Thank you to our sponsors

Platinum sponsors

esa  iTres  HySpex

Gold sponsors

Malvern Panalytical  SphereOptics  Headwall

Silver sponsors

ReSe APPLICATIONS

Other sponsors

Photon Systems Instruments  CzechGlobe

Media partner

remote sensing  an Open Access Journal by MDPI
Overview

Workshop Venue
Masaryk University Campus, Kamenice 5

Tutorials and Excursions
CzechGlobe, Bělidla 986/4a

Ice Breaker
Brno Observatory and Planetarium, Kraví hora 522/2

Workshop Dinner
Starobrn Brewery, Mendlovo náměstí 158/20

Workshop Programme
page 8–14
Welcome to EARSeL Imaging Spectroscopy Workshop, Brno 2019

CzechGlobe and the Workshop organizing committee warmly welcome you to 11th EARSeL SIG Imaging Spectroscopy Workshop in Brno. The Workshop of the EARSeL Special Interest Group on Imaging Spectroscopy aims to continue the long-term international discussion among researchers and specialists working with innovative imaging spectroscopy Earth Observation technologies. As imaging spectroscopy increasingly expands from traditional airborne platforms towards new ground-based, unmanned airborne and satellite systems, it is finding its way to interdisciplinary research addressing today’s key environmental and societal challenges. At the same time, novel prospective spectral signals, as for instance chlorophyll fluorescence or thermal emissions, are being intensively explored.

The 11th EARSeL SIG Imaging Spectroscopy Workshop in Brno brings together students and professionals from universities, research organizations and private companies to present, exchange and discuss their basic and applied research achievements, as well as newly developing concepts related to all aspects of imaging spectroscopy.

We hope that you will enjoy scientific presentations, posters, exhibition booths, complementary excursions and tutorials, followed by attractive social programme including tasting of good Czech beer.

We thank to the Workshop sponsors, members of the scientific and organizing committees, colleagues from the remote sensing team of CzechGlobe and student volunteers for all their efforts to make this Workshop a successful event.

Lucie Homolová and the local organizing team

Scientific Committee
Eyal Ben-Dor (Tel Aviv University, Israel)
Jocelyn Chanussot (Grenoble INP, France)
Jean-Baptiste Feret (Irstea, France)
Claudia Giardino (IREA CNR, Italy)
Luis Guanter (GFZ Potsdam, Germany)
Robert O. Green (NASA JPL, USA)
Lammert Kooistra (Wageningen University, The Netherlands)
Sebastian van der Linden (Humboldt University, Germany)
Zbyněk Malenovský (University of Tasmania, Australia)
Józse Moreno (University of Valencia, Spain)
Michael Rast (ESA ESRIN, Italy)
Miina Rautiainen (Aalto University, Finland)
Michael E. Schaeppman (University of Zürich, Switzerland)
Martin Schlerf (LIST, Luxembourg)
Christiaan van der Tol (University of Twente — ITC, The Netherlands)
Jochem Verrelst (University of Valencia, Spain)

Organizing Committee
Lucie Homolová (CzechGlobe, Czech Republic)
Jan Hanuš (CzechGlobe, Czech Republic)
Olga Brovkina (CzechGlobe, Czech Republic)
Petr Lukeš (CzechGlobe, Czech Republic)
František Zemek (CzechGlobe, Czech Republic)
Růžena Janoutová (CzechGlobe, Czech Republic)
Heide Bierbrauer (EARSeL Secretariat, Germany)
Lena Halounová (EARSeL Vice-Chair, Czech Technical University in Prague, Czech Republic)
Mathias Kneubühler (SIC IS Chairman, University of Zürich, Switzerland)
Andreas Müller (SIC IS Chairman, German Aerospace Centre DLR, Germany)
The Workshop is organized at the Masaryk University Campus, Kamenice 5, Brno.

**Plenary sessions** take place in the aula (A116).

**Parallel sessions** take place in the lecture rooms 205, 206 and 234.

The small lecture room 211 is available at your disposal to host small meetings, discussions during the Workshop and data practical session.

The corridor is reserved for **posters**, exhibitors and **catering**.
Practical Information

Posters

Please put up your posters on Wednesday morning on a panel with your poster ID (for poster IDs see pages 13 and 14). Posters will remain on the panels for the entire Workshop. We have two dedicated poster sessions:

- Poster session 1 — Wednesday 6 February 2019, 16.20 — 17.20, see page 13
- Poster session 2 — Thursday 7 February 2019, 12.40 — 13.40, see page 14

Oral Presentations

Oral presentations will be maximum 20 minutes long, including 3–4 minutes for discussion and changeover to the next speaker (your presentation should not be longer than 17 minutes). Keynote presentations will be maximum 35 minutes long, including 5 minutes for discussion.

Please upload your presentation to the computer in the respective lecture room before the start of your session. Personal laptops cannot be used.

Internet Access

Free WiFi access is available using login details given to each Workshop participant at the registration. Besides, eduroam is also available on the university campus.

Best contribution awards

EARSeL will award three best student presentations and posters at the end of the Workshop.

The Workshop scientific committee and the audience will vote and select the most outstanding research contributions that will be awarded with 33% discount on article processing charges in the special issue in Remote Sensing.

Scan to vote
The pre-workshop tutorials and excursions are organized on 5 February 2019 at CzechGlobe premises (Bělidla 986/4a, Brno).

One excursion to Flying Laboratory of Imaging System is also offered after the Workshop ends on 8 February 2019 at 15.00 (meeting point at the reception desk, Masaryk University Campus).

