8th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing

21-24 August 2016, Los Angeles, USA

Workshop Preliminary Program
2. Exhibitors (More to come!)

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
3. Sponsors (More to come!)

DigitalGlobe is the industry-leading provider of Earth imagery and information about our changing planet, and a trusted partner to both governments and commercial customers. The company operates with a clear Purpose—Seeing a Better World™—which drives the business and galvanizes its employees around the world. DigitalGlobe’s unclassified and shareable imagery now serves hundreds of thousands of end-users across the U.S. government and its allies charged with the safety and security of nations, and enables the maps and geospatial applications relied on by billions of consumers. With best-in-class imagery, a global ground infrastructure, and accessible Geospatial Big Data platform on which hundreds of applications can be run against a 15-plus year time-lapse library of imagery, DigitalGlobe makes the unseen, seeable. The company’s wealth of imagery and data makes it possible for customers to see the Earth in new ways, extract unique insights, and implement new solutions for the world’s most pressing challenges. For more, go to www.digitalglobe.com.

http://www.digitalglobe.com
4. Technical sponsors

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http://www.ieee.org

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

UCLA
http://www.ucla.com

Gipsa-lab
http://www.gipsa-lab.grenoble-inp.fr

Whispers Conference 2016, Los Angeles, USA
5. COMMITTEES

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Jocelyn Chanussot, Grenoble Institute of Technology, France

Program Chair
Saurabh Prasad, University of Houston, USA

Tutorial Chair
Wenzhi Liao, Ghent University, Belgium

Technical Committee
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Antonio Plaza, University of Extremadura, Spain
Xiaoxiang Zhu, Technical University of Munich (TUM), Germany
Alina Zare, University of Missouri, USA
John Kerekes, Rochester Institute of Technology, USA
Nasser Nasrabadi, West Virginia University, USA
Jean-Yves Tourneret, INP-Ecole Nationale Supérieure Electronique Electrotechnique Informatique Hydraulique Toulouse, France
Paolo Gamba, University of Pavia, Italy
Xiuping Jia, UNSW Canberra at the Australian Defence Force Academy, Australia
John Richards, Australian National University, Australia
Xavier Briottet, The French Aerospace Lab, France
Lorenzo Bruzzone, University of Trento, Italy
Melba Crawford, Purdue University, USA
Saurabh Prasad, University of Houston, USA
Jocelyn Chanussot, Grenoble Institute of Technology, France

Webmaster & Graphic Designer
Vincent Couturier-Doux

Whispers Conference 2016, Los Angeles, USA
7. **Technical Program**
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| Monday, 22 |
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| Wednesday, 24 |

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<td>8:40</td>
<td>Opening ceremony</td>
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<tr>
<td>9:00</td>
<td>Plenary 1</td>
</tr>
<tr>
<td>10:00</td>
<td>Coffee break</td>
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<tr>
<td>10:30</td>
<td>Oral sessions mon-o-1 Recent Advances in Unmixing (1)</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<tr>
<td>13:30</td>
<td>Oral sessions mon-o-2-a Detection of Difficult Targets</td>
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<td>mon-o-2-b Image Classification (1)</td>
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<td>15:30</td>
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<tr>
<td>16:00</td>
<td>Oral sessions mon-o-3-a Spatial Enhancement of Hyperspectral data and Applications</td>
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<td>mon-o-3-b Mineral Spectroscopy</td>
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<tr>
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<td>Plenary 2</td>
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<tr>
<td>10:30</td>
<td>Oral sessions tue-o-1 Planetary Exploration</td>
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<tr>
<td>13:30</td>
<td>Oral sessions tue-o-2-a Image Classification (2)</td>
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<td>tue-o-2-b Recent Advances in Unmixing (2)</td>
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<td>15:30</td>
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<tr>
<td>16:00</td>
<td>Oral sessions tue-o-3-a Image Analysis Techniques</td>
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<td>tue-o-3-b Detection of Trace Gases</td>
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<tr>
<td>18:00</td>
<td>Banquet</td>
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<td>Oral sessions wed-o-1 Image Classification (3)</td>
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<tr>
<td>13:30</td>
<td>Oral sessions wed-o-2-a Denoising, Representation and Sensing</td>
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<td>wed-o-2-b A Diversity of Applications</td>
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<td>Oral sessions wed-o-3-a Unmixing (Regular) session</td>
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<td>wed-o-3-b Agricultural and Ecological Systems</td>
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<td><strong>Tutorials</strong></td>
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<td>Nonlinear Unmixing of Hyperspectral Data</td>
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<td></td>
<td>Paul Gader, University of Florida, USA</td>
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<td>Rob Heylen, Vision Lab, University of Antwerp, Belgium</td>
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<td></td>
<td>tutorial-b</td>
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<td>Graph-based models for hyperspectral imaging</td>
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<td>Andrea Bertozzi, UCLA, USA</td>
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<td>18:00</td>
<td>Icebreaker</td>
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<td>Time</td>
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<td>8:40</td>
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<td>9:00</td>
<td><strong>Plenary 1</strong>&lt;br&gt;Spectral unmixing in the wild: a data science prospective&lt;br&gt;Mario Parente, <em>University of Massachusetts, USA</em>&lt;br&gt;Session chair: tba, tba</td>
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<td>10:00</td>
<td><strong>Posters</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Session mon-p-1-a</strong>&lt;br&gt;Applications of Spectroscopy for Characterization of Material Properties&lt;br&gt;Session chairs: tba, tba&lt;br&gt;Session mon-p-1-b&lt;br&gt;Image Analysis&lt;br&gt;Session chairs: tba, tba</td>
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<td>10:00</td>
<td>Coffee break (posters)</td>
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<td>10:30</td>
<td><strong>Session mon-o-1</strong>&lt;br&gt;Recent Advances in Unmixing (1)&lt;br&gt;Session chairs: tba, tba&lt;br&gt;Session mon-o-2-b&lt;br&gt;Image Classification (1)&lt;br&gt;Session chairs: tba, tba</td>
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<td>13:30</td>
<td><strong>Session mon-o-2-a</strong>&lt;br&gt;Detection of Difficult Targets&lt;br&gt;Session chairs: tba, tba&lt;br&gt;Session mon-o-2-b&lt;br&gt;Image Classification (1)&lt;br&gt;Session chairs: tba, tba</td>
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<td>16:00</td>
<td><strong>Session mon-o-3-a</strong>&lt;br&gt;Spatial Enhancement of Hyperspectral data and Applications&lt;br&gt;Session chairs: tba, tba&lt;br&gt;Session mon-o-3-b&lt;br&gt;Mineral Spectroscopy&lt;br&gt;Session chairs: tba, tba</td>
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Plenary 1
Spectral unmixing in the wild: a data science prospective
Mario Parente, University of Massachusetts, USA
Session chair: tba, tba

