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# The 17th William T. Pecora Memorial Remote Sensing Symposium

November 16 - 20, 2008 • Denver, Colorado

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# PECORA 17

*The Future of Land Imaging*

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*...Going Operational*



## *Preliminary Program*

### **Lead Sponsors**

U.S. Geological Survey (USGS)  
National Aeronautics and Space Administration (NASA)

### **Co-Sponsors**

Environmental Protection Agency (EPA)  
National Geospatial-Intelligence Agency (NGA)  
National Oceanic and Atmospheric Administration (NOAA)  
U.S. Department of Agriculture Foreign Agricultural Service (USDA)  
U.S. National Park Service

### **Co-Organizer**

American Society for Photogrammetry & Remote Sensing (ASPRS)



A Remarkable Satellite  
A Unique Legacy

# Landsat

Celebrating

25

Years

<http://landsat.usgs.gov>

There will be a celebration of the remarkable success of Landsat 5, the “workhorse” satellite for land observations, Wednesday November 19, 2008, as part of the Pecora 17 conference. The celebration, sponsored by Lockheed Martin, will take place in the Grand Ballroom II, Tower Building, Sheraton Hotel from 5:00 to 6:00 p.m.

*Landsat 5, launched on March 1, 1984, was designed to collect data for 3 years. Remarkably, on March 1 of this year it began its 25th year of data collections and has been recognized as an important foundation for the global earth observation industry.*



As Steering Committee Chair of the 17th William T. Pecora Memorial Remote Sensing Symposium, I am delighted to have this opportunity to invite you to Denver, Colorado, November 16-20, 2008 for this exciting technical program. During the symposium, with an eye toward the future, we will examine the full range of issues around the theme of "Future of Land Imaging...Going Operational." In 1966, through the vision and support

of Dr. Pecora, Secretary of the Interior Stewart Udall announced the beginning of "Project EROS" - Earth Resources Observation Satellites - a revolutionary program aimed at gathering facts about the natural resources of our planet from Earth-orbiting satellites carrying remote sensing instruments. That announcement stimulated a partnership between the National Aeronautics and Space Administration (NASA) and the Department of the Interior, U.S. Geological Survey (USGS) that resulted in the 1972 launch of the first Earth Resources Technology Satellite, eventually dubbed "Landsat". In recognition of that historic announcement, the Honorable Congressmen Mark Udall and Tom Udall have been invited to share their thoughts and insights for extending well into the future the original vision for an "operational Earth Resources Observation Satellite (EROS)" Program, as envisioned by Stewart Udall and others, over 40 years ago. Prior to the Congressmen's remarks we will have a special showing of *An Idea That Worked* - a Stewart Udall Commemorative Video produced by the USGS. In addition, we have invited both the Secretary of the Interior, Dirk Kempthorne and Director of the Office of Science and Technology Policy, Dr. John Marburger to join the Congressman as keynote speakers during our opening session.

Through the leadership and commitment of the USGS, NASA and all the Symposium sponsors, especially the Technical Program Committee Chairs - June Thormodsgard and Darrel Williams, we have compiled an outstanding program. The Symposium clearly continues the Pecora tradition of focusing on the applications of satellite and other remotely sensed data to study, monitor, and manage the Earth's land surface, as well as technologies to improve satellite data analyses, quality, access, and preservation. A special focus of Pecora 17 will be to examine the current and future pathways to transition remote sensing technology and information access from experimentation and exploration to operational monitoring of land surface change.

The Symposium also includes a Wednesday evening celebration recognizing 25 years of continuous observations of the Earth from Landsat 5. The combination of technical sessions, policy discussions, posters, workshops, and exhibits at Pecora 17 comprise a unique opportunity for you to share experiences, successes, and ideas. Please join us and your friends in Denver November 17-20, 2008 for this very special Symposium.

Thomas M. Holm  
Steering Committee Chair  
Pecora 17 Symposium

## Steering Committee Members

Tom Holm, Chair  
*U.S. Geological Survey/EROS*

June Thormodsgard, Technical Committee Co-Chairs  
*U.S. Geological Survey/EROS*

Darrel Williams, Technical Committee Co-Chairs  
*NASA/Goddard Space Flight Center*

Henry Bastian  
*DOI/OWFC*

Amy Budge  
*Earth Data Analysis Center, University of New Mexico*

Brad Doorn  
*U.S. Department of Agriculture/FAS*

Joanne Gabrynowicz  
*University of Mississippi, School of Law*

Ed Grigsby  
*NASA*

John Gross  
*National Park Service*

Larry Handley  
*U.S. Geological Survey/BRD*

Jim Irons  
*NASA/Goddard Space Flight Center*

John Lyon  
*U.S. Environmental Protection Agency*

Jim Merchant  
*University of Nebraska - Lincoln*

Carolyn Merry  
*Ohio State University*

Carol Mladinich  
*U.S. Geological Survey/ASPRS Rocky Mountain Region*

Rick Mueller  
*U.S. Department of Agriculture/NASS*

Bruce Quirk  
*U.S. Geological Survey/LRS*

Kristi Sayler  
*U.S. Geological Survey/EROS*

William Stoney  
*Mitretek*

Mike Story  
*National Park Service*

Kay Weston  
*NOAA*

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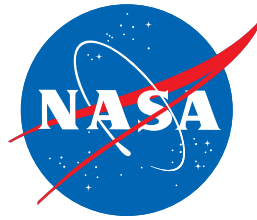
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## The Landsat 5 Legacy

On March 1, 1984, Landsat 5 headed into space with an expected lifespan of three years. No one could have foreseen that this fifth satellite in the Earth-observing Landsat Program would far exceed that expectation. In 2009, the still-operational Landsat 5 celebrates its 25th anniversary in orbit. For a quarter of a century, it has steadfastly captured images of Earth's changing surface as illustrated in the timeline. To date, Landsat 5 has taken more than 600,000 images of Earth's continents and coastal regions. These unique pictures of the planet form a global visual archive, an irreplaceable reference for monitoring Earth's well-being.



# Conference-at-a-Glance

	6 am	7 am	8 am	9 am	10 am	11 am	Noon	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm
<i>Saturday, November 15<sup>th</sup></i>														
ASPRS Executive Committee Meeting														
<i>Sunday, November 16<sup>th</sup></i>														
Registration														
ASPRS Committee Meetings														
Workshops														
<i>Monday, November 17<sup>th</sup></i>														
Registration														
ASPRS Board Meeting														
Workshops														
Classified Session — Raytheon Intelligence and Information Systems														
ASPRS RMR Social														
<i>Tuesday, November 18<sup>th</sup></i>														
Registration														
Opening/General Session I														
Exhibit Hall														
Poster Sessions														
Technical Sessions														
General Session II/Pecora Award Presentation														
Exhibitors' Reception														
<i>Wednesday, November 19<sup>th</sup></i>														
Registration														
General Session III														
Exhibit Hall														
Poster Sessions														
Technical Sessions														
General Session IV														
Landsat 5 Celebration/Reception														
<i>Thursday, November 20<sup>th</sup></i>														
Registration														
Technical Sessions														
Poster Sessions														
Closing/General Session V														
UAV/UAS Programs and Applications														
<i>Friday, November 21<sup>st</sup></i>														
UAV/UAS Programs and Applications														

# Workshops — Sunday, November 16

## Workshop 1

### Hyperspectral Imagery Processing and Feature Extraction: Maximizing Geospatial Information Retrieval

William Farrand, *Space Science Institute*

Stuart Blundell, *Visual Learning Systems, Inc.*

Sunday, November 16, 1:00 pm to 5:00 pm, CEU .4

Registration Fee: \$165 Member, \$265 Non-Member

**INTERMEDIATE Workshop:** Intended for users of remote sensing data including analysts who may have used multispectral data and GIS systems and are now interested in using hyperspectral data and feature extraction in their work. Also appropriate for managers who must make decisions about what kind of remote sensing data to purchase for their projects and/or what kind of image processing or feature extraction software they should purchase.

Imaging spectrometry, commonly referred to as hyperspectral remote sensing, provides high-resolution spectral information for environmental, natural resources, and urban characterization projects. Hyperspectral image processing approaches can also be applied to broadband multispectral imagery and results from these analyses can be used to enhance automated feature extraction techniques. In this workshop, we will provide students with an introduction to the phenomenology of imaging spectrometry, hyperspectral image processing techniques, and feature extraction approaches to demonstrate how to add value to the maintenance of geospatial databases. We will emphasize that the added value in imaging spectrometry is on the spectrometry, the ability to identify materials based on their reflectance signatures. We will briefly discuss the phenomenology of reflectance spectrometry and explain why some materials are more amenable to mapping than others. We will describe commercially available processing systems that are available for processing hyperspectral and multispectral data and discuss the processing techniques within those packages. Certain processing techniques are better suited to certain applications. We will explain why this is so.

Hyperspectral imagery provides users with discrete spectral, and consequently compositional, information about Earth surface materials. The ability to integrate other types of geologic, geochemical, biologic, or hydrologic data with information from hyperspectral data improves the interpretation and mapping process. The student will be introduced to the concepts of developing feature extraction models for assisted and automated feature extraction approaches using hyperspectral, lidar, DEMs and multispectral data within a GIS. We will provide real-world examples of how end products, derived from hyperspectral and multispectral data processing, including resultant mineral and vegetation species maps, can be extracted using the Feature Analyst software.

We will provide a package of materials to the students that will include hard copies of the material presented and an extensive list of references on the topics addressed.

Topics to be addressed

- I. Define Imaging Spectrometry (Hyperspectral Remote Sensing)
- II. The Phenomenology of Reflectance Spectrometry
- III. Object Recognition and Feature Extraction using Spatial and Spectral Attributes
- IV. Commercially Available Hyperspectral Imaging (Hsi) Software Packages
- V. Processing Techniques for Applications of HSI and MSI (Demonstration)
- VI. Feature Extraction Strategies using HSI, LIDAR and MSI Datasets
- VII. Summary and Final Discussion

## Workshop 2

### Image Interpretation

Charles Olson, Professor Emeritus, *University of Michigan*

Sunday, November 16, 1:00 pm to 5:00 pm, CEU .4

Registration Fee: \$165 Member, \$265 Non-Member

**INTRODUCTORY Workshop:** Anyone desiring to extract information from remotely sensed data, especially in those situations when automated methods cannot get the job done with sufficient accuracy.

Human interpreters routinely map land cover with accuracy above 90 percent. In this workshop we will explore how they do it.

- I. The Interpretation Process – Integrating Multiple Inputs
- II. Elements of Image Interpretation
  - A. Shape
  - B. Size
  - C. Tone (the only element successfully automated)
  - D. Shadow
  - E. Pattern
  - F. Texture
  - G. Site
  - H. Association
  - I. Resolution
- III. Interpretation of “Unknown” Features

## Maximize Your Recognition Achievement Advancement



**JOIN ASPRS TODAY!**

### Benefits of ASPRS Membership

The benefits of membership in the American Society for Photogrammetry and Remote Sensing far exceed the initial investment.

**Some of the member benefits and services include:**

- Monthly issue of *Photogrammetric Engineering & Remote Sensing (PE&RS)*
- Discounts on all ASPRS publications
- Discounts on registration fees for ASPRS Annual and Specialty Conferences
- Discounts on ASPRS Workshops
- Receipt of Region Newsletter
- Region specialty conferences, workshops, technical tours and social events
- Opportunity to participate in ISPRS activities
- Eligibility for over \$40,000 in awards, scholarships and fellowships
- Opportunity to Access the ASPRS Membership Directory on the internet (search for other active individual members, sustaining members, and certified professionals)
- and many more!

## Workshop 3

### Advanced Classification

Ranga Raju Vatsavai, *Oak Ridge National Laboratory*  
Sunday, November 16, 1:00 pm to 5:00 pm, CEU .4  
Registration Fee: \$165 Member, \$265 Non-Member

ADVANCED Workshop: Though basic principles will be covered, we assume the attendees are familiar with basic classification schemes (e.g., techniques offered in commercial systems such as ERDAS Imagine or PCI Geomatica).

The primary objective of this workshop is to bring recent advances in classification technology to the remote sensing analyst. Through this workshop we would like to disseminate the basic principles behind these new classification and machine learning schemes, and give the participants a firsthand practical experience through open source research prototype systems.

Participants are encouraged to bring a lap-top computer for hands-on training of the software.

The following topic will be covered in depth along with hands on practice using open source machine learning tools.

- I. **Statistical Framework:** Introduce basic concepts, such as, maximum likelihood parameter estimation, Bayesian classification framework, Gaussian Mixture Models, Expectation Maximization, Covariance structure and robust estimation techniques.
- II. **Semi-supervised Learning:** Statistical classification algorithms, such as, MLC and MAP requires a large number of training samples for accurate estimation of model (e.g., Gaussian) parameters. Recently, semi-supervised learning techniques that utilize large unlabeled training samples in conjunction with small labeled training data are becoming popular in machine learning and data mining. Introduce basic semi-supervised learning framework for the classification of remote sensing imagery.
- III. **Sub-class Classification:** Increased spectral resolution offers the remote sensing analyst the ability to carryout species level classification, however it also requires additional training efforts. Introduce a new sub-class classification scheme that is capable of automatically identifying finer (sub-) classes from aggregate classes, thus reduces the need for large amounts of additional training data.
- IV. **Spatial Classification:** Increasing spatial resolution invalidates the basic assumption that the training samples are independent and identically distributed. Introduce a spatial semisupervised learning scheme and also allude the participants to the basic differences with respect to the conventional per-pixel based classification schemes.
- V. **Multiple Classifier Systems:** Introduce basic premise behind multiple classifier systems and discuss various classification fusion schemes.

Workshop registration fees are NOT included in the full Conference registration fee. Workshops require separate registration and payment for each workshop. Please see the registration form on page 29. Availability is based on space.

ASPRS reserves the right to cancel any workshop if the minimum number of registrations is not received by October 17, 2008. Popular workshops sell out early, so register early to ensure your place in a selected workshop. Workshops are limited to a maximum of 40 attendees.

# Workshops — Monday, November 17

## Workshop 4

### Emerging Technologies in Photogrammetry and Remote Sensing

Mike Renslow, *Renslow Mapping Services*  
Claire Kiedrowski, *KAPPA Mapping, Inc.*  
Monday, November 17, 8:00 am to 5:00 pm, CEU .8  
Registration Fee: \$215 Member, \$315 Non-Member

INTERMEDIATE Workshop: This workshop provides an overview of emerging technologies and their impact on photogrammetry and remote sensing methodologies. The advance towards full digital mapping from start to finish, and the capacity to capture very large amounts of data supported by rapid processing and software will alter the way maps and imagery are produced in the near future. At the same time, active sensors, hand-held data collection devices, and feature extraction are changing fundamental mapping procedures and the way data are supplied to GIS.

