7th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing

2-5 June 2015, Tokyo, Japan

Workshop Program
1. Foreword

It is with great pleasure that the University of Tokyo is hosting the 7th Annual IEEE WHISPERS in Japan.

More than 150 papers are submitted from all over the world. We wish to appreciate Jocelyn Chanussot and Naoto Yokoya, the program chairs, for the arrangement of all the peer reviews and completion of an excellent technical program. We also would like to thank all the reviewers, who carefully dedicated their efforts and time to improve the manuscripts, although we have an earlier schedule in this year to avoid the rainy season in Japan.

As is the tradition with WHISPERS, prior to the technical program, we have a tutorial on the rapidly growing topics in hyperspectral community. We would like to express our deepest gratitude to José Manuel Bioucas Dias for lecturing inverse problems in hyperspectral imaging.

The three days of technical program with two parallel sessions follows the tutorial. We are grateful to three plenary speakers, Yoshio Inoue, Lori M. Bruce and Bing Zhang, who show us the outstanding works in the hyperspectral research. In addition to the traditional hyperspectral topics, such as unmixing, classification, sensor design, planetary exploration, target detection and atmospheric correction, new topics on hyperspectral pansharpening, big data and various applications further enlarge a diversity of the hyperspectral community. Since several hyperspectral missions are going in space in the coming five years, the application studies of spaceborne hyperspectral imaging will direct you to the evolution of global contribution. We would like to thanks for the organizer of the special sessions.

This workshop is held by the back up of Ito International Research Center Conference. WHISPERS are also supported by the industry of hyperspectral instruments and software as well as public organizations. Please visit the exhibitors to feel the latest technologies that will lead to new scientific findings.

During your stay, we hope you will find and enjoy the various faces of Tokyo, historical and traditional places, Japanese culture (subculture) and modern attractions.

Thanks again for participating in WHISPERS 2015.

Akira Iwasaki
2. Exhibitors

HySpex, NEO's line of hyperspectral cameras, aims to offer compact, high performance and versatile instruments for a multitude of applications, ranging from airborne to laboratory and industrial use of imaging spectroscopy. Norsk Elektro Optikk AS (NEO) was established in 1985 as a privately owned research oriented company within the field of electro-optics. NEO has grown to be the largest independent research and development organization in electro optics in Norway, and has in addition established itself as a manufacturer of advanced electro optical products for an international market.

http://www.hyspex.no

Headwall is a global manufacturer of multispectral and hyperspectral imaging sensors for use in a wide range of remote sensing applications. Mounted aboard earth-orbiting satellites, fixed-wing aircraft, or UAVs, Headwall's sensors are small, light, and highly precise. Outstanding hyperspectral imaging performance is achieved thanks to aberration-corrected optics, which deliver high spatial and spectral resolution within a very wide field of view.

New for 2015 are three sensors designed for remote sensing applications. Nano-Hyperspec® is a lightweight and compact VNIR (400-1000nm) sensor suitable for small, hand-launched UAVs that combines integrated data storage and direct-attached GPS. Second is Headwall's wideband VNIR-SWIR sensor that covers the 400-2500nm spectral range and features co-registered pixels for outstanding image clarity and resolution. Third, Headwall offers a new high-resolution fluorescence sensor for precise environmental monitoring research that specifically targets the 754-775nm range in a small and lightweight package. Headwall is ISO-9001:2008-certified and operates from manufacturing facilities in the United States and Europe.

http://www.HeadwallPhotonics.com

ASD Inc., a PANalytical company, is the global leader in remote sensing and hyperspectral measurement solutions, providing unparalleled ground truthing results. Our rugged, portable FieldSpec® 4 line of spectroradiometers provides the freedom to rapidly collect high-quality spectra in the field. Trusted by top research experts at thousands of universities and research institutions, ASD's full-range spectrometers are used in more than 70 countries.

http://www.asdi.com

ImageONE is a distributor of ASD products in Japan.

http://www.imageone.co.jp
**Exelis VIS K.K.**, a business unit of Exelis Inc. offers world-wide academic, commercial and government customers in Defense, Intelligence, Earth and Space Science and Aerospace areas with one of the widest ranges of capabilities in the image capture, and remote sensing industry. Exelis Inc. even offer image sensor of IKONOS, QuickBird, GeoEye-1/2, WorldView-1/2/3, MTSAT-2, and Himawari 8 as well.

We started to offer enterprise solution products such as ENVI Services Engine (ENVI in Cloud) and Jagwire.

**ENVI** leading and standard hyperspectral image processing software with atmospheric correction option module for hyperspectral/multispectral images. Equipped wide range of spectral libraries with sophisticated function such as Linear Spectral Unmixing and Spectral Angle Mapper.

**SARscape** developed by sarmap SA. Option module of ENVI, processing SAR data which is easy to use GUI based software with Workflow function.

**ENVI Services Engine** Cloud-based image analysis solution lets your organization create, publish, and deploy advanced ENVI image and data analytics to virtually any existing enterprise infrastructure.

**Jagwire** Not just geospatial data management, Data management plus DECISIONS.

Cloud-based solution that enhances situational awareness by providing geographically spread teams with on-demand access to critical geospatial (intelligence) data. Jagwire reduces the time from data collection to decision making through a flexible platform that can be accessed from the cloud, mobile devices, and desktops

[http://www.exelisvis.com](http://www.exelisvis.com)

Japan Space System (J-spaceystems) is a total solution provider in the space activities to promote the space utilization such as development of space systems from space segment to ground segment and research & development of application for the remote sensing satellite. J-spaceystems promotes HISUI project is a spaceborne hyperspectral imager mission.


ARGO is a distributor of hyperspectral and multispectral imaging sensors for Japan.

First New for 2015 are three sensors designed from HeadWall Photonics for remote sensing applications. Nano-Hyper-spec is a lightweight and compact VNIR (400-1000nm) sensor suitable for small, hand-launched UAVs that combines integrated data storage and direct-attached GPS. Second is Headwall's wideband VNIR-SWIR sensor that covers the 400-2500nm spectral range and features co-registered pixels for outstanding image clarity and resolution. Third, Headwall offers a new high-resolution fluorescence sensor for precise environmental monitoring research that specifically targets the 754-775nm range in a small and lightweight package.

Second new is a real time hyperspectral solution from IMEC. The newly developed mosaic sensors feature one spectral filter per pixel, arranged in mosaics of 4x4 (16 spectral bands) or 5x5 (25 spectral bands) deposited onto a full array of 2 Million pixels 5.5 micron size CMOSIS CMV2000 sensor. Two versions of the mosaic hyperspectral image sensors have been developed:

- one 4x4 mosaic with 16 bands in the 470-630nm (visible range)
- one 5x5 mosaic with 25 bands in the 600-1000nm range (Visible-NIR range)

Imec's hyperspectral imaging sensors (100bands linescan, 32bands tiled and 16/25bands mosaic designs) are off-the-shelf, commercially available now.

KLV has known as one of the top maker of light sources, optical parts and optical products. We also have supported and developed many optical fields such as medical, bioscience, agriculture, environment, and food for past 30 years in Japan. Now, we are going to new direction as “solution for optical system demands”. We provide the best optical solutions to customers. KLV is a dealer of Norsk Elektro Optikk AS (NEO) products in Japan.

http://www.klv.co.jp/eng/eng.html

Hokkaido Satellite Corp. Ltd. was established to create a new space business of agricultural remote sensing for precision farming from Japan. Hyperspectral sensor is the key technology for advanced sensing because of its analytical ability. We also developed spin-off products such as “Hyperspectral Camera”. We serve to promote the space industry and related businesses for global prosperity.

http://www.hokkaido-sat.co.jp/

Telops, located in Quebec City, Canada, specializes in the design and production of sophisticated opto-electronic systems for the defence & security, environmental and scientific research markets. Telops advanced optical systems allow the detection and identification of remote substances which are often invisible to the naked eye.

In addition to providing specialized opto-electronic engineering services, Telops has also developed the Hyper-Cam, an infrared hyperspectral imager which allows standoff chemical detection at a distance of up to five kilometers. This advanced instrument enables its user to measure different spectrum and then compare the measured spectrum with the signatures of known gases and solids. The constituents and properties of a target can then be easily identified. As well Telops has developed a high performance line of infrared cameras which includes unique cameras, custom designed for specific applications. This line includes the FAST-IR comprised of two different rapid frame rate infrared cameras, the HD-IR which includes high-definition infrared cameras, the MS-IR which offers unique, multispectral capabilities, the HDR-IR, a high dynamic range camera which allows users to resolve scenes up to 2500°C and finally the TS-IR, a versatile, easy to use infrared camera which comes in an IP67 sealed enclosure making it ideal for use in harsh environments.

