EARSeL 2017

10th EARSeL SIG Imaging Spectroscopy Workshop

19 -21 April 2017
University of Zurich

Zurich, Switzerland

Programme Book

RSL measurements | products | policy

University of Zurich[UZH]

with the financial support of:

Swiss Academy of Sciences
Akademie der Naturwissenschaften
Accademia di scienze naturali
Académie des sciences naturelles

Cover Photo: © paulgsell / fotolia

Content

Welcome to Zurich

The University of Zurich and the Workshop Organizing Committee would like to welcome you to Zurich to participate in the 10th Workshop of the EARSeL Special Interest Group on Imaging Spectroscopy (SIG-IS).

With this workshop, the EARSeL SIG-IS series celebrates its 20th birthday. After almost 20 years, the 10th workshop comes back to its roots at the University of Zurich where the first meeting took place at the Remote Sensing Laboratories (RSL) in 1998.

EARSeL's Special Interest Group on Imaging Spectroscopy aims at encouraging interdisciplinary discussions among specialists working with innovative Earth Observation methods and technologies.
Imaging spectroscopy is increasingly finding its way into transdisciplinary research aiming to integrate state-of-the-art methods and data analysis concepts in response to today's key environmental and societal challenges.
Besides the discussion of advanced technologies for spectroscopy data processing and analysis, as well as next generation platforms and sensors, the workshop particularly addresses integrated approaches in Earth System Science using spectroscopy across all spheres, including the anthroposphere.

Please enjoy the keynotes, the topical keynote sessions, the presentations, posters and exhibition booths. Besides, we hope you will also find the time to visit the beautiful city of Zurich.

We wish to thank the conference sponsors, scientific committee, student volunteers, and members of the organizing committee for all their efforts to make this workshop a success.

Enjoy!

Mathias Kneubühler and Alexander Damm
Co-chairs 10th EARSeL SIG-IS Workshop

Venue

The 10th EARSeL SIG-IS Workshop will be held at the University of Zurich, Irchel Campus. With 26'000 students, the University of Zurich is Switzerland's largest university. The workshop is organized by the Remote Sensing Laboratories (RSL) at the Department of Geography.

The university's Irchel Campus is pleasantly situated in one of the largest public parks in Zurich in close vicinity to the city centre. Public transport from the city centre (Zurich main station) is provided by the Zurich Tram routes 10 and 14 to the Milchbuck hub. From the hub, it is a pleasant 10 minutes walk through the public park to the EARSeL workshop location at the campus. Tram route 10 directly connects Zurich Airport and the city centre, with a tram stop at Milchbuck hub in vicinity to the University of Zurich Irchel Campus.

Organizing Committee

- Mathias Kneubühler, University of Zurich, Switzerland
- Sandra Altorfer, University of Zurich, Switzerland
- Heide Bierbrauer, EARSeL Secretariat, Münster, Germany
- Alexander Damm, University of Zurich, Switzerland
- Andreas Hueni, University of Zurich, Switzerland
- Daniel Kükenbrink, University of Zurich, Switzerland
- Klaus-Ulrich Komp, EARSeL Chairman, Münster, Germany
- Andreas Müller, DLR Oberpfaffenhofen, Germany
- Michael Schaepman, University of Zurich, Switzerland
- Martin Schlerf, Luxembourg Institute of Science and Technology (LIST), Luxembourg
- Devis Tuia, University of Zurich, Switzerland

Scientific Committee

- Fabrizia Buongiorno, National Institute of Geophysics and Vulcanology (INGV), Rome Italy
- Sabine Chabrillat, Helmholtz Centre Potsdam (GFZ), Germany
- Jocelyn Chanussot, INP – Grenoble Institute of Technology, France
- Robert Green, Jet Propulsion Laboratory (JPL), Pasadena, USA
- Uta Heiden, German Aerospace Center (DLR), Oberpfaffenhofen, Germany
- Philip Lewis, University College London (UCL), United Kingdom
- Alasdair McArthur, University of Edinburgh, United Kingdom
- José Moreno, University of Valencia, Spain
- Antonio Plaza, University of Extremadura, Spain
- Uwe Rascher, Forschungszentrum Jülich, Germany
- Micol Rossini, Università degli Studi di Milano-Bicocca, Milano, Italy
- Gabriela Schaepman-Strub, University of Zurich, Switzerland
- Sebastian Schmidtlein, Karlsruhe Institute of Technology (KIT), Germany
- Susan Ustin, University of California Davis, USA

Workshop Topics

Advanced methods for spectroscopy calibration, data processing and archiving

- Sensor calibration and product validation
- Software systems for imaging spectroscopy
- Big data and data mining
- Inversion schemes and data assimilation
- In-situ, field and laboratory spectroscopy
- Atmospheric compensation techniques
- Spectral databases and information systems
- Very high resolution spectroscopy
- Statistical and computational methods for data analysis