Participants will receive an overview of the systems, technologies, and impacts on mapping in the next two to three years, as well as, the institutional issues involved in implementation.

Workshop topics include:

- I. Metric Digital Sensors (Large and Medium Format)
- II. Direct Georeferencing (INS, GPS, IMU)
- III. Impact of New Technologies on Photogrammetry ('Heavy' Stereo Coverage, Nearly No Ground Control, True Orthos, Institutional Issues, Software)
- IV. Automatic Feature Extraction (Linear Features and Buildings)
- V. Active Sensors (Lidar, Radar, Data Processing and Software, and Future Systems)
- VI. Satellite-borne Sensors
- VII. Mobile Mapping (Hand-held Technologies, Auto-GIS Update)
- VIII. Supporting Technologies (Communications, Standards, GPS, Computing Speeds, UAVs)
- IX. Adoption of the NCEES Model Law for Licensure of Photogrammetrists

#### Continuing Education Units (CEUs)

ASPRS, in conjunction with the University of Maryland, College Park, is pleased to offer Pecora 17 workshop attendees the opportunity to earn Continuing Education Credits (CEUs). All attendees are eligible for CEUs if they attend any of the workshops, register on site for CEUs, and pay the processing fee of \$25. For each workshop attended, one CEU for every 10 hours of eligible sessions attended is awarded to CEU registrants. (Full day workshops are eight (8) hours and receive 0.8 CEUs. Half day workshops are four (4) hours and receive 0.4 CEUs). Forms and payment are accepted on site only at the Conference Registration Desk.

CEU participants will receive a certificate of completion awarded by the University of Maryland, College Park, approximately one month after the conference. If certificate is not received within 60 days after the conference, contact ASPRS.

Please note: CEUs are awarded to workshop attendees only. Technical sessions, general sessions, poster sessions, or any other scheduled special event at this conference are not eligible for CEUs.

# Workshops — Monday, November 17

## Workshop 5

### Grid-Based Map Analysis and GIS Modeling

Joseph K. Berry, *University of Denver and Berry & Associates*

Monday, November 17, 8:00 am to 5:00 pm, CEU .8

Registration Fee: \$215 Member, \$315 Non-Member

**INTERMEDIATE Workshop:** This workshop provides experience with the concepts, underlying theory, data considerations, procedures, and practical considerations in applying advanced grid-based map analysis techniques. It investigates spatial analysis and spatial data mining approaches using numerous hands-on examples of analytical techniques and applications from natural resources management, environmental assessment, precision agriculture and geo-business. Specific topics include the Nature of Grid-based Data (discrete spatial objects vs. continuous map surfaces), Spatial Analysis Operations (operators for assessing “geographical context” within and among map layers; Reclassify, Overlay, Distance and Neighbors), Spatial Statistics Operations (operators for assessing “numerical context” within and among map layers; Surface Modeling and Spatial Data Mining) and Future Directions (alternative data structures; GeoExploration vs. GeoScience). The workshop follows the organization of the instructor’s chapter on “GIS Modeling and Analysis” in the forthcoming *ASPRS Manual of Geographic Information Systems*. Each participant receives a CD with lecture materials, related readings and software/exercises for hands-on experience as homework. Attendees should be comfortable with the basic concepts in GIS and math/stat procedures and have an interest in map analysis/modeling.

The first portion of the workshop focuses on the Nature of Grid-based Data and Spatial Analysis Operations (5 hours). Discussion first establishes the difference between analytical potential of maps composed of discrete spatial objects (points, lines, and polygons; mapping and geo-query) and those organized as continuous map surfaces (spatial analysis and statistics). Discussion of Spatial Analysis operators for assessing geographical context within and among map layers include underlying theory, data considerations and advanced applications for such grid-based techniques as shape/pattern indices, effective distance, optimal path/corridor connectivity, visual exposure, and roving windows.

The second portion of the workshop focuses on Spatial Statistics Operations and Future Directions (3 hours). Discussion of Spatial Statistics operators for assessing numerical context within and among map layers include underlying theory, data considerations and advanced applications for such grid-based techniques as density analysis, spatial interpolation, residual analysis of interpolation performance, map generalization, linking data space and geographic space, level slicing, map similarity, spatial clustering and predictive modeling. Discussion of Future Directions investigates alternative data structure implications, as well as the interaction and impact of GeoExploration and GeoScience paradigms guiding geotechnology.

Specific topics and hands-on examples include:

- I. Maps as Data, Not Pictures (Ex#1– Grid-based Map Analysis Framework)
- II. A Map-ematical Approach (Ex#2– Structuring a Simple GIS Model)
- III. Analytical Operations for Reclassifying and Overlaying Maps (Ex#3–R&O Techniques)
- IV. Analytical Operations for Measuring Distance and Connectivity (Ex#4– D&C Techniques)
- V. Analytical Operations for Characterizing Neighborhoods (Ex#5– Neighborhood Techniques)
- VI. Model Development and Execution (Ex#6– Suitability Modeling)
- VII. Surface Modeling (Ex#7– Spatial Interpolation)
- VIII. Establishing Spatial Patterns and Relationships (Ex#8– Spatial Data Mining)
- IX. Future Directions in Geotechnology (GIS, GPS, RS, other)

## Workshop 6

### Preparing For ASPRS Certification

Robert Burtch, *Ferris State University*

Rakesh Malhotra, *North Carolina Central University*

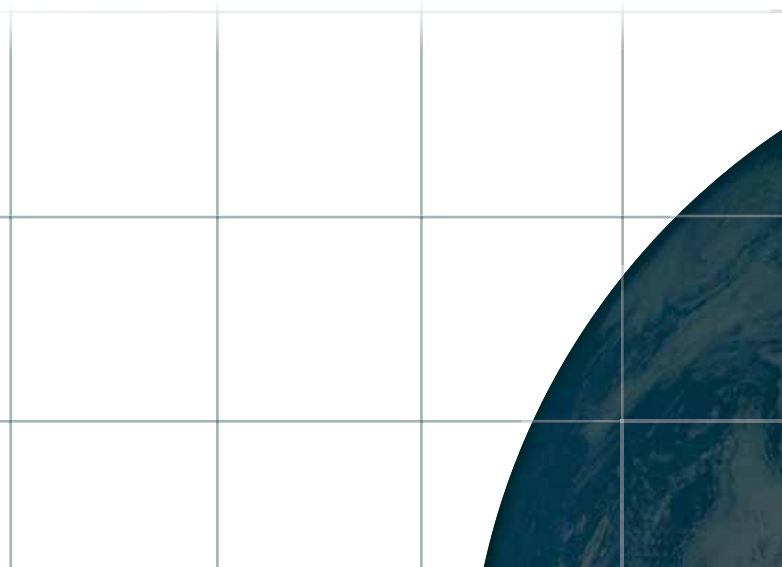
Monday, November 17, 8:00 am to 5:00 pm, CEU .8

Registration Fee: \$215 Member, \$315 Non-Member

**INTERMEDIATE Workshop:** Assumes participants have subject knowledge and are serious about taking the Certification Exam.

The purpose of this workshop is to prepare individuals who are planning to sit for the ASPRS Certification exams as a Certified Photogrammetrist or Certified Mapping Scientist in either Remote Sensing or GIS. The workshop will begin by explaining the purpose and form of the exam. It will then identify key topical areas that an applicant should be aware of prior to taking the exam. Topics will start with a review of the basic concepts and sample questions to show how they will be tested in the exam. Finally, the workshop will try to identify resources in which exam takers should be aware and from which to study in their preparation for the examination.

- I. Purpose of the Exam
  - A. Role of the exam in the certification process
  - B. Format of the exam
  - C. Topical areas covered on each of the three different exams
- II. Geodesy/Surveying
  - A. Principles of State Plane Coordinates
  - B. Surveying Technologies
  - C. Resources for further study
- III. Photogrammetry
  - A. Important principles
  - B. Review questions
  - C. Resources for further study
- IV. Remote Sensing
  - A. Important principles
  - B. Review questions
  - C. Resources for further study
- V. Geographic Information Systems
  - A. Important principles
  - B. Review questions
  - C. Resources for further study
- VI. Other topical areas of importance in preparation for the exam



## Workshop 7

### Professional Airborne Digital Mapping Systems — An Overview

Dave Fuhr, *Airborne Data Systems*

Brian Huberty, *U.S. Fish & Wildlife Service*

Monday, November 17, 8:00 am to 5:00 pm, CEU .8

Registration Fee: \$215 Member, \$315 Non-Member

#### INTRODUCTORY Workshop

The primary objective of this tutorial is to review professional airborne digital mapping camera systems. We will discuss all advantages and disadvantages of these new, dynamic systems - technical, costs, feasibility, calibration and applications. Participants will leave with a better understanding of what it takes to map their projects by either contracting or acquiring airborne digital mapping camera systems.

- I. Introduction
- II. Geospatial Information - What and Where is the Information You Need?
  - A. Physical resolution
  - B. Spectral resolution
  - C. Positional accuracy
- III. History
- IV. Mapping and Multi-spectral Airborne Cameras
- V. Platforms UAV to U2
- VI. Camera Basics
  - A. Array sensors-CCD,CMOS
  - B. Linear/pushbroom sensors
  - C. Scanning mirror
  - D. Lenses
  - E. Filters/bandwidth
  - F. Electronic shutters
- VII. Camera Systems Design
  - A. Processing and storage systems
  - B. Aircraft power supply
  - C. Navigation GPS/IMU
  - D. Real-time data links
- VIII. Applications
- IX. References
- X. Future

## ASPRS Division, Committee and Board of Directors Meetings

### Saturday, November 15

8:00 am to 5:00 pm

**Executive Committee**

### Sunday, November 16

9:00 am to 10:00 am

**Division Directors  
Committee Chairs**

10:00 am to 11:00 am

**Electronic Communications Committee**

10:00 am to 12 noon

**Geographic Information Systems Division**

11:00 am to 12 noon

**Sustaining Members Council  
Journal Policy and Publication Committees  
Data Preservation and Archiving Committee**

1:00 pm to 3:00 pm

**Photogrammetric Applications Division Lidar  
Subcommittee  
Convention Policy and Planning Committee  
Professional Practices Division**

3:00 pm to 5:00 pm

**Education and Professional Development Committee  
Primary Data Acquisition Division  
Remote Sensing Applications Division  
Student Advisory Council**

5:00 pm to 6:00 pm

**By-Laws Committee  
Division Directors**

### Monday, November 17

8:00 am to 5:00 pm

**Board of Directors**



November 16-20, 2008 - Denver, Colorado

# Monday, November 17

## Classified Session

8:00 am to 4:30 pm

### Classified Level

This session is offered at the TS/SCI level.

Attendees must be U.S. citizens and have a TS/SCI clearance.

The program is jointly organized by the National Geospatial-Intelligence Agency (NGA) and the U.S. Geological Survey (USGS)/ Civil Applications Committee.

The NGA portion of the session will focus on Feature-based Registration. Topics will include a review and overview of the Registration Problem and Critical Needs, 3D Voxcel Registration, Photogrammetric Registration issues, and data specific Registration issues.

The USGS portion of the session will cover general topical areas such as climate change, environmental monitoring, Advanced Education Opportunity and Unmanned Aircraft Systems (UAS).

### Registration Fee: \$70.00

This fee is in addition to the Conference Registration fee for those interested in also attending the Pecora 17 Symposium. Classified Session Speakers must register for this session and pay the \$70 registration fee. Registration instructions are listed below.

### Transportation

Bus transportation for attendees will begin loading from the Sheraton Hotel main entrance at 6:45 am and depart promptly at 7:00 am for the Raytheon facility. Only attendees who have submitted clearances to Raytheon Company Security Office and the session POC will be allowed on board. Passengers also must have a photo ID to enter Raytheon.

### Registration

Participants will be charged \$70 to attend the Classified Symposium. The registration fee includes transportation between the Sheraton Hotel and Raytheon, a continental breakfast, lunch, and morning and afternoon beverage breaks. Lunch will be served at 12:15 pm. Please send the completed registration form in this program or on-line at [www.asprs.org/Pecora17](http://www.asprs.org/Pecora17) and appropriate payment to the address on the form no later than **November 10, 2008**.

### Important Deadlines

All attendees and speakers must be pre-registered with ASPRS by October 17, 2008. In addition, attendees and speakers must have their security office submit certification of their SCI access by November 10, 2008. Please send certifications to Judi Sparling of the Raytheon Program Security Office, using one of the following methods:

#### Facsimile

303-739-3750 (S)

303-344-3118 (U)

#### Email

[JSparlin@general.rscdn.npa.gov](mailto:JSparlin@general.rscdn.npa.gov) (S)

[JMSparling@raytheon.com](mailto:JMSparling@raytheon.com) (U)

Information must include the Event: Pecora 17 Symposium Classified Session POC: Judi Sparling 303-344-6182.

Contact Judi Sparling at 303-344-6182 (U) or 837-6007 (S) if additional assistance is required.

**REGISTRATIONS CAN NOT BE ACCEPTED AFTER November 10, 2008.**

## ASPRS RMR Social

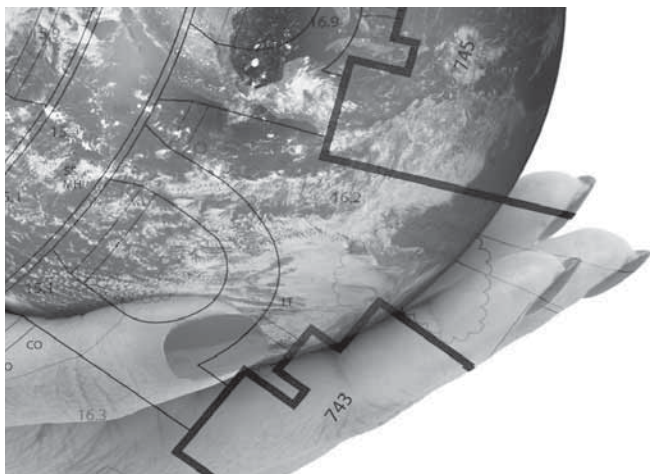
5.30pm - 8.30pm

Wynkoop Brewery

1634 18th Street, Denver

Mercantile Room

PECORA17 attendees and their guests are invited to join the Rocky Mountain Region (RMR) of ASPRS for their annual scholarship announcement party during the regular gathering of the Rocky ROGUES. The Wynkoop Brewing Company, Colorado's oldest brew pub is housed in the glorious J. S. Brown Mercantile Building. This social is a great introduction to the spirit of Denver and an ideal opportunity to meet with the Geospatial community in Colorado- the ROGUES have specifically planned this gathering to coincide with PECORA17.