8:40 Opening of the conference: opening ceremony

9:00

Plenary 1
Spectral unmixing in the wild: a data science prospective
Mario Parente, University of Massachusetts, USA
Session chair: tba, tba

10:00

Session mon-p-a: Applications of Spectroscopy for Characterization of Material Properties
Session chairs: tba, tba
tba, tba

HYPERSPECTRAL LWIR MAPPING OF FUMAROLE SULFATES, SALTON SEA, IMPERIAL COUNTY, CALIFORNIA
Paul Adams, David Lynch, Kerry Buckland, Patrick Johnson and David Tratt

POTENTIAL OF NEAR-INFRARED HYPERSPECTRAL IMAGING SPECTROSCOPY TO QUANTIFY WATER CONTENT IN BISCUITS
Elodie Lancelot, Philippe Courcoux, Sylvie Chevallier, Alain Le-Bail and Benoit Jaillais

MGM DECONVOLUTION OF COMPLEX MAFIC MINERALOGY ROCK SLAB SPECTRA FROM VISIBLE-NEAR INFRARED IMAGING SPECTROSCOPY: IMPLICATIONS FOR THE CHARACTERIZATION OF THE TERRRESTRIAL OCEAN CRUST AND OF THE LUNAR CRUST
Patrick Pinet, David Glenadel-Justaut, Yves Daydou, Georges Ceuleneer, Sheng Gou, Patrick Launeau, Serge Chevrel and Cristian Carli

SPATIAL PATTERN OF SOIL ORGANIC CARBON ACQUIRED FROM HYPERSPECTRAL IMAGERY AT REYNOLDS CREEK CRITICAL ZONE OBSERVATORY (RC-CZO)
Aihua Li, Ryan Will, Nancy Glenn, Shawn Benner and Lucas Spaete

HYPERSPECTRAL IMAGING AS AN ANALYTICAL TOOL FOR THIN SINGLE AND MULTILAYER OXIDES CHARACTERIZATION: A LABORATORY STUDY
Shu Hui Ham, Morgan Ferté and Gabriel Fricout

MINERAL ABSORPTION FEATURE EXTRACTION IN VEGETATION COVERED REGION BASED ON REFERENCE SPECTRAL BACKGROUND REMOVAL
Hengqian Zhao, Lifu Zhang and Xuesheng Zhao

MAPPING OF THE CARNALLITE MINERAL AND SAGEBRUSH VEGETATION PLANT BY USING HYPER SPECTRAL REMOTE SENSING AND USGS SPECTRAL LIBRARY.
Sujan Singh Niranjana, Jyoti Sarup and Neelima Chaube

Session mon-p-b: Image Analysis
Session chairs: tba, tba
tba, tba

A COMPARISON OF LAND USE LAND COVER CLASSIFICATION USING SUPERSPECTRAL WORLDVIEW-3 VS HYPER SPECTRAL IMAGERY
Jan Koenig and Lionel Gueguen

JOINT LOW RANK AND SPARSE REPRESENTATION-BASED HYPER SPECTRAL IMAGE CLASSIFICATION
Mengmeng Zhang, Wei Li and Qian Du

FUSION MULTI-SCALE SUPERPIXEL FEATURES FOR CLASSIFICATION OF HYPER SPECTRAL IMAGES
Shanshan Li, Xiuping Jia, Bing Zhang and Hua Wu

SEQUENTIAL BAND SELECTION METHOD BASED ON GROUP ORTHOGONAL MATCHING PURSUIT
Chih-Hung Lai, Chu-Song Chen, Shih-Yu Chen and Keng-Hao Liu
Monday, 22, August

INVESTIGATION OF THE IMPACT OF DIMENSIONALITY REDUCTION AND FEATURE SELECTION ON THE CLASSIFICATION OF HYPERSPECTRAL ENMAP DATA
Sina Keller, Andreas Braun, Stefan Hinz and Martin Weinmann

PERFORMANCE EVALUATION OF ROTATION FOREST FOR SVM-BASED RECURSIVE FEATURE ELIMINATION USING HYPERSPECTRAL IMAGERY
Taskin Kavzoglu and Ismail Colkesen

A NON-NEGATIVE MATRIX FACTORIZATION APPROACH FOR HYPERSPECTRAL UNMIXING WITH PARTIAL KNOWN ENDMEMBERS
Nan Wang, Lifu Zhang, Yi Cen and Qingxi Tong

OPTIMIZING CLASSIFICATION USING MULTI-CLASSIFIERS FOR SPACEBORNE HYPERSPECTRAL DATASET
Mahendra Pal and Alok Porwal

MODIFIED VERSIONS OF SLIC ALGORITHM FOR GENERATING SUPERPIXELS IN HYPERSPECTRAL IMAGES
Athina Psalta, Vassilia Karathanassi and Polichronis Kolokoussis

CONFORMAL GEOMETRIC ALGEBRA BASED BAND SELECTION AND CLASSIFICATION FOR HYPERSPECTRAL IMAGERY
Hongjun Su and Bo Zhao

MAPPING MANGROVE COMMUNITIES IN COASTAL WETLANDS USING AIRBORNE HYPERSPECTRAL DATA
Xiong Zhou, Anna Armitage and Saurabh Prasad

REGISTRATION OF MWIR-LWIR BAND HYPERSPECTRAL IMAGES
Alper Koz, Akin Caliskan and Aydin Alatan

HYPERSPECTRAL UNMIXING BY REWEIGHTED LOW RANK AND TOTAL VARIATION
Rui Wang, Wenzhi Liao, Heng-Chao Li, Hongyan Zhang and Aleksandra Pizurica

HYPER SPECTRAL PANSHARPENING USING CONVEX OPTIMIZATION AND COLLABORATIVE TOTAL VARIATION REGULARIZATION
Paolo Addesso, Mauro Dalla Mura, Laurent Condat, Rocco Restaino, Gemine Vivone, Daniele Picone and Jocelyn Chanussot

FROM LOCAL TO GLOBAL UNMIXING OF HYPERSPECTRAL IMAGES TO REVEAL SPECTRAL VARIABILITY
Guillaume Tochon, Lucas Drumetz, Miguel Angel Vanzones, Mauro Dalla Mura and Jocelyn Chanussot

10:00 coffee break (posters)

10:30 Session mon-o-1 : Recent Advances in Unmixing (1)
Session chairs :
tba, tba
tba, tba

AN ITERATIVE ENHANCEMENT OF HIGHER ORDER NONLINEAR MIXTURE MODEL FOR ACCURATE HYPERSPECTRAL UNMIXING
Andrea Marinoni, Javier Plaza, Antonio Plaza and Paolo Gamba

NONLINEAR HYPERSPECTRAL UNMIXING ACCOUNTING FOR SPATIAL ILLUMINATION VARIABILITY
Abderrahim Halimi, Paul Honeine, Jose Bioucas-Dias, Gerald S. Buller and Steve McLaughlin

