

PECORA 19

Sustaining Land Imaging...
UAS to Satellites

in conjunction with the Joint Symposium of ISPRS Technical
Commission I and IAG Commission 4

November 17-20

2014

Renaissance
Denver Hotel

Denver, Colorado

FINAL PROGRAM



Introducing the RE-designed, RE-imagined and RE-thought ASPRS Annual Conference.....

The Imaging & Geospatial Technology Forum IGTF 2015

and co-located JACIE Workshop
May 6 – 8, 2015 * Tampa, Florida



asprs

IMAGING & GEOSPATIAL
TECHNOLOGY FORUM



**The ASPRS Annual
Conference has been
RE-designed,
RE-imagined and
RE-thought
with YOU in mind!**

The Imaging and Geospatial Technology Forum was created to encompass the broadest terms for our industry, “Imaging” and “Geospatial”, while incorporating the idea of “Technology” as this concept is the center and reason we all come together.

We decided to use “Forum” instead of conference because Forum means to assemble or a meeting place for the discussion of questions, promoting open discussion and sharing. And the sharing of ideas and open discussion is the core value for each event.

All these elements together formed the new look and feel for ASPRS Annual Conferences –
The Imaging & Geospatial Technology Forum (IGTF).

The all new **IGTF 2015** will bring innovative presentations, Dynamic keynote speakers, an exciting Technology Floor, A new conference layout and MUCH, much more!

**Be sure to watch the ASPRS website as this new design takes shape.
Official Forum website coming soon!**

LETTER FROM THE CHAIRS

Tom Holm, USGS and Charles Toth, PhD, The Ohio State University

We are delighted to welcome you to Denver, Colorado for the 19th William T. Pecora Memorial Remote Sensing Symposium in conjunction with the Joint Symposium of ISPRS Technical Commission I and IAG Commission 4. The joint Symposium is a wonderful opportunity to become better informed on remote sensing science, technology, and applications. This gathering also provides a venue for celebrating noteworthy achievements in Earth observations across four-plus decades.

This year the Symposium will be a two and half day conference starting Tuesday afternoon, November 18 and ending Thursday afternoon, November 20, 2014. We are rearranging the symposium schedule for 2014 and beginning with a Welcome Luncheon in the Exhibit Hall on Tuesday. Following the welcome lunch will be the opening 90-minute plenary session. Two additional plenary sessions will be held on Wednesday, with the final plenary following the Thursday technical sessions. The plenary themes collectively span the symposium theme – Sustaining Land Imaging ...UAS to Satellites. Prior to the opening of the conference, ASPRS will hold workshops throughout Monday and in the morning on Tuesday. NGA will also hold a full day Classified Session on Monday, November 17th.

During the past several decades, there has been an explosion in airborne and satellite technologies designed to help us understand our changing planet. The Symposium highlights how remotely sensed data acquired using the latest technology and platforms are being used to further our understanding of an ever-changing Earth, and are being used to improve the information being gathered for managing our natural resources. 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 offers a unique opportunity to explore new technologies to improve satellite data analyses, quality, access, and preservation with the Joint Symposium of ISPRS Technical Commission I and IAG Commission 4.

Through the leadership and commitment of the U.S. Geological Survey (USGS), the National Aeronautics and Space Administration (NASA), the International Society for Photogrammetry and Remote Sensing (ISPRS), the International Association of Geodesy (IAG), the American Society for Photogrammetry and Remote Sensing (ASPRS) and all the Symposium sponsors, especially the Technical Program Committee Chairs – Bruce Cook, Jim Voglemann and Charles Toth we have compiled an outstanding program for your benefit. Accompanying the plenary sessions are 35 technical sessions with accepted and invited papers, a poster session, exhibit hall, and social and networking events to keep you busy for the duration of the Symposium. This combination of activities comprises a unique opportunity for you to share experiences, successes, and ideas.



Thomas M. Holm
Steering Committee Chair
Pecora 19 Symposium



Dr. Charles Toth
President, ISPRS Technical Commission I
ISPRS/IAG Commission Symposium

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SPONSORS



SYMPOSIUM STEERING COMMITTEE

Tom Holm, USGS EROS
Steering Committee Chair

Charles Toth,
The Ohio State University
ISPRS Technical Commission I President

Bruce Cook, NASA GSFC
Technical Program Co-Chair

James Vogelmann,
USGS EROS
Technical Program Co-Chair

Dorota A. Grejner-Brzezinska,
The Ohio State University
IAG Commission 4 President

Amy Budge, UNM/EDAC

Brad Doorn, NASA

Kevin Gallo, NOAA

Jim Irons, NASA/GSFC

Boris Jutzi,
Karlsruhe Institute of Technology

Francis Kelly, USGS EROS

Steven Labahn, USGS EROS

Tom Loveland, USGS EROS

Rick Mueller, USDA - NASS

Timothy Newman, USGS LRS

Bruce Quirk, USGS LRS

Doug Spencer, USGS LRS

Mike Story, NPS

MEDIA SPONSORS

The American Surveyor

www.amerisurv.com



The *American Surveyor* is made by surveyors for surveyors. Editor Marc Cheves draws on 40+ years of industry experience alongside a stellar team of nationally recognized writers. Sister publications include LIDAR News & GISuser.com.

COORDINATES

www.mycoordinates.org



COORDINATES is an international monthly magazine on positioning, navigation and geospatial technologies and applications. In its 9th year, it is widely circulated in Asia, Australia, New Zealand, Europe, and N. America. Download the complete magazine including the AD's free from www.mycoordinates.org.

Directions Magazine

www.directionsmag.com



Directions Magazine is the leading source of geospatial information technology, news and commentary for "all things location." We keep our readers informed with the latest geospatial technology trends and issues through newsletters, blogs, podcasts, industry Channels and webinars.

EARTH Magazine

www.earthmagazine.org



Each monthly issue of EARTH gives readers definitive coverage on topics from natural resources, energy, natural disasters and the environment to space exploration and paleontology and much, much more. EARTH explores the science behind the headlines with timely, relevant editorial content, numerous photos, illustrations, and great maps, with an increasingly diverse mix of topics in each issue. EARTH is available digitally at Zinio.com for just \$19.99.

GeoConnexion Limited

www.geoconnexion.com



GeoConnexion International and GeoConnexion UK bring you the latest news and stories plus reports from geotechnology industries in UK, Europe, the Middle East, Africa, North America and Asia. Coverage of topics such as 3D Visualisation, Remote Sensing, LiDAR, Cloud, Mobile Mapping, Navigation with emphases on healthcare, public safety, retail, the environment, utilities, surveying, LBS, transport/ logistics, telecommunications and more. To view the magazines: <http://www.geoconnexion.com>.

GeoInformatics

www.geoinformatics.com

GeoInformatics Magazine is published 8 times a year in print and fluidbook (digital version). GeoInformatics provides coverage, analysis and commentary with respect to the international surveying, mapping and GIS industry. Feel free to visit our daily updated website www.geoinformatics.com

GIM International

www.gim-international.com



GIM International is the independent and high-quality information source for the geomatics industry, GIM International focuses on worldwide issues bringing to its readership the latest insights and developments in both technology and management.

GISCafe.com

www.GISCafe.com



GISCafe is an online magazine offering GIS and geospatial professionals complete GIS product catalog listings, technical papers, GIS news, CEO interviews, multimedia presentations, press releases, event postings, job placement and more. Subscribe to the daily newsletter at GISCafe.Com.

GISuser.com

www.gisuser.com

A Spatial Media publication. Dr. Gene Roe leads an expert editorial team, bringing insights and commentary to readers via websites, blogs, eNewsletters & the print editions. Spatial Media (Frederick, Maryland) is an advanced internet media provider, operating websites, eNewsletters and interactive magazines. Publications include *The American Surveyor* (www.amerisurv.com), *GISuser.com*, *LBSzone.com*, *Machine Control Magazine* (www.machinecontrolonline.com) and others.

LiDARnews.com

www.lidarnews.com



LIDAR News (www.LIDARnews.com), a Spatial Media publication, promotes the adoption of LIDAR and 3D laser scanning technology. Dr. Gene V. Roe, Managing Editor, leads an expert editorial team, bringing insights and commentary to readers via *LIDAR Magazine*, eNewsletters, blogs and social media.

Point of Beginning

www.pobonline.com



Point of Beginning (POB) helps land surveyors and geomatics professionals in the surveying industry succeed through our coverage of new technologies and opportunities. We offer practical solutions to surveying and mapping problems, while keeping you up-to-date on business strategies, the law and education. In 2012, POB launched GeoDataPoint, an innovative information resource for all geospatial-related professions and technologies. Visit www.geodatapoint.com to learn from the industry's thought leaders about new technologies, applications and opportunities.

Remote Sensing Journal www.mdpi.com/journal/remotesensing

Remote Sensing (ISSN 2072-4292) publishes regular research papers, reviews, letters and communications covering all aspects of the remote sensing process, from instrument design and signal processing to the retrieval of geophysical parameters and their application in geosciences.

Sensors & Systems

www.sensorsandsystems.com



Sensors & Systems covers the integrated technologies of GIS, remote sensing, modeling, spatial analysis, surveying and sensor technologies for the understanding of change. We focus on some of the key challenges that these tools help us address, including energy, water, food, biodiversity, environment and security.

