for risk querying efficient data. Haicheng Liu, flood Peter national service gateway high-currency geo-information service for geo-spatial analysis of emergency geographic information and research. Alberto Vavassori, Maria Gorica from Indoor Approach Reconstructing to Architectural Modelling Parametric Spaces Research aero. quality key of points photogrammetry inspection and results of datasets. Tadono, Fumi Takeo Hiroki Doutsu, Ohgushi, Masanori Junichi Takaku, digital surface in ALOS open ‘AW3D30’ of Geospatial Wei Heng Huang, Flickr Using geo-tagged to images outcomes. Alexander 3D IOPES indoor-outdoor analysis seamless performance of positioning the behavior of the analysis city of features an for the of the of the maps.. Azelle network adversarial to maps..
• #402 3D city model as a first step towards digital twin of Sofia city. Hristiyan Dimitrov, Dessislava Petrova-Antonova.

• #446 Topology-Aware 3D Modelling of Indoor Spaces from Point Clouds. Hossein Zavar, Hossein Arefi, Shirin Malihi, Mehdi Maboudi.

• #450 Exploratory spatial analysis of housing prices obtained from web scraping technique. Thais Góes De Souza, Fernanda Doracy Rocha Fonseca, Vivian De Oliveira Fernandes, Júlio Cesar Pedrassoli.

• #457 Analysis the influence of modulated amplitude on common mode error based on gps data. Fan Wang.

• #469 Indoor positioning for smart devices based on sensor fusion with particle filter: localization and map updating. Yuan Yang, Charles Toth.


• #492 A full life data quality workflow research and project practic. Haitao Zhao, Wenchao Gao.

• #494 Spatial-Temporal Changes Of Land Degradation Caused By Natural And Human Induced Factors: Case Study Of Bulgan Province In Central Mongolia. Sainbayar Dalantai, Erdenesukh Sumiya, Yuhai Bao, Munkhdulam Otgonbayar, Urtnasan Mandah, Bayartungalag Batsaikhan, Boldbaatar Natsagdorj.

• #496 The Use AHP within GIS for destructed areas in Damascus, Syria. Mohamad Khalil, J. Satish Kumar.

• #500 Spatial distribution, pollution, and health risk assessment of heavy metal in industrial area soils of ulaanbaatar, mongolia. Oyunbat Purevsuren, Bakhthishig Ochirbat, Bayartungalag Batsaikhan, Frank Lehmkuhl, Martin Knippertz, Veit Nottebaum.

• #504 The Setting up of a gis for the general population and housing census. Kamel Si Youcef, Issam Boukerch, Imane Hocine, Aicha Benabdellaker.

• #505 Geovisualization of aerial photogrammetric flights for data quality assessment. Mehmet Buyukdemircioglu, Sultan Kocaman.

• #507 Integration of urban spatial data management and visualization with enterprise applications using open-source software. Hamidreza Ostadabbas, Helmut Merz, Heike Weippert.

• #510 Sidewalk detection and pavement characterisation in historic urban environments from point clouds: preliminary results. Daniele Treccani, Lucia Diaz-Vilarinho, Andrea Adami.

• #522 Spatio temporal data cube applied to AIS containerships trend analysis in the early year of the Belt and Road Initiative - From global to local scale. Emere Arco, Andrea Ajmar, Fabio Cremaschini, Cristina Monaco.

• #525 Ontology-based data mapping to support planning in Historical urban centres. Elisabetta Colucci, Margarita Kokla, Francesca Noardo.

• #559 Comparison and evaluation of spatial interpolation methods for monthly average air temperature of mongolia based on digital elevation model. Boldbaatar Natsagdorj, Sainbayar Dalantai, Erdenesukh Sumiya, Yuhai Bao, Sainbuyan Bayarsaikhan, Bayartungalag Batsaikhan, Danzanchadav Ganbat.

• #560 Integration of data of the remote sensing, GIS, and gamma-spectrometric analysis to study soil material redistribution. Lyubov N Trofimetz, Alexey A Kolesnikov, Evgeny A Panidi, Pavel M Kikin.

• #568 Using systems of parallel and distributed data processing to build hydrological models based on remote sensing data. Alexey A Kolesnikov, Pavel M Kikin, Evgeny A Panidi, Anastasia G Rusina.