IMPROVED DISCRETE SWARM INTELLIGENCE ALGORITHMS FOR ENDMEMBER EXTRACTION IN HYPERSPECTRAL REMOTE SENSING IMAGE
Yuanchao Su, Xu Sun, Lianru Gao, Jun Li and Bing Zhang

SPARSE HYPERSPECTRAL UNMIXING WITH SPATIAL DISCONTINUITY PRESERVATION
Shaoquan Zhang, Jun Li, Zebin Wu and Antonio Plaza

UNMIXING MULTIPLE INTIMATE MIXTURES VIA A LOCALLY LOW-RANK REPRESENTATION
Arun Saranathan and Mario Parente

A LINEAR-QUADRATIC UNSUPERVISED HYPERSPECTRAL UNMIXING METHOD DEALING WITH INTRA-CLASS VARIABILITY
Charlotte Revel, Yannick Deville, Véronique Achard and Xavier Briottet

12:30 lunch (until 13:30)
### Session mon-o-2-a
**Detecting difficult targets**

**Session chairs:**
tba, tba
tba, tba

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<th>Authors</th>
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<tr>
<td>13:30</td>
<td>ANALYSIS OF HYPERSPECTRAL ANOMALY CHANGE DETECTION ALGORITHMS</td>
<td>Yair Elhadad and Stanley Rotman</td>
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<tr>
<td>13:50</td>
<td>CLASSIFICATION AND ANOMALY DETECTION ALGORITHMS FOR WEAK HYPERSPECTRAL SIGNAL PROCESSING.</td>
<td>Pierre Lahaie</td>
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<tr>
<td>14:10</td>
<td>HYPERSPECTRAL-BASED VERSES POLARIMETRIC-BASED ANOMALY DETECTION IN THE LWIR</td>
<td>Dalton Rosario and Joao Romano</td>
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<tr>
<td>14:30</td>
<td>CRACKS IN KRX: WHEN MORE DISTANT POINTS ARE LESS ANOMALOUS</td>
<td>James Theiler and Guen Grosklos</td>
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<tr>
<td>14:50</td>
<td>DETECTION OF UNDERWATER OBJECTS IN HYPERSPECTRAL IMAGERY</td>
<td>David Gillis</td>
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<td>15:10</td>
<td>CONSIDERING SPATIAL INFORMATION TO IMPROVE ANOMALY DETECTION IN HETEROGENEOUS HYPERSPECTRAL IMAGES</td>
<td>Francois Weber, Marc Bousquet, Eric Moulines, Nicolas Roux and Sidonie Lefebvre</td>
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**Coffee break (posters)** 15:30

### Session mon-o-2-b
**Image Classification (1)**

**Session chairs:**
tba, tba
tba, tba

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<td>13:30</td>
<td>COMBINING MULTISCALE FEATURES FOR CLASSIFICATION OF HYPERSPECTRAL IMAGES: A SEQUENCE BASED KERNEL APPROACH</td>
<td>Yanwei Cui, Laetitia Chapel and Sébastien Lefèvre</td>
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<td>13:50</td>
<td>SPECTRAL-SPATIAL CLASSIFICATION FOR HYPERSPECTRAL IMAGE BY BILATERAL FILTERING AND MORPHOLOGICAL FEATURES</td>
<td>Wenzhi Liao, Daniel Erick Ochoa Donoso, Friese Van Colie, Jie Li, Chun Qi, Sidharta Gautama and Wilfried Philips</td>
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<td>14:10</td>
<td>SEMI-SUPERVISED CLASSIFICATION OF HYPERSPECTRAL IMAGE BASED ON SPECTRAL AND EXTENDED MORPHOLOGICAL PROFILES</td>
<td>Junshu Wang, Guoming Zhang, Min Cao and Nan Jiang</td>
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<td>14:30</td>
<td>INTEGRATING SPATIAL AND SPECTRAL INFORMATION FOR CHANGE DETECTION IN HYPERSONAL IMAGERY</td>
<td>Karmon Yongsy and Michael Mendenhall</td>
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<td>14:50</td>
<td>SPECTRAL ANGLE BASED UNARY ENERGY FUNCTIONS FOR SPATIAL-SPETRAL HYPERSPECTRAL CLASSIFICATION USING MARKOV RANDOM FIELDS</td>
<td>Utsav Gewali and Sildomar Monteiro</td>
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<td>15:10</td>
<td>SUBPIXEL TARGET DETECTION IN HYPERSPECTRAL IMAGES WITH LOCAL MATCHED FILTERING IN SLIC SUPERPIXELS</td>
<td>Yilong Liang, Fanos Markopoulos and Eli Saber</td>
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### Session mon-o-3-a
**Spatial Enhancement of Hyperspectral data and Applications**

**Session chairs:**
tba, tba
tba, tba

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<td>16:00</td>
<td>SPECTRAL SUPER-RESOLUTION BASED ON MATRIX FACTORIZATION AND SPECTRAL DICTIONARY</td>
<td>Yongqiang Zhao, Chen Yi, Jingxiang Yang and Jonathan Cheung-Wai Chan</td>
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<td>16:20</td>
<td>ANT COLONY OPTIMIZATION FOR SUB-RESOLUTION OF HYPERSPECTRAL IMAGES</td>
<td>Shakti Sharma, Shreya Sharma and Krishna Buddhiraju</td>
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### Session mon-o-3-b
**Mineral Spectroscopy**

**Session chairs:**
tba, tba
tba, tba

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<tr>
<td>16:00</td>
<td>GEOLOGIC SWATH MAP OF THE LAVIC LAKE FAULT FROM AIRBORNE THERMAL HYPERSPECTRAL IMAGERY</td>
<td>Ryan D. Witkosky, Paul Adams, Sinan Aksiz, Kerry Buckland, Janet Harvey, Pat Johnson, David K. Lynch, Frank Sousa, Joann Stock and David Tratt</td>
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<tr>
<td>16:20</td>
<td>IDENTIFYING AND QUANTIFYING MINERAL ABUNDANCE THROUGH VSWIR MICROIMAGING SPECTROSCOPY: A COMPARISON TO XRD AND SEM</td>
<td>Ellen Leask and Bethany Ehlmann</td>
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### Monday, 22, August