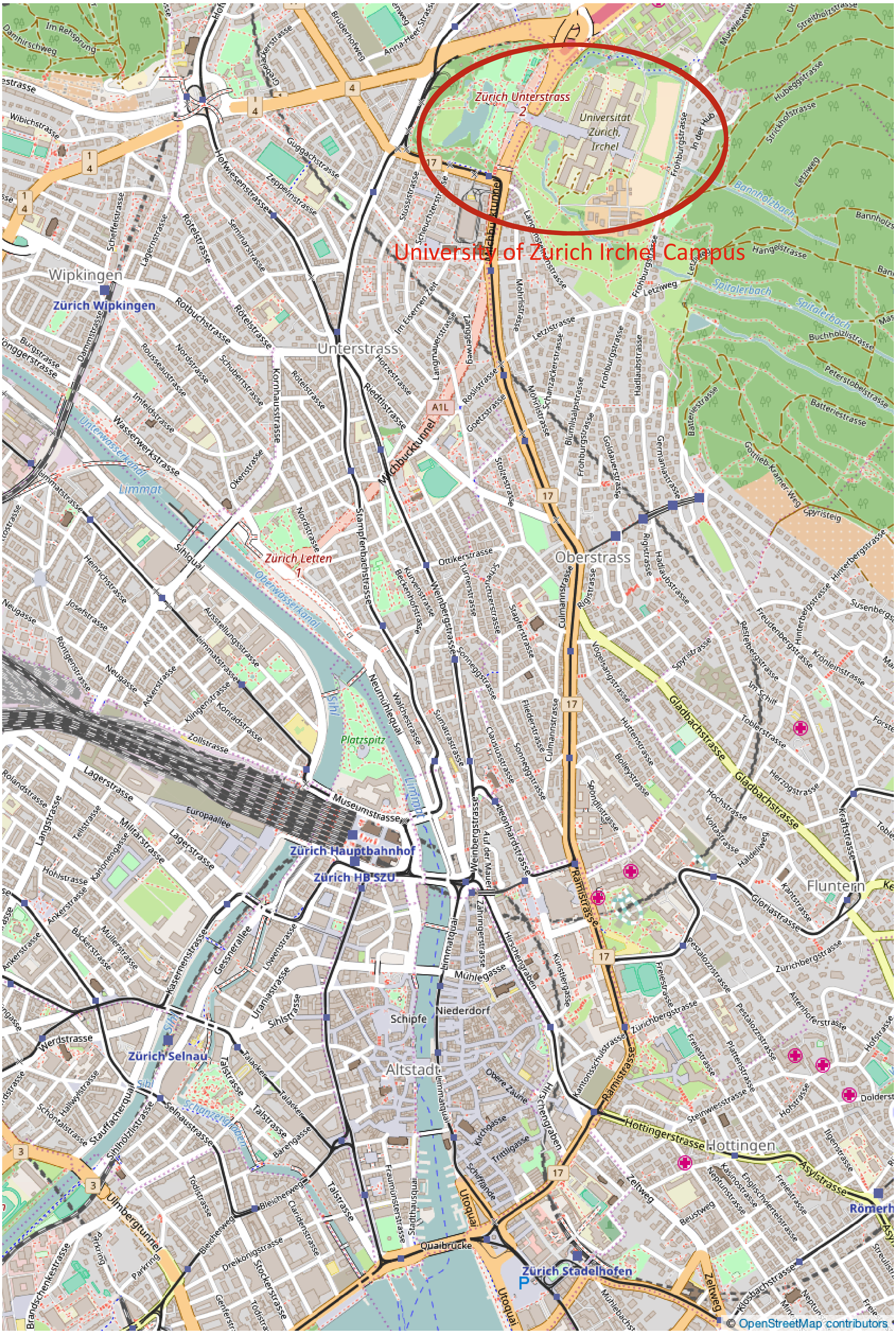
Integrated approaches in Earth System Science using spectroscopy

- Combined use of Earth Observation technologies (LiDAR, SAR, etc. and spectroscopy)
- Forward and inverse modeling of spheres
- Sphere specific analysis methods (atmosphere, biosphere, hydrosphere, pedosphere, anthroposphere)
- Ecosystem processes and functions in vegetated ecosystems, soils, snow and ice, atmosphere, coastal and inland waters, urban areas
- Scaling, interactions and feedback mechanisms between and across spheres
- Transdisciplinary applications using Ecosystem Services (ESS)
- Spectroscopy in the context of societal challenges (water scarcity, food security, biodiversity loss, etc.)

Next generation platforms and sensors

- Spectroscopy from ground, drone, air- and spaceborne platforms
- Visible, near-, mid- and thermal infrared spectral and multi-angular spectral measurements
- Emerging concepts, technologies and missions

Map of Location



Practical Information

Registration Desk

- Tuesday, 18 April 2017: 09:00 – 16:00
- Wednesday 19 April to Friday 21 April 2017: 08:00 – 16:00

Poster

Please put up your poster on Wednesday morning. Posters will remain on the boards for the entire workshop. We have dedicated poster sessions from Wednesday to Friday at 12:30 – 14:00 where you should be around.

Oral Presentation

Please upload your presentation to the computer in the respective seminar room before the start of your session (in the morning before 08:30 or during coffee/lunch breaks). Personal laptops cannot be used.
Oral presentations last 12 minutes, plus 3 minutes for discussion and changeover to the next speaker. Keynote presentations last 30 minutes, including 5 minutes for discussion and changeover to the next speaker.

Internet Access

- Free WiFi access is available to all workshop participants using the following link: http://t.uzh.ch/coa Event-ID: 17EARSeL2370
- Besides, eduroam is also available on the university campus.