Telops also offers R&D services for optical system technology development. Telops experts deliver significant expertise in the fields of opto-electronic systems engineering with full disciplinary specialist in optical, mechanical, electronics, thermal, software and system engineering. Telops works closely with its clients/scientists to develop customized optical solutions in the area of infrared remote sensing, spectrometry, cryogenic and ruggedized optical systems as well as dedicated imaging and calibration systems.

http://www.telops.com

Cornes Technologies is a leading specialist importer and distributor of electronic devices, systems and equipment, scientific equipment, and industrial machinery, with unrivalled experience in the promotion, marketing and selling of new products and technology sourced from overseas to a broad range of customers in Japan.

http://www.cornestech.co.jp/en/
3. Sponsors

Since its establishment in October 1988, the Support Center for Advanced Telecommunications Technology Research (SCAT) has been engaged in the development of info-communications technology by reviewing and surveying advanced technologies, funding for R&D projects, and providing information on advanced technologies. SCAT intends to continue its active supports for further promotion of R&D in the info-communications technology areas.

http://www.scat.or.jp/english/
4. Technical Sponsors

IEEE
http://www.ieee.org

GRSS
http://www.grss-ieee.org

東京大学
http://www.u-tokyo.ac.jp

ANR

伊藤国際学術研究センター
http://www.u-tokyo.ac.jp/ext01/iirc/en/

gipsa-lab
http://www.gipsa-lab.grenoble-inp.fr
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Webmaster & Graphic Designer
Vincent Couturier-Doux
6. Conference Information

Arrival to the Conference Venue - IIRC, University of Tokyo:

- **By public transportation**
  The easiest way to reach the venue from the city is the Tokyo Metro Marunouchi Line or the Toei Oedo Line (see the access map). For detailed transportation information, see the website: http://www.ieee-whispers.com. Follow menu to 2015 INFOS >> Transportation. The Ito International Research Center (IIRC) is 500m from the metro stop “Hongo-sanchome” (see map of the venue location).

- **Once there**
  The IIRC is located next to Akamon (the Red Gate). Enter the IIRC by the Ito Hall’s entrance with the WHISPERS signboard, descend two levels to the ground floor and you’re there.

Registration desk:

- **Location:** Main Foyer area at the Ito International Research Center, on the second basement level (see map of the IIRC). Exception: 12h30-18h on Tuesday 2nd, the desk is on the third floor.

- **Hours:**
  Tuesday 2nd: 12h30 – 18h30
  Wednesday 3rd – Friday 5th: 9h – 18h.

- **Onsite registration and/or extra banquet ticket:** cash only

Internet:

- Free Wi-Fi is available in the whole building and its password will be provided on-site.

Speaker Preparation:

- **Software:** Each lecture hall (Ito Hall and Gallery 1, see map of the IIRC) 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 (Ito Hall and Gallery 1) to upload your presentation BEFORE the start of your session. A Whisperer will be there to assist you as needed.

Poster sessions:

- **Set-up:** Please arrive each day before your session 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 poster session and the coffee breaks.

- **Size:** max posters size is A0 (841 × 1189 mm).

- **The posters sessions will be held in the Event Space in front of the Ito Hall (see map of the IIRC).**

Tutorial:

- **Location:** Seminar Room at the Ito International Research Center, on the third floor (see map of the IIRC).

- **Hours:**
  Tuesday 2nd, 13h30 – 17h
Social Events:

Tuesday 2nd, from 19h: Ice breaker @ Ito International Research Center (IIRC)

- The ice breaker will take place at the Event Space of the Ito International Research Center, the conference venue (see map of the IIRC).
- The event will feature Japanese and Western harmonized cuisines and live music.
- The participation to the ice breaker is included in the registration cost.

Thursday 4th, from 18h30: Banquet @ Hotel Chinzanso Tokyo

- The banquet will take place at Hotel Chinzanso Tokyo, the five-stars hotel with a luxury garden oasis in the heart of Tokyo. The gardens were formally established in 1861, in what we called the Meiji era, but it is said this area was already appreciated as beautiful camellia hills with a long history dating back some 700 years. The banquet place will be the Orion Banquet Hall overlooking the vast Japanese garden.
- The event will start with an aperitif followed by a special buffet dinner with traditional Japanese music.
- The participation to the banquet is included in the registration cost.
- We will move by bus to reach Hotel Chinzanso Tokyo from the conference venue. Buses will leave from the nearest rotary at 18:00 pm (see map of the venue location), and come back to Akamon at 22:15 pm from the parking area of the hotel. Whisperers will be along the way to guide you.
Access Map to University of Tokyo
WHISPERS 2015 Venue is at Hongo Campus
WHISPERS 2015 Venue Location: Itoh International Research Center, University of Tokyo
WHISPERS 2015 Floor Map
7. Technical Program
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<td>Plenary 2</td>
<td>Plenary 3</td>
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<tr>
<td>9:20</td>
<td>Plenary 1</td>
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<td>thu-p-(a &amp; b)</td>
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<tr>
<td>10:00</td>
<td>Posters &amp; coffee break</td>
<td>thu-p-(a &amp; b)</td>
<td>Plenary 1</td>
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<tr>
<td>10:20</td>
<td>Spectral unmixing: Sensor design, noise reduction, and data compression</td>
<td>thu-o-1-a</td>
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<td>fri-p-(a &amp; b)</td>
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<tr>
<td>11:30</td>
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<td>thu-o-1-b</td>
<td>A diversity of applications</td>
<td>Classification: Anomaly and target detection</td>
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<tr>
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<tr>
<td>13:40</td>
<td>Oral sessions</td>
<td>thu-o-2-b</td>
<td>Hyperspectral pansharpening and fusion (1)</td>
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<td>14:20</td>
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<td>Forward modeling and atmospheric compensation</td>
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<td>15:20</td>
<td>Oral sessions</td>
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<td>Machine learning</td>
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<td>15:50</td>
<td>Oral sessions</td>
<td>thu-o-3-b</td>
<td>Spectral unmixing (2)</td>
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<tr>
<td>17:30</td>
<td>Oral sessions</td>
<td>thu-o-3-b</td>
<td>Thermal hyperspectral imaging</td>
<td>Spectral unmixing (4)</td>
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<td>Banquet</td>
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<td>22:00</td>
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<tr>
<td>13:30</td>
<td>Tutorial</td>
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<td>Inverse Problems in Hyperspectral Imaging</td>
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<td>José Manuel Bioucas Dias, <em>Instituto de Telecomunicações, Instituto Superior Técnico, Universidade de Lisboa</em></td>
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<td>17:00</td>
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<td>19:00</td>
<td>Icebreaker Ito International Research Center</td>
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9:00 Opening of the conference

9:20 Plenary 1
Applying Game Theory to Hyperspectral Image Analysis with Applications to Vegetative Ground Cover Mapping
Lori M. Bruce, Mississippi State University, USA
Session chair: Akira Iwasaki, University of Tokyo, Japan

10:20 Posters / coffee break

Session wed-p-1-a
Spectral unmixing
Session chairs:
Yifan Zhang, Northwestern Polytechnical University, China
Charoula Andreou, DLR, Germany

Session wed-p-1-b
Sensor design, noise reduction, and data compression
Session chairs:
Wenzhi Liao, Ghent University, Belgium
Angshul Majumdar, Indraprastha Institute of Information Technology, India

11:30 Lunch

Session wed-o-1-a
Classification (1)
Session chairs:
Qian Du, Mississippi State University, USA
Yanfei Zhang, Wuhan University, China

Session wed-o-1-b
Urban analysis
Session chairs:
Mingyi He, Northwestern Polytechnical University, China
Yoann Altmann, Heriot-Watt University, UK

13:10 Session

14:20 Session wed-o-2-a
Detecting difficult targets
Session chairs:
Alan Schaum, Naval Research Laboratory, USA
Nicolas Younan, Mississippi State University, USA

Session wed-o-2-b
Big remote sensing data
Session chairs:
Mingmin Chi, Fudan University, China
Antonio Plaza, University of Extremadura, Spain