xyHt

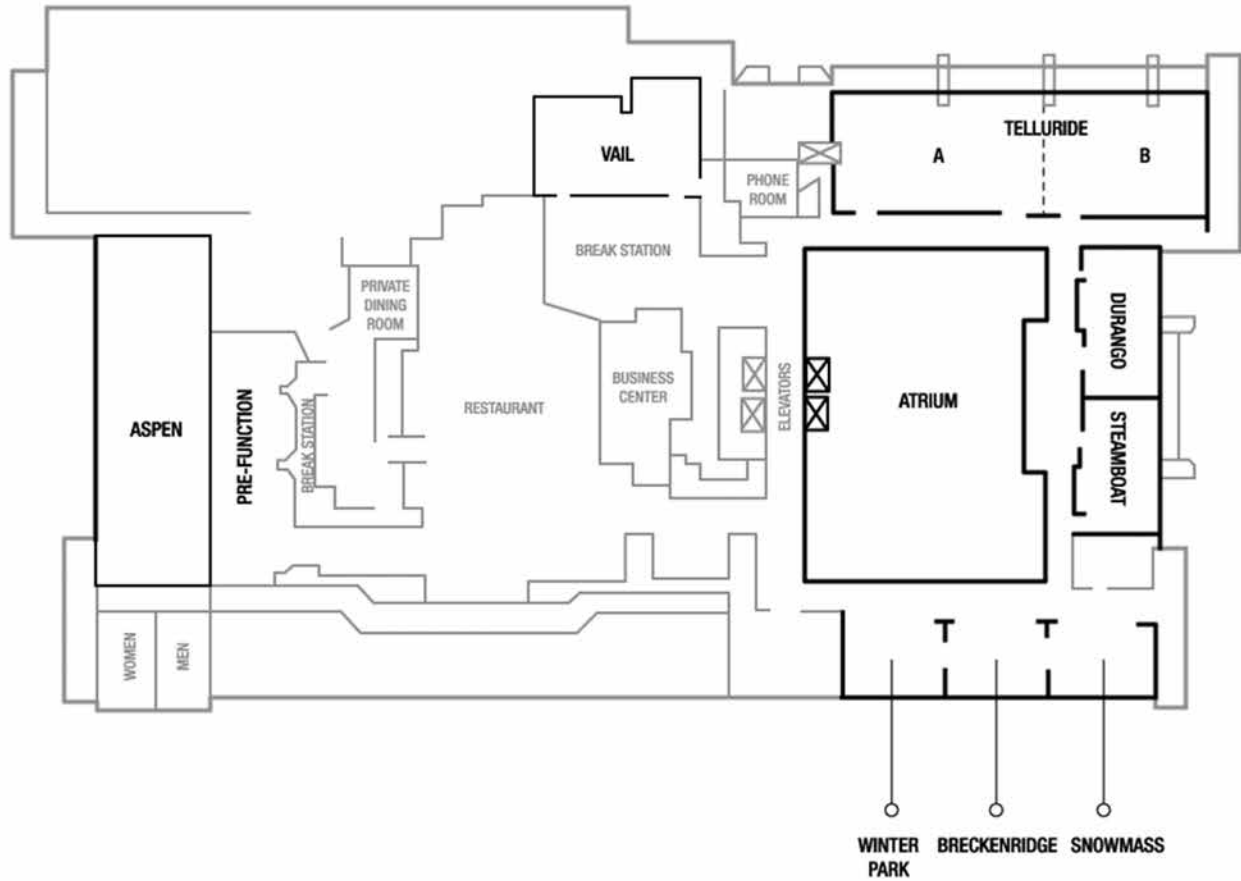
www.xyht.com



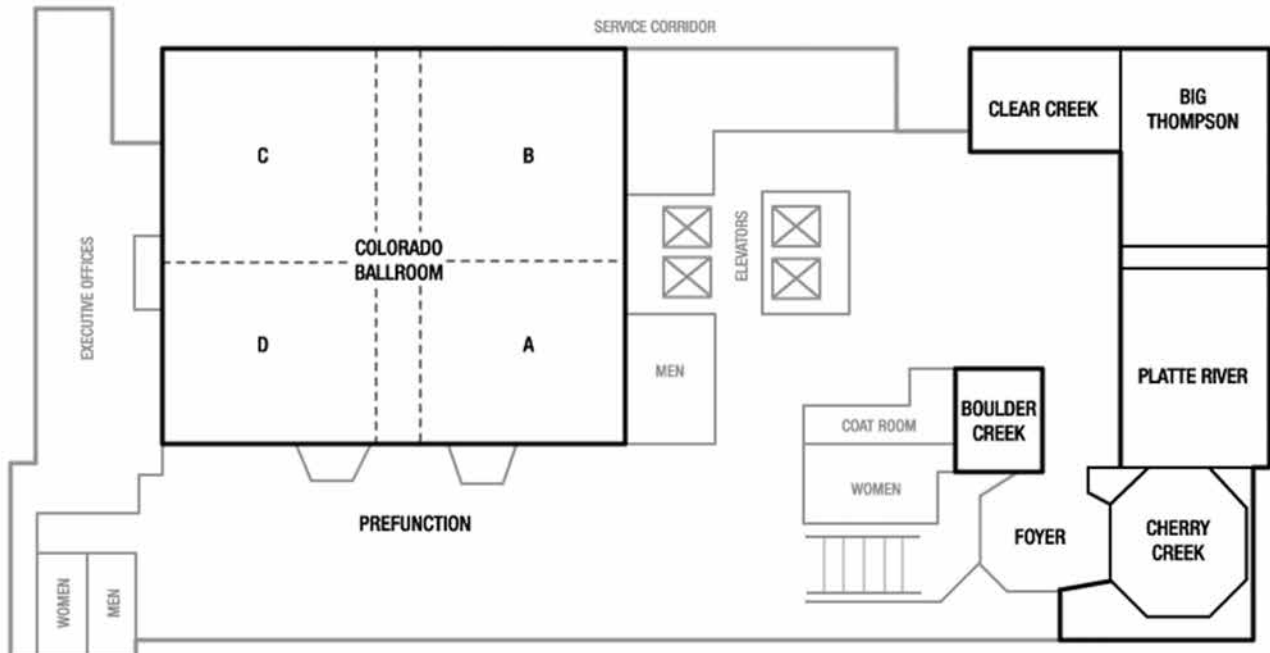
xyHt - North America's newest and most comprehensive geospatial publication, providing great content for today's converging technologies, while also connecting buyers and sellers to prospects in precision measurement, positioning, and imaging. Subscribe now and you'll also receive our special Outlook '15 issue and our new aerial edition in spring of 2015. Take your business to new heights by reading or advertising in xyHt!

HOTEL FLOORPLAN

ATRIUM LEVEL



BALLROOM LEVEL



FREQUENTLY ASKED QUESTIONS

How do I get help in an Emergency?

Contact an ASPRS staff person or pick up any hotel house phone and ask for Security. Give all details of the emergency including the location. DO NOT CALL 911 yourself.

Where is the Symposium Registration Desk?

The Symposium Registration Desk is located on the Banquet Level of the hotel outside the Colorado Ballroom in the Renaissance Denver Hotel.

What are the Symposium Registration Desk Hours?

Sunday, November 16	3:00 PM to 7:00 PM
Monday, November 17	7:00 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 4:00 PM

Once the Symposium Registration Desk is closed, materials will not be available until the following morning.

What are the Technology Floor Hours?

The Technology Floor is located on the Banquet Level of the hotel in the Colorado Ballroom Salons A & B of the Renaissance Denver Hotel.

Tuesday, November 18	12:00 PM to 7:00 PM
Welcome Lunch	12 NOON to 1:00 PM
Exhibitors' Reception	5:30 AM to 7:00 PM
Wednesday, November 19	9:30 AM to 3:30 PM
Lunch with Exhibitors	12 NOON to 1:30 PM

(Please note: Children under the age of 13 are not allowed in the Technology Floor.)

Are Workshops included with the registration fees?

No. Workshops require individual registration and a separate fee in addition to the general Symposium registration fees. Availability is based on space. We do not reserve spaces without full payment in advance and there is no waiting list. On-site registration is available for confirmed workshops with available space.

What should presenters do after they register?

All Technical Paper Presenters should check in at the Symposium Registration Desk to pick-up their registration packets and initial the Master Final Program next to their name including either a hotel room number or cell phone number. A Master Final Program will be posted at the Symposium Registration Desk so the session moderators can check if each presenter has arrived and can contact them if necessary.

Does the Symposium provide laptops for Technical Sessions?

No, the Symposium does not provide laptops or desktop computers for Presenters during Technical Sessions. All Presenters' must provide their own laptop computer.

What does the Symposium provided in each Technical Session room?

Each technical session room will be equipped with a LCD projector and screen. A microphone will be provided when necessary. The Symposium does NOT provide internet access, laser pointers, or laptop computers for the technical sessions.

Do Presenters have a Preparation Room?

Yes, the Clear Creek room, Banquet level of the hotel has been reserved for presenters'. The room is available on a first come basis and should be used for rehearsal only. Please be respectful of your fellow presenters when utilizing this room.

Tuesday, November 18	8:00 AM to 5:00 PM
Wednesday, November 19	8:00 AM to 5:00 PM
Thursday, November 20	8:00 AM to 4:00 PM

This room will be equipped with an LCD projector and screen. All presenters must bring their own laptops for all presentations. We encourage presenters to review their materials prior to their presentation.

Do Moderators need to check-in?

Yes, as soon as you arrive, go to the Symposium Registration Desk where a Master Final Program will be posted. Please initial and write your cell phone number or a hotel room number beside your name on this Master Program. We are asking the Presenters to do the same thing. This will be your way of knowing what presenters have arrived for your session and how to get ahold of everyone.

Prior to your session, check the Master Final Program at the Symposium Registration Desk to confirm that all of your presenters have arrived at the Symposium.

What are Poster Presenters expected to do?

The Symposium provides to each Poster Presenter one side of a fabric covered poster board that measures three feet wide by eight feet high, and push pins. The poster boards will be located in the Technology Floor, Colorado Ballroom Salons A & B.

All Poster Presenters should plan to arrive between 7:30 am and 10 am on Tuesday, November 18th to affix their work to any available board. All poster packaging must be removed from the poster area once posters are hung. The Symposium Organizers are not responsible for posters that are not removed.

Poster Presenters must also check in at the Symposium Registration Desk to pick-up their registration packets and initial the Master Final Program next to their name including either a hotel room number or cell phone number.

Please be near your poster during the following special events held on the Technology Floor:

Welcome Lunch

Tuesday, November 18th 12:00 PM to 1:00 PM

Exhibitors' Reception

Tuesday, November 18th 5:30 PM to 7:30 PM

Lunch with Exhibitors'

Wednesday, November 19th 12:00 PM to 1:30 PM

These are times for Symposium attendees to view your posters and ask you questions or gain further information about your research.

FREQUENTLY ASKED QUESTIONS

Is there an ASPRS staff office in the hotel?

Yes, the ASPRS staff offices are located in the Cherry Creek room, Banquet level of the hotel.

Where should Student Assistants and Volunteers report?

All Student Assistants and Volunteers should check in with the Coordinator in Cherry Creek on the Banquet level of the hotel at least 15 minutes before their scheduled session time.

Why do I need a badge?

You paid your registration fee and your badge is proof of your payment. For entrance to the General Sessions, plenary and technical sessions, and Technology Floor, you need to wear your name badge.

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.

How can I visit the Technology Floor if I am not registered for the Symposium?

Daily Technology Floor badges may be purchased at the Symposium Registration Desk in the Renaissance Denver Hotel. Everyone entering the Technology Floor must have a name badge, including children over 13 years of age. Children under 13 years of age are not permitted in the Technology Floor at any time due to insurance and safety regulations.

Will it be possible to post resumes and job openings?

Yes, posting boards are provided near the Technology Floor 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 Proceedings?

All registrants, except for Spouse/Guest, will receive password access information to the Proceedings located on the Symposium website with their registration materials. Additional access can be purchased at the Symposium Registration Desk.

How can someone from outside the hotel contact me?

Messages cannot be personally delivered to Symposium attendees due to the varied schedules of everyone in attendance. Messages can be left in the rooms of those staying at the Renaissance Denver Hotel through the hotel telephone operator. Packages and fax messages can be sent to individuals staying at the hotel. There is a charge for all packages and faxes sent to hotel guests. This fee will NOT be paid by ASPRS. All packages should be addressed as follows:

Renaissance Denver Hotel
Attn: (Person to receive shipment), Guest of the Hotel
111 E. Pecan Street
San Antonio, Texas 78205 USA

Is there a Lost and Found?

Please contact Hotel Security through the hotel house phones for all lost and found items.

Where can I store my bags/luggage?

Please contact the Hotel Bellman for storage of your personal items. There may be a fee for this service. The Symposium is not responsible for your bags or luggage during the Symposium and will not hold bags/luggage.

How do I access the complimentary wireless internet?

Each guest of the Symposium hotel room block receives complimentary access to wireless internet throughout the hotel. You should be able to access the wireless on a regular basis; however, we cannot guarantee the internet strength. If you have any trouble accessing the wireless internet, please call the hotel front desk for assistance.

Wireless internet will be available for attendees in the meeting rooms. For password information, please refer to the insert in your registration packets.
(Please Note: Do not download large files, stream video content or engage in malicious activities while using this service.)

Students & Young Professionals



Please join the Student Advisory Council (SAC) for some activities designed just for YOU!

Student and Employer “Meet and Greet”

Date TBA

Get together with the other Students and Associate members of ASPRS attending this year’s Symposium and learn what the SAC has been working on. Stay for the meet and greet and make some connections with potential Employers attending this year.

The SAC members would love to meet all students attending the Symposium and hear any ideas you may have to make your symposium experience enjoyable.



The meet and greet is designed to connect members looking to apply for jobs in the digital mapping industry with employers looking to hire. Bring your resume, a business card, or just a smile and a handshake, and expand your job network at the symposium.

Other Social Activities

Your SAC Networking Councilor will arrange relaxed social gatherings after each of the day’s symposium activities. These events will allow you to get to know more of the students and young professional members of ASPRS. All student attendees are welcome to join in on the fun as well.



We guarantee that your participation in these activities will make your conference experience more enjoyable!

SOCIAL & NETWORKING OPPORTUNITIES

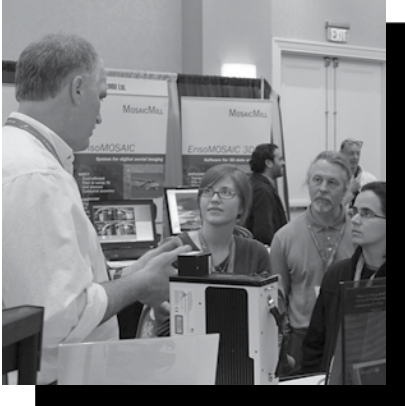
Welcome Lunch

Tuesday, November 18th, 12:00 PM to 1:00 PM

Location: Technology Floor, Colorado Ballroom, Salons A & B, Banquet Level

Have lunch on us! Come to the Exhibit Hall to visit with the wonderful exhibiting companies in attendance and grab a quick lunch. A great way to begin your Symposium week!

Admission to this event is included with most registrations.



Exhibitors' Reception

Tuesday, November 18th, 5:30 PM to 7:00 PM

Location: Technology Floor, Colorado Ballroom, Salons A & B, Banquet Level

Take this wonderful opportunity to visit with the national and international suppliers exhibiting at the Symposium. A tradition, the Exhibitors' Reception is a perfect time to mingle with fellow attendees, thank the Conference Exhibitors', our hosts for the evening and stop by to view the wonderful Posters on display. The evening is sure to provide a relaxed environment with light hors d'oeuvres and beverages and a time to come together with old and new friends.

Admission to this event is included with most registrations.