EARSeL SIG-IS Workshop Website

http://www.earsel.org/SIG/IS/workshops/10-IS-Workshop/

Sponsors

The organizing committee would like to thank those organizations who have sponsored the workshop, either directly through financial support to the meeting or indirectly through supporting the duties of the organizing committee members to prepare the workshop. For the key financial sponsors full page advertisements may be found in this programme.

Pre-Workshop Tutorials

The pre-workshop tutorials are scheduled on Tuesday, 18 April 2017 between 10:00-17:00. See the workshop reception for details.

Workshop Sessions Seminar Rooms

The workshop sessions take place in the following seminar rooms on the University of Zurich Irchel campus:

- Y (Irchel Campus) 15 (Building) G (Floor) 60 (Seminar Room): Y-15-G-60
- Y (Irchel Campus) 16 (Building) G (Floor) 15 (Seminar Room): Y-16-G-15
- Y (Irchel Campus) 16 (Building) G (Floor) 05 (Seminar Room): Y-16-G-05
- Y (Irchel Campus) 03 (Building) G (Floor) 85 (Seminar Room): Y-03-G-85
- Y (Irchel Campus) 03 (Building) G (Floor) 95 (Seminar Room): Y-03-G-95

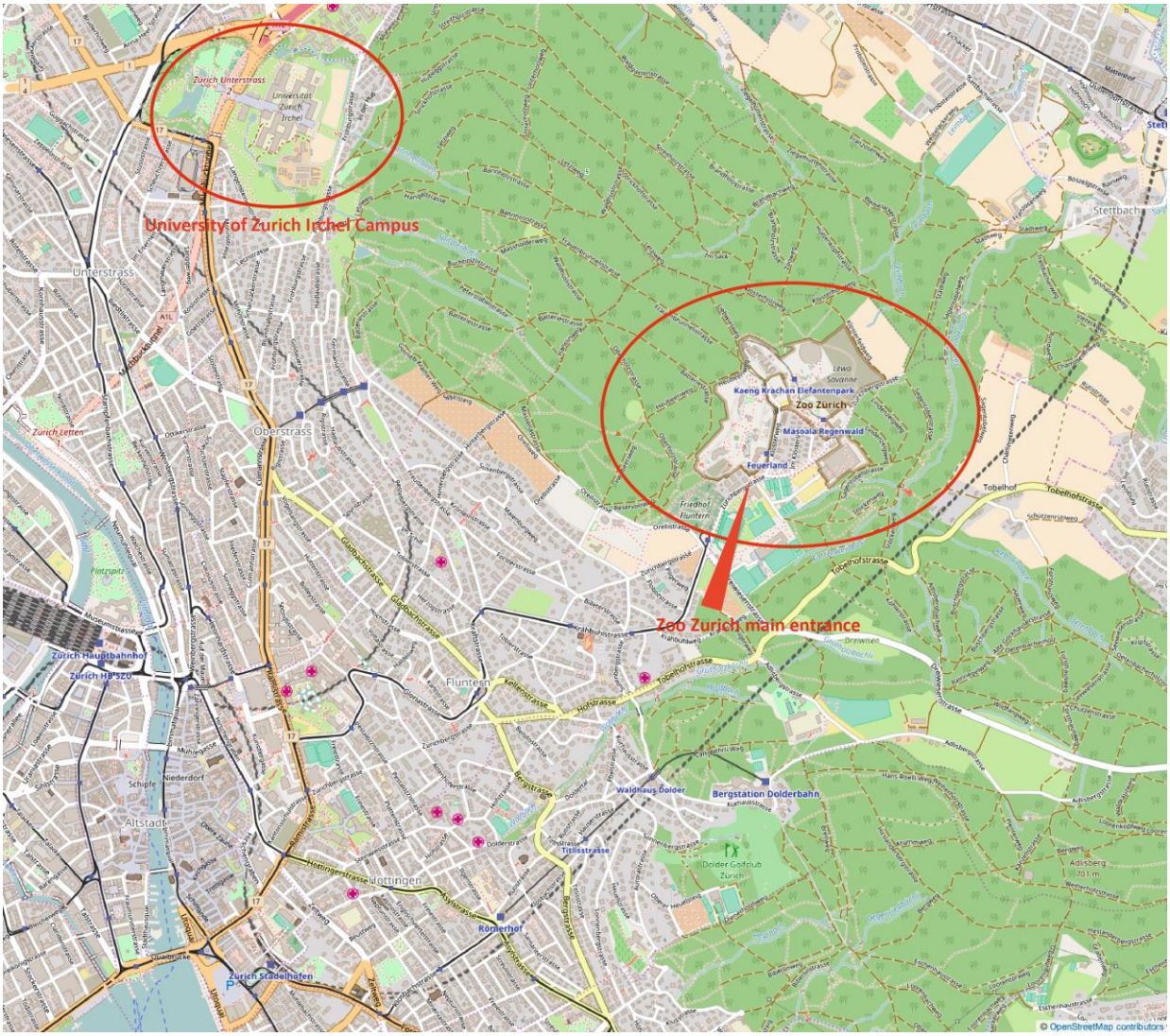
Social Events

Wednesday, 19 April 2017, 19:00 – 21:00:
Ice Breaker, Main Hall University of Zurich ("Lichthof"), Irchel Campus

Thursday, 20 April 2017: 18:00 – 23:30:
Workshop Dinner at Restaurant Pantanal, Zoo Zurich