16:00 Coffee

16:30 Session wed-o-3-a
Spectral unmixing (1)
Session chairs:
Jean-Yves Tourneret, University of Toulouse, France
Rob Heylen, University of Antwerp, Belgium

Session wed-o-3-b
A diversity of applications
Session chairs:
Michael Sears, University of the Witwatersrand, South Africa
Kuniaki Uto, Tokyo Institute of Technology, Japan

18:10
Plenary 1

Applying Game Theory to Hyperspectral Image Analysis with Applications to Vegetative Ground Cover Mapping

Lori M. Bruce, Mississippi State University, USA

Session chair: Akira Iwasaki, University of Tokyo, Japan

Opening of the conference: opening ceremony

9:00

9:20

Session wed-p-a

Spectral unmixing

Session chairs:
Yifan Zhang, Northwestern Polytechnical University, China
Charoula Andreou, DLR, Germany

GRAPH REGULARIZED COUPLED SPECTRAL UNMIXING FOR CHANGE DETECTION
Naoto Yokoya and Xiaoxiang Zhu

IMPACT OF SPARSE REPRESENTATION ON THE ADMISSIBLE SOLUTIONS OF SPECTRAL UNMIXING BY NON-NEGATIVE MATRIX FACTORIZATION
Neeraj Kumar, Said Moussaoui, Jerome Idier and David Brie

SUBPIXEL LAND-COVER CHANGE DETECTION BASED ON PIXEL UNMIXING AND EM ALGORITHM
Ke Wu, Yue Ma and Liangpei Zhang

AN MULTI-AGENT COMBINED ARTIFICIAL BEE COLONY ALGORITHM TO HYPERSONITORAL IMAGE ENDMEMBER EXTRACTION
Lina Yang, Xu Sun, Bing Zhang and Tianhe Chi

A BAND PRIORITIZATION METHOD BASED ON KERNEL WEIGHTS FOR PROGRESSIVE BAND UNMIXING OF HYPERSONITORAL IMAGERY
Chih-Hung Lai and Keng-Hao Liu

BAND DETECTION IN HYPERSONITORAL IMAGERY BY PIXEL PURITY INDEX
Chein-I Chang, Yao Li and Chao-Cheng Wu

ENDMEMBER EXTRACTION BY L_{2,0} CONSTRAINED SPARSE DICTIONARY SELECTION
Shaohui Mei, Qian Du and Mingyi He

LINEAR SPECTRAL UNMIXING USING LEAST SQUARES ERROR, ORTHOGONAL PROJECTION AND SIMPLEX VOLUME FOR HYPERSONITORAL IMAGES
Hsiao-Chi Li and Chein-I Chang

PROGRESSIVE ENDMEMBER FINDING BY FULLY CONSTRAINED LEAST SQUARES METHOD
Shih-Yu Chen, Yen-Chieh OuYang, Chinsu Lin, Cheng Gao, Chein-I Chang and Hsian-Min Chen

A HYPERSONITORAL IMAGE SPECTRAL UNMIXING METHOD INTEGRATING SLIC SUPERPIXEL SEGMENTATION
Xu Sun, Feifei Zhang, Lina Yang, Bing Zhang and Lianru Gao

FULLY ABUNDANCE-CONSTRAINED ENDMEMBER FINDING FOR HYPERSONITORAL IMAGES
Cheng Gao, Shih-Yu Chen, Hsian-Min Chen, Chao-Cheng Wu, Chia-Hsien Wen and Chein-I Chang

UNCERTAINTIES IN TIR HYPERSONITORAL IMAGE CUBE UNMIXING
Keshav Dev Singh and Ramakrishnan Desikan

Session wed-p-b

Sensor design, noise reduction, and data compression

Session chairs:
Wenzhi Liao, Ghent University, Belgium
Angshul Majumdar, Indraprastha Institute of Information Technology, India

REQUIREMENTS AND OPTIMIZATION OF SENSOR PARAMETERS FOR MINERAL EXTRACTION
Qingting Li, Lianru Gao, Wenjuan Zhang and Bing Zhang

DEVELOPMENT OF HYPERSONITORAL IMAGING SYSTEM USING OPTICAL FIBER BUNDLE AND SWING MIRROR
Kuniaki Uto, Haruyuki Seki, Genya Saito, Yukio Kosugi and Teruhisa Komatsu

Whispers Conference 2015, Tokyo, Japan
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<td>Urban analysis</td>
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<td><strong>Session chairs:</strong> Qian Du, Mississippi State University, USA</td>
<td><strong>Session chairs:</strong> Mingyi He, Northwestern Polytechnical University, China</td>
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<td>Yanfei Zhang, Wuhan University, China</td>
<td>Yoann Altmann, Heriot-Watt University, UK</td>
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<td>11:30</td>
<td>COMBINING ROTATION FOREST AND MULTISCALE SEGMENTATION FOR THE CLASSIFICATION OF HYPERSONTRAL DATA</td>
<td>AN EMPIRICAL STUDY OF URBAN MAPPING IN A CHAIN APPROACH</td>
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<td>Jike Chen, Junshi Xia, Peijun Du and Jocelyn Chanussot</td>
<td>Li Liwei, Zhang Bing and Gao Lianru</td>
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<td>ON THE SAMPLING STRATEGIES FOR EVALUATION OF JOINT SPECTRAL-SPATIAL INFORMATION BASED CLASSIFIERS</td>
<td>SPLITTING THE HYPERSONTRAL-MULTISPECTRAL IMAGE FUSION PROBLEM AUTONOMOUSLY INTO WEIGHTED PAN-SHARPENING TASKS - THE SPECTRAL GROUPING CONCEPT -</td>
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<td>SEGSALSA-STR: A CONVEX FORMULATION TO SUPERVISED HYPERSONTRAL IMAGE SEGMENTATION USING HIDDEN FIELDS AND STRUCTURE TENSOR REGULARIZATION</td>
<td>COMPARISON OF TG-1 AND EO-1 HYPERION IN URBAN LAND COVER CLASSIFICATION</td>
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<td>Xueke Li, Kai Liu, Taixia Wu and Hongbo Su</td>
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<tr>
<td>12:30</td>
<td>TRANSFORMATION OF HYPERSONTRAL DATA TO IMPROVE CLASSIFICATION BY MITIGATING NONLINEAR EFFECTS</td>
<td>URBANIZATION ANALYSIS IN WUHAN AREA FROM 1991 TO 2013 BASED ON SMA</td>
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<td>Wolfgang Gross, Sebastian Wuttke and Wolfgang Middelmann</td>
<td>Anchang Sun and Tao Chen</td>
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<td>12:50</td>
<td>A SPARSE SELF-REPRESENTATION METHOD FOR BAND SELECTION IN HYPERSONTRAL IMAGERY CLASSIFICATION</td>
<td>ORDER∞ NONLINEAR HYPERSONTRAL UNMIXING BY SINUSOIDAL POLYTOPE DECOMPOSITION</td>
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<td>Weiwei Sun, Liangpei Zhang, Xiaohui Chen and Shunli Chen</td>
<td>Andrea Marinoni and Paolo Gamba</td>
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<th>Time</th>
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<td>14:20</td>
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**Wednesday, 3, June**

**Poster until 11:30**
- MODIFIED RESIDUAL METHOD FOR ESTIMATION OF NOISE STATISTICS IN HYPERSONTRAL IMAGES
  Asad Mahmood, Amandine Robin and Michael Sears
- HYPERSONTRAL IMPULSE DENOISING WITH SPARSE AND LOW-RANK PENALTIES
  Snigdha Tariyal, Hemant Kumar Aggarwal and Angshul Majumdar
- HYPERSONTRAL IMAGE COMPRESSION USING LEARNED CLASSIFIED DICTIONARY
  Dawei Xu, Rong Zhang and Qian Wu

**11:30**

**A GRADIENT AND LAPLACIAN BASED REACTION-DIFFUSION FILTER FOR HYPERSONTRAL IMAGE DENOSING**
Yi Wang, Ke Wu and Tao Chen

**Session wed-o-1-b**

**Urban analysis**

**Session chairs:** Mingyi He, Northwestern Polytechnical University, China
Yoann Altmann, Heriot-Watt University, UK

**11:50**

**ON THE SAMPLING STRATEGIES FOR EVALUATION OF JOINT SPECTRAL-SPATIAL INFORMATION BASED CLASSIFIERS**
Jun Zhou, Jie Liang, Yunqiao Qian and Yongsheng Gao

