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<th>Date: Monday, 10 Jun 2019</th>
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**Date: Wednesday, 12/Jun/2019**

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>9:00am - 10:30am</td>
<td><strong>IND-04: Indoor Modelling</strong></td>
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<td>Waaier 4</td>
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<tr>
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<td><strong>LS-01: Machine &amp; Deep Learning</strong></td>
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<td>Waaier 2</td>
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<tr>
<td>9:00am - 10:30am</td>
<td><strong>UAVG-07a: Scene Understanding from UAV Data</strong></td>
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<td>Waaier 1</td>
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<tr>
<td>9:00am - 10:30am</td>
<td><strong>UAVG-07b: UAVs in H2020 Projects</strong></td>
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<td>Waaier 3</td>
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<tr>
<td>11:00am - 12:30pm</td>
<td><strong>IND-05: Virtual and Augmented Reality</strong></td>
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<td>Waaier 4</td>
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<tr>
<td>11:00am - 12:30pm</td>
<td><strong>ISSDQ-01: Spatial Data Quality: The Wider Context</strong></td>
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<td>Waaier 3</td>
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<tr>
<td>11:00am - 12:30pm</td>
<td><strong>LS-02: Change Detection</strong></td>
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<td>Waaier 2</td>
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<tr>
<td>11:00am - 12:30pm</td>
<td><strong>UAVG-08a: Integration of UAV Data with Other Sources</strong></td>
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<td>Waaier 1</td>
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<tr>
<td>11:00am - 12:30pm</td>
<td><strong>UAVG-08b: ITS4LAND I</strong></td>
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<td>Carré 2K</td>
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<tr>
<td>1:15pm - 2:15pm</td>
<td><strong>IS-03: Gold sponsor presentations:Riegl and Zoller &amp; Fröhlich</strong></td>
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<td>Waaier 2</td>
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<tr>
<td>1:30pm - 2:30pm</td>
<td><strong>PS-03: Poster session</strong></td>
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<td>Foyer</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td><strong>IND-06: Positioning and Navigation II</strong></td>
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<td>Waaier 4</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td><strong>ISSDQ-02: Spatial Data Quality on Images</strong></td>
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<td>Waaier 3</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td><strong>LS-03: Registration and Change Detection</strong></td>
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<td>Waaier 2</td>
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<td>Time</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td>UAVG-09a: UAV for Mapping: Experiences and Best Practices</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td>UAVG-09b: ITS4LAND II</td>
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<tr>
<td>4:00pm - 5:30pm</td>
<td>IND-07: Indoor Mapping II</td>
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<tr>
<td>4:00pm - 5:30pm</td>
<td>ISSDQ-03: The Latest in Methodology of Spatial Data Quality</td>
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<tr>
<td>4:00pm - 5:30pm</td>
<td>LS-04: Environmental Mapping</td>
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<tr>
<td>4:00pm - 5:30pm</td>
<td>UAVG-10: UAV Photogrammetry II</td>
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**Date: Thursday, 13/Jun/2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Chair(s)</th>
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<tbody>
<tr>
<td>9:00am - 10:30am</td>
<td>ISSDQ-04: Novel Applications of Spatial Data Quality</td>
<td>Waaier 4</td>
<td>Mahmoud Delevar, Wenzhong Shi</td>
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<tr>
<td>9:00am - 10:30am</td>
<td>JS-03: Single Photon Lidar</td>
<td>Waaier 1</td>
<td>Martin Rutzinger, Cheng Wang, Joint session of Laser Scanning and EuroCOW-M3DMaN</td>
</tr>
<tr>
<td>9:00am - 10:30am</td>
<td>PRSM-01: Planetary Mapping</td>
<td>Waaier 3</td>
<td>Kaichang Di, Jürgen Oberst</td>
</tr>
<tr>
<td>9:00am - 10:30am</td>
<td>SGA-01: Imagery-based applications</td>
<td>Waaier 2</td>
<td>Mila Koeva, Giorgio Agugiaro, SmartGeoApps session</td>
</tr>
<tr>
<td>11:00am - 12:30pm</td>
<td>COW-01: Orientation and Mapping</td>
<td>Waaier 2</td>
<td>Jan Skaloud, Andrea Maria Lingua, EuroCOW-M3DMaN session</td>
</tr>
<tr>
<td>11:00am - 12:30pm</td>
<td>ISSDQ-05: Spatial Data Quality and Uncertainty Assessment in Smart Cities</td>
<td>Carré 2K</td>
<td>Wenzhong Shi, Alfred Stein, Discussion session</td>
</tr>
<tr>
<td>11:00am - 12:30pm</td>
<td>JS-04: Big Data</td>
<td>Waaier 1</td>
<td>Jan Boehm, Eric Guilbert, Joint session of Laser Scanning and C3M&amp;GBD</td>
</tr>
<tr>
<td>11:00am - 12:30pm</td>
<td>PRSM-02: Planetary Photogrammetry</td>
<td>Waaier 3</td>
<td>Bo Wu, Christian Wöhler</td>
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<tr>
<td>11:00am - 12:30pm</td>
<td>SGA-02: Energy, BIM</td>
<td>Waaier 4</td>
<td>Giorgio Agugiaro, Mila Koeva, SmartGeoApps session</td>
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<tr>
<td>1:15pm - 2:15pm</td>
<td>IS-04: Gold sponsor presentations: IGI and Agisoft</td>
<td>Waaier 2</td>
<td>Shivash Hosseinyalamdary, Industry session</td>
</tr>
<tr>
<td>1:30pm - 2:30pm</td>
<td>PS-04: Poster session</td>
<td>Foyer</td>
<td>Posters of the workshops Laser Scanning, EuroCOW-M3DMaN, and SmartGeoApps</td>
</tr>
<tr>
<td>2:30pm - 3:30pm</td>
<td>COW-02: Camera Systems</td>
<td>Waaier 4</td>
<td>Ismael Colomina, Julian Smit, EuroCOW-M3DMaN session</td>
</tr>
<tr>
<td>2:30pm - 3:30pm</td>
<td>LS-05: Segmentation and Detection</td>
<td>Waaier 1</td>
<td>Wen Xiao, Wenzhong Shi, Laser Scanning session</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td>PRSM-03: Planetary Remote Sensing</td>
<td>Waaier 3</td>
<td>Kaichang Di, Cristina Re</td>
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<tr>
<td>2:30pm - 3:30pm</td>
<td>SGA-03: Urban applications</td>
<td>Waaier 2</td>
<td>Jérôme Kaempf, Giorgio Agugiaro, SmartGeoApps session</td>
</tr>
<tr>
<td>4:00pm - 5:30pm</td>
<td>UAVG-10: UAV Photogrammetry II</td>
<td>Waaier 1</td>
<td>Francesco Nex</td>
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</table>
### Presentations

**Waaier 3**  
**C3MGBD-02: Remote Sensing Solutions**  
Session Chair: Eric Guilbert  
Session Chair: Ken Arroyo Ohori

**Waaier 4**  
**COW-03: Navigation and Dynamic Networks**  
Session Chair: Steffen Schön  
Session Chair: Craig Glennie  
EuroCOW-M3DMaN session

**Waaier 1**  
**LS-06: Intensity and Full Waveform**  
Session Chair: Martin Weismann  
Session Chair: Kourosh Khoshelham  
Laser Scanning session

**Carré 2K**  
**PRSM-04: Feature Extraction from Planetary Data**  
Session Chair: Randolph Kirk  
Session Chair: Emerson Speyerer

**Waaier 2**  
**SGA-04: Traffic Applications**  
Session Chair: Mila Koeva  
Session Chair: Giorgio Agugiaro  
SmartGeoApps session

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**Date: Friday, 14/Jun/2019**

#### 9:00am - 10:30am

**Waaier 4**  
**C3MGBD-03: Road Network**  
Session Chair: Maria Antonia Brovelli  
Session Chair: Daniele Oxoli

**Waaier 2**  
**COW-04: Calibration I**  
Session Chair: Norbert Haala  
Session Chair: Antonio Maria Garcia Tommaselli  
EuroCOW-M3DMaN session

**Waaier 1**  
**JS-05: SAR in Cryosphere and Hydrosphere**  
Session Chair: Kohei Cho  
Session Chair: Uwe Soergel  
Joint session of CHGCS and SarCon

**Waaier 3**  
**PRSM-05: Chang'E-4 Mission**  
Session Chair: Jürgen Oberst  
Session Chair: Bo Wu

**Waaier 4**  
**C3MGBD-04: Crowdsourced and VGI Data I**  
Session Chair: Cidália Costa Fonte  
Session Chair: Serena Coetzee

**Carré 2K**  
**CHGCS-01: The Changing Cryosphere I**  
Session Chair: Rongxing Li  
Session Chair: Hansheng Wang

**Waaier 2**  
**COW-05: Calibration II**  
Session Chair: Michael Cramer  
Session Chair: Naser El-Sheimy  
EuroCOW-M3DMaN session

**Waaier 1**  
**HYPER-01: Analysis of Hyperspectral Data**  
Session Chair: Eija Honkavaara  
Session Chair: Martin Weinmann  
HyperMLPA session

**Waaier 3**  
**SARCON-01: Monitoring and object detection**  
Session Chair: Michele Crosetto  
Session Chair: Uwe Soergel

**Foyer**  
**PS-05: Poster session**  
Posters of the workshops C3M&GBD, CHGCS, HyperMLPA, and SarCon

**Waaier 2**  
**C3MGBD-05: Crowdsourced and VGI Data II**  
Session Chair: Berk Anbaroglu  
Session Chair: Paul Vincent Kuper

**Waaier 4**  
**CHGCS-02: Hydrosphere and Applications**  
Session Chair: Yansheng Zhang  
Session Chair: Marco Scailoni

**Waaier 1**  
**HYPER-02: Land Cover and Land Use Classification**  
Session Chair: Rupert Müller  
Session Chair: Sina Keller  
HyperMLPA session

**Waaier 3**  
**SARCON-02: Urban areas**  
Session Chair: Uwe Soergel  
Session Chair: Michele Crosetto

**Waaier 1**  
**HYPER-03: Environmental Mapping**  
Session Chair: Ralf Reulke  
Session Chair: Martin Weinmann  
HyperMLPA session

**Waaier 4**  
**CHGCS-03: The Changing Cryosphere II**  
Session Chair: Beata Maria Csatho  
Session Chair: Gang Qiao
Opening
Time: Monday, 10/Jun/2019: 9:30am - 10:30am  ·  Location: Waaier 1+2
Session Chair: George Vosselman
Welcome on behalf of the ISPRS
Christian Heipke
ISPRS President

Keynote: Geospatial Technologies for Urban Resilience in Africa: Insights from the Field
Edward Anderson
World Bank, Tanzania

Charles Toth
ISPRS Second Vice President

Presentation of the Best Papers 2017 and 2018 for the Jack Dangermond Award, published in the ISPRS International Journal of Geo-Information, and sponsored by ESRI and MDPI AG.
Lena Halounova
ISPRS Secretary General

The ISPRS Congress 2020 in Nice
Nicolas Paparoditis
ISPRS Congress Director
SEM-01: Orientation and Matching

Time: Monday, 10/Jun/2019: 11:00am - 12:30pm · Location: Waaier 2
Session Chair: Helmut Mayer
Session Chair: Norbert Haala

LGS: Local Geometrical Structure Based Interest Point Matching for Wide-Baseline Imagery in Urban Area
Min Chen, Qing Zhu, Shaohua Yan, Yitao Zhao
Southwest Jiaotong University, China, People's Republic of

Precise Disparity Estimation for Narrow Baseline Stereo Based on Multiscale Superpixels and Phase Correlation
Zhen Ye¹, Yusheng Xu¹, Ludwig Hoegner¹, Xiaohua Tong¹, Uwe Stilla¹
¹Photogrammetry and Remote Sensing, Technische Universität München, Munich 80333, Germany; ²College of Surveying and Geo-Informatics, Tongji University, Shanghai 200092, China

Reduction of the Fronto-Parallel Bias for Wide-Baseline Semi-Global Matching
Lukas Roth, Helmut Mayer
Bundeswehr University Munich, Germany

FOSS4G DATE for DSM Generation: Sensitivity Analysis of the Semi Global Block Matching Parameters
Lorenzo Lastilla¹,², Roberta Ravanelli¹, Francesca Fratarcangeli¹, Martina Di Rita¹, Andrea Nascetti², Mattia Crespi¹,²
¹Geodesy and Geomatics Division, DICEA - University of Rome “La Sapienza”, Rome, Italy; ²Sapienza School for Advanced Studies, Rome, Italy; ³Geoinformatics Division, Department of Urban Planning and Environment - KTH Royal Institute of Technology, Stockholm, Sweden
**Keynote: Unmanned Aerial Vehicles in Agriculture and Forestry Monitoring: Meeting the Expectations?**

Pablo Zarco-Tejada  
University of Melbourne, Australia

**Tree Species Classification Based on 3D Spectral Point Clouds and Orthomosaics Acquired by Snapshot Hyperspectral UAS Sensor**

Chris Iseli, Arko Lucieer  
University of Tasmania, Australia

**Evaluation of Multiple Linear Regression Model to Estimate DBH of Trees Using Data from a Lightweight Laser Scanning System Onboard a UAV**

Marcela do Valle Machado¹, Antonio Maria Garcia Tommaselli², Vilma Mayumi Tachibana³, Rorai Pereira Martins Neto¹, Mariana Batista Campos³  
¹Post Graduate Program in Cartographic Science, São Paulo State University (UNESP), Presidente Prudente-SP, Brazil; ²Department of Cartography, São Paulo State University (UNESP), Presidente Prudente-SP, Brazil; ³Department of Statistics, São Paulo State University (UNESP), Presidente Prudente-SP, Brazil

**On The Derivation of Crop Heights from Multitemporal UAV Based Imagery**

Diana Becirevic¹, Lasse Klingbeil¹, Andreas Honecker², Henrik Schumann², Uwe Rascher³, Jens Léon², Heiner Kuhlmann¹  
¹Institute of Geodesy and Geoinformation, University of Bonn, Germany; ²INRES Plantbreeding, University of Bonn, Germany; ³Forschungszentrum Jülich, Institute of Bio- and Geosciences, IBG-²Plant Sciences, Germany
IS-01: Gold sponsor presentation: Pix4D

Time: Monday, 10/Jun/2019: 1:15pm - 1:45pm · Location: Waaler 2
Session Chair: Francesco Nex

1:15pm - 1:45pm

Automating photogrammetry pipelines: Pix4Dengine, new developments and challenges

Piotr Dobrowolski
Pix4D SA
PS-01: Poster session

**Time:** Monday, 10/Jun/2019: 1:30pm - 2:30pm  ·  **Location:** Foyer

**Generation of A Benchmark Dataset Using Historical Photographs for An Automated Evaluation of Different Feature Matching Methods**

*Ferdinand Maiwald*

Institute of Photogrammetry and Remote Sensing, TU Dresden, Germany

**Long Line Cliff Topography Measurement by Using Structure from Motion Photogrammetry**

*Cihan Altuntas*

Konya Technical University, Turkey

**Active Shape Model Precision Analysis of Vehicle Detection in 3D LiDAR Point Clouds**

*Steffen Busch*

Leibniz Universität Hannover, Germany

**Quality Prediction of Dense Points Generated by Structure from Motion for High-Quality and Efficient As-Is Model Reconstruction**

*Ryota Moritani1, Satoshi Kanai1, Hiroaki Date1, Yasuhiro Niina2, Ryohei Honma2*

1Graduate School of Information Science and Technology, Hokkaido University, Japan; 2Asia Air Survey Co., Ltd.

**Precise Aerial Image Orientation using SAR Ground Control Points and Mapping of Urban Landmarks for Autonomous Driving**

*Franz Kurz, Thomas Krauß, Hartmut Runge, Dominik Rosenbaum, Pablo d'Angelo*

DLR - German Aerospace Center, Germany

**Geometric Object Based Building Reconstruction from Satellite Imagery Derived Point Clouds**

*Zhixin Li, Bo Xu, Jie Shan*

Purdue University, United States of America

**3D Hazard Analysis and Characterization of Landslide Motion Mechanism with a UAV**

*Efstratios Karantanellis1, Vasileios Marinios1, Emmanouel Vassilakis2*

1Laboratory of Engineering Geology and Hydrogeology, Faculty of Geology, Aristotle University of Thessaloniki, Greece; 2Faculty of Geology and Geoenvironment, National and Kapodistrian University of Athens, Greece

**Automatic Apple Tree Blossom Estimation from UAV RGB Imagery**

*Aina Tubau Comas1, João Valente2, Lammert Kooistra3*

1Laboratory of Geo-information Science and Remote Sensing, Wageningen University & Research, Netherlands, The; 2Laboratory of Geo-information Science and Remote Sensing, Wageningen University & Research, Netherlands, The; 3Laboratory of Geo-information Science and Remote Sensing, Wageningen University & Research, Netherlands, The

**Computational Time Assessment for Tree Crown Extraction from Imagery using Geographic Object-Based Image Analysis**

*Jefferson Adetokunbo Okojie1, Agbor Esong Effiom2, Ekow Nyamekye Tawiah2, Ilamosi Juliet Akpejiori2*

1GeoNet Research Initiative, Nigeria; 2Faculty of Geoinformation Science and Earth Observation, Enschede, The Netherlands

**Crop Row Detection Procedure Using Low-Cost UAV Imagery System**

*Mohamed Hassanein, Maan Khedr, Naser El-Sheimy*

University of Calgary, Canada

**Determination of Surface Velocity of a River using Videos captured from Unmanned Aerial System (UAS)**

*Sanjeevan Shrestha1, Mahesh Thapa2, Leon Gaw Yan Feng3, Sarah Abdelkader4, Dr. Torsten Prinz3, Dr. Jan Lehmann3, Holzer Fritz1*

1Land Management Training Centre, Government of Nepal; 2Survey Department, Government of Nepal; 3University of Munster, Germany; 4Universidade Nova de Lisboa, Portugal; 5University of Jaume I, Spain

**Estimating Crop Density from Multi-Spectral UAV Imagery in Maize Crop**

*Daniela Stroppiana1, Monica Pepe1, Mirco Boschetti1, Alberto Crema1,2, Gabriele Candeloni1, Daniele Giordan3, Marco Baldo1, Paolo Allasia1, Lorenzo Monopoli2*

1IREA-CNR, Italy; 2Department of Agricultural and Forestry science (DAFNE), University of Tuscia, Italy; 3IRPI-CNR, Italy; 4IBF Servizi S.p.a., Italy
Lava Dome Changes Detection at Agung Mountain During High Level of Volcanic Activity Using UAV Photogrammetry

