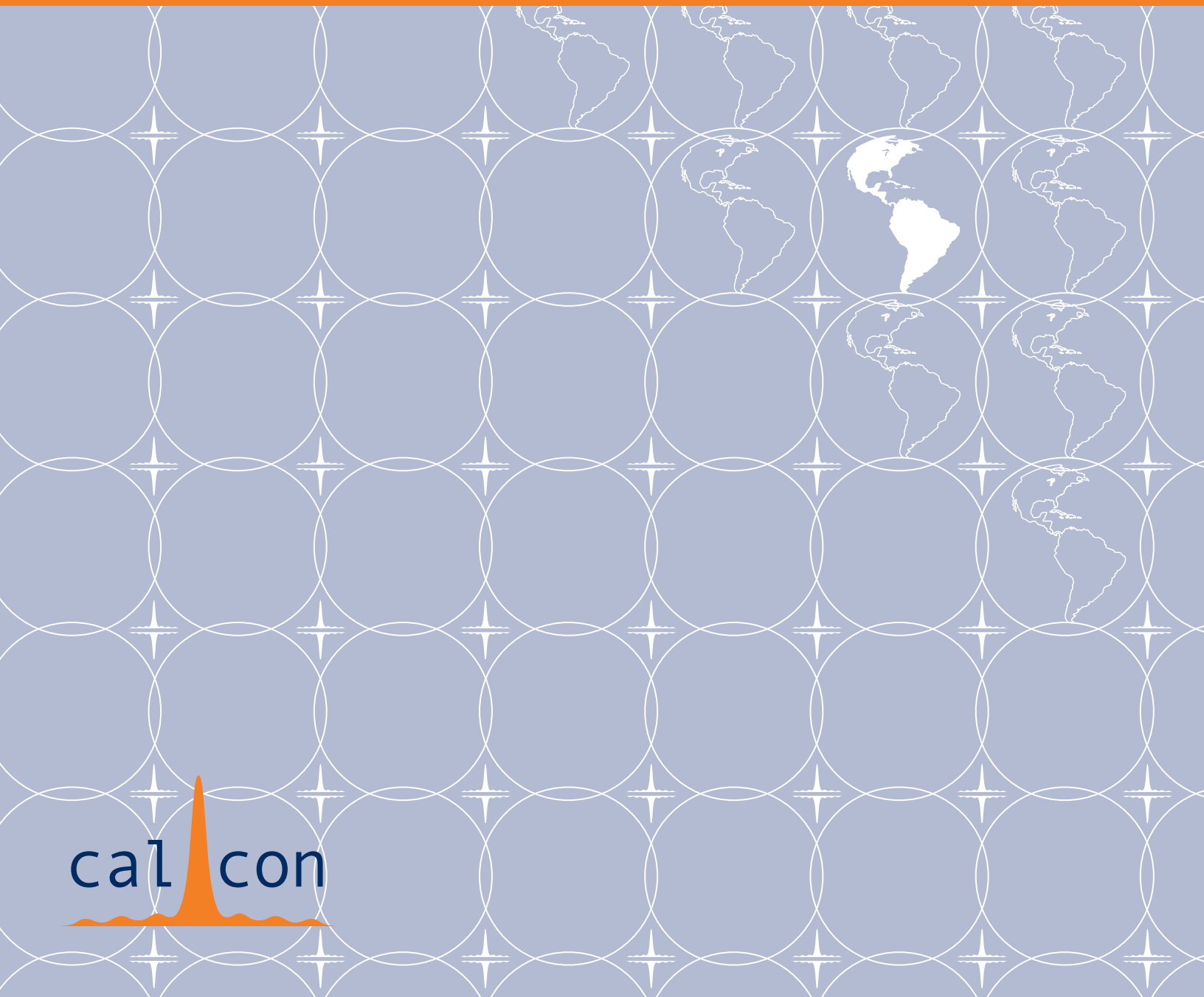
2010

CALCON Technical Conference

Sessions Posters

August 23 to 26, 2010

Utah State University Eccles Conference Center, Logan, Utah, USA



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Welcome to the 19TH Conference on Characterization and Radiometric Calibration for Remote Sensing. We hope you find the oral and poster presentations informative and interesting. We encourage you to take advantage of this time to discuss ideas and challenges, make new contacts, and foster existing relationships. Thank you for joining us.

Conference Presenters

The Speaker Ready Room is located in Room 212. Speakers must deliver their presentation to be uploaded to the server on or before the day and time specified below:

Monday Speakers:	Due by Monday, August 23	12:30 P.M.
Tuesday Speakers:	Due by Monday, August 23	3:00 P.M.
Wednesday Speakers:	Due by Tuesday, August 24	3:00 P.M.
Thursday Speakers:	Due by Wednesday, August 25	3:00 P.M.

Conference Presenters

All speakers are required to attend an audiovisual meeting with the technician and session chairs. This is your opportunity to be trained with the audio visual equipment as well as meet your session chair. You are required to attend the meeting on the day of your presentation. Audiovisual meetings will be held in Auditorium Room 216 at the following times:

Monday Speakers & Session Chairs:	Monday, August 23	12:30-1:00 P.M.
Tuesday Speakers & Session Chairs	Tuesday, August 24	7:30-7:55 A.M.
Wednesday Speakers & Session Chairs:	Wednesday, August 25	7:30-7:55 A.M.
Thursday Speakers & Session Chairs:	Thursday, August 26	7:30-7:55 A.M.

Exhibit Hours

Monday, August 23:	12:00 P.M.–5:00 P.M.	Check-In/Set-up
Tuesday, August 24:	7:00 A.M.–9:30 A.M.	Final Touch-Ups
	9:30 A.M.–4:30 P.M.	Show Open
Wednesday, August 25:	9:30 A.M.–4:30 P.M.	Show Open
	4:30 P.M.–5:00 P.M.	Take-Down
Thursday, August 26:	8:00 A.M.–1:00 P.M.	Take-Down

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Visit the conference website
www.spacedynamics.org/conferences/calcon

Conference Schedule*

Location—The Pre-Conference Tutorials and all conference sessions will be held in the Eccles Conference Center on the Utah State University Campus.