**SPLITTING THE HYPERSONTRAL-MULTISPECTRAL IMAGE FUSION PROBLEM AUTONOMOUSLY INTO WEIGHTED PAN-SHARPENING TASKS - THE SPECTRAL GROUPING CONCEPT -**
Claas Grohnfeldt, Xiao Xiang Zhu and Richard Bamler

**12:10**

**COMPARISON OF TG-1 AND EO-1 HYPERION IN URBAN LAND COVER CLASSIFICATION**
Xueke Li, Kai Liu, Taixia Wu and Hongbo Su

**12:30**

**TRANSFORMATION OF HYPERSONTRAL DATA TO IMPROVE CLASSIFICATION BY MITIGATING NONLINEAR EFFECTS**
Wolfgang Gross, Sebastian Wuttke and Wolfgang Middelmann

**URBANIZATION ANALYSIS IN WUHAN AREA FROM 1991 TO 2013 BASED ON SMA**
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Weiwei Sun, Liangpei Zhang, Xiaohui Chen and Shunli Chen

**ORDER∞ NONLINEAR HYPERSONTRAL UNMIXING BY SINUSOIDAL POLYTOPE DECOMPOSITION**
Andrea Marinoni and Paolo Gamba

**13:10**

**Lunch**
Wednesday, 3, June

14:20 Session wed-o-2-a
Detecting difficult targets
14:20 Oral until 16:00
Session chairs:
Alan Schaum, Naval Research Laboratory, USA
Nicolas Younan, Mississippi State University, USA

14:20 ENHANCED DETECTION OF CHEMICAL PLUMES IN HYPERSONAL IMAGES AND MOVIES THROUGH IMPROVED BACKGROUND MODELING
Yi Wang, Mauro Maggioni and Guangliang Chen

14:40 DETECTION OF SPECTRALLY VARYING BRDF MATERIALS IN HYPERSONAL REFLECTANCE IMAGERY
Robert Sundberg, Steven Adler-Golden, Timothy Perkins and Karmon Vongsy

15:00 DECONSTRUCTING OPTIMAL DETECTION ALGORITHMS
Alan Schaum

15:20 ESTIMATING TARGET SIGNATURES WITH DIVERSE DENSITY
Taylor Glenn and Alina Zare

15:40 SPARSITY-BASED OPTIMAL TARGETS SPECTRA GENERATION METHOD
Ting Wang and Hui Lin

16:20 Session wed-o-2-b
Big remote sensing data
Session chairs:
Mingmin Chi, Fudan University, China
Antonio Plaza, University of Extremadura, Spain

14:20 SUPERPIXEL-BASED ACTIVE LEARNING FOR THE CLASSIFICATION OF HYPERSONAL IMAGES
Zhongyi Sun and Mingmin Chi

14:40 FPGA IMPLEMENTATION OF A MAXIMUM VOLUME ALGORITHM FOR ENDMEMBER EXTRACTION FROM HYPERSONAL IMAGERY
Cong Li, Lianru Gao, Antonio Plaza and Bing Zhang

15:00 BENCHMARKING SERVER-SIDE SOFTWARE MODULES FOR HANDLING AND PROCESSING REMOTE SENSING DATA THROUGH RASDAMAN
Thanasios Karmas and Konstantinos Karantzalos

15:20 BIG DATA CHALLENGES IN CHINA CENTRE FOR RESOURCES SATELLITE DATA AND APPLICATION
Jun Shao, Daqi Xu, Chun Feng and Mingmin Chi

15:40 MULTIPLE STRATIFIED SAMPLING STRATEGY FOR ASSESSING THE BIG REMOTE SENSING PRODUCTS
Huan Xie, Xiaohua Tong, Wen Meng, Fang Wang and Xiong Xu

16:00 coffee break

16:30 Session wed-o-3-a
A diversity of applications
Session chairs:
Michael Sears, University of the Witwatersrand, South Africa
Kuniaki Uto, Tokyo Institute of Technology, Japan

16:20 DETECTION OF BLACK MOLD INFECTED FIGS BY USING TRANSMITTANCE SPECTROSCOPY
Efkan Durmuş, Ahmet Seçkin Bilgi, Gizem Ortaç, Habil Kalkan and Kadim Taşdemir

16:40 JOINT ESTIMATION OF WATER COLUMN PARAMETERS AND SEABED REFLECTANCE COMBINING MAXIMUM LIKELIHOOD AND UNMIXING ALGORITHM
Mireille Guillaume, Yves Michels and Sylvain Jay

17:10 MULTIPLE OBJECT TRACKING WITH BACKGROUND ESTIMATION IN HYPERSONAL VIDEO SEQUENCES
Zacharias Kandylakis, Konstantinos Karantzalos, Anastasios Doulamis and Nikos Doulamis

17:30 CHARACTERIZATION OF FINE METAL PARTICLES USING HYPERSONAL IMAGING IN AUTOMAT- IC WEEE RECYCLING SYSTEMS
Gabriele Candiani, Nicoletta Picone, Loredana Pompeo, Monica Pepe and Marcello Colledani

17:50 PROSPECTING FOR HYDROTHERMAL MINERAL DEPOSITS IN THE HIMALAYA USING SHORT-WAVE INFRARED SPECTROSCOPY
Himanshu Govil

18:10 Whispers Conference 2015, Tokyo, Japan
Thursday, 4, June
Overview

9:00  Opening of the conference

9:00  Plenary 2
  Hyperspectral Remote Sensing for Agro-Environmental Information
  Yoshio Inoue, Ecosystem Informatics Division, National Institute
  for Agro-Environmental Sciences, Japan
  Session chair: Kuniaki Uto, Tokyo Institute of Technology, Japan

10:00  Session thu-p-a
  Planetary exploration
  Session chairs:
  Lianru Gao, RADI, Chinese Academy of Sciences
  Akira Iwasaki, University of Tokyo, Japan

10:00  Session thu-p-b
  A diversity of applications
  Session chairs:
  Gabriele Candiani, IREA - National Research Council, Italy
  Naoto Yokoya, University of Tokyo, Japan

11:00  Session thu-o-1-a
  Agricultural and ecological systems
  Session chairs:
  Bing Zhang, RADI, Chinese Academy of Sciences
  Mireille Guillaume, Institut Fresnel, France

11:00  Session thu-o-1-b
  Classification (2)
  Session chairs:
  Peijun Du, Nanjing University, China
  Daniele Cerra, DLR, Germany

12:40  Lunch

13:40  Session thu-o-2-a
  Hyperspectral pansharpening and fusion (1)
  Session chairs:
  José M. Bioucas-Dias, Instituto Superior Tecnico, Portugal
  Nicolas Dobigeon, University of Toulouse, France

13:40  Session thu-o-2-b
  Forward modeling and atmospheric compensation
  Session chairs:
  Robert Sundberg, Spectral Sciences, Inc., USA
  Yi Cen, RADI, Chinese Academy of Sciences

15:20  Coffee

15:50  Session thu-o-3-a
  Spectral unmixing (2)
  Session chairs:
  Wing-Kin Ma, The Chinese University of Hong Kong, Hong Kong SAR
  Rob Heylen, University of Antwerp, Belgium

15:50  Session thu-o-3-b
  Thermal hyperspectral imaging
  Session chairs:
  Lifu Zhang, Institute of Remote Sensing and Digital Earth, CAS
  Manuel Cubero-Castan, EPFL, Switzerland

18:30  Banquet, Hotel Chinzanso Tokyo

22:00
Plenary 2
Hyperspectral Remote Sensing for Agro-Environmental Information
Yoshio Inoue, Ecosystem Informatics Division, National Institute for Agro-Environmental Sciences, Japan
Session chair: Kuniaki Uto, Tokyo Institute of Technology, Japan

9:00 Opening of the conference

9:00 Posters / coffee break : 2 parallel sessions

10:00 Plenary 2
Hyperspectral Remote Sensing for Agro-Environmental Information
Yoshio Inoue, Ecosystem Informatics Division, National Institute for Agro-Environmental Sciences, Japan
Session chair: Kuniaki Uto, Tokyo Institute of Technology, Japan

10:00 Session thu-p-a
Planetary exploration
Session chairs:
Lianru Gao, RADI, Chinese Academy of Sciences
Akira Iwasaki, University of Tokyo, Japan