Ruli Andaru1,2, Jiann Yeou Rau2
1Department of Geodetic Engineering, Gadjah Mada University, Indonesia; 2Department of Geomatics, National Cheng Kung University, Taiwan

Mass Movements Detection from UAV Images Analysis

Villie Morocho1, Andres España2, Carolina Serrano2, Rosario Achig1, Joep Crompvoets3
1Computer Science Department, University of Cuenca, Cuenca, Ecuador; 2Engineering Faculty, University of Cuenca, Cuenca, Ecuador; 3Public Governance Institute, KU LEUVEN, Leuven, Belgium

Opportunities of UAVs in Orchard Management

Chenglong Zhang1,2, Joao Valente1, Lammert Kooistra1, Leifeng Guo2, Wensheng Wang3
1Wageningen University & Research, Netherlands; 2Agriculture Information Institute, Chinese academy of agricultural science, China; 3Key Laboratory of Agricultural Big Data, Chinese academy of agricultural science, China

The Crown Diameter Estimation from Fixed Wing Type of UAV Imagery

Alžbeta Grznárová1, Martin Morkoš1,2, Peter Surový2, Martin Slavík2, Marek Pondelik1, Ján Merganič3
1Department of Forest Management and Geodesy, Faculty of Forestry, Technical University in Zvolen, 96053 Zvolen, Slovakia; 2Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, 165 21 Praha 6–Suchdol, Czech Republic; 3Department of Forest Harvesting, Logistics and Ameliorations, Faculty of Forestry, Technical University in Zvolen, 96053 Zvolen, Slovakia

UAV and Satellite Imagery Applied to Alien Species Mapping in NW Spain

Joaquín Martínez-Sánchez1,2, Luis M. González-de Santos1,2, Ana Novo1, Higinio González-Jorge2,3
1Mining and Energy School, University of Vigo, Spain; 2Centro de Innovación Aeroespacial de Galicia; 3Aerospace Engineering School, University of Vigo, Spain

Ultra-High Spatial Resolution UAV-Based Imagery to Predict Biomass in Temperate Grasslands

Ulrike Lussem1, Andreas Bolten1, Jannis Menne1, Martin Leon Gnyp2, Georg Bareth1
1Institute of Geography, GIS & Remote Sensing Group, University of Cologne, Albertus-Magnus-Platz, 50923 Cologne, Germany; 2Research Center for Crop Nutrition Hanninghof, Yara International ASA, 48249 Dülmen, Germany

Shadow Detection Hyperspectral Images Acquired by UAV

Nilton Nobuhiro Imai, Antonio M. G. Tommaselli, Adilson Berveglieri, Érika A. S. Moriya
Univ. of Sao Paulo State, Brazil

UAV based Multi Seasonal Deciduous Tree Species Analysis in the Hainich National Park using Multi Temporal and Point Cloud Curvature Features

Sören Hese1, Christian Thiel2, Andreas Henkel3
1Friedrich-Schiller-University Jena, Germany; 2Deutsches Zentrum für Luft- und Raumfahrt (DLR); 3Nationalpark Verwaltung Hainich, Bad Langensalza, Germany

Mapping Artificial Terraces from Image Matching Point Cloud in Loess Plateau of China

Jiaming Na1,2, Xin Yang1, Xuan Fang1,3, Guoan Tang1, Norbert Pfeifer2
1School of Geography, Nanjing Normal University, 210023 Nanjing, China; 2Department of Geodesy and Geoinformation, Technische Universität Wien, 1040 Vienna, Austria; 3School of Environment Science, Nanjing Xiaozhuang University, 211171 Nanjing, China

A Normalized Surf for Multispectral Image Matching and Band Co-Registration

Jyun-Ping Jhan, Jiann-Yeou Rau
National Cheng Kung University, Taiwan
IWIDF-01: Land Use and Land Cover

Time: Monday, 10/Jun/2019: 2:30pm - 3:30pm · Location: Waaier 4

Session Chair: Xinlian Liang
Session Chair: He Zhang

Study of River Channel Migration and Identification of Potential Sugarcane Cultivation Area in the Mohana-Macheli Watershed using Remote Sensing

Dinesh Neupane¹, Pradeep Gyawali¹, Dinee Tamang²
¹Kathmandu University, Nepal; ²Mercy Corps Nepal

A Land Cover Change Detection Method Based on Difference Map Fusion

Huaqiao Xing¹, Dongyang Hou², Miao Lu³, Jiage Chen¹
¹School of Surveying and Geo-informatics, Shandong Jianzhu University, Jinan 250101, China; ²School of Geosciences and Info Physics, Central South University, Changsha 410083, China; ³Key Laboratory of Agri-informatics, Ministry of Agriculture/Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Beijing, China

UAV/Satellite Multiscale Data Fusion for Crop Monitoring and Early Stress Detection

Vasit Sagan¹, Maitiniyazi Maimaitijiang¹, Paheding Sidike¹, Matthew Maimaitiyiming¹, Hasanjan Erkbo³, Sean Hartling¹, Kyle T. Peterson¹, Jim Peterson², Joel G. Burken³, Felix B. Fritsch¹
¹Saint Louis University, United States of America; ²Missouri State University; ³Missouri University of Science and Technology; ⁴University of Missouri
SEM-02: Deep Learning from Terrestrial Data

Time: Monday, 10/Jun/2019: 2:30pm - 3:30pm  ·  Location: Waaier 2
Session Chair: Bruno Vallet
Session Chair: Martin Weinmann

Using 3D Models to Generate Labels for Panoptic Segmentation of Industrial Scenes
Adrien Nivaggioli1, Jean-Francois Hullo1, Guillaume Thibault2
1EDF Energy R&D UK Centre, United Kingdom; 2EDF R&D, France

Floodwater Level Estimation from Social Media Images
Priyanka Chaudhary1, Dr. Stefano D'Aronco1, Matthew Moy de Vitry2, Dr. Joao Paulo Leitao2, Dr. Jan Dirk Wegner1
1ETH Zurich, Switzerland; 2Eawag - Swiss Federal Institute of Aquatic Science and Technology

Comparison of Training Strategies for ConvNets on Multiple Similar Datasets for Facade Segmentation
Matthias Schmitz, Hai Huang, Helmut Mayer
Bundeswehr University Munich, Germany
Investigations into the Quality of Image-Based Point Clouds from UAV Imagery
Heinz-Jürgen Przybilla¹, Maren Lindstaedt², Thomas P. Kersten²
¹Lab for Photogrammetry, Bochum University of Applied Sciences, Germany; ²Photogrammetry & Laser Scanning Lab, HafenCity Universität Hamburg, Germany

Comparison of UAV Imagery-Derived Point Cloud to Terrestrial Laser Point Cloud
Scott M Peterson, Jacob D Lopez, Riadh Munjy
California State University, Fresno, United States of America

A System for Monitoring of UAV Camera Orientation: Design and Initial Analysis
Jernej Tekavec, Kristof Oštir, Anka Lisec, Gašper Štebe
University of Ljubljana, Faculty of Civil and Geodetic Engineering, Slovenia
Automatic Generation of Geometric Parameters of Individual Cauliflower Plants for Rapid Phenotyping Using Drone Images

Görres Grenzdörffer
University of Rostock, Germany

Predicting Biomass and Yield at Harvest of Salt-Stressed Tomato Plants Using UAV Imagery
Kasper Johansen¹, Mitchell Morton¹, Yoann Malbeteau¹, Bruno Aragon¹, Samir Al-Mashharawi¹, Matteo Ziliani¹, Yoseline Angel¹, Gabriele Fiene¹, Sónia Negrão², Magdi Mousa³, Mark Tester¹, Matthew McCabe¹
¹King Abdullah University of Science and Technology, Saudi Arabia; ²University College Dublin, Ireland; ³King Abdulaziz University, Saudi Arabia

High Throughput Phenotyping of Physiological Growth Dynamics from UAS-Based 3D Modeling in Soybean
Monica Herrero-Huerta, Katy M. Rainey
Purdue University, United States of America
Iterative Closest Point Algorithm for Accurate Registration of Coarsely Registered Point Clouds with CityGML Models
Steffen Goebbels, Regina Pohle-Fröhlich, Philipp Pricken
Niederrhein University of Applied Sciences, Germany

Slope Failure Risk Assessment Modeling Using Topographic Data and Numerical Calculation of Soil Conservation by Tree Root Systems
Taiki Mori1, Tomoyasu Sugiyama2, Ikuya Hosooka3, Makoto Nakata4, Kazuyuki Okano5, Yoshifumi Satofuka6
1Structural Engineering Office / West Japan Railway Company; 2Graduate School of Engineering / Kyoto University; 3National Land Conservation Technical Dept / Asia Air Survey CO., LTD; 4Nishi-Nihon National Land Conservation Consulting Dept, Asia Air Survey CO., LTD; 5College of Scienc and Engineering / Ritsumeikan University

Introducing A Framework for Conflating Road Network Data with Semantic Web Technologies
Michael G. Niestroj, David A. McMeekin, Petra Helmholz
Curtin University, Australia

Analyzing The Effect of Climate Change (Rainfall ond Temperature) on Vegetation Cover of Nepal Using Time Series Modis Images
Neha Joshi1, Pradeep Gyawali1, Sudha Sapkota1, Dinesh Neupane1, Sanjeevan Shrestha2, Florencia Matina Tuladhar1, Nawaraj Shrestha1
1Kathmandu University, Nepal; 2Land Management Training Centre, Government of Nepal

Study on Snowmelt Flood Disaster Model based on Remote Sensing and GIS
Chen Qiao1, Quanyi Huang1, Tao Chen1, Yiming Chen2
1Department of Earth System Science, Tsinghua University, Beijing 100084, China; 2Chinese Academy of Surveying & Mapping, Beijing 100036, China
SEM-03: Classification for Topographic Applications

**Time:** Monday, 10/Jun/2019: 4:00pm - 5:30pm  ·  **Location:** Waaler 2

**Session Chair:** Uwe M. Stilla
**Session Chair:** Yuliang Lan

**Multispectral Airborne Laser Scanning Point-Clouds for Land Cover Classification Using Convolutional Neural Networks**

Lingfei MA¹, Zhuo Chen¹, Ying Li¹, Dedong Zhang¹, Jonathan Li¹²,³, Michael Chapman⁴

¹Department of Geography and Environmental Management, University of Waterloo, Waterloo, ON N2L 3G1, Canada; ²Department of Systems Design Engineering, University of Waterloo, Waterloo, ON N2L 3G1, Canada; ³Fujian Key Laboratory of Sensing and Computing for Smart Cities, School of Information Science and Engineering, Xiamen University, Xiamen, Fujian 361005, China; ⁴Department of Civil Engineering, Ryerson University, Toronto, ON M5B 2K3, Canada

**Submanifold Sparse Convolutional Networks for Semantic Segmentation of Large-Scale ALS Point Clouds**

Stefan Schmohl, Uwe Sörgel

Universität Stuttgart, Germany

**Towards Better Classification of Land Cover and Land Use Based on Convolutional Neural Networks**

Chun Yang, Franz Rottensteiner, Christian Heipke

Leibniz University of Hanover, Germany

**Building Segmentation from Aerial VHR Images using Mask R-CNN**

Kaixuan Zhou¹, Yizi Chen², Ihor Smal¹, Roderik Lindenbergh¹

¹Dept of Geoscience and Remote Sensing, Delft University of Technology, the Netherlands; ²Dept of Computational Science and Engineering, Delft University of Technology, the Netherlands
UAVG-03a: UAV Lidar and SAR: Uses and Best Practices

**Valuing Forest Stand at A Glance with UAV Based Lidar**
Udaya Vepakomma, Denis Cormier
FPInnovations, Canada

**Airborne to UAS Lidar: An Analysis of UAS Lidar Ground Control Targets**
Lesley Davidson¹, Jon Mills¹, Ian Haynes², Charles Augarde³, Paul Bryan¹, Mark Douglas⁶
¹Newcastle University, School of Engineering; ²Newcastle University, School of History, Classics and Archaeology; ³Durham University, Department of Engineering; ⁴Historic England; ⁵English Heritage

**R&D of Drone-Borne SAR System**
Tomonori Deguchi, Tomoyuki Sugiyama, Munemaru Kishimoto
Nittetsu Mining Consultants Co., Ltd, Japan

**Real-Time Powerline Corridor Inspection by Edge Computing of UAV Lidar Data**
Shi Pu¹, Longguang Xie², Mingru Ji¹, Yongyi Zhao¹, Wensong Liu¹, Lei Wang³, Yongqiang Zhao³, Fang Yang³, Dan Qiu²
¹Tovos Tech, China, People's Republic of; ²Guangdong Power Grid Co., Ltd, Guangzhou, China

**Comparison of UAV Lidar and Imagery for Beach Monitoring**
Lachlan Shaw¹,², Petra Helmholz¹, David Belton¹, Nicholas Addy²
¹Spatial Sciences, Curtin University, GPO Box U1987, Perth WA 6845, Australia; ²Land Surveys, 19 Brennan Way, Belmont WA 6104, Australia
Flight-Planning for the Calibration of “Prosumer” UAV Cameras
Chris Radford, George Bevan
Queen's University, Canada

Efficient Flight Planning for Building Façade 3D Reconstruction
Harinish Kumar Palanirajan¹, Bashar Saleem Abbas Alsadik², Francesco Nex¹, Sander Oude Elberink¹
¹Faculty of Geoinformation science and Earth observation (ITC), University of Twente, Netherlands; ²Cyclomedia, Netherlands

UPhO and MAGO: Two Useful Instruments in Support of Photogrammetric UAV Survey
Sara Gagliolo, Daniele Passoni, Bianca Federici, Ilaria Ferrando, Domenico Sguerso
Università degli studi di Genova, Italy

Mosaicing Fidelity Geometrical Assessment Based on SURF Point Classification
Roberto Giudici, Luc Courtrai, Sebastien Lefevre
Université Bretagne Sud - IRISA, France

Assessment of Influence of Image Processing on Fully Automatic UAV Photogrammetry
Chenyang Feng¹, Dapeng Yu², Yubin Liang¹, Dongxu Guo¹, Qiang Wang¹, Xiaoliang Cui²
¹Tianjin Normal University, China, People's Republic of; ²Shen Kao Engineering & Technology Corporation, MCC, China, People's Republic of
Vision-based indoor localization via a visual SLAM approach
Minglei Li¹,², Franz Rottensteiner²
¹College of Electronic and Information Engineering, Nanjing University of Aeronautics and Astronautics, China; ²Institute of Photogrammetry and Geoinformation, Leibniz Universität Hannover, Germany

Portable Image-Based High Performance Mobile Mapping System in Underground Environments – System Configuration and Performance Evaluation
Stefan Blaser, Stephan Nebiker, Dominik Wisler
Institute of Geomatics, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Muttenz, Switzerland.

Configuration and Simulation Tool for 360-Degree Stereo Camera Rig
Oliver Hasler¹, Benjamin Loesch², Stefan Blaser¹, Stephan Nebiker²
¹Institute of Geomatics Engineering, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Switzerland; ²iNovitas, Baden-Dättwil, Switzerland

Quantifying the Quality of Indoor Maps
Moawiah Assali¹, Georgios Pipelidis², Vladimir Podolskiy¹, Dorota Iwaszczuk³, Lukas Heinen⁴, Michael Gerndt¹
¹Computer Architecture and Parallel Systems, Technical University of Munich, Germany; ²Software and Systems Engineering Research Group, Technical University of Munich, Germany; ³Computational Modeling and Simulation, Technical University of Munich, Germany; ⁴BMW Group IT, Munich, Germany

A Graph-Matching Approach to Indoor Localization Using a Mobile Device and a Reference Building Information Model (BIM)
Fanny Bot, Pirouz Nourian, Edward Verbree
Delft University of Technology, the Netherlands
JS-01: Semantic Analysis of UAV and Oblique Aerial Images

**Time:** Tuesday, 11/Jun/2019: 9:00am - 10:30am  ·  **Location:** Waaier 1+2

**Session Chair:** Franz Rottensteiner
**Session Chair:** Petra Helmholz

**Keynote:** Vision-based Robotic Perception
Margarita Chli
ETH Zürich, Switzerland

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**Automatic Muck Pile Characterization from UAV Images**
Fabian Schenk¹, Alexander Tscharf², Gerhard Mayer³, Friedrich Fraundorfer¹
¹Graz University of Technology, Austria; ²Montanuniversitaet Leoben

**Vector Map generation from Aerial Imagery using Deep Learning**
Manish Sahu¹, Anurag Ohri²
¹Indshine, India; ²Indian Institute of Technology (BHU), Varanasi

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**Damage Detection on Building Façades Using Multi-Temporal Aerial Oblique Imagery**
Diogo Duarte, Francesco Nex, Norman Kerle, George Vosselman
University of Twente, Faculty ITC, the Netherlands
JS-02: Building Models

Time: Tuesday, 11/Jun/2019: 11:00am - 12:30pm · Location: Waaier 1
Session Chair: Zhizhong Kang
Session Chair: Uwe Soergel

Keynote: Fast, Automated 3D Modeling of Building Interiors and Parsing of Assets
Avideh Zakhor
UC Berkeley, United States of America

A Stochastic Approach to Automated Reconstruction of 3D Models of Interior Spaces from Point Clouds
Ha Tran, Kouros Khoshelem
Department of Infrastructure Engineering, The University of Melbourne, Parkville 3010, Australia

Indoor 3D Modeling and Flexible Space Subdivision from Point Clouds
Shayan Nikoohemat\textsuperscript{1}, Abdoulaye Diakité\textsuperscript{2}, Sisi Zlatanova\textsuperscript{3}, George Vosselman\textsuperscript{1}
\textsuperscript{1}University of Twente, Faculty ITC, the Netherlands; \textsuperscript{2}Dept. of Built Environment, University of New South Wales, Sydney, Australia

Semantic Segmentation of Building in Airborne Images
Shan Huang, Francesco Nex, Yaping Lin, Michael Ying Yang
University of Twente, Netherlands
Application of Self-Organizing Map on Flight Data Analysis for Quadcopter Health Diagnosis System

De-Li Cheng, Wei.Hsiang Lai
National Cheng-Kung University, Taiwan

Improved Reference Key Frame Algorithm

Haytham Mohamed¹, Adel Moussa¹,², Mohamed Elhabiby³, Naser El-Sheimy¹
¹University of Calgary, Canada; ²Port-Said University, Port-Said, Egypt; ³Ain Shams University, Cairo, Egypt

Enhanced UAV Navigation Using Hall-Magnetic and Air-Mass Flow Sensors In Indoor Environment

Shady Zahran¹, Adel Moussa¹,², Naser El-Sheimy¹
¹University of Calgary, Canada; ²Port said University, Egypt