- 17:30: Departure by bus from Irchel Campus, Taxi rank (D-Floor)
- 18:00: Arrival at Zoo Zurich main entrance
- 18:15 – 20:00: Guided Tours / Drinks and Snacks
- 20:00 – 23:30: Workshop Dinner
- 23:30: Departure by bus to Irchel Campus, Taxi rank (D-Floor)

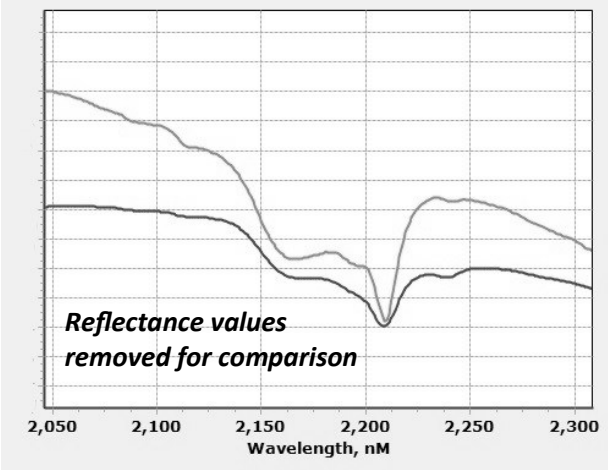
If you wish to arrive at Zurich Zoo main entrance individually, you may take tram route 9 at *Universität Irchel* (tram stop, direction *Triemli*), and change at *Zürich, ETH/Universitätsspital* (tram stop) to tram route 6 (direction *Zoo*), which will take you to Zoo Zurich. Allow at least 30 minutes for travel. Be at the Zoo main entrance by 18:00 latest.



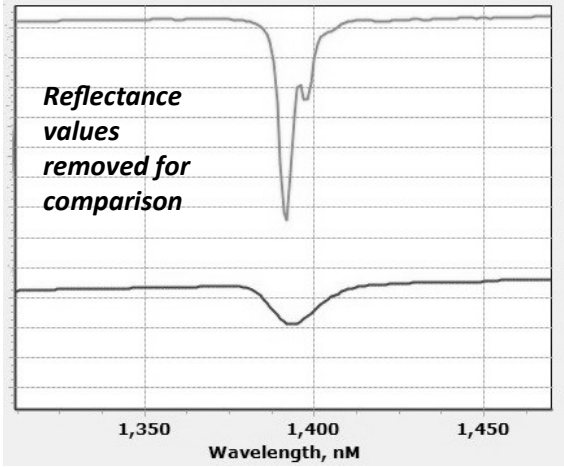
High Resolution Solutions for Remote Sensing

SR-6500—Enhanced Spectral Resolution

- ►1.5nm @ 700nm (FWHM)
- ►3.0nm @ 1500nm (FWHM)
- ►3.8nm @ 2100nm (FWHM)



Kaolinite scan feature close-up.
Top – SR-6500
Bottom—standard field spectrometer



Talc scan feature close-up.
Top– SR-6500
Bottom—standard field spectrometer

Field Portable Solution:

PSR+ for Remote Sensing and Soil Analysis

- ►High resolution/high sensitivity
- ►Rugged/reliable—no moving optical parts
- ►EZ-ID sample identification software—extensive clay and mineral library —allows you to build a custom library

For a quote, call 1-978-687-1833 or email sales@spectralevolution.com.

For more information, visit www.spectralevolution.com.

SPECTRAL EVOLUTION

Harris Geospatial Solutions has more than 30 years' experience developing scientifically proven solutions using cutting-edge technology. Today, organizations from across industries use our in-depth knowledge of advanced geospatial analytics, machine learning, and remotely sensed data to make better decisions.

ENVI

ENVI is the image analysis software of choice for remote sensing scientists, image analysts and GIS professionals to extract accurate and meaningful information from all kinds of data. ENVI is designed to be used by anyone that relies on imagery and data to make decisions, delivering the same expert-level results across the board, regardless of prior experience with imagery. Originally, ENVI was developed for advanced hyperspectral image processing. The continuous refinement of its spectral mapping capabilities make ENVI standard for research and image scientists worldwide. ENVI is fully integrated with ArcGIS from Esri, and ENVI analytics can be executed from within any ArcGIS environment and results can be accessed directly from ArcMap or via ArcGIS Online.

ENVI Analytics at Scale

Deploying ENVI image and data analytic capabilities through our Geospatial Services Framework (GSF) takes advantage of existing investments in server and enterprise technology and enables the use of light weight, browser-based clients and apps to access ENVI analytics. Geospatial Services Framework (GSF) is elastic and easily scales up or down to meet demands and is cloud and data agnostic. This means GSF easily installs within existing infrastructure and takes advantage of the data assets an organization has already invested in. GSF uses the full power of cloud and enterprise architecture and can quickly run automated analytics on existing data stores or new and incoming data.

ENVI in the Cloud

Using a convenient subscription model, ENVI in the Cloud offers the full desktop experience of ENVI and IDL through a web browser. This service enables organizations to quickly get up and running while saving time and money on IT support and infrastructure. The full ENVI desktop software, as well as atmospheric correction, photogrammetry, and feature extraction modules are available on a monthly basis. Users simply login to virtual instances of ENVI or IDL and can start working right away. Subscriptions also include storage, making it possible to upload project data or access CloudEO's data services.