Monday, August 23, 2010

7:30 A.M. to 8:30 A.M.	Registration
8:30 A.M. to Noon	**Pre-Conference Tutorials**
	Option 1: Basics and Applications of Spectroradiometry
	Option 2: Atmospheric Retrieval Methods
Noon to 1:00 P.M.	Lunch Break
Noon to 1:00 P.M.	Registration
1:15 P.M.	Conference Welcome
1:30 P.M. to 3:15 P.M.	**SPOTLIGHT Session:** GSICS
3:15 P.M. to 3:45 P.M.	Break
3:45 P.M. to 5:50 P.M.	**Technical Session:** Pre-Launch Testing and Post-Launch Performance
6:30 P.M. to 8:30 P.M.	Opening Social at the Space Dynamics Laboratory

Tuesday, August 24, 2010

7:30 A.M. to 8:15 A.M.	Breakfast
8:15 A.M. to 10:10 A.M.	**SPOTLIGHT Session:** NPOESS
10:10 A.M. to 10:40 A.M.	Poster and Exhibit Viewing Break
10:40 A.M. to 12:20 P.M.	**SPOTLIGHT Session:** NPOESS (cont.)
12:20 P.M. to 1:30 P.M.	Lunch Provided
1:30 P.M. to 2:30 P.M.	**Keynote Introduction and Address**
2:30 P.M. to 3:45 P.M.	**SPOTLIGHT Session:** WISE
3:45 P.M. to 4:20 P.M.	Break
4:20 P.M. to 6:05 P.M.	**Technical Session:** Calibration Methods for Climate Change Measurement & Modeling
6:30 P.M. to 8:30 P.M.	LBIR Users' Board Meeting
	Free Evening

Wednesday, August 25, 2010

7:30 A.M. to 8:15 A.M.	Breakfast
8:15 A.M. to 10:00 A.M.	**Technical Session:** National Standards Technology Advancement
10:00 A.M. to 10:45 A.M.	Poster and Exhibit Viewing Break
10:45 A.M. to 12:50 P.M.	**SPOTLIGHT Session:** Landsat OLI
12:50 P.M. to 1:45 P.M.	Lunch Provided
1:45 P.M. to 3:30 P.M.	**Technical Session:** Radiometric Sensor Calibration Uncertainty & Error Analysis
3:30 P.M. to 4:00 P.M.	Break
4:00 P.M. to 5:45 P.M.	**Technical Session:** Calibration of Microwave Radiometers & other Microwave Instruments
6:15 P.M. to 8:30 P.M.	BBQ in Logan Canyon

Thursday, August 26, 2010

7:30 A.M. to 8:15 A.M.	Breakfast
8:15 A.M. to 9:40 P.M.	**Technical Session:** Inter-calibration and Validation of Operational Sensors
9:40 A.M. to 10:10 A.M.	Break
10:10 A.M. to 12:15 P.M.	**Technical Session:** Calibration Methods using Celestial Objects
12:15 P.M. to 1:00 P.M.	Lunch Provided
1:00 P.M. to 2:25 P.M.	US-Only Restricted Session
2:25 P.M. to 3:00 P.M.	Break
3:00 P.M. to 4:20 P.M.	US-Only Restricted Session (cont.)
4:20 P.M.	Conference End

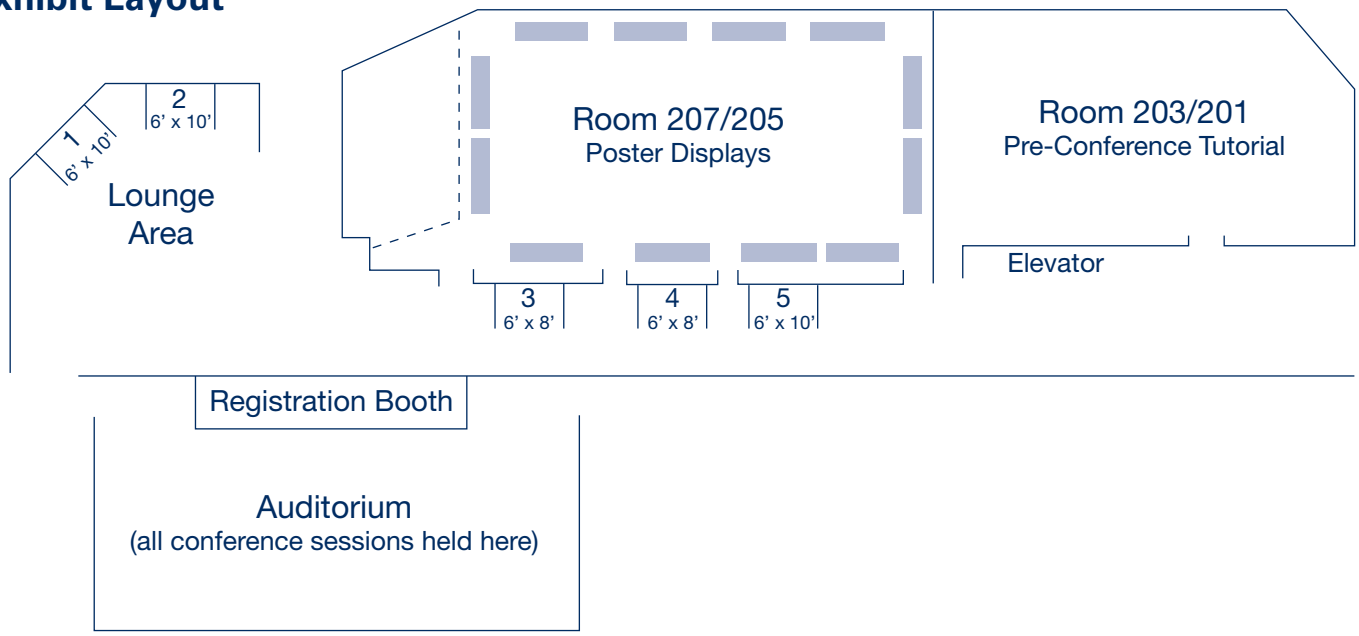
*Conference schedule is based on information available at the time of publication and is subject to change.