SPIN-FORBIDDEN PYROXENE ABSORPTIONS IN THE VIR-SPECTRA OF 4VESTA
Katrin Stephan, Ralf Jaumann, Maria Cristina De Santis, Eleonora Ammannito, Thomas Roatsch, Klaus-Dieter Matz, Lucy A. McFadden, Rachel Klima, Carol A. Raymond and Chris T. Russell

IDENTIFICATION OF CRATERS ON LUNAR SURFACE USING HYPERSPECTRAL CHANDRAYAN DATA
Vishal Saini and Ajay Kumar Patel

IDENTIFY ANOMALY COMPONENT BY SPARSITY AND LOW RANK
Wei Wang, Shuangjiang Li, Hairong Qi, Bulent Ayhan, Chimian Kwan and Steven Vance

CHARACTERIZING DARK SPECTRA IN MERCURY SURFACE OBSERVATIONS BY NONLINEAR HYPERSPECTRAL MODELING
Andrea Marinoni, Rachel Klima and Paolo Gamba

NON-LINEAR SPECTRAL UNMIXING OF MOON MINERALOGY MAPPER (M3) DATA
Keshav Dev Singh and Ramakrishnan Desikan

Session thu-p-b
A diversity of applications
Session chairs:
Gabriele Candiani, IREA - National Research Council, Italy
Naoto Yokoya, University of Tokyo, Japan

IMPROVEMENT OF LINEAR SPECTRAL EMISSIVITY CONSTRAINT METHOD FOR TEMPERATURE AND EMISSIVITY SEPARATION OF HYPERSPECTRAL THERMAL INFRARED DATA
Li Ni, Hua Wu, Bing Zhang, Wenzhuan Zhang and Lianru Gao

NONDESTRUCTIVE MONITORING OF CHICKEN MEAT FRESHNESS USING HYPERSPECTRAL IMAGING TECHNOLOGY
Xujun Ye, Kanako Iino, Shuhuai Zhang and Seiichi Oshita

COMPARATIVE ANALYSIS OF THE HYPERSPECTRAL VEGETATION INDEX AND RADAR VEGETATION INDEX: A NOVEL FUSION VEGETATION INDEX
Yong-Hyun Kim, Jae-Hong Oh, Jae-Wan Choi and Yong-Il Kim

EVALUATING DIFFERENT VEGETATION INDEX FOR ESTIMATING LAI OF WINTER WHEAT USING HYPERSPECTRAL REMOTE SENSING DATA
Jingguo Tian, Shudong Wang and Lifu Zhang

HYPERSPECTRAL IMAGING SYSTEM FOR DETECTION OF DRIED FIGS WITH BLACK MOLD
Gizem Ortaç, Kadim Tazdemir, Ahmet Seçkin Bilgi, Etkan Durmuş and Habil Kalkan

IMPACT OF HYBRID PANSHARPENING APPROACHES APPLIED TO HYPERSPECTRAL IMAGES
Giorgio Licciardi, Miguel Ángel Veganzones, Gemine Vivone, Laetitia Loncan and Jocelyn Chanussot
Thursday, 4, June

**Poster until 11:00**

- **METHOD FOR TIME SERIES EXTRACTION OF CHARACTERISTIC PARAMETERS FROM MULTIDIMENSIONAL REMOTE SENSING DATASETS**
  Lifu Zhang, Hao Chen, Dongjie Fu, Taixia Wu, Jia Liu and Changping Huang

- **CHESRE: A COMPREHENSIVE PUBLIC HYPER-SPECTRAL EXPERIMENTAL SITE AND DATA SET FOR RESOURCES EXPLORATION**
  Fuping Gan, Shuneng Liang, Peijun Du, Fuxing Dang, Kun Tan, Hongjun Su and Zhaohui Xue

- **A NOVEL DYNAMIC CLASSIFIER ENSEMBLE ALGORITHM FOR HYPER-SPECTRAL IMAGE CLASSIFICATION**
  Hongjun Su and Peijun Du

**Oral until 12:40**

**Session thu-o-1-a**

**Application of hyperspectral imaging on agricultural and ecological systems**

Session chairs:
Bing Zhang, RADI, Chinese Academy of Sciences
Mireille Guillaume, Institut Fresnel, France

- **CROP AND FOREST ACREAGE ESTIMATION USING EXPERT SYSTEM BASED KNOWLEDGE CLASSIFIER APPROACH**
  Sandip Thorat, Yogesh Rajendra, K. V. Kale and Suresh Mehrotra

- **OPTIMIZED FEATURE FUSION OF LIDAR AND HYPER-SPECTRAL DATA FOR TREE SPECIES MAPPING IN CLOSED FOREST CANOPIES**
  Frieke Van Coillie, Wenzhi Liao, Pieter Kempeneers, Kris Vandekerckhove, Sidharta Gautama, Willried Philips and Robert De Wulf

- **SEMI-BLIND SOURCE SEPARATION FOR ESTIMATION OF CLAY CONTENT OVER SEMI-VEGETATED AREAS, FROM VNIR/SWIR HYPER-SPECTRAL AIRBORNE DATA**
  Walid Ouerghemmi, Cécile Gomez, Mohamed Saber Naceur and Philippe Lagacherie

**Session thu-o-1-b**

**Classification (2)**

Session chairs:
Peijun Du, Nanjing University, China
Daniele Cerra, DLR, Germany

- **EXTENDED MORPHOLOGICAL PROFILES WITH DUALITY FOR HYPER-SPECTRAL IMAGE CLASSIFICATION**
  Farid Imran and Mingyi He

- **OPTIMAL HYPER-SPECTRAL CLASSIFICATION FOR PADDY FIELD WITH SEMISUPERVISED SELF-LEARNING**
  Taichi Takayama, Naoto Yokoya and Akira Iwasaki

- **AN ANALYSIS OF SHADOW EFFECTS ON SPECTRAL VEGETATION INDICES USING A GROUND-BASED IMAGING SPECTROMETER**
  Taixia Wu, Lifu Zhang and Changping Huang

**Session thu-o-1-b**

**Representation-based classification for hyperspectral imagery: an elastic net regularization approach**
Wei Li, Lan Chang and Qian Du