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<td>MAPPING LAND COVERS OF BRUSSELS CAPITAL REGION USING SPATIALLY ENHANCED HYPER-</td>
<td>Jonathan Cheung-Wai Chan and Naoto Yokoya</td>
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<td>SPECTRAL IMAGES</td>
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<td>17:00</td>
<td>AN IMAGE SHARPENING STRATEGY BASED ON MULTIFRAME SUPER RESOLUTION FOR MULTI-</td>
<td>Jianying Sun, Qunbo Lv, Zheng Tan and Yangyang Liu</td>
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<td>SPECTRAL DATA</td>
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<td>17:20</td>
<td>MULTISPECTRAL AND HYPERSPECTRAL DATA FUSION BASED ON SAM MINIMIZATION BAND</td>
<td>Daniele Picone, Rocco Restaino, Gemine Vivone, Paolo Addesso, Mauro Dalla Mura and Jocelyn Chanussot</td>
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<td>ASSIGNMENT APPROACH</td>
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<td>17:40</td>
<td>COHERENCE ENHANCEMENT DIFFUSION FOR HYPERSPECTRAL IMAGERY USING A SPECTRAL-</td>
<td>Maider Marin-Mcgee and Miguel Velez-Reyes</td>
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<td>LY WEIGHTED STRUCTURE TENSOR</td>
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<td>18:00</td>
<td>USING VSWIR MICROIMAGING SPECTROSCOPY TO EXPLORE THE MINERALOGICAL DIVERSITY</td>
<td>Abigail Fraeman, Bethany Ehlmann, Geraint Northwood-Smith, Yang Liu, Meenakshi Wadhwa and Rebecca Greenberger</td>
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<td>EMISSION SPECTROSCOPY FOR THE IDENTIFICATION OF RARE EARTH ELEMENTS USING</td>
<td>Margret Fuchs, Richard Gloaguen, Jan Beyer, Sandra Jakob and Johannes Heitmann</td>
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<td>LASER-INDUCED PHOTOLUMINESCENCE</td>
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<td>PROCESSING OF DRONE-BORNE HYPERSPECTRAL DATA FOR GEOLOGICAL APPLICATIONS</td>
<td>Sandra Jakob, Robert Zimmermann and Richard Gloaguen</td>
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<td>COMBINED HYPERSPECTRAL AND LITHOGEO-CHEMICAL ESTIMATION OF ALTERATION IN-</td>
<td>Kati Laakso, Jan Peter, Benoit Rivard and Richard Gloaguen</td>
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<td>TENSIENCIES IN A VOLCANOGENIC MASSIVE SULFIDE DEPOSIT HYDROTHERMAL SYSTEM: A</td>
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<td>CASE STUDY FROM NORTHERN CANADA</td>
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<td>Time</td>
<td>Session Description</td>
<td>Session Chair(s)</td>
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<td>9:00</td>
<td>Opening of the conference</td>
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| 9:00  | **Plenary 2** Imaging spectroscopy for planetary science: new discoveries and a look to the future  
Bethany L. Ehlmann, *California Institute of Technology, USA* | tba, tba          |
| 10:00 | Coffee break (posters)                                  |                   |
| 10:00 | **Session tue-o-1** Planetary Exploration               |                   |
|       | Session chairs:                                         |                   |
|       | tba, tba                                                |                   |
|       | tba, tba                                                |                   |
| 12:30 | Lunch                                                    |                   |
| 13:30 | **Session tue-o-2-a** Image Classification (2)          |                   |
|       | Session chairs:                                         |                   |
|       | tba, tba                                                |                   |
|       | tba, tba                                                |                   |
| 15:30 | Coffee break (posters)                                  |                   |
| 16:00 | **Session tue-o-3-a** Image Analysis Techniques         |                   |
|       | Session chairs:                                         |                   |
|       | tba, tba                                                |                   |
|       | tba, tba                                                |                   |
| 18:00 | Banquet                                                 |                   |
Plenary 2
Imaging spectroscopy for planetary science: new discoveries and a look to the future
Bethany L. Ehlmann, California Institute of Technology, USA
Session chair: tba, tba

Tuesday, 23, August

9:00 Opening of the conference

9:00

Plenary 2
Imaging spectroscopy for planetary science: new discoveries and a look to the future
Bethany L. Ehlmann, California Institute of Technology, USA
Session chair: tba, tba

10:00

all day poster session

Session tue-p-a: A Diversity of Applications
Session chairs: tba, tba tba, tba

LITHOLOGICAL MAPPING USING ASTER AND MAGNETIC DATA
Jiang Chen and Qun Zhu

COMPARISON OF INTERNAL AREA RELATIVE REFLECTANCE AND 65V REFLECTANCE CALIBRATION FOR IMPERVIOUS SURFACE DETECTION
Shailesh Deshpande and Arun Inamdar

A TEMPERATURE AND EMISSIVITY RETRIEVAL ALGORITHM BASED ON ATMOSPHERIC ABSORPTION FEATURE FROM HYPERSPECTRAL THERMAL INFRARED DATA
Mengshuo Chen, Yonggang Qian, Hua Wu, Ning Wang, Lingling Ma, Chuanrong Li and Lingli Tang

DISENTANGLING ISOTROPIC FLUORESCENCE FROM THE CANOPY DIRECTIONAL REFLECTANCE USING BRDF MODELS
Changping Huang, Lifu Zhang, Siheng Wang and Dongjie Fu

QUALITY IMPROVEMENT OF HYPERSPECTRAL REMOTE SENSING IMAGES: A TECHNICAL OVERVIEW
Huifang Li, Huanfeng Shen, Qiangqiang Yuan, Hongyan Zhang, Lefei Zhang and Liangpei Zhang

HIGH-LEVEL IMPERVIOUS SURFACES CLASSIFICATION IN URBAN ENVIRONMENTS FROM HYPERSPECTRAL IMAGE
Ting Wang, Hongsheng Zhang and Hui Lin

STATISTICALLY MODELLING AND MINING REMOTELY SENSED DATA IN URBAN AREAS BASED ON TOPIC MODELS - A CONCEPTUAL ANALYSIS
Liwei Li, Bing Zhang and Junsheng Li

INFLUENCE OF SENSOR SPECTRAL PROPERTIES ON TEMPERATURE AND EMISSIVITY SEPARATION FOR HYPERSPECTRAL THERMAL INFRARED DATA
Ning Wang, Yong-Gang Qian, Ling-Ling Ma, Lingli Tang and Chuanrong Li

DEVELOPMENT OF MULTI-DIMENSIONAL ANALYSIS OF REMOTE SENSING (MARS) SOFTWARE
Lifu Zhang, Xuejian Sun and Hao Chen

RADIOMETRIC CALIBRATION OF THE COSI HYPERSONAL RPAS CAMERA
Stefan Livens, Joris Blommaert, Dirk Nuyts, Aleksandra Sima, Pieter-Jan Baek and Bavo Delaure

PROSPECTS OF TEMPO FOR MONITORING REGIONAL FOOD SECURITY: PRELIMINARY RESULTS FROM SIMULATIONS AND AIRBORNE GEOTASO DATA
Abduwasit Ghulam, Jack Fishman, Matthew Maimaitiyiming and Bethany Marshall