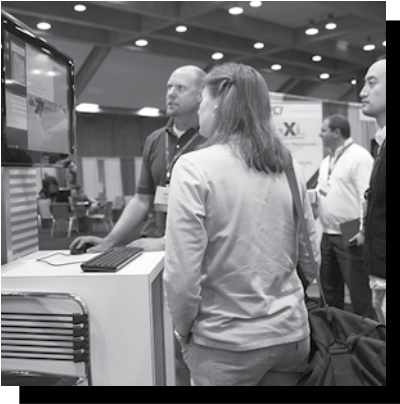
SOCIAL & NETWORKING OPPORTUNITIES

Refreshment Breaks on the Technology Floor

Location: Technology Floor, Colorado Ballroom, Salons A & B, Banquet Level

Each day of the conference refreshment breaks will be served on the Technology Floor. Take a break from the track sessions to network, visit the fantastic booths and grab a cup of coffee or a soda.

Admission to this event is included with most registrations.

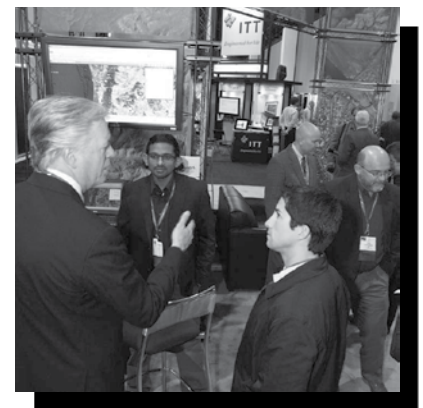
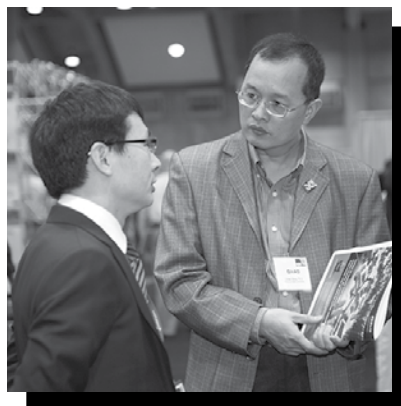


Lunch with Exhibitors'

Wednesday, November 19th; 12:00 pm to 1:30 pm

Location: Technology Floor, Colorado Ballroom, Salons A & B, Banquet Level

Take some time out of your busy week and have lunch with the Exhibitors. A 90-minute break in the middle of your day will surely refresh you with a complimentary lunch and some good conversation. Take this time to meet with our generous exhibiting companies, speak with poster presenters and even catch-up with friends.



TECHNOLOGY FLOOR

Colorado Ballroom Salons A & B, Banquet level

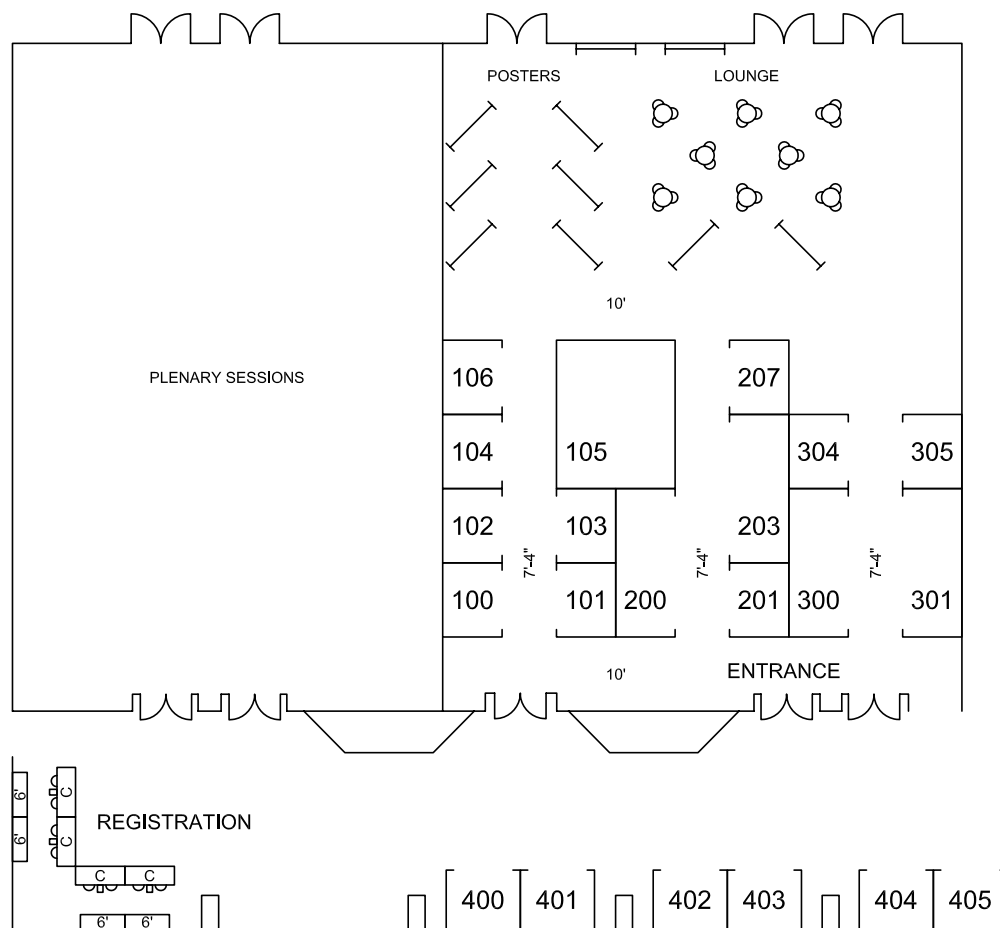
Tuesday, November 18 12:00 PM – 7:00 PM

Wednesday, November 19 9:30 AM – 3:30 PM

EXHIBITORS

- 305** AmericaView
- 101** ASD Inc., a PANalytical company
- 203** ASPRS
- 102** Bradar Industria SA
- 400** Cardinal Systems, LLC
- 304** Clark Labs
- 103** Compass Data, Inc.
- 100** Dynamic Aviation
- 300** Esri

- 200** Leica/Intergraph
- 207** MDPI AG
- 305** MRS4
- 401** NASA
- 104** National Geospatial-Intelligence Agency (NGA)
- 301** Optech
- 106** Spectral Evolution
- 105** USGS EROS



EXHIBITOR DESCRIPTIONS

- AmericaView** **305**
www.AmericaView.org
AmericaView (AV) is a nationwide consortium of remote sensing scientists, who support the use of Landsat and other remotely-sensed satellite data through applied remote-sensing research, K-12 and higher STEM education, workforce development, and technology transfer. Incorporated as a 501(c)(3) non-profit organization in 2003, 40 'StateViews' currently participate in the AmericaView network. Visit www.AmericaView.org for more information.
- ASD Inc., a PANalytical company** **101**
Boulder, Colorado
www.asdi.com
ASD Inc., a PANalytical company is the world's leading supplier of precision field portable spectrometers and spectroradiometers. Our ruggedized analytical instruments provide the freedom to rapidly collect high-quality visible, NIR, and SWIR spectra in the field for real-time lab quality results. When accuracy matters and success is measured in nanometers, see why the world's leading research institutions depend on ASD for data that can be trusted.
- ASPRS** **203**
Bethesda, MD
www.asprs.org
Book Sale during the Symposium, so be sure to stop by for some great discounts. We will have a limited number to sell on-site, but the sale will be available online as well. Stop by for information on ASPRS certifications, membership, awards and scholarships and more!
- Bradar Industria SA** **102**
São José dos Campos, São Paulo
www.bradar.com.br
Bradar S.A. is a technology-based company, specialized in the development, production and use of Synthetic Aperture Radars (SAR). Its main activity areas are: Remote sensing by airborne Synthetic Aperture Radar (SAR); Development of defense Radars for aerial and terrestrial surveillance. Bradar provides remote sensing services since 2003, having mapped areas in South America and Europe. The company is responsible for the development of the radars: OrbiSAR, MiniSAR, BradarSAR, SABER-M60, SABER-M200 and SENTIR-M20.
- Cardinal Systems, LLC** **400**
Flagler Beach, Florida
www.cardinalsystems.net
Cardinal has added two modules to its VrAirTrig application: VrAutoTiePoint for automatic generation of tie points in blocks of imagery and VrBundle adding the ability to adjust difficult geometries including UAS, oblique, high oblique, close range, coincident cameras without GPS or other camera positions. Other modules are VrLiDAR for displaying and editing point data in 2D and true three-dimensional stereo, VrOne, VrTwo, VrVolumes, VrOrtho and VrMosaic. To learn more please visit Booth 400.
- Clark Labs** **304**
Worcester, MA
clarklabs.org
Clark Labs produces environmental modeling and monitoring software and provides consulting services, training sessions and customized software. Specialties include GIS and image processing, land change modeling, REDD, species impact, ecosystem services, and tools to explore earth trends and climate adaptation. Learn more at www.clarklabs.org.
- Compass Data, Inc.** **103**
- Dynamic Aviation** **100**
Bridgewater, VA
www.dynamicaviation.com
Dynamic Aviation specializes in providing turbine powered aircraft and aviation infrastructure to organizations with exacting data needs, but lacking aviation resources. We offer versatile, superior aerial platforms into which existing and emerging technologies can be installed to acquire data of all types. Our aerial platforms can be deployed to obtain LiDAR and multi/hyperspectral data. They may be used for aerial photography, geophysical survey, and air sampling; as well as for aerial and maritime surveillance.
- Esri** **300**
Redlands, CA
www.esri.com
Esri® creates GIS software tools and methodologies that enable organizations to effectively analyze and manage their geographic information and make better decisions. Esri leads the way for remote sensing technology that helps our customers become successful through easy to use imagery products for managing, visualizing, sharing and analyzing imagery. We also provide online access to a wealth of imagery content, including high resolution world base-maps, and dynamic elevation and Landsat image services.
- Leica/Intergraph** **200**
Norcross, GA
www.leica-geosystems.us
Intergraph SG&I provides geospatially powered solutions to a wide range of industries. Hexagon Geosystems newly formed Geospatial Solutions Division is bringing together Leica Geosystems' Airborne Sensors and Intergraph's Z/I Imaging Solutions.
- MDPI AG** **207**

EXHIBITOR DESCRIPTIONS

MRS4 305
Visit Booth 305! Come one, come all! Meet with the editors of the ASPRS Manual of Remote Sensing, 4th edition to learn about "MRS4".... an electronic document that focuses on new technologies, developments, and applications of remote sensing since the 3rd

NASA 401
www.nasa.gov

National Geospatial-Intelligence Agency (NGA) 104

Optech 301
West Henrietta, NY
www.optech.com

Now celebrating 40 years of innovation, Optech is dedicated to providing the world's most advanced lidar and camera 3D survey instruments. Optech strives to empower mapping professionals with high-accuracy and productivity-enhancing solutions for airborne mapping, airborne lidar bathymetry, mobile mapping, and static laser scanning. Optech systems are focused on being complete solutions, with tightly integrated multi-sensor packages and end-to-end software suites that unify all components in one planning, operation and processing workflow.

Spectral Evolution 106
Lawrence, Massachusetts
www.spectralevolution.com

SPECTRAL EVOLUTION is a leading manufacturer of field portable and laboratory spectroradiometers, spectrometers, and spectrophotometers for applications including geological remote sensing, ground truthing, spectral remote sensing, environmental and climate research, crop and soil research, vegetative studies, water body research including water quality and pollution studies, forestry and canopy studies, radiometric calibration transfer, upwelling and downwelling measurement, plastics identification, LED measurement and test, identifying food components, counterfeit drug screening, and more.

USGS EROS Center 105
Sioux Falls, SD
<http://eros.usgs.gov/>

The Earth Resources Observation and Science (EROS) Center is a field center for the U.S. Geological Survey (USGS). Fundamental to the EROS mission - "contributing to the understanding of a changing Earth" - is the collection and archiving of data about Earth's land surfaces, providing a visual and digital record of global features and environmental change, and ensuring the accessibility of these records to anyone, anywhere, and at no cost to users.