Exhibit Information

Exhibit Hours

Monday, August 23	Tuesday, August 24	Wednesday, August 25	Thursday, August 26
Exhibit Setup	9:30 A.M. to 4:30 P.M.	9:30 A.M. to 4:30 P.M.	Exhibit Closed

Exhibit Layout



Exhibitor Descriptions

Frontier Technology, Inc.
Booth Space 1
Exhibit Manager: Chris Cooper
Khowse@FTI-net.com
www.fti-net.com

Space Dynamics Laboratory
Booth Space 2
Exhibit Manager: Eric Warren
eric.warren@sdl.usu.edu
www.spacedynamics.org

CI Systems, Inc.
Booth Space 5
Exhibit Manager: Kim Browne
kbrowne@cisystemsinc.com
www.ci-systems.com

Visit the conference website
www.spacedynamics.org/conferences/calcon

Monday, August 23

— 7:30 A.M. to 8:30 A.M. Registration

— 8:30 A.M. to 12:00 P.M. Pre-Conference Tutorials

Pre-Conference Tutorial Option 1

Basics and Applications of Spectroradiometry

Howard Yoon, NIST

Physicist, Optical Technology Division, Optical Thermometry and Spectral Methods Group

Howard Yoon is currently a Physicist in the Optical Technology Division at NIST. He is also the US National Representative for radiation thermometry on the Consultative Committee for Thermometry at the BIPM. He received his Ph.D. from the University of Illinois at Urbana-Champaign and has published over 90 technical publications, mostly in the areas of spectroradiometry and radiation thermometry. Since 2001, he has organized the NIST Spectroradiometry Short Course, where much of the information for the Calcon tutorial was derived.

Dr. Howard Yoon will cover the fundamentals of radiometry, radiometric properties of sources and detectors, reflectance properties of materials, applications of spectroradiometric techniques, and measurement uncertainties. The basic concepts will be illustrated with applied spectroradiometric measurement examples from the NIST calibration services and from the NIST short courses. The intended audiences of the tutorial are scientists, engineers, and technicians engaged in spectroradiometric measurements.

Pre-Conference Tutorial Option 2

Atmospheric Retrieval Methods

— **Reflective Solar Bands—Istvan Laszlo, NOAA**

Research scientist, Satellite Meteorology and Climatology Division, Environmental Monitoring Branch

Istvan Laszlo is the aerosol and radiation budget lead scientist at NESDIS/STAR. He received an M.S. degree in Astronomy/Physics and a Ph.D. degree in Physics from the Eötvös Loránd University in Budapest, Hungary and has published over 50 peer-reviewed journal articles, monographs and reports. Laszlo's research interests include atmospheric radiation, radiative transfer, radiation budget and remote sensing of atmospheric and surface properties from space. He is currently working on remote sensing of aerosol properties from space and on the estimation of the shortwave radiation budget from current and future operational geostationary satellites.

Dr. Istvan Laszlo will present an introduction to the physics of atmospheric remote sensing at reflective solar wavelengths, including radiative transfer and measurement retrieval methods. A complete review of all methods of data retrieval is beyond the scope of the presentation, although source references for further study on an individual basis will be described.

— **Infrared—Chris Barnet, NOAA**

Physical scientist, Satellite Meteorology and Climatology Division, Sensor Physics Branch

Christopher Barnet is a member of the Infrared Atmospheric Sounding Interferometer (IASI) sounding team and the NPOESS Sounder Operational Algorithm Team (SOAT) and currently leads the calibration and validation team for the Cross-track Infrared Sounder and Advanced Technology Microwave Sounder (ATMS) Environmental Data Records (EDRs). He received a B.S. degree in electronics technology (1976), M.S. degree in solid state physics (1978) from Northern Illinois University, DeKalb and a Ph.D. (1990) from New Mexico State University, Las Cruces. At the Office of Satellite Applications and Research (STAR) of NOAA/NESDIS, he is currently exploiting operational sounder missions to provide measurements of ozone, carbon monoxide, carbon dioxide, and methane in the free troposphere.

Dr. Chris Barnet will present an introduction to the physics of atmospheric remote sensing at infrared wavelengths, including radiative transfer, measurement retrieval methods and applications of infrared data in weather and climate studies.

— **Microwave—Fuzhong Weng, NOAA**

Chief, Satellite Meteorology and Climatology Division, Sensor Physics Branch

Fuzhong Weng is the chief of Sensor Physics Branch of NOAA/NESDIS/Center for Satellite Applications and Research and also Senior Scientist of Joint Center for Satellite Data Assimilation (JCSDA). He received his Ph.D. degree in 1992 from Department of Atmospheric Science, Colorado State University (CSU), Fort Collins, USA. Dr. Weng is a leading expert in satellite instrument calibration, radiative transfer theory and modeling, satellite products developments, applications of satellite data in weather and climate prediction models, and satellite data assimilation. He has published over 80 papers in the international peer-reviewed journals and the awards he has received include the NOAA Administrator's Award for developing new and powerful radiative transfer models to assimilate advanced satellite data.

Dr. Fuzhong Weng will present an introduction to the physics of atmospheric remote sensing at microwave wavelengths, including radiative transfer, measurement retrieval methods and applications of microwave data in weather and climate studies.