SNOW COVER ESTIMATION BASED ON SPECTRAL UNMIXING
Théo Masson, Mauro Dalla Mura, Marie Dumont, Pascal Sirguey, Miguel Angel Veganzones, Jocelyn Chanussot and Jean-Pierre Dedieu
Session tue-p-b: Image Analysis

Snigdha Tariyal, Hemant Aggarwal and Angshul Majumdar

Morpho-spectral Objects Classification by Hyperspectral Airborne Imagery
Sébastien Gadal and Walid Ouerghemmi

Fuzzy Threshold-Based Uniform Local Binary Patterns for Hyperspectral Imagery Classification
Sen Jia, Jie Hu, Lin Deng and Hongjun Su

Discriminative Graph-Based Dimensionality Reduction for Hyperspectral Image Classification
Yanfeng Gu and Qingwang Wang

Hyperspectral Image Classification Based on PCA Network
Fan Wang, Rong Zhang and Qian Wu

Integration of Contextual Knowledge in Unsupervised Sub-pixel Classification
Arun Pv, Krishna Mohan B and Alok Porwal

A Sun/Shadow Approach for the Classification of Hyperspectral Data
Guillaume Roussel, Christiane Weber, Xavier Ceamanos and Xavier Briottet

10:00 coffee break (posters)

Session tue-o-1: Planetary Exploration

Xia Zhang, Xing Wu and Honglei Lin

Rare Jarosite Detection in CRISM Imagery by Non-parametric Bayesian Clustering
Murat Dundar and Bethany Ehlmann

Identification of Mafic Minerals on Mars by Nonlinear Hyperspectral Unmixing
Andrea Marinoni and Harold Clenet

Testing the Multi-angle Approach for Retrieval of Surface Reflectance from CRISM Observations on Martian Icy Surfaces
Sylvain Douté, Cédric Pilorget and Cheng Jiang

Supervised Planetary Unmixing With Optimal Transport
Sina Nakhhostin, Nicolas Courty, Remi Flamary and Thomas Corpetti

Nonnegative CP Decomposition of Multiangle Hyperspectral Data: A Case Study on CRISM Observations of Martian Icy Surface
Miguel Angel Veganzones, Sylvain Douté, Jeremy E. Cohen, Rodrig Cabral Farias, Jocelyn Chanussot and Pierre Comon
12:30 lunch

13:30 Session tue-o-2-a
Image Classification (2)
Session chairs:
tba, tba
tba, tba

GSEAD: GRAPHICAL SCORE ESTIMATION FOR HYPERSPECTRAL ANOMALY DETECTION
Rui Zhao, Bo Du and Liangpei Zhang

13:50 HYPER SPECTRAL IMAGE CLASSIFICATION WITH SPARSE REPRESENTATION CLASSIFIER AND ACTIVE LEARNING
Lian-Zhi Huo, Li-Jun Zhao and Ping Tang

14:10 DEEP STACKING NETWORK WITH COARSE FEATURES FOR HYPERSPECTRAL IMAGE CLASSIFICATION
Mingyi He and Xiaohui Li

14:30 COMBINATION OF CEM & RXD FOR TARGET DETECTION IN HYPERSPECTRAL IMAGES
Muhammad Fahad, Mingyi He and Yifan Zhang

14:50 CLASSIFICATION OF PIXEL-LEVEL FUSED HYPERSPECTRAL AND LIDAR DATA USING DEEP CONVOLUTIONAL NEURAL NETWORKS
Saurabh Marchhale, V. Paul Fauca, Robert Plemmmons and Todd Torgersen

15:10 A REGULARIZED MULTI-METRIC ACTIVE LEARNING FRAMEWORK FOR HYPERSPECTRAL IMAGE CLASSIFICATION
Zhou Zhang and Melba Crawford

15:30 coffee break (posters)

16:00 Session tue-o-3-a
Image Analysis Techniques
Session chairs:
tba, tba
tba, tba

16:00 ORIENTED TRIPLET MARKOV FIELDS FOR HYPERSPECTRAL IMAGE SEGMENTATION
Jean-Baptiste Courbot, Emmanuel Monfrini, Vincent Mazet and Christophe Collet

16:20 LAND-COVER MONITORING USING TIME-SERIES HYPERSPECTRAL DATA VIA FRACTIONAL-ORDER DARWINIAN PARTICLE SWARM OPTIMIZATION SEGMENTATION
Naoto Yokoya and Pedram Ghamisi

16:20 Session tue-o-3-b
Detection of Trace Gases
Session chairs:
tba, tba
tba, tba

MULTI-YEAR STUDY OF REMOTELY-SENSED AMMONIA EMISSION FROM FUMAROLES IN THE SALTON SEA GEOTHERMAL FIELD
David Tratt, Stephen Young, Patrick Johnson, Kerry Buckland and David Lynch

16:20 URBAN-INDUSTRIAL EMISSIONS MONITORING WITH AIRBORNE LONGWAVE-INFRARED HYPERSPECTRAL IMAGING
David Tratt, Kerry Buckland, Eric Keim and Patrick Johnson
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<tr>
<th>Time</th>
<th>Topic</th>
<th>Authors/Details</th>
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<tr>
<td>16:40</td>
<td>THE LINEAR MIXED MODEL CONSTRAINED PARTICLE SWARM OPTIMIZATION FOR HYPERSPECTRAL ENDMEMBER EXTRACTION FROM HIGHLY MIXED DATA</td>
<td>Mingming Xu, Liangpei Zhang, Bo Du and Lefei Zhang</td>
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<td>17:00</td>
<td>BAND SELECTION FROM STATISTICAL WAVELET MODELS</td>
<td>Siwei Feng, Yuki Itoh, Mario Parente and Marco F. Duarte</td>
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<td>17:20</td>
<td>TARGET DETECTION IN THE PRESENCE OF MULTIPLE SUBPIXEL TARGETS IN COMPLEX BACKGROUNDS</td>
<td>Marom Dadon, Stanley Rotman, Dan Blumberg, Steve Adler-Golden and Patrick Conforti</td>
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<td>17:40</td>
<td>REDUCED DIMENSION ESTIMATORS IN MATCHED SUBSPACE DETECTION</td>
<td>Tegan Emerson, Michael Kirby, Louis Scharf and Chris Peterson</td>
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<tr>
<td>18:00</td>
<td>GENERATING CHEMICAL PLUMES FOR IMAGING SPECTROMETERS: EQUIPMENT AND PROCEDURES</td>
<td>Karl Westberg and Jeffrey Matic</td>
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<td>UNMIXING-BASED GAS PLUME TRACKING IN LWIR HYPERSPECTRAL VIDEO SEQUENCES</td>
<td>Guillaume Tochon, Delphine Pauwels, Mauro Dalla Mura and Jocelyn Chanussot</td>
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<td>COMPARING IMAGING SPECTROSCOPY AND IN SITU OBSERVATIONS OF CHINO DAIRY COMPLEX EMISSIONS</td>
<td>Ira Leifer, Christopher Melton, David Tratt, Jason Frash, Manish Gupta, Brian Leen, Kerry Buckland and Patrick Johnson</td>
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<td>GROUND BASED HYPERSPECTRAL IMAGING OF URBAN EMISSIONS</td>
<td>Masoud Ghandehari, Milad Aghamohamadnia, Gregory Dobler, Andreas Karpf, Camila Cavalcante, Kerry Buckland, Jun Qian and Steven Koonin</td>
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<td>9:00</td>
<td>Opening of the conference</td>
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| 9:00  | **Plenary 3**  
|       | Hyperspectral image reconstruction            |
|       | Stanley Osher, UCLA, USA                      |
|       | Session chair: tba, tba                       |
| 10:00 | Coffee break (posters)                         |
| 10:30 | **Session wed-o-1**  
|       | Image Classification (3)                      |
|       | Session chairs : tba, tba                     |
| 12:30 | Lunch                                          |
| 13:30 | **Session wed-o-2-a**  
|       | Denoising, Representation and Sensing         |
|       | Session chairs : tba, tba                     |
| 15:30 | Coffee break (posters)                         |
| 16:00 | **Session wed-o-3-a**  
|       | Unmixing (Regular) session                    |
|       | Session chairs : tba, tba                     |
| 18:00 | **Session wed-o-3-b**  
|       | Agricultural and Ecological Systems           |
|       | Session chairs : tba, tba                     |
Wednesday, 24, August