11:00

11:00

**Lunch**

13:40
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<tr>
<th>Time</th>
<th>Session thu-o-2-a</th>
<th>Session thu-o-2-b</th>
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<tbody>
<tr>
<td>13:40</td>
<td>Hyperspectral pansharpening and fusion (1)</td>
<td>Forward modeling and atmospheric compensation</td>
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<td>HYPERSPECTRAL AND MULTISPECTRAL IMAGE FUSION BASED ON</td>
<td>INVESTIGATING FRAUNHOFER LINE BASED FLUORESCENCE</td>
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<td>CONSTRAINED CNMF UNMIXING</td>
<td>RETRIEVAL IN O2-B BAND WITH HYPERSPECTRAL RADIATIVE</td>
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<td>Yifan Zhang, Yang Liu, Yan Gao and Mingyi He</td>
<td>TRANSFER SIMULATIONS</td>
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<td>14:00</td>
<td>DYNAMIC DICTIONARY LEARNING STRATEGIES FOR SPARSE</td>
<td>A NEW SMOOTHNESS BASED STRATEGY FOR SEMI-SUPERVISED</td>
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<td>REPRESENTATION BASED HYERSPECTRAL IMAGE ENHANCEMENT</td>
<td>ATMOSPHERIC CORRECTION: APPLICATION TO THE LEMAN-BAIKAI</td>
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<td>Claas Grohnfeldt, Tristan Michael Burns and Xiao Xiang</td>
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<td>Zhu</td>
<td>Manuel Cubero-Castan, Dragos Constantin, Kevin</td>
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<td>Barbieux, Vincent Nouchi, Yosef Akhtiman and Bertrand</td>
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<td>14:20</td>
<td>BAYESIAN FUSION OF MULTISPECTRAL AND</td>
<td>HIT-FRTC: A FAST RADIATIVE TRANSFER CODE USING KERNEL</td>
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<td>HYPERSPECTRAL IMAGES USING A BLOCK COORDINATE DESCENT</td>
<td>REGRESSION</td>
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<td>METHOD</td>
<td>Jean-Claude Thelen and Stephan Havemann</td>
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<td>14:40</td>
<td>HYPERSPECTRAL PANSHARPENING BASED ON UNMIXING TECHNIQUES</td>
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<td>Laëtitia Loncan, Jocelyn Chanussot, Sophie Fabre and</td>
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<td>Xavier Briottet</td>
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<td>15:00</td>
<td>IMPROVING THE SPATIAL RESOLUTION OF HYPERSPECTRAL</td>
<td>A SPECTRAL-CORRELATION-BASED EMISSIVITY IMAGE SIMULATION</td>
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<td>IMAGE USING PANCHROMATIC AND MULTISPECTRAL IMAGES: AN</td>
<td>METHOD FOR THE 2.7 MICRON ABSORPTION BANDS</td>
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<td>INTEGRATED METHOD</td>
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<td>15:20</td>
<td>Xiangchao Meng, Huanfeng Shen, Huifang Li &amp; Liangpei</td>
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<td>15:50</td>
<td>Coffee</td>
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<tr>
<td>16:10</td>
<td>HYPERSONAL IMAGE UNMIXING USING CASCADED AUTOENCODER</td>
<td>WATER STRESS DETECTION USING HYPERSONAL THERMAL</td>
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<td></td>
<td>Rui Guo, Wei Wang and Hairong Qi</td>
<td>INFRARED REMOTE SENSING</td>
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<td>16:30</td>
<td>ROBUST COLLABORATIVE NONNEGATIVE MATRIX FACTORIZATION</td>
<td>STANDOFF MIDWAVE INFRARED HYPERSPECTRAL IMAGING OF</td>
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<td>FOR HYPERSONAL UNMIXING (R-CNMF)</td>
<td>SHIP PLUMES</td>
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<td>Jun Li, Jose Bioucas Dias, Antonio Plaza and Lin Liu</td>
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<td>16:50</td>
<td>WHEN CAN THE MINIMUM VOLUME ENCLOSING SIMPLEX IDENTIFY</td>
<td>HIGHLY REFLECTIVE PLATE DETECTION FROM LWIR GROUND</td>
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<td>THE ENDMEMBERS CORRECTLY WHEN THERE IS NO PURE PIXEL?</td>
<td>IMAGES</td>
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<td>Wing-Kin Ma, Chia-Hsiang Lin, Wei-Chiang Li and Chong-Yung Chi</td>
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<tr>
<td>17:10</td>
<td>GEOMETRIC SIMPLEX GROWING ALGORITHM</td>
<td>EVALUATION OF TEMPERATURE AND EMISSIVITY</td>
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<td>Hsiao-Chi Li and Chein-I Chang</td>
<td>SEPARATION METHOD USING THE HYPERSONAL DATA FOR</td>
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<td>17:30</td>
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<td>CONTRAST EMISSIVITY SURFACES</td>
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**Thursday, 4, June**

Whispers Conference 2015, Tokyo, Japan
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<th>Time</th>
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<tbody>
<tr>
<td>9:00</td>
<td>Opening of the conference</td>
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<tr>
<td>9:00</td>
<td><strong>Plenary 3</strong></td>
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<td><strong>Intelligent Hyperspectral Remote Sensing Satellite (IHRS): A New Perspective</strong></td>
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<td>Bing Zhang, <em>Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, China</em></td>
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<td>Session chair: Naoto Yokoya, <em>University of Tokyo, Japan</em></td>
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<td>10:00</td>
<td>Posters / coffee break</td>
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<td>11:10</td>
<td><strong>Session fri-o-1-a</strong></td>
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<td><strong>Hyperspectral pansharpening and fusion (2)</strong></td>
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<td>José M. Bioucas-Dias, <em>Instituto Superior Tecnico, Portugal</em></td>
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<td>Nicolas Dobigeon, <em>University of Toulouse, France</em></td>
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<td>14:00</td>
<td><strong>Session fri-o-2-a</strong></td>
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<td><strong>Sparse reconstruction and compressive sensing</strong></td>
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<td>Session chairs:</td>
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<td>Antonio Plaza, <em>University of Extremadura, Spain</em></td>
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<td>Xiaoxiang Zhu, DLR &amp; TU Munich, Germany</td>
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<td>15:40</td>
<td>coffee</td>
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<td>16:10</td>
<td><strong>Session fri-o-3-a</strong></td>
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<td><strong>Spectral unmixing (4) - Beyond endmember variability</strong></td>
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<td>Session chairs:</td>
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<td>Rob Heylen, <em>University of Antwerp, Belgium</em></td>
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<td>Jun Li, <em>Sun Yat-Sen University, China</em></td>
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<tr>
<td>17:50</td>
<td><strong>Session fri-o-3-b</strong></td>
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<td><strong>Spaceborne hyperspectral imager</strong></td>
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<td>Session chairs:</td>
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<td>Tetsushi Tachikawa, <em>Japan Space Systems, Japan</em></td>
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<td>Osamu Kashimura, <em>Japan Space Systems, Japan</em></td>
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8:00 Opening of the conference

8:00 **Plenary 3**

**Intelligent Hyperspectral Remote Sensing Satellite (IHRS): A New Perspective**

Bing Zhang, *Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, China*

Session chair: Naoto Yokoya, *University of Tokyo, Japan*

9:00 Posters / coffee break: 2 parallel sessions

<table>
<thead>
<tr>
<th>Session fri-p-a</th>
<th>Classification</th>
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| Session chairs: | Alp Ertürk, *Kocaeli University, Turkey*  
Guangliang Chen, *San Jose State University, USA* |
| HYPERSONETRICAL IMAGE ANALYSIS USING MULTIFRACTAL ATTRIBUTES | ANISOTROPICALLY FOVEATED NONLOCAL WEIGHTS FOR JOINT SPARSE REPRESENTATION-BASED HYPERSONETRICAL CLASSIFICATION |
| Sébastien Combexelle, Herwig Wendt, Jean-Yves Tourneret, Stephen McLaughlin and Patrice Abry | Zhi He and Lin Liu |
| COMPARING INFEERENCE METHODS FOR CONDITIONAL RANDOM FIELDS FOR HYPERSONETRICAL IMAGE CLASSIFICATION | AUTOMATIC FRAMEWORK FOR SEMI-SUPERVISED HYPERSONETRICAL IMAGE CLASSIFICATION USING SELF-TRAINING WITH DATA EDITING |
| Yang Hu, Sildomar Monteiro and Eli Saber | Junshu Wang, Nan Jiang, Guoming Zhang, Bin Hu and Yang Li |
| DIMENSION REDUCTION OF HYPERSONETRICAL IMAGE WITH RARE EVENT PRESERVING | DISCRIMINATING MULTIPLE KERNEL LEARNING FOR JOINT CLASSIFICATION OF OPTICAL AND LIDAR DATA IN URBAN AREA |
| Jihan Khoder and Rafic Younes | Qingwang Wang, Huan Liu and Yanfeng Gu |
| AN ISOMAP-BASED KERNEL-KNN CLASSIFIER FOR HYPERSONETRICAL DATA ANALYSIS | HYPERSONETRICAL IMAGE CLASSIFICATION USING MULTIPLE FEATURES AND NEAREST REGULARIZED SUBSPACE |
| Yuan Zhou, Chun Liu and Nan Li | Bing Peng, Xiaoming Xie, Wei Li and Qian Du |
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| OBJECT-BASED FUSION OF HYPERSONETRICAL AND LIDAR DATA FOR CLASSIFICATION OF URBAN AREAS | SPATIAL-SPECTRAL CLASSIFICATION WITH LOCAL REGIONAL FILTER AND MARKOV RANDOM FIELD |
| Prashanth Marpu and Sergio Sanchez Martinez | Qiong Ran, Wei Li and Qian Du |

Whispers Conference 2015, Tokyo, Japan
Session fri-p-b
Anomaly and target detection
Session chairs:
Taichi Takayama, University of Tokyo, Japan
Ronny Hänsch, Technische Universität Berlin, Germany

ANOMALY DISCRIMINATION AND CLASSIFICATION FOR HYPERSPECTRAL IMAGERY
Li-Chien Lee, Drew Paylor and Chein-I Chang

A COMPARATIVE STUDY OF HYPERSPECTRAL ANOMALY AND SIGNATURE BASED TARGET DETECTION METHODS FOR OIL SPILLS
Hilal Soydan, Alper Koz, H. Şebnem Düzgün and Aydın Alatan

