whispers

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

21-24 August 2016, Los Angeles, USA

Workshop Program

IEEE GRSS UCLA gipsa-lab

whispers

2016

Los Angeles, USA

1. 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

2. Sponsors

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

3. Technical sponsors

http://www.ieee.org

http://www.grss-ieee.org

http://www.ucla.com

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

4. 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

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Peijun Du, Nanjing University, China
Rob Heylen, University of Antwerp, Belgium
Alan Schaum, Naval Research Laboratoy, USA
James Theiler, Los Alamos National Laboratory, USA
Mario Parente, University of Massachusetts, USA
Qian Du, Mississippi State University, USA
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Saurabh Prasad, University of Houston, USA
Jocelyn Chanussot, Grenoble Institute of Technology, France

Webmaster & Graphic Designer
Vincent Couturier-Doux

5. Conference Information

Arrival to the Conference Venue :

- **The Tutorials will take place at the IPAM (Institute for Pure & Applied Mathematics) building on sunday 21**
- **The Conference will take place at the CNSI (California NanoSystems Institute) building from monday to wednesday**
- **By public transportation**
  Public transportation to UCLA mostly goes through the BigBlueBus.
  If you are not planning on staying on or close to the campus and if you will not have a car on site, you may look for an accomodation close to a BigBlueBus line:
  https://www.bigbluebus.com

Registration desk :

- Sunday 21st : from 1pm to 7pm
  Location: Institute for Pure & Applied Mathematics (IPAM)
  http://www.ipam.ucla.edu/your-visit/directions/
- Monday 22nd to Wednesday 24th : from 8am to 6pm
  Location : California NanoSystems Institute (CNSI) auditorium
  http://cnsi.ctrl.ucla.edu/file-sharing/publicview/facilities/DirectionsCNSI.pdf
  CNSI at UCLA :
  UCLA
  570 Westwood Plaza
  Building 114
  Mail Code: 722710
  Los Angeles, CA 90095
- 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 CNSI auditorium

Tutorial :

- Location: IPAM.
- Hours:
  Sunday 21st, 1:30pm – 17pm

Social Events:

Ice breaker

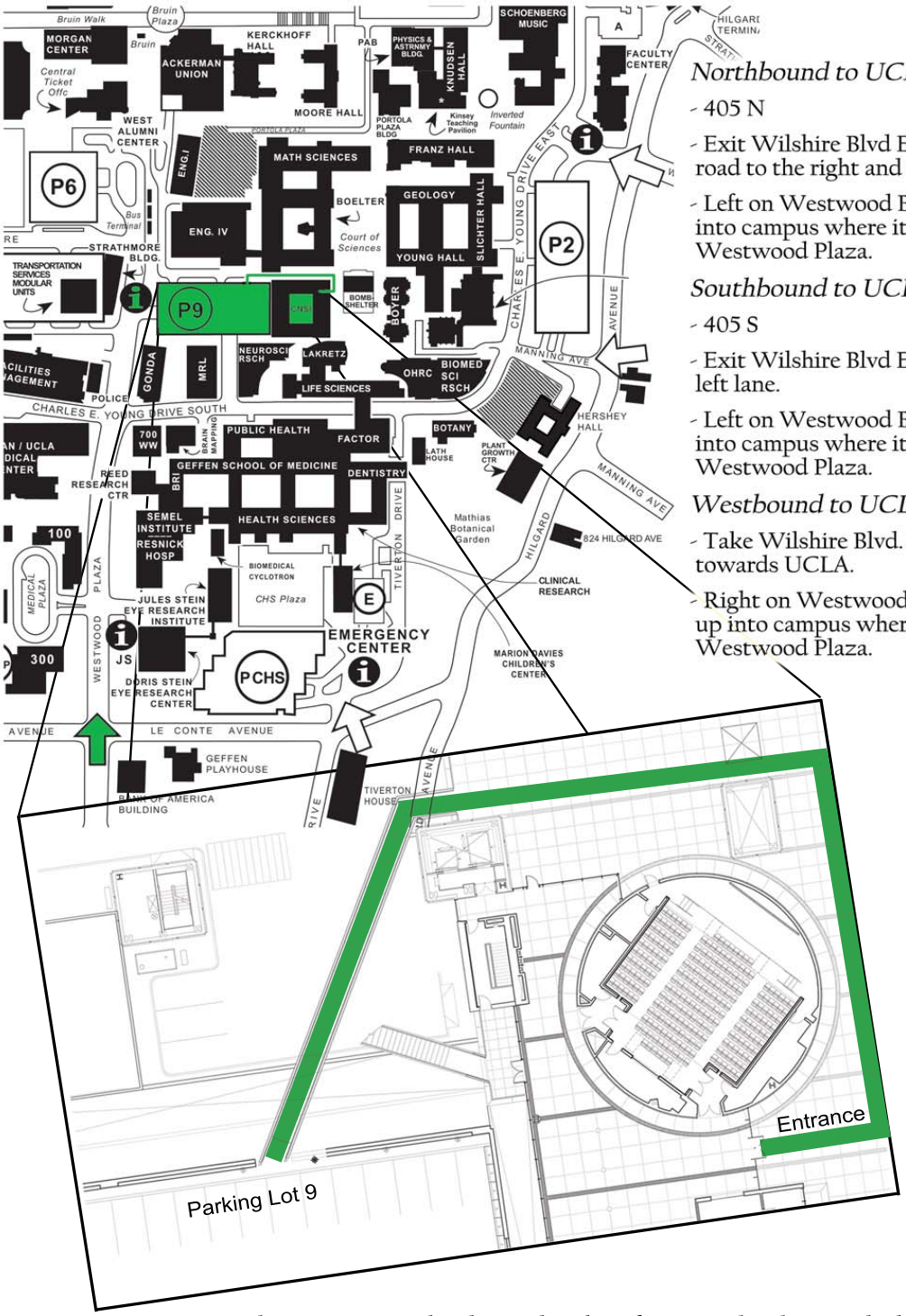
- The ice breaker will take place at IPAM, from 5pm to 7pm on sunday, august 21.
- The participation to the ice breaker is included in the registration cost.