Autonomous UAV-Based 3D-Reconstruction of Structures for Aerial Physical Interaction

Beril Sirmacek, Ramy Rashad, Patrick Radl
University of Twente, Netherlands, The

UAVs Enhanced Navigation in Outdoor GNSS Denied Environment Using UWB and Monocular Camera Systems

Shady Zahran¹, Andrea Masiero², Mostafa Mostafa¹, Adel Moussa¹,², Antonio Vettore², Naser El-Sheimy¹
¹University of Calgary, Canada; ²University of Padua, Italy; Port Said University, Egypt
Raspberry PI 3 Multispectral Low-Cost Sensor for UAV Based Remote Sensing. Case Study in South-West Niger
Elena Belcore1,2, Marco Piras1, Alessandro Pezzoli2, Giovanni Massazza2, Maurizio Rosso1
1Politecnico di Torino, DIATI, Department of Environment, Land and Infrastructure Engineering, Italy; 2Politecnico di Torino, DIST, Interuniversity Department of Regional and Urban Studies and Planning, Italy

Preliminary Evaluation of Atmospheric Temperature and Wind Profiles Obtained Using Unmanned Aerial Vehicle Based Acoustic Tomography
Anthony Finn, Kevin Rogers, Joshua Meade, Jarrod Skinner, Amir Zargarian
University of South Australia, Australia

Detecting Antarctic Seals and Flying Seabirds by UAV
Osama Mustafa1, Christina Braun2, Jan Esefeld1,2, Stefan Knetsch1, Jakob Maercker1, Christian Pfeifer1, Marie-Charlott Rümmler1
1ThINK - Thuringian Institute of Sustainability and Climate Protection, Germany; 2Institute of Ecology and Evolution, Friedrich Schiller University Jena, Dornburger Straße 159, 07743 Jena, Germany

Intraseasonal Variability of Guano Stains in a Remotely Sensed Penguin Colony Using UAV and Satellite Images
Maximilian Firla1, Osama Mustafa1, Christian Pfeifer1, Martin Senf2, Sören Hese3
1ThINK - Thuringian Institute of Sustainability and Climate Protection, Germany; 2Institute of Ecology and Evolution, Friedrich Schiller University Jena, Germany; 3Institute for Geoinformatics, Friedrich Schiller University Jena, Germany

Mass Movement of an Alpine Rock Glacier
Ruedi Boesch, Christoph Graf
Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Switzerland
IS-02: Gold sponsor presentations: nFrames and Geodyn

Time: Tuesday, 11/Jun/2019: 1:15pm - 2:15pm  · Location: Waaker 2
Session Chair: Michael Ying Yang

1:15pm - 1:45pm
Precision aware 3D Mesh reconstruction from imagery and LiDAR with SURE
Konrad Wenzel
nFrames, Germany

1:45pm - 2:15pm
Access and Processing of Time-Phased Aerial Photography
Rolf Becker
GeoDyn, Germany
PS-02: Poster session

**Fully Convolutional Networks for Street Furniture Identification in Panorama Images**

Ying Ao¹, Jinhua Wang³, Mei Zhou², Roderik Lindenbergh³, Michael Ying Yang¹

¹University of Twente, Netherlands; ²Academy of Opto-Electronics, Chinese Academy of Sciences, China; ³TU Delft, Netherlands

**Cloud-based Solution for Nationwide Power Line Mapping**

Isabella Toschi¹, D. Morabito¹, D. Grill³, Fabio Remondo¹, C. Carlevaro², A. Cappelletto², G. Tamagni³, M. Maffeis³

¹3D Optical Metrology (3DOM) unit, Bruno Kessler Foundation (FBK), Trento, Italy; ²Spindox Labs srl, Trento, Italy; ³Enel Group – Europa e Latino America, Milano, Italy; ¹Laboratory of Photogrammetry, National Technical University of Athens (NTUA), Athens, Greece

**Support Vector Machine and Decision Tree Based Classification of Side-Scan Sonar Mosaics using Textural Features**

Hendra Kurnia Febriawan¹, Petra Helmholz¹, iain Parnum³

¹Spatial Sciences, Curtin University, GPO Box U1987, Perth, WA, 6845, Australia; ³Centre for Marine Science and Technology, Curtin University, GPO Box U1987, Perth, WA, 6845, Australia

**Marked Point Processes for the Automatic Detection of Bomb Craters in Aerial Wartime Images**

Christian Kruse, Franz Rottensteiner, Christian Heipke

Institute of Photogrammetry and Geoinformation, Leibniz Universität Hannover, Germany

**A Modified Three-Dimensional Gray-Level Co-Occurrence Matrix for Image Classification with Digital Surface Model**

Yan Li, Wang XIA

Wuhan University, China, People's Republic of

**A Faster R-CNN Approach for Extracting Indoor Navigation Graph from Building Designs**

Lei Niu, Yiquan Song

Henan University of Urban Construction, China, People's Republic of

**A Comparison of Three Methods for Individual Tree Crown Segmentation of Digital Surface Models From 3K Optical Imagery**

Christian Kempf¹, Jiaojiao Tian³, Franz Kurz³, Pablo d'Angelo³, Peter Reinartz²

¹TUM, Germany; ²DLR, Germany

**A Book Retrieval and Location System based on Real-Scene 3D**

Shuangfeng Wei¹,², Boyi Li¹, Zhihao Guo¹, Shuai Guo¹, Liurun Cheng¹

¹School of Geomatics and Urban Spatial Informatics, Beijing University of Civil Engineering and Architecture, Beijing; ²Engineering Research Center of Representative Building and Architectural Heritage database, Ministry of Education, Beijing; ³Key Laboratory for Urban Geomatics of Ministry of Natural Resources, Beijing; ¹Beijing Key Laboratory for Architectural Heritage Fine Reconstruction & Health Monitoring, Beijing

**Placement Optimization of Positioning Nodes: Maximizing the distinction of Indoor Zones**

Dimitris Xenakis, Martijn Meijers, Edward Verbree

Delft University of Technology, Netherlands, The

**A Comparative Analysis of Planetoscope and Sentinel 2 Space-Borne Sensors in Mapping Striga Weed using Guided Regularised Random Forest Classification Ensemble**

Bester Tawona Mudereri¹,², Timothy Dube³, Effath Mohamed Abdel-Rahman¹, Saliou Niassy¹, Emily Kimathi¹, Zeyaur Khan¹, Tobias Landman³

¹International Centre of Insect Physiology and Ecology (ICIPE), Kenya; ²Department of Earth Sciences, University of Western Cape, South Africa; ³Department of Agronomy, University of Khartoum, Sudan; ³Remote Sensing Solutions, Germany

**CA Markov Modeling of Dynamics of Land Use Land Cover and Sensitivity Analysis to Identify Sensitive Parameter(s)**

Md. Surabuddin Mondal¹, Nayan Sharma³, Martin Kappas³, P K Garg³

¹Dept. of W R D & M, Indian Institute of Technology, Roorkee – 247667, India; ³Dept. of W R D & M, Indian Institute of Technology, Roorkee – 247667, India; ³Dept. of Cartography, GIS & Remote Sensing, Institute of Geography, Georg-August

Prasad Jayant Deshpande, Anudeep Sure, Onkar Dikshit, Shivam Tripathi
Indian Institute of Technology Kanpur, India

An Advanced Benchmarking for Image Compositing Evaluation

Roberto Giudici, Luc Courtrai, Sebastien Lefevre
Universite Bretagne Sud - IRISA, France

Analysis of Bundle Adjustments and Epipolar Model Accuracy According to Flight Path Characteristics of UAV

Jonghwan Son, Pyung-Chae Lim, Junghoon Seo, Taejung Kim
Inha University, Korea, Republic of (South Korea)

Analysis of Orientation Accuracy of an UAV Image According to Camera Calibration

Pyung-Chae Lim, Junghoon Seo, Jonghwan Son, Taejung Kim
Inha University, Korea, Republic of (South Korea)

Development of Visible GPS Simulation Method under Urban Canyon Environment

Dusik Kim¹, Junhee Youn¹, Taehoon Kim¹, Gihong Kim²
¹Korea Institute of Civil Engineering and Building Technology (KICT), Korea, Republic of (South Korea); ²Gangneung-Wonju National University, Korea, Republic of (South Korea)

Establishing New Foundations for The Use of Remotely-Piloted Aircraft Systems for Civilian Applications

Marco Balsi¹, Sam Prem², Koen Williamse³, Dimitri Teboul⁴, Laurent Deletraz⁵, Pierre Inti Hebrard Capdeville⁶
¹La Sapienza University, Rome, Italy; ²Viasat, Lausanne, Switzerland; ³Unify, Antwerp, Belgium; ⁴Connectiv-IT, Paris, France; ⁵Skyguide, Geneve, Switzerland; ⁶M3 Systems, Toulouse, France

First Approach to UAV-Based Contact Inspection: A Smart Payload for Navigation in the Neighbourhood of Structures

L. M. González-de Santos¹, J. Martínez-Sánchez¹, H. González-Jorge², A. Novo¹, P. Arias¹
¹Applied Geotechnologies Group, Dept. Natural Resources and Environmental Engineering, School of Mining and Energy Engineering, University of Vigo, Campus Lagoas-Marcosende, CP 36310 Vigo, Spain; ²Applied Geotechnologies Group, Dept. Natural Resources and Environmental Engineering, School of Aerospace Engineering, University of Vigo, Campus Lagoas, CP 32004 Ourense, Spain.

Improving Point Cloud Quality Using Multi-Directional Image of UAV

Jihun Kang, Sewon Lee, Sunghyun Yeon
Korea Land and Geospatial Informatix Corp., Korea, Republic of (South Korea)

Potential of Non-Calibrated UAV-Based RGB Imagery for Forage Monitoring: Case Study at the Rengen Long-term Grassland Experiment (RGE), Germany

Georg Bareth¹, Ulrike Lussem¹, Jannis Menne¹, Jens Hollberg², Jürgen Schellberg²
¹University of Cologne, Institute of Geography, GIS & RS Group, Germany; ²Bonn University, INRES, Germany

Remote Sensing UAV/Drone Technology as a Tool for Urban Development Measures in APCRDA

PREETHILATHA THALATHOTI, NAGASUNDARI K, SREEDHAR CHERUKURI, PRASAD M V V S V
ANDHRA PRADESH CAPITAL REGION DEVELOPMENT AUTHORITY,VIJAYAWADA,India

UAV and LiDAR Image Registration: A Surf-Based Approach for Ground Control Points Selection

Bahareh Kalantar¹, Naonori Ueda¹, Husam Al-Najjar², Hossein Moayed³, Alfian Halin³, Shatrii Mansor³
¹RIKEN Center for Advanced Intelligence Project, Goal-Oriented Technology Research Group, Disaster Resilience Science Team, Tokyo 103-0027, Japan.; ²Centre for Advanced Modelling and Geospatial Information Systems (CAMGIS), Faculty of Engineering and IT, University of Technology Sydney, Sydney, Australia.; ³Dept. of Geotechnics and Transportation, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia.; ⁴Dept. of Multimedia, Faculty of Computer Science and Information Technology, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia.; ⁵ Dept. of Civil Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia

UAV-based Oblique Photogrammetry for 3D Reconstruction of Transmission Line: Practices and Applications
San Jiang¹, Wanshou Jiang²,³
¹School of Computer Science, China University of Geosciences, Wuhan 430074, China; ²State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan 430072, China; ³Collaborative Innovation Center of Geospatial Technology, Wuhan University, Wuhan, 430072, China

Vertical Orientation Correction of UAV Image-based Point Clouds using Statistical Modeling of Gable Roof Geometry

Przemyslaw Polewski, Wei Yao, Li Fang
The Hong Kong Polytechnic University, Hong Kong S.A.R. (China)
Modelling Uncertainty of Single Image Indoor Localisation Using A 3D Model and Deep Learning
Debaditya Acharya¹, Sesa Singha Roy², Kourosh Khoshelham¹, Stephan Winter³
¹Department of Infrastructure Engineering, The University of Melbourne, Parkville, Victoria, Australia, 3010; ²Institute for Sustainable Industries and Livable Cities, Victoria University, Werribee, Victoria, Australia, 3030

A Scene-Assisted Point-Line Feature Based Visual Slam Method for Autonomous Flight in Unknown Indoor Environments
Sai Cheng, Juntao Yang, Zhizhong Kang, Perpetual Hope Akwensi
China university of Geoscience, China, People's Republic of

Navigation in Indoor Voxel Models
Ben Gorte¹, Sisi Zlatanova¹, Fodil Fadli²
¹GRID-UNSW, Australia; ²Architecture and Urban Planning (DAUP), College of Engineering, Qatar University
Superpixel Classification of High Spatial Resolution Remote Sensing Image Based on Multi-Scale CNN and Scale Parameter Estimation

Yangyang Chen, Dongping Ming
China University of Geosciences (Beijing)

A Machine Learning Dataset for Large-scope High Resolution Remote Sensing Image Interpretation Considering Landscape Spatial Heterogeneity

Yue Xu¹, Xiangyun Hu¹, Yujun Wei¹, Ying Yang², Donghua Wang²
¹Wuhan University, China, People’s Republic of; ²National Geomatics Center of China, China, People’s Republic of

Closing IWIDF

Wei Yao
The Hong Kong Polytechnic University
SEM-04: Building Models and Facades

Time: Tuesday, 11/Jun/2019: 2:30pm - 3:30pm · Location: Waaier 1
Session Chair: Markus Gerke
Session Chair: Jie Shan

Facade Reconstruction for Textured LoD2 CityGML Models Based on Deep Learning and Mixed Integer Linear Programming

Simon Hensel¹, Steffen Goebbels¹, Martin Kada²
¹Institute for Pattern Recognition, Niederrhein University of Applied Sciences, Krefeld, Germany; ²Institute of Geodesy and Geoinformation Science, Technical University of Berlin, Berlin, Germany

Unsupervised Window Extraction from Photogrammetric Point Clouds with Thermal Attributes

Dong Lin¹, Zhen Dong², Xinlong Zhang¹, Hans-Gerd Maas¹
¹Technische Universität Dresden, Institute of Photogrammetry and Remote Sensing, Germany; ²State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, China

Classification of Aerial Point Clouds with Deep Learning

Emre Özdemir, Fabio Remondino
FBK Trento, Italy
Using DJI Phantom 4 RTK Drone for Topographic Mapping of Coastal Areas

Yuri Taddia¹, Francesco Stecchi², Alberto Pellegrinelli³
¹University of Ferrara - Engineering Department, Italy; ²AdriaRilievi, Italy

Red Tape in Higher Education Institutions: UAV Policy

Patricia K. Freeman, Robert S. Freeland
The University of Tennessee, United States of America

RPAS in The Support of Photogrammetry Education: Cases of Topographic Mapping and Documentation of Historical Monuments

Mario Luiz Lopes Reiss¹, Tatiana Sussel Gonçalves Mendes¹, Márcio Roberto Magalhães de Andrade⁵, Alexandre De Morais Amory³, Roosevelt De Lara², Sérgio Florêncio De Souza²
¹LAFOTO – Laboratory of Photogrammetry Research, Department of Geodesy, Institute of Geoscience, UFRGS – Federal University of Rio Grande do Sul, Brazil; ²LAGEO – Laboratory of Geodesy, Department of Geodesy, Institute of Geoscience, UFRGS – Federal University of Rio Grande do Sul, Brazil; ³Faculty of Computer Science, PUCRS – Pontifical Catholic University of Rio Grande do Sul, Brazil; ⁵Faculty of Computer Science, PUCRS – Pontifical Catholic University of Rio Grande do Sul, Brazil; ⁶Department of Environmental Engineering, Institute of Science and Technology – ICT, University of São Paulo – UNESP, São José dos Campos, São Paulo, Brazil; ⁷National Center for Natural Disaster Monitoring and Alerts - CEMADEN, São José dos Campos, São Paulo, Brazil
Quantifying Lodging Percentage, Lodging Development and Lodging Severity Using a UAV Based Canopy Height Model
Norman Wilke1, Bastian Siegmann1, Onno Muller1, Lasse Klingbeil2, Uwe Rascher1
1Institute of Bio- and Geosciences, Plant Sciences (IBG-2), Research Center Jülich GmbH, 52428 Jülich, Germany;
2Department of Geodesy, University of Bonn, 53115 Bonn, Germany

Determining Morphometric Properties of Radiata Pine using Long Wave Infrared Sensing and Biologically-Inspired Vision
Anthony Finn, Russell Brinkworth, Daniel Griffiths, Stefan Peters
University of South Australia, Australia

Intensity-Based Individual Tree Detection from UAV Lidar Data in a Mixed Species Woodland
Aleksandra Zaforemska, Wen Xiao, Rachel Gaulton
School of Engineering, Newcastle University, United Kingdom
Energy Function Algorithm for Detection of Openings in Indoor Point Clouds
Rami Assi, Tania Landes, Hélène Macher, Pierre Grussenmeyer
ICube Laboratory UMR 7357, Photogrammetry and Geomatics Group, National Institute of Applied Sciences (INSA) Strasbourg, France

Construction of Obstacle Element Map Based on Indoor Scene Recognition
Fuda Li, Hui Wang, Perpetual Hope Akwensi, Zhizhong Kang
China University of Geosciences (Beijing), China, People's Republic of

Semantic Segmentation of Indoor 3D Point Cloud with SLENet
Youli Ding¹, Xianwei Zheng¹, Hanjiang Xiong¹, Yi Zhang²
¹State Key laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Hubei, Wuhan; ²School of Mathematics and Statistics, Wuhan University, Hubei, Wuhan

Using EdgeConv to Improve 3D Object Detection from RGB-D Data
weisheng lin¹, yiping chen¹, cheng wang¹, jonathan li¹,²
¹Fujian Key Laboratory of Sensing and Computing, School of Informatics, Xiamen University, 422 Siming Road South, Xiamen 361005, China; ²Mobile Mapping Lab, Department of Geography and Environmental Management, University of Waterloo, Waterloo, ON N2L 3G1, Canada
SEM-05: Image Sequences and Tracking

Time: Tuesday, 11/Jun/2019: 4:00pm - 5:30pm · Location: Waaier 3
Session Chair: Michael Ying Yang
Session Chair: Siavash Hosseinyalamdary

Confidence-aware Pedestrian Tracking Using a Stereo Camera
Uyen Dao Xuan Nguyen, Franz Rottensteiner, Christian Heipke
Institut für Photogrammetrie und Geoinformation, Leibniz Universität Hannover, Germany

Precise Vehicle Reconstruction for Autonomous Driving Applications
Max Coenen, Franz Rottensteiner, Christian Heipke
Leibniz University Hannover, Germany

Human Detection based on A Sequence of Thermal Images using Deep Learning
Xinran Wang, Siavash Hosseinyalamdary
University of Twente, Netherlands, The

Closing Semantics3D
Franz Rottensteiner
Leibniz University Hannover, Germany
Detecting Rumex Obtusifolius Weed Plants in Grasslands From UAV RGB Imagery Using Deep Learning

João Valente¹, Marty Doldersum², Corinna Roers³, Lammert Kooistra⁴
¹Wageningen University & Research, Netherlands, The; ²Wageningen University & Research, Netherlands, The; ³Naturschutzzentrum im Kreis Kleve e.V.; ⁴Wageningen University & Research, Netherlands, The

Wheat Lodging Assessment using Multispectral UAV Data

Sugandh Chauhan¹, Roshanak Darvishzadeh¹, Yi Lu¹, Daniela Stroppiana², Mirco Boschetti², Monica Pepe², Andrew Nelson¹
¹Faculty of Geo-information Science and Earth Observation (ITC), University of Twente, Enschede 7500AE, The Netherlands; ²CNR-IREA, Institute for Electromagnetic Sensing of the Environment, National Research Council, 20133 Milano, Italy

Assessment of RGB, Multi- and Hyperspectral UAV Remote Sensing for Grass Quantity and Quality Estimation

Raquel Alves de Oliveira¹, Roope Näsi¹, Oiva Niemeläinen², Laura Nyholm³, Katja Alhonoja⁴, Jere Kaivosoja⁵, Niko Viljanen¹, Teemu Hakala¹, Somayeh Nezami¹, Lauri Markelin¹, Lauri Jauhiainen¹, Eija Honkavaara¹
¹National Land Survey of Finland, Finland; ²Natural Resources Institute Finland, Finland; ³Valio Oy, Finland; ⁴Yara Suomi Oy, Finland

Extraction of Vineyard Macrostructure from Sub-Optimal Sequences of Aerial Imagery

Anthony Finn, Aaron Melville Smith, Russell Brinkworth
University of South Australia, Australia

Can UAV Lidar Derive Vertical Structure of Herbaceous Vegetation on Riverdike?