Monday, August 23

— 12:00 P.M. to 1:15 P.M. Registration

— 1:15 P.M. to 1:30 P.M. **Conference Welcome:** Scott Hinton, Dean of the College of Engineering, Utah State University

Spotlight Session—GSICS

Session Chair: Mitch Goldberg, NOAA/NESDIS/STAR

— 1:35 P.M. **Overview of GSICS Program**
Mitchell Goldberg—NOAA/NESDIS/STAR

— 1:55 P.M. **GSICS Activities at NOAA**
Xiangqian Wu, Fuzhong Weng—NOAA/NESDIS/STAR; Aleksandar Jelenak—UCAR; Robert Iacovazzi, Fangfang Yu—ERT

— 2:15 P.M. **The Calibration of Geostationary Visible Sensors Using MODIS as a Reference for GSICS**
David Doelling—NASA Langley; Rajendra Bhatt, Daniel Morstad, Arun Gopalan—SSAI

— 2:35 P.M. **Deriving an Inter-sensor Consistent Calibration for the AVHRR Solar Reflectance Data Record**
Andrew Heidinger—NOAA/NESDIS

— 2:55 P.M. **An Update on the NOAA MSU/AMSU CDR Development**
Cheng-Zhi Zou—NOAA/NESDIS/STAR

— 3:15 P.M. to 3:45 P.M. Refreshment Break

Pre-launch Testing & Post-launch Performance

Assess pre- and post-launch calibration and performance characterization for operational remote sensing systems.

Session Chair: Jim Butler, NASA Goddard Space Flight Center

— 3:50 P.M. **Characterization of MODIS Solar Diffuser On-orbit Degradation**
Jack Xiong—NASA Goddard Space Flight Center; Zhipeng Wang, Hongda Chen; Junqiang Sun—Sigma Space Co.; Amit Angal—SSAI

— 4:10 P.M. **Trend Analysis of Onboard Calibration Data of Terra/ASTER/VNIR and SWIR and One of the Suspected Causes of their Sensitivity Degradations**
Kohei Arai—Saga University; Nagamitsu Ohgi—JAROSS

— 4:30 P.M. **Anti-Reflection Coating Absorptions In IR Systems**
Andrea Gilbert, Ray Russell, Pete Fuqua, Chris Panetta, Jim Barrie, Brad Hirasuna—The Aerospace Corporation

— 4:50 P.M. **SI Traceability of the Radiometric Calibration of the Atmospheric Infrared Sounder (AIRS)**
Margaret Weiler—Swales Aerospace; Kenneth Overoye—BAE Systems, Inc.

— 5:10 P.M. **Calibration Plan for the Thermal Infrared Sensor on the Landsat Data Continuity Mission**
Kurtis Thome, Dennis Reuter—NASA Goddard Space Flight Center; Allen Lunsford—Catholic University of America; Matthew Montanaro, Brian Wenny—Sigma Space Corporation; Zelalem Tesfaye—Bastion Technologies, Inc.

— 5:30 P.M. **Improved Calibration of Space-based Passive Microwave Cross-track Sounders**
Vincent Leslie, William Blackwell—MIT Lincoln Laboratory

— 6:30 P.M. to 8:30 P.M. Opening Social at the Space Dynamics Laboratory
1695 North Research Park Way, North Logan

Tuesday, August 24

— 7:30 A.M. to 8:15 A.M. Continental Breakfast

Spotlight Session—New NPP Sensor Testing Strategies & Test Results

Session Chair: Bruce Guenther, NOAA/NESDIS

— 8:30 A.M. **NIST Contributions to the 'Clouds and the Earth's Radiant Energy System' (CERES) Pre-Launch Ground Calibration Campaign**
Kory Priestley—NASA Langley Research Center/Science Directorate

— 8:50 A.M. **Recommended Testing Increments of ATMS Model 2: Benefits of the Tests**
William Blackwell—MIT Lincoln Laboratory

— 9:10 A.M. **CHILR Measurement of the CrIS ICT Emissivity**
Harri Latvakoski, Deron Scott, Gail Bingham—USU/Space Dynamics Laboratory; Leonard Hansen, Jinan Zeng—NIST

— 9:30 A.M. **CrIS Day in the Life Test Results**
Mark Esplin, Vladimir Zavyalov, Chad Fish—USU/Space Dynamics Laboratory; Daniel Mooney—MIT Lincoln Laboratory

— 9:50 A.M. **Expected On-orbit Performance of the CrIS and Comparisons with IASI and AIRS**
Dave Tobin, Hank Revercomb—University of Wisconsin-Madison, Space Science and Engineering Center

— 10:10 A.M. to 10:40 A.M. Refreshment Break
Poster Viewing—Authors Present

Spotlight Session—New NPP Sensor Testing Strategies & Test Results (cont.)

Session Chair: Bruce Guenther, NOAA/NESDIS

— 10:40 P.M. **VIIRS F1 Emissive Band Radiometry Summary: NASA Independent Analysis**
Jeff McIntire, Aisheng Wu, Hassan Oudrari—Sigma Space Corporation; Sergei Marchenko, Sanxiong Xiong—SSAI; Xiaoxiong Xiong, Jim Butler—NASA

— 11:00 A.M. **Spacecraft-level End-to-end Testing of the NPP VIIRS Solar Input Ports**
Craig Kent—Stellar Solutions, Inc.; Robert Lambeck, Glenn Iona—NASA Goddard Space Flight Center; Keith Lykke, Steven Brown—NIST; Tomas Gonzales—Ball Aerospace and Technologies Corporation; James McCarthy—Northrop Grumman Aerospace Systems

— 11:20 A.M. **VIIRS F1 Spacecraft Level Test Program: Strategy and Implementation of Laser Based Spectral Testing**
Chris Moeller—University of Wisconsin; Steve Brown, Keith Lykke—NIST; Bruce Guenther—NPOESS Integrated Program Office; Eric Johnson—Raytheon Corporation; Jim McCarthy—Northrop Grumman Aerospace Section; Tom Gonzales—Ball Aerospace and Technologies Corporation