IDL

IDL is the trusted scientific-programming language used to extract meaningful visualizations from complex numerical data. IDL allows ENVI users to create batch processes for common tasks, customize menu items, add proprietary algorithms, and integrate other code with their geospatial analysis.

ENVI SARscape

ENVI SARscape is used to process and analyze SAR data acquired from all existing spaceborne and selected airborne platforms, taking the data from hard-to-interpret numbers and turning it into to meaningful, contextual information. SARscape generates products and offers the option to integrate this information with other geospatial products.

Custom Services Group

Leverage our expertise in remote sensing and geospatial analytics along with proven machine learning technology to jump start a business or solve a challenging problem. At Harris we look at machine learning as an enabling technology to help solve real-world customer problems. To that end, we have developed a highly-tuned process, relying less on the volume of label data and more on reliable training models and high-performance computing, that allows us to solve those problems quicker and more cost effectively than ever before. Harris' machine learning technologies excel at automated object recognition, obtaining near-ceiling performance on Pan, RGB, MSI, HSI, SAR, LiDAR, and derived point cloud data sets.

ASD Inc., a PANalytical company is recognized worldwide for providing high performance analytical instrumentation solutions to industrial and scientific markets. The ASD Inc. team solves real-world natural resource materials measurement problems.

Incorporated in 1990 as Analytical Spectral Devices, Inc., ASD is based in Boulder, Colorado. It is now a PANalytical company, and a part of Spectris.
ASD was established to address a fundamental need of earth science researchers for a robust, high-performance, portable instrument that could be used in field work.

It continues to design, manufacture, and sell sophisticated Near-Infrared (VNIR/SWIR) spectroscopy instruments, solutions and applications expertise for materials measurement and researches.

Responding to this need, two renowned remote sensing scientists, Dr. Alexander F. H. Goetz, Director of the Center for the Study of Earth from Space (CSES), and Dr. Brian Curtiss, a senior scientist at CSES, designed and produced the Personal Spectrometer II (PSII), the world's first truly portable, rugged, research-grade spectroradiometer.

The PSII was quickly embraced by fellow scientists around the world as a practical and necessary tool to do their work. Subsequent generations of portable field instruments, trademarked under the name FieldSpec® , earned ASD world-wide recognition as the number one portable instrumentation supplier for remote sensing scientists and field researchers. **Today, the FieldSpec 4 and FieldSpec HandHeld 2 instrument families provide researchers with a complete suite of instruments for all of their field work needs.**

ASD successfully expanded beyond its origins in the scientific markets, into industrial manufacturing markets, by providing instrumentation solutions for the real-time measurement of non-homogenous materials in manufacturing and quality control environments. ASD's industrial instrument lines now include QualitySpec® for on-line and near-line process control, LabSpec® for material inspection and identification in the field and lab, and TerraSpec® for mining exploration and production.

ASD's legacy is one of innovation and leadership in addressing customers' needs —providing the latest technologies combined with the highest standards of quality and service. We continue to provide customers with value enhancing solutions to their materials measurement needs by offering the following resources:

- Instrumentation for field, near-line, and on-line materials measurements
- Applications expertise supplied by our SummitCAL Solutions Team, our scientists, and engineers
- Service and support for installations, and post-sales support worldwide
- Global presence: ASD has instruments in over 60 countries and a distribution network encompassing six continents

Evidence of our success can be seen in the timeline of major milestones in ASD's history.

See more at: http://www.asdi.com

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 modeling and sensitivity analyses for optical and thermal systems.

NEW : GLIMPS -
the free Remote Sensing Image Viewer
... for short analyses and education.