Naoko Miura¹, Tomoyo F. Koyanagi², Shige Hiro Yokota³, Susumu Yamada⁴
¹The University of Tokyo, Japan; ²Tokyo Gakugei University; ³Tokyo City University; ⁴Tokyo University of Agriculture
Landslide Deformation Monitoring by Three-Camera Imaging System  
Jiann-Yeou Rau, Jyun-Ping Jhan, Ruli Andaru  
National Cheng Kung University, Taiwan

Towards Post-Disaster Debris Identification for Precise Damage and Recovery Assessments from UAV and Satellite Images  
Saman Ghaffarian, Norman Kerle  
ITC, University of Twente, The Netherlands

UAV Direct Georeferencing Approach in An Emergency Mapping Context. The 2016 Central Italy Earthquake Case Study  
Filiberto Chiabrando¹, Fabio Giulio Tonolo¹, Andrea Lingua²  
¹Politecnico di Torino - DAD, Italy; ²Politecnico di Torino - DIATI, Italy

Towards a High-Resolution Drone-Based 3D Mapping Dataset to Optimise Flood Hazard Modelling  
Dietmar Backes¹, Guy Schumann², Jan Boehm³, Felix Norman Teferle¹  
¹University of Luxembourg, Luxembourg; ²University of Bristol; ³University College London

Development Of A Geodatabase for Efficient Remote Sensing Data Management in Emergency Scenarios  
Ahmed Alamouri, Markus Gerke  
Technical University of Braunschweig, Germany
**IND-04: Indoor Modelling**  
*Time:* Wednesday, 12/Jun/2019: 9:00am - 10:30am  
*Location:* Waaier 4  
*Session Chair:* Lucía Díaz Vilariño  
*Session Chair:* Edward Verbree

**Building Change Detection Through Comparison of A Lidar Scan With A Building Information Model**  
Ha Tran, Kourosh Khoshelham  
Department of Infrastructure Engineering, The University of Melbourne, Australia

**Automatic Extraction of a Navigation Graph intended for IndoorGML from an Indoor Point Cloud**  
**Puck Flikweert**¹, **Ravi Peters**¹, **Lucia Diaz-Vilariño**², **Robert Voûte**¹,³, **Bart Staats**²  
¹Delft University of Technology, The Netherlands; ²CGI, The Netherlands; ³University of Vigo, Spain

**Point clouds to Direct Indoor Pedestrian Pathfinding**  
**Jesús Balado**, **Lucia Diaz-Vilariño**, **Pedro Arias**, **Ernesto Frias**  
University of Vigo, Spain

**Improving Automatic Reconstruction of Interior Walls from Point Cloud Data**  
**Eleonora Maset**, **Luca Magri**, **Andrea Fusiello**  
University of Udine, Italy

**An original algorithm for BIM generation from indoor survey point clouds**  
**Francesco Capocchiano**¹,², **Roberta Ravaneli**¹  
¹Geodesy and Geomatics Division, DICEA - University of Rome "La Sapienza", Rome, Italy; ²Sapienza School for Advanced Studies, Rome, Italy
LS-01: Machine & Deep Learning

Time: Wednesday, 12/Jun/2019: 9:00am - 10:30am  ·  Location: Waaier 2

Session Chair: Jan Boehm
Session Chair: David Griffiths

PointNet for The Automatic Classification of Aerial Point Clouds
Mario Soilán¹, Roderik Lindenbergh², Belén Riveiro¹, Ana Sánchez-Rodríguez¹
¹Dept. of Materials Engineering, Applied Mechanics and Construction, University of Vigo, Spain; ²Dept. of Geoscience and Remote Sensing, TU Delft, The Netherlands

Feature Relevance Analysis for 3D Point Cloud Classification Using Deep Learning
Ashutosh Kumar¹,², Katharina Anders³,⁴, Lukas Winiwarter³, Bernhard Höfle³,⁴
¹Institute of Industrial Science, The University of Tokyo, Komaba, Japan; ²School of Engineering, The University of Tokyo, Hongo, Japan; ³3D Geospatial Data Processing Research Group (3DGeo), Institute of Geography, Heidelberg University, Heidelberg, Germany; ⁴Interdisciplinary Center for Scientific Computing (IWR), Heidelberg University, Heidelberg, Germany

Classification of Aerial Laser Scanning Point Clouds using Machine Learning: A Comparison Between Random Forest and Tensorflow
Francesco Pirotti¹,², Filippo Tonion¹,²
¹CIRGEO Interdepartmental Research Center of Geomatics, University of Padova, Italy; ²TESAF Department, University of Padova, Italy

Joint Classification of ALS and DIM Point Clouds
Florian Politz, Monika Sester
Leibniz University Hannover, Institute of Cartography and Geoinformatics, Germany

Extraction and Shape Reconstruction of Guardrails Mobile Mapping Data
Hiroki Matsumoto, Yuma Mori, Hiroshi Masuda
The University of Electro-Communications, Japan
Translating Aerial Images into Street-Map-Like Representations for Visual Self-Localization of UAVs

Michael Schleiss
FKIE Fraunhofer Institute, Germany

Urban Scene Classification Using Features Extracted from Photogrammetric Point Clouds Acquired by UAV

Guilherme Gomes Pessoa¹, Renato Cesar Dos Santos¹, André Caceres Carrilho¹, Maurício Galo¹,², Amilton Amorim¹,²
¹São Paulo State University - UNESP, Graduate Program in Cartographic Sciences, Presidente Prudente, São Paulo, Brazil;
²São Paulo State University - UNESP, Dept. of Cartography, Presidente Prudente, São Paulo, Brazil

Resnet-Based Tree Species Classification Using UAV Images

Sowmya Natesan¹, Costas Armenakis¹, Udayalakshmi Vepakomma²
¹York University, Canada; ²FPInnovations, Canada

Surface Flow Velocity Measurements from UAV-Based Videos

Jens Brauneck, Thomas Gattung, Robert Jünger
Hydraulic Engineering and Water Management, Civil Engineering, TUK Kaiserslautern, Germany – brauneck@rhrk.uni-kl.de

A Real-Time Drone Mapping Platform for Marine Surveillance

Ilseo Jeon¹, Sangwoo Ham¹, Jangwoo Cheon¹, Anna Maria Klimkowska¹, Hwiyoung Kim¹, Kyoungah Choi², Impyeong Lee³
¹Dept. of Geoinformatics, University of Seoul, Seoul, Republic of Korea; ²Innovation Growth Headquarters, Korea Agency for Infrastructure Technology Advancement, Gyeonggi-do, Republic of Korea

UAVG-07b: UAVs in H2020 Projects

Time: Wednesday, 12/Jun/2019: 9:00am - 10:30am  · Location: Waaier 3
Session Chair: Francesco Nex

AEROBI - AErial RObotic System for In-Depth Bridge Inspection by Contact
Philippe Chrobocinski
Airbus Defence and Space, France

MONIFLY - Mobile Network Infrastructure For Surveillance Of Low Flying
Björn Blom
Technical University Braunschweig, Germany

DroC2om – Drone Critical Communications
Benjamin Hiller
atesio GmbH, Germany

Muse3D - Multi-Spectral- and 3D-Monitoring of Vegetation by UAVs
Konstantinos Smagas
Geoimaging Ltd, Cyprus

ITS4LAND- Innovative Geospatial Tools for Mapping Land Rights
Mila Koeva
University of Twente, Netherlands, The
Augmented Annotations: Indoor Dataset Generation with Augmented Reality
Vedant Saran, James Lin, Avideh Zakhor
University of California Berkeley, United States of America

Indoor Mapping Eyewear: Geometric Evaluation of Spatial Mapping Capability of Hololens
Kourosh Khoshelham, Ha Tran, Debaditya Acharya
University of Melbourne, Australia

Indoor 3D Interactive Asset Detection Using a Smartphone
Revekka Kostoeva, Rishi Upadhyah, Yersultan Sapar, Avideh Zakhor
University of California, Berkeley, United States of America

Creation of A Virtual Reality Environment of A University Museum Using 3D Photogrammetric Models
Kayziel Martinez, Marko Zolo Untalan, Diana Faith Burgos, Roseanne Ramos, Mark Jonathan Germentil
University of the Philippines Diliman, Philippines
Keynote: Contextual Uncertainties in Geographic and Environmental Health Research
Mei-Po Kwan
University of Illinois Urbana-Champaign, United States of America

Detection of Shallow Water Area with Machine Learning Algorithms
Nur Yagmur, Nebiye Musaoglu, Gülsen Taskin Kaya
Istanbul Technical University, Turkey

A Synthetic 3D Scene for the Validation of Photogrammetric Algorithms
Dirk Frommholz
DLR - German Aerospace Center, Germany
LS-02: Change Detection

Time: Wednesday, 12/Jun/2019: 11:00am - 12:30pm · Location: Waier 2
Session Chair: Wei Yao
Session Chair: Gottfried Mandlburger

Clustering Time Series of Repeated Scan Data of Sandy Beaches
Roderik Lindenbergh, Sylke Van der Kleij, Mieke Kuschnerus, Sander Vos, Sierd de Vries
TU Delft, Netherlands, The

Non-Rigid Multi-Body Tracking in RGBD Streams
KaiXuan Dai¹, Hao Guo¹, Philippos Mordohai², Francesco Marinello³, Andrea Pezzuolo³, QuanLong Feng¹, QuanDi Niu¹
¹China Agricultural University, China, People’s Republic of; ²Department of Computer Science, Stevens Institute of Technology, New Jersey, USA; ³Department of Land, Environment, Agriculture and Forestry, University of Padova, Italy

High-Frequency 3D Geomorphic Observation using Hourly Terrestrial Laser Scanning Data of a Sandy Beach
Katharina Anders¹,², Roderik C. Lindenbergh³, Sander Vos⁴, Hubert Mara², Sierd de Vries⁴, Bernhard Höfle¹,²,³
¹3D Geospatial Data Processing Research Group (3DGeo), Institute of Geography, Heidelberg University, Germany; ²Interdisciplinary Center for Scientific Computing (IWR), Heidelberg University, Germany; ³Department of Geoscience & Remote Sensing, Delft University of Technology, The Netherlands; ⁴Department of Hydraulic Engineering, Delft University of Technology, The Netherlands; ²Heidelberg Center for the Environment, Heidelberg University, Germany

Assessment of Landslide-Induced Displacement and Deformation of Above-Ground Objects Using UAV-Borne and Airborne Laser Scanning Data
Thomas Zieher¹, Magnus Bremer¹,², Martin Rutzinger¹,², Jan Pfeiffer¹,², Patrick Fritzmann², Volker Wichmann³
¹Institute for Interdisciplinary Mountain Research, Austrian Academy of Sciences, Technikerstr. 21a, 6020 Innsbruck, Austria; ²Institute for Geography, University of Innsbruck, Innrain 52f, 6020 Innsbruck, Austria; ³Federal state of Tyrol, Division of Geoinformation, Herrengasse 3, 6020 Innsbruck, Austria

Comparison and Time Series Analysis of Landslide Displacement Mapped by Airborne, Terrestrial and Unmanned Aerial Vehicle Based Platforms
Jan Pfeiffer²,³, Thomas Zieher¹,², Martin Rutzinger¹,², Magnus Bremer¹,², Volker Wichmann³
¹Institute of Interdisciplinary Mountain Research, Austrian Academy of Science, Austria; ²Institute of Geography, University of Innsbruck, Austria; ³Laserdata GmbH, Austria
UAVG-08a: Integration of UAV Data with Other Sources

Time: Wednesday, 12/Jun/2019: 11:00am - 12:30pm · Location: Waaier 1
Session Chair: Norbert Haala
Session Chair: Sander Oude Elberink

Evaluation and Calibration of Fixed-Wing Multisensor UAV Mobile Mapping System: Improved Results
Krzysztof Bakula¹, Wojciech Ostrowski¹, Magdalena Pilarska¹, Marcin Szender², Zdzisław Kurczyński³
¹Warsaw University of Technology, Faculty of Geodesy and Cartography, Warsaw, Poland; ²MSP Marcin Szender, Warsaw, Poland

Orientation of UAV Image Blocks by Surface Matching
Jose Alberto Gonçalves¹, Nuno Jordão², André Pinhal¹
¹University of Porto, Science Faculty, Portugal; ²Academia Militar, Lisbon, Portugal

The Joint Research Project ANKommEn - Exploration Using Automated UAV and UGV
Ahmed Alamouri¹, Markus Gerke¹, Simon Batzdorfer², Martin Becker², Ulf Bestmann², Markus Bobbe³, Yogesh Khedar³, Tobias Blume¹, Jan Schattenberg¹, Julian Schmiemann³
¹Technical University of Braunschweig, Institute for Geodesy and Photogrammetry, Braunschweig, Germany; ²Technical University of Braunschweig, Institute of Flight Guidance, Braunschweig, Germany; ³Technical University of Braunschweig, Institute of Mobile Machines and Commercial Vehicles, Braunschweig, Germany

Automatic Co-Registration of Aerial Imagery and Untextured Model Data Utilizing Average Shading Gradients
Sylvia Schmitz², Martin Weinmann², Boitumelo Ruf²
²Fraunhofer Institute of Optronics, System Technologies and Image Exploitation (IOSB), Karlsruhe, Germany; ³Institute of Photogrammetry and Remote Sensing, Karlsruhe Institute of Technology, Karlsruhe, Germany

360° Images for UAV Multisensor Data Fusion: First Tests and Results
Alessio Calantropio, Filiberto Chiabrando, Davide Einaudi, Lorenzo Teppati Losè
DAD, Department of Architecture and Design – Politecnico di Torino, Viale Pier Andrea Mattioli, 39 – 10125, Torino, Italy
UAVG-08b: ITS4LAND I

Time: Wednesday, 12/Jun/2019: 11:00am - 12:30pm · Location: Carré 2K
Session Chair: Mila Koeva

Introduction to the ITS4LAND sessions

Mila Koeva
University of Twente, The Netherlands

ITS4LAND - A Land Administration Toolbox with Innovative Geospatial Tools for Fit-for-Purpose Land Rights Recording

Tarek Zein
Hansa Luftbild

Governance and Capacity Development Model to Support the Implementation of the ITS4LAND Tools

Joep Cromvoets
KU Leuven, Belgium

UAV Data Acquisition for Land Administration

Claudia Stöcker
University of Twente, Netherlands, The
IS-03: Gold sponsor presentations: Riegl and Zoller & Fröhlich

Time: Wednesday, 12-Jun-2019: 1:15pm - 2:15pm  ·  Location: Waaier 2
Session Chair: Sander Oude Elberink

1:15pm - 1:45pm
Floor plans and views of a historic building using laser scanning
Nikolaus Studnicka
Riegl, Austria

1:45pm - 2:15pm
Data Acquisition using 3D Laserscanning Technology
Faisal Shahzad
Zoller & Fröhlich
PS-03: Poster session

Feature Selection of Optical Satellite Images for Chlorophyll-a Concentration Estimation
Manh Van Nguyen¹,², Hone-Jay Chu¹, Chao-Hung Lin¹, Lalu Muhamad Jaelani³
¹Department of Geomatics, National Cheng Kung University; ²Vietnam Academy of Science and Technology, Institute of Geography; ³Institut Teknologi Sepuluh Nopember, Department of Geomatics Engineering

Lithological Mapping Using Landsat 8 OLI and ASTER Multispectral Data in Imini-Ounilla District South High Atlas of Marrakech
Zouhair OURHZIF, Ahmed Algouti, Abdellah Algouti, Fatima Hadach
University Cadi Ayyad

Analysis of Common Quality Problems in Coordinate Transformation Between Reference Coordinate System and Geocentric Coordinate System
Xunhu Zhang, Jixian Zhang, Lei Zhang, Jinhu Liu
National Quality Inspection and Testing center for Surveying and Mapping product, China, People's Republic of

Weighted Point Cloud Augmentation for Neural Network Training Data Class-Imbalance
David Griffiths, Jan Boehm
University College London, United Kingdom

Semantic Labeling of ALS Point Clouds for Tree Species Mapping Using the Deep Neural Network PointNet++
Sebastian Brieche¹, Peter Krzystek¹, George Vosselman²
¹Munich University of Applied Sciences, Munich, Germany; ²University of Twente, Faculty ITC, the Netherlands

Evaluating the Possibility of Tree Species Classification with Dual-Wavelength ALS Data
Magdalena Pilarska, Wojciech Ostrowski
Warsaw University of Technology, Faculty of Geodesy and Cartography, Poland

Large scale LiDAR points classification by using active learning
Nan Li¹,², Norbert Pfeifer²
¹Technische Universität Wien, Austria; ²Tongji University, China

3D-CNN Based Tree Species Classification Using Mobile LiDAR Data
Haiyan Guan¹, Yongtao Yu², Wanzhan Yan¹, Yufu Zang¹, Diliang Li², Jonathan Li²
¹Nanjing University of Information Science and Technology, China, People's Republic of; ²Hualui Institute of Technology, China, People's Republic of; ³Wuhan University, China, People's Republic of; ⁴University of Waterloo, Canada

Individual Tree Species Classification Based on Terrestrial Laser Scanning Using Curvature Estimation and Convolutional Neural Network
Tomohiro Mizoguchi¹, Akira Ishii², Hiroyuki Nakamura²
¹Nihon University; ²Woodinfo Inc.