**Building A**

Tutorials and registration (room A120, ground floor)

**Building C**

Spectro lab (basement) and the meeting point for excursions (foyer)

5 Feb 2019
9.00 – 12.30
- Tutorial on ARTMO – a toolbox for optimizing and automating mapping of vegetation properties
  CzechGlobe – Lecture room A120
- Tutorial on laboratory spectroscopic measurements of leaf and soil optical properties
  CzechGlobe – Spectro lab

5 Feb 2019
13.30 – 17.00
- Tutorial on machine learning based unmixing using the EnMAP-Box
  CzechGlobe – Lecture room A120
- Excursion to Flying Laboratory of Imaging Systems at CzechGlobe
  Meeting point at CzechGlobe, building C foyer
- Excursion to Plant phenotyping facility at PSI
  Meeting point at CzechGlobe, building C foyer

8 Feb 2019
15.00 – 17.30
- Excursion to Flying Laboratory of Imaging Systems at CzechGlobe
  Meeting point at the reception desk, Masaryk University Campus
Ice Breaker

Ice Breaker will take place at Brno Observatory and Planetarium (Kraví hora 522/2, Brno).

Wednesday, 6 February 2019, 18:30 — 21:00

Bus transportation from the Workshop venue will be arranged, departure at 17:30.

If you wish to arrive at the Observatory and Planetarium individually, please, note that there is a traffic diversion, therefore you shall take bus X4 either at bus/tram stop Komenského náměstí (opposite the “red church”) or tram/trolley stop Ţudolní/Ťvoz (trolley 25, 26). No transportation will be provided on the way back, you can take bus X4 from “Náměstí míru” stop back to the city centre.
Workshop Dinner

The Workshop Dinner will take place at Starobrno Brewery (Mendllovo náměstí 158/20, Brno).