— 11:40 A.M. **Interferometer-based Relative Spectral Responsivity for a VIIRS Type Sensor**
Joseph Rice, Jorge Neira—NIST; Dan LaPorte, Chris Moeller—University of Wisconsin, Madison; Jim Young—Microcosm

— 12:00 P.M. **SDL Experiences with Interferometric Testing of Sensor Spectral Characteristics**
James Peterson, Scott Hansen, Alan Thurgood—USU/Space Dynamics Laboratory

— 12:20 P.M. to 1:30 P.M. Lunch Provided

— 1:30 P.M. to 2:30 P.M. **Keynote Introduction and Address:** James Kiessling
Technical Advisor to the Director of MDA Engineering

Tuesday, August 24

Keynote Speaker

James Kiessling
Technical Advisor to the Director of MDA Engineering

Mr. Kiessling is a senior government technical professional with significant background and interests in the results of remote sensing and the means of performing remote sensing. During his career in industry, Mr. Kiessling worked with submarine launched missiles, design and development of missile interceptor prototypes and various sensors including ground based optics, aircraft sensors and sensors inserted into space. His principal interest and emphasis was on the phenomenology of objects in a near earth space environment and how remote sensing data could be applied to the problem of inferring object identity.

Mr. Kiessling transitioned to the Government where he has held a series of positions that have utilized and grown his skills in both sensors and phenomenology. As the Chief Engineer for Technology, he provided direction and oversight to the technology planning process which resulted in the BMDO Technology Master Plan. As the Program Integrator for the Discrimination Program, he provided oversight to the entire area of optical and radar data analysis, high fidelity signature modeling, and development of data collection assets. As Architect and Chief Engineer of the HALO Upgrade Program, he directed the overall engineering effort including requirements derivation, system design synthesis, functional partitioning to subsystems through flight testing. As the Chief Engineer, Airborne Infrared Surveillance (AIRS) Program he led the congressionally mandated program to evaluate the military utility of the Heimdall Sensor developed as part of the HALO II project. His current tasking is to serve as the technical advisor to the Director of MDA Engineering for issues in phenomenology and integration.

Spotlight Session—WISE

Session Chair: Mark Larsen, USU/Space Dynamics Laboratory

— 2:45 P.M. **WISE—the Wide-Field Infrared Survey Explorer**
Edward Wright—UCLA

— 3:05 P.M. **The Link Between Top Level Science Requirements, Payload Requirements, Ground Calibration Measurements, and On-Orbit Performance for the Wide Field Infrared Survey Explorer (WISE) Payload**
Mark Larsen, Joel Cardon, Harri Latvakoski, John Elwell—USU/Space Dynamics Laboratory; Roc Cutri, Frank Masci—Infrared Processing and Analysis Center; Amy Mainzer—Jet Propulsion Laboratory

— 3:25 P.M. **WISE Characterization**
Harri Latvakoski, Joel Cardon, Mark Larsen—USU/Space Dynamics Laboratory

— 3:45 P.M. to 4:20 P.M. Refreshment Break

Tuesday, August 24

Calibration Methods for Climate Change Measurement & Modeling

Methods and techniques that are capable of meeting the very stringent calibration precision and accuracy requirements of climate change measurement and modeling programs, and calibration results for sensors designed to achieve climate-quality measurement results.

Session Chair: Laura Hinkelman, JISAO/University of Washington

— 4:25 P.M. **Post-launch Calibration of the ISCCP Narrowband Visible Imagers for Climate Monitoring**
Laura Hinkelman—JISAO/University of Washington; Tom Stone—US Geological Survey; Paul Stackhouse, David Doelling, Seiji Kato—NASA Langley Research Center; William Rossow—City University of New York; Joseph Ferrier—NASA Goddard Institute for Space Studies; Rajendra Bhatt, Arun Gopalan, J. Colleen Mikovitz, Daniel Morstad—Science Systems and Applications, Inc.

— 4:45 P.M. **Solar Intensity Distributing and Convolving Optic (SIDCO) Concept for the CLARREO Visible-Near Infra-Red (VNIR)**
Grant Matthews—ITT

— 5:05 P.M. **Calibration of SSM/I and SSMIS Data for Weather and Climate Applications**
Fuzhong Weng—NOAA/NESDIS

— 5:25 P.M. **Inter-Calibration of Special Sensor Microwave Imager (SSM/I) Using Double Difference Technique (DDT) for Climate Change Measurements**
Ninghai Sun—I.M. System Group; Fuzhong Weng—NOAA/NESDIS/STAR

— 5:45 P.M. **A Global Atmospheric Monitoring Network Based on Standard Stars**
John McGraw, Peter Zimmer—University of New Mexico; Emilio Falco—Harvard Smithsonian Center for Astrophysics; Steven Brown, Claire Cramer, Gerald Fraser, Keith Lykke, Allan Smith, John Woodward—National Institute of Standards and Technology; Christopher Stubbs—Harvard University

— 6:30 P.M. to 8:30 P.M. LBIR User's Board Meeting
Free Evening

Conference Organizing Committee

Jim Butler
NASA

Changyong Cao
NOAA/NESDIS

Raju Datla
NIST

Scott Hansen
Space Dynamics Laboratory

Randy Jost
Space Dynamics Laboratory

David Pollock
University of Alabama-Huntsville

Ray Russell
The Aerospace Corporation

Deron Scott
Space Dynamics Laboratory

Joe Tansock
Space Dynamics Laboratory

Alan Thurgood
Space Dynamics Laboratory

Stephanie Halton
USU Research Foundation

Visit the conference website
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Wednesday, August 25

— 7:30 A.M. to 8:15 A.M. Continental Breakfast

National Standards Technology Advancement

Opportunities for communication and collaboration between national standards laboratories and the calibration community to improve calibration technologies and methodologies.