Point Cloud Classification by Fusing Supervoxel Segmentation with Multi-Scale Features
Wei Ao¹, Lei Wang², Jie Shan³
¹School of Remote Sensing and Information Engineering, Wuhan University, Wuhan, China; ²State Key Laboratory for Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, China; ³Lyles School of Civil Engineering, Purdue University, USA

Classification of Mobile Lidar Data Using Vox-Net and Auxiliary Training Samples
Hanxian He, Kourosh Khoshelham, Clive Fraser
The University of Melbourne, Australia

Automatic Classification of Bridges and Continental Water Bodies from 3D Point Clouds (Aerial Lidar)
Sara Lorite Martinez, Jesús Moreno Jabato, Borja Rodríguez Cuenca, Jesús María Garrido Sáenz de Tejada
Spanish National Geographic Institute, Madrid (Spain)

Building Detection from Lidar Data Using Entropy and the K-Means Concept
Automatic Detection of Road Edges from Aerial Laser Scanning Data
Linh Truong-Hong1, Debra Laefer2, Roderik Lindenbergh1
1Dept. of Geoscience and Remote Sensing, Delft University of Technology, Netherlands; 2Center for Urban Science and Progress, New York University, New York, US

Automatic Road Markings Extraction, Classification and Vectorization from Mobile Laser Scanning Data
Yue Pan1,2, Bisheng Yang1, Shengfu Li1, Hong Yang1, Zhen Dong1, Yue Yang4
1State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan, China; 2School of Geodesy and Geomatics, Wuhan University, Wuhan, China; 3Sichuan Provincial Transport Department Highway Planning, Survey, Design and Research Institute, Chengdu, China; 4Faculty of Information Engineering, China university of Geosciences, Wuhan, China

Mobile Laser Scan Data for Road Surface Damage Detection
Bibi van der Horst1, Roderik Lindenbergh1, Sander Puister2
1Department of Geoscience and Remote Sensing, Delft University of Technology, Netherlands; 2Iv-Infra, Haarlem, Netherlands

Automatic Detection of Forest-Road Distances to Improve Clearing Operations in Road Management
Ana Novo Gómez1, Higinio González Jorge2, Joaquín Martínez Sánchez1, Luis González de Santos1, Henrique Lorenzo Cimadevila3
1Geotech Group, Department of Natural Resources and Environmental Engineering, School of Mining Engineering, University of Vigo, 36310, Vigo, Spain; 2Geotech Group, Department of Natural Resources and Environmental Engineering, School of Aerospace Engineering, University of Vigo, 32004, Ourense, Spain; 3Geotech Group, Department of Natural Resources and Environmental Engineering, School of Forestry Engineering, University of Vigo, 36005, Pontevedra, Spain

Automatic Detection and Characterisation of Power Lines and Their Surroundings Using LiDAR Data
Miguel Yermo García, Jorge Martínez Sánchez, Oscar García Lorenzo, David López Villariño, José C. Cabaleiro Domínguez, Tomás Fernández Pena, Francisco Fernández Rivera
CIITUS, Centro Singular de Investigación en Tecnologías de la Información, Spain

TLS Point Cloud Registration for Detecting Change in Individual Rocks of a Mountain River Bed
Agata Walicka1,2, Norbert Pfeifer2, Grzegorz Jóźków1, Andrzej Borkowski1
1Wroclaw University of Environmental and Life Sciences, Poland; 2Vienna University of Technology, Austria

TLS Point Cloud Registration Based on ICP Algorithm Using Point Quality
Hiroaki Date1, Eisuke Wakisaka2, Yoshinori Moribe3, Satoshi Kanai3
1Hokakido University; 2Shinryo Corporation; 3Sanki Engineering Corporation
The automatic generation of an adaptive navigation model for indoor map matching

Pengyuan Wang$^{1,2}$, Jianga Shang$^{1,2}$, Zhiyong Zhou$^3$, Yijie Wu$^{1,2}$, Weixin Sun$^4$
$^1$Faculty of Information Engineering, China University of Geosciences, 430074 Wuhan, China; $^2$National Engineering Research Center for Geographic Information System, 430074 Wuhan, China; $^3$GIScience Center, Department of Geography, University of Zurich; $^4$Beijing Satellite Navigation Center, Beijing, China

Indoor Positioning Based-On Images Aided by Artificial Neural Networks

Mei-Qin Hung, Jhen-Kai Liao, Kai-Wei Chiang
National Cheng Kung University, Taiwan

Adaptive Strategy-based Tightly-coupled INS/GNSS Integration System Aided by Odometer and Barometer

Yu Chi Tien, You Liang Chen, Kai Wei Chiang
National Cheng Kung University, Taiwan (R.O.C.)
ISSDQ-02: Spatial Data Quality on Images

Mountainous Remote Sensing Images Registration Based on Improved Optical Flow Estimation

Ruitao Feng, Xinghua Li, Huanfeng Shen
Wuhan University, China, People's Republic of

Comparative Study of The Different Versions of The General Image Quality Equation

Alvaro Quinteros Valenzuela, Juan Carlos Galvez Reyes
Chilean Air Force, Chile

Quality Check of Crisis Maps Produced over Five Years by Copernicus EMS

Katarina Spasenovic, Daniela Carrion
Politecnico di Milano, Italy
LS-03: Registration and Change Detection

**Change Detection Between Digital Surface Models from Airborne Laser Scanning and Dense Image Matching Using Convolutional Neural Networks**

**Zhenchao Zhang**, George Vosselman, Markus Gerke, Claudio Persello, Devis Tuia, Michael Ying Yang

1 University of Twente, Faculty ITC, the Netherlands; 2 Institute of Geodesy and Photogrammetry, Technical University of Brunswick; 3 Wageningen University and Research

**Fast Pairwise Coarse Registration Between Point Clouds of Construction Sites using 2D Projection Based Phase Correlation**

Rong Huang, Zhen Ye, Richard Boerner, Wei Yao, Yusheng Xu, Uwe Stilla

1 Photogrammetry and Remote Sensing, Technical University of Munich, 80333 Munich, Germany; 2 Department of Land Surveying and Geo-Informatics, The Hong Kong Polytechnic University, Hung Hom, Hong Kong

**Mobile Mapping of the La Corona Lavatube on Lanzarote**

Helge Andreas Lauterbach, Dorit Borrmann, Andreas Nüchter, Angelo Pio Rossi, Vikram Unnithan, Patrizio Torrese, Riccardo Pozzobon

1 Julius-Maximilians-University Würzburg, Germany; 2 Jacobs University Bremen gGmbH, Germany; 3 Università di Pavia, Italy; 4 Università di Padova, Italy
UAVG-09a: UAV for Mapping: Experiences and Best Practices

Time: Wednesday, 12/Jun/2019: 2:30pm - 3:30pm · Location: Waaier 1

Session Chair: Markus Gerke
Session Chair: Caroline Gevaert

Photogrammetric Assessment and Comparison of DJI Phantom 4 Pro and Phantom 4 RTK Small Unmanned Aircraft Systems

Maria Valasia Peppa, James Hall, James Goodyear, Jon Mills
Newcastle University, United Kingdom

UAV-based cadastral mapping: An assessment of the impact of flight parameters and ground truth measurements on the absolute accuracy of derived orthoimages

Claudia Stöcker¹, Francesco Nex¹, Mila Koeva¹, Markus Gerke²
¹University of Twente, Netherlands, The; ²Technische Universität Braunschweig, Germany

Evaluation of Camera Positions and Ground Points Quality in a GNSS-NRTK Based UAV Survey: Preliminary Results from a Practical Test in Morphological Very Complex Areas

Emanuele Tufarolo¹,², Claudio Vanneschi³, Marco Casella⁴, Riccardo Salvini¹,²
¹Department of Physical Sciences, Earth and Environment, University of Siena; ²Centre of Geotechnologies, University of Siena; ³CGT Spinoff s.r.l.; ⁴AeroDron s.r.l.
UAVG-09b: ITS4LAND II

Time: Wednesday, 12/Jun/2019: 2:30pm - 3:30pm  ·  Location: Carré 2K
Session Chair: Mila Koeva

SMARTSKEMA: Bringing Land Tenure Sketch Maps to Life
Malumbo Chipofya, Sahib Jan
University of Muenster, Germany

Towards Cadastral Intelligence
Sophie Crommelinck
University of Twente, Netherlands, The

Publish and Share - Integrated ITS4LAND Tools into a Common Platform
Christian Timm
Hansa Luftbild, Germany
An RGB-D Data Processing Framework for Mapping Indoor Environments
Walid Darwish1,2, Wenbin Li2, Shengjun Tang1, Yaxin Li2, Wu Chen2
1Vrije Universiteit Brussels, Belgium; 2The Hong Kong University; 3Shenzhen University

Reinforcement Learning and SLAM Based Approach for Mobile Robot Navigation in Unknown Environments
Khaled Mustafa1, Nicolo Botteghi1, Beril Sirmacek1, Mannes Poel2, Stefano Stramigioli1
1Robotics and Mechatronics, Faculty of Electrical Engineering, Mathematics and Computer Science, University of Twente, The Netherlands; 2Data Science, Faculty of Electric Engineering, Mathematics and Computer Science, University of Twente, The Netherlands

Indoor Scene Registration Based on Siamese Network and PointNet
Zheng Zhang1, Chenglu Wen1, Yiping Chen1, Wei Li1, Changbin You1, Cheng Wang1, Jonathan Li1,2
1Xiamen University, China, People's Republic of; 2University of Waterloo, Waterloo, Canada

A Frequency-Drift Compensated Closed-Form Solution for Stereo RGB-D Mapping
Shengjun Tang1, Qing Zhu1, Wu Chen3, WeiXi Wang1, You Li1, Walid Darwish1, Wenbin Li1
1Research Institute for Smart Cities & Shenzhen Key Laboratory of Spatial Information Smart Sensing and Services, School of Architecture and Urban Planning, Shenzhen University, Shenzhen, PR China; 2Faculty of Geosciences and Environmental Engineering of Southwest Jiaotong University, Chengdu, China; 3Department of Land Surveying & Geo-Informatics, The Hong Kong Polytechnic University, Hung Hom, Hong Kong, China

Closing Indoor3D
Zhizhong Kang
China University of Geosciences
ISSDQ-03: The Latest in Methodology of Spatial Data Quality

Time: Wednesday, 12/Jun/2019: 4:00pm - 5:30pm · Location: Waaier 3
Session Chair: Wenzhong Shi
Session Chair: Mahmoud Delevar

Quality Control for Crowdsourcing Large Scale Topographic Maps
Irit Bekker Peretz, Yaron Felus
Survey of Israel, Israel

A New Thinking of LULC Classification Accuracy Assessment
Ke-Sheng Cheng1,2, J.L. Ling1, T.W. Lin1, Y.T. Liu1, Y.C. Shen1, Y. Kono2
1Department of Bioenvironmental Systems Engineering, National Taiwan University, Taiwan; 2Master Program in Statistics, National Taiwan University; 3Kyoto University

Classification Accuracy Assessment for Regional Vector Data Product Based on Spatial Sampling: A Case Study of Japan
Yao Lu1,2, Jixian Zhang3, Xiaohua Tong1, Wenli Han2, Haitao Zhao3
1Tongji University, Shanghai, People's Republic of China; 2National Quality Inspection and Testing Center For Surveying and Mapping Products, Beijing, People's Republic of China

A Process-Oriented Spatiotemporal Clustering Method for Complex Trajectories
Jingyi Liu, cunjin Xue, chengbin Wu, qing Dong
Aerospace Information Research Institute, CAS, China

SDQO and SfO, Ontologies for Spatial Data Quality Assessment
Cemre YILMAZ, Cetin COMERT, Deniz YILDIRIM
Karadeniz Technical University, Turkey
LS-04: Environmental Mapping

Time: Wednesday, 12/Jun/2019: 4:00pm - 5:30pm  ·  Location: Waaier 2

Session Chair: Martin Rutzinger
Session Chair: Michael James Olsen

L1-norm Fitting of Elliptic Paraboloids with Prior Information for Enhanced Coniferous Tree Localization in ALS Point Clouds

Przemyslaw Polewski, Wei Yao, Marco Heurich
1The Hong Kong Polytechnic University, Hong Kong S.A.R. (China); 2Bavarian Forest National Park, 94481 Grafenau, Germany; 3University of Freiburg, 79106 Freiburg, Germany

Comparison of Forest Structure Metrics Derived from UAV LiDAR and ALS Data

Moritz Bruggisser, Markus Hollaus, Daniel Kükenbrink, Norbert Pfeifer
1Department of Geodesy and Geoinformation, TU Wien, Austria; 2Remote Sensing Laboratories, Department of Geography, University of Zurich, Switzerland

The Potential of Dual-Wavelength Terrestrial Laser Scanning in 3D Canopy Fuel Moisture Content Mapping

Ahmed Elsherif, Rachel Gaulton, Jon Mills
Newcastle University, United Kingdom

Potential and Limitations of Terrestrial Laser Scanning for Discontinuity Roughness Estimation

Maja Bitenc, Kieffer D. Scott, Khoshelham Kourosh
1Graz University of Technology, Austria; 2The University of Melbourne, Victoria, Australia

Unmanned Aerial Vehicle Laser Scanning for Erosion Monitoring in Alpine Grassland

Andreas Mayr, Magnus Bremer, Martin Rutzinger, Clemens Geitner
1University of Innsbruck, Austria; 2Austrian Academy of Sciences, Austria
UAVG-10: UAV Photogrammetry II

Time: Wednesday, 12/Jun/2019: 4:00pm - 5:30pm · Location: Waaier 1
Session Chair: Francesco Nex

Investigations on the Geometric Quality of Cameras for UAV Applications Using the High Precision UAV Test Field Zollern Colliery
Heinz-Jürgen Przybilla¹, Markus Gerke², Isabelle Dikhoff², Yahya Ghassoun²
¹Lab for Photogrammetry, Bochum University of Applied Sciences, Germany; ²Institute of Geodesy and Photogrammetry, TU Braunschweig, Germany

Simulation and Analysis of Photogrammetric UAV Image Blocks: Influence of Camera Calibration Error
Yilin Zhou, Ewelina Rupnik, Christophe Meynard, Christian Thom, Marc Pierrot-Deseilligny
LaSTIG, IGN, ENSG, University Paris-Est, F-94160 Saint-Mande, France

Closing UAV-g
Francesco Nex
University of Twente, The Netherlands
Evaluation of Digital Elevation Models for Geomorphometric Analyses on Different Scales for Northern Chile

_Tanja Kramm, Dirk Hoffmeister_
Institute of Geography, University of Cologne, Germany

Soil Moisture Analysis Using Multispectral Data in North Central Part of Mongolia

_Enhjargal Natsagdorj¹, Tsolmon Renchin², Philippe De Maeyer¹, Batchuluun Tseveen³, Chimgee Dari⁴, Erdenebaatar Dashdondog⁵_
¹Dept. of Geography, Ghent University, Belgium; ²NUM-ITC-UNESCO Laboratory for Space Science and Remote Sensing, National university of Mongolia, Mongolia; ³Dept. of Environment and Forest Engineering, National University of Mongolia, Mongolia; ⁴Dept. of Management, School of Business, National University of Mongolia, Mongolia; ⁵Dept. of Physics, National University of Mongolia, Mongolia

A Preliminary Quality Analysis of the Climate Change Initiative Land Cover Products for Continental Portugal

_Cidália Costa Fonte¹, Myroslava Lesiv², Linda See², Steffen Fritz²_
¹Department of Mathematics, University of Coimbra, Portugal; Institute for Systems Engineering and Computers at Coimbra (INESCC), Coimbra, Portugal; ²International Institute for Applied Systems Analysis, Laxenburg, Austria

Sensitivity of Actual Evapotranspiration estimation using the SEBS Model to variation of input parameters (LST, DSSF, aerodynamics parameters, LAI, FVC)

_Nesrine Abid¹, Chris M Mannaerts², Bargaoui Zoubeida¹_
¹Université de Tunis El Manar, Ecole Nationale d'ingénieurs de Tunis, ENIT (Tunisia); ²University of Twente, Faculty of Geo-Information Sciences and Earth Observation (ITC) (the Netherlands)

Evaluation of The Long-Term Effects of Exposure to Greenspace on Type 2 Diabetic Patients: Case Study - Tehran, Iran

_Amin Esmaeilzadeh¹, Mahmoud reza Delavar¹, Ensieh Nasil-Esfahani²_
¹College of Engineering, University of Tehran, Tehran, Iran; ²Tehran University of Medical Sciences, Tehran, Iran
JS-03: Single Photon Lidar

Time: Thursday, 13/Jun/2019: 9:00am - 10:30am · Location: Waaier 1
Session Chair: Martin Rutzinger
Session Chair: Cheng Wang

Craig Glennie
University of Houston, United States of America

A Comparison of Single Photon and Full Waveform LiDAR
Gottfried Mandlburger1,2, Hubert Lehner3, Norbert Pfeifer1
1TU Vienna, Department of Geodesy and Geoinformation, Austria; 2University of Stuttgart, Institute for Photogrammetry, Germany; 3City of Vienna, Municipal Department 41, Austria

Investigation into the Potential of Single Photon Airborne Laser Scanning Technology
Charly Bernard1, Jon Mills2, Julià Talaya3, Fabio Remondino4
1ENSG, IGN, France; 2Newcastle University, UK; 3Institut Cartogràfic i Geològic de Catalunya, Spain; 4FBK Trento, Italy

Optimisation Of The Calibration Process of a K-TLS Based Multi-Sensor-System by Genetic Algorithms
Jens Hartmann, Ilka von Gösseln, Niklas Schild, Alexander Dorndorf, Jens-André Paffenholz, Ingo Neumann
Leibniz University Hannover, Geodetic Institute, Germany
PRSM-01: Planetary Mapping

Time: Thursday, 13/Jun/2019: 9:00am - 10:30am
Location: Waaier 3
Session Chair: Kaichang Di
Session Chair: Jürgen Oberst