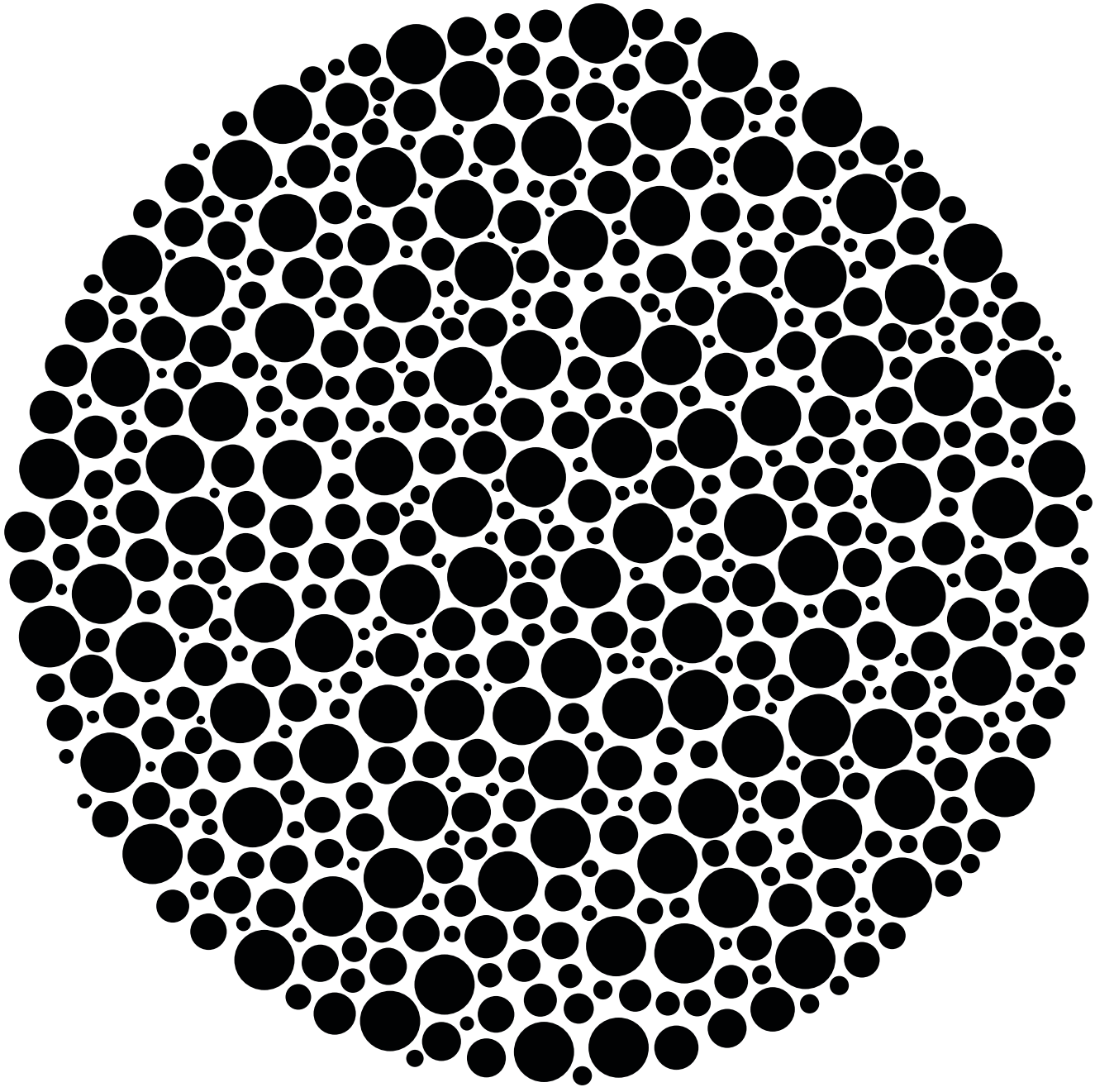
ReSe
Applications
Schläpfer

ReSe Applications
Dr. D. Schläpfer
info@rese.ch

www.rese-apps.com

Langeggweg 3
CH-9500 Wil
Switzerland

Are you color blind?



Everything's better with color.
We'll give you hundreds.

Visit the HySpex stand for sample data.

www.hyspex.no

Programme Overview

Date: Wednesday, 19/Apr/2017

8:00am - 9:00am	**REG-1: Registration** Location: **UZH Irchel Campus**				
9:00am - 9:30am	**OP: Greetings** Location: **Y-15-G-60** Müller, Andreas: Greetings from the EARSeL SIG Imaging Spectroscopy Chair (5') Schyns, Jean-Christophe: Greetings from the EARSeL Bureau (5') Schaepman, Michael E.: Greetings from the Dean of the Faculty of Science (15')				
9:30am - 10:00am	**KN-1: Keynote 1: On the Dimensionality of Earth's Upwelling VSWIR Light Field** Location: **Y-15-G-60** Speaker: **Thompson, David Ray**				
10:00am - 10:30am	**CB-1: Coffee Break 1**				
10:30am - 11:30am	**TKS1: Topical Keynote Session 1: Blending physical modelling and machine learning: new frontiers in spectroscopy data processing** Location: **Y-15-G-60** Chair: **Jochem Verrelst**				
11:30am - 12:30pm	**TKS1_Disc: Plenary Discussion Topical Keynote 1** Location: **Y-15-G-60** Chair: **Jochem Verrelst** Chair: **Jose Luis Gomez-Dans** Chair: **Gustau Camps-Valls**				
12:30pm - 1:00pm	**A1-P-BDV: Posters - Vegetation Structure and Function as Essential Biodiversity Variables: from the Visible to Thermal** Location: **Gallery**	**A2-P-SCM: Posters - Statistical and Computational Methods for Data Analysis** Location: **Gallery**	**C1-P-SOC: Posters - Spectroscopy in the Context of Societal Challenges** Location: **Gallery**	**C2-P-ATM: Posters - Athmospheric Compensation Techniques** Location: **Gallery**	**C3-P-FIM: Posters - Forward and Inverse Modelling of Spheres** Location: **Gallery**
1:00pm - 2:00pm	**LB-1: Lunch & Poster Session 1**				
2:00pm - 2:15pm	**GP: Group Photo**				
2:15pm - 3:15pm	**A1-O-BDV-1: Vegetation Structure and Function as Essential Biodiversity Variables: from the Visible to Thermal (Special Session)** Location: **Y-16-G-05** Chair: **Andrew Skidmore** Chair: **Roshanak Darvishzadeh**	**A2-O-SCM-1: Statistical and Computational Methods for Data Analysis** Location: **Y-03-G-85** Chair: **Devis Tuia** Chair: **Anna Brook**	**A3-O-TIR-1: Challenges and Applications in Thermal Infrared Imaging Spectroscopy (Special Session)** Location: **Y-16-G-15** Chair: **Christoph Andreas Hecker** Chair: **Sabine Chabrillat**		
3:15pm - 4:15pm	**B1-O-BDV-2: Vegetation Structure and Function as Essential Biodiversity Variables: from the Visible to Thermal (Special Session)** Location: **Y-16-G-05** Chair: **Roshanak Darvishzadeh** Chair: **Andrew Skidmore**	**B2-O-SCM-2: Statistical and Computational Methods for Data Analysis** Location: **Y-03-G-85** Chair: **Mireille Olwen Guillaume** Chair: **Derek Michael Rogge**	**B3-O-TIR-2: Challenges and Applications in Thermal Infrared Imaging Spectroscopy (Special Session)** Location: **Y-16-G-15** Chair: **Christoph Andreas Hecker** Chair: **Thomas Udelhoven**		
4:15pm - 4:45pm	**CB-2: Coffee Break 2**				
4:45pm - 6:00pm	**C1-O-SOC: Spectroscopy in the Context of Societal Challenges** Location: **Y-16-G-05** Chair: **Hannes Feilhauer** Chair: **Pedro J. Leitão**	**C2-O-ATM: Athmospheric Compensation Techniques** Location: **Y-03-G-85** Chair: **Daniel Schläpfer** Chair: **Gerrit Kuhlmann**	**C3-O-FIM: Forward and Inverse Modelling of Spheres** Location: **Y-16-G-15** Chair: **Gabriela Schaepman-Strub** Chair: **Matti Mõttus**		
7:00pm - 9:00pm	**IB: Icebreaker** Location: **Main Hall UZH Irchel Campus**				