Thursday, 7 February 2019, 19.00 – 23.30

Please, arrive to the restaurant at the Mendel square individually. Mendel square is one of the main public transport hubs, well connected by trolleys 25 and 26, trams 1, 5 and 6.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location/Room</th>
<th>Chair/Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.30</td>
<td>Workshop Registration &amp; Office</td>
<td>WS: Registration &amp; Office – A22 Foyer</td>
<td></td>
</tr>
<tr>
<td>8.45</td>
<td>Opening session</td>
<td>A22 – Aula 116</td>
<td>Lucie Homolová, Dr. Klaus Ulrich Komp (EARSel Chair), Dr. Mathias Kneubühler (SIG Imaging Spectroscopy Chair), Prof. Michal V. Marek (CzechGlobe), Prof. Michael Rast (ESA)</td>
</tr>
<tr>
<td>9.20</td>
<td>KN1-1: Keynote 1</td>
<td>A22 – Aula 116</td>
<td>Zbyněk Malenovský</td>
</tr>
<tr>
<td></td>
<td>Update on Recent Developments in Imaging Spectroscopy from Space</td>
<td></td>
<td>Luis Guanter</td>
</tr>
<tr>
<td>10.30</td>
<td>Low-altitude UAV Remote Sensing Approaches for Vegetation Monitoring</td>
<td>Corridor</td>
<td>Helce Aasen</td>
</tr>
<tr>
<td>10.30</td>
<td>Coffee Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.00</td>
<td>SPACE1: Spaceborne Imaging Spectroscopy</td>
<td>A11 – Lecture room 205</td>
<td>Uta Heiden, Luuk Luander</td>
</tr>
<tr>
<td></td>
<td>The Photosynthetic fAPARch Canopy Fraction Among Six Sites Derived</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with EO-1 Hyperion Time-Serie</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The 2017 Decadal Survey: Surface Biology and Geology Science and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Application with Global Imaging Spectroscopy Observables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modelling The Seasonal Traits Of Production</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grasslands From UAV-Based Imaging Spectroscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of Bi-Temporal Hyperspectral Imagery to Determine the Influence</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of Soil Degradation on Rainfed Crop Yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of Bi-Temporal Hyperspectral Imagery To Determine The Influence</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of Soil Degradation on Rainfed Crop Yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.45</td>
<td>Lunch break (extended by instrument demo session)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.30</td>
<td>DEMO1-1: Instrument demonstration</td>
<td>Corridor</td>
<td></td>
</tr>
<tr>
<td>14.15</td>
<td>UAV demo flight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session/Event Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.15</td>
<td><strong>SPACE-2: Spaceborne Imaging Spectroscopy</strong> Location: A11 — Lecture room 205 Chair: Uta Heiden, Sebastian van der Linden</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radiometric Characterization, Calibration, and Correction for the Imaging Spectroscopy Mission EnMAP by TOBIAS STORCH, Hans-Peter Honold, Harald Krawczyk, Kevin Alonso Gonzales, Miguel Pato, Martin Bachmann, Richard Wachter, Martin Muecke, Sebastian Fischer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.00</td>
<td><strong>UAS-2: Imaging spectroscopy from UAS</strong> Location: A11— Lecture room 206 Chair: Helge Aasen, Eija Honkavaara</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drone-based Forest Inventory In Different Seasons Using High Resolution RGB Cameras And Hyperspectral Imaging by OLLI NEVALAINEN, Eija Honkavaara, Niko Viljanen, Raquel Alves de Oliveira, Roope Nasi, Teemu Hakala</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi Modal Sensing Fosters Drone Application In Breeding: An Example On Sugar Beet Tolerance to Beet Cyst Nematode by FRANK LIEBISCHE, Samuel Joalland, Claudio Screpant, Achim Walter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction Of Variable Relations For Improved Retrieval Of LAI Through the Soil-Leaf-Canopy Model Inversion by ASMAA MAHMoud ABDELBAKI, Martin Schlerf, Thomas Udelhoven</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessment Of Downey Mildew Infection on Grapevine Using Hyperspectral In Situ and UAV Data by MIRIAM MACHWITZ, Krittiya Pimkotr, Rebecca Retzlaff, Daniel Molitor, Gilles Rock, Mareike Schultz, Franz Ronellenfitsch, Christian Bossung, Marco Beyer, William Metz, Martin Schlerf</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hyperspectral Ortho-Mosaic From UAV-Borne Hyperspectral Imagery For Discriminating Different Grassland Management Regimes by JAYAN WIJESINGHA, Thomas Moeckel, Frank Hensgen, Michael Wachendorf</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>VEG-1: Spectroscopy of vegetation</strong> Location: A11 — Lecture room 234 Chair: Petr Lukeš, Miina Rautiainen</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A Novel Dataset For Testing Physical Reflectance Models Of Trees by AARNE HOVI, Petri Forssström, Giulia Chielmetti, Daniel Kiiänbrink, Felix Morsdorf, Michael Schaepman, Miina Rautiainen</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation Functional Photoprotection Dynamics Seen From Leaf Absorbance Features by SHARI VAN WITTENBERGAC, Luis Alonso, Zbynek Malenovsky, Jose Moreno</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>After this Talk You will always map Leaf Pigment Content and not Concentration by TEJA KATTENBORN, Felix Schier, Pablo Zarco-Tejada, Sebastian Schmidtlin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seasonal Course of Leaf Optical Properties and Traits — Linking Structure with Leaf Dorsiventral Reflectance by PETR LUKEŠ, Eva Neuwirthová, Růžena Janoutová, Zuzana Lhotáková, Jana Albrectová</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding Dynamics of Leaf Spectral Properties Under Bark Beetle Ips typographus, L) Infestation by HAIDI JAMAL ABDULLAH, Andrew K Skidmore, Roshanak Darvishzadeh, Marco Heurich</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.00</td>