Keynote: Exploring Europa with EIS — The Europa Imaging System
Randolph Kirk
United States Geological Survey, United States of America

Multi-resolution 3D Mapping of RSLs at Valles Marineris
Yu Tao, Jan-Peter Muller
Imaging Group, Mullard Space Science Laboratory, University College London

Atmospherically Compensated Shape from Shading on the Martian Surface: Towards the Perfect Digital Terrain Model of Mars.
Marcel Hess¹, Kay Wohlfarth¹, Arne Grumpe¹, Christian Wöhler¹, Ottaviano Ruesch², Bo Wu³
¹Image Analysis Group, TU Dortmund, 44227 Dortmund, Germany; ²European Space Research and Technology Center, Noordwijk, the Netherlands; ³Department of Land Surveying and Geo Informatics, The Hong Kong Polytechnic University, Hung Hom, Kow-loon, Hong Kong

Bahareh Kalantar1, Naonori Ueda1, Husam A. H. Al-Najjar2, Mohamed Barakat A. Gibril2, Usman Salihu Lay4, Alireza Motevalli5
1RIKEN Center for Advanced Intelligence Project, Goal-Oriented Technology Research Group, Disaster Resilience Science Team, Tokyo 103-0027, Japan; 2Centre for Advanced Modelling and Geospatial Information Systems (CAMGIS), Faculty of Engineering and IT, University of Technology Sydney, 2007 NSW, Australia; 3Research Institute of Sciences and Engineering, University of Sharjah, Sharjah 27272, UAE; 4Department of Civil Engineering, Faculty of Engineering, Universiti Putra Malaysia, Serdang, Selangor, Malaysia; 5Department of Watershed Management Engineering, College of Natural Resources, Tarbiat Modares University, Noor, Mazandaran, Iran

The Roles of Urban Buildings and Vegetation in Adjusting Seasonal and Daily Air Temperature

Yuliang Lan1,2,3, Zhengdong Huang1,2,3, Renzhong Guo1,2,3, Qingming Zhan4
1Research Institute for Smart Cities, School of Architecture and Urban Planning, Shenzhen University, Shenzhen, PR China; 2Laboratory of Spatial Information Smart Sensing and Services, School of Architecture and Urban Planning, Shenzhen University, Shenzhen, PR China; 3Key Laboratory for Geo-Environmental Monitoring of Coastal Zone of the National Administration of Surveying, Mapping and Geoinformation, Shenzhen University, Shenzhen, PR China; 4Collaborative Innovation Center of Geospatial Technology, 129 Luoyu Road, Wuhan 430079, PR China

Spatiotemporal Change of Urban Agriculture Using Google Earth Imagery: A Case of Municipality of Nakhonratchasima City, Thailand

yaowaret jantakat1, Pongpun Juntakut2, Sasikarn Plaiklang3, Worapon Arre1, Chomphak Jantakat4
1Rajamangala University of Technology Isan; 2Academic Division of Chulachomklao Royal Military Academy; 3Rambhaibarni Rajabhat University; 4Vongchavalitkul University
Correction of Mobile Mapping Trajectories in GNSS-Denied Environments Using Aerial Nadir and Aerial Oblique Images

Philipp Fanta-Jende¹, Francesco Nex¹, Markus Gerke², George Vosselman¹
¹University of Twente, Faculty ITC, the Netherlands; ²Braunschweig University of Technology

Deep Lidar Odometry

Qing Li¹, Cheng Wang¹-², Shaoyang Chen¹, Xin Li¹, Chenglu Wen¹, Ming Cheng¹, Jonathan Li¹-⁴
¹Fujian Key Laboratory of Sensing and Computing for Smart City and the School of Information Science and Engineering, Xiamen University, Xiamen 361005, China; ²Fujian Collaborative Innovation Center for Big Data Applications in Governments, Fuzhou 350003, China; ³Geometric and Visual Computing (GVC) Group, Louisiana State University, USA; ⁴GeoSTARS Lab, the Department of Geography and Environmental Management, University of Waterloo, Canada

Hybrid Orientation of Airborne LiDAR Point Clouds and Aerial Images

Philipp Glira¹-², Norbert Pfeifer¹, Gottfried Mandlburger¹-³
¹TU Vienna, Department of Geodesy and Geoinformation, Vienna, Austria; ²Austrian Institute of Technology (AIT), Vienna, Austria; ³University of Stuttgart, Institute for Photogrammetry, Stuttgart, Germany

Progress on ISPRS Benchmark on Multisensory Indoor Mapping and Positioning

Cheng Wang¹, Yudi Dai¹, Naser Elsheimy², Chenglu Wen¹, Guenther Retscher², Zhizhong Kang⁴, Andrea Lingua⁵
¹Xiamen University, China, China, People's Republic of; ²University of Calgary, Canada; ³Vienna University of Technology, Austria; ⁴China University of Geosciences, Beijing, China; ⁵Polytechnic University of Turin, Italy
Discussion on “Spatial Data Quality and Uncertainty Assessment in Smart Cities”

Alfred Stein¹, Wenzhong Shi², Mahmoud Delavar³

¹University of Twente, The Netherlands; ²The Hong Kong Polytechnic University; ³University of Tehran

Closing ISSDQ

Alfred Stein¹, Wenzhong Shi², Mahmoud Delavar³

¹University of Twente, The Netherlands; ²The Hong Kong Polytechnic University; ³University of Tehran
JS-04: Big Data

Time: Thursday, 13/Jun/2019: 11:00am - 12:30pm · Location: Waaier 1

Session Chair: Jan Boehm
Session Chair: Eric Guilbert

Keynote: nD-PointCloud for Managing Massive Data Sets
Peter van Oosterom
TU Delft, Netherlands, The

Piecewise-Planar Approximation of Large 3D Data as Graph-Structured Optimization
Stephane Guinard, Loic Landrieu, Laurent Caraffa, Bruno Vallet
IGN, France

A Fast Voxel-Based Indicator for Change Detection Using Low Resolution Octrees
Joachim Gehrung1,2, Marcus Hebel1, Michael Arens1, Uwe Stilla2
1Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB, Germany; 2Technische Universität Muenchen

K-Nearest Neighbour Query Performance Analyses on a Large Scale Taxi Dataset: Postgresql vs. Mongodb
Ihsan Bugra Coskun1, Sibel Sertok2, Berk Anbaroglu3
1Dept. of Geomatics Engineering, Hacettepe University, Turkey; 2Dept. of Statistics, Hacettepe University, Turkey; 3Dept. of Geomatics Engineering, Hacettepe University, Turkey
Planetary3D: A Photogrammetric Tool for 3D Topographic Mapping of Planetary Bodies
Han Hu, Bo Wu
Department of Land Surveying and Geo-Informatics, The Hong Kong Polytechnic University

Performance Evaluation of 3DPD, a Photogrammetric Pipeline for the Cassis Stereo Images
Cristina Re1, Stepan Tulyakovb2, Emanuele Simioni1, Teo Mudric1, Gabriele Cremonese1, Nicolas Thomas3
1INAF Osservatorio Astronomico di Padova, Vicolo dell’Osservatorio 5, 35122, Padova, Italy; 2Dept. of Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland; 3Physics Institute, Space Research and Planetary Sciences - University of Bern, Sidlerstrasse 5, 3012 Bern, Switzerland

Bundle Adjustment of Spaceborne Double-Camera Push-Broom Imagers and its Application to LROC NAC Imagery
Isabel Haase1, Philipp Gläser1,2, Jürgen Oberst1,3
1Technical University Berlin, Germany; 2Ronin Institute for Independent Scholarship, USA; 3German Aerospace Center, Germany

A Generic Rigorous Sensor Model for Photogrammetric Processing of Pushbroom Planetary Images
Xun Geng1,2, Shuai Xing1, Qing Xu1
1Zhengzhou Institute of Surveying and Mapping, China; 2X’ian Information Technique Institute of Surveying and Mapping, China

Vision Based Obstacle Detection using Rover Stereo Images
Yexin Wang1, Man Peng1, Kaichang Di1, Wenhui Wan1, Zhaoqin Liu1, Zongyu Yue1, Yan Xing3, Xiaoyan Mao2, Baoyi Teng2
1State Key Laboratory of Remote Sensing Science, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, China; 2Beijing Institute of Control Engineering, Beijing, China
Keynote: Urban Energy Simulation and Semantic 3D City Models: a Return on Experiences with CitySim

Jérôme Kaempf
Ecole Polytechnique Fédérale de Lausanne, Switzerland

Unbroken Digital Data Flow in the Built Environment Process - A Case Study in Sweden

Per-Ola Olsson¹, Tim Johansson¹, Helen Eriksson¹,², Thomas Lithen³, Lars-Håkan Bengtsson⁴, Josefine Axelsson⁵, Ulrika Roos⁴, Karin Neland⁴, Birgitta Ryden¹, Lars Harrie¹

¹Department of Physical Geography and Ecosystem Science, Lund University, Sweden; ²Lantmäteriet - the Swedish mapping, cadastral and land registration authority, Sweden; ³Sweco, Sweden

Geobim Benchmark 2019: Design and Initial Results

Francesca Noardo¹, Ken Arroyo Ohori¹, Filip Biljecki², Thomas Krijnen², Claire Ellul¹, Lars Harrie⁴, Jantien Stoter¹

¹Department of Urbanism, Delft University of Technology, Delft (The Netherlands); ²Department of Architecture, National University of Singapore, Singapore; ³Department of Civil, Environmental and Geomatic Engineering, University College London, London, UK; ⁴Department of physical geography, Lund University, Lund, Sweden.; ⁵Department of the Built Environment - Eindhoven University of Technology (The Netherlands)
IS-04: Gold sponsor presentations: IGI and Agisoft

**Time:** Thursday, 13 Jun 2019: 1:15pm - 2:15pm  
**Location:** Waier 2  
**Session Chair:** Siavash Hosseinyalamdary

1:15pm - 1:45pm  
**Modular Multi Sensor Systems from IGI**  
Nazeer Saeed  
IGI mbH, Germany

1:45pm - 2:15pm  
**New features in Agisoft Metashape**  
Boris Simiyutin  
AgiSoft, Russia
Performance of GNSS Carrier-Tracking Loop Based on Kalman Filter in A Challenging Environment
Yiran Luo1,2,3, Chunyang Yu1, Jian Li1,2, Naser El-Sheimy3
1Radar Research Lab, School of Information and Electronics, Beijing Institute of Technology, Beijing, China; 2Key Laboratory of Electronic and Information Technology in Satellite Navigation (Beijing Institute of Technology), Ministry of Education, Beijing, China; 3Department of Geomatics Engineering, University of Calgary, Calgary, Canada

A Comparison of UWB and Motion Capture UAV Indoor Positioning
Andrea Masiero, Francesca Fissore, Riccardo Antonello, Angelo Cenedese, Antonio Vettore
University of Padua, Italy

Hyperbolic Distortion Model for Radial Distortion Correction
Guy Blanchard Ikokou1, Lloyd Smit Julian2
1Thswean University of Technology, South Africa; 2University of Cape Town

Investigation of Sustainable Urban Development Direction Considering Social, Economic, and Environmental Perspectives Using Geospatial Information Systems (Case Study: Zanjan City)
Zohreh Masoumi1, John Van Genderen2
1Departament of Earth Science, Institute for Advanced Studies in Basic Sciences, Iran, Islamic Republic of; 2Department of Earth Observation Sciences (ITC), University of Twente, Enschede

Indoor Positioning Using Convolution Neural Network to Regress Camera Pose
Jing-Mei Ciou, Hsueh-Chan Lu
Department of Geomatics, National Cheng Kung University, Taiwan

Hierarchical Data Model for Storage and Indexing of Massive Street View
Mingyi Du, Jian Wang, Changfeng Jing, Jie Jiang, Qiang Chen
School of Geomatics and Urban Spatial Informatics, Beijing University of Civil Engineering and Architecture, Beijing, China

A Novel Denoising Algorithm for Airborne LiDAR Point Cloud Based on Empirical Mode Decomposition
Zhenyang Hui, Penggen Cheng, Leyang Wang, Yuanping Xia, Haiying Hu, Xiaoning Li
East China University of Technology, China, People's Republic of

An Instrumental Basis for Multispectral Lidar with Spectrally-Resolved Distance Measurements
David Salido-Monzú, Andreas Wieser
ETH Zurich, Switzerland

Automated Visibility Field Evaluation of Traffic Sign Based On 3D LiDAR Point Clouds
Shanxin Zhang1,3, Chen Wang1, Ming Cheng1, Jonathan Li4
1Fujian Key Laboratory of Sensing and Computing for Smart City, School of Information Science and Engineering, Xiamen University, Xiamen, China; 2Xizang Key Laboratory of Optical Information Processing and Visualization Technology, Information Engineering College, Xizang Minzu University, Xianyang, China; 3Department of Geography and Environmental Management, Faculty of Environment, University of Waterloo, Waterloo, Canada

An Improved Coherent Point Drift Method for TLS Point Cloud Registration of Complex Scenes
Yufu Zang1,2, Roderik Lindenbergh2
1School of Remote Sensing & Geomatics Engineering, Nanjing University of Information Science & Technology; 2Department of Geoscience and Remote Sensing, Delft University of Technology

Extraction of Leaf Angle Distribution from an Individual Broadleaf Tree Using Terrestrial Laser Scanning Data
Yiming Chen1, Zhengjun Liu1, Wuming Zhang2, Chen Qiao3
1Chinese Academy of Surveying & Mapping, Beijing 100036, China; 2Institute of Remote Sensing Science and Engineering, Faculty of Geographical Science, Beijing Normal University, Beijing 100875, China; 3Department of Earth System Science, Tsinghua University, Beijing 100084, China

Image-Based Vehicle Tracking from Roadside Lidar Data
Jiaxing Zhang1, Wen Xiao1, Benjamin Coifman2, Jon Mills1
1Newcastle University, Newcastle upon tyne, United Kingdom; 2The Ohio State University, Columbus, USA
Integration of A Low-Cost Multisensory UAV System for Forest Application
Jianping Li¹, Bisheng Yang¹, Yangzi Cong¹, Senlei Li¹, Yuanwen Yue²
¹State Key Laboratory of Information Engineering in Survey, Mapping and Remote Sensing, Wuhan University; ²School Of Resource And Environmental Science, Wuhan University

Low-Cost Wheeled Robot-Borne Laser Scanning System for Indoor and Outdoor 3D Mapping Application
W. Wu, C. Chen, Y. Cong, Z. Dong, J. Li, S. Li, W. Dai, B. Yang
State Key Laboratory of Information Engineering in Survey, Mapping and Remote Sensing, Wuhan University

MLS Point Cloud Segmentation Based on Feature Points of Scanlines
Ryohei Honma¹, Hiroaki Date², Satoshi Kanai²
¹Asia Air Survey Co., Ltd.; ²Graduate School of Information Science and Technology, Hokkaido University

Orthographic Reflectance Image for Planar Target Localization in Low Density TLS Point Clouds
Dongxu Guo¹, Dapeng Yu¹, Yubin Liang¹, Chenyang Feng¹
¹Tianjin Normal University, China, People's Republic of; ²Shen Kan Engineering & Technology Corporation, MCC, China, People's Republic of

Simulating Unmanned-Aerial-Vehicle Based Laser Scanning Data for Efficient Mission Planning in Complex Terrain
Magnus Bremer¹,², Volker Wichmann³, Martin Rutzinger², Thomas Zieher², Jan Pfeiffer²
¹University of Innsbruck, Innsbruck, Austria; ²Institute for Interdisciplinary Mountain Research, Austrian Academy of Sciences, Innsbruck, Austria; ³Laserdata GmbH, Innsbruck, Austria

Trajectory-Based Visualization of MMS Point Clouds
Genki Takahashi¹,², Hiroshi Masuda¹
¹The University of Electro-Communications; ²Kokusai Kogyo Co., Ltd., Japan
Aircraft Based Real Time Bundle Adjustment and Digital Surface Model Generation
Pablo d'Angelo, Franz Kurz
German Aerospace Center (DLR), Germany

Some Improvements on the Orientation of an Oblique Aerial Digital Camera
Michael Gruber, Gerhard Kniewasser
Vexcel Imaging GmbH, Austria

Calibration and Orientation of Modular Multiple Camera Systems
Phillipp Grimm
IGI Systems, Germany
LS-05: Segmentation and Detection

Time: Thursday, 13/Jun/2019: 2:30pm - 3:30pm · Location: Waier 1
Session Chair: Wen Xiao
Session Chair: Mario Soñán Rodríguez

Describing the Vertical Structure of Informal Settlements on the Basis of Lidar Data - A Case Study for Favelas (Slums) in Sao Paulo City

Silvio Cesar Lima Ribeiro1,2, Malgorzata Jarzabek-Rychard1, Jorge Pimentel Cintra1, Hans-Gerd Maas4
1Polytechnic School and Paulista Museum, Sao Paulo University, Brazil; 2Urbanism Secretariat, Sao Paulo City Hall, Brazil; 3Institute of Geodesy and Geoinformation Science, Technische Universität Berlin, 10623 Berlin Germany; 4Institute of Photogrammetry and Remote Sensing, Technische Universität Dresden, 01069 Dresden Germany

Structural Segmentation of Point Clouds with Varying Point Density Based on Multi-Size Supervoxels

Yuan Li, Bo Wu
The Hong Kong Polytechnic University, Hong Kong S.A.R. (China)

Automatic Road Structure Detection and Vectorization using MLS Point Clouds

Xiaoxin Mi1, Bisheng Yang1, Chi Chen1, Ming Yang2, Zhen Dong1
1State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan, China; 2Shanghai Surveying & Mapping Institute, China
Lateral Variations in Bulk Density and Porosity of The Upper Lunar Crust from High-Resolution Gravity and Topography Data: Comparision of Different Analysis Techniques

Daniel Wahl¹, Jürgen Oberst¹,²
¹Technische Universität Berlin, Chair of Planetary Geodesy, 10623 Berlin, Germany; ²German Aerospace Center (DLR), Department of Planetary Geodesy, 12489 Berlin, Germany

Lunar Surface Sampling Feasibility Evaluation Method for Chang’e-5 Mission

Jia Wang¹, Chuanling Ma¹, Zining Zhang¹, Yexin Wang², Man Peng², Wenhui Wan², Xiaomeng Feng¹, Xiaoxue Wang¹, Ximing He¹, Yi You¹
¹Beijing Aerospace Control Center, Beijing, China; ²State Key Laboratory of Remote Sensing Science, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, China

The Overview of The Planetary Atmospheric Spectral Telescope (PAST) in The Scientific Experimental System in Near-Space (SENSE)