COMMITTEE MEETINGS

Monday, November 17

Committee Chairs & Division Directors

8:00 AM – 9:00 AM

Location: Big Thompson, Banquet Level

Journal Policy

9:00 AM – 10:00 AM

Location: Platte River, Banquet Level

Professional Practice Division (PPD)

9:00 AM – 10:00 AM

Location: Big Thompson, Banquet Level

Data Preservation & Archiving Committee (DPAC)

10:00 AM – 11:00 AM

Location: Platte River, Banquet Level

GIS Division

10:00 AM – 11:00 AM

Location: Big Thompson, Banquet Level

Lidar Division

11:00 AM – 12:00 PM

Location: Platte River, Banquet Level

**Joint Meeting with:
Sustaining Members Council
Convention Policy & Planning (CPPC)
National Technical Planning
Committee (NTPC)**

11:30 AM – 1:00 PM

Location: Technology Floor, Colorado Ballroom, Salons A & B

ASPRS Board Meeting

1:00 pm – 5:00 PM

Location: Colorado Ballroom, Salon D

MONDAY, NOVEMBER 17

Workshops

WS #1

Advanced Hyperspectral Sensing of the Terrestrial Environment

Dean Riley, Booze Allen Hamilton
 7:45 am until 12:15 pm; 0.4 CEU
 ADVANCED
 Location: Telluride B, Atrium Level

WS #2

Using Open Source Tools to Build Web Maps for the Federal Government

The NPMAP Team: Nate Irwin, NPMAP Lead; Mamata Akella, NPMAP Cartographer; Jim McAndrew, NPMAP Developer; Katrina Engelsted, NPMAP Developer
 7:45 am until 5:15 pm; 0.8 CEU
 INTERMEDIATE
 Location: Durango, Atrium Level

WS #3

International Charter Space & Major Disasters Overview with a Focus on Project Manager Training

Brenda Jones, U.S. Geological Survey
 7:45 am until 5:15 pm; 0.8 CEU
 INTRODUCTORY
 Location: Steamboat, Atrium Level

WS #6

Introduction to Unmanned Aerial System (UAS) Operations

Dave Prall, Unmanned Experts
 7:45 am until 5:15 pm; 0.8 CEU
 INTERMEDIATE
 Location: Telluride A, Atrium Level

WORKSHOP FEES

Full Day (WS #2, 3, 6)	Price
Member	\$275
Non-Member	\$375
Student	\$150
Half Day (WS #1, 5, 7)	Price
Member	\$200
Non-Member	\$300
Student	\$100

Continuing Education Credits (CEU's)

ASPRS is pleased to announce that Continuing Education Units (CEUs) are awarded for the ASPRS workshops. This program is being offered in conjunction with George Mason University.

The Continuing Education Unit (CEU) is a nationally recognized unit of measurement for participation in non-credit continuing education programs. Adults who successfully complete George Mason University's approved programs will be awarded continuing education units. A permanent record of CEUs awarded will be maintained in the university database and will be easily accessible for certification and verification purposes.

The objective of the CEU is to:

- Provide a nationally established record of professional development learning activity
- Encourage adult students to utilize educational resources to meet their personal and educational needs
- Recognize individuals who continue their education and keep themselves current in their chosen professions
- Enable individuals to have an accurate source of their current CEU activity
- Provide a system to document continuing education experiences in meeting certification requirements.

George Mason University, Office of Continuing Professional Education is registered with the National Association of State Boards of Accountancy (NASBA), as a sponsor of continuing professional education on the National Registry of CPE Sponsors. State boards of accountancy have final authority on the acceptance of individual courses for CPE credit.

TUESDAY, NOVEMBER 18

Workshops

WS #5

Extended Multispectral Satellite Remote Sensing in the VNIR and SWIR

Dr. William Farrand and Rachana Ravi

7:45 am - 12:15 pm; 0.4 CEU

INTRODUCTORY

Location: Big Thompson, Banquet Level

WS #7

Making Movies out of Landsat Images: a Primer in Harmonic Regression and Related Multitemporal Algorithms used with Landsat Stacks

Evan B. Brooks, *Virginia Polytechnic Institute and State University, Department of Forest Resources and Environmental Conservation*

7:45 am until 12:15 pm; 0.4 CEU

INTRODUCTORY

Location: Platte River, Banquet Level

Committee Meetings

Primary Data Acquisition Division (PDAD)

9:00 AM – 10:00 AM

Location: Durango, Atrium Level

Poster Presentations

All **Posters** will be displayed on the Technology Floor beginning on Tuesday, November 18th at 12:00 noon. Symposium attendees are invited to view the posters anytime the Technology Floor is open.

Poster Presenters are requested to be near their posters for questions from attendees during the following special events on the Technology Floor:

- Welcome Luncheon on Tuesday, November 18th
- Exhibitors' Reception on Tuesday, November 18th
- Lunch with Exhibitors on Wednesday, November 19th

Poster presenters are not required to be near their posters at any time. The Symposium Planning Committee requests that Presenters are available during the above busy times on the Technology Floor. A Presenter who is available for questions and comments will receive much more effective feedback on their research.



TUESDAY, NOVEMBER 18

Welcome Lunch on the Technology Floor *included in most registrations*
12:00 noon – 1:00 pm Location: Technology Floor, Colorado Ballroom Salons A & B, Banquet level

Plenary Opening Session 1:00 PM – 2:30 PM
Location: Colorado Ballroom Salons C & D, Banquet level
Welcome & Opening Remarks

Tom Holm, *Pecora Steering Committee Chair, U.S. Geological Survey EROS*

Charles Toth, *President ISPRS Technical Commission I, ISPRS/IAG Commission Committee Chair, The Ohio State University*

Dorota A. Grejner-Brzezinska, *President IAG Commission 4, The Ohio State University*

Landsat: A Vision Realized!

Moderator: Dr. Frank Kelly, Director, USGS EROS

This session will discuss the importance of the Landsat Program to the Nation and the world, including a vision for sustaining land imaging. For over 40 years, Landsat imagery has played a critical role in monitoring ongoing changes to the Earth from population, industry, climate change, land

use and other factors. The continued collection of moderate resolution imagery is needed to provide an effective means to intensively and systematically measure the Earth's vital conditions as food and water and energy resources become ever more scarce.



Berrien Moore III
Vice President, Weather & Climate Programs
Dean, College of Atmospheric & Geographic Sciences
Chesapeake Energy Corporation Chair in Climate Studies
Director, National Weather Center

Dr. Berrien Moore III is an internationally recognized Earth scientist who has been honored by National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA). He received his Bachelor of Science in Mathematics in 1963 from the University of North Carolina and his PhD in Mathematics in 1969 from the University of Virginia.

Berrien Moore III joined the University of New Hampshire (UNH) mathematics faculty in 1969 and became a tenured professor in 1976. He was recognized by UNH in 1992 for research excellence and was named University Distinguished

Professor in 1997. From 1987 to 2008, Moore served for as the Director of the Institute for the Study of Earth, Oceans and Space at UNH. During his period at UNH, Moore also held numerous visiting scientist positions including visiting Senior Scientist at the Laboratoire de Physique et Chimie Marines at the Universite Pierre et Marie Curie in Paris and at the Institute of Meteorology at the University of Stockholm. Earlier, he served as a Senior Research Fellow at the East-West Center in Honolulu and as a Fellow at the Marine Policy and Ocean Management Program at the Woods Hole Oceanographic Institution. Currently, he serves on the UNH Foundation Board.

In 2008, Moore left UNH to serve as the founding Executive Director of Climate Central, a think-tank based in Princeton, New Jersey and Palo Alto, California, which is dedicated to providing objective and understandable information about climate change.

In the summer of 2010, Moore joined the University of Oklahoma, where he holds the Chesapeake Energy Corporation Chair in Climate Studies. He also serves as Dean of the College of Atmospheric and Geographic Sciences, Director of the National Weather Center, and Vice President for Weather and Climate Programs.

2014 Pecora Award Presentations

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). *continued on next page*

2014 Group Award

Landsat 8 Team - For outstanding contributions toward understanding the Earth's land surface and surrounding coastal regions

The Landsat Data Continuity Mission was successfully launched on February 11, 2013. Renamed Landsat 8 on May 30, 2013, this mission continues the goals established by William Pecora and other visionaries 50 years ago. The Landsat 8 Team consisting of NASA, USGS, and industry partners, has performed at the highest levels from the beginning of mission development to the present.

2014 Individual Award

Christopher Owen Justice - For outstanding contributions toward understanding the Earth by means of remote sensing.

Dr. Christopher O. Justice, Professor and Chair of Geographical Sciences, University of Maryland, has dedicated his career to remote-sensing education, research, and service. Dr. Justice has advanced remote sensing science, contributed to a better understanding of the changing Earth, and enriched the lives of many of today's leading remote-sensing scientists as an advisor, educator, and research director.

TUESDAY, NOVEMBER 18

Technical Sessions

2:45 PM – 4:15 PM

TS #1

Data Processing and Image Analysis

Moderator: Jason Stoker

Location: Telluride A, Atrium Level

Harmonic Regression of Multi-temporal Landsat Data for Forest Biophysical Parameter Estimation and Extrapolation

Evan Brooks, *United States*

J. W. Coulston, R. H. Wynne, V. A. Thomas

Bringing Algorithms to Landsat Data Using Hadoop

Srinivas Yarlanki, *United States*

R. Wynne, V. Thomas, A. Abbott

Using Genetic Sequencing Algorithms and Object-Oriented Multitemporal Satellite Image Analysis for Long-Term Change Characterization

John Long, *United States*

R.L. Lawrence, P.R. Miller, M.C. Greenwood, L.A. Marshall

A Fully Automated Approach to Classifying Urban Land Use and Cover from LiDAR, Multi-spectral Imagery, and Ancillary Data

Jason Perent, *United States*

Q. Lei

Determining the Optimum Number of Images for Generating 3D Point Clouds Using Structure from Motion

Farid Javadnejad, *United States*

J. Raugust, M. Olsen, D. Gillins

Multisensor Multitemporal Data Fusion Using Wavelet Transform

Sherin Ghannam, *United States*

M. Awadallah, A. L. Abbott, R. H. Wynne

TS #2

Agriculture, Drought and Water

Moderator: Jesslyn Brown

Location: Telluride B, Atrium Level

Beyond NDVI: Are FPAR, LAI, GPP, or LST Better for Estimating Crop Yields?

David Johnson, *United States*

Satellite Data Continuity for Drought Monitoring in VegDRI and QuickDRI models and products

Jesslyn Brown, *United States*

B. Wardlow, T. Tadesse, D. Howard, K. Callahan, C. Poulsen

Landsat-based Calculation of Agricultural Water Use Fractions in California

Lee Johnson, *United States*

F. Cassel-Sharma, D. Goorahoo, F. Melton

Near Real-Time Detection of Drought Severity Using MODIS Time Series: Implications for a National Monitoring Program

Jonathan Maynard, *United States*

J. W. Karl, D. M. Browning

Towards a Global Food Security-Support Data Product at 30 m Resolution (GFSAD30)

Prasad Thenkabail, *United States*

C. Milesi, M. Ozdogan, R. Congalton, C. Giri, J. Tilton, T. Sankey, P. Teluguntla, J. Xiong, M. Gumma, R. Massey, A. Phalke, K. Yadav

Understanding Water Shortage Affects on Farmland in California

Audra Zakzeski, *United States*

TS #3

UAS and Data Analysis

Moderator: Jeff Sloan

Location: Big Thompson, Banquet Level

U.S. Geological Survey (USGS) National Unmanned Aircraft Systems (UAS) Project Office

Jill Cress, *United States*

J. Sloan, L. Brady

Bureau of Land Management: Use of Unmanned Aerial Systems for Natural Resource Management

Matt Bobo, *United States*

J. Safran

Photogrammetrically Measuring Dryland Soil Erosion from a UAS Platform

Jeffrey Gillan, *United States*

J. Karl

Addressing Threats to Agriculture using UAS and Advanced Remote Sensing Techniques

Donna Delparte, *United States*

The Use of UAV's for Gathering Spatial Information

James Van Rens, *United States*

TUESDAY, NOVEMBER 18

Technical Sessions 2:45 PM – 4:15 PM

TS #4

Lidar Technology and Industry ISPRS Working Group I/2

Moderator: M. Kada and Dorota Iwaszczuk
Location: Platte River, Banquet Level

Long-Range, High-Resolution Terrestrial Scanning with a Frequency-Modulated, Continuous Wave LADAR System

Trenton Berg, *United States*
R.R. Reibel, J.R. Curry, B.M. Kaylor, S.C. Crouch, P.A. Roos

A Comparative Study Between Frequency-Modulated Continuous Wave LADAR and Linear Mode LiDAR

John Anderson, *United States*
R.D. Massaro, J.D. Nelson

Experiences with Sensor Level Full Waveform Compression

Michaela Quirk, *United States*
G. Jóźków, C. Toth

Planar Surface Segmentation using A Color-enhanced Hybrid Model for RGB-D Camera-based Indoor Mobile Mapping Point Clouds

