



**24-26 September 2019**  
**Amsterdam, The Netherlands**  
**Program**



# Table of contents



2019  
Amsterdam, The Netherlands

Whispers Committees	2
SwIImS Committees	3
Conference Info	4
Exhibition	6
Technical sponsors	7
Speakers	8
Venue Map	12
Whispers/SwIImS at a glance	13
Tuesday, 24 Overview	14
Tuesday, 24	15
Wednesday, 25 Overview	22
Wednesday, 25	23
Thursday, 26 Overview	34
Thursday, 26	35

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**Uta Heiden**, *German Aerospace Center (DLR), Germany*

**Jocelyn Chanussot**, *Grenoble Institute of Technology, France*

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**Zebin Wu**, *Nanjing University of Science and Technology, China*

**Emmett Ientilucci**, *Rochester Institute of Technology, USA*

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**Ralf Klessen**, *Heidelberg University, Germany*

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**George P. Petropoulos**, *Agricultural Org. "DEMETER" & Technical Univ. of Crete, Greece*

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**Antonio Plaza**, *University of Extremadura, Spain*

**Saurabh Prasad**, *University of Houston, USA*

**Stanley Rotman**, *Ben-Gurion University of the Negev, Israel*

**Alan Schaum**, *Naval Research Laboratory, USA*

**Paul Scheunders**, *Vision Lab - University of Antwerp, Belgium*

**James Theiler**, *Los Alamos National Laboratory, USA*

**Miguel Velez-Reyes**, *University of Texas at El Paso, USA*

**Naoto Yokoya**, *The University of Tokyo, Japan*

**Alina Zare**, *University of Florida, USA*

**Bing Zhang**, *Institute of Remote Sensing & Digital Earth, China*

**Jun Zhou**, *School of Information and Communication Tech., Griffith Univ., Australia*

**Xiaoxiang Zhu**, *German Aerospace Center (DLR) and Technical University of Munich (TUM), Germany*

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## Multimedia

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**Vincent Couturier-Doux**

## General chair

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*Aoife Gowen, UCD School of Biosystems and Food Engineering, Ireland*

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*Lidia Esteve Agelet, Senior Scientist-NIR Program Development Mars Global Services, Netherlands*

*Ryad Bendoula, Research Group ITAP Irstea - SupAgro Information-Technologies-environmental Analysis-agricultural Process, France*

*Junli Xu, Postdoctoral Research Fellow UCD School of Biosystems and Food Engineering, Ireland*

*Ana Herrero-Langreo, Post-doctoral Research Fellow UCD School of Biosystems and Food Engineering, Ireland*

*Nathalie Gorretta, Research Group ITAP Irstea – SupAgro Information-Technologies-environmental Analysis-agricultural Process, France*

*Cristina Malegori, Group of Analytical Chemistry and Chemometrics Department of Pharmacy University of Genova, Italy*

*Ludovic Duponchel, LASIR Lab, University of Lille, France*

## Multimedia

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**Vincent Couturier-Doux**

## Conference Venue

Amsterdam Conference Centre Beurs van Berlage  
Damrak 243  
1012 ZJ Amsterdam  
The Netherlands

T +31 (0)20 - 530 41 41  
info@beursvanberlage.com  
www.beursvanberlage.com

## Arrival from Amsterdam Schiphol Airport

From Amsterdam Schiphol Airport, you can reach Amsterdam Conference Centre Beurs van Berlage by train or taxi. If you are travelling by train, you can buy a ticket to Amsterdam Centraal Station in the Arrivals Hall of Schiphol. The trains leave four times every hour and the journey takes about fifteen minutes. If you take a taxi, you can state "Beurs van Berlage" as your destination. The address is: Damrak 243. The drive takes about twenty-five minutes.

## Arrival from Amsterdam Centraal Station

Beurs van Berlage is 300 metres away, about a five minute walk. You can see Beurs van Berlage on the Damrak in front of you when you leave the Central Station along the Stationsplein (Station square) and head out towards the Dam from there.

<b>Tram</b>	Stop : Dam (Bijenkorf)	Trams : 4, 9, 16, 24, 25	Walking : 1 minute
	Stop : Dam (Magna Plaza)	Trams : 10, 13, 14, 17	Walking : 5 minute

<b>Bus</b>	Stop : Dam (Bijenkorf)	Bus : 355, 357, 359, 361, 363	Walking : 1 minute
	Stop : Dam/Raadhuisstraat	Bus : 170, 170, 174, 272, 352, 354, 358, N70	Walking : 5 minute

For an up-to-date timetable,  
go to [www.gvb.nl](http://www.gvb.nl)

**Taxi** There are taxi stops right next to Beurs van Berlage, at the Oudebrugsteeg. You can order a cab at the Taxi Centrale Amsterdam, 020 - 777 77

**Car** The ideal way to reach the city centre of Amsterdam is to park your car at a P+R-location at the edge of the city, and use public transportation the rest of the way. If you come from the northeast, east or southeast of the Netherlands, it is best to use the P+R Zeeburg. Accessible via Ring A10, exit S114. If you come from the northwest or west of the Netherlands, it is best to park at P+R Sloterdijk. Accessible via Ring A10, exit S103.

### Parking centrum Oosterdok

- Oosterdokstraat 150, 1011 DK Amsterdam
- 1.700 parking spaces
- Maximum vehicle height 2.10 m / 6ft 11in
- Opening hours 24 hours, 7 days a week
- For rates please check the website [www.parkingcentrumoosterdok.nl](http://www.parkingcentrumoosterdok.nl)

### Parking garage Q-Park Bijenkorf:

- Beursplein 15, 1012 JW Amsterdam
- Immediately next to Beurs van Berlage
- 400 parking spaces
- Maximum vehicle height 1.80 m / 5ft 11in
- Opening hours 24 hours, 7 days a week
- For rates please check the website [www.q-park.nl](http://www.q-park.nl)

### Disabled access

Beurs van Berlage is largely accessible for disabled people. Unfortunately, Beurs van Berlage has no special disabled parking spaces. However, there is a Bijenkorf carpark right next to Beurs van Berlage. The Beurs van Berlage Toren (Tower) is only accessible by stairs.

### Registration Desk

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Tuesday, 24 to Thursday, 26 : from 8:00 to 18:00

Onsite registration : only cash

### Internet

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Free Wi-Fi is available in the whole building.

Name : HySpex\_goes\_industrial

Password : SpectroExpo2019

### Speaker Preparation

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Software: Each lecture hall is equipped with Office and Acrobat reader.

- File types: We accept .ppt, .pptx or .pdf formats.
- Loading your presentation: Please go to the appropriate lecture hall to upload your presentation BEFORE the start of your session.  
A Whisperer will be there to assist you as needed.

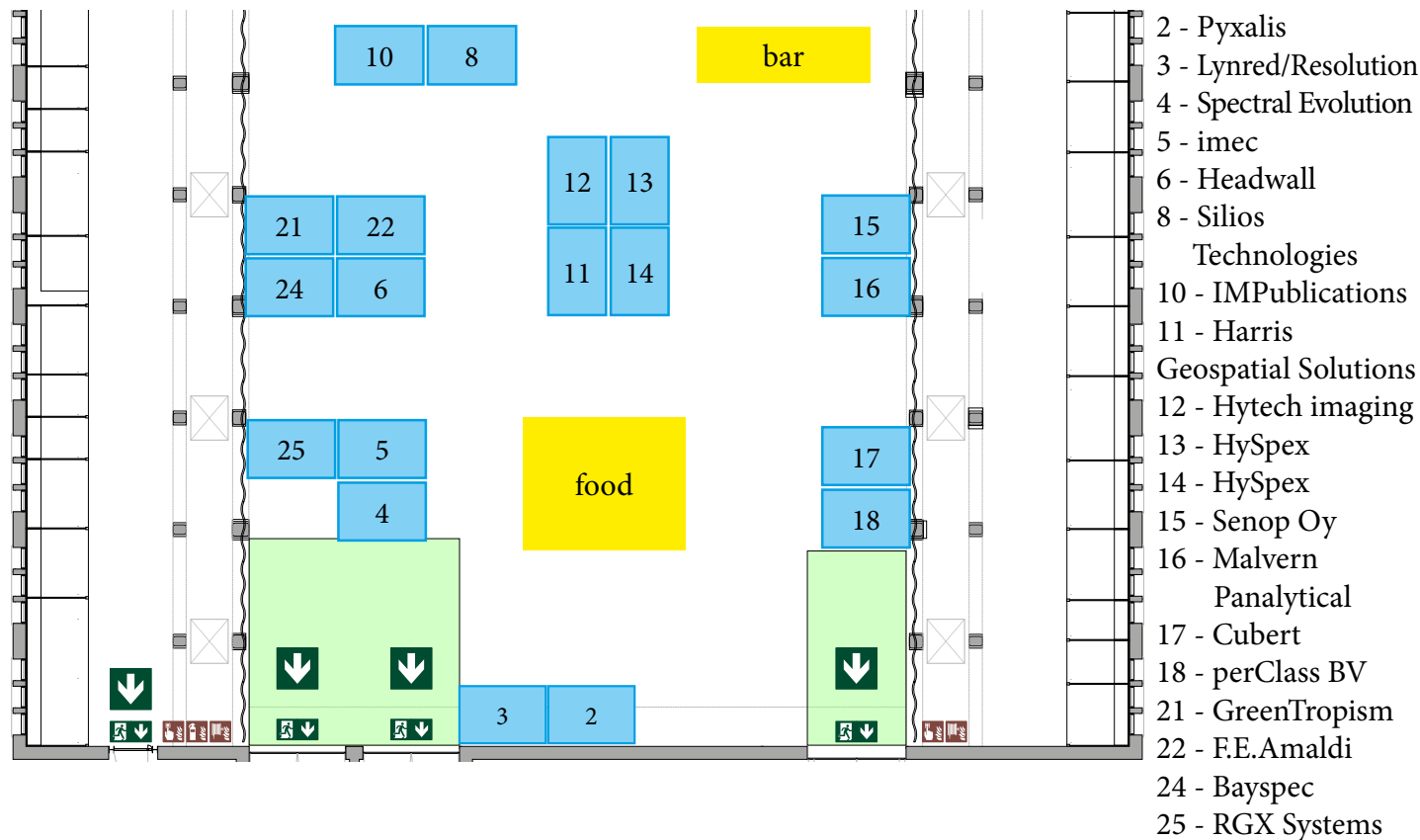
### Poster Preparation

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Set-up: Please arrive each day at the opening to set-up your poster. Whisperers will be there to assist you.

- Break-down: Please remove your poster at the end of the day, to free the spot for the next day's posters.
- Presentation: speaker should be alongside the poster during the coffee breaks.
- Size: max posters size is A0 (841 × 1189 mm). Orientation : portrait, no landscape !

## Exhibitors





### IEEE (<https://www.ieee.org>)

IEEE and its members inspire a global community to innovate for a better tomorrow through highly cited publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted “voice” for engineering, computing, and technology information around the globe.



### IEEE - GRSS (<http://www.grss-ieee.org>)

The fields of interest of the IEEE Geoscience and Remote Sensing Society are the theory, concepts, and techniques of science and engineering as they apply to the remote sensing of the earth, oceans, atmosphere, and space, as well as the processing, interpretation and dissemination of this information.



### ESA (<http://www.esa.int/ESA>)

The European Space Agency (ESA) is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. ESA is an international organisation with 22 Member States. By coordinating the financial and intellectual resources of its members, it can undertake programmes and activities far beyond the scope of any single European country.



### Hewlett Packard Enterprise (<https://www.hpe.com>)

Edge to cloud solutions built on the right mix of technologies, partners, services, and financial models to help you thrive. Discover our products and solutions in artificial intelligence and data driven services, deep learning, high performance computing, data centers services and much more !





## Tutorial

Optimal Estimation for Combined Retrievals of Surface and Atmosphere: Algorithms, Results, and Open Source Software

wednesday, 25

David R. Thomson, *Jet Propulsion Laboratory, California Institute of Technology, USA*

**Description:** This is a sequence of hands-on lab experiences using open source code for imaging spectrometer data analysis. Topics include visualization, atmospheric correction, and surface property estimation with rigorous uncertainty propagation. These modules will be offered as independent tutorial sessions in conjunction with the WHISPERS 2019 meeting. The sessions are open to all attendees, who can attend any combination in any order as desired.