# Vr Mapping

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Cardinal Systems

# Opening Session — Tuesday, November 18

## Opening/General Session 1

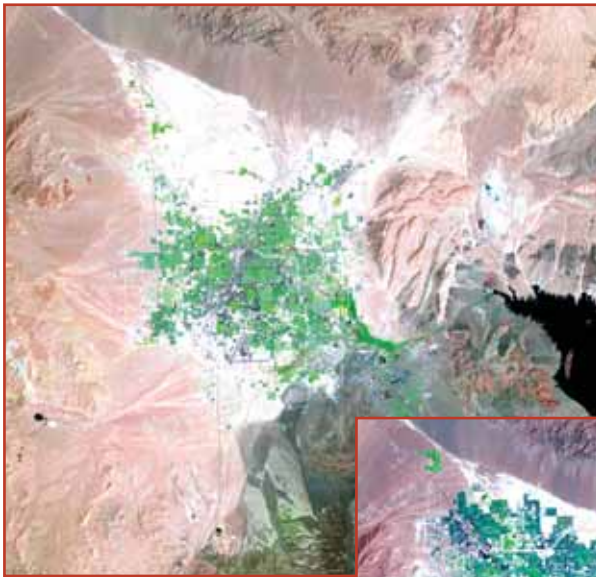
8:30 am to 10:00 am

### From a Vision in the '60s to an Operational Program in the 21st Century

Keynote: Congressman Mark Udall (invited) and Congressman Tom Udall (invited)  
John Marburger (invited), *Director, Office of Science and Technology Policy (OSTP)*  
Dirk Kempthorne (invited), *Secretary of the Interior*

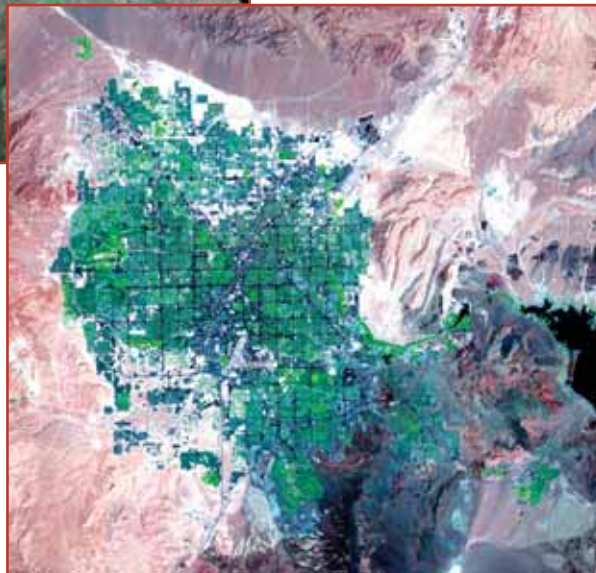
In 1966, through the vision and support of Dr. William T. Pecora (former Director of the U.S. Geological Survey), Secretary of the Interior Stewart Udall announced the beginning of "Project EROS" - Earth Resources Observation Satellites - a revolutionary program aimed at gathering facts about the natural resources of our planet from Earth-orbiting satellites carrying remote sensing instruments. That announcement stimulated a partnership between the National Aeronautics and Space Administration (NASA) and the Department of the Interior, U.S. Geological Survey (USGS) that resulted in the 1972 launch of the first Earth Resources Technology Satellite, eventually dubbed "Landsat". To commemorate this historic event, USGS produced a video about Secretary Udall's vision. The Opening Session will feature a special viewing of this video, *An Idea That Worked*. The Honorable Congressman Mark Udall (invited) and Congressman Tom Udall (invited) will share their thoughts and insights for extending the original vision for an "operational Earth Resources Observation Satellite (EROS)" Program another 40 Years.

In August 2007, after more than three decades of "experimental" land imaging, the White House issued a report for the long-term continuity of operational land imaging in the United States. This report calls for the establishment of a National Land Imaging Program (NLIP). NLIP, established at the Department of the Interior, will provide focused leadership and management for the nation's land imaging efforts. Dr. John Marburger (invited), Director, Office of Science and Technology Policy (OSTP) will provide comments on the Future of Land Imaging – Beyond LDCM, and Dirk Kempthorne (invited), Secretary of the Interior, will highlight plans for the NLIP implementation within the Department



Las Vegas, Nevada. Path 39, row 35. Taken August 3, 1984 and July 18, 2007.

These images from 1984 and 2007 show the increasing urban sprawl of Las Vegas, Nevada.



### Exhibit Hall Opens

10:00 am to 7:00 pm

### Poster Session

10:00 am to 7:00 pm

## Technical Sessions

10:30 am to 12:00 pm

-1-

### Remote Sensing Applications to Wildland Fire

Moderator: Henry Bastian, *DOI*

### Forecasting Distribution of Large Federal-land Fires Utilizing Satellite and Gridded Weather Information

Jeff Eidenshink, *U.S. Geological Survey*

Robert Klaver, Haiganoush Preisler, and Robert Burgan

### Environmental Monitoring of Wildland Fires using Historical Landsat Time Series

Kari Pabst, *Arctic Slope Regional Corporation Research and Technology Solutions (ASRC)*

Stephen Howard and Jeffery Eidenshink

### Evaluating the use of SRTM data in LANDFIRE Existing Vegetation Height Mapping

Kurtis Nelson, *U.S. Geological Survey*

Birgit Peterson, Josef Kelldorfer, and Wayne Walker

### Updating LANDFIRE Data in the Southeastern United States using Landsat Time Series Data

Birgit Peterson, *U.S. Forest Service*

Kurtis Nelson

# Technical Program — Tuesday, November 18

-2-

## Monitoring and Modeling Land Use/ Land Cover Change

Moderator: Rick Mueller, *U.S. Department of Agriculture/NASS*

## Assessing Moderate Resolution Remote Sensing for Characterizing Sagebrush Structure

Teal Wyckoff, *Wyoming GIS*

Steven Prager and Kenneth Driese

## Developing Multi-Scale Remote Sensing Sagebrush Steppe Quantification and Monitoring Methods in Wyoming

Collin Homer, *U.S. Geological Survey*

Cameron Aldridge and Debra Meyer

## A Remote Sensing and GIS Method for Detecting Land Surface Areas Covered by Copper Mill Tailings

Russell Schimmer, *University Connecticut*

## Regional Variability of Land Cover Change in the Great Plains

Kristi Sayler, *U.S. Geological Survey*

Mark Drummond

## Monitoring and Modeling Urban Land use Change in Alexandria, Egypt using Satellite Images and SLEUTH Cellular Automata Model

Lotfy Azaz, Geography Department, *College of Arts and Social Sciences, Sultan Qaboos University, Oman*

Oman Alkhouid

-3-

## Landsat Data Continuity Mission - Status and Plans

Moderator: Bill Ochs, *NASA*

## The Road to Launching the Landsat Data Continuity Mission

James R. Irons, *NASA Goddard Space Flight Center*

William R. Ochs and Del T. Jenstrom,

## LDCM Space Segment Overview

Jeanine Murphy-Morris, *NASA Goddard Space Flight Center*

William Anselm

## Landsat Data Continuity Mission Calibration and Validation

Brian Markham, *NASA Goddard Space Flight Center*

James Storey and Ron Morfitt

## Operating the Landsat Data Continuity Mission: Data Collection, Archiving, and Distribution

Tom Loveland, *U.S. Geological Survey*

## Generation of Standard Products from LDCM OLI Data

John Dwyer, *U.S. Geological Survey*

Tom Loveland

-4-

## National Security Applications

Moderator: Ned Mamula, *U.S. Geological Survey*

## Established use of Classified Remote Sensing Capabilities by the Civil, Homeland Security and Law Enforcement Communities

Martin Eckes, *U.S. Geological Survey*

Ned Mamula

## Addressing Gaps in National Security Using Geoscience Intelligence

Ned Mamula, *U.S. Geological Survey*

## Fusion of KH-Series Declassified Satellite Imagery and Landsat MSS Data in Support of Urban Land Cover Classification

Daniel Civco, *University Connecticut*

Anna Chabaeva, Jason Parent, Manfred Ehlers, and Schlomo Angel

## Thermal-based Remote Sensing Models for Prediction of Thermal and Dielectric Soil Properties from Landsat Imagery

Jan Hendrickx, *New Mexico Tech*

Sung-ho Hong, Brian Borchers, Bruce Harrison, and Thomas Ruzyski

-5-

## Global Mapping from Space

Moderator: Sam Goward, *University Maryland*

## Global Land Surveys 1975-2010

Jeffrey Masek, *NASA Goddard Space Flight Center*

Rachel Headley, Garik Gutman, and Raymond Byrnes

## Global Irrigated Area Map (GIAM) and Global Map of Rainfed Cropland Areas (GMRCA) at the end of last Millennium using Time-series Remote Sensing

Prasad Thenkabail, *International Water Management Institute, Sri Lanka*

C.M. Biradar, P. Noojipady, V. Dheeravath, M. Gumma, Y.J. Li, M. Velpuri, G.P.O. Reddy, X.L. Cai, and H. Turrall

## Operational Assessment of Global Crop Status and Market Opportunities with Remotely Sensed Data

Dmitry Varlyguin, *GDA Corporation*

Stephanie Hulina, Luke Roth, Julian Winter, Curt Reynolds, and Brad Doorn

## The CEOS Land Surface Imaging Constellation contribution to GEO/GEOSS

Kevin Gallo, *NOAA/NESDIS*

G. Bryan Bailey

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## Data Exploitation

Moderator: Greg Stensaas, *U.S. Geological Survey*

## Large Area Scene Selection Interface (LASSI). The methodology used to Select Scenes for the Global Land Survey 2005

Shannon Franks, *University Maryland, College Park*

Rachel Headley

## Is 80% Accuracy Good Enough?

Charles Olson, *Michigan Tech Research Institute*

## i3Miner: An Automated Framework for Thematic Information Extraction From Large Collection of Remotely Sensed Images

Ranga Raju Vatsavai, *Oak Ridge National Labs*

Shashi Shekhar and Budhendra Bhaduri

# General Session II

1:30 pm to 3:00 pm

## Insights and Visions of Land Imaging as Seen Through the Eyes of Past Pecora Award Recipients

Al Watkins, SAIC, formerly U.S. Geological Survey

Vince Salomonson, NASA

Compton (Jim) Tucker, NASA

Stanley A. Morain, University of New Mexico

The first Pecora Award was presented in 1974, two years after William Pecora's untimely death at age 59, just a few days before the launch of ERTS-1, and the birth of what we now know as the Landsat era of Earth observation. The first two recipients of the Pecora Award were from the USGS (William A. Fischer) and NASA (William Nordberg). Both men played key roles in the early years of the Landsat program and were instrumental in bringing national and international recognition to the program. The vast majority of subsequent Pecora Award recipients have had strong ties to the Landsat program. As we celebrate the upcoming 25th anniversary of Landsat 5, as well as the official decision to "go operational" more than four decades after Secretary Udall and Pecora announced Project EROS, we have invited several past Pecora Award recipients to share their thoughts on the past, present, and future of Earth observations. We will hear from Al Watkins, SAIC, formerly USGS (Pecora Award 1986); Vince Salomonson, NASA (Pecora Award 1987); Compton (Jim) Tucker, NASA (Pecora Award 1997); and Stanley A. Morain, University of New Mexico (Pecora Award 2007). The 2008 Pecora Award will be presented at the end of this session.

## 2008 Pecora Award Presentation

The William T. Pecora Award is presented annually to individuals or groups that make outstanding contributions toward understanding the Earth by means of remote sensing. The award is sponsored jointly by the Department of the Interior (DOI) and the National Aeronautics and Space Administration (NASA).

## Previous Recipients

1974	William A. Fischer, USGS (deceased)	1992	Shelby G. Tilford, NASA
1975	William Nordberg, NASA (deceased) Carlos Brockmann, Landsat-Bolivia Project	1993	J. Robert Porter, Earth Satellite Corporation
1976	Environmental Research Inst. of Michigan and Laboratory for Applications of Remote Sensing of Purdue University (Group Awards)	1995	Philip N. Slater, University of Arizona
1977	Robert N. Colwell, University of California, Berkeley (deceased) Michel T. Halbouty, The Halbouty Center (deceased)	1996	Crofton B. Farmer, Jet Propulsion Laboratory M. Patrick McCormick, Hampton University
1978	David S. Johnson, National Environmental Satellite Service, Department of Commerce	1997	Compton J. Tucker, NASA
1979	John M. DeNoyer, USGS Virginia T. Norwood, Hughes Aircraft Co.	1998	John R. Apel, Global Ocean Associates (deceased) TOPEX/Poseidon Team (Group Award)
1980	Verner E. Suomi, University of Wisconsin (deceased)	1999	John E. Estes, University of California, Santa Barbara (deceased)
1981	Leonard Jaffe, NASA James R. Anderson, USGS (posthumously)	2000	Fawwaz T. Ulaby, University of Michigan SeaWiFS Project Team (Group Award)
1982	Alexander F.H. Goetz, NASA Lawrence C. Rowan, USGS	2001	Ronald J.P. Lyon, Stanford University Landsat 7 Satellite Team (Group Award)
1983	Floyd F. Sabins, Jr., Chevron Oil Field Research Co.	2002	Ichtiague Rasool, NASA/International Geosphere-Biosphere Program Upper Atmosphere Research Satellite (UARS) Team (Group Award)
1984	Archibald B. Park, Globex, Inc.	2003	Thomas J. Jackson, U.S. Department of Agriculture
1985	Charles Elachi, NASA	2004	William Krabill, NASA Staff of the USGS EROS Data Center (Group Award)
1986	Allen H. Watkins, USGS	2005	Jeff Dozier, University of California, Santa Barbara John R. G. Townshend, University of Maryland
1987	Francis P. Bretherton, National Center for Atmospheric Research Vincent V. Salomonson, NASA	2006	John R. Jensen, University of South Carolina Total Ozone Mapping Spectrometer (TOMS) Team (Group Award)
1988	William J. Campbell, USGS (deceased)	2007	Stanley A. Morain, University of New Mexico The GRACE Team (Group Award)
1989	Moustafa T. Chahine, NASA		
1990	David A. Landgrebe, Purdue University		
1991	David S. Simonett, University of California, Santa Barbara (posthumously)		

November 16-20, 2008 - Denver, Colorado

# Technical Program — Tuesday, November 18

## Technical Sessions

3:30 pm to 5:00 pm

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### Remote Sensing Applications to Forestry

Moderator: Jeff Masek, NASA

### Monitoring Gradual Change in Forest Condition in the Western United States using Landsat Time-Series Data

James Vogelmann, ASRC Research and Technology Solutions

Brian Tolk and Zhiliang Zhu

### Change Detection in Noisy Time-series Data: A Technique for Near Real-time Forest Disturbance Monitoring at Regional Scales

Eric Nielsen, U.S. Forest Service Remote Sensing Applications Center

Everett Hinkley and Jim Ellenwood

### Development of Vegetation Indices from Landsat Data and their Relationship to Field Based Measurements on the Cumberland Plateau

Dawn Lemke, Canterbury University, New Zealand, and Alabama A&M University

Wubishet Tadesse

### Contrasting Protected Areas with Surrounding Areas in the Western United States: Ecosystem Attributes, Conditions, and Disturbances

Hua Shi, ASRC Research and Technology Solutions, U.S. Geological Survey

Zhiliang Zhu, James Vogelmann, Jeffery C. Eidenshink, Stephen Howard, Chengquan Huang

## Career Opportunities/ New Staffing

Anyone seeking career opportunities or new staffing of specialists in various fields is invited to take advantage of the Career Development Area provided by ASPRS in the Exhibit area. Resumes and staff openings may be posted on the appropriate boards. Please bring multiple copies of all postings. There is no charge for this service and it is available to all conference registrants.