Banquet

- The banquet will take place on campus premises. Information will be available at the registration desk.
- The participation to the banquet is included in the registration cost.

The conference will take place at the CNSI building
check how to access the site here : http://www1.cnsi.ucla.edu/staticpages/facilities-main

DIRECTIONS



Northbound to UCLA (LAX to UCLA):

- 405 N
- Exit Wilshire Blvd East and follow the road to the right and stay on the far left lane
- Left on Westwood Blvd and go straight up into campus where it will change to Westwood Plaza.

Southbound to UCLA:

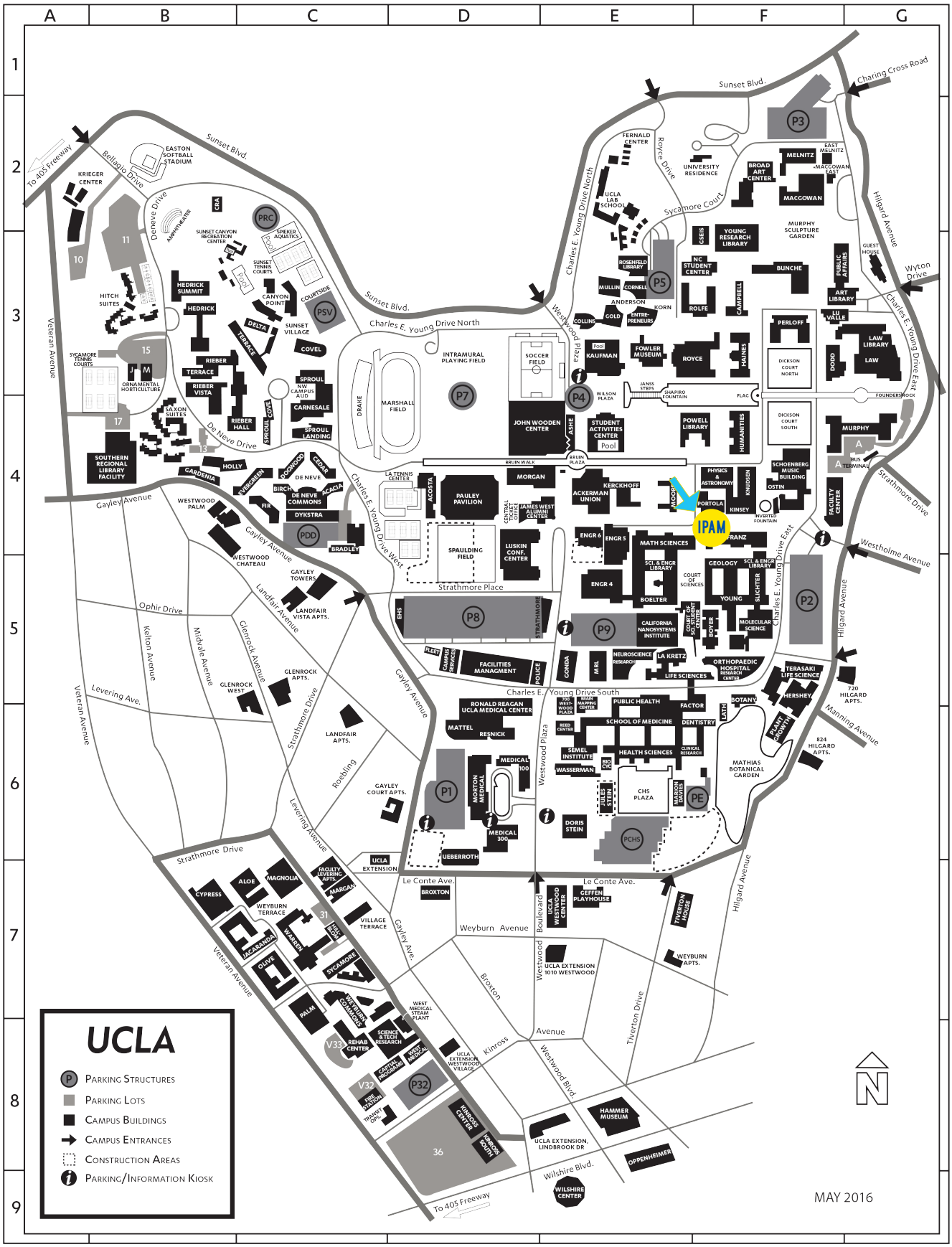
- 405 S
- Exit Wilshire Blvd East and stay on the far left lane.
- Left on Westwood Blvd and go straight up into campus where it will change to Westwood Plaza.

Westbound to UCLA

- Take Wilshire Blvd. and head west towards UCLA.
- Right on Westwood Blvd and go straight up into campus where it will change to Westwood Plaza.