Session Chair: Raju Datla, Optical Properties and Infrared Technology Group/Optical Technology Division/ NIST

— 8:20 A.M. **Design and Performance of the NIST Missile Defense Transfer Radiometer (MDXR)**
Timothy Jung—Jung Research and Development Corporation; Adriaan Carter—Booz Allen Hamilton, Inc.; Solomon Woods, Simon Kaplan—National Institute of Standards and Technology

— 8:40 A.M. **IR Calibration Methodologies for the Missile Defense Transfer Radiometer (MDXR)**
Simon Kaplan, Solomon Woods—National Institute of Standards and Technology; Adriaan Carter—Booz Allen Hamilton, Inc.; Timothy Jung—Jung Research and Development Corporation

— 9:00 A.M. **Results of a NIST Comparison of Radiance Temperature in the Range of -40° C to 300° C with the National Metrology Institutes of Great Britain, Germany and Canada**
Vladimir Khromchenko—NIST/USU; S. Mekhontsev, L. Hanssen—National Institutes of Standards and Technology

— 9:20 A.M. **NIST Support for CLARREO Infrared Spectral Radiance**
Leonard Hanssen, Sergey Mekhontsev, Eric Shirley, Joseph Rice—National Institute of Standards and Technology

— 9:40 A.M. **Phase Transitions for On-orbit Temperature Recalibration**
T. Topham, G. Bingham, H. Latvakoski, M. Watson, D. Ahlstrom—USU/Space Dynamics Laboratory

— 10:00 A.M. to 10:45 A.M. Refreshment Break
Poster Viewing—Authors Present

Spotlight Session—Landsat OLI

Session Chair: Edward Knight, Ball Aerospace and Technologies Corporation

— 10:50 A.M. **The Operational Land Imager: Overview and Requirements**
Edward Knight—Ball Aerospace and Technologies Corporation

— 11:10 A.M. **Overview of the Radiometric Calibration of the Operational Land Imager (OLI)**
Geir Kvaran—Ball Aerospace and Technologies Corporation; Brian Markham—NASA Goddard Space Flight Center; Edward Zalewski—University of Arizona

— 11:30 A.M. **Characterization of LANDSAT Panels Using the NIST BRDF Scale from 1100 nm to 2500 nm**
Benjamin Tsai, David Allen, Catherine Cooksey, Howard Yoon, Jinan Zeng, Leonard Hanssen—NIST; Linda Fulton—Ball Aerospace and Technologies Corporation; Stuart Biggar—The University of Arizona; Brian Markham—NASA Goddard Space Flight Center

— 11:50 A.M. **OLI Radiometric Calibration: Ground Support Equipment Characterization and Calibration**
Hansford Cutlip, Holden Chase, Linda Fulton, Laura Schneider, Anna Pierce, David Gleeson, Geir Kvaran, Brent Canova—Ball Aerospace and Technologies Corporation; Carol Johnson, Robert Saunders, Zhigang Li—National Institute of Standards and Technology; Brian Markham, Lawrence Ong, Milton Hom—NASA Goddard Space Flight Center; Stuart Biggar—University of Arizona Remote Sensing Group

— 12:10 P.M. **Operational Land Imager: Using the Sun as the Source for Ground Based Radiometric Calibration**
Sandra Collins, William Good, Hansford Cutlip, Jonathan Seerveld, Paul Kaptchen, Geir Kvaran—Ball Aerospace and Technologies Corporation

— 12:30 P.M. **Stray Light Testing of the OLI Telescope**
Frank Grochocki, John Fleming—Ball Aerospace and Technologies Corporation

— 12:50 P.M. to 1:45 P.M. Lunch Provided

Wednesday, August 25

Radiometric Sensor Calibration Uncertainty and Error Analysis

Sensor calibration and characterization relies on models, measurements, and analysis to provide the needed data to derive results. Coupled with the models, measurements and analysis are estimates of errors and uncertainties that show how well the results are understood.

Session Chair: Eric Kintner, Frontier Technology, Inc.

— 1:50 P.M. **Statistical Biases in Noise Measurements Performed on Thermal Imagers**
Ze'ev Bomzon—CI Systems Ltd.

— 2:10 P.M. **Eigenvalue-Based Analysis of VIIRS Attenuator In-Out Calibration Data**
William Bicknell—MIT Lincoln Laboratory

— 2:30 P.M. **Vicarious Radiometric Calibration Based on Combined Accuracy Estimation**
Stefan Livens, Sindy Sterckx, Wouter Dierckx, Stefan Adriaensen, Ils Reusen—VITO Flemish Institute for Technological Research

— 2:50 P.M. **Radiant Sensing Calibration Zero-to-infinity**
David Pollock—University of Alabama Huntsville; Arvind Marathay—University of Arizona; John McCalmont—Air Force Research Laboratory/Sensors Directorate

— 3:10 P.M. **Preliminary CLARREO IR Instrument Error Analysis**
Joseph Tansock, Harri Latvakoski, Roy Esplin, Mark Esplin, Joel Cardon, Scott Jensen, Glen Hansen—USU/Space Dynamics Laboratory; Alan Little—NASA/Langley Research Center; Joe Walker—SSAI

— 3:30 P.M. to 4:00 P.M. Refreshment Break

Calibration of Microwave Radiometers and Other Microwave Instruments

Calibration and characterization issues associated with making radiometric measurements within the microwave band, including the comparison or fusion of microwave data with data obtained within the optical bands.