The tutorials will use the open-source ISOFIT codebase (<https://github.com/isofit/isofit>) for atmospheric correction, and OpenSPEC for visualization capability similar to that provided in the ENVI interface. Tutorial materials are also available as open source resources for participants to use in their own courses.

**Convener:** Dr. David R. Thompson is a researcher and Technical Group Lead in the Imaging Spectroscopy group at the NASA Jet Propulsion Laboratory. He is Science Lead for NASA's EMIT mission, and Investigation Scientist for the AVIRIS imaging spectrometers. He is recipient of the NASA Early Career Achievement Medal and the JPL Lew Allen Award.

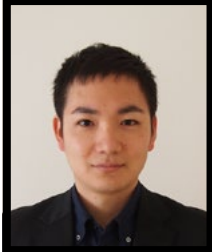
**Acknowledgements:** A portion of this research was performed at the Jet Propulsion Laboratory, California Institute of Technology. We acknowledge the support of a PRISM AITT grant from the National Aeronautics and Space Administration (NASA) Earth Science Technology Office. We acknowledge the support of the JPL and Caltech Presidents' and Directors' Fund Program. We thank other supporting sponsors including the NASA Earth Science Division for the HypsIRI preparatory campaign, the AVIRIS-NG instrument and the data analysis program "Utilization of Airborne Visible/Infrared Imaging Spectrometer Next Generation Data from an Airborne Campaign in India" NNH16ZDA001N-AVRNG, for its support of the algorithm development; the Jet Propulsion Laboratory Research and Technology Development Program; and the NASA Center Innovation Fund managed in conjunction with the Jet Propulsion Laboratory Office of the Chief Scientist and Technologist. Copyright 2019 California Institute of Technology. US Government Support Acknowledged.

## Turning NIR measurements into valuable information with multivariate analysis and spectroscopic knowledge

**Plenary****Jeroen Jansen, Radboud University, Nijmegen, The Netherlands****wednesday, 25**

**Abstract:** Spectroscopic data may contain a wealth of information, but generally requires preprocessing to remove non-informative artefacts and to enhance predictive features. A wealth of preprocessing methods have been proposed for several systematic steps in data preprocessing. The effect of each method on predictive power within the data may be poorly predictable, especially when multiple methods are used in concert. Contemporary computer power allows the patient data scientist to evaluate many such preprocessing combinations to find the combination with optimal predictive power, but such a search is out of scope for most on-line applications. For this, we have developed a Design approach to find an optimal preprocessing method in real-time. We show how these methods shift the importance of specific spectral areas in the prediction, and we also implement it in a multi-platform spectroscopic setting. The relevance of optimizing preprocessing in real-time we show by an implementation of this preprocessing in Multivariate Statistical Process Control of an industrial process, in which NIR is a key technology that needs to be continuously updated to retain predictive power.

**Jeroen Jansen** is Assistant Professor and Head of Department in Analytical Chemistry&Chemometrics at Radboud University Nijmegen. He received his PhD in chemometrics from University of Amsterdam and was Post Doctoral Research Associate at the Netherlands Institute for Ecology and the Netherlands Metabolomics Centre. The primary interest of Jansen is the development of quantitative methods that functionalize measurement technologies. Specifically data preprocessing, model updating and the implementation of spectroscopy in Industry 4.0 are his areas of interest. Jansen has received the 2016 Chemometrics and Intelligent Laboratory Systems Award.



## Plenary 1

## Hyperspectral Data Fusion

tuesday, 24

Naoto Yokoya, *Riken, Japan*

**Abstract:** A new era of spaceborne hyperspectral remote sensing (or imaging spectroscopy) has begun with the launch and operation of hyperspectral satellite missions (e.g., DESIS and PRISMA). Continuous spectral signatures of hyperspectral imagery enable the detection and identification of Earth surface materials and processes at a more detailed level that is not easy to achieve with conventional multispectral sensors. Spaceborne hyperspectral missions are expected to make an impact in various application fields, such as mineral mapping and environmental assessment; however, there are limitations in spatial resolution, observation coverage, and revisit cycle due to sensor design constraints. Data fusion is the key to extend the resolution and

analysis range while fully utilizing the rich spectral information of hyperspectral images. This talk provides an overview of data fusion technology to overcome the limitations by fusing hyperspectral images with other data sources (e.g., multispectral images and LiDAR-derived digital surface model). We introduce recent data fusion techniques based on coupled matrix/tensor decomposition, co-learning, and non-convex optimization for four different tasks, namely, super-resolution, land cover classification, change detection, and spectral unmixing, followed by discussions on remaining challenges and future directions.

**Naoto Yokoya** (S'10-M'13) received the M.Eng. and Ph.D. degrees in aerospace engineering from the University of Tokyo, Tokyo, Japan, in 2010 and 2013, respectively.

He is currently a Unit Leader at the RIKEN Center for Advanced Intelligence Project, Tokyo, Japan, where he leads the Geoinformatics Unit since 2018. He is also a visiting Associate Professor at Tokyo University of Agriculture and Technology since 2019. He was an Assistant Professor at the University of Tokyo from 2013 to 2017. In 2015-2017, he was an Alexander von Humboldt Fellow, working at the German Aerospace Center (DLR), Oberpfaffenhofen, and Technical University of Munich (TUM), Munich, Germany. His research interests include image processing, data fusion, and machine learning for understanding remote sensing images, with applications to disaster management.

Dr. Yokoya won the first place in the 2017 IEEE Geoscience and Remote Sensing Society (GRSS) Data Fusion Contest organized by the Image Analysis and Data Fusion Technical Committee (IADF TC). He is an Associate Editor for the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS) since 2018. He is/was the Chair (2019-present) and Co-Chair (2017-2019) of IEEE GRSS IADF TC and also the secretary of IEEE GRSS All Japan Joint Chapter since 2018.

## Recent Advances in Spectral–Spatial Hyperspectral Image Classification Plenary 2

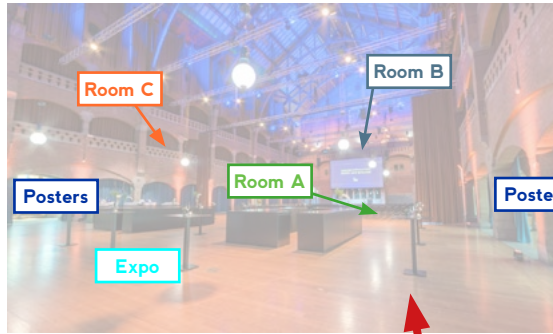
*Jun Li, College of Electrical and Information Engineering Hunan University, China*

**tuesday, 24**



**Abstract:** Imaging spectroscopy, also known as hyperspectral imaging, has been transformed in the last four decades from being a sparse research tool into a commodity product available to a broad user community. Particularly, in the last 10 years, a significant number of new techniques have been introduced in the domain of hyperspectral image classification. Most of these techniques are characterized by their capacity to take into account both the spatial and spectral characteristics of the hyperspectral data, as opposed to classic techniques for hyperspectral classification that perform in pixel-by-pixel fashion. Spectral–spatial hyperspectral image classification techniques can achieve better performance than their pixel-wise counterparts, as they can combine the rich spectral information contained in the data with spatial-contextual information. In this talk, we provide a comprehensive overview of recent developments in spectral–spatial techniques for hyperspectral image classification in a unified context. The idea of spatial dependency system is first introduced, which involves pixel dependency and label dependency. Resulting from this concept, we categorize available approaches into fixed, adaptive, and global. Then, existing spectral–spatial methods are grouped into four categories according to the fusion stages in which spatial information becomes effective, i.e., preprocessing-based, integrated, postprocessing-based, and hybrid techniques. Finally, typical methodologies are outlined. The talk concludes with a detailed comparison of representative spectral–spatial classification methods using hyperspectral images collected by several instruments, in the context of different applications.

**Jun Li** received the Geographical Information Systems degree from Hunan Normal University in 2004, the M.Sc. degree in Remote sensing and Photogrammetry from Peking University in 2007, and the Ph.D. degree in Electrical and Computer Engineering from Instituto Superior Tecnico, Technical University of Lisbon in 2011. She was a postdoctoral researcher with the Hyperspectral Computing Laboratory, Department of Technology of Computers and Communications, University of Extremadura, Cáceres, Spain. She was a Full Professor with the School of Geography and Planning, Sun Yat-Sen University during 2014–2018, China. She is currently a Full Professor at College of Electrical and Information Engineering, Hunan University, China. She has published a total of 86 journal citation report (JCR) papers, 48 conference international conference papers, and 1 international book chapter. She has received a significant number of citations to her published works, with several papers distinguished as “Highly Cited Papers” in Clarivate Analytics’ Web of Science Essential Science Indicators (WoS-ESI). She was elevated to IEEE Senior Member status in 2016. Her students have also obtained important distinctions and awards at international conferences and symposia. Her main research interests comprise remotely sensed hyperspectral image analysis, signal processing, supervised/semisupervised learning and active learning. Prof. Li is an Associate Editor for the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (since 2014). She has been a Guest Editor for several journals, including the Proceedings of the IEEE and the ISPRS Journal of Photogrammetry and Remote Sensing. She has also been an active reviewer for several journals, including the IEEE Transactions on Geoscience and Remote Sensing, the IEEE Geoscience and Remote Sensing Letters, the IEEE Transactions on Image Processing, Pattern Recognition, Optical Engineering, Journal of Applied Remote Sensing, and Inverse Problems and Imaging. She has received several important awards and distinctions, including the IEEE Geoscience and Remote Sensing Society (GRSS) Early Career Award in 2017. She was distinguished as a Best Reviewer of the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (in 2013). One of her students received the Best Student Paper at the 2016 SPIE Remote Sensing Europe Symposium held in Edinburgh, UK. One of her students received the 2nd prize in the Student Paper competition held at the 2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS) held in Fort Worth, Texas.



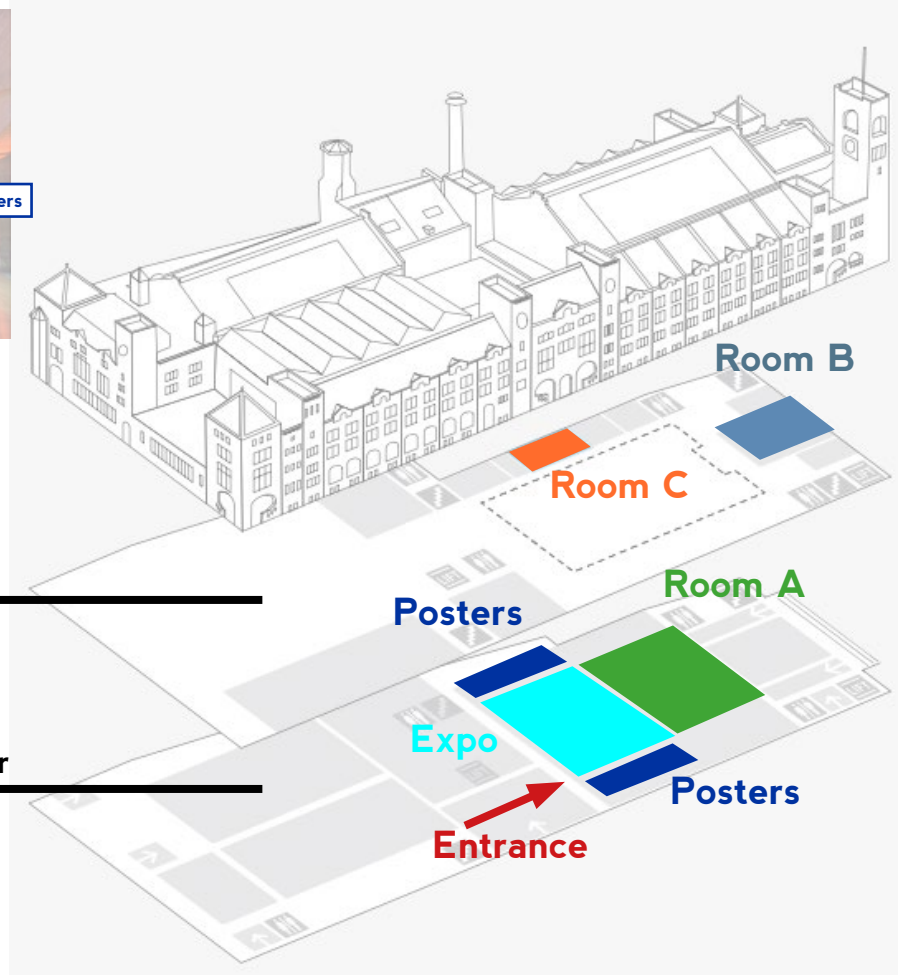
**Entrance**

**first floor**

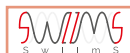
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**ground floor**