• #588 Abnormal crowdsourced data detection using remote sensing image features. Xiaoguang Zhou, Guang Yu, Dongyang Hou, Dongsheng Wei.

• #591 An extension of CityJSON for the support of point clouds. Gilles-Antoine Nys, Abderrazzaq Kharroubi, Florent Poux, Roland Billen.
• #611 From architectural survey to continuous monitoring: graph-based data management for cultural heritage conservation with Digital Twins. Marika Falcone, Antonio Origlia, Massimiliano Campi, Sergio Di Martino.
• #613 Social network analysis of spatial human mobility behaviour in infectious disease interaction: an exploratory evidence of tuberculosis in Malaysia. Ilham Abdul Jalil, Abdul Rauf Abdul Rasam.
• #629 A collaborative platform for water quality monitoring: simile webgis. Juan Fernando Toro Herrera, Daniela Carrion, Maria Antonia Brovelli.
• #654 Interactive videos as geospatial interfaces: A case study for regional promotion. Matej Zmitko, Fabian Schwander, Doris Agotai, Arzu Çöltekin.
• #684 Building OPENDRIVE model from mobile mapping data. Mark Barsi, Arpad Barsi.
• #728 The Digital Elevation Model Intercomparison eXperiment DEMIX, a community based approach at global DEM benchmarking. Peter Strobl, Conrad Bielski, Peter Guth, Carlos Grohmann, Jan-Peter Muller, Carlos López-Vázquez, Dean B. Gesch, Giuseppe Amatulli, Serge Riazanoff, Claudia Carabajal.
• #781 Determining the suitable location for the metallurgical and steel processing factory in Mongolia using GIS-based multi-criteria analysis methods. Zolzaya Adiya, Battogtokh Dorjgotov, Sainbuyan Bayarsaikhan, Myagmartseren Purevtseren.
• #821 Collaborative air quality mapping of different metropolitan cities of India. Rakesh Dubey, Shruti Bharadwaj, Md Iltaf Zafar, Susham Biswas.
• #822 Raster Data Based Automated Noise Data Integration for Noise Mapping Limiting Data Dependency. Shruti Bharadwaj, Rakesh Dubey, Md Iltaf Zafar, Susham Biswas.

Technical Commission V: Education and Outreach

• #274 Research oriented remote sensing image processing software design in practical courses for senior undergraduates. Haopeng Zhang, Danpei Zhao, Fengying Xie, Zhiguo Jiang.
• #341 Qualitative testing of an advanced terrestrial laser scanner simulator: users experience and feedback. Maria Chizhova, Denys Gorkovchuk, Tatyana Kachkovskaya, Darius Popovas, Julia Gorkovchuk, Thomas Luhmann, Mona Hess.

Thematic Sessions

AI for Knowledge Discovery in Geoscience

Image-to-Image translation in remote sensing


LULC Change Detection and Updating

- #524 Study on the characteristics of beijing subsidence based on ps-insar/leveling/gnss and primary investigation of the relationship with fault zone. Xiao Qing Wang, Peng Zhang, Yong Shang Wang, Zhan Yi Sun.
- #546 Deforestation detection in the Amazon rainforest with spatial and channel attention mechanisms. Pedro Tovar, Mabel Ortega Adarme, Raul Feitosa.
- #601 Deforestation mapping using Sentinel-1 and object-based Random Forest classification on Google Earth Engine. Vasil Yordanov, Maria Antonia Brovelli.
- #753 Socioeconomic drivers of land use intensification in Fiji Islands: a geographical approach. David Lopez Cornelio.
- #773 Promising advances of amazonian monitoring systems throughout vanguard technology and scientific knowledge. Luciana Soler, Daniel Silva, Cassiano Messias, Thiago Carvalho Lima, Juan Doblas, Bruna Pechini, Jefferson Souza, Douglas Moraes, Claudio Almeida.

CIPA

- #327 Urban parametric perception. The case study of the historic centre of Perugia. Fabio Bianconi, Marco Filippucci, Marco Seccharoni, Costanza Maria Aquinardi.
- #527 Landscape Analysis Techniques Applied to a Buddhist Carved Rock Sculpture. Giuseppe Salemi, Emanuela Faresin, Luca Maria Olivieri.