Chenglu Wen, *China*
S. Lin, C. Wang, J. Li

Hierarchical Extraction of Multiple Objects from Mobile Laser Scanning Data Based on Multi-Scale Supervoxel

Dong Zhen, *China*
Y. Bisheng, Z. Gang, D. Wenxia

Terrestrial Method for Airborne Lidar Quality Control and Assessment

Naif Muidh Alsubaie, *Canada*
H.M Badawy, M.M Elhabiby, N El-Sheimy

TS #5

Algorithmic Developments ISPRS Working Group I/3 and I/4

Moderator: Dr. Ayman Habib and Peter Reinartz
Location: Durango, Atrium Level

A Novel Quality Control Procedure for the Evaluation of Laser Scanning Data Segmentation Outcome

Dr. Ayman Habib, *Canada*
Z. Lari, K. Al-Durgham

A SLAM-based Procedure For Calibrating a Mobile Laser Scanning System

Michael Hahn, *Germany*
M. Ziegler

Camera Calibration with Radial Variance Component Estimation

Balazs Melykuti, *Germany*
E. Kruck

RGB-D Indoor Plane-based 3D-Modeling using Autonomous Robot

Navid Mostofi, *Canada*

Least Squares Image Matching: A Comparison of the Performance of Robust Estimators

Zeyu Li, *Australia*
J. Wang

A Change Detection Measure Based on the Number of Connected Components for Flood Detection in SAR Images

Jun Lu, *Canada*
J. Li, L. Zhao, B. Xiong, G. Kuang

TUESDAY, NOVEMBER 18

Special Topic Short Sessions 4:30 PM – 5:30 PM

TS #6

Outreach and Education

Moderator: John Faundeen
Location: Durango, Atrium Level

Integrating the UAS in Undergraduate Teaching and Research - Opportunities and Challenges at UNG

Jitendra Sharma, *United States*
D Hulsey

Providing Professional Development in Remote Sensing for Community College Instructors

Jeannie Allen, *United States*

4-H and Pictometry Online - Youth Development from a Bird's Eye View

Susan Hoskins, *United States*

Explaining the basic concept of geography to K-12 Students: Abstraction

Raechel Bianchetti, *United States*
S. Hoskin, J. Allen

TUESDAY, NOVEMBER 18

Special Topic Short Sessions 4:30 PM – 5:30 PM

TS #7

Camera Calibration Special Session ISPRS Working Group I/3 and ICWG III/I

Moderator: Charles Toth and Boris Jutzi

Location: Telluride A, Atrium Level

The Potential of Automated Target-Free Camera Calibration (Invited Presentation, 30 min.)

Clive Fraser, *Australia*

Calibration of Multi-camera Photogrammetric Systems

Mehdi Mazaheri, *Canada*

I. Detchev, S. Rondeel, A. Habib

Linear Approach for Initial Recovery of the Exterior Orientation Parameters of Randomly Captured Images by Low-Cost Mobile Mapping Systems

Fangning He, *Canada*

A. Habib

TS #8

Remote Sensing for Managing BLM Lands

Moderator: Matt Bobo

Location: Telluride B, Atrium Level

Close-Range Photogrammetry: 3D Data Collection In Your Control

Neffra Matthews, *United States*

T. Noble, M. Bobo, T. Burton

Moderate-Scale Remote Sensing Applications For Vegetation Mapping and Monitoring

Brian Hadley, *United States*

M. Bobo, E. Kachergis

Subsurface Geophysical Remote Sensing Methods and Applications in Natural Resource Management

Jason Frels, *United States*

Multi-scale Monitoring for Adaptive Management: The BLM AIM Strategy

Emily Kachergis, *United States*

M. Bobo, S. Lamagna, B. Hadley, S. W. Miller, M. Karl, C. Spurrier, J.

Karl, S. McCord, G. Toevs

TS #9

Landsat and Sentinel

Moderator: Jennifer Lacey

Location: Platte River, Banquet Level

Copernicus: The Sentinel-2 Mission

Bianca Hörsch, *Italy*

Operational Land Imaging; Europe's Copernicus Global Land Service

Alan Belward, *Italy*

M. Cherlet, G. Dubois

Copernicus Sentinel-2 Mission: Products, Algorithms and CalVal

Dr. Ferran Gascon, *Italy*

Integrating Data from the Landsat and Sentinel-2 Missions: An Opportunity to Improve Time Series of Medium Resolution Satellite Data

Jennifer Lacey, *United States*

J. Dwyer

TS #10

UAS for Disaster Prediction, Management, and Response – Panel Session

Moderator: Ben Vander Jagt

Location: Big Thompson, Banquet Level

This Student Advisory Council (SAC) organized session will focus on the applications and use of Unmanned Aerial Systems (UAS) in disasters of natural and anthropogenic causes. In addition to formal presentations, time will be allotted for an open discussion.

Panelists

Chris Miser, *Falcon UAV*

Jeff Sloan, *US Geological Survey*

James Bialas, *Michigan Tech University*

Omar Mora, *The Ohio State University*

EXHIBITORS RECEPTION

SEE PG. 8 FOR DETAILS

5:30 PM – 7:00 PM

Posters

Location: Technology Floor, Colorado Ballroom, Salons A & B, Banquet Level

Poster presenters are requested to be near their poster, to answer questions and discuss their research, during lunch breaks, at the Exhibitors' Reception and during refreshment breaks, as their schedule allows. Poster titles below are in alphabetical order.

Posters on display are not in a particular order.

A CityGML Extension For Traffic-Sign Objects That Guides The Automatic Processing Of Data Collected Using Mobile Mapping Technology

Belen Riveiro, *Spain*

P. Arias, H. González-Jorge, J. Martínez-Sánchez, M. Varela

A Comparison of Simulated Leaf Area Index Values and Satellite-derived LAI Values From an Oak-Hickory Forest Complex in Southwestern Virginia, USA

John Iames, *United States*

E. Cooter

A Geospatial Analysis and Geoheritage Investigation of Land Use Practices in the Upper Pecos River Valley, New Mexico, USA.

Amanda Aragon, *United States*

J. P. Zebrowski

Access, Efficiency, and User Engagement of Remote Sensing Data Services at EROS, USGS

Raad Saleh, *United States*

An Integrated Multi-platform Approach for Evaluating Brush Management Conservation Efforts in Semiarid Rangelands

Chandra Holifield Collins, *United States*

M. Kautz, G. Ponce-Campos, J. Hottenstein

Building Detection from Multispectral Satellite Images using Two Different Strategies

Lizy Abraham, *India*

M. Sasikumar

Data Mining Social Media and Natural Language Processing Applications for Rapid Crisis Response

Sam Aden, *United States*

J.P. Bialas

Development and Processing of Landsat TM and ETM+ Imagery to High-Level Products

Steve Foga, *United States*

J. Dwyer

Evaluating Sensor Linearity of Chosen Infrared Sensors

Piotr Walczykowski, *Poland*

A. Orych, A. Jenerowicz, P. Karcz

Examining the Possibility of Correcting Imagery Acquired for the Purpose of Obtaining Spectral Reflectance Coefficients in the Infrared Range Using Photometric Measurements

Michal Kedzierski, *Poland*

A. Orych, P. Walczykowski, A. Fryskowska

Hyperspectral Remote Sensing of Vegetation: Knowledge Gain and Knowledge Gap after 40 Years of Research

Prasad Thenkabail, *United States*

J. Lyon, A. Huete

Imagery-based UAS Navigation Data Analysis

Arpad Barsi, *Hungary*

Z. Koppányi, T. Lovas, B. Molnár

Implementation of NLDAS, GridMET and Statsgo Data Layers on the Google Earth Engine

Charles Morton, *United States*

R. Allen, J. Huntington, A. Kilie, D. Thau, N. Gorelick, B. Kamble, R.

Trezza, I. Ratcliffe, C. Robison

Impact of the Cameras Radiometric Resolution on the Accuracy of Determining Spectral Reflectance Coefficients

Agata Orych, *Poland*

P. Walczykowski, A. Jenerowicz, Z Zdunek

Joint Agency Commercial Imagery Evaluation (JACIE) Image Quality

Greg Stensaas, *United States*

K. Thome, D. Mita, M. Goldberg

Land Cover Change in the United States Northern Great Plains 1973-2011

Kristi Sayler, *United States*

Landscape Pattern and Change by Integration of Multi-Sensor Remote Sensing and Stonewall Feature Identification

Rebecca Trueman, *United States*

Y.Q. Wang

Lineament Extraction from SPOT 5 and NigeriaSat-X Imagery of the Upper Benue Trough, Nigeria

Kehinde Ogunmola, *Nigeria*

E.A Ayolabi, S.B Olobaniyi

Maintaining JPSS Product Quality

Paula Smit, *United States*

K. Grant, W. Ibrahim, K Brueske

Managing Natural Resources Using NSLRSDA Assets: How You Can Tap Into This National Treasure

John Faundeen, *United States*

T. Holm

Photogrammetric Mapping Using Unmanned Aerial Vehicle

Edson Mitishita, *Brazil*

N Graça, J. Eduardo

Photogrammetric Processing of Apollo's Images

Ahmed Elaksher, *United States*

Posters (continued)

Pre-processing of Xeva-XS imagery for Determining Spectral Reflectance Coefficients in Laboratory Conditions

Anna Fryskowska, *Poland*
P. Walczykowski, A. Orych, M. Kedzierski

Radiometric Workflow for Aerial and Satellite Electro-optical Sensors

Greg Stensaas, *United States*
R. Ryan, D. Helder, M. Pagnutti

Registration of Time of Flight Terrestrial Laser Scanner Data For Stop-and-go Mode

Hani Mohammed, *Canada*
N. M. Alsubaie, M. Elhabiby, N. El-sheimy

Seamless Synthetic Aperture Radar Archive for Interferometry Analysis

Brian Buechler, *United States*
G. Bryson

Spatial Analysis From Remotely Sensed Observations of Congo Basin of East African High Land to Drain Water Using Gravity for Sustainable Management of Low Laying Chad Basin of Central Africa

Babagana Modu, *Nigeria*
B. Herbert

Spectral and Socioeconomic Assessment of Land Use/Land Cover Changes in Chippewa and Eau Claire Counties, WI

Drew Briski, *United States*
C. Wilson, E. Fabian

Study of Landcover Change in Yelwa-Heipang Area of Plateau State, North-Central Nigeria: A Geoinformatics Approach

Kehinde Ogunmola, *Nigeria*
E.N. Gajere, D.N. Jeb, I.J. Agene

Test field for Airborne Laser Scanning in Finland

Eero Ahokas, *Finland*
H. Kaartinen, A. Kukko, P. Litkey

Test of an Object-Oriented Empirical Distribution-Based Strategy for High-Resolution Landcover Classification

Francois Smith, *United States*
M. Angeles

The Air Pollution in China — On-site and Remote Sensing PM2.5 Concentrations

Jonathan Li, *China*
J. Wang, S. Li

Understanding Spatio-Temporal Mobility Patterns Among Senior, Child/Student and Adult Using Smart Card Data

Jing Tan, *China*
X. Huang

USGS LandsatLook Viewer: Past, Present, and Future

Rynn Lamb, *United States*
E. Wood, R. Longhenry

Vegetation Response to Intensive Commercial Horticulture in Central Highlands, Kenya

Faith Justus, *United States*



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.

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 Meetings 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
- Invitations to Technical Committee and Division meetings
- Local, regional, national and international networking opportunities
- Eligibility for over \$18,000 in National and Region 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)

Registration Open 7:00 AM to 5:00 PM
Location: Colorado Ballroom Foyer, Banquet level

Technology Floor Open 9:30 AM to 3:30 PM
Location: Colorado Ballroom Salons A & B, Banquet level

Plenary Session II 8:30 AM – 10:00 AM Location: Colorado Ballroom Salons C & D, Banquet level

Opening Remarks

Stewart Walker, *ASPRS President, BAE Systems*

ISPRS Remarks & Awards

Christian Heipke, *ISPRS Secretary General, Leibniz University Hannover*
Marguerite Madden, *ISPRS Second Vice President, University of Georgia*

UAS to Satellites: Platforms, Sensors, Technology, and Systems

Moderator: Jeff Sloan, USGS

During the past several decades, there has been an explosion in airborne and satellite technologies designed to help us understand our changing planet. This general session will highlight how remotely sensed data acquired using the latest technology and platforms are being used to further our understanding of an ever-changing Earth.