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# At a glance



Tuesday, 24		All day poster session		Wednesday, 25		All day poster session		Thursday, 26		All day poster session	
8:30	Welcome			8:30	wed-o-1-a SwIImS	wed-o-1-b Precision agriculture, soil and vegetation	tuto-wed-1-c David R. Thompson	8:30	thu-o-1-a Massive Data Processing and Analysis in Radioastronomy	thu-o-1-b Spectral unmixing	
9:00	Plenary 1 Naoto Yokoya room A										
10:00	Coffee Break			10:10	Coffee Break			10:10	Coffee Break		
10:30	Plenary 2 Jun Li room A			10:50	wed-o-2-a SwIImS Food inspection	wed-o-2-b Hyperspectral + Lidar data fusion	tuto-wed-2-c David R. Thompson	10:50	thu-o-2-a Massive Data Processing and Analysis in Radioastronomy	thu-o-2-b Sensors	thu-o-2-c Classification and Application
11:30	Special Tracks & Awards SwIImS, Orion B & Awards Ceremony room A			12:30	Lunch			12:30	Lunch		
12:30	Lunch										
14:00	tue-o-1-a Small platforms	tue-o-1-b Anomaly / target detection	tue-o-1-c Hands-on session Headwall	14:00	wed-o-3-a Spaceborne Imaging Spectroscopy Missions and Analyses Techniques	wed-o-3-b SwIImS Applications : materials, art and vegetation	tuto-wed-3-c Hands-on session perClass	14:00	thu-o-3-a Mineralogy	thu-o-3-b Massive Data Processing and Analysis in Radioastronomy	thu-o-3-c Advanced Processing
15:40	Coffee Break			15:40	Coffee Break			15:40	Coffee Break		
16:20	tue-o-2-a Precision agriculture	tue-o-2-b Hyperspectral Computer Vision : Detection, Classification and Tracking	tue-o-2-c Platforms, Sensors	16:20	wed-o-4-a Hyperspectral Computer Vision : Image Processing and Feature Extraction	wed-o-4-b SwIImS VNIR, SWIR : models and sensors		16:20	thu-o-4-a Thermal emission and gas detection	thu-o-4-b Denoising	thu-o-4-c Massive Data Processing and Analysis in Radioastronomy
18:00	Icebreaker			18:00				18:00			
	room A	room B	room C		room A	room B	room C		room A	room B	room C

## Overview

		Poster Room		
All day	Poster sessions	tue-p-1	Agriculture and vegetation	
		tue-p-2	Super-resolution, pansharpening	
		tue-p-3	Methods and models	
8:30	Welcome	Room A	Room B	Room C
9:00	Plenary 1	Plenary 1		
		Naoto Yokoya		
10:00	Coffee Break			
10:30	Plenary 2	Plenary 2		
		Jun Li		
11:30	Plenary 3	Special Tracks & Awards		
		SwIImS, Orion B & Awards Ceremony		
12:30	Lunch			
14:00	Oral Sessions	tue-o-1-a	tue-o-1-b	tuto-tue-o-1-c
		Small platforms	Anomaly / target detection	Hands-on session Headwall
15:40	Coffee Break		14:00 - 16:00	
16:20	Oral Sessions	tue-o-2-a	tue-o-2-b	tue-o-2-c
		Precision agriculture	Hyperspectral Computer Vision : Detection, Classification, and Tracking	Platforms, Sensors
18:00	Icebreaker		16:20 - 18:20	16:20 - 18:20



## tue-p-1 Agriculture and vegetation

## All day poster session

IMPROVING CROP MAPPING USING GENETIC ALGORITHM AND SPECTRAL ANGLE MAPPER ALGORITHM COOPERATION

Mohamad Awad

HOMOGENISING, SEGMENTING HYPERSPECTRAL IMAGES OF PLANTS AND TESTING CHEMICALS IN A HIGH-THROUGHPUT PLANT PHENOTYPING SETUP

Puneet Mishra, Martin Schmuck, Sina Roth, Andreas Nicol and Alison Nordon

INDIVIDUAL TREE SPECIES CLASSIFICATION USING AIRBORNE HYPERSPECTRAL IMAGERY AND LIDAR DATA

Peter Burai, Laszlo Beko, Csaba Lenart, Tamas Tomor and Zoltan Kovacs

MANGROVE FOREST SPECIES CLASSIFICATION USING AVIRIS-NG DATA

Aman Jain Bhutoria, Kshitij Srivastava, Prem Chandra Pandey, George P Petropoulos and Prashant K Srivastava

ESTIMATION OF THE LIFE OF FLAMINGO VASE USING HYPERSPECTRAL TECHNIQUES

Shih-Yu Chen, Chinsu Lin, Li-Wei Kang and Zhe-Yuan Kao

EVALUATING THE POTENTIAL OF A UAS HYPERSPECTRAL IMAGING SYSTEM FOR MAPPING INVASIVE VEGETATION IN SUPPORT OF OIL FIELD HABITAT RESTORATION

Christian Haselwimmer, Irma Caraballo Álvarez, Tod Rubin and Hallvard Skjerpjng

A TPE BASED INVERSION OF PROSAIL FOR ESTIMATING CANOPY BIOPHYSICAL AND BIOCHEMICAL VARIABLES OF OILSEED RAPE

Shanqin Wang, Wenhan Gao and Jin Ming

SIMULATING SPECTRAL HETEROGENEITY IN TROPICAL FOREST CANOPY REFLECTANCE WITH 3D RADIATIVE TRANSFER MODELING

Dav Ebengo, Florian de Boissieu, Claudia Lavalley, Gregoire Vincent, Christiane Weber and Jean-Baptiste F  ret

A COUPLED RETRIEVAL OF COLUMNAR WATER VAPOR AND CANOPY WATER CONTENT FROM SPACEBORNE HYPERSPECTRAL MEASUREMENTS

Niklas Bohn, Theres Kuester, Karl Segl and Luis Guanter

FUNCTIONAL TRAIT VARIATION OF QUERCUS GARRYANA ACROSS A MODIFIED LANDSCAPE USING LEAF SPECTROSCOPY

Paul Hacker, Nicholas Coops and Philip Townsend

EXPLORING THE INFLUENCE OF SPATIAL RESOLUTION ON THE DIGITAL MAPPING OF SOIL ORGANIC CARBON BY AIRBORNE HYPERSPECTRAL VNIR IMAGING

Long Guo

RECENT APPLICATIONS OF MULTISPECTRAL IMAGING IN SEED PHENOTYPING AND QUALITY MONITORING—A REVIEW

Gamal Elmasry, Nasser Mandour, Noha Morsy, Salim Alrajai, Etien Belin and David Rousseau

QUANTIFYING STRUCTURAL COMPLEXITY IN HYPERSPECTRAL IMAGERY FOR CLASSIFICATION OF MANGROVE SPECIES IN COSTA RICA

Patrick Osei Darko, Margaret Kalacska, J. Pablo Arroyo-Mora and Matthew E Fagan

PIXELWISE CLASSIFICATION USING HYPERSPECTRAL AND LIDAR DATA FOR FOREST TREE SPECIE IDENTIFICATION

Eduardo Tusa, Jean-Matthieu Monnet, Jean-Baptiste Barr  , Mauro Dalla Mura, Fr  d  ric Berger and Jocelyn Chanussot

## tue-p-2 Super-resolution, pansharpening

All day poster session

DEEP LEARNING FOR SUPER-RESOLUTION OF UNREGISTERED MULTI-TEMPORAL SATELLITE IMAGES

Andrea Bordone Molini, Diego Valsesia, Giulia Fracastoro and Enrico Magli

RESOLUTION ENHANCEMENT OF UNSUPERVISED CLASSIFICATION MAPS THROUGH SPATIAL-FEATURES AIDED LEARNING FOR DATA FUSION OF SPECTRAL AND VISIBLE IMAGES

Fdai Kizel

A SUMMARY OF SUPER-RESOLUTION FOR SATELLITE VIDEOS VIA LEARNING-BASED METHODS

Huan Liu and Yanfeng Gu

MULTIRESOLUTION ANALYSIS PANSHARPENING FOR THE FUSION OF RAMAN AND CONVENTIONAL BRIGHTFIELD MICROSCOPY IMAGES

Christoph Pomrehn, Daniel Klein, Andreas Kolb, Peter Kaul and Rainer Herpers

HYPERSPECTRAL AND MULTISPECTRAL IMAGE FUSION BASED ON DEEP ATTENTION NETWORK

Qing Yang, Yang Xu, Zebin Wu and Zhihui Wei

DEEP PANCHROMATIC IMAGE GUIDED RESIDUAL INTERPOLATION FOR MULTISPECTRAL IMAGE DEMOSAICKING

Zhihong Pan, Baopu Li, Yingze Bao and Hsunchun Cheng

A PIXEL LEVEL SCALED FUSION MODEL TO PROVIDE HIGH SPATIAL-SPECTRAL RESOLUTION FOR SATELLITE IMAGES USING LSTM NETWORKS

Carlos Theran, Michael Alvarez, Emmanuel Arzuaga and Heidy Sierra

## tue-p-3 Methods and models

All day poster session

MEASUREMENTS AND MODELS IN HYPERSPECTRAL IMAGING: BIG DATA ON A SMALL COMPUTER

Harald Martens

AN UNSUPERVISED DIMENSIONALITY REDUCTION APPROACH FOR UNMANNED AERIAL SYSTEM-BASED HYPERSPECTRAL DATA

Pedram Ghamisi, Sandra Lorenz, Behnood Rasti, Robert Jackisch and Richard Gloaguen

HIGH-THROUGHPUT ONBOARD HYPERSPECTRAL IMAGE COMPRESSION WITH GROUND-BASED CNN RECONSTRUCTION

Diego Valsesia and Enrico Magli

A THEORY OF INFORMATION PERSPECTIVE ON HYPERSPECTRAL IMAGES

Mihai Ivanovici

VALIDATION OF SPECTRAL DISTANCES THROUGH OPTICAL MODELING AND HYPERSPECTRAL IMAGING

Anne-Cécile Membre, Fernando Zenatti Fadanelli, Aurélie Tournié, Anne Michelin, Noël Richard and Christine Andraud

A FRAMEWORK FOR AN ARTIFICIAL NEURAL NETWORK ENABLED SINGLE PIXEL HYPERSPECTRAL IMAGER

Fernando Arias, Heidy Sierra and Emmanuel Arzuaga

CLOSED-LOOP MOVING WINDOWS WAVELENGTH SELECTION METHOD WITH APPLICATION TO NEAR-INFRARED SPECTROSCOPIC ANALYSIS

Liwen Pang, Jiemei Chen and Tao Pan

DISCRETE WAVELENGTHS SCREENING METHOD FOR THE NEAR-INFRARED SPECTROSCOPIC ANALYSIS OF SERUM GLUCOSE

Yucai Lin, Jiemei Chen and Tao Pan

L0 GRADIENT REGULARIZED LOW-RANK TENSOR MODEL FOR HYPERSPECTRAL IMAGE DENOISING

Minghua Wang, Qiang Wang and Jocelyn Chanussot

## Welcome

8:30

## Plenary 1    Hyperspectral Data Fusion

9:00 - 10:00

Naoto Yokoya, *Riken, Japan*

## Coffee break

10:00

## Plenary 2    Recent Advances in Spectral–Spatial Hyperspectral Image Classification

10:30 - 11:30

Jun Li, *College of Electrical and Information Engineering Hunan University, China*

## Special Tracks & Awards    SwIImS, Orion B & Awards Ceremony

11:30 - 12:30

INTRODUCTION TO SYMPOSIUM ON SHORT WAVE INFRARED IMAGING AND SPECTROSCOPY (SWIIMS)

Aoife Gowen and Ana Herrero-Langreo

INTRODUCTION TO MASSIVE DATA PROCESSING AND ANALYSIS IN RADIOASTRONOMY

Maryvonne Gerin, Jérôme Pety and François Levrier

AWARDS CEREMONY

## Lunch

12:30

tue-o-1-a

Small platforms

14:00 - 15:40

tue-o-1-b

Anomaly / target detection

14:00 - 16:00

**Session chairs :** **Stefan Livens**, *VITO Remote Sensing, Belgium*  
**Pablo Arroyo-Mora**, *Nat. Research Council of Canada*