<td><strong>Coffee Break</strong> Location: Corridor</td>
</tr>
<tr>
<td>16.20</td>
<td>POSTER-1: Poster session 1 Location: Corridor</td>
</tr>
<tr>
<td>17.20</td>
<td>Ice Breaker Location: Planetarium Brno Observatory and Planetarium—Transportation from the Workshop venue will be arranged.</td>
</tr>
<tr>
<td>18.30</td>
<td>Ice Breaker Location: Planetarium Brno Observatory and Planetarium—Transportation from the Workshop venue will be arranged.</td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8.15</td>
<td>Workshop Registration &amp; Office</td>
</tr>
<tr>
<td>8.45</td>
<td>KN-2: Keynote 2</td>
</tr>
<tr>
<td></td>
<td>Location: A22 – Aula 116</td>
</tr>
<tr>
<td></td>
<td>Chair: Lucie Homolová</td>
</tr>
<tr>
<td>10.00</td>
<td>The FLEX Satellite Mission – Update on the Mission Status and our Understanding of solar-induced Fluorescence measured on different Scales by UWE RASCHER</td>
</tr>
<tr>
<td></td>
<td>Modelling And Scaling Imaging Spectroscopy Signatures Of Terrestrial Photosynthesis by ZBYNĚK MALENOVSKÝ, Jean-Philippe Castellu-Etchevery, Tiangang Yin, Nuria Duran, Nicolas Laurent, Eric Chavanon, Jordan Guilleux, Jianbo Qi, Douglas Morton, Bruce Cook</td>
</tr>
<tr>
<td>10.00</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10.30</td>
<td>FLUO-1: Terrestrial Chlorophyll Fluorescence</td>
</tr>
<tr>
<td></td>
<td>Location: A11 – Lecture room 205</td>
</tr>
<tr>
<td></td>
<td>Chair: Uwe Rascher, Zbyněk Malenovský</td>
</tr>
<tr>
<td></td>
<td>Systematic Assessment Of Airborne Sun-Induced Fluorescence Maps By The Application Of Quality Criteria by VERA KRIEGER, Maria Matveeva, Patrick Rademske, Sergio Cogliati, Alexander Damm, Uwe Rascher</td>
</tr>
<tr>
<td></td>
<td>FLUOSPECCHIO: A Spectral Data Base System in Support of a Validation Network for the Upcoming Fluorescence Explorer (FLEX) Mission by ALEXANDER DAMM, Andreas Burkart, Marco Celesti, Sergio Cogliati, Andreas Hueni, Tommaso Julitta, Franco Miglietta, Dirk Schuettemeyer, Simon Trim, Roberto Colombo</td>
</tr>
<tr>
<td></td>
<td>Measuring Temporal Patterns of Crop Sun-induced Chlorophyll Fluorescence at Canopy and Plot Scale by NA WANC, Harm Bartholomeus, Lammert Kooistra, Juha Suomalainen, Benjamin Brede, Marcello Novani, Dainius Masiliunas, Jan Clevers</td>
</tr>
<tr>
<td></td>
<td>Combining Vegetation Traits with Multi/hyperspectral, Thermal and Fluorescence Measurements across different Scales and Plattforms – First Results from 2018 ESA FLEXSense Campaign by BASTIAN SIEGMANN, Maria Matveeva, Patrick Rademske, Onno Muller, Dzhaner Emin, Norman Wilke, Sascha Heinemann, Lars Grünhagen, Ines Munoz-Fernandez, Christoph Jedwobski, Paul Náthe, Juliane Bendig, Zbyněk Malenovský, Mareike Burba, Andreas Burkart, Tommaso Julitta, Kai Wittneben, Franco Miglietta, Roberto Colombo, Alexander Dam, Miro Migliavacca, Ilja Reiter, Jan Hanuš, John Camon, Dirk Schüttemeyer, Matthias Drusch, Uwe Rascher</td>
</tr>
<tr>
<td>10.45</td>
<td>Investigating Impacts of Avocado Canopy Structures on Simultaneous Solar and Actively Induced Chlorophyll Fluorescence Measurements by Rhy's Wyber, JULIANE BENDIG, Deepak Gautam, Arko Luciër, Zbyněk Malenovský, Barry Osmond, Sharon Robinson</td>
</tr>
<tr>
<td>10.50</td>
<td>TOOL-1: Data analyzing software, toolboxes</td>
</tr>
<tr>
<td></td>
<td>Location: A11 – Lecture room 206</td>
</tr>
<tr>
<td></td>
<td>Chair: Jochem Verrelst, Akpona Okujeni</td>
</tr>
<tr>
<td></td>
<td>EnMAP-Box 3 Free And Open-Source Imaging Spectroscopy Data Processing in QGIS by ANDREAS RABE, Benjamin Jakimow, Akpona Okujeni, Sam Cooper, Fabian Thiel, Patrick Hostert, Sebastian van der Linden</td>
</tr>
<tr>
<td></td>
<td>A Flexible Imaging Spectroscopy Processing Software Suite for Vegetation Studies by PHILIP TOWNSEND, Adam Chius, Zhiwei Ye, John Chapman, Ting Zheng, Aditya Singh, Fabian Schneider, Natalie Queally, David Thompson, Ryan Pavlick, David Schimmel</td>
</tr>
<tr>
<td></td>
<td>TOC2TOA: An ARTMO Toolbox to Simulate Top-Of-Atmosphere Radiance Data for Imaging Spectroscopy Applications by JOCHEN VERRELST, Juan Pablo Rivera-Cacedo, Jorge Vicent, Pablo Morcillo, Jose Moreno</td>
</tr>
<tr>
<td></td>
<td>FRANCA – A Fully Automated Hyperspectral Processing Chain For FRActioNal Cover Analysis by Valentín Ziel, MARTIN BACHMANN, Stefanie Holtzwarth, Uta Heiden</td>
</tr>
<tr>
<td></td>
<td>“Get a Look at Image Processing for Students” (GLIMPS) – an Educational Imaging Spectroscopy Tool by DANIEL SCHLAPFER</td>
</tr>
<tr>
<td>12.10</td>
<td>Lunch break (extended by Poster session 2)</td>
</tr>
<tr>
<td>12.40</td>
<td>POSTER-2: Poster session 2</td>
</tr>
<tr>
<td>13.40</td>
<td>Location: Corridor</td>
</tr>
</tbody>
</table>
13.40 VEG-2: Spectroscopy of vegetation
Location: A11—Lecture room 205
Chair: Alexander Damm, Philip Townsend
LAI And Cab Retrieval From The Synergetic Use Of OLCI And FLORIS Reflectances by CHARLOTTE DE GRAVE, Jochem Verrelst, Pablo Morcillo Pallarés, Juan Pablo Rivera-Caicedo, José Moreno
Intra-Annual Multi-Temporal Hyperspectral Data for Tree Species Classification of an Extensive Forest Area by ANETA MODZELEWSKA, Krzysztof Stereńczak, Fabian Fassnacht, Rafał Sadkowski
Spectral Invariants in Remote Sensing of Vegetation by MATTI MÖTTUS
LiDAR Data Improves Predictions Of Canopy N And P Concentrations From Imaging Spectroscopy by Michael Ewald, Raf Arts, Jonathan Lenoir, FABIAN EWALD FASSNACHT, Manuel Nicolas, Sandra Skowronek, Jérôme Piat, Olivier Honnay, Carol Xinrma Garzón-López, Hannes Feilhauer, Ruben Van De Kerchove, Ben Somers, Tarek Hattab, Duccio Rocchini, Sebastian Schmidtlein
NEON Imaging Spectroscopy: Characterizing Fine-Scale Vegetation Function at the Continental Scale by PHILIP TOWNSEND, Zhihui Wang, Eric Kruger