Qingyu Meng¹, Fei He², Weiguo Zhao¹, Kejun Wang¹, Libao Yang¹, Jihong Dong¹, Xiaodong Wang¹
¹Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China, People's Republic of; ²Institute of Geology and Geophysics, Chinese Academy of Sciences
Semantic Validation of Social Media Geographic Information: A Case Study on Instagram Data for Expo Milano 2015

Federica Migliaccio, Daniela Carrion, Francesco Ferrario
Politecnico di Milano, Italy

Spatio-Temporal Modelling & the New Urban Agenda in Post-Apartheid South Africa

Baleseng Tholoheko Mokoena¹, Thembani Moyo², Eric Nyembezi Makoni³, Walter Musakwa³
¹City of Ekurhuleni, South Africa; ²Department of Operations and Quality Management, University of Johannesburg, South Africa; ³Department of Town and Regional Planning, University of Johannesburg, South Africa
C3MGBD-02: Remote Sensing Solutions

Time: Thursday, 13 Jun 2019 4:00pm - 5:30pm · Location: Waier 3
Session Chair: Eric Guilbert
Session Chair: Ken Arroyo Ohori

V-RSIR: A Web-Based Tool and Benchmark Dataset for Remote Sensing Image Retrieval
Dongyang Hou², Huaqiao Xing³
¹School of Geosciences and Info-Physics, Central South University, Changsha, Hunan, China; ²College of Geography and Environment, Shandong Normal University, Jinan, Shandong, China; ³School of Surveying and Geo-Informatics, Shandong Jianzhu University, Jinan, Shandong, China

Extending Accuracy Assessment Procedures of Global Coverage Land Cover Maps through Spatial Association Analysis
Daniele Oxoli¹, Gorica Bratic¹, Hao Wu¹,², Maria Antonia Brovelli¹
¹Politecnico di Milano, Italy; ²National Geomatics Center of China, China

Design and Implementation of Crowdsourcing Based China's National Public Geographic Information Collection System
Hongping Zhang¹,², Jie Jiang², Wei Huang¹, Liang Yang¹
¹National Geomatics Center of China, China, People's Republic of; ²School of Geomatics and Urban Spatial Information, Beijing University of Civil Engineering and Architecture, Beijing, China

A Semantic Retrieval System for Remote Sensing Web Platforms
Gilles-Antoine Nys¹, Jean-Paul Kasprzyk¹, Pierre Hallot², Roland Billen¹
¹Geomatics Unit, University of Liège, Belgium; ²LNA-DIVA, University of Liège, Belgium
COW-03: Navigation and Dynamic Networks

Time: Thursday, 13/Jun/2019: 4:00pm - 5:30pm · Location: Waaier 4
Session Chair: Steffen Schön
Session Chair: Craig Glennie

Keynote: GNSS in Urban Areas – Benefits and Limits of Collaborative Positioning
Steffen Schön
Leibniz Universität Hannover, Germany

Collaborative Navigation Simulation Tool Using Kalman Filter with Implicit Constraints
Nicolas Garcia Fernandez, Steffen Schön, Hamza Alkhatib
Leibniz Universität Hannover, Germany

What Can Dynamic Geodetic Networks Do for Sensor Orientation?
Ismael Colomina, Marta Blazques, Pere Molina
Geonumerics

ON RAW INERTIAL MEASUREMENTS IN DYNAMIC NETWORKS
Davide Antonio Cucci, Jan Skaloud
Geodetic Engineering Laboratory, EPFL, Switzerland
LS-06: Intensity and Full Waveform

Time: Thursday, 13 Jun/2019: 4:00pm - 5:30pm · Location: Waaier 1

Session Chair: Martin Weinmann
Session Chair: Kourosh Khoshelham

Combined Multiple Classified Datasets Classification Approach for Point Cloud LiDAR Data

Nagwa El-Ashmawy¹, Ahmed Shaker²
¹Survey Research Institute, National Water Research Center - Egypt; ²Ryerson University, Toronto - Canada

Pavement Marking Reflectivity Evaluation Through Radiometric Calibration of The Leica P40 Terrestrial Laser Scanner

Erzhuo Che, Michael James Olsen, Chris Parrish, Jaehoon Jung
Oregon State University, United States of America

Automatic IN-SITU Self-Calibration of A Panoramic TLS from A Single Station Using 2D Keypoints

Tomislav Medic, Heiner Kuhlmann, Christoph Holst
University of Bonn, Germany

Detection and Extraction of Water Bottom Topography from Laserbathymetry Data by using Full-Waveform-Stacking Techniques

David Mader¹, Katja Richter¹, Patrick Westfeld², Robert Weiß³, Hans-Gerd Maas¹
¹Technische Universität Dresden, Germany; ²Federal Maritime and Hydrographic Agency (BSH), Germany; ³German Federal Institute of Hydrology, Germany

Closing Laser Scanning

Jan Boehm
University College London, United Kingdom
PRSM-04: Feature Extraction from Planetary Data

*Time:* Thursday, 13/Jun/2019: 4:00pm - 5:30pm · *Location:* Carré 2K
*Session Chair:* Randolph Kirk
*Session Chair:* Emerson Speyerer

**Automated Detection of Lunar Ridges Based on DEM Data**
*Man Peng, Yexin Wang, Zongyu Yue, Kaichang Di*
Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences

**Assessment of Feature Detectors and Descriptors in Remote Images of Planetary Bodies**
*Emerson Speyerer*
Arizona State University, United States of America

**Anomaly Detection Performance Comparison on Anomaly-Detection Based Change Detection on Martian Images**
*Alfiah Rizky Diana Putri, Panagiotis Sidiropoulos, Jan-Peter Muller*
University College London, United Kingdom

**A Gradient-Region Constrained Level Set Method for Autonomous Rock Detection from Mars Rover Image**
*Juntao Yang, Zhizhong Kang*
China university of Geoscience, China, People's Republic of

**Relief of Mercury and The Moon: from Morphometry to Morphological Mapping**
*Anastasia Zharkova¹²³, Maria Kolenkina¹, Alexander Kokhanov¹, Irina Karachevtseva¹*
¹Moscow State University of Geodesy and Cartography (MIIGAIK), Russian Federation; ²Moscow State University Sternberg Astronomical Institute, Russian Federation; ³Russian Federation
SGA-04: Traffic Applications

Time: Thursday, 13/Jun/2019: 4:00pm - 5:30pm · Location: Waaier 2

Session Chair: Mila Koeva
Session Chair: Giorgio Agugiaro

Application Research of LOD Technology and The Shortest Path Algorithm in Traffic Geographic Information System

Xunhu Zhang¹, Xunlian Zhang², He Zhang¹
¹National Quality Inspection and Testing center for Surveying and Mapping product, China, People's Republic of; ²Renfeng Town Central Primary School, Jiyang District, Jinan City, Shandong Province, China

Exploring the Relationship Between Travel Pattern and Social-Demographics Using Smart Card Data and Household Survey

Yang Zhang, Tao Cheng, Nilufer Sari Aslam
University College London, United Kingdom

Ranking Nodes in Complex Networks: A Case Study of The Gabus

Thembani Moyo, Walter Musakwa
University of Johannesburg, South Africa

Local Maximum Density Approach for Small-scale Clustering of Urban Taxi Stops

Han Wang¹, Xiao-Jian Chen², Ying Wang¹, Jie Shan²
¹School of Remote Sensing and Information Engineering, Wuhan University, Wuhan 430079, China; ²State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, Wuhan 430079, China; ³Lyles School of Civil Engineering, Purdue University, West Lafayette, IN 47907, USA

Closing SmartGeoApps

Giorgio Agugiaro¹, Mila Koeva²
¹Delft University of Technology, The Netherlands; ²University of Twente, The Netherlands
C3MGBD-03: Road Network

Time: Friday, 14/Jun/2019: 9:00am - 10:30am · Location: Waaier 4
Session Chair: Maria Antonia Brovelli
Session Chair: Daniele Oxoli

Floating Car Data (FCD) for Mobility Applications
Andrea Ajmar1, Emere Arco2, Piero Boccardo2, Francesca Perez1
1ITHACA, Torino, Italy; 2Politecnico di Torino, Italy

A Method of Urban Road Network Extraction Based on Floating Car Trajectory Data
Chunlei Mi1,2, Feng Lu1,2
1Institute of Geographic Sciences and Natural Research, CAS, China; 2Chinese Academy of Sciences, China

Updating a Road Network Dataset Exploiting the Results of Semantic Segmentation Techniques Applied to Street-Level Imagery
Andrea Ajmar1, Emere Arco2, Piero Boccardo2, Fabio Giulio Tonolo3, Janine Yoong4
1ITHACA Information Technology for Humanitarian Assistance, Cooperation and Action, Torino, Italy; 2Politecnico di Torino - DIST, Torino, Italy; 3Politecnico di Torino - DAD, Torino, Italy; 4 Mapillary Inc., Brooklyn NY, USA

Road Network Comparison and Matching Techniques. A Workflow Proposal for The Integration of Traffic Message Channel and Open Source Network Datasets
Emere Arco1, Andrea Ajmar2, Piero Boccardo1
1Politecnico di Torino, Italy; 2ITHACA Information Technology for Humanitarian Assistance, Cooperation and Action, Turin, Italy

Analysis of Roads in Tanzania, Uganda and Kenya Using Free and Open Source Software
Stefan Jovanovic, Dina Jovanovic, Gorica Bratic, Maria Antonia Brovelli
Politecnico di Milano, Italy
COW-04: Calibration I

Time: Friday, 14/Jun/2019: 9:00am - 10:30am · Location: Waaier 2
Session Chair: Norbert Haala
Session Chair: Antonio Maria Garcia Tommaselli

Calibration of Airborne Camera Systems with Diffractive Optical Elements
Dennis Dahike, Henry Meißner, Matthias Geßner, Karsten Stebner, Denis Grießbach, Ralf Berger, Anko Börner
German Aerospace Centre, Germany

Camera Calibration with Irrational Radial Distortion Model with Analytical Solutions
Guy Blanchard Ikokou¹, Lloyd Smit Julian²
¹Tswane University of Technology, South Africa; ²University of Cape Town

Automatic Detection and Labelling of Photogrammetric Control Points in a Calibration Test Field
David Jarron¹, Mozdeh Shahbazi¹, Derek Lichti¹, Robert Radovanovic²
¹Dept. of Geomatics Engineering, University of Calgary, T2N 1N4 Calgary AB, Canada; ²McElhanney Geomatics Engineering Ltd., T2G 0Y4 Calgary, AB, Canada

Automatic Camera System Calibration with A Chessboard Enabling Full Image Coverage
Jürgen Wohlfeil, Denis Grießbach, Ines Ernst, Dirk Baumbach, Dennis Dahlke
German Aerospace Center, Institute of Optical Sensor Systems

Assessment of Chromatic Aberrations for GoPro 3 Cameras in Underwater Environments
Petra Helmholz¹, Derek Lichti²
¹Discipline of Spatial Sciences, School for Earth and Planetary Sciences, Curtin University, Australia; ²Department of Geomatics Engineering, The University of Calgary, Canada
JS-05: SAR in Cryosphere and Hydrosphere

Keynote: ARGOS, a Geosynchronous SAR Satellite to Observe Land, Ice, Hydrosphere and Atmosphere

Ramon Hanssen
TU Delft, Netherlands, The

Seasonal Comparison of Velocity of The Eastern Tributary Glaciers, Amery Ice Shelf, Antarctica, Using Sar Offset Tracking

Shridhar D. Jawak¹, Shubhang Kumar², Alvarinho J. Luis³, Prashant H. Pandit⁴, Sagar F. Wankhede⁵, Anirudh Tharaventhadath Somadasg⁶
¹Svalbard Integrated Arctic Earth Observing System (SIOS), SIOS Knowledge Centre, University Centre in Svalbard (UNIS), Norway; ²Central University of Jharkhand, Ranchi, India; ³Earth System Science Organization- National Centre for Polar and Ocean Research, Ministry of Earth Sciences, India; ⁴National Bureau of Soil Survey and Land Use planning (NBSS & LUP) - Indian Agriculture Research Institute (IARI), India; ⁵University of Twente Faculty ITC, Netherlands

Validation of ASMR2 Sea Ice Concentration Data Using Modis Data

Kohei Cho, Ryohei Nagao, Kazuhiro Naoki
Tokai University, Japan

Investigations on Vertical Land Movements Along the North Sea and Baltic Sea Coast in Germany with PS Interferometry

Anika Riedel, Bjoern Riedel, Dieter Tengen, Markus Gerke
Institute of Geodesy and Photogrammetry, Technische Universität Braunschweig, Germany
PRSM-05: Chang'E-4 Mission

Time: Friday, 14/Jan/2019: 9:00am - 10:30am · Location: Waaier 3
Session Chair: Jürgen Oberst
Session Chair: Bo Wu

Topographic Analysis of Chang'e-4 Landing Site Using Orbital, Descent and Ground Data
Kaichang Di1, Zhaqin Liu1, Bin Liu1, Wenhui Wan1, Man Peng1, Jian Li2, Jianfeng Xie2, Mengna Jia1, Shengli Niu1, Xin Xin1, Lichun Li2, Jia Wang2, Zongyu Yue2, Sheng Gu1, Yexin Wang1, Runzhi Wang1, Jia Liu1, Zhong Bo1, Chuankai Liu2, Tianyi Yu1, Luhua Xi2, Yi Miao Miao2
1Institute of Remote Sensing and Digital Earth Chinese Academy of Sciences, China, People's Republic of; 2Beijing Aerospace Control Center, Beijing, China

High Precision DTM and DOM Generating Using Multi-Source Orbital Data on Chang'e-4 Landing Site
Bin Liu, Shengli Niu, Xin Xin, Mengna Jia, Kaichang Di, Zhaqin Liu, Man Peng, Zongyu Yue
Institute of Remote Sensing and Digital Earth Chinese Academy of Sciences, China, People's Republic of

Descent and Landing Trajectory Recovery Of Chang'e-4 Lander Based on Decent Images
Wenhui Wan1, Zhaqin Liu1, Bin Liu1, Kaichang Di1, Jia Wang2, Chuankai Liu2, Tianyi Yu2, Yi Miao1, Man Peng1, Yexin Wang1, Sheng Gu1
1Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences; 2Beijing Aerospace Control Center

Potential Geologic Issues of Von Kármán Crater Revealed by Multisource Remote Sensing Data
Zhiguo Meng1,2,3, Huihui Wang1, Shengbo Chen1, Jinsong Ping1, Qian Huang1, Zhanhuan Cai2, Yunzhao Wu3, Lixin Xing1, Yangang Wu1
1Jilin University, China, People's Republic of; 2Macau University of Science and Technology, Macau; 3National Astronomical Observatory of CAS, China, People's Republic of; 4China University of Geosciences, China, People's Republic of; 5Purple Mountain Observatory, Chinese Academy of Sciences, China

Closing PRSM
Bo Wu
The Hong Kong Polytechnic University
**C3MGBD-04: Crowdsourced and VGI Data I**

**Time:** Friday, 14/Jun/2019: 11:00am - 12:30pm  ·  **Location:** Waaier 4

**Session Chair:** Cidália Costa Fonte  
**Session Chair:** Serena Coetzee

**Volunteer Geographic Information in Africa**  
*Aster Denekew Yilma*  
United Nations Economic Commission for Africa, Ethiopia

Traffic Event Detection Using Twitter Data Based on Association Rules  
*Shishuo Xu1,2, Songnian Li1, Richard Wen1, Wei Huang2*  
1Department of Civil Engineering, Ryerson University, 350 Victoria St., Toronto, ON M5B 2K3, Canada; 2School of Environment Science and Spatial Informatics, China University of Mining and Technology, No. 1 Daxue Road, Xuzhou, Jiangsu 221116, China

Towards Establishing an Open Catalogue for Geospatial Educational Resources  
*Victoria Rautenbach1, Serena Coetzee1, Arzu Coltekin2, Chris Pettit1, Lauren Pijper1, Marguerite Madden1, Sidonie Christophe1, Ochiroo Lkhamjav3*  
1University of Pretoria, South Africa; 2University of Applied Sciences Northwestern Switzerland, Switzerland; 3UNSW, Australia

Monitoring SDG 9 with Global Open Data and Open Software - A Case Study from Rural Tanzania  
*Codrina Ilie1, Maria Brovelli2, Serena Coetzee3*  
1Technical University of Civil Engineering of Bucharest, Bucharest, Romania; 2Politecnico di Milano, Italy; 3University of Pretoria, South Africa

Using and Improving Mapathon Data Through Hackathons  
*Serena Coetzee1, Victoria Rautenbach1, Cameron Green1, Kiev Gama2, Nicoline Fourie1, Breno Goncalves2, Nishanth Sastry4*  
1Centre for Geoinformation Science, Department of Geography, Geoinformatics and Meteorology, University of Pretoria, South Africa; 2Federal University of Pernambuco (UFPE), Brazil; 3Council for Scientific and Industrial Research, South Africa; 4King’s College London, Great Britain
CHGCS-01: The Changing Cryosphere I

Time: Friday, 14/Jun/2019: 11:00am - 12:30pm · Location: Carré 2K
Session Chair: Rongxing Li
Session Chair: Hansheng Wang

Ice Sheet Elevation Mapping and Change Detection with the Ice, Cloud and Land Elevation Satellite-2
Beata Maria Csatho¹, Anton Franz Schenk¹, Thomas Neumann¹
¹University at Buffalo, Buffalo, NY, United States of America; ²NASA Goddard Space Flight Center, Greenbelt, MD, United States of America

Mass Balance of Antarctic Ice Sheet from 2003 to 2008: A Systematically Improved New Estimation
Rongxing Li¹², Huan Xie¹², Yixiang Tian¹², Wenjia Du¹², Jiajin Chen¹², Gang Hai¹², Shanshan Zhang¹³, Xiaohua Tong¹³
¹Center for Spatial Information Science and Sustainable Development Applications, Tongji University, Shanghai; ²College of Surveying and Geo-Informatics, Tongji University, Shanghai

Noise Reduction and Interpretation of Ice-Penetrating Radar Data in Antarctic Ice Sheet based on Variational Mode Decomposition
Xueyuan Tang, Siyuan Cheng, Jingxue Guo
Polar Research Institute of China, China, People's Republic of

Preliminary Results of Sea Ice Freeboard Measurements of Beaufort Sea From Cryosat-2 Altimetry
Shengkai Zhang, Yaowen Zuo, Feng Xiao, Lexian Yuan, Tong Geng, Yue Xuan
Wuhan University, China, People's Republic of