### Irrigated Lands

Moderator: Gabriel Senay, ASRC Research and Technology Solutions

### Evaluation of Remote Sensing-based Irrigated Area Map for the Conterminous United States

Shahriar Pervez, Stinger-Ghaffarian Technologies, Inc. (SGT)

Jesslyn Brown and Susan Maxwell

### Cost Comparison For Monitoring Irrigation Water use

Anthony Morse, Idaho Department of Water Resources

### Wetland and Coastal Land Cover Modeling in the Northern Gulf of Mexico - Louisiana and Mississippi

Joyce Fry, Stinger-Ghaffarian Technologies, Inc. (SGT)

Collin Homer

### Resolution of Imagery and Irrigated Areas

Manohar Velpuri, International Water Management Institute, Sri Lanka

P.S. Thenkabail, M. Gumma, C. Biradar, V. Dheeravath, P. Noojipady, and Y.J. Li

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### Landsat Data Continuity Mission - Instrument Characterization

Moderator: Jim Irons, NASA

### The OLI Instrument Design: Key Differences from Landsat-7

Edward J. Knight, Ball Aerospace & Technologies Corporation

Steven W. Bidwell

### Geometric Performance Differences between the OLI and the ETM+

James C. Storey, Stinger-Ghaffarian Technologies, Inc. (SGT)

Kenton Lee and Michael J. Choate

### Pre-Launch Radiometric Calibration of the Operational Land Imager (OLI)

Geir Kvaran, Ball Aerospace & Technologies Corporation

Edward Knight and Stuart Biggar

### LDCM On-orbit Operational Calibration and Validation

Ron Morfitt, Stinger-Ghaffarian Technologies, Inc. (SGT)

Brian Markham, Jim Storey, and Doug Hollaren

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### Remote Sensing for Modeling of Evapotranspiration

Moderator: Richard Allen, University of Idaho

### Yellowstone's Geothermal Areas: Mapping Changes in Radiative Flux

Shannon Savage, Montana State University

Rick Lawrence and Stephan Custer

### Application of the Surface Energy Balance using Landsat Thermal Imagery to Improve On-farm Water Management in the Imperial Irrigation District

Deepak Lal, SEBAL N. America

Byron Clark, Bryan Thoreson, and John Eckhardt

### Calibration and Refinement of Traditional Crop Coefficients Curves in the South Platte River Basin using Mapping Evapotranspiration at High Resolution with Internalized Calibration

Claudio Schneider, Riverside Technology, Inc.

Graeme Aggett and Mary Hattendorf

### An Inventory of Denver's Urban Vegetation using Multiple Endmember Spectral Mixture Analysis

Rebecca Powell, University of Denver

Sharolyn Anderson

## ASPRS Meeting Schedule

*Save the dates!!!*

### ASPRS 2009 Annual Conference

75th Anniversary of ASPRS

March 8 – 13, 2009

Baltimore Marriott Waterfront Hotel

Baltimore, Maryland

### ASPRS/MAPPS 2009 Fall Conference

November 16 – 19, 2009

Crowne Plaza Hotel

San Antonio, Texas

### ASPRS 2010 Annual Conference

April 26 – 30, 2010

Town and Country Hotel

San Diego, California

### ASPRS 2011 Annual Conference

May 1 – 5, 2011

Midwest Airlines Center/Hyatt Hotel

Milwaukee, Wisconsin

Check [www.asprs.org](http://www.asprs.org) for updates and important program information.

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**Workforce Development and Continued Education**

Moderator: Kevin Czajkowski, *University of Toledo*

**GeorgiaView Internship Program 2004 - 2008: Geospatial Workforce Development and Statewide Outreach**

Rebecca Dodge, *AmericaView, Inc.*

Marguerite Madden

**The DEVELOP National Internship Program at NASA Ames Research Center**

Cindy Schmidt, *San Jose State University/ NASA Ames Research Center*

Jay Skiles

**Workforce Development on Tribal Lands**

Tammie Grant, *Salish Kootenai College*

**Integrated Geospatial Education and Technology Training**

Jeannie Allen, *SSAI/NASA Goddard Space Flight Center*

Laura Rocchio, Ken Bailey, and Ann Johnson

**From Theory to Practice: How TexasView Supports Applied Remote Sensing in the Workplace**

Teresa Howard, *University of Texas at Austin Center for Space Research*

Gayla Mullins

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**GEOSS Special Session on Air Quality and Human Health**

Moderator: Amy Budge, *Earth Data Analysis Center, University of New Mexico*

Changes in the natural environment can compromise human health. For example, dust is a global problem that affects millions of people, especially those with respiratory illness. Human health is one of the nine Societal Benefit Areas identified by the Group on Earth Observations (GEO). One of their goals is to work with the Health community to improve the flow of user-friendly environmental data by facilitating access to comprehensive data sets that support prevention, early warning, research, health-care planning and delivery, and timely public alerts. This session focuses on air quality and human health, including discussions on environmental modeling, uses of Earth observation data to improve models, early warning systems, and enhancements to decision support and surveillance systems.

**International Sand & Dust Storm Warning and Assessment System**

William Sprigg, *University of Arizona*

**Impacts of Desert Dust on Human Health**

Mark Lyles, *U.S. Navy*

**Earth Observations for Assessing Environmental Impacts on Human Health: Programs and Initiatives**

Stanley Morain, *University of New Mexico*

**Application of Satellite Aerosol Optical Depth and Airborne Lidar Data for Monitoring and Evaluating Spatial Gradient of the Fine Particulate Matter in the San Joaquin Valley, California**

Jim Szykman, *Environmental Protection Agency*

**Exhibitors' Reception**

5:30 pm to 7:00 pm

The conference exhibitors, your hosts for the evening, invite all attendees to join them for light hors d'oeuvres and beverages. This is a great chance get a first-hand look at the latest products and services in the industry being displayed in the Exhibit Hall by both national and international suppliers.

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*November 16-20, 2008 - Denver, Colorado*

# Technical Program — Wednesday, November 19

## General Session III

8:30 am to 10:00 am

### Satellite-borne Radar in Today's Remote Sensing Community

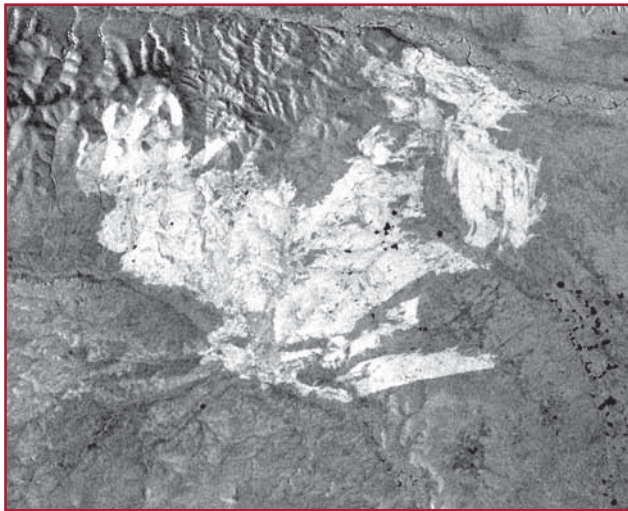
Marcello Maranesi, Managing Director, *Eurimage*

John Hornsby, President, *MDA Geospatial Services Inc.*, Canada

Corinne Kaplan, Vice President, *Space, EADS North America*

Multispectral optical data have dominated remote land imaging since Landsat 1 in 1972. However, the remote sensing community has recognized also that radar sensors, with their ability to provide data through clouds and in darkness, and their sensitivity to shapes and moisture have many exciting capabilities that could augment, and even replace, optical data information. Due to their complexity, satellite-borne radar emerged over a decade after the first Landsat (1987) and are limited in number. This situation changed rather abruptly in 2007 with the launch of four Radarsats, doubling the number then in orbit. This dramatic increase in radar data availability, as well as the increase in the data specifications (1 and 3 meter resolutions compared with the 8 and 30 meter capabilities for the former systems), should stimulate considerable experimentation and application by remote sensing user communities.

This session provides users with a description of radar data products currently available commercially.



Radarsat-1 image, taken on October 4, 2003, of the Yukon Flats Alaska. Acquired shortly after the B346 boreal forest fire was extinguished, the burning of the vegetation increased the intensity of the backscattered SAR signal by about 6 dB to 10 dB. The burned area appears white in the Radarsat-1 image.

### Exhibit Hall

10:00 am to 5:00 pm

### Poster Session

10:00 am to 5:00 pm

## Technical Session

10:30 am to 12:00 pm

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### Remote Sensing and Applications to Forestry

Moderator: Jim Vogelmann, *ASRC Research and Technology Solutions*

### Predicting Spatial Distribution of Privet (*Ligustrum spp.*) in South Carolina from MODIS and Forest Inventory Plot Data

Salajanu Dumitru, *U. S. Department of Agriculture/Forest Service*

Dennis Jacobs

### Changes in Whitebark Pine Distribution in the Northern Rockies: 1984 – 2002

Jeff Jewett, *Spatial Sciences Center, Montana State University*

Rick Lawrence

### Integration of MODIS-derived Metrics to Assess Interannual Variability in Snowpack, Lake Ice, and NDVI in Southwest Alaska

Page Spencer, *Lake Clark National Park*

Bradley Reed, Mike Budde, and Amy Miller

### Remote Sensing of Trentino Forest Biophysical Variables using IRS Satellite Data

Loris Vescovo, *Centro di Ecologia Alpina-Fondazione Mach, Italy*

Sergio Tonolli, Michele Dalponte, Markus Neteler, Lorenzo Bruzzone, and Damiano Gianelle

## OPEN NEW CAREER DOORS...

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- ✓ Remote Sensing Mapping Scientist
- ✓ GIS/LIS Mapping Scientist
- ✓ Photogrammetric Technologist
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## WITH ASPRS CERTIFICATION

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**Monitoring and Modeling Land Use/  
Land Cover Change**

Moderator: Rick Mueller, *U. S. Department of  
Agriculture/National Agriculture Statistics  
Services*

**Assessment of 2006 and 2007 Drought  
Patterns in the Vegetation Drought Response  
Index Across Nebraska**

Jesslyn Brown, *U.S. Geological Survey*

Brian Wardlow and Tsegaye Tadesse

**Deriving Essential Dates of AWiFS and  
MODIS Data for the Identification of Corn  
and Soybean Fields in the U.S. Heartland**

Claire G. Boryan, *U.S. Department of  
Agriculture/National Agriculture Statistics  
Services/RDD*

**Impact of Band-Ratio Enhanced AWiFS  
Image to Crop Classification Accuracy**

Zhengwei Yang, *U.S. Department of  
Agriculture/National Agriculture Statistics  
Services/RDD*

Rick Mueller

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**Special Session on the Delta Project:  
Application of RADARSAT-1**

Moderator: Greg Snyder, *U.S. Geological  
Survey*

**The DELTA Project: Innovative Research  
and Development into the Application of  
RADARSAT-1 Interferometric Data for  
Subsidence Mapping in New Orleans**

Steve Iris, *Canada Space Agency, Canada*

Greg Snyder and Mike Kirby

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**Remote Sensing for Modeling of  
Evapotranspiration**

Moderator: Jim Verdin, *U.S. Geological Survey*

**Fine-tuning Components of Inverse-  
Calibrated, Thermal-based Remote Sensing  
Models for Evapotranspiration**

Richard Allen, *University of Idaho*

Jeppe Kjaersgaard, Jan Hendrickx, M. Tasumi,  
and Magali Garcia

**Modeling Urban Heat Islands and their  
Relationship with Impervious Surface and  
Vegetation Abundance by using Landsat  
Images**

Qihao Weng, *Center for Urban and  
Environmental Change, Indiana State  
University*

Umamaheshwaran Rajasekar and Xuefei Hu

**Computation of Landsat based  
Evapotranspiration Maps along the South  
Platte and North Platte Rivers**

Jeppe Kjaersgaard, *University of Idaho*

Richard Allen, Graeme Aggett, Claudio  
Schneider, Mary Hattendorf, Ayse Irmak,  
Gary Hergert, and Clarence Robison

**Mapping Evapotranspiration using Thermal  
Satellite Data**

Ayse Irmak, *University of Nebraska-Lincoln  
- School of Natural Resources*

Ian Ratcliffe and Ramesh Singh

-17-

**Workforce Development and Continued  
Education**

Moderator: Carolyn Merry, *Ohio State  
University*

**A Wetland Education using Maps, Aerial  
Photography, and Satellite Imagery**

Catherine Lockwood, *Chadron State College*

Lawrence Handley and Nathan Handley

**AmericaView: Current Mission and Future  
Direction**

Rick E. Landenberger, *West Virginia View*

Rebecca L. Dodge

**A Roadmap for Implementing Geospatial  
Technology in K12 within the United States**

Stanford Hovey

**Using a Web-based GIS to Teach Problem-  
based Science in High School**

Cindy Schmidt, *San Jose State University*

Allison Lenkeit-Meezan, Ellen Metzger, and  
Richard Taketa

**Students and Teachers Exploring Local  
Landscapes to Interpret the Earth from  
Space Application to the International Polar  
Year (SATELLITES-IPY Application)**