CSIMBA: CONTRIBUTING TO GLOBAL MONITORING WITH A SMALL  
HYPERSPETRAL MISSION

Stefan Livens, Bavo Delauré, Joris Blommaert and Bart Pajmans

IMPLEMENTATION OF A UAV-HYPERSPECTRAL PUSHBROOM IMAGER  
FOR ECOLOGICAL MONITORING

J. Pablo Arroyo-Mora, Margaret Kalacska, Deep Inamdar, Raymond Soffer, Oliver Lucanus, Janine Gorman, Tomas Naprstek, Erica Skye Schaaf, Gabriela Ifimov, Kathryn Elmer and George Leblanc

THE ROLE OF BI-DIRECTIONAL REFLECTANCE CORRECTION IN UAV-  
BASED HYPERSPECTRAL IMAGING TO IMPROVE DATA ROBUSTNESS

Keshav Dev Singh, Steve J. Shirtliffe and Hema S. N. Duddu

A COMPREHENSIVE RELATIVE RADIOMETRIC CORRECTION METHOD  
FOR HYPERSPECTRAL UAV IMAGES

Su Junjie, Yang Cankun, Li Yue and Zhang Ke

FUSION OF LOW- AND HIGH- LEVEL FEATURES FOR UAV HYPERSPEC-  
TRAL IMAGE CLASSIFICATION

Shuang Zhang, Xuming Zhang, Aizhu Zhang, Hang Fu, Ji Cheng, Genyun Sun, Li Zhang and Yanjuan Yao

**Session chairs :** **Robert Sundberg**, *Spectral Sciences, Inc., USA*  
**Tegan Emerson**, *Pacific Northwest National Laboratory, USA*

ANOMALY DETECTION IN HYPERSPECTRAL IMAGES VIA SUPERPIXEL  
SEGMENTATION AND UNSUPERVISED BACKGROUND LEARNING

Sertac Arisoy and Koray Kayabol

GENERATIVE AND ENCODED ANOMALY DETECTORS

Tegan Emerson, Colin Olson, Timothy Doster, Jason Edelberg and Nicolas Merrill

EFFECTS OF THE ATMOSPHERIC COMPENSATION METHOD ON HYPER-  
SPECTRAL RARE TARGET DETECTION

Robert Sundberg and Steve Adler-Golden

IMPROVED HYPERSPECTRAL ANOMALY TARGET DETECTION METHOD  
BASED ON MEAN VALUE ADJUSTMENT

Guangyu Zhang, Mingming Xu, Yan Zhang and Yanguo Fan

MULTI-TARGET MULTIPLE INSTANCE LEARNING FOR HYPERSPECTRAL  
TARGET DETECTION

James Bocinsky, Susan Meerdink, Alina Zare, Connor McCurley, Daniel Shats and Paul Gader

APPROXIMATE COMPUTING FOR ONBOARD ANOMALY DETECTION  
FROM HYPERSPECTRAL IMAGES

Yuanfeng Wu, Sebastián López, Bing Zhang, Fei Qiao and Lianru Gao

*please notice end of session tue-o-1-b is 16:00*

## Coffee break

15:40

Tuesday, 24

Lunch

12:30

tuto-tue-o-1-c Hands-on session

14:00 - 15:40

## HYPERSENSPECTRAL + LIDAR DATA FUSION

Organizer : Headwall Photonics

14:00

### OUTDOOR HANDS-ON SESSION

You will have the chance to attend a real field hyperspectral measurement and go through the post-processing steps of a datacube acquired by our latest portable sensor by Headwall Photonics.

The main characters of this sensor are its portability and its flexibility of use in the field. The topics of lens focusing, sensor optimization, scan speed settings, radiometric and reflectance conversions will be covered and extensively explained to the auditors. The session will start in the field. In the field you will acquire data.

After the measurement, you will move to a room and look at the acquired data-cube.

15:00

### HYPERSENSPECTRAL + LIDAR DATA FUSION

Feedback and best practices by Headwall Photonics

Coffee break

15:40

See us at **whispers**  
**Booth No. 6**

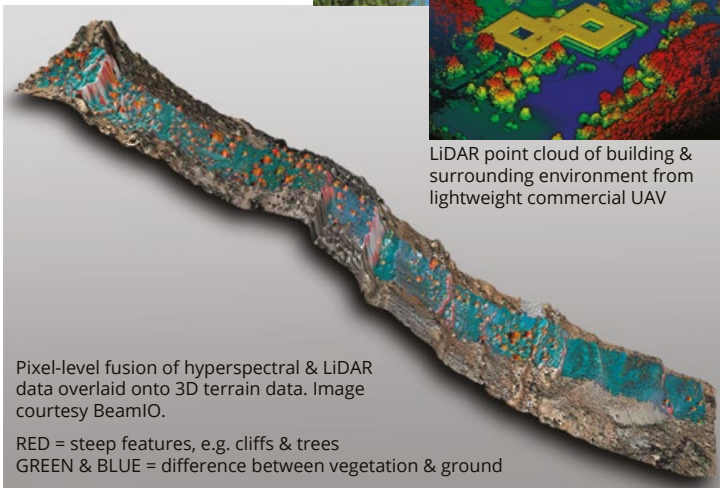
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LiDAR point cloud of building & surrounding environment from lightweight commercial UAV



Pixel-level fusion of hyperspectral & LiDAR  
data overlaid onto 3D terrain data. Image  
courtesy BeamIO.

RED = steep features, e.g. cliffs & trees  
GREEN & BLUE = difference between vegetation & ground

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tue-o-2-a

Precision agriculture

16:20 - 18:00

**Session chairs :** **Katja Berger**, *LMU Munich, Germany*  
**Stephanie Delalieux**, *Flemish Inst. for Tech. Research, Belgium*

REGULARIZATION & OPTIMIZATION OF HYBRID INVERSION PROCEDURES FOR THE RETRIEVAL OF AGRICULTURAL VARIABLES FROM HYPERSPECTRAL DATA

Martin Danner, Katja Berger, Matthias Woher, Wolfram Mauser and Tobias Hank

TRANSFER LEARNING FOR FINE-GRAINED CROP DISEASE CLASSIFICATION BASED ON LEAF IMAGES

Kamal Kc, Zhengdong Yin, Bo Li, Bo Ma and Mingyang Wu

MAPPING PLANT TRAITS IN AGRICULTURAL FIELDS BASED ON TIME SERIES OF HYPERSPECTRAL IMAGES FROM UNMANNED AERIAL VEHICLES (UAV)

Georgios Ntakos, Christiaan van der Tol and Tamme van der Wal

UAV-BASED HYPERSPECTRAL IMAGING APPROACH FOR MONITORING AND MANAGEMENT OF VEGETATION STRESSES IN AGRONOMIC AND SPECIALTY CROPS FOR SUSTAINABLE AGRICULTURE

Keshav D. Singh

POTATO VIRUS Y DETECTION IN SEED POTATOES USING DEEP LEARNING ON HYPERSPECTRAL IMAGES

Gerrit Polder, Pieter M. Blok, Hendrik A.C. de Villiers, Jan M. van der Wolf and Jan Kamp

tue-o-2-b

**Hyperspectral Computer Vision : 16:20 - 18:20**  
**Detection, Classification and Tracking**

**Session chairs :** **Jun Zhou**, *Griffith University, Australia*

CONVOLUTIONAL NEURAL NETWORKS FOR HETEROGENEOUS INGREDIENT DISCRIMINATION WITH HYPERSPECTRAL IMAGING

Carolina Blanch Perez del Notario, Wouter Saeys and Andy Lambrechts

A MASSIVE SELF-ORGANIZING MAP FOR HYPERSPECTRAL IMAGE CLASSIFICATION

Michael Wong, Wajira Abeysinghe and Chih-Cheng Hung

KNOWLEDGE TRANSFER VIA CONVOLUTION NEURAL NETWORK FOR MULTI-RESOLUTION LAWN WEED CLASSIFICATION USING REMOTE SENSING IMAGES

Adnan Farooq, Xiuping Jia, Jiankun Hu and Jun Zhou

FEW-SHOT HYPERSPECTRAL IMAGE CLASSIFICATION THROUGH MULTITASK TRANSFER LEARNING

Ying Qu, Razieh Kaviani Baghbaderani and Hairong Qi

DYNAMIC MATERIAL-AWARE OBJECT TRACKING IN HYPERSPECTRAL VIDEOS

Fengchao Xiong, Jun Zhou, Yuntao Qian and Jocelyn Chanussot

INDUSTRIAL SORTING APPLICATION WITH SMALL OBJECTS AND HOW DISTORTIONS AFFECT THE RESULTS

Andreas Vidman and Oskar Jonsson

*please notice end of session tue-o-2-b is 18:20*

Icebreaker

18:00

**Session chairs :**    **Neil Goldstein**, *Spectral Sciences, Inc., USA*  
                              **Marco Esposito**, *Cosine, Netherlands*

THE EVOLUTION OF THE HYPERSCOUT PLATFORM FOR SMART EO APPLICATIONS

Marco Esposito

A COMPACT TWO-CHANNEL IMAGING SYSTEM IN THE VIS-SWIR RANGE FOR REMOTE SENSING DRONE APPLICATIONS

Alexander Jenal, Georg Bareth and Jens Bongartz

A HYPERSPECTRAL IMAGING SYSTEM FOR UAV BASED AGRICULTURAL REMOTE SENSING IN THE VIS-SWIR RANGE

Moritz Prüm, Marcel Dogotari, Bethany Melville, Olee Hoi Ying Lam and Rolf Becker

CUSTOM BAYER FILTER MULTISPECTRAL IMAGING: EMERGING INTEGRATED TECHNOLOGY

Stéphane Tisserand

IMAGAZ - IMAGING GASES IN SWIR WITH IMSPOC

Etienne le Coarer

SINGLE-SHOT MULTISPECTRAL IMAGE ACQUISITION FOR LOW-ALTITUDE REMOTE SENSING USING LIGHT DIFFRACTION TECHNIQUES

Carlos Iturrino, Fernando Arias, Heidy Sierra and Emmanuel Arzuaga

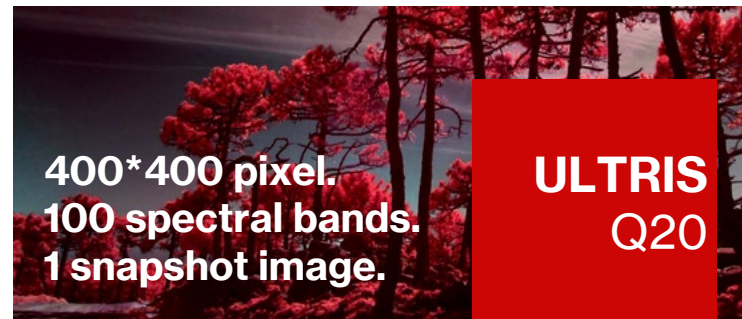
*please notice end of session tue-o-2-c is 18:20*

**Icebreaker**

**18:00**

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# Overview

## Poster Room

**wed-p-1** Hyperspectral Computer Vision : Segmentation and Classification  
**wed-p-2** Applications : from Biology to non Destructive Control

## Room A

## Room B

## Room C

<b>08:30</b>	<b>Oral Sessions</b>	<b>wed-o-1-a</b> [SwIImS] Plenary :	<b>wed-o-1-b</b> Precision Agriculture, Soil and Vegetation	<b>tuto-wed-1-c</b> David R. Thompson
10:10	Coffee Break			
<b>10:50</b>	<b>Oral Sessions</b>	<b>wed-o-2-a</b> [SwIImS] Food Inspection	<b>wed-o-2-b</b> Hyperspectral + Lidar Data Fusion	<b>tuto-wed-2-c</b> David R. Thompson
12:30	Lunch			
<b>14:00</b>	<b>Oral Sessions</b>	<b>wed-o-3-a</b> Spaceborne Imaging Spectroscopy Missions and Analyses Techniques 14:00 - 16:00	<b>wed-o-3-b</b> [SwIImS] Applications : Materials, Art and Vegetation	<b>tuto-wed-3-c</b> Hands-on session perClass
15:40	Coffee Break			
<b>16:20</b>	<b>Oral Sessions</b>	<b>wed-o-4-a</b> Hyperspectral Computer Vision : Image Processing and Feature Extraction 16:20 - 18:20	<b>wed-o-4-b</b> [SwIImS] VNIR, SWIR : Models and Sensors	
<b>18:00</b>	End of the day			