Ice Flow Velocity Mapping of East Antarctica from 1963 to 1989
YUAN CHENG¹², XUEWEI LI¹², GANG QIAO¹², WENKAI YE¹², YONG HUANG¹², YANJUN LI¹², KANGLE WANG¹², YIXIANG TIAN¹², XIAOHUA TONG¹², RONGXING LI¹²
¹Center for Spatial Information Science and Sustainable Development, Tongji University, 1239 Siping Road, Shanghai, China; ²College of Surveying and Geo-Informatics, Tongji University, 1239 Siping Road, Shanghai, China
COW-05: Calibration II

Time: Friday, 14/Jun/2019: 11:00am - 12:30pm · Location: Waaser 2

Session Chair: Michael Cramer
Session Chair: Naser El-Showimy

Real-Time on-Orbit Calibration of Angles Between Star Sensor and Earth Observation Camera for Optical Surveying and Mapping Satellites

Wei Liu1, Hui Wang2, Weijiao Jiang3, Fangming Qian2, Leiming Zhu4

1Xi'an Research Institute of Surveying and Mapping, China, People's Republic of; 2State Key Laboratory of Integrated Service Network, Xidian University, Xi'an, China; 3Information Engineering University, Zhengzhou, China; 4Centre of TH-Satellite of China, Beijing, China

Automatic Calibration and Co-Registration for a Stereo System and a Thermal Imaging Sensor using a Chessboard

Andre Choinowski, Dennis Dahlke, Ines Ernst, Sebastian Pless, Immanuel Rettig

German Aerospace Centre, Germany

Reliability of The Geometric Calibration of an Hyperspectral Frame Camera

Maria Angela Musci, Irene Aicardi, Paolo Dabose, Andrea Maria Lingua

Politecnico di Torino, Italy

Performance Evaluation of Sequential Band Orientation by Polynomial Models in Hyperspectral Cubes Collected with UAV

Adilson Berveglieri1, Antonio M. G. Tommaselli1, Guilherme Santos1, Lucas D. Santos1, Eija Honkavaara2

1Unesp - Sao Paulo State University, Brazil; 2FGI - Finnish Geospatial Research Institute

Closing EuroCOW-M3DMaN

Michael Cramer

Universität Stuttgart, Germany
HYPER-01: Analysis of Hyperspectral Data

Time: Friday, 14/Jun/2019: 11:00am - 12:30pm · Location: Waager 1
Session Chair: Eija Honkavaara
Session Chair: Martin Weinmann

Opening HyperMLPA
Martin Weinmann, Sina Keller
Karlsruhe Institute of Technology, Germany

Keynote: Deep Learning for the Processing of Hyperspectral Data: Over a Decade of History
Jocelyn Chanussot
Grenoble Institute of Technology, France

Soil Texture Classification with 1D Convolutional Neural Networks based on Hyperspectral Data
Felix M. Riese, Sina Keller
Karlsruhe Institute of Technology (KIT), Germany

A Hybridization of An Improved Particle Swarm Optimization and Fuzzy K-Means Algorithm for Hyperspectral Image Classification
Qiang Chen, Jie Jiang, Mingyi Du, Lei Zhou, Changfeng Jing, Chang Lu
Beijing University of Civil Engineering and Architecture, China, People's Republic of
SARCON-01: Monitoring and object detection

Time: Friday, 14/Jun/2019: 11:00am - 12:30pm · Location: Waaier 3

Session Chair: Michele Crosetto
Session Chair: Uwe Soergel

Workable Monitoring System based on Spaceborne SAR Images for Mining Areas - STINGS Development Project

Chia-Hsiang Yang1, Andreas Müterthies1, Uwe Soergel2
1EFTAS Remote Sensing Transfer of Technology, Germany; 2Institute for Photogrammetry, University of Stuttgart, Germany

3D Estimation of Slow Ground Motion using InSAR and The Slope Aspect Assumption, A Case Study: The Puncak Pass Landslide, Indonesia

Noorlaila Isya1,2, Wolfgang Niemeier1, Markus Gerke1
1Institute of Geodesy and Photogrammetry, Technical University of Braunschweig, Germany; 2Department of Geomatics Engineering, Sepuluh Nopember Institute of Technology, Indonesia

Radar Remote Sensing Applications in Landslide Monitoring with Multi-platform InSAR Observations: a Case Study from China

Tengteng Qu1,2, Qiang Xu2, Chun Liu3, Zhenhong Li3, Bo Chen1, Keren Dai2
1College of Engineering, Peking University, Beijing 100871, China; 2State Key Laboratory of Geohazard Prevention and Geoenvironment Protection, Chengdu University of Technology, Chengdu 610059, China; 3College of Surveying and Geo-Informatics, Tongji University, Shanghai 200092, China; 4COMET, School of Engineering, Newcastle University, Newcastle Upon Tyne NE1 7RU, UK

InSAR Analysis of Ayvacik 2017 (Mw 5.3) Earthquake Swarm (Çanakkale, Nw-Turkey)

Saygin Abdikan1, Mumin Imamoglu2, Tolga Alasag2, Mustafa Toker3, Senol Hakan Kutoglu1, Sakir Sahin4
1Zonguldak Bulent Ecevit University, Turkey; 2TÜBİTAK Bilgem, Turkey; 3Yüzüncü Yıl University, Turkey; 4Süleyman Demirel University, Turkey

Multiple-Point Geostatistics to Derive Missing Surface Displacement Values of A Glacier Inferred from Dinsar

Bhuwan Ranjit1, Valentyn A. Tolpekin2, Alfred Stein2
1Land Management Training Centre, Ministry of Land Management, Cooperatives and Poverty Alleviation, Dhulikhel, Kavrepalanchok, Nepal; 2Dept. of Earth Observation Science, Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, Hengelostraat 99, 7514 AE Enschede, The Netherlands
PS-05: Poster session

Application of Sentinel-1 SAR Imagery for Floods Damage Assessment: A Case Study of Nakhon Si Thammarat, Thailand
Gautam Dadhich, Hiroyuki Miyazaki, Mukand S Babel
Asian Institute of Technology, Thailand

PollInSAR Based Scattering Information retrieval for Forest Aboveground Biomass Estimation
Neeraj Agrawal¹, Shashi Kumar², Valentyn Tolpekin³
¹Iora Ecological Solutions Pvt. Ltd., New Delhi, India; ²Indian Institute of Remote Sensing, Dehradun, India; ³Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, The Netherlands

Trajectory Extraction for Analysis of Unsafe Driving Behaviour
Christian Koetsier, Steffen Busch, Monika Sester
Leibniz University Hannover, Germany

DSM and DTM for Extracting 3D Building Models: Advantages and Limitations
Francesca Fissore¹,², Francesco Pirotti¹,²
¹CIRGEO Interdepartmental Research Center of Geomatics, University of Padova, Italy; ²TESAF Department, University of Padova, Italy

Exploring the Potential of Crowd Sourced Data to Map Commuter Points of Interest: a Case Study of Johannesburg
Thembani Moyo, Walter Musakwa
University of Johannesburg, South Africa

Geomatic Methods Applied to The Change Study of the La Paúl Rock Glacier, Spanish Pyrenees
Adrián Martinez-Fernández¹, Enrique Serrano³, José Juan Sanjose², Manuel Gómez-Lende³, Alfonso Pisabarro¹, Manuel Sánchez²
¹Dept. of Geography, University of Valladolid, Valladolid, Spain; ²Dept. of Graphic Expression, Polytechnic School, University of Extremadura, Cáceres, Spain; ³GIR PANGEA, University of Valladolid, Valladolid, Spain

Ground Point Filtering from Airborne Lidar Point Clouds Using Deep Learning: A Preliminary Study
Eric Janssens-Coron, Eric Guilbert
Department of Geomatics Sciences, Université Laval, Québec, Canada

The Vertical Land Motion of Tide Gauge and Absolute Sea Level Rise in Bohai Sea
Dongxu Zhou¹, Weikang Sun¹,², Yanguang Fu¹,², Xinghua Zhou¹,²
¹The First Institute of Oceanography, Ministry of Natural Resources, China, People’s Republic of; ²Shandong University of Science and Technology

Mapping Velocity of The Potsdam Glacier, East Antarctica Using Landsat-8 Data
Shridhar D. Jawak¹, Mansi Joshi¹,², Alvarinho J. Luis³, Prashant H. Pandit⁴, Shubhang Kumar⁴, Sagar F. Wankhede⁴, Anirudh Tharaventhedath Somadas⁵
¹Svalbard Integrated Arctic Earth Observing System (SIOS), SIOS Knowledge Centre, University Centre in Svalbard (UNIS), Norway; ²Mangalore University, Mangalore, Karnataka, India; ³Indian Institute of Science, Bangalore, Karnataka, India; ⁴Earth System Science Organization-National Centre for Polar and Ocean Research, Ministry of Earth Sciences, India; ⁵National Bureau of Soil Survey and Land Use planning (NBSS & LUP) - Indian Agriculture Research Institute (IARI), India; ⁶Central University of Jharkhand, Ranchi, India; ⁷University of Twente Faculty ITC, Netherlands

Evaluating Glacier Dynamics Using Temporal Remote Sensing Images: A Case Study of Hunza Valley, Northern Pakistan
Muhammad Shafique¹,², Babar Faiz¹, Alamsher Bacha¹
¹National Centre of Excellence in Geology, University of Peshawar, Pakistan, Pakistan; ²Faculty of Environmental Design, King Abdulaziz University, Kingdom of Saudi Arabia

Multi-Source Satellite Observations Reveal Evolution Pattern of Riffs in The Filchner-Ronne Ice Shelf, Antarctica
Rongxing Li¹,², Da Lv¹,², Haifeng Xiao¹,², Shijie Liu¹,², Yuan Cheng¹,², Gang Hai¹,², Xiaohua Tong¹,²
¹Center for Spatial Information Science and Sustainable Development Applications, Tongji University, Shanghai, China; ²College of Surveying and Geo-Informatics, Tongji University, Shanghai, China
Application of Hyperspectral Thermal Emission Spectrometer (HyTES) data for HyspIRI optimal Band Positioning to Characterize Surface Minerals
Saleem Ullah, Arshad Iqbal
Institute of Space Technology, Islamabad, Pakistan

Comparative Analysis of SVM, ANN and CNN for Classifying Vegetation Specie Using Hyperspectral Thermal Infrared Data
Mehmood ul Hasan, saleem ullah, muhammad jaleed khan, khurram khursid
Institute of Space Technology Islamabad, Pakistan

Feature Filtering and Selection for Dry Matter Estimation on Perennial Ryegrass: a Case Study of Vegetation Indices.
Gustavo Togeiro de Alckmin¹,², Lammert Kooistra², Arko Lucieer¹, Richard Rawnsley¹,³
¹University of Tasmania, Australia; ²Wageningen University; ³Tasmanian Institute of Agriculture

Spectral Preprocessing for Hyperspectral Remote Sensing of Heavy Metals in Water
Mengshan Lee, Xin-Yu Chen, Hui-Chun Lee
National Kaohsiung University of Science and Technology, Taiwan

Comparision of Object Based Machine Learning Classifications of Planetscope and Worldview-3 Satellite Images for Land Use / Cover
Aylin Tuzcu, Gulsen Taskin, Nebiye Musaoğlu
Istanbul Technical University, Turkey

Classification of Tree Species on the Basis of Tree Bark Texture
Lene Ganschow¹, Tom Thiele¹, Niklas Deckers², Ralf Reulke²
¹VINS 3D GmbH, Berlin, Germany; ²HU-Berlin, Germany
C3MGBD-05: Crowdsourced and VGI Data II

**Time:** Friday, 14/Jun/2019: 2:30pm - 3:30pm  ·  **Location:** Waailer 2

**Session Chair:** Berk Anbaroglu
**Session Chair:** Paul Vincent Kuper

**Database-Supported Change Analysis and Quality Evaluation of OpenStreetMap Data**

Alexander Martini¹, Paul Vincent Kuper², Martin Breunig²

¹Disy Informationssysteme GmbH, ²Karlsruhe Institute of Technology (KIT)

**Spatial Database Model for Mobility Management**

Emere Arco¹, Andrea Ajmar², Piero Boccardo¹

¹Politecnico di Torino, Italy; ²ITHACA Information Technology for Humanitarian Assistance, Cooperation and Action, Turin, Italy

**Closing C3M&GBD**

Maria Antonia Brovelli¹, Éric Guilbert²

¹Politecnico di Milano, Italy; ²Université Laval, Canada
Sea Level Trend and Variability in The South China Sea

Yanguang Fu¹,², Xinghua Zhou¹,², Dongxu Zhou¹, Weikang Sun², Chuanling Jiang²
¹First Institute of Oceanography, Ministry of Natural Resources; ²College of Geodesy and Geomatics, Shandong University of Science and Technology

Extraction of Rivers and Lakes on Tibetan Plateau Based on Google Earth Engine

R.G. Xu¹, G. Qiao², Y.J. Wu², Y.J. Cao³
¹College of Surveying and Geo-Informatics, Tongji University, Siping Road 1239, Shanghai 200092, China; ²College of Surveying and Geo-Informatics, Tongji University, Siping Road 1239, Shanghai 200092, China; ³College of Surveying and Geo-Informatics, Tongji University, Siping Road 1239, Shanghai 200092, China

Converse Trends of The Terrestrial and Ground Water Storage Changes in Canada and the United States

Hansheng Wang¹,², Longwei Xiang¹, Holger Steffen³, Patrick Wu⁴, Liming Jiang¹, Qiang Shen¹, Dimitrios Piretzidis⁵, Michael G. Sideris⁶, Masaki Hayashi⁷, Lulu Jia⁸
¹State Key Laboratory of Geodesy and Earth's Dynamics, Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan 430077, China; ²University of Chinese Academy of Sciences, Beijing 100049, China; ³Lantmäteriet, 80182 Gävle, Sweden; ⁴Department of Geoscience, University of Calgary, Calgary T2N 1N4, Canada; ⁵Department of Geomatics Engineering, University of Calgary, Calgary T2N 1N4, Canada; ⁶National Earthquake Infrastructure Service, Beijing 100036, China
Fusion of Hyperspectral, Multispectral, Color and 3D Point Cloud Information for the Semantic Interpretation of Urban Environments

Martin Weinmann¹, Michael Weinmann²
¹Karlsruhe Institute of Technology, Germany; ²University of Bonn, Germany

Land Use and Land Cover Classification Using Hyperspectral Imagery: Evaluating the Performance of Spectral Angle Mapper, Support Vector Machine and Random Forest Classifiers

Luiz Eduardo Christovam, Guilherme Gomes Pessoa, Milton Hirokazu Shimabukuro, Maria de Lourdes Bueno Trindade Galo

São Paulo State University, School of Sciences and Technology, Presidente Prudente, SP, Brazil

Comparison of Pixel and Region-Based Approaches for Tree Species Mapping in Atlantic Forest Using Hyperspectral Images Acquired by UAV

Gabriela Takahashi Miyoshi¹, Nilton Nobuhiro Imai¹, Antonio Maria Garcia Tommaselli¹, Eija Honkavaara²
¹São Paulo State University, Brazil; ²Finnish Geospatial Research Institute FGI, Finland
A Persistent Scatterer Interferometry Procedure to Monitor Urban Subsidence
Michele Crosetto1, Oriol Monserrat1, Anna Barra1, María Cuevas-González1, Vrinda Krishnakumar1, Marek Mróz2, Bruno Crippa3
1Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Division of Geomatics, Spain; 2Institute of Geodesy, University of Warmia and Mazury in Olsztyn, Poland; 3University of Milan, Department of Earth Sciences, Italy

Monitoring the Surface Subsidence of Handan City Using Sentinel-1A Images and SBAS-InSAR Technology
Guoman Huang1,2, Huan Chen1,2, Xi Li1,2, Guoqi Cheng1,2, Zhigang Yu1,2, Haiyan Gu1
1College of Geomatics, Shandong University of Science and Technology, Qingdao 266590, China; 2Key Laboratory of Geo-Informatics of State Bureau of Surveying and Mapping, Chinese Academy of Surveying and Mapping, 100830 Beijing, China

Evaluation of A PSI-Based Change Detection Regarding Simulation, Comparison, and Application
Chia-Hsiang Yang, Uwe Soergel
Institute for Photogrammetry, University of Stuttgart, Germany

Closing SarCon
Uwe Soergel1, Michele Crosetto2
1Universität Stuttgart, Germany; 2CTTC, Spain
Detecting Citrus Huanglongbing in Brazilian Orange Orchard Using Hyperspectral Aerial Images
Érika Akemi Saito Moriya¹⁴, Nilton Nobuhiro Imai¹, Antonio Maria Garcia Tommaselli¹, Adilson Berveglieri¹, Eija Honkavaara¹, Márcio Augusto Soares³, Marcelo Marino¹
¹Unesp, Brazil; ²Finnish Geodetic Institute; ³Agroterenas; ⁴Fundunesp

Estimating Chlorophyll A Concentrations of Several Inland Waters with Hyperspectral Data and Machine Learning Models
Philipp M. Maier, Sina Keller
Karlsruhe Institute of Technology, Germany

The Superspectral/Hyperspatial Worldview-3 as The Link Between Spaceborne Hyperspectral and Airborne Hyperspatial Sensors: The Case Study of The Complex Tropical Coast
Antoine Collin¹², Mark Andel³, Dorothée James¹, Joachim Claudet¹⁴
¹EPHE, PSL Université Paris, 35800 Dinard, France; ²LabEx CORAIL, Moorea, French Polynesia; ³DigitalGlobe Foundation, 80234 Westminster, Colorado, USA; ⁴National Center for Scientific Research, PSL Université Paris, CRIOBE, 75005 Paris, France

Closing HyperMLPA
Martin Weinmann, Sina Keller
Karlsruhe Institute of Technology, Germany
Monitoring Sub-Weekly Evolution of Surface Velocity and Elevation for a High-Latitude Surging Glacier Using Sentinel-2

Bas Altena, Odin Næss Haga, Christopher Nuth, Andreas Kääb
University of Oslo, Norway

Investigation on Mountain Glacier Ice Storage and its Changes during 2000-2016 Combine Ground and Satellite Observation in Western Tibetan Plateau

Yinsheng Zhang, Xiaojuan Zou, Haifeng Gao
Institute of Tibetan Plateau Research, Chinese Academy of Sciences, China

Remote Sensing of Global Monthly Evapotranspiration with an Energy Balance (EB) Model

Xuelong Chen¹, Bob Su², Yaoming Ma¹
¹Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China; ²Faculty of Geo-Information Science and Earth Observation, University of Twente,

Monitoring alpine Glaciers from Close-range to Satellite Sensors

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Deformation Monitoring of High-Latitude Permafrost Region of Northeastern China with Time Series InSAR Technique

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