Small Unmanned Aircraft Systems (sUAS) Technology and Applications in Agriculture

Dr. Kevin P. Price, EVP Research and Technology Development
RoboFlight Systems, LLC



Dr. Kevin Price recently joined RoboFlight after serving as a Professor in the Department of Agronomy, with a 20 percent teaching appointment in Geography, at Kansas State University. Before transferring to KSU in the fall of 2008, he spent 19 years on the faculty at the University of Kansas where he served as the Associate Director of the Kansas Applied Remote Sensing (KARS) Program. His Ph.D. is in Biogeography from the University of Utah, and he has B.S. and M.S. degrees in Range Science from Brigham Young University, Provo, Utah. Dr. Price has been working in the field of remote sensing and geographic information systems (GIS) for 33 years.

NOAA Utilization of the Global Hawk Unmanned Aircraft for High-Impact Weather Research and Forecast Improvement

Gary Wick, Physicist, NOAA Earth System Research Laboratory, Physical Sciences Division (ESRL/PSD) on detail to the NOAA Unmanned Aircraft Systems Program



Dr. Gary Wick is a Physicist in the Physical Science Division of NOAA's Earth System Research Lab (ESRL). Gary is working on the Science Definition Team in NOAA's UAS Program. Gary's involvement in the UAS Program will be focused on high impact weather projects, in particular the new Sensing Hazards with Operational Unmanned Technology (SHOUT). Gary will continue to serve as the NOAA PI for the Global Hawk dropsonde system as part of the Severe Storm and Sentinel Project.

Using Unmanned Aircraft for In-Situ Sensing with Wireless Sensor Networks

Anthony Carfang, Research Assistant, University of Colorado's Research and Engineering Center for Unmanned Vehicles



Anthony Carfang is a Ph.D. candidate at the University of Colorado, Boulder, in Aerospace Engineering under Dr. Eric Frew. His research focuses on communication systems for unmanned aerial vehicles, specifically optimal control of aircraft to enhance communication in sparse wireless sensor networks. He received his Masters of Engineering from UC Boulder in 2012, and his Bachelor of Science in 2008 at Illinois Institute of Technology, receiving a B.S. in both Aerospace Engineering and Computer Science with a specialization in Information Security. He previously worked at Northrop Grumman and Ironbridge Software, as well on projects with US FIRST Robotics. When not busy with research, Anthony is an avid bike racer, competing at the Collegiate National Championships in 2014.

Refreshment Break on Technology Floor

10:00 AM – 10:30 AM

WEDNESDAY, NOVEMBER 19

Technical Sessions

10:30 AM – 12:00 NOON

TS #11

Mobile Mapping Technologies: Sensing ICWG I/Va and ICWG I/Vb

Moderator: Jonathan Li and JoaoFernando Silva
Location: Telluride A, Atrium Level

A Mobile Platform with a Catadioptric Sensor

Antonio Tommaselli, *Brazil*

J. Marcato Junior, A.L. Olivete, M.A.V. Moraes

Video-based Mobile Mapping System using Smartphones

Adel Moussa, *Canada*

A. Al-Hamad, N. El-Sheimy

Georeferencing Experiments with UAS Imagery

Grzegorz Jozkow, *United States*

C. Toth

Performance of a Real-Time Sensor and Processing System on a Helicopter

Franz Kurz, *Germany*

D. Rosenbaum, O. Meynberg, G. Mattyus, P. Reinartz

Experiences with Light Weight Fixed Wing Aerial Mapping UAVs

Werner Mayr, *Germany*

Feasibility study of using RoboEarth's Cloud Computing For Rapid Mapping And Tracking With Small Unmanned Aerial Systems

Julien Li-Chee-Ming, *Canada*

C. Armenakis

TS #12

Future of Land Imaging Section 1 (Government) – Panel Session

Moderator: Greg Stensaas
Location: Big Thompson, Banquet Level

Panelists

Greg Stensaas, *United States*

USGS Requirements Capabilities and Analysis Project

Tim Newman, *United States*

US GEO and OSTP Earth Observation Assessments

Brad Doorn, *United States*

NASA/USGS Sustainable Land Imaging

Jon Christopherson, *United States*

Joint Agency Commercial Imagery Evaluation and Future Imaging Systems

TS #13

National Land Cover Data (NLCD) Program

Moderator: Collin Homer
Location: Platte River, Banquet Level

NLCD Special Session: The National Land Cover Database, Delivering Land Cover Change Data for the Nation Since 2001- Status and Future Plans

Collin Homer, *United States*

The National Land Cover Database Project: The Story of Its Impact

Carol Deering, *United States*

Approaches Towards Analyzing, Reporting, and Visualizing Coastal Land Cover Change

John McCombs, *United States*

N. Herold

Quantifying Urban Land Cover Trends with NLCD imperviousness at US Historical Climatology Network Climate Stations between 2001 and 2011

George Xian, *United States*

K Gallo, C Homer

National Land Cover Database Evaluation, Visualization & Analysis (NLCD EVA) Tool

Christopher Barnes, *United States*

TS #14

International Association of Geodesy (IAG) Special Session – ISPRS TC I

Moderator: Boris Jutzi and Charles Toth
Location: Durango, Atrium Level

PNT: Concept Evolution, Future Trends and Applications (Invited Presentation, 30 min.)

Dorota Grejner-Brzezinska, *United States*

Reference Frames, Timing and Applications

Larry Hothem, *United States*

Addressing the Challenges for High Performance Collaborative Positioning in Vehicular Ad-Hoc Networks

Allison Kealy, *Australia*

A. Rabian, M. Morelande, C. Toth, D. Brzezinska, G. Retscher

Indoor Ultra-Wide Band Network Adjustment using Maximum Likelihood Estimation

Zoltan Koppanyi, *Hungary*

C. K. Toth

Development of a Multi-Sensor System for Road Condition Mapping

Alvand Miraliakbari, *Germany*

M. Hahn, H-G. Maas

Technical Sessions 10:30 AM – 12:00 NOON

TS #15

Clouds and Shadows

Moderator: Jim Vogelmann

Location: Telluride B, Atrium Level

Cloud Impact on Landsat Surface Observations: An Assessment Based on a Decade Of Daily Terra MODIS Observations

Darrel Williams, *United States*

S. Goward, T. Loboda

Crowds for Clouds: Using an Internet Workforce to Interpret Satellite Images

Sheryl Ball, *United States*

R. Wynne, L. Yu, C. Blinn, K. Moeltner, S. Peery, V. Thomas

Cirrus Cloud Effects on Land Use Classification of Multitemporal Landsat 8 Data: A Case Study Using Hierarchical/Multilevel Models

Randolph Wynne, *United States*

G.B. Anderson

Accuracy Standards for Landsat Climate Data Records: An Assessment of Cloud/Shadow Masking and Topographic Normalization Over Snow-Covered Surfaces

Christopher Crawford, *United States*

D. Hall

ISPRS Committee Meetings

ISPRS TC 1 Officers Meeting

12:30 PM - 1:30 PM

Location: Big Thompson, Banquet Level

ISPRS Working Group I/1 Officers Meeting

1:30 PM – 3:00 PM

Location: Big Thompson, Banquet Level

Lunch with Exhibitors'

12:00 PM until 1:30 PM

Location: Technology Floor, Colorado Ballroom Salons A & B, Banquet level

Take some time out of your busy week and have lunch with the Exhibitors. Included with most registrations.

ASPRS Certification Program



ASPRS certification is official recognition by one's colleagues, peers and the Geospatial industry that an individual has demonstrated professional integrity and competence in his or her field.

The ASPRS certification program includes:

Professional Certification as a

- Photogrammetrist
- Mapping Scientist – Remote Sensing
- Mapping Scientist – GIS/LIS
- Mapping Scientist – Lidar

Technologist Certification as a

- Photogrammetric Technologist
- Remote Sensing Technologist
- GIS/LIS Technologist
- Lidar Technologist

www.asprs.org/Certification-Program



"ASPRS certification is a major accomplishment and significantly elevates one's authority."
– Mike Renslow



Plenary Session III 1:30 PM – 3:00 PM

Location: Colorado Ballroom Salons C & D, Banquet level

Opening Remarks

Tom Holm, *Pecora Steering Committee Chair, U.S. Geological Survey EROS*

Land Change Science: User Perspectives Panel Discussion

Moderator: Jim Irons, NASA

There has been remarkable progress over the last several decades towards developing data sets that characterize the Earth's land surface properties, ranging from local to global scales. This session will explore recent

progress towards developing these data sets, and will describe how these data sets are being used to assess and manage our natural resources.

Panelists



Professor Chris Justice received his Ph.D. from the University of Reading, UK and is currently the Chair of the Department of Geographical Sciences, University of Maryland. He was the Discipline Lead for the development of NASA MODIS Land Product Suite and now has the same role for NASA Suomi NPP VIIRS Land Discipline Team.

He is a co-investigator on the Landsat Science Team, with Dr. Eric Vermote. He is the Program Scientist for the NASA Land Cover Land Use Change Program and is the Co-Chair of the GOCF-GOLD Fire Implementation Team. He is Co-Chair of the NASA LANCE User Working Group. His research is in the development and use of time-series earth observation satellite data, starting with the AVHRR and subsequently with MODIS and VIIRS. He research has a focus on the practical use of satellite remote sensing for societal benefit and he has developed systems for global agriculture, fire and land use monitoring. He is currently studying the extent and impacts of global agricultural drought and has been instrumental in the development of the GEO-GLAM initiative endorsed by the G20 Agricultural Ministers, for which he is Co-Chair of the global program. He co-leads the Center for Agricultural Monitoring Research at the University of Maryland.



Dr. Alan Belward works at the European Commission's Joint Research Centre in Italy where he is Head of the **Land Resource Management Unit**— provides information for European and International policies aiming to balance competing land-use demands while securing access to natural resources and maintaining ecosystem services. In the 1990s he co-chaired the

International Geosphere Biosphere Programme's Land Cover Working Group and chaired the Committee for Earth Observing Satellites (CEOS) Working Group on Calibration and Validation. From 2002 to 2006 he chaired the Global Climate Observing System's (GCOS) Terrestrial Panel and in 2009 he was appointed to the GCOS Steering Committee. He was a member of the NASA and USGS Landsat Data Continuity Mission Science Team from 2007 to 2011 and is currently part of the European Space Agency's Sentinel-2 Mission Advisory Group. He is also a visiting lecturer at the Technical University of Vienna where he teaches Environmental Technologies and International Affairs.



Tom Loveland has been engaged in research in the use of remote sensing for land characterization for over 30 years and has been involved in land cover studies spanning local to global scales. Loveland is a USGS land-change science research leader, chairs the USGS-NASA Landsat Science Team, and is the co-director of the USGS-South Dakota State University Geospatial Sciences Center of Excellence. Loveland serves on numerous national and international science advisory panels dealing with remote sensing, land use and land cover dynamics, environmental monitoring, and global environmental change. Tom Loveland has a BS and MS in Geography from South Dakota State University and a Ph.D. in Geography from the University of California, Santa Barbara. Loveland serves on numerous national and international science advisory panels dealing with remote sensing, land use and land cover dynamics, environmental monitoring, and global environmental change. Tom Loveland has a BS and MS in Geography from South Dakota State University and a Ph.D. in Geography from the University of California, Santa Barbara.