Date: Thursday, 20/Apr/2017

8:00am - 8:30am	**REG-2: Registration** Location: UZH Irchel Campus				
8:30am - 9:00am	**KN-2: Keynote 2: Remote Sensing of Terrestrial Ecosystems and the Development of a Predictive Science of the Biosphere** Location: Y-15-G-60 Speaker: **Moorcroft, Paul**				
9:00am - 10:00am	**TKS2: Topical Keynote Session 2: Imaging spectroscopy from unmanned aerial systems (UAS): Recent advances in technology and applications** Location: Y-15-G-60 Chair: **Pablo J. Zarco-Tejada**				
10:00am - 11:00am	**TKS2_Disc: Plenary Discussion Topical Keynote 2** Location: Y-15-G-60 Chair: **Pablo J. Zarco-Tejada** Chair: **Arko Lucieer** Chair: **Helge Aasen** Chair: **Lammert Kooistra**				
11:00am - 11:30am	**CB-3: Coffee Break 3**				
11:30am - 12:30pm	**D1-O-SAAB: Sphere Specific Analysis Methods - Atmosphere/Biosphere** Location: Y-16-G-05 Chair: **Lammert Kooistra** Chair: **Felix C Seidel**	**D2-O-SOI-1: Soil Spectroscopy from Soil Spectral Libraries to Spatial Mapping from Space (Special Session)** Location: Y-16-G-15 Chair: **Sabine Chabrillat** Chair: **Johanna Wetterlind**	**D3-O-CAL-1: Sensor Calibration and Product Validation** Location: Y-03-G-85 Chair: **Andreas Hueni** Chair: **Helge Aasen**		
12:30pm - 1:00pm	**D1-P-SAAB: Posters - Sphere Specific Analysis Methods - Atmosphere/Biosphere** Location: Gallery	**D2-P-SOI: Posters - Soil Spectroscopy from Soil Spectral Libraries to Spatial Mapping from Space** Location: Gallery	**D3-P-CAL: Posters - Sensor Calibration and Product Validation** Location: Gallery	**F1-P-SAP: Posters - Sphere Specific Analysis Methods - Pedosphere** Location: Gallery	**G2-P-FUS: Posters - Fusion of Earth Observation Technologies** Location: Gallery
1:00pm - 2:00pm	**LB-2: Lunch & Poster Session 2**				
2:00pm - 3:00pm	**E1-O-SAH: Sphere Specific Analysis Methods - Hydrosphere** Location: Y-16-G-05 Chair: **Claudia Giardino** Chair: **Hariharasudhan V Gomathisankaraprasad**	**E2-O-SOI-2: Soil Spectroscopy from Soil Spectral Libraries to Spatial Mapping from Space (Special Session)** Location: Y-16-G-15 Chair: **Eyal Ben Dor** Chair: **Johanna Wetterlind**	**E3-O-CAL-2: Sensor Calibration and Product Validation (Special Session)** Location: Y-03-G-85 Chair: **Helge Aasen** Chair: **Andreas Hueni**		
3:00pm - 4:00pm	**F1-O-SAP: Sphere Specific Analysis Methods - Pedosphere** Location: Y-16-G-05 Chair: **Véronique Carrère** Chair: **Veronika Kopačková**	**F2-O-INV: Applications of Spectral Invariants (Special Session)** Location: Y-16-G-15 Chair: **Miina Rautiainen** Chair: **Yuri Knyazikhin**	**F3-O-FRM-1: Imaging Spectroscopy with Snapshot and Frame-Based Sensors - from Sensor Calibration to Data Product Generation (Special Session)** Location: Y-03-G-85 Chair: **András Jung** Chair: **Helge Aasen**	**F4-O-COM-1: Combined Observational Modelling Approaches for Advanced Earth Science Applications (Special Session)** Location: Y-03-G-95 Chair: **Alexander Damm** Chair: **Michael E. Schaepman**	
4:00pm - 4:30pm	**CB-4: Coffee Break 4**				
4:30pm - 5:30pm	**G1-O-SAU: Sphere Specific Analysis Methods - Urban** Location: Y-16-G-05 Chair: **Frantisek Zemek** Chair: **Akpona Okujeni**	**G2-O-FUS: Fusion of Earth Observation Technologies** Location: Y-16-G-15 Chair: **Stefanie Holzwarth** Chair: **Henning Buddenbaum**	**G3-O-FRM-2: Imaging Spectroscopy with Snapshot and Frame-Based Sensors - from Sensor Calibration to Data Product Generation (Special Session)** Location: Y-03-G-85 Chair: **Helge Aasen** Chair: **András Jung**	**G4-O-COM-2: Combined Observational Modelling Approaches for Advanced Earth Science Applications (Special Session)** Location: Y-03-G-95 Chair: **Michael E. Schaepman** Chair: **Alexander Damm**	
5:30pm - 11:30pm	**WD: Workshop Dinner** Location: Restaurant Pantanal Zurich Zoo				