Kevin Czajkowski, *University of Toledo*

Mikell Lynne Hedley

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**Hyperspectral Imaging**

Moderator: Roger Clark, *U.S. Geological  
Survey*

**Use of Airborne Hyperspectral Imagery for  
Water Quality Assessments of Minnesota's  
Rivers**

Leif Olmanson, *University of Minnesota*

Marvin Bauer and Patrick Brezonik

**Hyperspectral Analysis of Fugitive  
Contaminants**

Terrence Slonecker, *U.S. Geological Survey/  
EGSC*

Susan Price

**An Adaptive Noise Reduction Technique for  
Improving the Utility of Hyperspectral Data**

Rhonda Phillips, *Virginia Polytechnic Institute  
and State University*

Christine Blinn, Layne Watson, and Randolph  
Wynne

**Geospatial Exploitation of Simultaneously  
Collected Multi-Sensor Data**

Raul Campos-Marquetti, *Merrick & Company*

Mark Romano and Bill Emison

# Technical Program — Wednesday, November 19

## General Session IV

1:30 pm to 3:00 pm

### Availability of Multispectral Data from Non-U.S. Providers

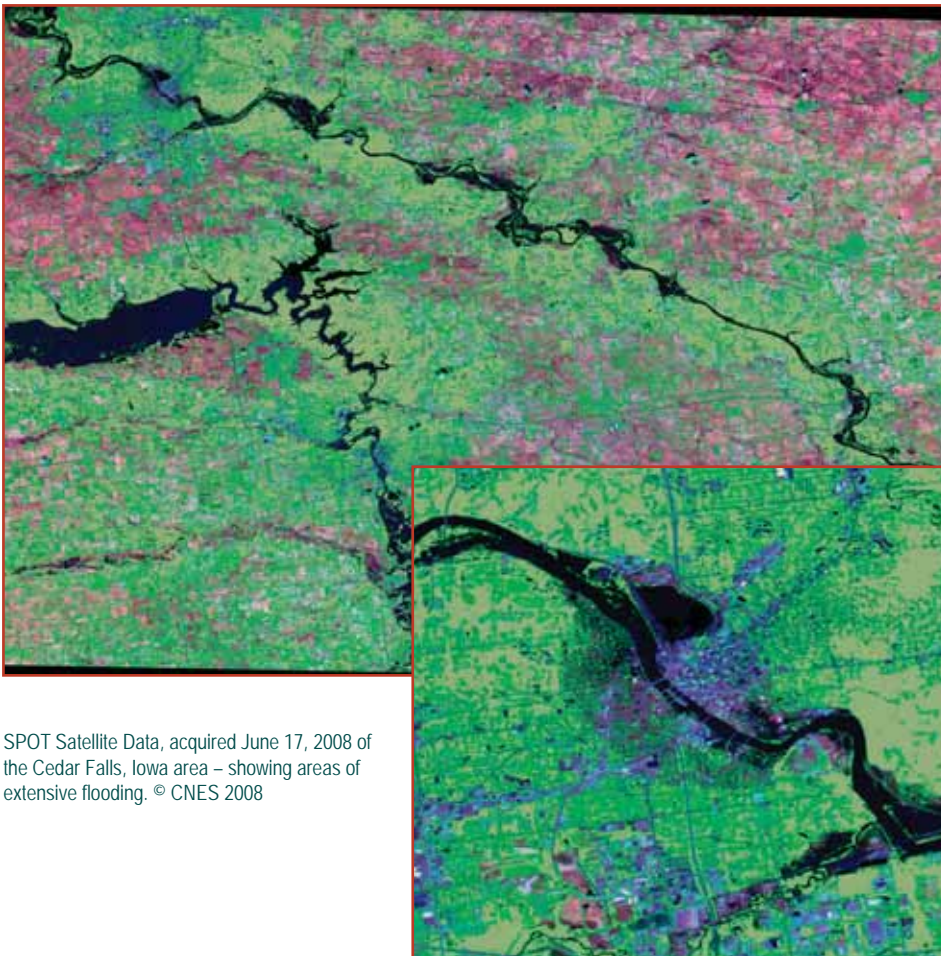
Wolfgang Biedermann, *RapidEye*

Paul Stephens *DMCii*

Antoine de Chassy, *SPOT*

Multispectral data are the basis for most, if not all, civil applications and science investigations. These data are available potentially from 25 systems that are currently in orbit, or planned to be in orbit by November 2008, and operated by a dozen countries. In addition to providing multispectral resolutions from 6 to 56 meters, the number of satellites flown singly and in constellations promises to provide users new abilities for acquiring data at specific times for the events being studied. For example, data could be acquired at a specific date and time over areas affected by human-induced or natural disasters.

This session focuses on availability of multispectral data from non-U.S. sources that manage single satellites or that are flying several platforms in constellations.



SPOT Satellite Data, acquired June 17, 2008 of the Cedar Falls, Iowa area – showing areas of extensive flooding. © CNES 2008

## Technical Session

3:30 pm to 5:00 pm

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### Data Access: Current and Future Approaches

Moderator: Jeff Eidenshink, *U.S. Geological Survey*

### A Service-Based Architectural Approach to Enhanced Data Access

Lyn Oleson, *U.S. Geological Survey*

### DataDoors: A System for Cataloging, Accessing, Processing, and Delivering Large Amounts of Image Data

Yusuf Siddiqui, *i-cubed*

Mick Garrett

### eMODIS Product Access for Landscape Scale Monitoring

Calli Jenkerson, *ADDNET Systems*

### Supporting Disaster Response Efforts: The USGS Role in Data Access

Brenda Jones, *U.S. Geological Survey*

### Improving Digital Access to the USGS Film Archive

Timothy Smith, *Stinger-Ghaffarian Technologies, Inc. (SGT)*

Ryan Longhenry

-20-

### Landsat: Past, Present and Future

Moderator: Ray Byrnes, *U.S. Geological Survey*

### Preserving Landsat's Legacy

Theresa Arvidson, *Lockheed Martin*

### Landsat 5: An Unprecedented Record of Global Observations

Bruce Quirk, *U.S. Geological Survey*

Ron Beck

### The Landsat Project: New Products, Activities, and No-charge Data

Kristi Kline, *U.S. Geological Survey*

### Operational Aspects of Implementing a National Land Imaging Program

Jennifer Willems, *U.S. Geological Survey*

Bruce Quirk

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**UAVs - Sensors, Platforms and Applications**

Moderator: Larry Handley, *U.S. Geological Survey*

**UAS Impact to the NAS and ATC**

Roger Trevino, *FAA*

Randy Willis and Ardyth Williams

**US Northern Command Unmanned Aircraft Systems Domestic Concept of Operations (CONOPS)**

Travis Buford, *U.S. Northern Command*

**UAS Activities in the NASA Airborne Science Program**

Andrew Roberts, *NASA*

**NOAA UAS Program**

Sarra Summers, *NOAA*

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**National Monitoring Programs**

Moderator: Claire Boryan, *U.S. Department of Agriculture/National Agriculture Statistics Services*

**Towards an Operational Multi-Resolution Monitoring Program in the BLM**

Matthew Bobo, *Bureau of Land Management*

**Early Season Remote Sensing Based Acreage Estimates**

Rick Mueller, *U.S. Department of Agriculture/National Agriculture Statistics Services*

**National Park Service Vegetation Inventory and use of Hybrid Approaches to Signature Development and Object Oriented Tools**

Karl Brown, *National Park Service*

Tammy Hamer

**National Lidar Program**

Jason Stoker, *U.S. Geological Survey*

**NEXTMap USA: A New National Map - Midterm Report**

Garth R. Lawrence, *Intermap Technologies Inc.*

-23-

**Workforce Development and Continued Education**

Moderator: Catherine Lockwood, *Chadron State College*

**Geographic Information Network of Alaska: Multi-agency Satellite Data and Information Product Sharing in Support of Operational, Real-time, and Emergency Response Activities**

Thomas Heinrichs, *University of Alaska Fairbanks*

Dayne Broderson, Kevin Engle, Larry Ledlow, Richard McMahon, Lance Seman, and Sean Triplett

**The Role of KansasView in Disaster Response and Recovery**

Kevin Dobbs, *KansasView, Kansas Applied Remote Sensing Program*

Stephen Egbert and Jude Kastens

**Supporting Statewide Emergency Management with the WisconsinView Remote Sensing Network**

Sam Batzli, *University of Wisconsin-Madison*

**Increasing Remote Sensing Applications in State Government Agencies: WyomingView Experience**

Ramesh Sivanpillai, *University of Wyoming / WYGISC*

-24-

**Airborne Lidar**

Moderator: Greg Stensaas, *U.S. Geological Survey*

**Evaluation of Airborne Lidar Data to Predict Vegetation-Cover Percentage and Presence / Absence in Jean Laffite National Park, Louisiana**

Monica Palaseanu-Lovejoy, *Jacobs/U.S. Geological Survey/FISC*

Amar Nayegandhi, John Brock, Robert Woodman, and Wayne C. Wright

**Estimation of Forest Biomass with Multireturn Lidar Data**

Michele Dalponte, *University of Trento, and Centro di Ecologia Alpina-Fondazione Mach, Italy*

Sergio Tonolli, Lorenzo Bruzzone, and Damiano Gianelle

**Tree Species Differentiation Using Lidar-based Structures and Intensity Data**

Sooyoung Kim

Gerard Schreuder, Hans-Erik Andersen, and Robert McGaughey

**Rigorous Lidar Sensor Modeling to Support End User Requirements**

Mark Lee, *Integrity Applications Incorporated*  
Henry Theiss and Craig Rodarmel

**Landsat 5 Celebration/Reception**

5:00 pm to 6:00 pm

Grand Ballroom II, Tower Building, Sheraton Hotel

There will be a celebration of the remarkable success of Landsat 5, the 'workhorse' satellite for land observations as part of the Pecora 17 Conference. The celebration is sponsored by Lockheed Martin.



LOCKHEED MARTIN



# Technical Program — Thursday, November 20

## Technical Session

8:30 am to 10:00 am

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### Advances in Radiometric Calibration

Moderator: Brian Markham, NASA

### Advances in the Landsat-5 TM Instrument Radiometric Characterization

Julia Barsi, NASA Goddard Space Flight Center

Esad Micijevic

### Consistent Radiometric Calibration of the Historical Landsat Archive

Dennis Helder, South Dakota State University

James Dewald

### Inflight, Intersensor Radiometric Calibration using the Reflectance-based Method for Landsat-Type Sensors

Kurtis Thome, University of Arizona

Joel McCorkel and Jeff Czaplak-Myers

### Calibration Matters; Landsat Data Analysis of Science Products with and without Calibration

Ronald Hayes, Stinger-Ghaffarian Technologies, Inc. (SGT)

Rynn Lamb

-26-

### Surface Water Hydrology

Moderator: Dave Johnson, U.S. Department of Agriculture/National Agriculture Statistics Services

### Locating Turf and Surface Water Features in the Las Vegas Valley Using Remote Sensing Techniques and GIS

Judy Brandt, Southern Nevada Water Authority

### Spatial and Temporal Analysis of a 20-year Landsat Water Clarity Database of Minnesota's 10,000 Lakes

Leif Olmanson, University of Minnesota

Marvin Bauer and Partick Brezonik

### Mapping of the Ganges River Network Changes in Bangladesh using Multi-temporal Remotely Sensed Data with GIS

Ashraf M. Dewan, Department of Earth and Environmental Science, Nagoya, Japan, University Bangladesh, India

Yasushi Yamaguchi

-27-

### UAVs - Sensors, Platforms and Applications

Moderator: Larry Handley, U.S. Geological Survey

### United States Forest Service Unmanned Aerial Systems Integration Status

Thomas Zajkowski, Remote Sensing Applications Center

Everett Hinkley

### UAS for Remote Sensing of Climate Change in Polar Regions

Susan Schoenung, Longitude 122 West, Inc.

Randal Albertson

### Thermal Infrared Imaging in Agriculture Using a Small Unmanned Aerial System

Dana G. Sullivan, U.S. Department of Agriculture ARS

G. Bland, J.P. Fulton, J.N. Shaw, D. Endale, J. E. Hook, and R.D. Lee

### Special UAV Applications Session: The Western States UAV Fire Imaging Mission: 2007 Results

Vincent Ambrosia, California State University - Monterey Bay/NASA-Ames

Everett Hinkley, Thomas Zajkowski, and Steve Wegener

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### Data Exploitation

Moderator: John Dwyer, U.S. Geological Survey

### Spatio-Temporal Data Mining Techniques for Land Surface Change Monitoring -- Exploring the Landsat Archive

Daniel R. Steinwand, U.S. Geological Survey

### Imagery-based Hurricane Catastrophic Damage Assessment for Litigation — Benefits, Challenges and Issues

Rick Crowsey, Crowsey, Inc.

### Incorporating Optical Sensor Models into Remote Sensing Analyses to Improve Accuracy

Tyler A. Erickson, Michigan Tech Research Institute

Brian Thelen

### A Comparison of Vanishing Points Based and Model Based Approach to Recovering Camera Pose

Ruisheng Wang, Centre for Intelligent Machines, McGill University, Canada

Frank Ferrie

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### Workforce Development and Continued Education

Moderator: Jeanie Allen, SSAI at NASA

### Remote Sensing Education Through Interactive Learning

Ramesh Sivanpillai, University of Wyoming / WYGIS

### Digital Image Classification Taught using Web-based Interactive Learning

Sugumaran Ramanathan, University of Northern Iowa

James Campbell

### Using GloVis in the Classroom

James B. Campbell, Virginia Tech

### AlabamaView Perspectives of Consortium Development

Luke J. Marzen, Auburn University

### The VirginiaView Atlas

Peter Sforza, Department of Geography, Virginia Tech

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### **GEOSS Special Session: Integration and Interoperability**

Moderator: John Lyon, *U.S. Environmental Protection Agency*

The Geo process and GEOSS offer great opportunities to leverage elements of various systems to create the whole. These talks will illustrate the continuum of elements that go into the system of systems. Synergy from a number of groups will cast the GEOSS vision into reality.

#### **The GEO Process and GEOSS**

Doug Muchoney, *GEO Secretariat*

John Lyon, *U.S. Environmental Protection Agency*

#### **Monitoring Agricultural Crop Rotations in the Great Lakes Basin using MODIS NDVI Data**

Ross S. Lunetta, *U.S. Environmental Protection Agency*

Yang Shao, *U.S. Environmental Protection Agency*

#### **Rapid Land Cover Mapping and Automated Feature Extraction for Environmental Decision Support using NASA World Wind and D.O.E. Genie Pro**

Drew Pilant, *U.S. Environmental Protection Agency*

#### **Interoperability of Joint Hyperspectral Sensors from a Single Collection Platform**

Dean Riley, *The Aerospace Corporation*

Neilson Schulenburg, *The Aerospace Corporation*

Conrad Wright, *SpecTIR, LLC*

Mark Landers, *SpecTIR, LLC*

### **Poster Session**

9:00 am to 12:00 noon

## *Closing/General Session V*

10:30 am to 12:00 noon

### **Integrated, Interoperable, Earth-monitoring System of Systems...A Closer Look**

Joanne Irene Gabrynowicz, Director, *National Center for Remote Sensing, Air, and Space Law* (invited)

Pontsho Maruping, Chair of CEOS, *General Manager, Frontier Programme* (invited)

Douglas M. Muchoney, *Group on Earth Observations (GEO)* (invited)

Gene Whitney, *Office of Science and Technology Policy, Executive Office of the President* (invited)

This closing session shifts gears to examine the global network that is dedicated to providing Earth observation technologies to communities of practice in several societal benefit areas worldwide. An integrated, interoperable, Earth-monitoring system of systems has been a stated policy and technical goal for many nations since the 1970s. This session addresses recent and on-going efforts that are closer to achieving this goal than any previous efforts. Speakers will review the work of the Committee on Earth Observation Satellites (CEOS), the Group on Earth Observations (GEO), and USGEO. They will review progress to date, including challenges from both the policy and technology perspectives, as well as looking toward possibilities of the future.