DTW BASED SIGNAL ALIGNMENT FOR ENHANCING CO2 DETECTION IN MWIR HYPERSPECTRAL IMAGERY
Fatih Omruuzun, Didem Ozisik Baskurt and Yasemin Yardimci Cetin

A METHOD FOR BAND REGISTRATION OF SMALL MOVING TARGET BASED ON STARING IMAGING SPECTROMETER
Hao Ding and Huijie Zhao

PESTICIDE RESIDUE DETECTION BY HYPER-SPECTRAL IMAGING SENSORS

PROGRESSIVE BAND PROCESSING OF AUTOMATIC TARGET GENERATION PROCESS
Yao Li, Cheng Gao and Chein-I Chang

Session fri-o-1-a
Hyperspectral pansharpening and fusion (2)
Session chairs:
José M. Bioucas-Dias, Instituto Superior Tecnico, Portugal
Nicolas Dobigeon, University of Toulouse, France

JOINTLY SPATIAL-SPECTRAL RESOLUTION ENHANCEMENT OF HYPERSPECTRAL IMAGERY
Yongqiang Zhao, Chen Yi and Jingxiang Yang

MULTIPLE GRAPH REGULARIZED NMF FOR HYPERSPECTRAL UNMIXING
Lei Tong, Jun Zhou, Yuntao Qian and Yongsheng Gao

HYPERSONAL RESOLUTION ENHANCEMENT USING MULTISENSOR IMAGE DATA
Jakub Bieniarz, Daniele Cerra, Xiaoxiang Zhu, Rupert Müller and Peter Reinartz

A SPATIAL COMPOSITIONAL MODEL FOR LINEAR UNMIXING
Yuan Zhou, Anand Rangarajan and Paul Gader

TWO-STAGE FUSION OF THERMAL HYPERSPECTRAL AND VISIBLE RGB IMAGE BY PCA AND GUIDED FILTER
Wenzhi Liao, Xin Huang, Friese Van Coillie, Thoonen Guy, Aleksandra Pizurica, Scheunders Paul and Wilfried Philips

HYPERSONAL DATA UNMIXING WITH GRAPH-BASED REGULARIZATION
Rita Ammanouil, André Ferrari and Cédric Richard

THE ESTIMATION OF HIGH RESOLUTION URBAN SURFACE TEMPERATURE USING HYPERSPECTRAL SPECTRAL MIXTURE ANALYSIS
Kai Liu, Hongbo Su, Weimin Wang and Xueke Li

NONLINEAR UNMIXING WITH A MULTILINEAR MIXING MODEL
Rob Heylen and Paul Scheunders

A MAP-BASED APPROACH TO RESOLUTION ENHANCEMENT OF HYPERSPECTRAL IMAGES
Hasan Irmak, Gozde Bozdogan Akar and Seniha Esen Yuksel

SPATIALLY INFORMED SPECTRAL UNMIXING
Daniel Bongiorno, Adam Fairley and Stefan Williams
### Friday, 5, June

#### Lunch

**12:50**

#### 14:00

**Session fri-o-2-a**

**Sparse reconstruction and compressive sensing**

**Session chairs:**

- Antonio Plaza, *University of Extremadura, Spain*
- Xiaoxiang Zhu, *DLR & TU Munich, Germany*

**14:00**

**NONSEPARABLE SPARSITY BASED HYPERSPECTRAL COMPRESSIVE SENSING**

Lei Zhang, Wei Wei, Yanning Zhang, Fei Li and Hangqi Yan

**14:20**

**HYPERSPECTRAL COMPRESSIVE ACQUISITION IN THE SPATIAL DOMAIN VIA BLIND FACTORIZATION**

Gabriel Martin and José M. Bioucas-Dias

**14:40**

**RESTORATION OF ENMAP DATA THROUGH SPARSE RECONSTRUCTION**

Daniele Cerra, Jakub Bieniarz, Tobias Storch, Rupert Müller and Peter Reinartz

**15:00**

**GPU IMPLEMENTATION OF A CONSTRAINED HYPERSPECTRAL CODED APERTURE ALGORITHM FOR COMPRESSIVE SENSING**

Sergio Bernabe, Gabriel Martin, Jose Nascimento, Jose Bioucas-Dias, Antonio Plaza and Vitor Silva

**15:20**

**HYPERSPECTRAL DATA COMPRESSION USING DOUBLE SPARSITY MODEL**

Qian Wu, Rong Zhang and Fan Wang

#### 14:00

**Session fri-o-2-b**

**Machine learning**

**Session chairs:**

- Paul Scheunders, *University of Antwerp, Belgium*
- Hairong Qi, *University of Tennessee, USA*

**14:00**

**AN ACTIVE LEARNING METHOD BASED ON MARKOV RANDOM FIELDS FOR HYPERSPECTRAL IMAGES CLASSIFICATION**

Shujin Sun, Ping Zhong, Huaitie Xiao, Fang Liu and Runsheng Wang

**14:20**

**FEATURE-INDEPENDENT CLASSIFICATION OF HYPERSPECTRAL IMAGES BY PROJECTION-BASED RANDOM FORESTS**

Ronny Hänsch and Olaf Hellwich

**14:40**

**ACTIVE LEARNING FOR HYPERSPECTRAL IMAGE CLASSIFICATION WITH A STACKED AUTOENCODERS BASED NEURAL NETWORK**

Jiming Li and Sen Jia

**15:00**

**GABOR CUBE SELECTION-BASED MULTI-TASK JOINT SPARSE REPRESENTATION FOR HYPERSPECTRAL IMAGERY CLASSIFICATION**

Sen Jia, Yao Xie, Linlin Shen and Lin Deng

**15:20**

**HYPERSPECTRAL IMAGE SEGMENTATION WITH LOW-RANK REPRESENTATION AND SPECTRAL CLUSTERING**

Alex Sumarsono, Qian Du and Nicolas Younan

#### 15:40 Coffee

#### 16:10

**Session fri-o-3-a**

**Spectral unmixing (4) - Beyond endmember variability**

**Session chairs:**

- Rob Heylen, *University of Antwerp, Belgium*
- Jun Li, *Sun Yat-Sen University, China*

**16:10**

**A NOVEL APPROACH FOR ENDMEMBER BUNDLE EXTRACTION USING SPECTRAL SPACE SPLITTING**

Charoula Andreou, Derek Rogge, Benoit Rivard and Rupert Müller

**16:10**

**Session fri-o-3-b**

**Application study of spaceborne hyperspectral imager**

**Session chairs:**

- Tetsushi Tachikawa, *Japan Space Systems, Japan*
- Osamu Kashimura, *Japan Space Systems, Japan*

**16:10**

**DETECTION OF LARGE POINT SOURCES OF CARBON DIOXIDE BY A SATELLITE HYPERSPECTRAL CAMERA**

Tsuneo Matsunaga, Satoru Yamamoto and Tetsushi Tachikawa

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Whispers Conference 2015, Tokyo, Japan
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<td>16:30</td>
<td>HYPER SPECTRAL UNMIXING ACCOUNTING FOR SPATIAL CORRELATIONS AND END MEMBER VARIABILITY</td>
<td>Abderrahim Halimi, Nicolas Dobigeon, Jean-Yves Tourneret and Paul Honeine</td>
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<td>A METHOD BASED ON NONNEGATIVE MATRIX FACTORIZATION DEALING WITH INTRA-CLASS VARIABILITY FOR UNSUPERVISED HYPER SPECTRAL UNMIXING</td>
<td>Charlotte Revel, Yannick Deville, Veronique Achard and Xavier Briottet</td>
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<td>17:10</td>
<td>SPECTRAL SHAPE-BASED ENDMEMBER EXTRACTION METHOD</td>
<td>Tatsumi Uezato, Richard J. Murphy, Arman Melkumyan and Anna Chlingaryan</td>
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<td>BLIND HYPER SPECTRAL UNMIXING USING AN EXTENDED LINEAR MIXING MODEL TO ADDRESS SPECTRAL VARIABILITY</td>
<td>Lucas Drumetz, Simon Henrot, Miguel Ángel Veganzones, Jocelyn Chanussot and Christian Jutten</td>
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HYPER SPECTRAL DATA SIMULATION DATA AND IMAGE CLASSIFICATION IN THE FUTURE EARTH OBSERVATION ASI MISSION FRAMEWORK
Malvina Silvestri, Massimo Musacchio, Maria Fabrizia Buongiorno and Cristina Ananasso