Date: Friday, 21/Apr/2017

8:00am - 8:30am	**REG-3: Registration** Location: **UZH Irchel Campus**		
8:30am - 9:00am	**KN-3: Keynote 3: Hyperspectral imaging from Space: European achievements and plans for ocean, land and atmospheric applications** Location: **Y-15-G-60** Speaker: **Meynart, Roland**		
9:10am - 10:10am	**H1-O-VEG: Vegetation Classification and Traits Retrieval** Location: **Y-16-G-15** Chair: **Jan Clevers** Chair: **Lucie Homolova**	**H2-O-LAB-1: In-situ, Field and Laboratory Spectroscopy** Location: **Y-16-G-05** Chair: **Alasdair Mac Arthur** Chair: **Miriam Machwitz**	**H3-O-FUT-1: Science and Applications Enabled by Global Coverage Imaging Spectroscopy - Future Technologies, Missions and Emerging Concepts (Special Session)** Location: **Y-15-G-60** Chair: **Robert O Green** Chair: **Michael E. Schaepman**
10:10am - 10:30am	**CB-5: Coffee Break 5**		
10:30am - 11:30am	**J1-O-FLU-1: Remote Sensing of Vegetation Fluorescence (Special Session)** Location: **Y-16-G-15** Chair: **Jose Moreno** Chair: **Alexander Damm** Chair: **Elizabeth M. Middleton**	**J2-O-LAB-2: In-situ, Field and Laboratory Spectroscopy** Location: **Y-16-G-05** Chair: **Daniel Doktor** Chair: **Michael Denk**	**J3-O-FUT-2: Science and Applications Enabled by Global Coverage Imaging Spectroscopy - Future Technologies, Missions and Emerging Concepts (Special Session)** Location: **Y-15-G-60** Chair: **Luis Guanter** Chair: **David Ray Thompson**
11:30am - 12:30pm	**K1-O-FLU-2: Remote Sensing of Vegetation Fluorescence (Special Session)** Location: **Y-16-G-15** Chair: **Alexander Damm** Chair: **Uwe Rascher**	**K2-O-MAP: Towards Universal Mapping Models - Enhancing the Spatial and Temporal Transferability of Empirical and Physical Models (Special Session)** Location: **Y-16-G-05** Chair: **Sebastian van der Linden** Chair: **Jochem Verrelst** Chair: **Akpona Okujeni**	**K3-O-PLA-1: Spectroscopy from Ground, Drone, Air- and Spaceborne Platforms** Location: **Y-15-G-60** Chair: **Richard Gloaguen** Chair: **Thomas Jarmer**
12:30pm - 1:00pm	**H1-P-VEG: Posters - Vegetation Classification and Traits Retrieval** Location: **Gallery**	**H2-P-LAB: Posters - In-situ, Field and Laboratory Spectroscopy** Location: **Gallery**	**J1-P-FLU: Posters - Remote Sensing of Vegetation Fluorescence** Location: **Gallery**
	K2-P-MAP: Posters - Towards Universal Mapping Models - Enhancing the Spatial and Temporal Transferability of Empirical and Physical Models Location: **Gallery**	**L1-P-EPF: Posters - Ecosystem Processes and Functions** Location: **Gallery**	**L2-P-SDB: Posters - Spectral Data Bases and Information Systems** Location: **Gallery**
	L3-P-PLA: Posters - Spectroscopy from Ground, Drone, Air- and Spaceborne Platforms Location: **Gallery**		
1:00pm - 2:00pm	**LB-3: Lunch & Poster Session 3**		
2:00pm - 3:00pm	**L1-O-EPF: Ecosystem Processes and Functions** Location: **Y-16-G-15** Chair: **Thomas Painter** Chair: **Anna Jarocinska**	**L2-O-SDB: Spectral Data Bases and Information Systems** Location: **Y-16-G-05** Chair: **Andreas Hueni** Chair: **Philip A Townsend**	**L3-O-PLA-2: Spectroscopy from Ground, Drone, Air- and Spaceborne Platforms** Location: **Y-15-G-60** Chair: **Zbynek Malenovsky** Chair: **Martin Bachmann**
3:15pm - 4:15pm	**CS: Closing Session** Location: **Y-15-G-60** Chair: **Andreas Müller** Chair: **Andreas Hueni**		
4:15pm - 4:45pm	**CB-6: Farewell Coffee Break**		