- A parking permit may be obtained at the information kiosk towards the end of Westwood Plaza.
- Parking Structure 9 is located on your right, park at the top level.
- The CNSI building is built onto the roof level of the parking structure. Use the walkway/bridge on the far left side to make your way around to the front entrance of the CNSI building. Once at the front entrance, please use the call box to the left of the doors to gain access to the building.

The tutorials will take place at the IPAM building
check how to access the site here : http://www.ipam.ucla.edu/your-visit/directions/



6. Technical Program

WHISPERS at a glance

Sunday, 21

13:00
Opening of the registration

13:30

Tutorials

17:00

17:00
Icebreaker
19:00

Monday, 22

All day poster session — **mon-p-(a & b)**
a - Applications of Spectroscopy for Characterization of Material Properties
b -Image Analysis

8:40 — **Opening ceremony**

9:00 — **Plenary 1**

10:00 — **Coffee break**

10:30 Oral sessions — **mon-o-1**
Recent Advances in Unmixing (1)

12:30 — **Lunch**

13:30 Oral sessions — **mon-o-2-a**
Detection of Difficult Targets

mon-o-2-b
Image Classification (1)

15:30 — **Coffee break**

16:00 Oral sessions — **mon-o-3-a**
Spatial Enhancement of Hyperspectral data and Applications

mon-o-3-b
Mineral Spectroscopy

18:00

Tuesday, 23

All day poster session — **tue-p-(a & b)**
a - A Diversity of Applications
b - Image Analysis

9:00 — **Plenary 2**

10:00 — **Coffee break**

10:30 Oral sessions — **tue-o-1**
Planetary Exploration

12:30 — **Lunch**

13:30 Oral sessions — **tue-o-2-a**
Image Classification (2)

tue-o-2-b
Recent Advances in Unmixing (2)

15:30 — **Coffee break**

16:00 Oral sessions — **tue-o-3-a**
Image Analysis Techniques

tue-o-3-b
Detection of Trace Gases

18:00 — **Banquet**

Wednesday, 24

All day poster session — **wed-p-(a & b)**
a - Applications: Agricultural and Ecological Systems
b - Image Analysis

9:00 — **Plenary 3**

10:00 — **Coffee break**

10:30 Oral sessions — **wed-o-1**
Image Classification (3)

12:30 — **Lunch**

13:30 Oral sessions — **wed-o-2-a**
Denoising, Representation and Sensing

wed-o-2-b
A Diversity of Applications

15:30 — **Coffee break**

16:00 Oral sessions — **wed-o-3-a**
Unmixing (Regular) session

wed-o-3-b
Agricultural and Ecological Systems

18:00

Sunday, 21, August

13:00 Opening of the registration

13:30 **Tutorials (IPAM)**

tutorial-a
Nonlinear Unmixing of Hyperspectral Data
Paul Gader, *University of Florida, USA*
Rob Heylen, *Vision Lab, University of Antwerp, Belgium*

tutorial-b
Graph-based models for hyperspectral imaging
Andrea Bertozzi, *UCLA, USA*

17:00

17:00 Icebreaker (IPAM)

19:00

Monday, 22, August
Overview

8:40 Opening of the conference

9:00 – 10:00
Plenary 1
Spectral unmixing in the wild: a data science prospective
Mario Parente, *University of Massachusetts, USA*
Session chair: Saurabh Prasad, *University of Houston, USA*

all day poster session Posters

Session mon-p-1-a
Applications of Spectroscopy for Characterization of Material Properties

Session mon-p-1-b
Image Analysis

10:00 Coffee break (posters)

10:30 – 12:30
Session mon-o-1
Recent Advances in Unmixing (1)
Session chairs :
Mario Parente, *UMassAmherst, USA*
Rob Heylen, *University of Antwerp, Belgium*

12:30 Lunch

13:30 – 15:30
Session mon-o-2-a
Detection of Difficult Targets
Session chairs :
Alan Schaum, *Naval Research Laboratory, USA*
James Theiler, *Los Alamos National Laboratory, USA*

Session mon-o-2-b
Image Classification (1)
Session chairs :
Wenzhi Liao, *Ghent University, Belgium*
Naoto Yokoya, *University of Tokyo, Japan*

15:30 Coffee break (posters)

16:00 – 18:00
Session mon-o-3-a
Spatial Enhancement of Hyperspectral data and Applications
Session chairs :
Jonathan C-W Chan, *Vrije Universiteit Brussel, Belgium*
Yongqiang Zhao, *Northwestern Polytechnical University, China*

Session mon-o-3-b
Mineral Spectroscopy
Session chairs :
Richard Gloaguen, *Helmholz Institute Freiberg for Resource Technology, Germany*
Sebastian Bauer, *Karlsruhe Institute of Technology, Germany*

Monday, 22, August

8:40 Opening of the conference : opening ceremony

9:00 – 10:00

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

all day poster session

2 parallel poster sessions

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

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
Eloïse 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 TERRESTRIAL 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

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 HYPERSPECTRAL REMOTE SENSING AND USGS SPECTRAL LIBRARY.
Sujan Singh Niranjan, Jyoti Sarup and Neelima Chaube

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

DETECTION OF ORGANIC-RICH OIL SHALES OF THE GREEN RIVER FORMATION, UTAH, WITH GROUND-BASED IMAGING SPECTROSCOPY
Rebecca Greenberger, Bethany Ehlmann, Paul Jewell, Lauren Birgenheier and Robert Green