Refreshment Break on Technology Floor

3:00 PM – 3:30 PM

Technical Sessions

3:30 PM – 5:00 PM

TS #16

Mobile Mapping Technologies: Methods ICWG I/Va and ICWG III/I

Moderator: Antonio Tommaselli and Chenglu Wang
Location: Telluride A, Atrium Level

Motion Vector Field Estimation Using Brightness Constancy Assumption and Epipolar Geometry Constraint

Siavash HosseinyAlamdary, *United States*
A. Yilmaz

On the use of INS to improve Structure from Motion

Andrea Masiero, *Italy*
A. Guarnieri, A. Vettore, F. Pirotti

GNSS/IMU Data Supported Feature Matching for Aerial Oblique Images

Yunsheng Zhang, *China*
Z Zou, H Pan, T Tao

Automating the Photogrammetric Bridging Based on MMS Image Sequence Processing

JoaoFernando Silva, *Brazil*
M.C. Lemes Neto, V. Blasechi

Detection and Localization of 3D Traffic Signposts using Mobile Laser Scanning Data

Yongtao Yu, *China*
J. Li, H. Guan, D. Zai, C. Wang

A Graph Based Registration Method for UAV LiDAR Data and Sequent Images

Chi Chen, *China*
B.S. Yang

TS #17

Multi-Resolution Land Characterization

Moderator: Rick Mueller
Location: Telluride B, Atrium Level

High Spatial Resolution Land Cover Development for the Coastal United States

Eric Morris, *United States*
C. Robinson, N. Herold

Approximating Prediction Uncertainty for Random Forest Regression Models

Christine Blinn, *United States*
J. Coulston, V. Thomas, R. Wynne

Methods, Improvements, Accuracy, and Use of the Recently Completed 2010 NOAA Coastal Change Analysis Program Land Cover

John McCombs, *United States*
N. Herold

Integrating Recent Land Cover Mapping Efforts to Update the National Gap Analysis Program's Species Habitat Map

Alexa McKerrow, *United States*
A. Davidson, T. Earnhardt

Six Years of Continuous Conterminous US Agricultural Land Cover Monitoring

Rick Mueller, *United States*

TS #18

Imaging Systems: Advances, Calibration, and Quality – Panel Session

Moderator: Raad Saleh
Location: Big Thompson, Banquet Level

Panelists

Milan Karspeck, *United States*

High Resolution Satellite Calibration

K. Harrison, D. Mulawa

Dennis Helder, *United States*

Spatial Calibration of Sensors

Robert Ryan, *United States*

Radiometric Correction Workflow for Aerial Imaging Systems

Part I - Laboratory Calibration

Mary Pagnutti, *United States*

Radiometric Correction Workflow for Aerial Imaging Systems

Part II - Post Acquisition Processing

Kurt Thome, *United States*

Radiometric Calibration and Effects on Government Sensors

Steve Foga, *United States*

Land Image Product Validation

G. Stensaas

Technical Sessions 3:30 PM — 5:00 PM

TS #19

UVS: Sensors and Applications ICWG I/Vb

Moderator: Görres Grenzdörffer and Costas Armenakis
Location: Platte River, Banquet Level

Taking UAS to the Next level

Jeff Lovin, *United States*

Supporting Remote Sensing Research with Small Unmanned Aerial Systems

Robert C. Anderson, *United States*

C. Shanks, L. Kritis, K. Vehhaus, M. Trani

Autonomous Hyperspectral UAS Photogrammetry for Environmental Monitoring Applications

Eija Honkavaara, *Finland*

T. Hakala, L. Markelin, A. Jaakkola, H. Saari, H. Ojanen, I. Pölönen

Crop Height Determination with UAS Point Clouds

Görres Grenzdörffer, *Germany*

Point Cloud Generation from sUAS-Mounted iPhone Imagery: Performance Analysis

Andras Ladai, *United States*

J. Miller

Analysis of Point Cloud Generation from UAS Images

Steven Ostrowski, *United States*

G. Józków, C Toth

TS #20

DEM/DSM Accuracy and Analysis Working Group I/4

Moderator: Karsten Jacobsen and Peter Reinartz
Location: Durango, Atrium Level

DSM Accuracy Evaluation for the ISPRS Commission I Image Matching Benchmark (Invited Presentation, 30 min.)

Georg Kuschik, *Germany*

P. Reinartz, D. Poli, P. d'Angelo

DTM Generation In Forest Regions from Satellite Stereo Imagery

Jiaojiao Tian, *Germany*

T. Krauss, P. Reinartz

Assessment of Ice-Dam Collapse by Time-Lapse Photos at the Perito Moreno glacier, Argentina

Maria Gabriela Lenzano, *Argentina*

E. Lannutti, C. K. Toth, L.E. Lenzano, A. Lovecchio

Analyzing the Effects of Spatial Resolution for Small Landslide Susceptibility and Hazard Mapping

Omar Mora, *United States*

M.G. Lenzano, C.K. Toth, D.A. Grejner-Brzezinska

Performance Validation of High Resolution Digital Surface Models Generated By Dense Image Matching With The Aerial Images

Dr. Huseyin Bayraktar, *Turkey*

N. Yastikli, Z. Erisir

MANUAL OF REMOTE SENSING, 4TH EDITION

Visit Booth 305! Come one, come all! Meet with the editors of the ASPRS Manual of Remote Sensing, 4th edition to learn about “MRS4”.... an electronic document that focuses on new technologies, developments, and applications of remote sensing since the 3rd edition of the Manual. There is still time to join the team and contribute your expertise and knowledge to this ground-breaking project. Stan Morain and Amy Budge will be available to describe MRS4 and answer questions.

THURSDAY, NOVEMBER 20

Technical Sessions 8:30 AM – 10:00 AM

TS #21

Sensing in Urban Environment Working Group I/2

Moderator: Norbert Haala and Franz Mayer
Location: Platte River, Banquet Level

Alignment of 3D Building Models and TIR Video Sequences with Line Tracking

Dorota Iwaszczuk, Germany
U. Stilla

Automated Processing of High Resolution Airborne Images for Earthquake Damage Assessment

Francesco Nex, Italy
E. Rupnik, I. Toschi, F. Remondino

Thermal 3D Mapping for Object Detection in Dynamic Scenes

Martin Weinmann, Germany
J. Leitloff, L. Hoegner, U. Stilla, S. Hinz, B. Jutzi

Synergy Between LiDAR and Image Data in Context of Building Extraction

Aluir Dal Poz, Brazil

Road Tunnel Deformation Monitoring Using Terrestrial LiDAR Data

Dawei Zai, China
J. Li, Y. Yu, H. Guan, C. Wang

3D Mapping and Framework Structure Extraction of Building Interiors Using a Mobile Mapping System

Chenglu Wen, China
S. Pan, C. Wang, J. Li

TS #22

New Technologies and Systems

Moderator: Bruce Cook
Location: Steamboat, Atrium Level

Prospects of Photon Counting Lidar for Savanna Ecosystem Structural Studies

David Gwenzi, United States
M.A. Lefsky

Reducing the Complexity of Satellite Thermal Imagers through Denoising Algorithms

Robert Ryan, United States
M. Pagnutti, K. Holekamp

Semi-Automated Life Form Classification Tool for Photogrammetrically-Derived Point Clouds - A Case Study in the National Petroleum Reserve-Alaska

Jung-kuan Liu, United States
M Bobo, T Noble

Lidar Data Quality Through Analysis of Inter Swath Accuracy: A USGS-ASPRS Effort

Aparajithan Sampath, United States
H. K Heidemann, G. L Stensaas, J. B Christopherson

Fusion of LiDAR Pseudo-Waveforms and WorldView-2 Imagery for Object-Based Land Cover Mapping

Yuhong Zhou, United States
F. Qiu

TS #23

Fire Special Session (1)

Moderator: Amber Soja
Location: Telluride A, Atrium Level

NASA Applied Science Program - Wildland Fire: Driving Research to Operations

Amber Soja, United States
V.G. Ambrosia, L. Friedl

Development and Application of Spatially Refined Remote Sensing Active Fire Data Sets in Support of Fire Monitoring, Management and Planning

Wilfrid Schroeder, United States
J. Coen, P. J. Riggan, E. Hinkley, B. Quayle, E. Lorenz, G. Ruecker, P. Oliva

RECOVER: An Automated, Cloud-Based Decision Support System for Post-Fire Rehabilitation Planning

Mark Carroll, United States
J. Schnase, K. T. Weber, R. Gill, M. Wooten, K. Serr, J. May

Enhanced Wildland Fire Management Decision Support Using Lidar-Infused LANDFIRE Data

Birgit Peterson, United States

TS #24

Policy and Technology ISPRS TC I

Moderator: Boris Yutzi and Bryan Mercer
Location: Durango, Atrium Level

ISPRS and ICORSE: Intensifying Cooperation (Invited Presentation, 30 min.)

Lawrence A. Friedl, United States

On the Design of High Resolution Imaging Systems

Ralf Reulke, Germany
Dr. Eckardt

Evaluation of Skybox Video and Still Image Products

Pablo d'Angelo, Germany
G. Kuschik, P. Reinartz

Exploiting Satellite Focal Plane Geometry for Automatic Extraction of Traffic Flow from Single Optical Satellite Imagery

Thomas Krauss, Germany

Image Quality Parameters - A Critical Review

Ralf Reulke, Germany

THURSDAY, NOVEMBER 20

Technical Sessions

8:30 AM – 10:00 AM

TS #25

Mapping and Monitoring Land Cover Change (1)

Moderator: Kristi Saylor

Location: Big Thompson, Banquet Level

Development of a Remote Sensing Derived Fire History and its Application in Spatial and Temporal Analyses of Burn Patterns in the Mojave Ecoregion

Rob Klinger, *United States*

Mr. McKinley, Dr. Picotte, Dr. Brooks

Landsat Time Stacks Enable Discrimination of Forested Wetlands and Upland Forests

Valerie Thomas, *United States*

N. Kayastha, A. Banskota, J. Galbraith

An Automated Approach to Identify Burned Areas in Landsat Imagery

Todd Hawbaker, *United States*

S. Stitt, Y. Beal, G. Schmidt, J. Falgout, C. Mladinich, N. Brunner, M. Caldwell, R. Bosshart, J. Takacs, J. Riegle

Land Cover and Land Use Change in Ghana from 2000 to 2010: Multi-temporal Landsat ETM+ Image Processing Approaches for a Cloud Prone Study Area

Douglas Stow, *United States*

L. Coulter, M. Benza-Fiocco, N. Ibanez, H. Shih

TS #26

National Land Imaging: Landsat 8 and Beyond (1)

Moderator: Jennifer Lacey

Location: Telluride B, Atrium Level

Landsat Operations Project Status

Jennifer Lacey, *United States*

J. Lacasse, K. Alberts

Impacts of Landsat 8 Technical Advancements

James Irons, *United States*

T.R. Loveland, J.G. Masek

Sustainable Land Imaging Architecture Study

Jim Nelson, *United States*

D. Jenstrom

Landsat Imagery Users and Uses Over Time: A Longitudinal Analysis Of User Survey Results

Holly Miller, *United States*

L. Richardson

Lessons from the Operational Land Imager (OLI) Design, Construction, and Operation

Edward Knight, *United States*

Analysis of the Performances of the Landsat8/OLI Surface Reflectance Product

Eric Vermote, *United States*

C. Justice

Refreshment Break in Exhibit Hall

10:00 AM – 10:30 AM

Location: Colorado Ballroom Foyer, Banquet level

All attendees welcome. Take a break and grab a beverage.

Plenary Session IV 10:30 AM – 12:00 NOON

Location: Colorado Ballroom Salons C & D, Banquet level

Opening Remarks

Michael Hauck, PhD., Executive Director, ASPRS

ISPRS Prague 2016 Congress Announcement

Lena Halounova, ISPRS Congress Director, Czech Technical University

Emergence of Data Mining and Image Analysis Techniques

The availability and volume of remotely sensed data has increased dramatically during the past few decades, and novel data mining and image analysis techniques provide an efficient and cost-effective alternative to the approaches

employed in the past. This session will address the challenges and opportunities offered by new supercomputing systems and signal processing algorithms for automated and interactive extraction of information

Petapixel Computing for All: Transforming Remote Sensing in the 21st Century

Moderator: Dr. Tom Loveland, USGS EROS

Rebecca Moore

Founder, Google Earth Engine & Earth Outreach, Google Inc



Rebecca Moore is an Engineering Manager at Google, where she initiated and leads the development of Google Earth Engine, a new technology platform that puts an unprecedented amount of satellite imagery online for the first time and enables scientists to conduct global-scale monitoring and measurement of changes in the earth's environment. Rebecca also conceived and leads the Google Earth Outreach program, which supports nonprofits, communities and indigenous peoples

around the world in applying Google's mapping tools to the world's pressing problems in areas such as environmental conservation, human rights and cultural preservation. Rebecca received a bachelor's degree with honors from Brown University in Artificial Intelligence and a master's degree from Stanford University. In 2013, Rebecca was recognized by the White House as a Champion of Change for Open Science. Her personal work using Google Earth was instrumental in stopping the logging of more than a thousand acres of redwoods in her Santa Cruz Mountain community.

around the world in applying Google's mapping tools to the world's pressing problems in areas such as environmental conservation, human rights and cultural preservation. Rebecca received a bachelor's degree with honors from Brown University in Artificial Intelligence and a master's degree from Stanford University. In 2013, Rebecca was recognized by the White House as a Champion of Change for Open Science. Her personal work using Google Earth was instrumental in stopping the logging of more than a thousand acres of redwoods in her Santa Cruz Mountain community.