15.20 Coffee Break
15.40 VEG-3: Spectroscopy of vegetation
Location: A11—Lecture room 205
Chair: Jan Clevers, Roshanak Darvishzadeh
The Optical Profile Of Herbaceous Plant Functional Types by ELISA VAN CLEEMPUT, Kenny Helsen, Hannes Feilhauer, Olivier Honnay, Ben Somers
Correction of Spatial Autocorrelation for Estimation of Regional Statistics: a Case Study on Alluvial Vegetation by CILLIAN MILANI, Michael Schaepe, Mathias Kneubühler
Comparison Of Object-based And Pixel-based Random Forest Algorithm For Tree Species Classification Using Airborne APEX Hyperspectral Imagery by ZAHRA DABIRI, Stefan Lang
Integrated Hyperspectral and Multispectral Approach for Mapping Invasive Plant Species Based on Phenological Characteristics by TARIN PAZ-KAGAN, Natalya Panov, Micha Silver, Arnon Karnieli

16.00 SOIL-1: Spectroscopy of soils and geology applications
Location: A11—Lecture room 206
Chair: Veronika Carrere, Veronika Kopackova
Cloud Computing of Remote Sensing Products for Soil Properties Mapping by JOSÉ LUCAS SAFANELLI, José Alexandre Melo Demeatté, Sabine Chabrillat, Eyal Ben-Dor, André Carmelito Dotto, Wanderson de Souza Mendes, Nélida Quiróñez, Benito Roberto Bonfatti, Raúl Poppiel, Rodnei Rizzo, Arnaldo Souza Barros, Caio Troula Fongaro
Using Complex And Multi-mineral Natural Systems As Analogues For Modelling Geochemical Processes On Mars by VERONIKA KOPACKOVA, Lucie Koucká, Jan Jelenek
Impact Of The Spatial Resolution For Mineralogical Mapping From Hyperspectral Sensors HySpx, HYPXIM And EnMAP: Application To The Almeria Sedimentary Basin, Spain by KARINE ADELINE, Véronique Miegebille, Marine Larrey
Using Imaging Spectroscopy For Detecting And Mapping Of Land-Use Effects On Soil Quality In Dryland by NATHAN LEVI, Arnon Karnieli, Tarin Paz-Kagan
UAV Hyperspectral-3D Fusion for Peatland Biogeochemistry by MARGARET KALACSKA, Juan Pablo Arroyo-Mora, Deep Inamdar, Oliver Lucanus

17.00 SENS-1: New airborne and UAV systems, spectroradiometers
Location: A11—Lecture room 234
Chair: Robert O. Green, Lammert Kooistra
WaterSat Imaging Spectrometer Experiment (WISE) for Canadian Microsatellite Mission by STEPHEN ACHAL, Shen-En Qian, Martin Bergeron
Simulation and Improvements of the Hyperspectral Images of the SIELEETERS Airborne System by OLIVIER GAZZANO, Yann Ferrec, Alain Kattnig, Christophe Coudrain, Laurent Roussel-Rouviere
Analysis Of High Frequency Hyperspectral Remote Sensing Reflectances From Autonomous In Situ Sensors Deployed In Lakes by MARIANO BRESCIANI, Claudia Giardino, Annelles Hommersom, Dario Manca, Tommaso Julitta, Cesana Ilaria, Valentina Della Bella, Rosalba Padula
Implementation Of A UAV – Hyperspectral Line Imager For Ecological Applications by JUAN PABLO ARROYO-MORA, Margaret Kalac ski, Deep Inamdar, Raymond Soffer, Oliver Lucanus, Janine Goldman, Tomas Naprstek, Gabriela Iffonov, Erica Syke Schaaf, Kathryn Elmer

19.00 Workshop Dinner
23.59 Location: Starobrn Brewery
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30</td>
<td>Workshop Registration &amp; Office</td>
</tr>
<tr>
<td>08.45</td>
<td>KN-3: Keynote 3: Promises and Pitfalls in Geometric and Atmospheric Preprocessing of Imaging Spectroscopy Data by DANIEL SCHLÄPFER</td>
</tr>
<tr>
<td>08.45</td>
<td>KN-3: Keynote 3: The Advantages of Using Hyperspectral Technology in the Middle and Longwave Infrared Region for Terrestrial Remote Sensing by EYAL BEN DOR</td>
</tr>
<tr>
<td>09.00</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>09.30</td>
<td>VEG-4: Spectroscopy of vegetation</td>
</tr>
<tr>
<td>10.10</td>
<td>VEG-4: Spectroscopy of vegetation</td>
</tr>
<tr>
<td>10.30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>12.00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>13.00</td>
<td>VEG-5: Spectroscopy of vegetation</td>
</tr>
<tr>
<td>15.00</td>
<td>EXC-3: Excursion 3: Flying Laboratory of Imaging Systems at CzechGlobe</td>
</tr>
<tr>
<td>17.30</td>
<td>EXC-3: Excursion 3: Flying Laboratory of Imaging Systems at CzechGlobe</td>
</tr>
</tbody>
</table>
Poster session 1

Date: Wednesday, 6 Feb 2019, 16.20 – 17.20
Location: Corridor

1 Photosynthetic Pigments Changes Related To Screening Of Photosynthesis Dynamic Of European Beech And Norway Spruce Trees Using PRI by DANIEL KOVAC

2 Seasonal Dynamics Of Lingonberry And Blueberry Spectra by PETRI FORSSTRÖM, Jouni Peltoniemi, Miina Rautiainen

3 Seasonal Modelling Of Leaf Optical Properties And Retrieval Of Leaf Chlorophyll Content Across The Canopy Using PROSPECT by Tawanda Gara, ROSHANAN DARVISHZADEH, Andrew Skidmore, Tiejun Wang

4 Seasonal Chlorophyll Fluorescence Changes In Citrus aurantium Exposed To Low and High Traffic Pollution. by DIMITRI DAVWE, Jolien Verhelst, Jochem Verrelst, Luis Alonso, José Moreno, Roeland Samson, Roland Vaclke

5 Estimation Of Crop Biophysical And Productivity Properties Using Radiative Transfer And Spectral Information Analysis by JAN MIŠUREC, Jiří Tomiček, Petr Lukeš, Karel Klem

6 Original Method for High Spatial Resolution Classification of Tree Species Using Multi-Temporal Many and Hyperspectral Satellite Data by OĽGA BROYKINA, Olga Grigorieva, Alisher Saidov