**REFLECTION OF THE PAST  
VISION FOR THE FUTURE**

**ASPRS 2009 Annual Conference**  
March 9 - 13, 2009  
Baltimore Marriott Waterfront Hotel  
Baltimore, Maryland

**Call for Papers**

visit [asprs.org/baltimore09](http://asprs.org/baltimore09) for information on submitting your paper

Suggested Topics include ASPRS History (Celebrating 75 years) • 25 years of Landsat 5  
Basemaps for GIS • Lidar • High-Resolution • Accuracy/Error Assessment • Data Management  
Agriculture • Close Range Photogrammetry • Data Fusion • Workforce Development • Higher Education

*November 16-20, 2008 - Denver, Colorado*

# Poster Sessions

## **Mapping Mountain Top Removal Mining over the Decades**

David Campagna, *SkyTruth*

John Amos and Matt Wasson

## **Remote Sensing Unveils Successes in Natural Resource Management in Niger: More People, More Trees**

Gray Tappan, *U.S. Geological Survey*

Chris Reij and Mahamane Larwanou

## **Shadows and Cloud Detection in High Resolution Images using Mathematical Morphology**

Thiago Statela, *CEFET - MT and FCT*

– *UNESP*, Brazil

Erivaldo Silva

## **Mathematical Morphology Application to Features Extraction in Digital Images**

Erivaldo Silva, *FCT – UNESP*, Brazil

Rodrigo Frigato

## **Mathematical Morphology Theory Applied in Cartography**

Erivaldo Silva, *FCT – UNESP*, Brazil

Fernando Leonardi and Thiago Rodrigues

## **An Approach to Evaluate Multi-temporal Moderate Resolution Satellite Image Data Composites**

Shahid K. Khurshid, *Canada Centre for Remote Sensing*, Canada

Darren Pouliot, Richard Fernandes, and Rasim Latifovic

## **An Operational Methodology to Detect Small Fires by Satellite Data**

Conese Claudio, *National Research Council – IBIMET*, Italy

Laura Bonora and Roberto Carlà

## **Deriving Hourly Surface Energy Fluxes and Evapotranspiration from Landsat Thematic Mapper Data Using Metric**

Prasanna Gowda, *U.S. Department of Agriculture/ARS Conservation and Production Research Laboratory*

Terry Howell and Richard Allen

## **Mapping Western Tanzania with Multi-scale Satellite Imagery to Support Conservation Planning**

Susan Maxwell, *Arctic Slope Regional Corporation (ASRC) Research and Technology Solutions*

Jay Kost, and Lilian Pinteá, and James Vogelmann

## **eMODIS 2008 Flood Response**

Calli Jenkerson, *ADDNET*

## **Forest Ice Storm Damage: A Multitemporal Kauth-Thomas Assessment**

Christine McMichael, *Morehead State University*

Grant York and Jeffrey Lewis

## **Irrigated Areas of India Derived using MODIS 500m Data for Years 2001-2003**

Venkateswarlu Dheeravath, *International Water Management Institute*, Sri Lanka

P.S. Thenkabail, G. Chandrakantha, P. Noojipady, C.M. Biradar, H. Turrall, M. Gumma, G.P.O. Reddy, and M. Velpuri

## **Comparisons Between Evapotranspiration Images Derived from MODIS-based Energy Balance and Those Based on Traditional Crop Coefficient-weather Data (ETToolbox) Along the Middle Rio Grande of New Mexico**

Clarence Robison, *University of Idaho*

Richard Allen, Ricardo Trezza, Magali Garcia, Al Brower, David Toll, Kristi Arsenault, Jan Hendrickx, M. Tasumi, Richard Stodt, and Steve Bowser

## **Enhanced Resolution of Evapotranspiration by Sharpening the Landsat Thermal Band**

Richard Allen, *University of Idaho*

Ricardo Trezza, Jeppe Kjaersgaard, William Kramber, Clarence Robison, M. Tasumi, Magali Garcia

## **Landsat Based Estimation of Evapotranspiration for the Nebraska Panhandle**

Ian Ratcliffe, *University of Nebraska-Lincoln*

Ayse Irmak, Jeppe Kjaersgaard, Rick Allen, Gary Hergert, Gary Stone, and Peggy Penrose

## **On Sensitivity of Modeled Ozone to Land Surface Temperature Over Houston-Galveston Area**

Biswadev Roy, *U.S. Environmental Protection Agency*

Mark Sather and Erik Snyder

## **Per Pixel and Object Oriented Approaches for Determining Land use Change in Urbanizing Watersheds of North Alabama**

Sharadha Seerla, *Alabama A&M University*

Wubishet Tadesse

## **Land Use and Land Cover Change and its Impact on Land Surface Temperature of Urbanized Watersheds in North Alabama using Landsat Data**

Wubishet Tadesse, *Alabama A&M University*

Teferi Tsegaye and Mezemir Wagaw

## **Estimation of Crop LAI from Landsat TM Vegetation Indices in the Texas Panhandle**

Sreekala G. Bajwa, *University of Arkansas*

Prasanna H. Gowda, Terry A. Howell, and Mansoor Leh

## **Opportunities for Environmental Modeling and Forecasting of Disease Risk using Remotely-Sensed Data**

Michael Wimberly, *GIScCE Center of Excellence*

Michael Hildreth, Christine Wey, Lon Kightlinger,

## **Metrics and Tools for the Analysis of Urban Sprawl**

Jason Parent, *University of Connecticut*

Daniel Civco and Shlomo Angel

## **Monitoring Land Cover Changes after Wildfire in the Black Hills of South Dakota using Landsat Imagery**

Xuexia Chen, *ASRC Research and Technology Solutions (ARTS)*

Zhiliang Zhu and Donald Ohlen

## **Feature-based and Pixel-based Glacier Surface Change Detection**

Mahsa sadat Moussavi, *Remote Sensing Department, K.N.Toosi University of Technology*, Iran

Mohamad Javad Valadan Zoej, Mahmoud Reza Sahebi, and Yousef Rezaei

## **Using Geospatial Techniques to Quantify Land Use/Cover Change and Landscape Fragmentation in Dhaka Megacity, Bangladesh**

Ashraf M. Dewan, *Department of Earth and Environmental Science, Nagoya, Japan, University Bangladesh*, India

Yasushi Yamaguchi

## **Assessing Multi-temporal Landsat ETM+ SLC-off Data for Cropland Classification**

David Johnson, *U.S. Department of Agriculture/National Agricultural Statistics Service*

# UAV/UAS Programs and Applications

## **Water Productivity Mapping Methods and Protocols using Remote Sensing to Support Growing More Crop per Drop**

Prasad Thenkabail, *International Water Management Institute (IWMI)*, Sri Lanka

C. Xueliang, C. Biradar, A. Platonov, M. Gumma, and V. Dheeravath

## **Sub-Pixel Area (SPA) Computation Methods**

Prasad Thenkabail, *International Water Management Institute (IWMI)*, Sri Lanka

C.M Biradar, P. Noojipady, V. Dheeravath, M. Gumma, Y.J. Li, M. Velpuri, G.P.O. Reddy, X.L. Cai, and H. Turrall

## **Comparison of Evapotranspiration Images Derived from MODIS and Landsat along the Middle Rio Grande of New Mexico**

Richard Allen, *University of Idaho*

M. Tasumi, Ricardo Trezza, Clarence Robison, Magali Garcia, Jeppe Kjaersgaard, David Toll, Kristi Arsenault, and Jan Hendrickx

## **Close-range Photogrammetry: A New Look at using Ground-based Photographs to Produce Detailed 3D Terrain Data**

Neffra Matthews, *Bureau of Land Management, National Operations Center*

Tommy Noble and Matthew Bobo

## **An Operational-ready Algorithm for using Satellite Data to Measure Biomass Accumulation in Secondary Tropical Forest of Lowland Amazonia**

Eileen H. Helmer, *International Institute of Tropical Forestry*

Michael A. Lefsky and Dar A. Roberts

## **Effects of Land Use Change on Erosion in the West Fork of the White River Watershed, Arkansas, USA**

Mansoor D. Leh, *Department of Biological & Agricultural Engineering*

Sreekala G. Bajwa and Indrajeet Chaubey

## **Moving Towards Collaborative Classifiers while Supporting Non-experts**

Giorgos Mountakis, *State University of New York College of Environmental Science and Forestry*

Luo Li

**As a continuation of the UAV Special Sessions during the Pecora Conference, there will be additional sessions of presentations focusing on UAV/UAS Programs and Applications.**

The primary objective of the UAV organized sessions associated with the Pecora 17 Conference is to:

- I. Provide a mechanism to stimulate communication across a broad community of UAV managers, users, producers, and researchers.
- II. Communicate within the community and to a wider public on:
  - A. what to use,
  - B. when to use it,
  - C. how to use it, and
  - D. convey to others outside the UAV community.

Also available will be a series of static displays of UAS systems presented by NASA, DOD, and private industry.

### **Special UAV Program**

Thursday, November 20, 1:30 pm to 5:00 pm  
Sheraton Hotel

#### **NASA Global Hawk: Project Update and Upcoming Missions**

Chris Naftel, *NASA Dryden Flight Research Center*

#### **NASA UAS Remote Sensing Systems for Earth Science**

Jeffrey Myers, *University of California, Santa Cruz*

Edward Hildum

#### **Impact Assessment of Potential Hurricane Imaging Radiometer (HIRAD) Tropical Cyclone Observations from UAS and Satellite Platforms**

Robbie Hood, *NASA Marshall Space Center*

#### **Remote Sensing of Crop Leaf Area Index Using Unmanned Airborne Vehicles (UAVs)**

E. Raymond Hunt, *U.S. Department of Agriculture/ARS Hydrology and Remote Sensing Lab*

W. Dean Hively, C. S. T. Daughtry, Greg McCarty, and Stephen Fujikawa

#### **Remote Sensing of Road Condition using UAV**

Chunsun Zhang, *South Dakota State University*

#### **UAV Applications Special Session: UAS for Threat Detection on Pipeline Rights-of-Way**

Lee Johnson, *NASA (CSUMB)*

Steve Dunagan and Brad Lobitz

### **Special UAV Program**

Friday, November 21, 8:00 am to 5:00 pm  
U.S. Geological Survey Auditorium, Denver Federal Center

Buses will depart from the hotel to the Denver Federal Center in Lakewood, Colorado at 8:00 am and return to the hotel at approximately 5:00 pm.

**There is no additional fee to participate in either of these sessions.**



**These sessions are sponsored and conducted by the U.S. Geological Survey.**

*November 16-20, 2008 - Denver, Colorado*



# Welcome to Denver, Colorado!

Whether you are looking for something to occupy an afternoon, or for reasons to arrive early or stay through the weekend after the conference, Denver has something to appeal to every preference.

**Denver has 300 days of sunshine a year.** With a mild dry and sunny climate, Denver has more hours of sun than Miami Beach. Remember to bring your sunscreen and moisturizer!

**Denver's history is colorful.** The Gold Rush brought some of the wild-est events in the country's history to Denver. This fascinating period lives again in museums, old gold mining villages and elegant Victorian build-ings throughout the city.



**Denver has the largest city park system in the nation.** There are more than 200 parks within the city and 20,000 acres of parks in the nearby mountains. With 70 golf courses and 27 formal flower gardens and one of the nation's largest urban trail systems, Denver residents and visitors have countless ways to enjoy the outdoors.

**Denver is a cultural city.** Denver's cultural renaissance is found in three new art muse-ums...Daniel Libeskind's new Denver Art Museum, one of the boldest architectural designs in the country, the Denver Perform-ing Arts Complex, the second largest in the U.S., and the Ellie Caulkins Opera House, one of the finest acoustical venues in the world.



**Denver loves its sports.** Denver has eight professional sports teams and six new sports stadiums! In addition to football, basketball, hockey, baseball and soccer, Denver has lacrosse and arena football – a dream come true for the sports fan.

**Denver really is exactly one mile high.** By an amazing stroke of good luck, the 13<sup>th</sup> step on the State Capitol is exactly 5,280 feet above sea level.

**Denver has the 10<sup>th</sup> largest downtown in America.** Denver has a definitive, excit-ing and walk-able downtown – within a mile radius are three major sports stadiums, the Denver Performing Arts Center, three colleges, an assortment of art and history museums, a mint producing 10 billion coins a year, a river of-fering white water rafting and over 300 restaurants.

**Denver is near the mountains, not in them.** Located on high rolling plains, Denver is 12 miles east of what locals call the “foothills,” a series of gentle mountains that climb to 11,000 feet. Just beyond is the Front Range, formidable snowcapped peaks rising to 14,000 feet that can be seen from practically everywhere in the city. Be sure to bring a camera.

**Denver brews more beer than any other city.** On an average day, Denver brews over 80 different beers and is the “Napa Valley” of beer. Brewers use the great taste of Rocky Mountain spring water as their key ingredient.

**Denver is a great base for day trips.** Whether you are in the mood to visit a casino, see a narrow gauge railway or tour the Pro Rodeo Hall of Fame, all are available within 80 miles of Denver. And Rocky Moun-tain National Park is only 71 miles (114 km) northwest of Denver. It features 400 square miles (1,036 sq km) of scenic beauty. The park has hundreds of miles of hiking trails, tranquil lakes, waterfalls, wildlife and horseback riding. Bring binoculars as well as a camera.



# Hotel & Travel Information

## Sheraton Denver Hotel

(formerly Adams Mark Hotel)

**1550 Court Place  
Denver, Colorado 80202  
(303) 893-3333**

ASPRS has chosen the Sheraton Denver Hotel (formally the Adams Mark hotel), as the site for the 2008 Pecora 17 Memorial Symposium. The entire symposium will be held in the hotel.

With their excellent location in downtown Denver, the Sheraton affords meeting attendees every convenience and amenity needed for a wonderful Denver experience. The hotel is located on the 16th Street Pedestrian Mall with free shuttle service to all downtown shopping, dining and entertainment venues and is adjacent to the Pavilion Complex of movies, theaters and shopping. Shuttle service is available at minimal cost to and from Denver International Airport.