## wed-p-1 Hyperspectral Computer Vision : Segmentation and Classification

All day poster session

AN EDGE-PRESERVING ACTIVE CONTOUR MODEL WITH BILATERAL FILTER BASED ON HYPERSPECTRAL IMAGE SPECTRAL INFORMATION FOR OIL SPILL SEGMENTATION

Wandi Wang, Hui Sheng, Shanwei Liu, Yanlong Chen, Jianhua Wan and Jijun Mao

UNSUPERVISED CLASSIFICATION FOR HYPERSPECTRAL DATASETS

Himanshi Yadav and David Wettergreen

MULTI-SCALE DILATED RESIDUAL CONVOLUTIONAL NEURAL NETWORK FOR HYPERSPECTRAL IMAGE CLASSIFICATION

Kumari Pooja, Rama Rao Nidamanuri and Deepak Mishra

OPTIMAL FEATURE SELECTION FOR THE CLASSIFICATION OF HYPERSPECTRAL IMAGERY USING ADAPTIVE SPECTRAL-SPATIAL CLUSTERING

Chidambaram Somanathan and Sumathi Appranchi

SPACEBORNE HYPERSPECTRAL IMAGING FOR SPECTRAL ANALYSIS AND CHARACTERIZATION OF INTERSTELLAR MEDIUM OF MILKY WAY GALAXY

Chidambaram Somanathan and Sumathi Appranchi

A NOVEL STATISTICAL METRIC LEARNING FOR HYPERSPECTRAL IMAGE CLASSIFICATION

Zhiqiang Gong, Ping Zhong, Weidong Hu, Zixuan Xiao and Xuping Yin

DE-NOISING AUTO-ENCODER TECHNIQUE FOR CLASSIFICATION OF HYPERSPECTRAL DATA

Kshitij Srivastava, Aman Jain Bhutoria, Prem Chandra Pandey, Prashant K Srivastava and George P Petropoulos

CAPSULE NETWORKS ARE BETTER THAN CNN IN HYPERSPECTRAL IMAGE CLASSIFICATION ?

Gheorghe Gardu

CLUSTER-BASED SPECTRAL-SPATIAL SEGMENTATION OF HYPERSPECTRAL IMAGERY

Sean Kennedy, William Williamson and James Scrofani

A BAND SUBSET SELECTION APPROACH BASED ON SELF-SPARSE MODEL FOR HYPERSPECTRAL IMAGE CLASSIFICATION

Meng-Hsien Yang, Meng-Han Lu and Keng-Hao Liu

DISCRIMINATIVE MARGINALIZED LEAST SQUARES REGRESSION FOR HYPERSPECTRAL IMAGE CLASSIFICATION

Yu Xiang Zhang, Wei Li, Qian Du and Sun Xu

LAND COVER CLASSIFICATION FOR SATELLITE IMAGES THROUGH 1D CNN

Yang Song, Zhifei Zhang, Razieh Kaviani Baghbaderani, Fanqi Wang and Hairong Qi

HYPERSPECTRAL IMAGE CLASSIFICATION USING SPECTRAL-SPATIAL DISTANCE BASED ON INFORMATION CONTENT

Siya Chen

MULTI-TEMPORAL LAND COVER CLASSIFICATION WITH SEQUENTIAL RECURRENT ENCODERS

Marc Rußwurm and Marco Körner

A BAND SELECTION METHOD FOR HYPERSPECTRAL IMAGE CLASSIFICATION BASED ON CUCKOO SEARCH ALGORITHM WITH CORRELATION BASED INITIALIZATION

Shrutika S. Sawant, Manoharan Prabukumar and Sathishkumar Samiappan

CREATING MODELS OF HYPERSPECTRAL CLASSIFICATION WORKFLOWS INTEGRATING DIMENSIONALITY EXPANSION FOR MULTISPECTRAL IMAGERY

Thomas Bahr and Daniel C. Heinz

ADAPTIVE SELF-LEARNED ACTIVE LEARNING FRAMEWORK FOR HYPERSPECTRAL CLASSIFICATION

Nasehe Jamshidpour, Enayat Hosseini Aria, Abdolreza Safari and Saeid Homayouni

DISCRIMINATIVE SPECTRAL-SPATIAL ATTENTION-AWARE RESIDUAL NETWORK FOR HYPERSPECTRAL IMAGE CLASSIFICATION

Yaoming Cai, Zhimin Dong, Zhihua Cai and Xiaobo Liu

**wed-p-2 Applications : from Biology to non Destructive Control**
**All day poster session**

CLASSIFICATION OF STAMPS OF HISTORICAL BANKNOTES USING SIGNAL PROCESSING ALGORITHMS USED FOR HYPERSPECTRAL IMAGING DATA

Paulina Krupska, Julio M. del Hoyo Meléndez and Anda Jaworucka-Drath

THE USE OF HYPERSPECTRAL IMAGING FOR CAKE MOISTURE AND HARDNESS PREDICTION

Adam Polak, Fraser Coutts, Paul Murray and Stephen Marshall

IN SITU HIGH SPEED NIR IMAGING TO MONITOR FORM CHANGE AND DRUG RELEASE FROM RAPIDLY DISINTEGRATING TABLETS

Patrick Wray, Lucy Hawarden, Khezia Asamoah, Andrew Dennis and Stuart Charlton

AUTOMATIC LIVE AND DEAD CELL CLASSIFICATION VIA HYPERSPECTRAL IMAGING

He Chen, Benjamin Ho, Haofei Wang, Say Hwa Tan, Chun-Xia Zhao, Nam-Trung Nguyen, Yongsheng Gao and Jun Zhou

DESIGN AND EVALUATION OF A LARGE AREA INFRARED RADIATION SOURCE FOR RADIOMETRIC CALIBRATION IN FIELD EXPERIMENT

Yonggang Qian, Shi Qiu, Li Kun, Ning Wang, Yaokai Liu, Caixia Gao, Lingling Ma, Yuanyuan Qiu, Lingling Ma and Chuanrong Li

FTIR SPECTROSCOPY FOR MOLECULAR LEVEL DESCRIPTION OF WATER VAPOR SORPTION IN TWO HYDROPHOBIC POLYMERS

Junli Xu and Aoife Gowen

PAIRING SPECTRAL INDICES FOR MOISTURE AND RESIDUE COVER

Craig S.T. Dean Hively, E. Raymond Hunt, Feng Gao and Gregory W. McCarty

QUANTIFICATION OF PERMAFROST MELTING RISK USING FRACTAL ANALYSIS OF REMOTE SENSED IMAGES USING INSIGHTS FROM THE ANAKTAVUK RIVER FIRE OF 2007

Mithra Karamchedu



## CMOS BASED HYPERSPECTRAL IMAGING SOLUTIONS

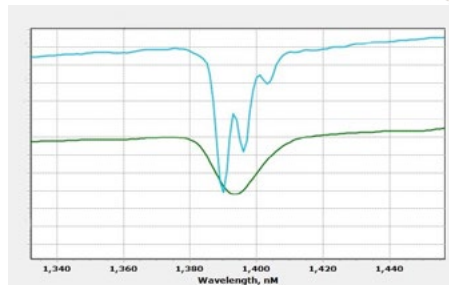
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**wed-o-1-a [SwIIms]**

08:30 - 10:10

**Session chairs :** **Anna Herrero Langreo**, *University College Dublin, Ireland*  
 **Steven Marshall**, *University of Strathclyde, Scotland*

**Plenary**

TURNING NIR MEASUREMENTS INTO VALUABLE INFORMATION WITH MULTIVARIATE ANALYSIS AND SPECTROSCOPIC KNOWLEDGE  
Jeroen Jansen

**THE HYPE IN SPECTRAL IMAGING**

Gerrit Polder and Aoife Gowen

SUPERSPECTRAL VERSES HYPERSPECTRAL, SEPARATING MINERALS WITH SIMILAR SPECTRA USING WORLDVIEW-3 SHORT-WAVE INFRARED IMAGERY

William Baugh

HOW TO CHOOSE THE RIGHT STRATEGY FOR THE PROCESSING OF HS IMAGES: FROM PIXEL LEVEL TO IMAGE LEVEL

Cristina Malegori and Paolo Oliveri

**wed-o-1-b Precision agriculture, soil and vegetation**

08:30 - 10:10

**Session chairs :** **Katja Berger**, *LMU Munich, Germany*  
**Clement Atzberger**, *BOKU, Austria*

EARLY DETECTION OF DROUGHT STRESS IN ARABIDOPSIS THALIANA UTILISING A PORTABLE HYPERSPECTRAL IMAGING SETUP

Puneet Mishra, Torsten Feller, Martin Schmuck, Andreas Nicol and Alison Nordon

UAV-BASED HIGH-RESOLUTION FIELD AND IMAGING SPECTROSCOPY TOWARDS ASSESSING GRAPE VINE HEALTH

Olaf Niemann, Patricia Bowen, Jose Urbez Torres, Carl Bogdanoff, Kevin Usher, Roger Stephen, Fabio Visintini and Robert Skelly

OPPORTUNITIES & LIMITATIONS OF CROP NITROGEN CONTENT RETRIEVAL FROM FUTURE IMAGING SPECTROSCOPY DATA

Katja Berger, Martin Danner, Matthias Woche, Zhihui Wang, Tobias Hank, Wolfram Mauser and Jochem Verrelst

SPECTRAL DISCRIMINATION OF SOIL TYPES AND SPARSE VEGETATION

William Philpot

UNSUPERVISED FEATURE LEARNING VIA DEEP STACKED AUTOENCODER FOR IMPROVED LUT INVERSION OF BIOCHEMICAL AND BIOPHYSICAL PARAMETERS USING THE PROSAIL MODEL

Linlin Xu, Yuan Fang, Alexander Wong and David Clausi

**Coffee break**

10:10

## Optimal Estimation For Combined Retrievals Of Surface And Atmosphere: Algorithms, Results, and Open Source Software

David R. Thompson, *Jet Propulsion Laboratory, California Institute of Technology, USA*



The advertisement features the BaySpec logo at the top, which includes a stylized rainbow-colored 'B' and the text 'BAYSPEC Pervasive Spectroscopy'. Below the logo, the headline reads 'Make Spectroscopy a Breeze™' followed by 'With BaySpec's New Palm Spectrometer (VIS/NIR/SWIR)'. A central diagram shows a palm spectrometer device connected by lines to eight circular icons representing various applications: Counterfeit (a banknote), Explosives (a bomb), Antioxidant (a bowl of fruit), Personal health (a hand holding a pill), Skin care (a woman's face), Drug Detection (a microscope), Food safety (a magnifying glass over a leaf), and a '???' icon. At the bottom, a hand holds the palm spectrometer device next to a smartphone displaying a spectral analysis graph. Text at the bottom describes the device as the world's first palm spectrometer with VIS-NIR-SWIR (400nm-1700 nm) capabilities, featuring a proprietary miniaturized spectral engine and a one-button operation connected via Bluetooth for rapid chemical analysis anywhere, anytime. The footer contains contact information for BaySpec, Inc. in San Jose, CA, and a copyright notice for 2019.