Technical Sessions

1:15 PM – 2:45 PM

TS #27

Fire Special Session (2)

Moderator: Amber Soja

Location: Telluride A, Atrium Level

Rapid Response Tools and Datasets for Post-fire Erosion Modeling: Linking Remote Sensing and Process-based Hydrological Models to support Post-fire

Mary Ellen Miller, *United States*

W. J. Elliot, P. R. Robichaud, K. A. Endsley, M. Billmire

Conservation Impacts of a Near Real-time Monitoring and Alert System in the Tropics

Karyn Tabor, *United States*

J. Musinsky

Utilizing Multi-Sensor Fire Detections to Map Fires in the United States

Stephen Howard, *United States*

J. J. Picotte, M.J. Coan

Improving National Shrub and Grass Fuel Maps using Remotely Sensed Data And Biogeochemical Modeling to Support Fire Risk Assessments

Jim Vogelmann, *United States*

H. Shi, T. Hawbaker, Z. Li, M. Reeves.

TS #28

Mapping and Monitoring Land Cover Change (2)

Moderator: Kurtis Nelson

Location: Big Thompson, Banquet Level

Landscape Disturbance Mapping by the LANDFIRE Program

Kurtis Nelson, *United States*

Atlas of Urban Expansion 2015 Edition

Daniel Civeo, *United States*

S. Angel, J. Hurd, J. Parent

A Land Product Characterization System (LPCS) for Monitoring Land Surface Change

Calli Jenkerson, *United States*

G. Stensaas, J. Dewyer, K. Gallo, R. Longhenry

On-the-Fly Massively Multitemporal Change Detection Using Statistical Quality Control Charts and Landsat Data

Evan Brooks, *United States*

R. H. Wynne, V. A. Thomas, C. E. Blinn, J. W. Coulston

TS #29

National Land Imaging: Landsat 8 and Beyond (2)

Moderator: Dennis Helder

Location: Telluride B, Atrium Level

Landsat 7 & 8 Long Term Acquisition Plan

Eugene Fosnight, *United States*

T. J. Arvidson

Landsat-8 TIRS Radiometric Performance

Julia Barsi, *United States*

M. Montanaro, B.L. Markham, S.J. Hook, J.R. Schott, N.G. Raqueno

Landsat-8 OLI and TIRS On-Orbit Performance and Data Quality

Brian Markham, *United States*

J. C. Storey, R. Morfitt, R. Hayes

Using Landsat 8 to Improve Global Land Survey Geometric Accuracy

James Storey, *United States*

M. Choate

Thermal Infrared Sensor (TIRS) Stray Light

Ron Morfitt, *United States*

M. Montanaro, S. Rohrbach, A. Gerace

Pseudo Invariant Calibration Sites (PICS): An Overview of Calibration Methodologies

Dennis Helder, *United States*

N. Mishra, A. Angal, X. Xiong

TS #30

EuroSDR Special Session Working Group 1/2, 1/4 and 1/5

Moderator: Clive Fraser and Bryan Mercer

Location: Steamboat, Atrium Level

Benchmark on High Density Aerial Image Matching

(Invited Presentation, 30 min.)

Norbert Haala, *Germany*

S. Cavegn

Oblique Aerial Camera Systems - A Review

(Invited Presentation, 30 min.)

Fabio Remondino, *Italy*

Oblique Aerial Photography for Building Inspection and Damage Assessment

Arnadi Murtiyoso, *France*

F. Remondino, E. Rupnik, F. Nex, P. Grussemeier

Multi-Platform Very High Resolution Photogrammetry – A New Benchmark Dataset for the Scientific and NMCA Communities

Francesco Nex, *Italy*

M. Gerke, F. Remondino

Mapping Using High-Resolution Satellite Imagery – A Review

Daniela Poli, *Austria*

THURSDAY, NOVEMBER 20

Technical Sessions 1:15 PM – 2:45 PM

TS #31

Long-term Data Records and Essential Climate Variables

Moderator: John Dwyer and
Location: Durango, Atrium Level

Normalization of global long term Landsat data to standard sun-target-sensor geometry using MODIS BRDF parameter climatology

Hankui Zhang, *United States*
D. Roy, V. Kovalsky

Preliminary Assessment of USGS Burned Area Essential Climate Variables Product over the Conterminous United States 2000-2013

Carol Mladinich, *United States*
N. Brunner, M. Caldwell, Y.-J. Beal

The Atmospheric Compensation Component of a Landsat Surface Temperature (LST) Product: Assessment of Errors Expected for a North American Test Product

John Schott, *United States*
M. J. Cook

Leaf Area Index Estimation in Loblolly Pine Plantations with Landsat 8

Christine Blinn, *United States*
R. H. Wynne, V. A. Thomas, T. R. Thomas, A. D. Gerace, J. R. Schott

An Evapotranspiration Mapping Tool at Landsat Resolution on the Google Earth Engine: EEFlux

The EEFlux Team, *United States*
R. Allen, B. Kamble, C. Morton, A. Kilic, J. Huntington, C. Robison, I. Rattcliffe, R. Trezza, D. Thau, T. Erickson, N. Gorelic

Comprehensive Regional Lake Water Quality Measurements by Satellite Remote Sensing: Capabilities and Limitations with Current and Upcoming Satellite Systems

Leif Olmanson, *United States*
P.L. Brezonik, J.C. Finlay, M.E. Bauer

THURSDAY, NOVEMBER 20

Technical Sessions 3:00 PM – 4:30 PM

TS #32

Geometric and Radiometric Properties of Sensors

Working Group 1/3 and Working Group 1/4

Moderator: Daniela Poli and Boris Jutzi
Location: Durango, Atrium Level

Radiometric and Geometric Characteristics of Pleiades Images

Karsten Jacobsen, *Germany*
H. Topan

Improving HySpex Sensor Co-registration Accuracy using BRISK and Sensor-model based RANSAC

Peter Schwind, *Germany*
M. Schneider, R. Müller

On-orbit Calibration and Validation of the Skybox Imaging Constellation

Byron Smiley, *United States*
J. Levine, A. Chau, M. Shearn, B. Hermalyn

The Influence of the In Situ Camera Calibration in the Direct Georeferencing of Aerial Imagery

Edson Mitishita, *Brazil*
R. Barrios, J. Centeno

A Generic Camera Calibration Method for Conventional and Fish-eye Lenses by Minimising Object Space Error

Panu Srestasathiern, *Thailand*
N. Soontranon

Technical Sessions

3:00 PM – 4:30 PM

TS #33

Land Cover Mapping

Moderator: Todd Hawbaker
Location: Telluride A, Atrium Level

Land Cover Classification with Multispectral Imagery, Lidar Data and Object-based Image Analysis

Marvin Bauer, *United States*

L.G. Olmanson, J.F. Knight, D. Kilberg, M. Martin, M. Voth, J. Dunsmore

Time Series Analysis of Wetland Dynamics through Spectral Mixture Analysis of Landsat Satellite Imagery

L. Monika Moskal, *United States*

M. Halabisky

Zero-inflated Methods for Estimating Percent Canopy Cover in Montana Lynx Habitat Using Landsat 5 and 8 Imagery

Shannon Savage, *United States*

R. Lawrence, J. Squires

Identifying Woody Vegetation on Coal Surface Mines using Phenological Indicators with Multitemporal Landsat Imagery

Adam Oliphant, *United States*

J. Li, R. H. Wynne, P. F. Donovan, C. E. Zipper

Predicting Mangrove Biomass Patterns of Sunda Banda Seascape, Indonesia

Mingshu Wang, *United States*

M. Madden, I. Hendy, G. Ahmadi, Estradivari

Generating Rapid and Cost-Effective Biomass Calibration/Validation Datasets using Hyperspectral Narrowbands and Other Non-Destructive Methods

Michael Marshall, *United States*

P. Thenkabail

TS #34

Satellite Systems for Earth Observation

Working Group 1/5 and Working Group 1/1

Moderator: T. Xinming and Ralf Reulke
Location: Telluride B, Atrium Level

Detection and Compensation of Band-to-band Registration Error for Multi-spectral Imagery Caused By Satellite Jitter

Ying Zhu, *China*

M. Wang, Q. Zhu, J. Pan

Vehicle Detection and Classification from High Resolution Satellite Images

Lizy Abraham, *India*

M Sasikumar

Thermal Infrared Earth Resource Monitoring Instrument (THERMI) for Future Landsat Missions

Jed Hancock, *United States*

R. Esplin, J. Cardon, D. Williams, S. Goward

Evaluation of the Consistency of Landsat-5 TM, Landsat-7 ETM+ and Landsat-8 OLI Surface Reflectance Products

Eric Vermote, *United States*

M. Claverie, B. Franch Gras, J. Masek

Noise Filtering of Remotely Sensed Images using Iterative Thresholding of Wavelet and Curvelet Transforms

Rizwan Ahmed Ansari, *India*

B. K. Mohan

Impacts of Stochastic Models On Real-time 3D UAV Mapping

Muwaffaq Alqurashi, *Australia*

J. Wang

TS #35

Geospatial Data Accuracy and the New Mapping Accuracy Standard: New Era

Panel Session

Moderator: Dr. Qassim Abdullah
Location: Steamboat, Atrium Level

This session will introduce the final draft of the new "ASPRS Positional Accuracy Standards for Digital Geospatial Data". Speakers in the session will discuss other topics related to geospatial data accuracy, including UAS accuracy tests, error propagation and related topics. The audience will have a chance for live questions and answers.

The New ASPRS Positional Accuracy Standards for Digital Geospatial Data

Qassim A. Abdullah, *United States*

ASPRS UAS Calibration and Test Ranges

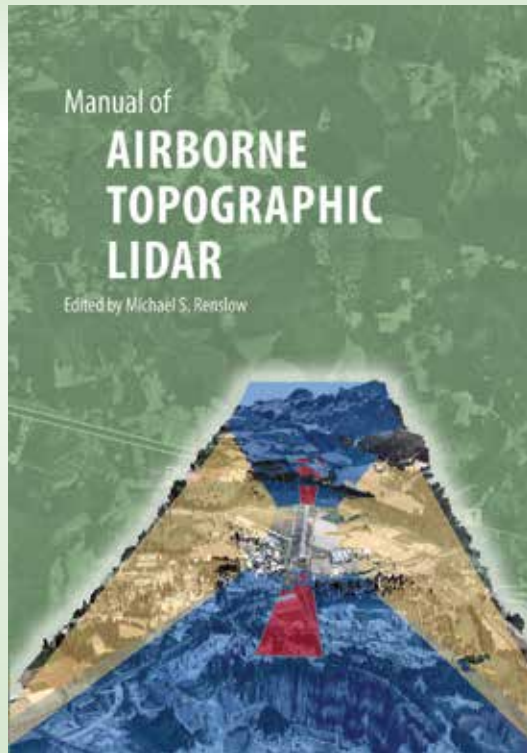
Pierre Le Roux, *United States*

The Applicability of the New ASPRS Positional Accuracy Standards to the Measurement and Reporting of Accuracy from Small Unmanned Aerial Systems (sUAS)

Becky Morton, *United States*

Manual of Airborne Topographic Lidar

Edited by Michael S. Renslow



The ASPRS *Manual of Airborne Topographic Lidar* covers all the relevant topics relating to the science behind lidar systems, mission planning, data collection and management, quality control/quality assurance, and product development.

Selected topics are discussed in-depth

- The Global Navigation Satellite System
- Full Waveform Lidar
- Digital Terrain Modeling using GIS
- Rotary-Wing and Fixed-Wing Installations
- Calibration
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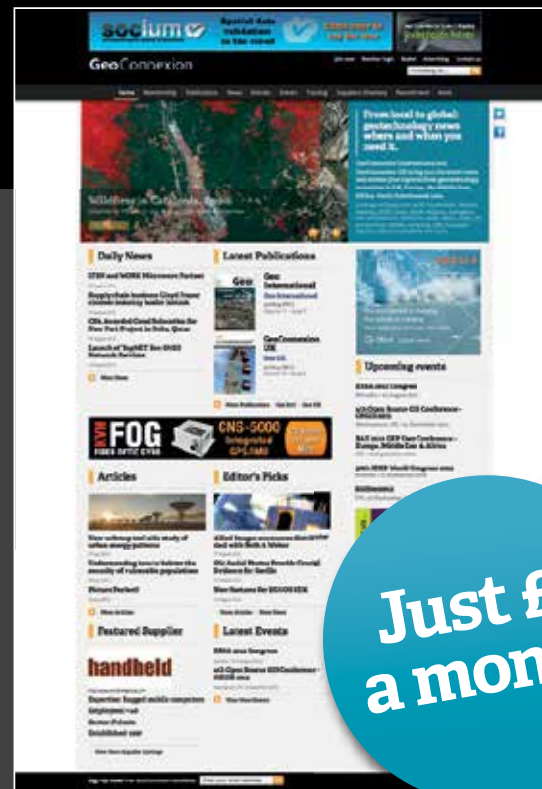
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