Session Chair: Fuzhong Weng, Center for Satellite Applications and Research—NOAA/NESDIS

— 4:05 P.M. **Comparison of Microwave and IR Sensor Calibration Error Budgets**
David Kunkee—The Aerospace Corporation

— 4:25 P.M. **ATMS NPP Preparation: Measured Channel Responses Resulting Spectral Response Function Analyses and Impact on Radiative Transfer Modeling Bias Corrections**
Lynn Chidester—USU/Space Dynamics Laboratory; Paul van Delst—Joint Center for Satellite Data Assimilation/EMC/SAIC; Giovanni DeAmici—Northrop Grumman Aerospace Systems (NGAS); William Blackwell—MIT Lincoln Laboratory; Steve Swadley—Naval Research Laboratory; Edward Kim—NASA Goddard Space Flight Center

— 4:45 P.M. **Proposal for "Best Practice" Guidelines for Characterization and Calibration/Validation (Cal-Val) of Instruments for Passive Microwave Remote Sensing**
David Walker—NIST; David Kunkee—NPOESS IPO; William Blackwell—MIT Lincoln Laboratory; Shannon Brown—NASA Jet Propulsion Laboratory

— 5:05 P.M. **Intersatellite Calibration of AMSU-A Tropospheric Temperature Channel 6**
Wenhui Wang—I. M. Systems Group at NOAA/NESDIS/STAR; Cheng-Zhi Zou—NOAA/NESDIS/STAR

— 5:25 P.M. **The Development of AMSU-A Fundamental CDR's**
Huan Meng, Ralph Ferraro—NOAA/NESDIS/Center for Satellite Applications and Research; Wenze Yang—University of Maryland College Park

— 6:15 P.M. to 8:30 P.M. Barbeque in Logan Canyon (Guinavah-Malibu Campground Group Site C)

Thursday, August 26

— 7:30 A.M. to 8:15 A.M. Continental Breakfast

Inter-calibration and Validation of Operational Sensors

Compare performance between sensors of differing scientific objectives, capabilities, and mission parameters to assess measurement bias and uncertainty.

Session Chair: David Tobin, Space Science and Engineering Center, University of Wisconsin-Madison

— 8:20 A.M. **A Radiometric Model to Improve the AVHRR/HIRS Infrared Channel Calibration**
Changyong Cao, Xiangqian Wu—NOAA/NESDIS/STAR; Ruiyue Chen, Aaron Pearlman—IMSG

— 8:40 A.M. **Hyperspectral Lunar Surface Characterization using NASA EO/1 Hyperion Data in Support of GOES-R ABI Calibration/Verification**
Francis Padula—Integrity Applications Incorporated; Changyong Cao—NOAA/NESDIS Center for Satellite Applications and Research

— 9:00 A.M. **Three-Year Comparison of AIRS and IASI Co-Located Radiances For Cold Scenes**
Denis Elliott, H. H. Aumann—California Institute of Technology/Jet Propulsion Laboratory

— 9:20 A.M. **Scan Angle Dependence of IASI/AIRS Comparisons Using Simultaneous Off-Nadir Observations**
David Tobin, Hank Revercomb, Steve Dutcher—Space Science and Engineering Center, University of Wisconsin-Madison

— 9:40 A.M. to 10:10 A.M. Refreshment Break

Calibration Methods Using Celestial Objects

Presentation of radiometric measurements and calibration methods using the Sun, Moon, stars, and other celestial objects in the ultra-violet, visible, and infrared wavelengths.

Session Chair: Kathleen Kraemer, AFRL/Battlespace Environments Division

— 10:15 A.M. **In-Flight Calibration Analysis and Preliminary Observation Results of the GOES-14 Solar X-Ray Imager using the Crab Nebula**
Karl Klett—US Army Research Laboratory

— 10:35 A.M. **Application of Lunar Calibration to Geostationary Visible-channel Imagers**
Tom Stone—US Geological Survey

— 10:55 A.M. **An Assessment of Variability in the Air Force Calibration Star Network: Results from the 3.5 Years of the DIRBE Cold+Warm Mission**
Kathleen Kraemer, Stephan Price—Air Force Research Laboratory; Beverly Smith—East Tennessee State University; Thomas Kuchar, Donald Mizuno—Boston College

— 11:15 A.M. **Absolute Spectroradiometric Calibration of Standard Stars**
John Woodward, Steven Brown, Allan Smith, Claire Cramer, Keith Lykke—NIST; John McGraw, Peter Zimmer—University of New Mexico; Christopher Stubbs—Harvard University; Emilio Falco—Harvard-Smithsonian Center for Astrophysics

— 11:35 A.M. **Towards Poisson-limited Photometric Precision from Ground-based Telescopes**
Peter Zimmer, John Mcgraw—University of New Mexico; Steven Brown, Claire Cramer, Gerald Fraser, Keith Lykke, Allan Smith, John Woodward—NIST; Emilio Falco—Harvard-Smithsonian Center for Astrophysics; Christopher Stubbs—Harvard University

— 11:55 A.M. **Further Observations of On-orbit Calibration Spheres and Calibration Stars with the Broadband Array Spectrograph System (BASS)**
Mark Skinner, Stephen Gregory—Boeing LTS; Ray Russell, Edward Laag, David Gutierrez, Daryl Kim, Richard Rudy, Kirk Crawford—The Aerospace Corporation

— 12:15 P.M. to 1:00 P.M. Lunch Provided

Poster Session

Poster presentations are diplayed in room 207/205. Poster may be viewed during the continental breakfasts, lunches, and refreshment breaks. Authors present during the following times:

— **Tuesday, August 24** 10:10 A.M. — **Wednesday, August 25** 10:00 A.M.