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**wed-o-2-a [SwIImS] Food Inspection 10:50 - 12:30**

**Session chairs :** **Cristina Magelori**, *University of Genova, Italy*  
 **Gerrit Polder**, *Wageningen Univ. & Research, Netherlands*

HYPERSPECTRAL IMAGING FOR DETERMINATION OF PROTEIN CONTENT IN SOYBEAN MEAL

Princess Tiffany Dantes and Charles Hurburgh

COMPARISON OF VIS-NIR (400-1,000 NM) AND NIR (978-1,678 NM) HYPERSPECTRAL IMAGING FOR DISCRIMINATION BETWEEN FRESH AND PREVIOUSLY FROZEN POULTRY

Anastasia Falkovskaya, Ana Herrero-Langreo and Aoife Gowen

ORTHOGONAL PROJECTION AS A SPECTRAL PRE-TREATMENT METHOD TO REDUCE THE INTERFERENCE OF POLYSTYRENE SIGNAL IN NIR IMAGING OF AGAR ON PETRI-DISHES

Ana Herrero-Langreo, Nathalie Gorretta, Agnes Beghin, Yu-Mei, Mariateresa Ferone, Aoife Gowen and Amalia Scannell

ASSESSMENT OF TOMATO QUALITY CHARACTERISTICS USING VIS/NIR HYPERSPECTRAL IMAGING AND CHEMOMETRICS

Samuel Ramos-Infante, Vanesa Suárez-Rubio, Paula Luri-Esplandiu and M<sup>a</sup> José Sáiz-Abajo

EARLY DETECTION OF THE FUNGAL DISEASE "APPLE SCAB" USING SWIR HYPERSPECTRAL IMAGING

Nathalie Gorretta, Nouri Maroua, Ana Herrero-Langreo, Aoife Gowen and Jean-Michel Roger

**wed-o-2-b Hyperspectral + Lidar Data Fusion 10:50 - 12:30**

**Session chairs :** **Zebin Wu**, *Nanjing Univ. of Science and Tech., China*

DUNE CORDONS FOLLOW-UP BY SYNCHRONIZED HYPERSPECTRAL AND FULL WAVEFORM LIDAR REMOTE SENSING

Giovanni Frati, Patrick Launeau and Manuel Giraud

URBAN BLUE-GREEN FACTOR ESTIMATION IN FREDRIKSTAD, NORWAY FROM HYPERSPECTRAL AND LIDAR REMOTE SENSING DATA FUSION - A CONCEPT STUDY

Vetle Odin Jonassen, Jenipa Kailainathan, Dagrun Aarsten and Ivar Maalen-Johansen

INTEGRATION OF SIMULATED COARSE RESOLUTION SATELLITE HYPERSPECTRAL DATA WITH LIDAR SMALL FOOTPRINT DISCRETE LIDAR DATA TO CHARACTERIZED THREE-DIMENSIONAL FOREST STRUCTURE.

Olaf Niemann, Daniel Peters and Robert Skelly

TOWARDS HIGH THROUGHPUT INVENTORY OF TROPICAL FOREST USING AERIAL LIDAR AND MULTISPECTRAL DATA FUSION

Mélaine Aubry-Kientz, Anthony Laybros, Marie Lefèvre-Fonollosa and Grégoire Vincent

3D HYPERSPECTRAL POINT CLOUD GENERATION: FUSING AIRBORNE LASER SCANNING AND HYPERSPECTRAL IMAGING SENSORS FOR IMPROVED OBJECT-BASED INFORMATION EXTRACTION

Maximilian Brell, Karl Segl, Luis Guanter and Bodo Bookhagen

Wednesday, 25

tuto-wed-2-c

Tutorial

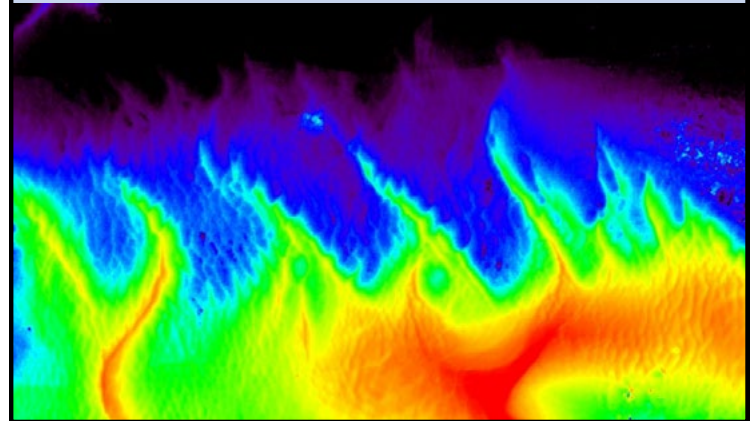
08:30 - 12:30

## Optimal Estimation For Combined Retrievals Of Surface And Atmosphere: Algorithms, Results, and Open Source Software

David R. Thompson, *Jet Propulsion Laboratory, California Institute of Technology, USA*



*Transforming light into information*





## wed-o-3-a Spaceborne Imaging Spectroscopy 14:00 - 16:00 Missions and Analyses Techniques

**Session chairs :** Uta Heiden, *DLR, Germany*

### THE ITALIAN HYPERSPECTRAL MISSION: FIRST RESULTS

Rocchina Guarini, Rosa Loizzo, Maria Girolamo Daraio, Ettore Lopinto and Patrizia Sacco

### DESIS - INFLIGHT CALIBRATION RESULTS OVER ONE YEAR IN SPACE

David Krutz, Ilse Sebastian, Thomas Säuberlich, Christian Fischer, Rupert Müller and Emiliano Carmona

THE EARTH SURFACE MINERAL DUST SOURCE INVESTIGATION (EMIT) IMAGING SPECTROMETER FOR THE INTERNATIONAL SPACE STATION  
Robert Green and David R. Thompson


VIRTUAL CONSTELLATIONS FOR DENSE SPATIOTEMPORAL SPECTROSCOPY  
David R. Thompson, David Bearden, Anthony Freeman, Robert Green, Elizabeth Middleton, Charles Miller, Jamie Nastal and David Schimel

SHALOM – SPACEBORNE HYPERSPECTRAL APPLICATIVE LAND AND OCEAN MISSION: AN ITALIAN-ISRAELI HYPERSPECTRAL ORBITAL MISSION  
Eyal Ben Dor

CALIBRATION AND VALIDATION OF THE PRISMA PAYLOAD AND PRELIMINARY RESULTS DURING COMMISSIONING  
Marco Faraci, Michele Dami, Enrico Fossati, Claudia Facchinetti, Francesco Longo, Massimo Cosi, Luigi Ansalone, Rosa Loizzo, Cristiano Contini, Leonardo Amoruso, Francesco Carriero and Stefano Signorile

*please notice end of session wed-o-3-a is 16:00*

## wed-o-3-b [SwIIImS] Applications : 14:00 - 15:40 Materials, Art and Vegetation

**Session chairs :** Nathalie Gorretta, *IRSTEA, France*  
 Puneet Mishra, *Wageningen Univ. & Res., Netherlands*

HYPERSPECTRAL PHOTOLUMINESCENCE IMAGING AS A TOOL TO STUDYING DEGRADATION OF OUTDOOR SILICON SOLAR PANELS  
Marija Vukovic, Andreas Svarstad Flo, Espen Olsen, Torbjørn Mehl and Ingunn Burud

SHORTWAVE INFRARED IMAGING OF THIN FILM COATINGS CONCEALED INSIDE POLYPROPYLENE TUBING  
Anton Walsh, Killian Barton, Steven Darby, Raymond Wolfe, Liam Lewis and Michael McAuliffe

PARTIAL LEAST SQUARES DISCRIMINANT ANALYSIS OF TIME SERIES SHORT WAVE INFRARED IMAGES REVEALS SLOWER UPTAKE OF WATER IN MAGNESIUM OXYCHLORIDE CEMENTS UPON ADDITION OF PHOSPHORIC ACID  
Federica Landolfo, Federico Marini and Aoife Gowen

HYPERSPECTRAL IMAGING COMBINED WITH DATA CLASSIFICATION TECHNIQUES AS AN AID FOR ARTWORK AUTHENTICATION  
Adam Polak, Timothy Kelman, Paul Murray, Stephen Marshall, David Stothard, Nicholas Eastaugh and Francis Eastaugh

SHORT WAVE INFRARED HYPERSPECTRAL IMAGE ANALYSIS OF SCOTS PINE WOOD AFFECTED BY DECAY FUNGI  
Arnoud Jochemsen, Gry Alfredsen and Ingunn Burud

**Coffee break**

**15:40**



## on Classification and Quantification using Spectral Images

**Organizer :** Pavel Pačlik, *perClass*

In this lab session, we will do hands-on exercises with practical use-cases such as:

- pixel classification using machine learning (plant disease, remote sensing terrain classification)
- object detection (foreign object detection)
- object classification (grading food products)
- object quality with regression modeling (e.g. sugar content estimation)
- 

We will use perClass Mira software and illustrate how it can be incorporated in a research work-flow. Participants will be able to install perClass Mira on their own laptops and are encouraged to bring their own data sets (in ENVI or Matlab format). The software does not require programming/scripting.

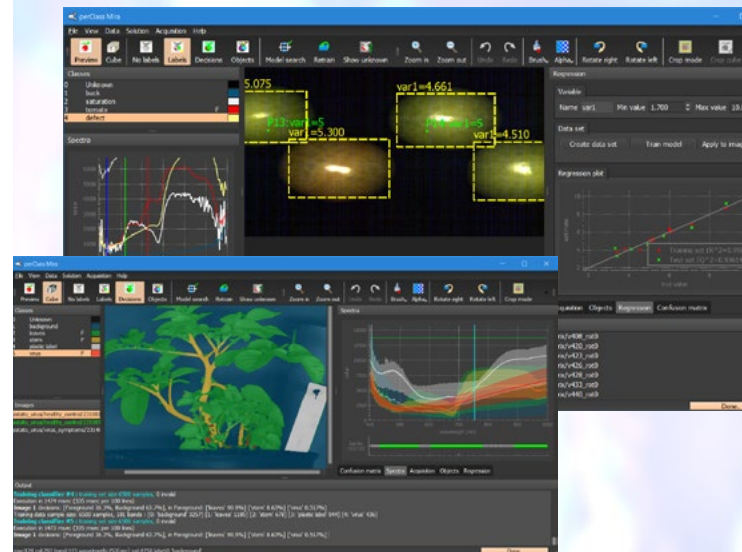
System requirements: MS Windows 7 and higher, 64 bit.

Web link: <http://perclass.com/perclass-mira/product>



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## wed-o-4-a Hyperspectral Computer Vision : 16:20 - 18:20

### Image Processing and Feature Extraction

**Session chairs :** Naoto Yokoya, *RIKEN, Japan*  
Jun Zhou, *Griffith University, Australia*

DETERMINING SMILE AND KEYSTONE OF LAB HYPERSPECTRAL LINE CAMERAS

Wim Bakker, Harald van der Werff and Freek van der Meer

DEEP CONVOLUTIONAL NETWORKS FOR SNAPSHOT HYPERSPECTRAL DEMOSAICKING

Tewodros Amberbir Habtegebrial, Gerd Reis and Didier Stricker

A METROLOGICAL FRAMEWORK FOR HYPERSPECTRAL TEXTURE ANALYSIS USING RELATIVE SPECTRAL DIFFERENCE OCCURRENCE MATRIX

Rui Jian Chu, Noel Richard, Faouzi Ghorbel, Christine Fernandez-Maloigne and Jon Yngve Hardeberg

A PYTHON-BASED BATCH-PROCESSING PHOTOSCAN PLUGIN FOR FAST STITCHING LARGE-VOLUME UAV SNAPSHOT HYPERSPECTRAL IMAGES

Linlin Xu, Yuan Fang, Alexander Wong and David Clausi

HYPERSPECTRAL IMAGE ENHANCEMENT AND MIXTURE DEEP-LEARNING CLASSIFICATION OF CORNEAL EPITHELIUM INJURIES


Siti Salwa Md Noor, Jinchang Ren, Stephen Marshall and Kaleena Michael

MAPPING OF SUBMERGED ARCHAEOLOGICAL REMAINS FROM HYPERSPECTRAL IMAGES: APPLICATION TO THE MEGALITHIC SITE OF ER LANNIC (MORBIHAN, FRANCE)

Alexandre Guyot, Marc Lennon and Laurence Hubert-Moy

## wed-o-4-b [SwIIImS] VNIR, SWIR : 16:20 - 18:00

### Models and Sensors

**Session chairs :** Junli Xu, *University College Dublin, Ireland*  
 Ludovic Duponchel, *Univ. Lille 1 Sciences et Tech., France*

FABRICATION AND TESTING OF A UAS-BASED VISIBLE TO EXTENDED-SWIR HYPERSPECTRAL SENSOR

Neil Goldstein, Brigit Tannian, Megan Stark, James Mccann McCann, Richard Wiggins, Jefferey Santman, Matthew Nasca, Patrick Woodman, Mohammad Saleh and Keith Nakanishis