9:00 Opening of the conference

9:00 Plenary 3
Hyperspectral image reconstruction
Stanley Osher, UCLA, USA
Session chair: tba, tba

10:00 2 parallel poster sessions

Session wed-p-a : Applications: Agricultural and Ecological Systems
Session chairs:
tba, tba
tba, tba

Tree species classification with hyperspectral imaging and lidar
Øystein Rudjord and Øivind Trier

Unsupervised anomaly weed detection in riparian forest areas using hyperspectral data and lidar
Kabir Peerbhay, Onisimo Mutanga, Romano Lottering and Riyad Ismail

Estimating soil heavy metal concentration using hyperspectral data and weighted K-NN method
Weibo Ma, Kun Tan, Qian Du, Jianwei Ding and Qingwu Yan

Retrieval of leaf pigment content using wavelet-based prospect inversion from leaf reflectance spectra
Dong Li, Tao Cheng, Xia Yao, Yongchao Tian, Yan Zhu and Weixing Cao

Joint lab, field and airborne spectral database for the quantification of soil hydrocarbon content
Vincent Lever, Pierre-Yves Foucher, Xavier Briottet, Dominique Dubucq, Rosa Oltra Carrió, Laurent Poutier, Véronique Achard and Philippe Deliot

Session wed-p-b : Image Analysis
Session chairs:
tba, tba
tba, tba

Sparse filtering based hyperspectral unmixing
Hemant Kumar Aggarwal and Angshul Majumdar

The K-LLE algorithm for nonlinear dimensionality reduction of large-scale hyperspectral data
Danfeng Hong, Naoto Yokoya and Xiao Xiang Zhu

Hyperspectral and color-infrared imaging from ultra-light aircraft: potential to recognize tree species in urban environments
Gintautas Mozgeris, Sébastien Gadal, Donatas Jonikavicius, Lina Straigyté, Walid Ouerghemmi and Vytaute Juodkiene

Linking plant strategies (CSR) and remotely sensed plant traits
Teja Kattenborn, Javier Lopatin, Fabian Faßnacht and Sebastian Schmidtlein

Measurement of a coastal area by a hyperspectral imager using an optical fiber bundle, a swing mirror and compact spectrometers
Kuniaki Uto, Haruyuki Seki, Genya Saito, Yukio Kosugi and Teruhisa Komatsu

Assessment of spectral variation between rice canopy components using spectral feature analysis of near-ground hyperspectral imaging data
Kai Zhou, Tao Cheng, Xinqiang Deng, Xia Yao, Yongchao Tian, Yan Zhu and Weixing Cao

Endmember extraction algorithm using orthogonal subspace projection and local spatial correlation
Xinyuan Miao, Ye Zhang and Junping Zhang

Optical solutions for improving spatial resolution of hyperspectral sensors
Sayed Ashkan Adibi, Azam Karami, Rob Heylen and Paul Scheunders

Whispers Conference 2016, Los Angeles, USA
A SUPERVISED DENSITY-PEAKS-BASED CLASSIFICATION APPROACH FOR HYPERSPECTRAL IMAGES
Tong Li, Junping Zhang and Ye Zhang

TWO-STAGE PROCESS FOR IMPROVING THE PERFORMANCE OF HYPERSPECTRAL TARGET DETECTION
Jee-Cheng Wu and Kahn-Bao Wu

FUSION OF HYPERSPECTRAL AND LIDAR DATA USING RANDOM FEATURE SELECTION AND MORPHOLOGICAL ATTRIBUTE PROFILES
Sathishkumar Samiappan, Lalitha Dabbiru and Robert Moorhead

NOISE ROBUST ESTIMATION OF NUMBER OF ENDMEMBERS IN A HYPERSPECTRAL IMAGE BY EIGENVALUE BASED GAP INDEX
Samiran Das, Aurobinda Routray and Alok Kanti Deb

A NOVEL MANIFOLD LEARNING FOR DIMENSIONALITY REDUCTION AND CLASSIFICATION WITH HYPERSPECTRAL IMAGE
Zezhong Zheng, Pengxu Chen, Mingcang Zhu, Zhiqin Huang, Yufeng Lu, Yicong Feng and Jiang Li

FUSION OF DIVERSE FEATURES AND KERNELS USING LP-NORM BASED MULTIPLE KERNEL LEARNING IN HYPERSPECTRAL IMAGE PROCESSING
Muhammad Aminul Islam, Derek Anderson, John Ball and Nicolas Younan

10:00 coffee break (posters)

10:30 Session wed-o-1 : Image Classification (3)
Session chairs : tba, tba
tba, tba

10:30 EXTENDED EXTINCTION PROFILE FOR THE CLASSIFICATION OF HYPERSPECTRAL IMAGES
Pedram Ghamisi, Roberto Souza, Jon Atli Benediktsson, Xiao Xiang Zhu, Laticia Rittner and Roberto Lotufo

10:50 CORRENTROPY-BASED ROBUST JOINT SPARSE REPRESENTATION FOR HYPERSPECTRAL IMAGE CLASSIFICATION
Jiangtiao Peng and Lefei Zhang

11:10 OBJECT BASED FUSION OF POLARIMETRIC SAR AND HYPERSPECTRAL IMAGING FOR LAND USE CLASSIFICATION
Jingliang Hu, Pedram Ghamisi, Andreas Schmitt and Xiao Xiang Zhu