Session mon-p-b : Image Analysis

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

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

FUSION MULTI-SCALE SUPERPIXEL FEATURES FOR CLASSIFICATION OF HYPERSPECTRAL 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

all day poster session

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

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

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

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

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

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

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

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

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

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

HYPERSPECTRAL 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

10:00 coffee break (posters)

10:30 *Oral until 12:30*

Session mon-o-1 : Recent Advances in Unmixing (1)
Session chairs :
Mario Parente, *UMassAmherst, USA*
Rob Heylen, *University of Antwerp, Belgium*

10:30 AN ITERATIVE ENHANCEMENT OF HIGHER ORDER NONLINEAR MIXTURE MODEL FOR ACCURATE HYPERSPECTRAL UNMIXING
Andrea Marinoni, Javier Plaza, Antonio Plaza and Paolo Gamba

10:50 NONLINEAR HYPERSPECTRAL UNMIXING ACCOUNTING FOR SPATIAL ILLUMINATION VARIABILITY
Abderrahim Halimi, Paul Honeine, Jose Bioucas-Dias, Gerald S. Buller and Steve McLaughlin

11:10 IMPROVED DISCRETE SWARM INTELLIGENCE ALGORITHMS FOR ENDMEMBER EXTRACTION IN HYPERSPECTRAL REMOTE SENSING IMAGE
Yuanchao Su, Xu Sun, Lianru Gao, Jun Li and Bing Zhang

11:30 SPARSE HYPERSPECTRAL UNMIXING WITH SPATIAL DISCONTINUITY PRESERVATION
Shaoquan Zhang, Jun Li, Zebin Wu and Antonio Plaza

11:50 UNMIXING MULTIPLE INTIMATE MIXTURES VIA A LOCALLY LOW-RANK REPRESENTATION
Arun Saranathan and Mario Parente

12:10 A LINEAR-QUADRATIC UNSURPERVISED 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 mon-o-2-b **Image Classification (1)**
13:30 *Oral until 15:30*	Session chairs : Alan Schaum, *Naval Research Laboratory, USA* James Theiler, *Los Alamos National Laboratory, USA*	Session chairs : Wenzhi Liao, *Ghent University, Belgium* Naoto Yokoya, *University of Tokyo, Japan*
13:30	ANALYSIS OF HYPERSPECTRAL ANOMALY CHANGE DETECTION ALGORITHMS Yair Elhadad and Stanley Rotman	COMBINING MULTISCALE FEATURES FOR CLASSIFICATION OF HYPERSPECTRAL IMAGES: A SEQUENCE BASED KERNEL APPROACH Yanwei Cui, Laetitia Chapel and Sébastien Lefevre
13:50	CLASSIFICATION AND ANOMALY DETECTION ALGORITHMS FOR WEAK HYPERSPECTRAL SIGNAL PROCESSING. Pierre Lahaie	SPECTRAL-SPATIAL CLASSIFICATION FOR HYPERSPECTRAL IMAGE BY BILATERAL FILTERING AND MORPHOLOGICAL FEATURES Wenzhi Liao, Daniel Erick Ochoa Donoso, Frieke Van Coillie, Jie Li, Chun Qi, Sidharta Gautama and Wilfried Philips
14:10	HYPERSPECTRAL-BASED VERSES POLARIMETRIC-BASED ANOMALY DETECTION IN THE LWIR Dalton Rosario and Joao Romano	SEMI-SUPERVISED CLASSIFICATION OF HYPERSPECTRAL IMAGE BASED ON SPECTRAL AND EXTENDED MORPHOLOGICAL PROFILES Junshu Wang, Guoming Zhang, Min Cao and Nan Jiang
14:30	CRACKS IN KRX: WHEN MORE DISTANT POINTS ARE LESS ANOMALOUS James Theiler and Guen Grosklos	INTEGRATING SPATIAL AND SPECTRAL INFORMATION FOR CHANGE DETECTION IN HYPERSPECTRAL IMAGERY Karmon Vongsy and Michael Mendenhall
14:50	DETECTION OF UNDERWATER OBJECTS IN HYPERSPECTRAL IMAGERY David Gillis	SPECTRAL ANGLE BASED UNARY ENERGY FUNCTIONS FOR SPATIAL-SPECTRAL HYPERSPECTRAL CLASSIFICATION USING MARKOV RANDOM FIELDS Utsav Gewali and Sildomar Monteiro
15:10	CONSIDERING SPATIAL INFORMATION TO IMPROVE ANOMALY DETECTION IN HETEROGENEOUS HYPERSPECTRAL IMAGES Francois Weber, Marc Bousquet, Eric Moulines, Nicolas Roux and Sidonie Lefebvre	SUBPIXEL TARGET DETECTION IN HYPERSPECTRAL IMAGES WITH LOCAL MATCHED FILTERING IN SLIC SUPERPIXELS Yilong Liang, Panos Markopoulos and Eli Saber

15:30 coffee break (posters)