7 Probability Map of Invasive Tree Species Using Hyperspectral and LiDAR Dataset by ZOLTÁN KOVÁCS, Péter Burai, László Belôk, Cergely Hunyadi, Onsolya Varga

8 Exploring the Potential of Light Use Efficiency Derived from Eddy Covariance and Reflectance Measurements for Spatial Simulations of Gross Primary Production by RAHUL RAI, Lucie Homolová, Petr Lukeš, Daniel Kovák

9 Is Retrieval of Forest Biochemical Traits Stable over Various Environmental Conditions? by MARIAN ŠVIK, Lucie Homolová, Růžena Janoutová, Barbora Navrátilová, Zuzana Lhotáková, Tomáš Fabiánek

10 Hyperspectral Analyses of Heavy Metal Contents in Floodplain Vegetation and Soils by Frank Riedel, MICHAEL DENK, Cornelia Glaßer

11 High Resolution UAV-based Hyperspectral Imagery for LAI And Chlorophyll Estimations For Wheat Plants With Different Nitrogen Fertilization For Grain Yield Prediction by MARTYN KANNING, Thomas Jarmer, Insa Kühling, Dieter Trautz

12 Determination Of Species-Related Forest Stand Characteristics With The Use Of Hyperspectral Data by MARTYNA WITECHKA, Łukasz Jelówicki, Krzysztof Mitelsztedt, Krzysztof Sterericzak, Stanisław Miścicki

13 Mapping of Tundra Vegetation Using Hyperspectral and Multispectral Imagery by VIKTOR MOCHALOV, Olga Grigoreva

14 Comparison And Validation Of In-situ Field Spectroscopy And Advanced High Pressure Liquid Chromatography To Assess Pigment Composition In Deciduous Leaves by FANNY PETIBON, Guido L.B. Wiesenber, Giulia Chielmetti, Michael W.I. Schmidt, Michael E. Schaepman, Mathias Kneubühler

15 Effect of Leaf Epidermal Structure of Arabidopsis Thaliana Mutants to Leaf Specular Reflection by EVA NEUWIRTHOVÁ, Zuzana Lhotáková, Petr Lukeš, Jana Albrechtová

16 Chlorophyll Content Estimations Based on CCM-300, Laboratory Measurements and Field Spectroscopy for Tundra Grass Species in The Krkonoše Mountains by LUCIE ČERVENÁ, Lucie Kupková, Markéta Potůčková, Jakub Lysák, Eva Neuwirthová, Zuzana Lhotáková, Jana Albrechtová

17 In-Field, UAV-Borne VIS-NIR And Thermal Spectroscopy As Tools For Distinguishing Water Stress Reaction In Common Bean. by ZUZANA LHOTÁKOVÁ, Milan Urban, Milton Valencia, Alejandro Vergara, Jaunr Ricateur, Jana Albrechtová, Michael Selvaraj

18 Method For Acquiring and Comparing Spatially Explicit Measurements of Sun Induced Fluorescence on the Ground by DZHANER SAMI EMIN, Maria Matveeva, Kelvin Acebron, Benedict Vierneisel, Patrick Rademks, Andreas Burkart, Tommaso Julieta, Uwe Rascher

19 Prediction of Leaf Area Index using Integration of the Thermal Infrared and Optical Data over the Mixed Temperate Forest by ELNAZ NEINAVAZ, Andrew K Skidmore, Roshanak Darvishzadeh

20 Predictive Performance Of PROSAIL Inversion And PLS Regression For Nitrogen Uptake Estimation Using Sentinel-2 And UAV Images by CHRISTIAN BOSSUNG, Miriam Machwitz, Adrien Petitjean, Martin Schlerf

21 Impact Of Environmental And Tree Structural Parameters On The Estimation Of Biochemical Properties For A Sparse Mediterranean Forest With AVIRIS Imagery by KARINE ADELINE, Thomas Miraglio, Jean-Victor Schmitt, Xavier Briottet, Jean-Philippe Castellu-Etchegory, Susanustin, Margarita Huesca, Keely Roth, Dennis Baldocchi

22 Variable Rate Nitrogen Application In Winter Wheat Supported by Low-Altitude Spectral Remote Sensing by FRANCESCO ARGENTO, Frank Liebisch, Helge Asen, Achim Walter, Thomas Anken, Nadja El-Benni

23 Quantifying the robustness of indices used by ARTMOS’ Global Sensitivity Analysis (GSA) toolbox by PABLO MORCILLO PALLARÉS, Juan Pablo Rivera-Cacedo, Santiago Belda, Charlotte De Grave, Helena Burrell, Jose Moreno, Jochem Verrelst

24 A Comparison of Tree Species Classification Accuracy Using UAV Images Acquired with a Snapshot Hyperspectral and a Multispectral Sensor by ELIAS FERNANDO BERRA, Melina Zemplia, Paul Brown, Lee Butler, Michelle L. Hamilton, Rachel Gautlon

25 HyPlant Derived Sun-Induced Fluorescence – A Way to Understand the Complex Vegetation Signals from Heterogeneous Ecosystems by Subhajit Bandopadhyay, ANSHU RASTOGI, Uwe Rascher, Patrick Rademkes, Anke Schickling

26 Does Simple Vegetation Indices Can Predict Sun Induced Fluorescence? A Fuzzy Simulations on Airborne Imaging Spectroscopic Data by Subhajit Bandopadhyay, ANSHU RASTOGI, Sergio Cogliatti, Uwe Rascher, Maciej Czabka, Radoslaw Juszczyk