11:30 GRAPH-BASED SEMI-SUPERVISED HYPERSPECTRAL IMAGE CLASSIFICATION USING SPATIAL INFORMATION
Nasehe Jamshidpour, Saeid Homayouni and Abdol Reza Safari

11:50 A CONJUGATED AND AUGMENTED DICTIONARY LEARNING METHOD FOR HYPERSPECTRAL IMAGE CLASSIFICATION
Jihao Yin, Hui Qv and Xiaoyan Luo

12:10 GPU IMPLEMENTATION OF ANT COLONY OPTIMIZATION-BASED BAND SELECTIONS FOR HYPERSPECTRAL DATA CLASSIFICATION
Jianwei Gao, Zhengchao Chen, Lianru Gao and Bing Zhang

Whispers Conference 2016, Los Angeles, USA
Wednesday, 24, August

12:30 lunch

13:30 Session wed-o-2-a
Denoising, Representation and Sensing
Session chairs:
tba, tba
tba, tba

13:30 EXPLOITING THE LOW-RANK PROPERTY OF HY-PERSPECTRAL IMAGERY: A TECHNICAL OVERVIEW
Hongyan Zhang, Wei He, Wenzhi Liao, Renbo Luo, Lian-gepei Zhang and Aleksandra Piœurica

13:50 BBD: A NEW BAYESIAN BI-CLUSTERING DENOISING ALGORITHM FOR IASI-NG HYPERSPECTRAL IMAGES
Miguel Colom, Gwendoline Blanchet, Andrzej Klonecki, Olivier Lezeaux, Eric Pequignot, Florian Poustomis, Carole Thiebaut, Sylvain Ythier and Jean-Michel Morel

14:10 STATIC FOURIER TRANSFORM HY-PERSPECTRAL IMAGING POLARIMETER
Jie Li, Chun Qi, Jingping Zhu, Wenzhi Liao and Wilfried Philips

14:30 DENOISING OF HYPERSPECTRAL IMAGES USING SHEARLET TRANSFORM AND FULLY CON-STRAINED LEAST SQUARES UNMIXING
Azam Karami, Rob Heylen and Paul Scheunders

14:50 AN APPROXIMATE MESSAGE PASSING AP-PROACH FOR COMPRESSIVE HY-PERSPECTRAL IMAGING USING A SIMULTANEOUS LOW-RANK AND JOINT-SPARSITY PRIOR
Yangqing Li, Saurabh Prasad, Wei Chen, Changchuan Yin and Zhu Han

15:30 coffee break (posters)

16:00 Session wed-o-3-a
Unmixing (Regular) session
Session chairs:
tba, tba
tba, tba

16:00 SUPERPIXEL BASED UNMIXING FOR ENHANCED HY-PERSPECTRAL DENOISING
Alp Ertürk

16:00 Session wed-o-3-b
Agricultural and Ecological Systems
Session chairs:
tba, tba
tba, tba

16:00 VEGETATION WATER CONTENT ESTIMATION USING BI-INVERTED GAUSSIAN MODEL
Xuan Liu, Ye Zhang and Junping Zhang
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<tr>
<td>16:20</td>
<td>VARIABILITY OF THE ENDMEMBERS IN SPECTRAL UNMIXING: RECENT ADVANCES</td>
<td>Lucas Drumetz, Jocelyn Chanussot and Christian Jutten</td>
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<td>16:40</td>
<td>IMPACT OF INITIALIZATION ON NONNEGATIVE MATRIX FRACTION FOR ENDMEMBER EXTRACTION FOR HYPERSPECTRAL IMAGERY</td>
<td>Luyan Ji, Xiurui Geng, Yongchao Zhao and Peng Gong</td>
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<td>17:00</td>
<td>USING IMAGE PYRAMIDS FOR THE ACCELERATION OF SPECTRAL UNMIXING BASED ON NON-NEGATIVE MATRIX FACTORIZATION</td>
<td>Sebastian Bauer and Fernando Puente León</td>
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<td>17:20</td>
<td>EFFECTS OF THE MULTISCALED-BAND PARTITIONING ON THE ABUNDANCE ESTIMATION</td>
<td>Charoula Andreou, Franziska Halbritter, Derek Rogge and Rupert Müller</td>
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<td>17:40</td>
<td>UNDERSTANDING SPATIAL-SPECTRAL DOMAIN INTERACTIONS IN HYPERSPECTRAL UNMIXING USING EXPLORATORY DATA ANALYSIS</td>
<td>Mohammed Alkhatib and Miguel Velez-Reyes</td>
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<td>18:00</td>
<td>MODELING EFFECTS OF ILLUMINATION AND PLANT GEOMETRY ON LEAF REFLECTANCE SPECTRA IN CLOSE-RANGE HYPERSPECTRAL IMAGING</td>
<td>Mohd Shahrimie Mohd Asaari and Paul Scheunders</td>
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<td>MULTITASK LEARNING OF VEGETATION BIOCHEMISTRY FROM HYPERSPECTRAL DATA</td>
<td>Utsav Gewali and Sildomar Monteiro</td>
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<td>SUNLIT/SHADED LIGHT-USE EFFICIENCY ESTIMATION OF CROPLAND USING HYPERSPECTRAL DATA</td>
<td>Dongjie Fu, Lifu Zhang and Yelu Zeng</td>
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<td>ESTIMATING INDEX OF REFRACTION, SURFACE TEMPERATURE, AND DOWNWELLING RADIANCE USING POLARIMETRIC-HYPERSPECTRAL IMAGERY (P-HSI)</td>
<td>Jacob Martin and Kevin Gross</td>
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<td>ON THE BENEFIT OF TOPOGRAPHIC DICTIONARIES FOR DETECTING DISEASE SYMPTOMS ON HYPERSPECTRAL 3D PLANT MODELS</td>
<td>Ribana Roscher, Jan Behmann, Anne-Katrin Mahlein and Lutz Plümer</td>
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8. Plenary speakers

PLENARY 1 (Monday, 22, August, 9:00)

SPECTRAL UNMIXING IN THE WILD: A DATA SCIENCE PROSPECTIVE

Mario Parente, University of Massachusetts, USA

Abstract:

One of the most challenging tasks in hyperspectral imaging is the extraction of the material composition of the surface from the electromagnetic signal received by the sensor within each pixel, the spectrum, a process called spectral unmixing. The observed signal within a pixel results from incoming light interacting with objects within, and in some cases outside the covered area. These interactions occur at microscopic scale (e.g. between particles composing a soil) and macroscopic scales (e.g. between 3-D objects such as buildings, trees or different topographical features), resulting in complex nonlinear phenomena. Spectral unmixing aims to identify the spectra of these constituent materials -- the endmembers -- present in each pixel of the image, together with their fractional abundances.