	Session mon-o-3-a **Spatial Enhancement of Hyperspectral data and Applications**	Session mon-o-3-b **Mineral Spectroscopy**
16:00 *Oral until 18:00*	Session chairs : Jonathan C-W Chan, *Vrije Universiteit Brussel, Belgium* Yongqiang Zhao, *Northwestern Polytechnical University, China*	Session chairs : Richard Gloaguen, *Helmholz Inst. Freiberg for Resource Technology, Germany* Sebastian Bauer, *Karlsruhe Inst. of Technology, Germany*
16:00	SPECTRAL SUPER-RESOLUTION BASED ON MATRIX FACTORIZATION AND SPECTRAL DICTIONARY Yongqiang Zhao, Chen Yi, Jingxiang Yang and Jonathan Cheung-Wai Chan	GEOLOGIC SWATH MAP OF THE LAVIC LAKE FAULT FROM AIRBORNE THERMAL HYPERSPECTRAL IMAGERY Ryan D. Witkosky, Paul Adams, Sinan Akciz, Kerry Buckland, Janet Harvey, Pat Johnson, David K. Lynch, Frank Sousa, Joann Stock and David Tratt
16:20	ANT COLONY OPTIMIZATION FOR SUPER-RESOLUTION OF HYPERSPECTRAL IMAGES Shakti Sharma, Shreya Sharma and Krishna Buddhiraju	IDENTIFYING AND QUANTIFYING MINERAL ABUNDANCE THROUGH VSWIR MICROIMAGING SPECTROSCOPY: A COMPARISON TO XRD AND SEM Ellen Leask and Bethany Ehlmann

16:40	MAPPING LAND COVERS OF BRUSSELS CAPITAL REGION USING SPATIALLY ENHANCED HYPER-SPECTRAL IMAGES Jonathan Cheung-Wai Chan and Naoto Yokoya	USING VSWIR MICROIMAGING SPECTROSCOPY TO EXPLORE THE MINERALOGICAL DIVERSITY OF HED METEORITES Abigail Fraeman, Bethany Ehlmann, Geraint Northwood-Smith, Yang Liu, Meenakshi Wadhwa and Rebecca Greenberger
17:00	AN IMAGE SHARPENING STRATEGY BASED ON MULTIFRAME SUPER RESOLUTION FOR MULTI-SPECTRAL DATA Jianying Sun, Qunbo Lv, Zheng Tan and Yangyang Liu	EMISSION SPECTROSCOPY FOR THE IDENTIFICATION OF RARE EARTH ELEMENTS USING LASER-INDUCED PHOTOLUMINESCENCE Margret Fuchs, Richard Gloaguen, Jan Beyer, Sandra Jakob and Johannes Heitmann
17:20	MULTISPECTRAL AND HYPERSPECTRAL DATA FUSION BASED ON SAM MINIMIZATION BAND ASSIGNMENT APPROACH Daniele Picone, Rocco Restaino, Gemine Vivone, Paolo Addesso, Mauro Dalla Mura and Jocelyn Chanussot	PROCESSING OF DRONE-BORNE HYPERSPECTRAL DATA FOR GEOLOGICAL APPLICATIONS Sandra Jakob, Robert Zimmermann and Richard Gloaguen
17:40	COHERENCE ENHANCEMENT DIFFUSION FOR HYPERSPECTRAL IMAGERY USING A SPECTRALLY WEIGHTED STRUCTURE TENSOR Maider Marin-Mcgee and Miguel Velez-Reyes	COMBINED HYPERSPECTRAL AND LITHOGEOCHEMICAL ESTIMATION OF ALTERATION INTENSITIES IN A VOLCANOGENIC MASSIVE SULFIDE DEPOSIT HYDROTHERMAL SYSTEM: A CASE STUDY FROM NORTHERN CANADA Kati Laakso, Jan Peter, Benoit Rivard and Richard Gloaguen
18:00		

Tuesday, 23, August
Overview

9:00 Opening of the conference

9:00 – 10:00
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: Jocelyn Chanussot, *Grenoble Institute of Technology, France*

all day poster session
Posters

Session tue-p-a
A Diversity of Applications

Session tue-p-b
Image Analysis

10:00 Coffee break (posters)

10:30 – 12:30
Session tue-o-1
Planetary Exploration
Session chairs :
Bethany Ehlmann, *Caltech, USA*
Abigail Fraeman, *Jet Propulsion Laboratory, USA*

12:30 Lunch

13:30 – 15:30
Session tue-o-2-a
Image Classification (2)
Session chairs :
Jenny Du, *Mississippi State University, USA*
Robert Sundberg, *Spectral Sciences, Inc., USA*

Session tue-o-2-b
Recent Advances in Unmixing (2)
Session chairs :
Rob Heylen, *University of Antwerp, Belgium*
Mario Parente, *UMassAmherst, USA*

15:30 Coffee break (posters)

16:00 – 18:00
Session tue-o-3-a
Image Analysis Techniques
Session chairs :
Stanley Rotman, *Ben-Gurion University of the Negev, Israel*
Zebin Wu, *Nanjing University of Science and Technology, China*

Session tue-o-3-b
Detection of Trace Gases
Session chairs :
David Tratt, *The Aerospace Corporation, USA*
Ira Leifer, *Bubbleology Research International, USA*

Banquet

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

10:00

all day poster session

2 parallel poster sessions

Session tue-p-a : A Diversity of Applications

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

COMPARISON OF INTERNAL AREA RELATIVE REFLECTANCE AND 6SV 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 HYPERSPECTRAL RPAS CAMERA
Stefan Livens, Joris Blommaert, Dirk Nuyts, Aleksandra Sima, Pieter-Jan Baeck and Bavo Delaure

PROSPECTES OF TEMPO FOR MONITORING REGIONAL FOOD SECUTIRY: 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

all day poster session

Session tue-p-b : Image Analysis

GREEDY DEEP DICTIONARY LEARNING FOR HYPERSPECTRAL IMAGE CLASSIFICATION
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 NERTWORK
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