Among the many services the Sheraton Denver offers its guests are grand sleeping room accommodations, free wireless high speed internet access in Lobby, 24-hour room service, Business Center/Services, non-smoking guest rooms, express/video checkout, multilingual staff, sauna, complimentary 24-hour fitness facility, VIP floor, gift/sundry shop, florist, and guest laundromat.

Several dining options are available within the hotel including the Bravo Ristorante featuring fine Italian cuisine, the Trattoria for casual all day dining, the Capitol Bar for cocktails and snacks and the Supreme Court and Nightclub for late night entertainment.

**ASPRS Pecora 17 Symposium Rates are  
\$149 single occupancy, \$164 double occupancy.**

A limited number of government rate rooms have also been reserved. Proof of eligibility may be required at check-in to receive these rates.

**Reservations may be made by calling 1 800 325-3535 or 303 893-3333.**

To obtain ASPRS rates, please be sure to identify yourself as attending the ASPRS Conference.

**Reservations may also be made through the web at:**

Regular rate - <http://www.starwoodmeeting.com/Book/ASPRS FALLMTG>

Government rate - <http://www.starwoodmeeting.com/Book/ASPRSgovt FALLMTG>

**RESERVATIONS MUST BE MADE NO LATER THAN**

**Thursday, October 16, 2008 (Subject to availability)**

**TO TAKE ADVANTAGE OF THESE SPECIALLY NEGOTIATED ASPRS RATES.**

## Denver International Airport

Complete information for the Denver International Airport (DIA) including airlines serving Denver, maps, directions, shops and restaurants at the airport and ground transportation to downtown Denver can be found at <http://www.flydenver.com>.

Photos courtesy of the Denver Metro Convention & Visitors Bureau, Ron Ruhoff for Denver Metro Convention & Visitors Bureau, and David Falconer For Denver Metro Convention & Visitors Bureau

### What is a Hotel Room Block?

In order to secure meeting room and Exhibit Hall floor space at the Sheraton Hotel, ASPRS must sign a contract with the hotel that guarantees a specified number of hotel rooms will be booked and used by our conference attendees. The number of rooms guaranteed is called the "Room Block." If attendees stay in the conference hotel, ASPRS will fulfill its contractual obligations. If attendees stay in other hotels or cancel their room reservations at the last minute, ASPRS faces the possibility that its room block will not be met, forcing the Society to pay severe penalties, which can run into tens of thousands of dollars. By staying in the selected conference hotel, you are helping ASPRS keep its registration costs down.

### Hotel Room Block Limitations

If you are attending the conference, please book your room reservations early, as we have a limited number of room nights in our room block. Once the room block is full, the hotel will not give us additional rooms. However, we find that people often make their hotel reservations early, then decide not to attend the conference. This fills up the room block superficially and keeps others who have registered for the conference from getting a room at the conference hotel. When these reservations are cancelled, it causes us to fall below our room block guarantee. **Please be courteous and only make your hotel reservations if you are registered for the conference and have a high expectation of attending. If you find that you cannot attend the conference, please cancel your hotel reservations as soon as possible so that someone else could use the hotel room.**

November 16-20, 2008 - Denver, Colorado

# ASPRS Volunteer Opportunities

## Attention All Students

If you are a student at an accredited college or university and would like to attend the 2008 Annual ASPRS Conference without paying the required Conference Registration fee, consider assisting with the conference. By helping the Conference Committee for only 15 hours during the week of November 16-20, 2008, depending on your assignments, you will be able to attend the General Sessions, and Technical Sessions, visit the Exhibit Hall, and enjoy the Exhibitors' Reception. This is a great opportunity to learn more about the geospatial field, meet some of the top names in the industry and explore job possibilities.

To serve as a volunteer, complete this application, and e-mail to the attention of one of the Conference Committee Volunteer Coordinators listed below:

**Carol Mladinich**  
**303-202-4313**  
**csmladinich@usgs.gov**

Please include ASPRS Volunteer Program in the Subject Line of all e-mail messages and send all applications via e-mail to the attention of one of the coordinators.

Assignments will be made on a first come basis and cannot be guaranteed. For more information contact either of the Conference Volunteer Coordinators or visit [www.asprs.org/pecora17](http://www.asprs.org/pecora17).

Name (FML): \_\_\_\_\_

First Name for Badge: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Daytime Phone: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

College/University: \_\_\_\_\_

Emergency Contact w/  
Phone Number: \_\_\_\_\_

Travel dates (please attach  
an itinerary as well): \_\_\_\_\_

Please make three choices in order of task preference for each day you are attending:  
Tasks include: Registration, General and Technical Sessions, Staff Office, and Floater

Sunday, November 16<sup>th</sup>

Availability - 10:00 am to 5:00 pm \_\_\_\_\_

First Choice \_\_\_\_\_

Second Choice \_\_\_\_\_

Third Choice \_\_\_\_\_

Monday, November 17<sup>th</sup>

Availability - 6:30 am to 5:30 pm \_\_\_\_\_

First Choice \_\_\_\_\_

Second Choice \_\_\_\_\_

Third Choice \_\_\_\_\_

Tuesday, November 18<sup>th</sup>

Availability - 7:00 am to 5:00 pm \_\_\_\_\_

First Choice \_\_\_\_\_

Second Choice \_\_\_\_\_

Third Choice \_\_\_\_\_

Wednesday, November 19<sup>th</sup>

Availability - 7:00 am to 6:00 pm \_\_\_\_\_

First Choice \_\_\_\_\_

Second Choice \_\_\_\_\_

Third Choice \_\_\_\_\_

Thursday, November 20<sup>th</sup>

Availability - 7:00 am to 12:00 noon \_\_\_\_\_

First Choice \_\_\_\_\_

Second Choice \_\_\_\_\_

Third Choice \_\_\_\_\_

# Frequently Asked Questions

## How do I register for the conference?

Please register on-line or by using the registration form in this Program on page 29. The form may be duplicated as needed. Complete the form (type, print clearly, or attach a business card). Your name badge will reflect this information. Payment in U.S. Dollars will be accepted by Visa, MasterCard, American Express, checks made payable to ASPRS 2008 Fall Conference, and signed government purchase orders or training orders. Registrations received without payment will not be processed. Please do not mail your registration form after you have registered by fax or online.

**Online:** [www.asprs.org/Pecora17](http://www.asprs.org/Pecora17)  
(Visa, MasterCard, or American Express only)

**Mail To:** ASPRS 2008 Fall Conference  
Registration  
IMI International Meetings, Inc.  
9901 Business Parkway, Suite J  
Lanham, Maryland 20706 USA  
(all forms of payment)

**Fax To:** ASPRS 2008 Fall Conference  
Registration  
301-306-7603 (fax)  
(Visa, MasterCard, American Express/purchase  
orders only)

## Will I receive confirmation of my registration?

Your registration will be confirmed by e-mail, mail or fax. A registration is not considered complete until all registration fees are received by the Meeting Registrar. Please notify the Meeting Registrar at **301-306-7606** or **888-233-2864** if you have not received your confirmation within two weeks of submitting your registration, or if you have any questions. Your registration packet will be available at the ASPRS Registration Desk, in the Sheraton Denver Hotel during the registration hours. See Registration Desk hours on page 5 of the program.

## What is the cancellation/refund policy?

To qualify for a full refund, a written cancellation must be received by the ASPRS 2008 Pecora Fall Conference Meeting Registrar by October 17, 2008. For cancellations received by October 31, 2008, a 50 percent refund will apply. No refunds will be made after October 31, 2008. This policy applies to all fees paid for the conference. All refunds are subject to a \$50.00 processing fee and will be issued one month after the conference concludes.

Cancellations for medical emergencies after the above deadline will be considered on an individual basis and will require a physician's signed letter.

## What is the Technical Paper and Poster Presenter's Registration Policy?

All Technical Paper and Poster Presenters are **REQUIRED TO REGISTER** at the appropriate Full Registration Rate if they are attending the entire conference. Those registered at the Full Registration Rate who attend the conference and present a technical paper(s) or poster(s) will receive a rebate reflecting the difference of the Full Registration Rate and the appropriate Presenter Registration Rate. This rebate will be issued within 30 business days after the conference. Presenters who register for Daily Registration must register at the appropriate Daily Registration Rate. There are no rebates for Presenter Daily, Moderator Daily or Student registrants.

**FOR A PAPER/POSTER PRESENTER'S NAME AND PAPER TITLE TO APPEAR IN THE FINAL CONFERENCE PROGRAM, THEIR REGISTRATION MUST BE RECEIVED WITHIN 60 DAYS OF THEIR RECEIVING NOTIFICATION OF THE PAPER/POSTER ACCEPTANCE.**

## What is the Moderator's Registration Policy?

All Moderators are **REQUIRED TO PRE-REGISTER** at the appropriate Full Registration Rate if they are attending the entire conference. Those registered at the Full Registration Rate who attend the conference and fulfill all requirements as directed by the Conference Coordinator including submitting the required Presenters' Attendance Form immediately after their session(s) will be eligible for the appropriate rebate. This rebate will be issued within 30 business days after the conference. Moderators who register for Daily Registration must register at the appropriate Daily Registration Rate. There are no rebates for Moderator Daily registrants.

## As a student, presenting either a Technical Paper or Poster, what registration fee do I pay?

All students attending the conference, whether they are presenting a paper or poster or not, are eligible for the student registration fee. See above for registration requirements.

## I am a part-time student at an accredited institution. Do I qualify for student registration fee?

Anyone who is currently enrolled as a full or part-time student at an accredited college or university may register at the student registration rates if they have not previously held an ASPRS membership in another category, e.g. someone who previously held full membership then returned to college cannot now register as a student. You must submit your registration by fax to the number on the form, with a copy of your student identification to qualify for the student registration fee.

## Must I pre-register for the conference?

No. On-site Registration will be located in The Sheraton Denver Hotel. However, a deep discount is available to everyone registering at least 30 days prior to the conference start date.

## Are Daily Registrations permitted for all categories?

Yes. Daily registrations may be done in advance or on-site. However, a deep discount is available to those who register at least 30 days prior to the conference start date.

## May I bring a Guest to the conference?

Yes, we welcome adult guests. This is a professional conference and children, under 12 years of age, are not permitted to attend any sessions or visit the Exhibit Hall. A separate registration fee has been set for all guests. (Please see Registration Form on page 29 of this program). This fee includes the admission to the Exhibit Hall, and the Exhibitors' Reception and the Landsat Celebration. Admission to the general and technical sessions is not included with this registration. If guests wish to attend any of these sessions, they must register at the appropriate rate.

## I am not a US citizen and am coming from outside the United States, how do I get a Letter of Invitation to obtain a visa?

You must first register for the conference following the procedures outlined above and pay the appropriate registration fee. You should then submit a written request for a Letter of Invitation to:

Sokhan Hing  
Membership Manager  
ASPRS  
5410 Grosvenor Lane,  
Bethesda, Maryland 20814  
[sokhanh@asprs.org](mailto:sokhanh@asprs.org)

*continued on next page*

# Frequently Asked Questions

## How do I get into the Exhibit Hall if I am not registered for the conference?

Daily Exhibit Hall badges may be purchased at the ASPRS Registration Desk in The Sheraton Denver Hotel. Everyone entering the Exhibit Hall must have a name badge.

## Are Workshops included with the registration fees?

No. Workshops require individual registration and a separate fee in addition to the general conference registration fees. Availability is based on space. We do not reserve spaces without full payment in advance and there is no waiting list. Workshop registrations must be postmarked by October 17, 2008. ASPRS reserves the right to cancel any workshop if the minimum number of registrations is not received by October 17, 2008. On-site registration will be available for confirmed workshops with available space. Register early as many workshops will sell out prior to October 17, 2008.

## As a Technical Paper or Poster Presenter, whose presentation has been accepted, when do I submit my work to be included in the proceedings?

You will need to register for the conference using the methods described above and submit your complete paper or poster as directed in the e-mail instructions you received previously – not an abstract – no later than September 12, 2008.

## Do Technical Paper Presenters bring their own laptops?

Yes, ASPRS does **not** provide laptops or desktop computers for Presenters.

## What are Poster Presenters expected to do?

ASPRS provides to each Poster Presenter one side of a fabric covered poster board that measures eight feet wide by four feet high, and push pins. All Poster Presenters should plan to arrive between 7:30 am and 10 am on Tuesday, November 18 to affix their work to any available board. All posters must be removed by 12 noon on Thursday, November 20. All poster packaging must be removed from the poster area once posters are hung. ASPRS is not responsible for posters that are not removed.

## May I volunteer to assist with the Conference activities?

If you are a student at an accredited college or university, you are welcome to apply for service as a conference volunteer. Please see full details on page 26 of this program.

## Is Disability Assistance Available?

If you have special needs, please contact ASPRS Headquarters at 301-493-0290 ext. 106. A written statement will be required outlining your particular needs. Please submit all requests for assistance by October 17, 2008 so that appropriate arrangements can be made.

## Do Presenters have a Preparation Room?

Yes. A room will be available on a first come basis from 8 am to 5 pm November 17-19 and 8 am to 12 noon November 20. This room will be equipped with an LCD projector and screen. All presenters must bring their own laptops for their presentations. The location of this room will be announced in the Final Program that will be included with the on-site registration materials available at check-in at the ASPRS Registration Desk. We encourage all presenters to review their materials prior to their presentation.

## Will there be a Press Room?

Yes, a room will be provided for use by members of the press who have registered for the conference. All attendees are encouraged to place applicable press releases in this room for distribution to the press. The location will be announced in the Final Program. Press conferences and interviews with ASPRS officers and keynote speakers should be arranged in advance of the conference. Please contact Anna Marie Kinerney at [akerney@asprs.org](mailto:akerney@asprs.org) to make these arrangements.

## Why do I need a badge?

Your badge is verification of your paid registration and must be visible for admission to all sessions and the Exhibit Hall.

## What if I forget or lose my badge?

A charge of \$5 will be made for replacement of lost badges.

## Why do I need tickets for certain events?

Your tickets are proof of payment for certain events and must be presented at the collection point. Lost tickets will not be replaced.

## Will it be possible to post resumes and job openings?

Yes, posting boards will be provided for all resumes and job openings. Please bring multiple copies of all postings to allow interested parties to take one and check the board frequently for new materials.

## How do I get a copy of the CD-ROM Proceedings?

All registrants, except for those registered as Spouse/Guest, will receive a copy on-site with their registration materials. Additional copies can be ordered with the Conference Registration Form or purchased on-site for \$20 at the ASPRS Booth in the Exhibit area.

## Where is the ASPRS Conference Registration Desk?

The ASPRS Conference Registration Desk is located on the Second Floor, Tower Building, Sheraton Denver Hotel.