Poster IDs are written in red colour.
Poster session 2

Date: Thursday, 7 Feb 2019, 12.40 – 13.40
Location: Corridor

27 Evaluation Of A Pushframe Hyperspectral Camera System by STEFAN LIVENS, Klaas Pauly, Pieter-Jan Baekx, Joris Blommaert, Bavo Delauré, Dirk Nuyts, Cerd Strockx

28 Assessment of the Estimates of Sun-induced Fluorescence in Large Masses of Vegetation by Fernando Rodriguez-Moreno, ZEMEK FRANTIŠEK, Miroslav Píkl

29 Improvements in the Processing Chain of Thermal Hyperspectral Data from TASI-600 by TOMÁS PURKET, Jan Hanus, Lukas Fajmon, Tomas Fabianek

30 Radiometric Calibration Of Multispectral Cameras On Board Drones Using Field Spectro-radiometers And Handcrafted Low-cost Calibration Panels by M. PILAR MARTÍN, José Ramón Melendo-Vega, Javier Becerra, Javier Pacheco-Labrador, María José Checa, Adrián Navarro

31 The EnMAP User Interface - An Overview by NICOLE PINNEL, Heiden Uta, Asamer Hubert, Dietrich Daniela, Mühle Helmut, Habermayer Martin, Storch Tobias

32 Operational DataQC Within The Hyperspectral DESIS And EnMAP Missions - Results Of The DESIS Commissioning Phase by MARTIN BACHMANN, Kevin Alonso, Emiliano Carmona, Daniele Cerra, Raquel de Los Reyes, Birgit Gerasch, Martin Habermayer, Harald Krawczyk, Maximilian Langheinrich, Rupert Mueller, Gintautas Palubinskas, Miguel Pato, Mathias Schneider, Peter Schwind, Tobias Storch, Valentin Ziel

33 Current Status of the FLIS Infrastructure and Pre-processing chain by JAN HANUŠ, Tomáš Fabiánek, Lukáš Fajmon, Tomáš Purket

34 Pixelwise Classification Of Hyperspectral Images Based On Deep Convolutional Neural Networks by LUCAS WITTRUCK, Thomas Jarmer, Martin Kanning

35 Radiative Transfer Simulations of Spruce Forest Canopies Reconstructed from Terrestrial Laser Scans by RŮŽENA JANOUTOVÁ, Lucie Homolová, Zbyněk Malenovský, Jean-Philippe Castellu-Etchegory, Nicholas Laurent, Jan Hanus

36 In-flight Estimation and Correction of Non-Gaussian Spectral Response by DAVID THOMSPON, Joseph W. Boardman, Robert O. Green, Justin M. Haag, Pantazis Mouroulis, Byron E. Van Corp

37 Hyperspectral Lithium-Pegmatite Detection – A Case Study for Hoydalen, Norway by FRIEDERIKE KLÖS, Christian Mielke, Christian Rogass, Nicole Kollner, Friederike Körtig, Agnieszka Kuras, Maria Bade

38 Atmospheric Correction Comparison of Alsat Spectral Imagery based on model FLAASH and model 6S by MOHAMMED AMINE BOUHLALA, Farah Benharrats, Habib Mahi, Madina Asmaa Missoumi

39 Soil Sampling Strategy Based On Multispectral Sentinel 2 And Hyperspectral EnMAP Satellite Data by FABIO CASTALDI, Sabine Chabrabill, Bas van Wesemael

40 Real-time Airborne gas detection using Thermal Hyperspectral Imaging. by STEPHANE ALBON BOUBANGA TOMBET, Alexandre Huot, Frédéric Marcotte, Pierre-Yves Foucher, Eric Guyot, Philippe Lagueux, Martin Chamberland

41 Fast And Easy Mineral Classification Using CASI/SASI/TASI Data by LUCIE KOUCKÁ, Veronika Kopačková, Jan Jelínek, Jan Hanuš

42 Feasibility Study for an Aquatic Ecosystem Earth Observing System by Arnold Dekker, Nicole Pinnel, CLAUDIA GIARDINO

43 Mineral Identification And Characterization: An Integrated Approach To Recover Mineralogical Information From Hyperspectral Images by RONAN RIALLAND, Rodolphe Marion, Véronique Carrère, Charles Soussens

44 Spectral characteristics of surface rocks between Iribid and Al Mafraq (Jordan) by WAHIB SAHWAN, Bernhard Lucke, Rupert Bäumler

45 Airborne Multisensors Information for a Zonal Crop Management by FRANTIŠEK ZEMEK, Miroslav Píkl, Vojtěch Lukas, Michal Kraus, Petr Srůček, Fernando Rodriguez-Moreno

46 Narrow-band Soil Spectral Indices for SOC, Clay and Calcium Carbonate Prediction: Literature Review and Performance based on the LUCAS Soil Database by SASKIA FOERSTER, Kathrin Ward, Sabine Chrabill


48 Hyperspectral Photoluminescence Imaging as a Tool to Study Degradation of the Outdoor Silicon Solar Panels by MARIJA VUKOVIĆ, Vetle Odin Jonassen, Espen Olsen, Sigurd Grøver, Torbjørn Mehl, ingunn Burud

49 Hyperspectral Imaging analysis of Scots Pine Wood Wffected by Decay Fungi by ARNOUD JOCHMEN, Gry Alfredsen, Sigrun Kolstad, Boyan Yuan, Nabil Belbachir, Ingunn Burud

50 Proximal Hyperspectral Outcrop Scanning – A Geological Use Case Study by FRIEDERIKE MACALENA KOERTING, Christian Mielke, Christian Rogass, Nicole Koellner, Friederike Klos, Uwe Altenberger, Agnieszka Kuras

51 Retrieving Macrophyte Pigments From Spectral Reflectance by Paolo Villa, Monica Pinardi, Viktor Toth, Diana Vaiciute, Martynas Bucas, MARIANO BRESCIANI

Poster IDs are written in red colour.
New integrated LiDAR with accurate positioning data from an enhanced GPS/IMU produces an extremely accurate digital elevation model (DEM) of terrain.