SPATIAL AND SPECTRAL CALIBRATION METHODS FOR MONOLITHIC VIS/NIR AND VIS/SWIR HYPERSPECTRAL SENSORS

Megan Stark, Neil Goldstein, Bridget Tannian and Benjamin St. Peter

WORLDVIEW-3 VNIR+SWIR SPECTRAL DATA: SENSOR STATUS AND BEST PRACTICES

William Baugh

CHALLENGES FACED AND LESSONS LEARNED WHILE CREATING AN URBAN SPECTRAL LIBRARY IN THE VNIR AND SWIR SPECTRAL RANGE

Rebecca Ilehag and Andreas Schenk

FASTER, EASIER AND BETTER MULTIVARIATE CURVE RESOLUTION OF NIR HYPERSPECTRAL IMAGES

Raffaele Vitale

*please notice end of session wed-o-4-a is 18:20*

# SENOP

Precision Hyperspectral Imaging

## Overview

All day	Poster sessions	Poster Room		
		thu-p-1 thu-p-2 thu-p-3	Unmixing Calibration, simulation Monitoring of the Environment	
08:30	Oral Sessions	Room A	Room B	Room C
		thu-o-1-a Massive Data Processing and Analysis in Radioastronomy 08:30 - 10:05	thu-o-1-b Spectral Unmixing 08:30 - 10:30	
10:10	Coffee Break			
10:50	Oral Sessions	thu-o-2-a Massive Data Processing and Analysis in Radioastronomy 10:45 - 12:35	thu-o-2-b Sensors 10:50 - 12:50	thu-o-2-c Classification and Application
12:30	Lunch			
14:00	Oral Sessions	thu-o-3-a Mineralogy	thu-o-3-b Massive Data Processing and Analysis in Radioastronomy	thu-o-3-c Advanced Processing
15:40	Coffee Break			
16:20	Oral Sessions	thu-o-4-a Thermal Emission and Gas Detection	thu-o-4-b Denoising	thu-o-4-c Massive Data Processing and Analysis in Radioastronomy 16:10 - 18:15
18:00	End of the day			

**thu-p-1 Unmixing**
**All day poster session**

A SPATIAL ENERGY AND SPECTRAL PURITY BASED PREPROCESSING ALGORITHM FOR FAST HYPERSPECTRAL ENDMEMBER EXTRACTION  
Xiangfei Shen and Wenxing Bao

HYPERSPECTRAL UNMIXING VIA WAVELET BASED AUTOENCODER NETWORK  
Bin Yan, Zebin Wu, Hongyi Liu, Yang Xu and Zhihui Wei

NONLINEAR SPECTRAL UNMIXING FOR THE CHARACTERISATION OF VOLCANIC SURFACE DEPOSIT AND AIRBORNE PLUMES FROM REMOTE SENSING IMAGERY  
Giorgio Licciardi, Pasquale Sellitto, Alessandro Piscini and Jocelyn Chanussot

INFLUENCE OF INSTRUMENT NOISE ON THE RETRIEVAL ACCURACY OF ATMOSPHERIC TEMPERATURE PROFILES FROM ULTRA-SPECTRAL THERMAL INFRARED DATA  
Weiyuan Yao, Ning Wang, Beibei Zhang, Lingling Ma, Chuanrong Li and Lingli Tang

LIDAR-GUIDED REDUCTION OF SPECTRAL VARIABILITY IN HYPER-SPECTRAL IMAGERY

Sevcn Kahraman, Raphael Bacher, Tatsumi Uezato, Jocelyn Chanussot and Ali Tangel

DYNAMICAL ENDMEMBER CHARACTERIZATION FROM SIMULATED MULTITEMPORAL HYPERSPECTRAL DATA  
Lucas Drumetz, Mauro Dalla Mura, Guillaume Tochon and Ronan Fablet

DEVELOPING SPECTRAL LIBRARIES USING MULTIPLE TARGET MULTIPLE INSTANCE ADAPTIVE COSINE/COHERENCE ESTIMATOR  
Susan Meerdink, James Bocinsky, Erin Wetherley, Alina Zare, Connor McCurley and Paul Gader

A GEOMETRIC VIEW OF FAST GRAM DETERMINANT-BASED ENDMEMBER EXTRACTION ALGORITHM FOR HYPERSPECTRAL IMAGERY  
Ning Xu, Kang Sun, Yuxin Hu and Yanan Wang

FAST BLIND HYPERSPECTRAL UNMIXING BASED ON GRAPH LAPLACIAN  
Jing Qin, Harlin Lee, Jocelyn Chi, Jocelyn Chanussot, Yifei Lou and Andrea Bertozzi

**thu-p-2 Calibration, Simulation**
**All day poster session**

VICARIOUS IN-FLIGHT CALIBRATION FOR HYPERSPECTRAL IMAGING FROM SPACE: OVERVIEW OF EXISTING CAPABILITIES AND FUTURE OPPORTUNITIES  
Nicolas Lamquin, Sébastien Clerc and Ludovic Bourg

CONSISTENT TRANSFER RADIOMETRIC CALIBRATION TECHNOLOGY FOR OPTICAL REMOTELY SENSOR AND FIELD CAMPAIGN VALIDATION  
Ning Wang, Yonggang Qian, Lingling Ma, Yinnian Liu, Yaokai Liu, Yongguang Zhao, Chuanrong Li and Lingli Tang

SIMULTANEOUS AND CONSTRAINED CALIBRATION OF MULTIPLE HYPERSPECTRAL IMAGES THROUGH A NEW GENERALIZED EMPIRICAL LINE MODEL  
Fdai Kizel, Jon Atli Benediktsson, Lorenzo Bruzzone, Gro B.M. Pedersen, Olga K. Vilmundard'ottir and Nicola Falco

SIMULATION TOOL FOR HYPER-SPECTRAL IMAGING FROM A SATELLITE  
Monica Lapadatu, Sivert Bakken, Mariusz E. Grøtte, Morten Alver and Tor A. Johansen

SPACEBORNE HYPERSPECTRAL IMAGING CHAIN SIMULATION BASED ON RAY TRACING  
Xiaomei Chen, Yiwen Ding, Yunqiao Xi and Tian Lan

**thu-p-3 Monitoring of the Environment**
**All day poster session**

SPATIO-TEMPORAL CHARACTERISTICS OF LAND COVER CHANGES OF LIANGJIANG NEW DISTRICT IN CHINA DURING 2010-2018

Xiaopan Wang, Yan Hu, Yi Ding and Jing Chen

SULFATE MINERAL MAPPING WITH HYMAP IMAGERY: A CASE STUDY OF THE RODALQUILAR AREA, SE SPAIN

Xiaoyan Chen, Jiang Chen and Jun Pan

MAPPING ENVIRONMENTAL IMPACTS CAUSED BY THE BRUMADINHO TAILING DAM FAILURE IN BRAZIL USING DESIS AND FIREBIRD DATA

Christian Fischer, Tilman Bucher, David Krutz, Ilse Sebastian, Thomas Säuberlich, Agnieszka Soszynska, Winfried Halle, Martin Bachmann and Rupert Müller

MULTIPLE MULTI-SPECTRAL REMOTE SENSING DATA FUSION AND INTEGRATION FOR GEOLOGICAL MAPPING

Mahendra Pal and Thorkild Rasmussen

APPLICATION OF DIFFERENT SIMULATED SPECTRAL DATA AND MACHINE LEARNING TO ESTIMATE THE CHLOROPHYLL A CONCENTRATION OF SEVERAL INLAND WATERS

Philipp Maier and Sina Keller

A DIVER-OPERATED HYPERSPECTRAL IMAGING AND TOPOGRAPHIC SURVEYING SYSTEM FOR AUTOMATED MAPPING OF BENTHIC HABITATS

Arjun Chennu, Paul Färber, Glenn DeAth, Dirk de Beer and Katharina Fabricius

UNCERTAINTY AND VARIATION OF REMOTELY SENSED LAKE ICE PHENOLOGY ACROSS THE TIBETAN PLATEAU

Linan Guo, Yanhong Wu, Hongxing Zheng and Bing Zhang

SEA FOG DETECTION USING U-NET DEEP LEARNING MODEL BASED ON MODIS DATA

Chunyang Zhu, Jianhua Wan, Shanwei Liu, Hui Sheng and Yanfang Xiao

TWO-LAYER SLOW FEATURE ANALYSIS NETWORK FOR CHANGE DETECTION

Min Yang, Meiling Zhang and Yanfeng Gu

CLASSIFICATION OF SURFACE MATERIALS IN CITIES FROM AIRBORNE HYPERSPECTRAL IMAGING

Ingunn Burud, Annette Primstad, Åsmund Stemme, Dagrun Aarsten, Vetle Odin Jonassen, Webjørn Finsland, Ivar Maalen and Thomas Thiis

ALTERATION MINERAL MAPPING USING ZHUHAI-1 HYPERSPECTRAL DATA AND ITS GEOLOGICAL APPLICATION: TAKEN THE HUANIUSHAN AREA IN DUNHUANG CITY OF GANSU PROVINCE AS AN EXAMPLE

Yu Sun and Yingjun Zhao

SPECTRAL MODELING OF PLASTIC LITTER IN TERRESTRIAL ENVIRONMENTS - USE OF 3D HYPERSPECTRAL RAY TRACING MODELS TO ANALYZE THE SPECTRAL INFLUENCE OF DIFFERENT NATURAL GROUND SURFACES ON REMOTE SENSING BASED PLASTIC MAPPING

Theres Kuester and Mathias Bochow

SPECTRAL LIBRARY OF INDIAN URBAN MATERIALS - OGC COMPATIBLE WEB SERVICES "TARANG"

Shailesh Deshpande, Piyush Yadav, Guneet Mutreja and Balamuralidhar P

TEMPORAL MAPPING OF HYPERSPECTRAL DATA

Ronald Fick, Paul Gader, Alina Zare and Susan Meerdink



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**thu-o-1-a**    **Massive Data Processing  
and Analysis in Radioastronomy**    08:30 - 10:05

**Session chairs :**    **J  r  me Bobin, CEA France**  
**Chiara Ferrari, Maison SKA France**

08:30 - 08:35  
INTRODUCTION BY THE SOC

08:35 - 09:05  
RADIOASTRONOMY CHALLENGES IN COSMOLOGY AND GALAXY EVOLUTION STUDIES  
Anna Scaife

09:05 - 09:25  
PARALLEL PRECISION WIDEBAND IMAGING IN THE SKA ERA WITH SCALABLE OPTIMISATION ALGORITHMS  
Yves Wiaux

09:25 - 09:45  
THE HI4PI SURVEY: DATA PROCESSING CHALLENGES  
Benjamin Winkel et al.

09:45 - 10:05  
THE LOTSS SURVEY  
Cyril Tasse

*please notice end of session thu-o-1-a is 10:05*

**thu-o-1-b**    **Spectral Unmixing**    08:30 - 10:30

**Session chairs :**    **Lucas Drumetz, IMT Atlantique, France**  
**Susan Meerdink, University of Florida, USA**

FRACTIONAL ABUNDANCE ESTIMATION OF MIXED AND COMPOUND MATERIALS BY HYPERSPECTRAL IMAGING  
Bikram Koirala, Zohreh Zahiri, Mahdi Khodadadzadeh and Paul Scheunders

SPARSE HYPERSPECTRAL UNMIXING ASSOCIATED WITH SLIC SUPERPIXELS IN SOLSA HIMIP – THE SOFTWARE FOR HYPERSPECTRAL IMAGE MANIPULATION, INTERPRETATION AND PROCESSING  
Thanh Bui, Thomas Lefevre, Beate Orberger, Marco Zanatta, Sylvain Delchini, Ali Mohammad-Djafari, Aisha Kanzari and Monique Le Guen

A NEW HYPERSPECTRAL UNMIXING METHOD USING CO-REGISTERED HYPERSPECTRAL AND PANCHROMATIC IMAGES  
Simon Rebeyrol, Yannick Deville, Veronique Achard, Xavier Briottet and Stephane May

SPATIAL CHARACTERIZATION OF MARINE VEGETATION USING SEMISUPERVISED HYPERSPECTRAL UNMIXING  
Touria Bajjouk, Ichrak Zarati, Lucas Drumetz and Mauro Dalla Mura

TOWARDS THE SPECTRAL RESTORATION OF SHADOWED AREAS IN HYPERSPECTRAL IMAGES BASED ON NONLINEAR UNMIXING  
Guichen Zhang, Daniele Cerra and Rupert M  ller

EFFECTS OF REGION SIZE ON SUPERPIXEL BASED UNMIXING  
Mohammed Alkhatib and Miguel Velez-Reyes

*please notice end of session thu-o-1-b is 10:30*

**Coffee break**
**10:10**





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**thu-o-2-a**    **Massive Data Processing and Analysis in Radioastronomy**    10:45 - 12:35

**Session chairs :**    **Maryvonne Gerin**, *Observatoire de Paris France*  
**Jérôme Pety**, *IRAM France*

10:45 - 11:05  
THE LARGEST DATA GENERATOR OF THE NETHERLANDS: APERTIF RADIO TRANSIENT SYSTEM  
Joeri van Leeuwen et al.