## What are the Conference Registration Desk Hours?

Sunday, November 16	10:00 am to 5:00 pm
Monday, November 17	6:30 am to 5:00 pm
Tuesday, November 18	6:30 am to 5:45 pm
Wednesday, November 19	7:00 am to 5:00 pm
Thursday, November 20	7:00 am to 10:30 am

Conference Registration materials are available only during the above hours.

## What are the Exhibit Hall Hours?

Tuesday, November 18	10:00 am to 7:00 pm
Wednesday, November 19	10:00 am to 5:00 pm

(Please note: The Exhibit Hall will not be open on Thursday, November 20.)

# THE 17TH WILLIAM T. PECORA MEMORIAL SYMPOSIUM \* DENVER, COLORADO

Register on-line at [www.asprs.org/pecora17](http://www.asprs.org/pecora17) or complete this form (type, print clearly, or attach a business card) and return to ASPRS Pecora 17 Symposium Registration, 9901 Business Parkway, Suite J, Lanham, Maryland 20706. Phone: 301-306-7606 or toll-free: 888-233-2864 (all forms of payment accepted by mail) or fax to 301-306-7603 (Visa, MasterCard, and American Express or purchase orders only).

## Personal Information

Preferred first name on badge: \_\_\_\_\_

Name (please print): \_\_\_\_\_  
First Name M.I. Last Name/Family Name Suffix

Organization Name (if applicable): \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State/Province: \_\_\_\_\_

Zip Code/Postal Code: \_\_\_\_\_ Country: \_\_\_\_\_

Business Phone: \_\_\_\_\_ Home Phone: \_\_\_\_\_

Business Fax: \_\_\_\_\_ Email: \_\_\_\_\_

Emergency Contact Name: \_\_\_\_\_ Emergency Contact Phone: \_\_\_\_\_  
Optional

Spouse/Guest Name: \_\_\_\_\_  
If attending

ASPRS Member (# \_\_\_\_\_ )  
Current membership status will be verified.

Non-member

please check the appropriate boxes

<b>Member Registration Fees</b>		
	Through October 17, 2008	After October 17, 2008
<input type="checkbox"/> <b>Full</b>	\$400	\$515
<input type="checkbox"/> <b>Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$230	\$290
<input type="checkbox"/> Wednesday 11/19**	\$200	\$260
<input type="checkbox"/> Thursday 11/20	\$175	\$235
<input type="checkbox"/> <b>Technical Paper/Poster</b>		
<input type="checkbox"/> <b>Presenter/Moderators, Full</b>	\$400	\$515
<input type="checkbox"/> <b>Technical Paper/Poster Presenter/Moderators, Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$205	\$280
<input type="checkbox"/> Wednesday 11/19**	\$175	\$250
<input type="checkbox"/> Thursday 11/20	\$135	\$200
<input type="checkbox"/> <b>Student, Full</b>	\$75	\$95
<input type="checkbox"/> <b>Student, Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$40	\$50
<input type="checkbox"/> Wednesday 11/19**	\$40	\$50
<input type="checkbox"/> Thursday 11/20	\$40	\$50
<input type="checkbox"/> <b>Student Technical Paper/Poster Presenter, Full</b>	\$75	\$95
<input type="checkbox"/> <b>Student Technical Paper/Poster Presenter, Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$40	\$50
<input type="checkbox"/> Wednesday 11/19**	\$40	\$50
<input type="checkbox"/> Thursday 11/20	\$40	\$50
<input type="checkbox"/> <b>Spouse/Guest</b>	\$65	\$65
<input type="checkbox"/> <b>Exhibit Hall Only</b>		
<input type="checkbox"/> Tuesday 11/18*	\$85	\$85
<input type="checkbox"/> Wednesday 11/19**	\$55	\$55

\*includes exhibitor reception \*\*includes Landsat Reception

<b>Non-Member Registration Fees</b>		
	Through October 17, 2008	After October 17, 2008
<input type="checkbox"/> <b>Full</b>	\$515	\$625
<input type="checkbox"/> <b>Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$290	\$365
<input type="checkbox"/> Wednesday 11/19**	\$260	\$335
<input type="checkbox"/> Thursday 11/20	\$235	\$285
<input type="checkbox"/> <b>Technical Paper/Poster</b>		
<input type="checkbox"/> <b>Presenter/Moderators, Full</b>	\$515	\$625
<input type="checkbox"/> <b>Technical Paper/Poster Presenter/Moderators, Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$290	\$300
<input type="checkbox"/> Wednesday 11/19**	\$260	\$270
<input type="checkbox"/> Thursday 11/20	\$210	\$220
<input type="checkbox"/> <b>Student, Full</b>	\$95	\$115
<input type="checkbox"/> <b>Student, Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$50	\$60
<input type="checkbox"/> Wednesday 11/19**	\$50	\$60
<input type="checkbox"/> Thursday 11/20	\$50	\$60
<input type="checkbox"/> <b>Student Technical Paper/Poster Presenter, Full</b>	\$95	\$115
<input type="checkbox"/> <b>Student Technical Paper/Poster Presenter, Daily</b>		
<input type="checkbox"/> Tuesday 11/18*	\$50	\$60
<input type="checkbox"/> Wednesday 11/19**	\$50	\$60
<input type="checkbox"/> Thursday 11/20	\$50	\$60
<input type="checkbox"/> <b>Spouse/Guest</b>	\$65	\$65
<input type="checkbox"/> <b>Exhibit Hall Only</b>		
<input type="checkbox"/> Tuesday 11/18*	\$115	\$115
<input type="checkbox"/> Wednesday 11/19**	\$55	\$55

\*includes exhibitor reception \*\*includes Landsat Reception

	Full Member-Non-member	Presenter Full Member-Non-member	Student Member-Non-member	Spouse/Guest	Daily, all registration categories
General & Technical Sessions	*	*	*		*
Exhibit Hall	*	*	*		*
Exhibitors' Reception	*	*	*	*	*
Landsat Reception	*	*	*	*	*
Conference Proceedings	*	*	*		*

\$ \_\_\_\_\_  
Subtotal

*November 16-20, 2008 - Denver, Colorado*

## Workshops (not included in registration fee)

	Member	Non-Member
<input type="checkbox"/> Workshop 1 — Hyperspectral Imagery Processing and Feature Extraction: Maximizing Geospatial Information Retrieval, Sunday*, 11/16	\$165	\$265
<input type="checkbox"/> Workshop 2 — Image Interpretation, Sunday*, 11/16	\$165	\$265
<input type="checkbox"/> Workshop 3 — Advanced Classification, Sunday*, 11/16	\$165	\$265
<input type="checkbox"/> Workshop 4 — Emerging Technologies in Photogrammetry and Remote Sensing, Monday, 11/17	\$215	\$315
<input type="checkbox"/> Workshop 5 — Grid-Based Map Analysis and GIS Modeling, Monday, 11/17	\$215	\$315
<input type="checkbox"/> Workshop 6 — Preparing For ASPRS Certification, Monday, 11/17	\$215	\$315
<input type="checkbox"/> Workshop 7 — Professional Airborne Digital Mapping Systems - An Overview, Monday, 11/17	\$215	\$315

\*denotes a half-day afternoon workshop.

**NOTE:** Individual workshops are subject to cancellation if the minimum number of required registrations are not received by October 17, 2008. Workshops are limited to a maximum of 40 attendees per workshop. Popular workshops sell out early and we do NOT keep a waiting list.

## Classified Session (not included in registration fee)

See page 10 for more details on the Classified Session

Classified Session \$70

This session will be held on Monday, November 17, 2008 at Raytheon Company, Denver, Colorado. Bus transportation for attendees will be provided from the ASPRS Conference Hotel. **Attendees must be U.S. citizens and have a SECRET clearance.**

Those wishing to register for this session must do so no later than October 17, 2008.

## Method of Payment

(Full payment must accompany this form.)

- Check (make payable to ASPRS 2007 Specialty Conference, print attendee name on check)  
 Visa     MasterCard     American Express

\_\_\_\_\_  
Name on Credit Card

\_\_\_\_\_  
Billing address of Credit Card Holder

\_\_\_\_\_  
Contact phone and email address for Credit Card Holder if other than registrant.

\_\_\_\_\_  
Credit Card Account Number

\_\_\_\_\_  
Expires (Month/Year)

\_\_\_\_\_  
Cardholder Signature

\_\_\_\_\_  
Date

Purchase Order # \_\_\_\_\_ (government and university only)

Payments must be made in US dollars drawn on a U.S. bank or appropriate credit card. Make checks payable to Pecora/ASPRS Specialty Conference and print attendee name on check.

\$ \_\_\_\_\_ \$ \_\_\_\_\_

**Subtotal from front of form    Total amount enclosed**

## UAV Seminar (No additional fee is required for this event)

Please indicate if you will be attending this additional event, which will be held offsite from the Sheraton Hotel on Friday, November 21st. There is no additional charge but we need to know how many people are attending so we can arrange for the proper transportation.

I plan to attend this one-day event.

## Additional Proceedings

CD-ROM Proceedings quantity \_\_\_\_\_ @ \$20 each

Each Full, Student, and Daily registrant will receive one copy of the conference proceedings as part of their registration. Extra copies of the proceedings may be purchased on site.

We are offering a special New Member Promotion to non-member attendees at the ASPRS/Pecora 17 Specialty Conference. Your Specialty Conference registration at the Non-Member rate entitles you to a complimentary 1-year ASPRS membership.

We are also offering a New Student Member Promotion to student non-members. Your ASPRS Specialty Conference registration at the Student Non-Member rate entitles you to a complimentary 1-year ASPRS Student membership.

Once your paid conference registration has been confirmed, we will provide you with a membership application and instructions for completing and returning it, if you choose to accept the complimentary membership. Students must provide proof of current status with their application.

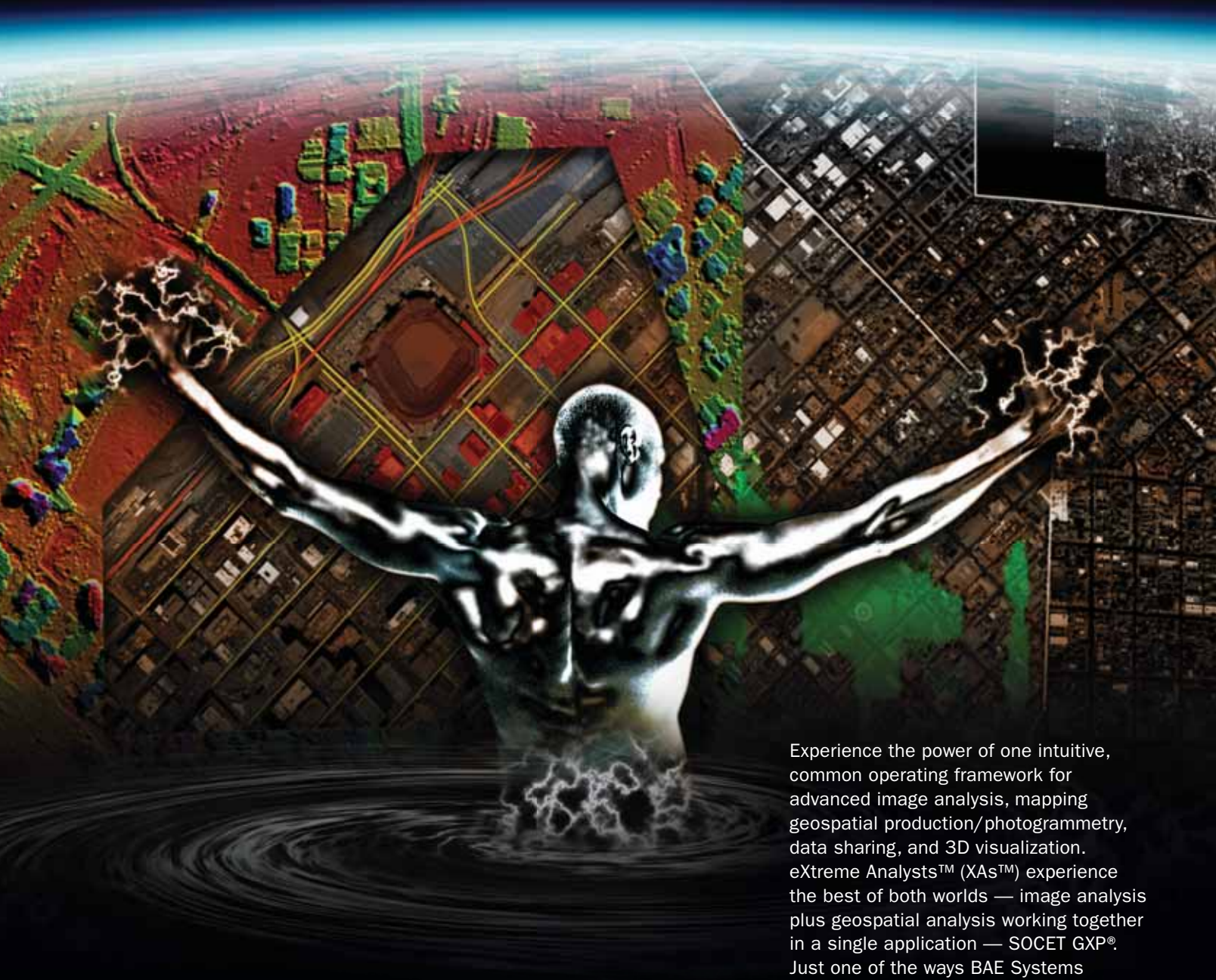
Presenters registered at the Full Registration Rate who actually present a technical paper(s) or poster(s) at the conference will receive a rebate reflecting the difference of the Full Registration Rate and the appropriate Presenter Full Registration Rate. Moderators registered at the Full Registration Rate who perform their duties as outlined are also entitled to the rebate. This rebate will be issued within 30 business days after the conference. **There are no rebates for any other registration categories.**

To qualify for a full conference registration refund, a written cancellation must be received by the ASPRS/Pecora 17 Conference Meeting Registrar by close of business on October 17, 2008. For cancellations received by close of business November 3, 2008, a 50 percent refund will apply. No refunds will be made after October 31, 2008. This policy applies to all fees paid for the conference. All refunds are subject to a \$50.00 processing fee and will be issued one month after the conference concludes.

Cancellations for medical emergencies after the above deadline will be considered on an individual basis and will require a physician's signed letter.

In the unlikely event ASPRS finds it necessary to cancel this entire conference, 100 percent of the registration fees paid will be refunded. ASPRS assumes no liability for any penalty fees on transportation tickets, deposits for hotel accommodations or any other fees, charges, penalties, or other incidental costs that a registrant might incur as a consequence of this conference being canceled.

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Organization  
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American Society for  
Photogrammetry &  
Remote Sensing

*Preliminary Program*

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Denver, Colorado

November 16-20, 2008

[www.asprs.org/Pecora17](http://www.asprs.org/Pecora17)