ESTIMATION OF RELATIVE SENSOR CHARACTERISTICS FOR HYPERSPECTRAL SUPER-RESOLUTION
Charis Lanaras, Emmanuel Baltsavias and Konrad Schindler

CLASSIFICATION OF HYPERSPECTRAL IMAGE USING MULTISCALE SPATIAL TEXTURE FEATURES
Sidike Paheding, Chen Chen, Vijayan Asari, Yan Xu and Wei Li

A BATCH-WISE SEGMENTATION ALGORITHM FOR HYPERSPECTRAL IMAGES
Xing Zhang, Gongjian Wen and Wei Dai

COMPRESSION OF HYPERSPECTRAL IMAGES USING BLOCK COORDINATE DESCENT SEARCH AND COMPRESSED SENSING
Shirin Hassanzadeh, Azam Karami, Rob Heylen and Paul Scheunders

PERSON RE-IDENTIFICATION WITH HYPERSPECTRAL MULTI-CAMERA SYSTEMS - A PILOT STUDY
Saurabh Prasad, Tanu Priya, Minshan Cui and Shishir Shah

FEATURE EXTRACTION USING NEAR-ISOMETRIC LINEAR EMBEDDINGS FOR HYPERSPECTRAL IMAGERY CLASSIFICATION
Weiwei Sun, Liangpei Zhang and Bo Du

SUB-PIXEL MAPPING OF REMOTELY SENSED IMAGERY BASED ON MAXIMUM A POSTERIORI ESTIMATION AND FUZZY ARTMAP NEURAL NETWORK
Ke Wu and Qian Du

10:00 coffee break (posters)

10:30 *Oral until 12:30*

Session tue-o-1 : Planetary Exploration

Session chairs :
Bethany Ehlmann, *Caltech, USA*
Abigail Fraeman, *Jet Propulsion Laboratory, USA*

10:30 COMBINING SWIR AND TIR SPECTRAL FEATURES FOR REGNIZAION OF PHYLLOSILICATE OF MARTIAN SURFACE
Xia Zhang, Xing Wu and Honglei Lin

10:50 RARE JAROSITE DETECTION IN CRISM IMAGERY BY NON-PARAMETRIC BAYESIAN CLUSTERING
Murat Dundar and Bethany Ehlmann

11:10 IDENTIFICATION OF MAFIC MINERALS ON MARS BY NONLINEAR HYPERSPECTRAL UNMIXING
Andrea Marinoni and Harold Clenet

11:30 SUPERVISED PLANETARY UNMIXING WITH OPTIMAL TRANSPORT
Sina Nakhostin, Nicolas Courty, Remi Flamary and Thomas Corpetti

11:50 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, Rodrigo Cabral Farias, Jocelyn Chanussot and Pierre Comon

12:30 lunch

	Session tue-o-2-a **Image Classification (2)**	Session tue-o-2-b **Recent Advances in Unmixing (2)**
13:30 *Oral until 15:30*	Session chairs : Jenny Du, *Mississippi State University, USA* Robert Sundberg, *Spectral Sciences, Inc., USA*	Session chairs : Rob Heylen, *University of Antwerp, Belgium* Mario Parente, *UMassAmherst, USA*
13:30	GSEAD: GRAPHICAL SCORE ESTIMATION FOR HYPERSPECTRAL ANOMALY DETECTION Rui Zhao, Bo Du and Liangpei Zhang	ESTIMATION OF THE NUMBER OF ENDMEMBERS VIA THE HUBNESS PHENOMENON Rob Heylen, Mario Parente and Paul Scheunders
13:50	HYPERSPECTRAL IMAGE CLASSIFICATION WITH SPARSE REPRESENTATION CLASSIFIER AND ACTIVE LEARNING Lian-Zhi Huo, Li-Jun Zhao and Ping Tang	GRAPH-REGULARIZED COUPLED SPECTRAL UNMIXING FOR MULTISENSOR TIME-SERIES ANALYSIS Naoto Yokoya, Xiao Xiang Zhu and Antonio Plaza
14:10	DEEP STACKING NETWORK WITH COARSE FEATURES FOR HYPERSPECTRAL IMAGE CLASSIFICATION Mingyi He and Xiaohui Li	ROBUST SPECTRAL UNMIXING OF MULTISPECTRAL LIDAR WAVEFORMS Yoann Altmann, Aurora Maccarone, Aongus McCarthy, Greg Newstadt, Gerald Buller, Stephen McLaughlin and Alfred Hero
14:30	COMBINATION OF CEM & RXD FOR TARGET DETECTION IN HYPERSPECTRAL IMAGES Muhammad Fahad, Mingyi He and Yifan Zhang	RANDOM PROJECTION BASED NONNEGATIVE LEAST SQUARES FOR HYPERSPECTRAL IMAGE UNMIXING Vineetha Menon, Qian Du and James Fowler
14:50	CLASSIFICATION OF PIXEL-LEVEL FUSED HYPERSPECTRAL AND LIDAR DATA USING DEEP CONVOLUTIONAL NEURAL NETWORKS Saurabh Morchhale, V. Paul Pauca, Robert Plemmons and Todd Torgersen	A GAUSSIAN MIXTURE MODEL REPRESENTATION OF ENDMEMBER VARIABILITY FOR SPECTRAL UNMIXING Yuan Zhou, Anand Rangarajan and Paul Gader
15:10	A REGULARIZED MULTI-METRIC ACTIVE LEARNING FRAMEWORK FOR HYPERSPECTRAL IMAGE CLASSIFICATION Zhou Zhang and Melba Crawford	CONTENT BASED HYPERSPECTRAL IMAGE RETRIEVAL USING BAG OF ENDMEMBERS IMAGE DESCRIPTORS Fatih Ömrüuzun, Begüm Demir, Lorenzo Bruzzone and Yasemin Yardimci Cetin