Maximize efficiency by acquiring hyperspectral images and LiDAR data simultaneously. Benefit from our expertise in capturing and interpreting data on robust, proven platforms.

- Turnkey airborne systems or integrated payloads
- VNIR, NIR, and SWIR spectral ranges
- Dual returns for better canopy characterization
- Boresighted with high-performance GPS/IMU

www.headwallphotonics.com
FieldSpec instruments for the remote sensing industry

- Reduces time in the field
- Rapid integration speed allows more measurements in a limited solar collection time window
- Improves data accuracy

Trusted and portable, ASD Inc.’s FieldSpec line of instruments provide precise spectral data measurements, making it possible to work in the world’s most remote locations

www.malvernpanalytical.com
Founded in 2003, SphereOptics is a highly technically focused company serving the following areas of photonics:

- Manufacturing, refinement and calibration of optical materials and standards for diffuse transmission and reflection.
- Distribution of test & measurement instruments for measuring the color and brightness of light sources and displays (e.g. goniophotometer, integration sphere systems and imaging colorimeters).
- Distribution of portable field spectro radiometers, industrial infrared cameras, hyperspectral cameras for remote sensing applications for the spectral range 0.25 μm to 15 μm and LIDAR sensors.
- Test & measurement service for lighting technology.
Remote Sensing Software

**ATCOR ®**
Atmospheric & Topographic Correction
Physical inversion to surface reflectance quantities for optical and infrared satellite sensors and airborne systems.

**PARGE ®**
Geocoding and Orthorectification
Direct geocoding of line scanner imagery to digital elevation models, optimized for imaging spectroscopy.

**MODO**
Modtran® for Remote Sensing Research
Radiative transfer model of the atmosphere and sensitivity analyses for optical and thermal systems.

Specially for education: GLIMPS
the free ENVI Image and Spectra Viewer
... for index calculation, small analysis and more

The MODTRAN® trademark is being used with the express permission of the owner, the United States of America, as represented by the United States Air Force.

ReSe Applications
Dr. D. Schläpfer
info@rese.ch
Langeggweg 3
CH-9500 Wil
Switzerland

www.rese-apps.com
<10% smile

www.HySpex.no
ITRES (1979) manufactures airborne hyperspectral and thermal mapping imagers for manned aircraft, UAVs, and ground use, and provides global air surveys. All spectral regions are covered from UV to longwave infrared. Up to five imagers may be operated simultaneously, with options for remote/autonomous control.

Innovative and effective custom design approaches fuel its two scientific-grade hyperspectral and broadband sensor product lines:

Max-Performance Sensor Line

- UVC-1800
- CASI-1500h
- SAVI-1000
- SASI-1000A
- MASI-600
- TABI-1800
- TSR-1800
- TASI-600

High Performance Micro Imager Line (unmanned and ground use)

- microCASI
- microTABI
- microSASI
- microSAVI

ITRES technologies work with Lidar and produce spectrally-accurate and GIS-ready maps. Imagers feature custom optics, high spatial resolution, deep well arrays, sub-pixel optical spot sizes, high SNR, precision georeferencing, and are supported by in-flight processing and imager calibration systems.

With the scientific foundation of the company originating from space imaging in the 1970s, ITRES developed and released the first commercial airborne hyperspectral VNIR imaging spectrograph (CASI-1) in 1989. Since then the company has remained a leader in airborne and ground-based hyperspectral and thermal imaging.

ITRES has returned to its space roots with successful projects conducted for the NRL’s ocean-monitoring HICO sensor, and a microsatellite breadboard imager for ocean monitoring for the Canadian Space Agency (available commercially as WISE). Currently, the company is actively developing two new sensors for the CSA, a DICE imager and a COCI breadboard.

More information on ITRES’ sensors and services can be found at www.itres.com.
Message from the Guest Editors

Dear Colleagues,

Imaging spectroscopy is a progressive optical remote sensing domain that is increasingly contributing to interdisciplinary research addressing today's key environmental and societal challenges. The imaging spectroscopy knowledge, traditionally based on airborne and limited space-borne sensors, is expanding towards new spatial and spectral perspectives with new ground-based, unmanned airborne and satellite systems. Several up-coming spaceborne imaging spectroscopy missions will in a near future open up new opportunities for hyperspectral mapping and quantitative estimations of land and water surfaces.

This Special Issue will feature the state-of-the-art imaging spectroscopy research presented and discussed in February 2019 in Brno (Czech Republic) at the 11th Workshop of Special Interest Group on Imaging Spectroscopy of the European Association of Remote Sensing Laboratories (EARSeL).

Dr. Zbyněk Malenovský
Prof. Eyal Ben-Dor
Dr. Claudia Giardino
Dr. Lucie Homolová
Guest Editors
Download Programme Book