A High-Accuracy Blackbody
Harri Latvakoski, Michael Watson, Shane Topham, Deron Scott, Michael Wojcik, Gail Bingham—USU/Space Dynamics Laboratory

ACCESS: Design and Preliminary Ground Performance
Mary Elizabeth Kaiser, Stephan McCandliss, Jeffrey Kruk, David Sahnow, Paul Feldman, Russel Pelton, Bryan Gaither, W. Van Dixon, H. Warren Moos—Johns Hopkins University; Bernard Rauscher, Randy Kimble, Duncan M. Kahle, Yiting Wen, Augustyn Waczynski, Robert Hill, D. Brent Mott, Dominic Benford, Jonathan Gardner, Bruce Woodgate —NASA Goddard Space Flight Center; Ralph Bohlin, Susana Deustua—Space Telescope Science Institute; Robert Kurucz—Harvard-Smithsonian Center for Astrophysics; Michael Lampton—University of California, Berkeley

Calibration of integrating-sphere-input extended-InGaAs radiometers using the IR Spectral Comparator Facility at NIST
Jinan Zeng—USU/Space Dynamics Laboratory; George Eppeldauer, Howard Yoon, Tom Larason, Leonard Hanssen—NIST

Characterization of Atmospheric Sounders by Correlative Measurements; AIRS Case Study
Nikita Pougatchev, Eric Fetzer, Evan Fishbein, Bjorn Lambritsen—California Institute of Technology/Jet Propulsion Laboratory

CLARREO Infrared Measurement Strategy: Basic Science, Technology, and Testing
John Dykema, James Anderson, Mark Witinski—Harvard University

Establishing a New Facility for Primary Realization of Spectral Radiance Emittance and Reflectance in the Mid-and Far-Infrared
Sergey Mekhontsev, Leonard Hanssen, Boris Wilthan—NIST; Vladimir Khromchenko—USU/Space Dynamics Laboratory

High Performance Spectroradiometer for Very Accurate Radiometric Calibrations and Testing of Blackbody Sources and EO Test Equipment
Dario Cabib, Amir Gil, R.A. Buckwald—CI Systems

Instrument Performance Monitoring of GOES Imager and Sounder Instruments
Fangfang Yu—ERT/NOAA/NESDIS; Xiangqian Wu—NOAA/NESDIS

Laser Safety for T-SIRCUS testing of VIIRS
Eugene Waluschka—NASA; James Barrie, Peter Fuqua—The Aerospace Corporation; James McCarthy—Northrop Grumman

New Data on the Long-term and Recent Variability of Alpha Ori in the IR
Ray Russell, Richard Rudy, Edward Laag, Daryl Kim, Kirk Crawford, David Gutierrez, Trishana Prater—The Aerospace Corporation; Mark Skinner, Steve Gregory—Boeing LTS; Edna Sugihara—Northrop Grumman Electronics Systems

Preliminary Radiometric Performance of COMS MI during In-Orbit Test
Byung-Il Lee, Jae-Dong Jang, Bong-Ju Lee, Hyesook Lee, Sung-Chul Jung, Young-Hooi Hwang, Chang-Hyun Kim, Woo Jin, Seong-Hee Sohn, Ae-Sook Suh—National Meteorological Satellite Center (KMA)

Programmable Infrared Scene Projector for On-Payload Sensor Characterization Calibration and Testing
Mark Massie—NovaSensors

Radiometric Considerations in the Design of the Operational Land Imager (OLI)
Geir Kvaran, Richard Tarde, Michael Dittman, Tom Miers—Ball Aerospace and Technologies

Real Time Correction of GOES N-Q Imager Stray Light during Eclipse Periods
Grant Matthews—ITT

SDL (Space Dynamics Laboratory) Calibration Data Collection, Management, and Processing System
Karl Burk, David Marchant, Dean Ferguson, James Peterson—USU/Space Dynamics Laboratory

Spacecraft-level Testing of NPP VIIRS using Traveling SIRCUS
Steven Brown, Keith Lykke—NIST

STARR II: Progress towards a new NIST facility for enhanced UV-SWIR reflectance calibrations
Heather Patrick—NIST; Clarence Zarobila—Jung Research and Development Corporation

Using the Pseudo-Invariant CEOS Reference Standard Test Sites for Calibration Stability Monitoring
Amit Angal—MCST-SSAI/NASA Goddard Space Flight Center; Gyanesh Chander—SGT/USGS EROS; Xiaoxiong Xiong—NASA Goddard Space Flight Center; Aisheng Wu, Taeyoung Choi—Sigma Space Corporation

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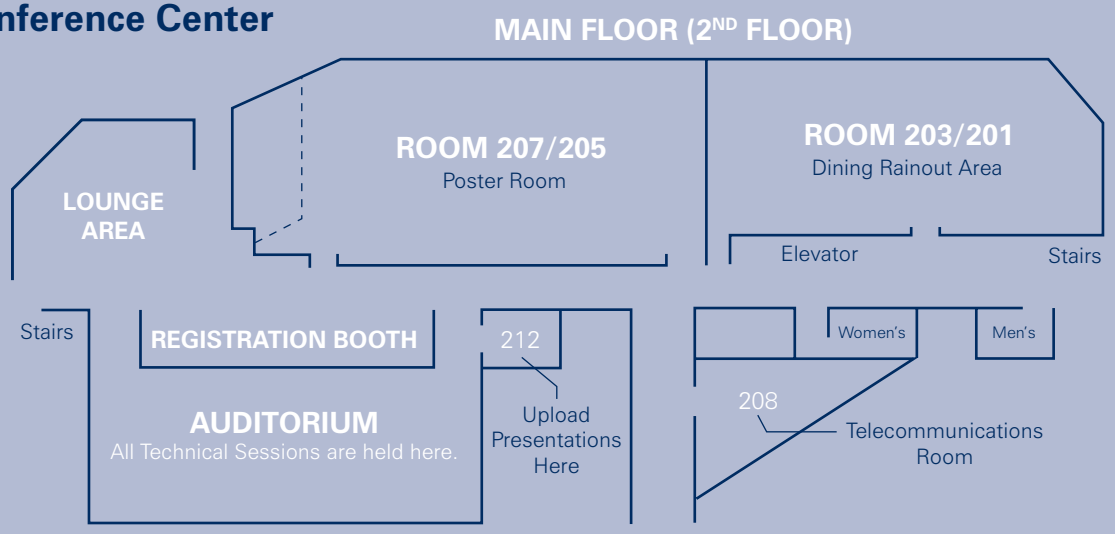

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