15:30 coffee break (posters)

	Session tue-o-3-a **Image Analysis Techniques**	Session tue-o-3-b **Detection of Trace Gases**
16:00 *Oral until 18:00*	Session chairs : Stanley Rotman, *Ben-Gurion University of the Negev, Israel* Zebin Wu, *Nanjing University of Science and Technology, China*	Session chairs : David Tratt, *The Aerospace Corporation, USA* Ira Leifer, *Bubbleology Research International, USA*
16:00	ORIENTED TRIPLET MARKOV FIELDS FOR HYPERSPECTRAL IMAGE SEGMENTATION Jean-Baptiste Courbot, Emmanuel Monfrini, Vincent Mazet and Christophe Collet	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	LAND-COVER MONITORING USING TIME-SERIES HYPERSPECTRAL DATA VIA FRACTIONAL-ORDER DARWINIAN PARTICLE SWARM OPTIMIZATION SEGMENTATION Naoto Yokoya and Pedram Ghamisi	URBAN-INDUSTRIAL EMISSIONS MONITORING WITH AIRBORNE LONGWAVE-INFRARED HYPERSPECTRAL IMAGING David Tratt, Kerry Buckland, Eric Keim and Patrick Johnson

16:40	THE LINEAR MIXED MODEL CONSTRAINED PARTICLE SWARM OPTIMIZATION FOR HYPERSPECTRAL ENDMEMBER EXTRACTION FROM HIGHLY MIXED DATA Mingming Xu, Liangpei Zhang, Bo Du and Lefei Zhang	GENERATING CHEMICAL PLUMES FOR IMAGING SPECTROMETERS: EQUIPMENT AND PROCEDURES Karl Westberg and Jeffrey Matic
17:00	BAND SELECTION FROM STATISTICAL WAVELET MODELS Siwei Feng, Yuki Itoh, Mario Parente and Marco F. Duarte	UNMIXING-BASED GAS PLUME TRACKING IN LWIR HYPERSPECTRAL VIDEO SEQUENCES Guillaume Tochon, Delphine Pauwels, Mauro Dalla Mura and Jocelyn Chanussot
17:20	TARGET DETECTION IN THE PRESENCE OF MULTIPLE SUBPIXEL TARGETS IN COMPLEX BACKGROUNDS Marom Dadon, Stanley Rotman, Dan Blumberg, Steve Adler-Golden and Patrick Conforti	COMPARING IMAGING SPECTROSCOPY AND IN SITU OBSERVATIONS OF CHINO DAIRY COMPLEX EMISSIONS Ira Leifer, Christopher Melton, David Tratt, Jason Frash, Manish Gupta, Brian Leen, Kerry Buckland and Patrick Johnson
17:40	REDUCED DIMENSION ESTIMATORS IN MATCHED SUBSPACE DETECTION Tegan Emerson, Michael Kirby, Louis Scharf and Chris Peterson	GROUND BASED HYPERSPECTRAL IMAGING OF URBAN EMISSIONS Masoud Ghandehari, Milad Aghamohamadnia, Gregory Dobler, Andreas Karpf, Camila Cavalcante, Kerry Buckland, Jun Qian and Steven Koonin
18:00		

Wednesday, 24, August
Overview

9:00 Opening of the conference

9:00 – 10:00 **Plenary 3**
Hyperspectral image reconstruction
Stanley Osher, *UCLA, USA*
Session chair: Andrea Bertozzi, *UCLA, USA*

all day poster session Posters

Session wed-p-a
Applications: Agricultural and Ecological Systems

Session wed-p-b
Image Analysis

10:00 Coffee break (posters)

10:30 – 12:30 **Session wed-o-1**
Image Classification (3)
Session chairs :
Miguel Velez-Reyes, *University of Texas at El Paso, USA*
Alp Ertürk, *University of Kocaeli, Turkey*

12:30 Lunch

13:30 – 15:30 **Session wed-o-2-a**
Denoising, Representation and Sensing
Session chairs :
Mingyi He, *Northwestern Polytechnical University, China*
Paul Scheunders, *University of Antwerp, Belgium*

Session wed-o-2-b
A Diversity of Applications
Session chairs :
Kati Laakso, *Helmholz Institute Freiberg for Resource Technology, Germany*
Chara Andreou, *German Aerospace Center, Germany*

15:30 Coffee break (posters)

16:00 – 18:00 **Session wed-o-3-a**
Unmixing (Regular) session
Session chairs :
Paul Gader, *University of Florida, USA*
Kuniaki Uto, *University of Tokyo, Japan*

Session wed-o-3-b
Agricultural and Ecological Systems
Session chairs :
Ribana Roscher, *University of Bonn, Germany*
Ilkka Pölönen, *University of Jyväskylä, Finland*

Wednesday, 24, August

9:00 Opening of the conference

9:00 – 10:00

Plenary 3
Hyperspectral image reconstruction
Stanley Osher, *UCLA, USA*
Session chair: Andrea Bertozzi, *UCLA, USA*

all day poster session

2 parallel poster sessions

Session wed-p-a : Applications: Agricultural and Ecological Systems

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

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 Faβnacht 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