Cultural Heritage

- #183 Point cloud exploitation for structural modelling and analysis: a reliable workflow. Alighiero Lucidi, Ersilia Giordano, Francesco Clementi, Ramona Quattrini.
- #264 Modelling the evolution of the archaeological works developed in qubbet el hawa (aswan, egypt). Jose Luis Pérez-García, Antonio T. Mozas-Calvache, Jose Miguel Gómez-López, Alejandro Jiménez-Serrano.
- #594 Development of panoramic virtual tours system based on low cost devices. Issam Boukerch, Bachir Tákarli, Kamal Saidi, Mokrane Kariche, Abd El Kader Mestapha Megueni.
- #621 State-wide Calculation of Terrain-Visualisations and Automatic Map Generation for Archaeological Objects. Frank Thiemann, Malte Schulze, Utz Böhner.
- #625 The memory of a 2nd WW camp: 3D modeling using the combination of hybrid technologies. Mathieu Koehl, Yassine Seddik, Alexandre Calay, Juliette Brange, Michaël Landolt, Florian Basoge, Samuel Guillemin, Loic Lutz.
Deep learning for Satellite Image Time Series Analysis


Digital Twins

- **#331** Wood and generative algorithms for the comparison between models and reality. **Fabio Bianconi**, Marco Filippucci, Giulia Pelliccia.

Disaster Management

- **#817** Large-scale subsidence geohazard monitoring with Sentinel-1 SAR Interferometry in central Lishui (China). **Tengteng Qu**, Zhiman Su, Hongzhen Yang, Xuguo Shi, Weiping Shao.

EuroSDR and NMCAs

- **#762** Public-private cooperation models for efficient access to geospatial content. **Simon Musäus**.

Processing of Multi-satellite and bistatic SAR constellation data

- **#517** InSAR Collaborative Monitoring Mode and Multi-Mode Computing Services for Geohazards Identification in Open-Pit Mining Area. **Jin Zhang**.

Unconventional applications for geo-spatial deep learning


Invited papers

Thematic Sessions

Global Urban Observation and Information Initiative and the UN SDG 11

- **#158** Remote sensing of cities: day and night. **Qihao Weng**.
- **#167** Examining changes in the impervious surfaces of urban functional zones and social-economic driving factors of Tianjin, China. **Shisong Cao**, Yile Cai, Xi Wang, Mingyi Du.
- **#196** Annual dynamics of impervious surfaces in China at 30m resolution derived from multisource satellite images over the past three decades. **Yinyi Lin**, Hongsheng Zhang, Peifeng Ma.
#229 Uncovering the spatiotemporal dynamics of SDG1.3.1 using Earth observation data: a case study of the Beijing-Tianjin-Hebei region, China. Meiling Zhou, Linlin Lu, Huadong Guo, Shuangcheng Zhang, Muhammad Fahad Baqa.

#448 Monitoring and characterizing long-term variability of urban thermal environment using time-series land cover and remote sensing data. George Z Xian.


#464 High-resolution global urban impervious surface mapping from Sentinel 1A/2 imagery In serve of sustainable development goals. Wenjie Du, Zhongchang Sun, Huadong Guo.

#519 Large-Scale 3D Characterization of Built-up Areas based on TanDEM-X Data. Thomas Esch, Julian Zeidler, Mattia Marconcini, Elisabeth Brzoska, Daniela Palacios-Lopez, Annekatrin Metz-Marconcini, Achim Roth.


#782 A novel model for detecting the dynamics of the urban fringe in Harbin City, China. Yuan Wang, Yilong Han, Lijie Pu, Bo Jiang.

Deep learning for Satellite Image Time Series Analysis

#114 Crop classification under varying cloud cover with neural ordinary differential equations. Nando Metzger, Mehmet Ozgur Turkoglu, Stefano D’Aronco, Jan Dirk Wegner, Konrad Schindler.

Deep Learning in Remote Sensing

#367 Geospatial Machines Interacting With People. Devis Tuia, Benjamin Kellenberger.

Unconventional applications for geospatial deep learning

#425 Better generic objects counting when asking questions to images: a multitask approach for remote sensing visual question answering. Sylvain Lobry, Diego Marcos, Benjamin Kellenberger, Devis Tuia.

#729 CNN semantic segmentation to retrieve past land cover out of historical orthoimages and DSM. Arnaud Le Bris, Clément Mallet, Sébastien Giordano.