In this talk, I will explore several scenarios commonly encountered in hyperspectral image analysis from a data-analytic prospective and illustrate the approaches that were developed by the Remote Hyperspectral Observers (RHO) group at UMass to perform unmixing tasks.

I will first observe that sparse unmixing based on a library of candidate endmembers can be used successfully to unmix hyperspectral data commonly analyzed using non-linear mixing models (e.g bilinear, simple radiative-transfer). I will offer a geometrical interpretation of the result and predict the performance of the linear approach based on on the magnitude and character of the non-linearity and the amount of correlation between the spectra of the library.

I will then shift my attention to hyperspectral data of particulate media, such as mineral mixtures and soils, which are dominant on rocky planetary surfaces. Due to the heterogeneous optical and physical characteristics of the particles of constituent materials, and observational conditions, hyperspectral data of these samples exhibit complex non-linear interactions between the spectra of individual endmembers. I will show that, without leveraging any prior knowledge, identification and unmixing of several mineral mixtures acquired in different conditions can be obtained by novel manifold learning approaches developed at UMass RHOgroup.

I will end my exposition of advanced techniques for hyperspectral unmixing with a novel data representation based on deep learning. Deep learning is the undisputed state-of-the art in many problems in computer vision, natural language processing and speech recognition and it has seen some success in hyperspectral image classification. I will show a recently developed deep architecture that creates a data representation especially suited for the unmixing problem, seen as a regression between spectra and compositions (abundances). The model can “learn” a mixing model using labeled data while, at the same time, predicting the endmembers for unlabeled mixed spectra.

Biography :

Mario Parente is an Assistant Professor in the Electrical and Computer Engineering Department at the University of Massachusetts Amherst. He completed his post-doctoral research in the combination of physical model and statistical analysis of hyperspectral images at Brown University and received M.S. degrees in Electrical Engineering and Statistics and the Ph.D. degree in Electrical Engineering from Stanford University, where he developed machine learning algorithms for the analysis, calibration and reduction of complex hyperspectral datasets of planetary surfaces.

Prof. Parente's professional interests include developing machine learning and statistical image processing techniques for spectroscopic analysis and imaging spectrometer data modeling, reduction and calibration for terrestrial and planetary remote sensing. He is interested in the integration of sensing and decision-making for data prioritization and identification of scientifically attractive targets in manned and unmanned, rover and orbiter-based missions. He has also worked on approaches for automatic spectroscopic and morphologic analysis of hyperspectral images of works of art.

Dr. Parente is a supporting researcher of several NASA funded mission teams, including the NASA Compact Reconnaissance Imaging Spectrometer for Mars (CRISM), the Moon Mineralogy Mapper (M3) and the Biologic Analog Science Associated with Lava Terrains (BASALT). Dr. Parente is also a consultant for the Johns Hopkins Applied Physics Laboratory and the MIT Lincoln Laboratory.

Prof. Parente is a senior member of the IEEE, serving as an Associate Editor for the IEEE Geoscience and Remote Sensing Letters. He is a member of the IGARSS Technical Program Committee.
PLENARY 2 (Tuesday, 23, August, 9:00)
IMAGING SPECTROSCOPY FOR PLANETARY SCIENCE: NEW DISCOVERIES AND A LOOK TO THE FUTURE
Bethany L. Ehlmann, California Institute of Technology, USA

Abstract:
The past decade has been a fruitful one for imaging spectroscopy across the solar system with the technology driving fundamental planetary science discoveries. These include diverse minerals on Mars preserving evidence for multiple types of ancient habitable environments, water/OH-bearing materials on the Moon, “tiger stripes” on Enceladus that produce water-rich plumes, and evidence for recent cryovolcanism or hydrothermalism on the asteroid Ceres. I will review these discoveries and the technologies enabling them. Then, I will look to the future: what are the essential advances in data processing and instrumentation needed to drive the next decade of advances? Dealing with and fully exploiting the rich “big data” cubes provided by imaging spectrometers, new surface-based applications and instruments, and new optical designs and detector arrays for improved instrument performance are some of the opportunities.

Biography:
Bethany Ehlmann is an assistant professor of planetary sciences at Caltech and research scientist at the Jet Propulsion Lab. Her research focuses on remote sensing techniques and instruments, the composition of planetary surfaces, the chemistry and mineralogy of aqueous alteration, understanding the geologic history of Mars, and science policy and outreach. She is a member of the science teams for the Mars Exploration Rovers (Spirit and Opportunity), the CRISM imaging spectrometer on the Mars Reconnaissance Orbiter, the Mars Science Laboratory Curiosity rover, the upcoming Mars 2020 rover and is an affiliate of the Dawn science team.
Abstract:

We present a method for HSI reconstruction from very sparse subsampled data. An important fact in hyperspectral images is that the patch manifold, which is sampled by three-dimensional blocks in the data cube, is generally of a low dimensional nature. This is a generalization of low-rank models in that hyperspectral images with nonlinear mixing terms can also fit in this framework. The point integral method is used to solve a Laplace-Beltrami equation over a point cloud, sampling the patch manifold. Both numerical simulations and theoretical analysis show that the constraints are correctly enforced by the point integral method. The framework is demonstrated by experiments on the reconstructions of both linear and nonlinear mixed hyperspectral images with a significant number of missing voxels, several entirely missing spectral bands, and additive noise. This is recent joint work with Zuoqiang Shi and Wei Zhu.

Biography:

Stanley Osher is a Professor of Mathematics, Computer Science, Chemical Engineering and Electrical Engineering at UCLA. He is also an Associate Director of the NSF-funded Institute for Pure and Applied Mathematics at UCLA. He received his MS and PhD degrees in Mathematics from the Courant Institute of NYU. Before joining the faculty at UCLA in 1977, he taught at SUNY Stony Brook, becoming professor in 1975. He has received numerous academic honors and co-founded three successful companies, each based largely on his own (joint) research. Osher has been elected to the US National Academy of Science and the American Academy of Arts and Sciences. He was awarded the SIAM Pioneer Prize at the 2003 ICIAM conference and the Ralph E. Kleinman Prize in 2005. He was awarded honorary doctoral degrees by ENS Cachan, France, in 2006 and by Hong Kong Baptist University in 2009. He is a SIAM and AMS Fellow. He gave a one hour plenary address at the 2010 International Conference of Mathematicians. He also gave the John von Neumann Lecture at the SIAM 2013 annual meeting. He is a Thomson-Reuters highly cited researcher-among the top 1% from 2002-2012 and 2003-2013 in both Mathematics and Computer Science with an h index of 101. In 2014 he received the Carl Friedrich Gauss Prize from the International Mathematics Union-this is regarded as the highest prize in applied mathematics. His current interests involve information science, which includes optimization, image processing, compressed sensing and machine learning and applications of these techniques to the equations of physics, engineering and elsewhere.
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