Session wed-p-b : Image Analysis

SPARSE FILTERING BASED HYPERSPECTRAL UNMIXING
Hemant Kumar Aggarwal and Angshul Majumdar

THE K-LLE ALGORITHM FOR NONLINEAR DIMENSIONALITY RUDUCTION OF LARGE-SCALE HYPERSPECTRAL DATA
Danfeng Hong, Naoto Yokoya and Xiao Xiang Zhu

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
Sayyed Ashkan Adibi, Azam Karami, Rob Heylen and Paul Scheunders

all day poster session

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

SUBSURFACE LINEAR UNMIXING ON A CONTROLLED UNDERWATER ENVIROMENT
Emmanuel Carpena-Colon, Luis O. Jimenez Rodriguez, Emmanuel Arzuaga and Miguel Velez-Reyes

GPU IMPLEMENTATION OF HYPERSPECTRAL IMAGE CLASSIFICATION BASED ON WEIGHTED MARKOV RANDOM FIELDS
Zebin Wu, Qicong Wang, Antonio Plaza, Jun Li, Jie Wei and Zhihui Wei

HYPERSPECTRAL IMAGE DESTRIPING USING UNMIXING-BASED KRIGING INTERPOLATION
Cencen Pan, Kun Tan, Qian Du, Jianwei Ding and Qingwu Yan

AN EFFICIENT BAND SELECTION METHOD FOR HYPERSPECTRAL DATA BASED ON COVARIANCE MATRIX
Kang Sun, Tong Shuai, Jinyong Chen, Xiurui Geng, Luyan Ji, Hairong Tang, Kang Jiang, Kai Yu and Yongchao Zhao

EMBEDDED HIGH PERFORMANCE COMPUTING FOR ON-BOARD HYPERSPECTRAL IMAGE CLASSIFICATION
Pankaj Randhe and Surya Durbha

10:00 coffee break (posters)

10:30 *Oral until 12:30*

Session wed-o-1 : Image Classification (3)

Session chairs :
Miguel Velez-Reyes, *University of Texas at El Paso, USA*
Alp Ertürk, *University of Kocaeli, Turkey*

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
Jiangtao 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 CLASSFICATION
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

12:30 lunch

13:30 *Oral until 15:30*

Session wed-o-2-a
Denoising, Representation and Sensing

Session chairs :
Mingyi He, *Northwestern Polytechnical University, China*
Paul Scheunders, *University of Antwerp, Belgium*

13:30 EXPLOITING THE LOW-RANK PROPERTY OF HYPERSPECTRAL IMAGERY: A TECHNICAL OVERVIEW
Hongyan Zhang, Wei He, Wenzhi Liao, Renbo Luo, Liangpei Zhang and Aleksandra Pi≈ærica

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 HYPERSPECTRAL IMAGING POLARIMETER
Jie Li, Chun Qi, Jingping Zhu, Wenzhi Liao and Wilfried Philips

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

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

Session wed-o-2-b
A Diversity of Applications

Session chairs :
Kati Laakso, *Helmholz Institute Freiberg for Resource Technology, Germany*
Chara Andreou, *German Aerospace Center, Germany*

LIMB-VIEWING HYPERSPECTRAL IMAGE SIMULATION BASED ON A POLYGONAL EARTH CROSS-SECTION (PEX) MODEL
Steven Richtsmeier, Alexander Singer-Berk and Robert Sundberg

USE OF LABORATORY HYPERSPECTRAL REFLECTANCE DATA OF SOILS FOR PREDICTING THEIR DIURNAL ALBEDO DYNAMICS ACCOMODATING THEIR ROUGHNESS
Jerzy Cierniewski, Jakub Ceglarek, Arnon Karnieli, Cezary Kazmierowski, Bogdan Zagajewski and Sławomir Królewicz

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

TOTAL CARBON MAPPING WITH HYPERSPECTRAL UNMIXING TECHNIQUES
Hilal Soydan, Alper Koz, H. Şebnem Düzgün and A. Aydin Alatan

SPECTRAL SENSITIVITY OF RADIATIVE TRANSFER INVERSION FOR SEASONAL CANOPY PIGMENTS ESTIMATION FROM AVIRIS DATA IN A WOODLAND SAVANNA ECOSYSTEM
Karine Adeline, Keely Roth, Margarita Huesca, Jean-Philippe Gastellu-Etchegorry, Dennis Baldocchi and Susan Ustin

15:30 coffee break (posters)

16:00 *Oral until 18:00*

Session wed-o-3-a
Unmixing (Regular) session

Session chairs :
Paul Gader, *University of Florida, USA*
Kuniaki Uto, *University of Tokyo, Japan*

16:00 SUPERPIXEL BASED UNMIXING FOR ENHANCED HYPERSPECTRAL DENOISING
Alp Ertürk

Session wed-o-3-b
Agricultural and Ecological Systems

Session chairs :
Ribana Roscher, *University of Bonn, Germany*
Ilkka Pölönen, *University of Jyväskylä, Finland*

VEGETATION WATER CONTENT ESTIMATION USING BI-INVERTED GAUSSIAN MODEL
Xuan Liu, Ye Zhang and Junping Zhang

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

7. 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 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 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.

PLENARY 3 (Wednesday, 24, August, 9:00)

HYPERSPECTRAL IMAGE RECONSTRUCTION

Stanley Osher, *UCLA, USA*

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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