DISCRIMINATION OF PEAT SWAMP FOREST TYPES WITH HYPER SPECTRAL DATA
Taichi Takayama, Takashi Ohki and Tomomi Takeda

BOTTOM-TYPE CLASSIFICATION IN CORAL REEF AREA USING HYPER SPECTRAL BOTTOM INDEX IMAGERY
Shinya Odagawa and Tomomi Takeda

CONSTRUCTION OF HIGH SPECTRAL RESOLUTION REFLECTANCE DATABASE
Toru Maruyama, Tomoji Sanga and Masaru Fujita
8. Plenary speakers

PLENARY 1 (Wednesday, 3, June, 9:20)

APPLYING GAME THEORY TO HYPERSPECTRAL IMAGE ANALYSIS WITH APPLICATIONS TO VEGETATIVE GROUND COVER MAPPING

Lori M. Bruce, Mississippi State University, USA

Abstract:

In the discipline of information analysis and decision making, game theory is one of the most mature fields, with well-defined and proven mathematical models. As a mathematical tool, game theory has mostly been used to support decision-making in the field of economics. Game theory describes how players accumulate benefits for themselves by employing appropriate strategies in a competitive or cooperative activity where many players participate. Game theory, and its mathematical models, can be applied to many areas of decision making in hyperspectral remote sensing. These include campaign planning, routing/mapping sensors, data fusion, feature selection, and classification.

This talk will introduce the basic concepts of game theory and outline the mechanisms for applying game theory models to hyperspectral image analysis, with special emphasis on data reduction, automated pixel classification, and ground cover mapping. General strategies will be outlined and details of practical implementations will be provided. The talk will include the demonstration of applying game theory methods to hyperspectral imagery for a variety of agricultural and environmental applications, including vegetative species mapping and vegetative stress characterization. Details will also be provided regarding the field campaigns and airborne image collection for the imagery used in these studies.

Biography:

Lori Mann Bruce received the B.S.E., Masters, and Ph.D. degrees in electrical and computer engineering from the University of Alabama, Huntsville, and the Georgia Institute of Technology in 1991, 1992, and 1996, respectively. Dr. Bruce is currently a Giles Distinguished Professor of electrical and computer engineering and the Associate Vice President for Academic Affairs and Dean of the Graduate School at Mississippi State University. As Dean, she is responsible for providing leadership and academic oversight for the approximately 3500 graduate students enrolled in more than 160 graduate programs.

Prior to her current position, Dr. Bruce has served as Associate Dean for Research and Graduate Studies in the Bagley College of Engineering, Associate Director of the Geosystems Research Institute and Professor of Electrical and Computer Engineering. As a faculty member, her research endeavors have been focused on advanced digital signal processing methodologies for exploitation of high-dimensional datasets, with particular emphasis on hyperspectral remote sensing. She has served as the Principal Investigator (PI) or Co-PI on more than 20 funded research grants and contracts, totaling approximately $20 million from federal agencies. As a faculty member, she has taught 45 sections of 17 different engineering courses and has successfully advised, as major professor or thesis/dissertation committee member, 75 Ph.D. and Master’s students. Her research has resulted in over 130 refereed publications.

Dr. Bruce is originally from Flintville, TN. She is married to Dr. J.W. Bruce and has one son, Walker Bruce.

Phone: (662) 325-7400
Email: bruce@grad.msstate.edu
PLENARY 2 (Thursday, 4, June, 9:00)

HYPERSONAL REMOTE SENSING FOR AGRO-ENVIRONMENTAL INFORMATION
Yosho Inoue, Ecosystem Informatics Division, National Institute for Agro-Environmental Sciences, Japan

Abstract:
Timely and geospatial information on agro-ecosystems is critical for diagnosis and decision making for precision crop management as well as for food and environmental security. Remote sensing using optical, thermal and microwave sensors has a vital role for non-destructive, geospatial and systematic assessment of agro-ecosystem dynamics. However, under open-field and/or ecosystem conditions, it is a challenging task to extract accurate biophysical and ecophysiological information of ecosystems consisting of mixed soil and plant elements such as leaves, stems and ears under the changing environment (illumination, etc.). Therefore, advanced sensors as well as accurate, robust, and simple algorithms are strongly required for such applications. In this paper, results of comprehensive spectral analysis and case studies will be presented. Spectral datasets obtained by ground-based hyperspectral sensors, airborne hyperspectral sensors, high-resolution satellite optical sensors are analyzed using several methods; 1) simple spectral index approaches, 2) multivariable statistical regression models, and 3) physically-based reflectance models. Methodologies for utilization of hyperspectral data as well as several robust algorithms for hyperspectral assessment of key ecophysiological variables will be presented. Some general insights on the advantage, disadvantage, and desirable specifications of sensors for such applications will also be discussed. Information-based smart agriculture is one of the major operational applications for hyperspectral remote sensing.

Biography:
Dr. Yoshio Inoue is a senior research scientist in the National Institute for Agro-Environmental Sciences, Japan. He received the Doctoral Degree in plant ecophysiology from the Kyoto University in 1988. The major part of present research is related to remote sensing and geospatial information for agricultural and natural resource managements, especially from biophysical and physiological points of view at the scales from a leaf to region. He has made a wide range of basic and applied studies for estimation of key variables in soil-plant-atmosphere systems such as stomatal conductance, chlorophyll and water contents, transpiration and CO2 fluxes, plant growth. These works are mostly based on experimental investigations using optical, thermal and microwave remote sensing sensors on ground-based, airborne and space-borne platforms, as well as using micrometeorological and physiological instruments. The synergistic linkage of remotely-sensed data with process-based models such as growth and biophysical models is also employed for prediction of ecosystem dynamics. One of major operational applications of these studies is information-based smart agriculture. He served as a Professor at the Graduate School of Life & Environmental Sciences, University of Tsukuba from 1995 to 2015. He has been contributing to both domestic and international research communities as editor-in-chief, editor and/or reviewer of more than 60 journals.

His scientific activities and achievements are summarized at http://cse.niaes.affrc.go.jp/yinoue/.
INTelligent HYperspectral REMote Sensing SATELLITE (IHRS): A NEW PERSPECTIVE

Bing Zhang, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, China

Abstract:

The intelligent hyperspectral remote sensing (IHRS) is a new perspective for an Earth Observation (EO) satellite system. This plenary talk will review the main characteristics of the IHRS system that is currently in the early stages of development. The technical design of the system will include the following characteristics: 1) a fore-field pre-judgment sensor for regional background information acquisition, which will enforce the capacity of the system to adapt to different scenarios and problems; 2) an advanced and adjustable hyperspectral sensor, which will be able to provide detailed surface observations using optimum data acquisition parameters; and 3) an onboard real-time data processing and analysis subsystem, with the capacity to provide real-time remote sensing products. These characteristics, which will be discussed in detail in the plenary talk, are completely innovative with regards to the specifications of available hyperspectral imaging systems. The IHRS calls for cutting-edge research on frontier scientific theories and key technologies in order to realize a leap-forward development in the field of hyperspectral remote sensing.

Biography:

Prof. Bing Zhang is a Full Professor and the Deputy Director of the Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, where he has been leading key scientific projects in the area of hyperspectral remote sensing for more than 20 years. His research interests include the development of Mathematical and Physical models and image processing software for the analysis of hyperspectral remote sensing data in many different areas, such as geology, hydrology, ecology and botany. Prof. Zhang has authored or co-authored around 150 publications, including more than 100 journal citation reports (JCR) papers and more than 50 peer-reviewed international conference papers. Prof. Zhang is the author of 4 books on hyperspectral remote sensing, including Hyperspectral Remote Sensing, Hyperspectral Image Classification and Target Detection, Hyperspectral Remote Sensing for Inland Water, and Hyperspectral Remote Sensing and its Multidisciplinary Applications, which serve as the main materials for education and research in hyperspectral remote sensing in China. He is currently focused on the development of the intelligent hyperspectral remote sensing (IHRS) satellite, which is a new Earth Observation (EO) system aiming at providing adaptive real-time EO and monitoring. Prof. Zhang is a Senior Member of IEEE and an Associate Editor of the IEEE Journal of Selected Topics in Applied Earth Observations in Remote Sensing (JSTARS). He has been guest editor of several special issues, including a JSTARS special issue on Hyperspectral Remote Sensing: Theory, Methods, and Applications, or a JSTARS special issue on Big Data in Remote Sensing, among others.
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