11:05 - 11:25  
THE APERTIF IMAGING SURVEYS  
Robert Schulz et al.

11:25 - 11:45  
EXPOSING THE PLURAL NATURE OF MOLECULAR CLOUDS: EXTRACTING FILAMENTS AND THE CIB AGAINST THE TRUE SCALE-FREE INTERSTELLAR MEDIUM  
Jean-François Robitaille et al.

11:45 - 12:05  
A GENERAL STATISTICAL DESCRIPTION OF COMPLEX STRUCTURES EMERGING IN INTERSTELLAR TURBULENCE  
François Levrier et al.

12:05 - 12:35  
ATOMIC AND MOLECULAR LINE IMAGING AS DIAGNOSTICS FOR ISM AND STAR FORMATION  
Susan Clark

*please notice session thu-o-2-a starts at 10:45 and ends at 12:35*

**thu-o-2-b**    **Sensors**    10:50 - 12:50

**Session chairs :**    **Trond Løke**, *HySpex, Norway*  
**Anthony Gelibert**, *Carbon Bee, France*

IMPACT OF OPTICAL DISTORTIONS ON OBJECT DETECTION/ CLASSIFICATION AND QUANTIFICATION  
Trond Løke

CHIMA : A COMPACT AND HIGH SPECTRAL RESOLUTION HYPERSPECTRAL IMAGER  
Vincent Moreau, Benoit Borguet, Alessandro Zuccaro Marchi, Micael Miranda, Marjorie Lismont and Luca Maresi

SPECTRAL SHIFT CORRECTION FOR FABRY-PEROT BASED SPECTRAL CAMERAS  
Thomas Goossens, Kathleen Vunckx, Andy Lambrechts and Chris Van Hoof

REAL-TIME CORRECTIONS FOR A LOW-COST HYPERSPECTRAL INSTRUMENT  
Marie Bøe Henriksen, Joseph Landon Garrett, Elizabeth Frances Prentice, Fred Sigernes, Annette Stahl and Tor Arne Johansen

DEEP LEARNING ENHANCED COMPUTED TOMOGRAPHY IMAGING SPECTROMETER  
Gerald Germain, Anthony Gelibert and Gautier Burat

EVOLUTION OF HYPERSPECTRAL SNAPSHOT IMAGING  
Matthias Locherer and Viktoriya Tsyganskaya

*please notice end of session thu-o-2-b is 12:50*

**Lunch**
**12:30**

thu-o-2-c

Classification and Application

10:50 - 12:30

**Session chairs :** **Mahendra Pal**, *Lulea Univ. of Tech., Sweden*  
**Shailesh Deshpande**, *TRDDC, Pune, India*

MULTISCALE LOW-RANK SPATIAL FEATURES FOR HYPERSPECTRAL CLASSIFICATION

Weiwei Sun, Jiangtao Peng and Gang Yang

GRAVITATION BASED CLASSIFICATION METHOD FOR HYPERSPECTRAL IMAGERY

Aizhu Zhang, Chenglong Zhang, Jun Rong, Shuang Zhang, Wei Wang and Genyun Sun

A NOVAL FRAMEWORK FOR HYPERSPECTRAL IMAGE CLASSIFICATION BASED ON GANS AND CAPSNET

Xue Wang, Kun Tan, Qian Du, Yu Chen and Peijun Du

SEMI-SUPERVISED CLASSIFICATION OF HYPERSPECTRAL IMAGES BASED ON FEATURE EXTRACTION AND TRI-TRAINING TECHNIQUE

Depin Ou and Kun Tan

EXPLORING THE POTENTIAL OF LEAF REFLECTANCE SPECTRA FOR RETRIEVING THE LEAF MAXIMUM CARBOXYLATION RATE

Xiaojin Qian, Yongjiang Zhang, Liangyun Liu and Shanshan Du

HYPERSPECTRAL IMAGING AND SPECTRAL CLASSIFICATION FOR PIGMENT IDENTIFICATION AND MAPPING IN PAINTINGS BY EL GRECO AND HIS WORKSHOP

Costas Balas, George Epitropou, Athanasios Tsapras and Nikos Hadjinikolaou



**L3HARRIS**  
 FAST. FORWARD.

**Lunch**

12:30

thu-o-3-a

Mineralogy

14:00 - 15:40

**Session chairs :** **Derek Rogge**, *Hyperspectral-Intelligence Inc., Canada*  
**Sandra Lorenz**, *Helmholtz-Institute Freiberg, Germany*

GEOCHEMICAL AND HYPERSPECTRAL DATA FUSION FOR DRILL-CORE MINERAL MAPPING

I. Cecilia Contreras, Mahdi Khodadadzadeh, Laura Tusa, Christina Loidolt, Raimon Tolosana-Delgado and Richard Gloaguen

ESTIMATION OF IRON CONCENTRATION IN SOIL OF A MINING AREA FROM UAV-BASED HYPERSPECTRAL IMAGERY

Yuan Fang, Zhongzheng Hu, Linlin Xu, Alexander Wong and David Clausi

ANALYSIS OF MOST SIGNIFICANT BANDS AND BAND RATIOS FOR DISCRIMINATION OF HYDROTHERMAL ALTERATION MINERALS

Shailesh Deshpande, Subeesh A and Anjali Saini

THE APPLICATION OF SUBSPACE CLUSTERING ALGORITHMS IN DRILL-CORE HYPERSPECTRAL DOMAINING

Kasra Rafiezadeh Shahi, Mahdi Khodadadzadeh, Raimon Tolosana Delgado, Laura Tusa and Richard Gloaguen

MULTI-SOURCE HYPERSPECTRAL DATA INTEGRATION USING IMAGE FEATURE EXTRACTION FOR MINERAL MAPPING

Sandra Lorenz, Peter Seidel, Pedram Ghamisi, Robert Zimmermann, Laura Tusa, Mahdi Khodadadzadeh, Isabel Cecilia Contreras Acosta and Richard Gloaguen

thu-o-3-b

**Massive Data Processing  
and Analysis in Radioastronomy**

14:00 - 15:40

**Session chairs :** **Ralph Klessen**, *Heidelberg university Germany*  
**Joshua Peek**, *STSCI USA*

OUTSTANDING RADIO-IMAGING OF ORION-B

Jérôme Pety et al.

RANDOM FORESTS AND GIANT MOLECULAR CLOUDS

Emeric Bron et al.

A FULLY BAYESIAN APPROACH FOR INFERRING PHYSICAL PROPERTIES WITH CREDIBILITY INTERVALS FROM NOISY ASTRONOMICAL DATA

Maxime Vono et al.

DEEP LEARNING FOR DENOISING AND ANALYSIS OF HYPERSPECTRAL IMAGING IN RADIO ASTRONOMY

Paul Vandame et al.

USING MACHINE LEARNING TO STUDY THE KINEMATICS OF COLD GAS IN GALAXIES

James Dawson et al.

Coffee break

15:40

thu-o-3-c

Advanced Processing

14:00 - 15:40

**Session chairs :**    **Chih-Cheng Hung**, *Kennesaw State University, USA*  
                               **Weiwei Sun**, *Ningbo University, China*

REGRESSION-INDUCED REPRESENTATION LEARNING AND ITS OPTIMIZER: A NOVEL PARADIGM TO REVISIT HYPERSPECTRAL IMAGERY ANALYSIS

Danfeng Hong

SPECTRAL REGION IDENTIFICATION VERSUS INDIVIDUAL CHANNEL SELECTION IN SUPERVISED DIMENSIONALITY REDUCTION OF HYPERSPECTRAL IMAGE DATA

Enayat Hosseini Aria, Menenti and Gorte

HYPERSPECTRAL VIDEO PROCESSING ON RESOURCE-CONSTRAINED PLATFORMS

Honglei Li, Lei Pan, Eung Joo Lee, Zhu Li, Matthew Hoffman, Anthony Vodablek and Shuvra Bhattacharyya

A NOVEL HYPERSPECTRAL TARGET DETECTION ALGORITHM FOR REAL-TIME APPLICATIONS WITH PUSH-BROOM SCANNERS

María Díaz, Raúl Guerra and Sebastián López

A HARDWARE-FRIENDLY ANOMALY DETECTOR FOR REAL-TIME APPLICATIONS WITH PUSH-BROOM SCANNERS

María Díaz, Raul Guerra and Sebastián López



Coffee break

15:40

thu-o-4-a	Thermal emission and gas detection	thu-o-4-b	Denoising
	16:20 - 18:00		16:20 - 18:00
Session chairs :	<b>Arnoud Jochemsen</b> , <i>Norwegian Univ. of Life Sciences, Norway</i> <b>Glynn Hulley</b> , <i>Jet Propulsion Laboratory, Pasadena, USA</i>	Session chairs :	<b>Pedram Ghamisi</b> , <i>Helmholtz Institute Freiberg, Germany</i> <b>Behnood Rasti</b> , <i>University of Iceland, Iceland</i>
SCIENCE HIGHLIGHTS FROM FIVE YEARS OF HYPERSPECTRAL THERMAL EMISSION SPECTROMETER (HYTES) ACQUISITIONS Glynn Hulley, Simon Hook and Kerry Cawse-Nicholson		HYPERSPECTRAL STRIPES REMOVAL WITH WAVELET-DOMAIN LOW-RANK/GROUP-SPARSE Na Liu, Wei Li, Ran Tao, James Fowler and Lina Yang	
TOWARD UAV BASED COMPACT THERMAL INFRARED HYPERSPECTRAL IMAGING SOLUTION FOR REAL-TIME GAS DETECTION IDENTIFICATION AND QUANTIFICATION Stephane Boubanga Tombet, Frederick Marcotte, Eric Guyot and Martin Chamberland		HYPERSPECTRAL IMAGE DENOISING USING DICTIONARY LEARNING Cássio Dantas, Jérémy Cohen and Rémi Gribonval	
REMOTE SENSING OF GASES FOR ROT DETECTION IN WOODEN UTILITY POLES Boyan Yuan, Arnoud Jochemsen and Nabil Belbachir		EFFICIENT CONVOLUTIONAL NEURAL NETWORK FOR SPECTRAL-SPATIAL HYPERSPECTRAL DENOISING Alessandro Maffei, Mercedes Paoletti, Juan Mario Haut, Antonio Plaza, Lorenzo Bruzzone and Javier Plaza	
CHANNEL SELECTION FOR CARBON MONOXIDE RETRIEVALS BASED ON ULTRA-SPECTRAL DATA Beibei Zhang, Ning Wang, Weiyuan Yao, Chuanrong Li and Lingli Tang SEQUENTIAL TENSOR DECOMPOSITION FOR GAS TRACKING IN LWIR HYPERSPECTRAL VIDEO SEQUENCES Suling Tan, Huan Liu, Yanfeng Gu and Jocelyn Chanussot		MIXED NOISE REDUCTION IN HYPERSPECTRAL IMAGERY Behnood Rasti, Pedram Ghamisi and Jocelyn Chanussot A NOVEL RESTORATION APPROACH FOR VEGETATION REFLECTANCE SPECTRA AT NOISY BANDS USING THE PRINCIPAL COMPONENT ANALYSIS METHOD Bowen Song and Liangyun Liu	

Thursday, 26

**thu-o-4-c**    **Massive Data Processing  
and Analysis in Radioastronomy**    16:10 - 18:15

**Session chairs :**    **François Levrier**, *LPENS France*  
                              **Benjamin Winkel**, *MPIfR Germany*

16:10 - 16:30

DEEP LEARNING FOR THE SELECTION OF YOUNG STELLAR OBJECT CANDIDATES FROM INFRARED SURVEYS  
David Cornu et al.

16:30 - 16:50

RESOLVING DATA QUALITY ISSUES USING RECEIVER HOUSEKEEPING DATA, CASE STUDY FROM HERSCHEL/HIFI AND SOFIA/UPGREAT INSTRUMENTS  
Ronan Higgins et al.

16:50 - 17:10

GALARIO: A GPU ACCELERATED LIBRARY FOR ANALYSING RADIO INTERFEROMETER OBSERVATIONS  
Marco Tazzari et al.

17:10 - 18:00

ROUND TABLE LED BY CYRIL TASSE, YVES WIAUX, AND THE SOC

18:00 - 18:15

CONCLUSIONS

*please notice session thu-o-4-c starts at 16:10 and ends at 18:15*



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