Hyperspectral Imaging and Sensing of the Environment (HISE)

OSA Topical Meeting and Tabletop Exhibit

Collocated with

Digital Holography and Three-Dimensional Imaging (DH)
Fourier Transform Spectroscopy (FTS)
Novel Techniques in Microscopy (NTM)
Optical Trapping Applications (OTA)

Technical Conference: April 26-30, 2009
Exhibition: April 27-29, 2009
Sheraton Vancouver Wall Centre Hotel
Vancouver, BC, Canada

PDP Submissions Deadline: April 2, 2009, 12:00 p.m. noon, EDT (16.00 GMT)
Housing Deadline: March 25, 2009
Pre-Registration Deadline: April 1, 2009

2009 Meeting Chairs

Bryan Baum, *Univ.of Wisconsin-Madison*, *USA,* Chair
Ping Yang, *Texas A&M Univ.*, *USA,* Chair

About Hyperspectral Imaging and Sensing of the Environment

The unprecedented advancement of remote sensing imaging and sounding by passive and active measurement technologies during and beyond this decade will provide unprecedented monitoring and understanding of our planetary system. The uniqueness of these new observations is already challenging scientists and users in all disciplinary areas and requires new approaches for managing, processing and using the data, including the integration of observations from different sensor constellations to better assess the information that these new sensors will provide.

Today, a number of advanced hyperspectral imaging and sounding instruments are on NASA and European aircraft and satellite platforms, and some of them will evolve in the near future into operational imaging and sounding systems, for example NPOESS, CLARREO, and GOES-R. Passive hyperspectral imaging and sounding data provide unique and independent sources of spatial and spectral information that are critical for studying the intricate characteristics of various weather and climate phenomena. Where sounding information is required to study the evolution of various atmospheric processes, imaging information is quite useful for the investigation of clouds and aerosols as well as land and coastal-ocean ecosystems. Additionally, active sensors such as Calipso and CloudSAT, currently operational as part of the NASA A-Train, provide a key role by providing additional insights into the vertical profiles of clouds and aerosols. They also provide an important source of information for assessing regional and global retrievals from passive sensors.

The focus of HISE 2009 is to increase the dialogue among various communities relating to new research and applications based on these unprecedented data sources to better understand weather and climate issues.

All relevant passive, active, imaging, and sounding hyperspectral remote sensing programs, missions, field campaigns, data processing, applications, validation approaches, basic research, educational outreach and users' feedback are welcome.

Topics to be Considered

- Algorithm development, research, and applications of current and planned advanced imager and sounders (e.g., NPOESS, GOES-R, MTG, CLARREO);
- Sensor system performance and new results of satellite capabilities from current observations;
- Determination of cloud and aerosol properties from active and passive remote sensing observations and atmospheric soundings of temperature, water vapor and other trace gas constituents;
- Assessment of cloud and aerosol properties derived from both active and passive sensors;
- Assimilation of data from hyperspectral sensors into numerical weather models;
- The development of new radiative transfer models necessary for the interpretation of the data;
- Environmental monitoring using imager and hyperspectral data; and
- Potential offered by new sensors under development.

About Hyperspectral Imaging and Sensing of the Environment

The unprecedented advancement of remote sensing imaging and sounding by passive and active measurement technologies during and beyond this decade will provide unprecedented monitoring and understanding of our earth (land and ocean)-atmosphere system (E-AS). The uniqueness of these new observations will challenge scientists and users in all disciplinary areas and require new approaches for managing, processing and utilizing the data, including the integration of observations from different sensor constellations to maximize the information which these new sensors will provide.

Today, a number of advanced hyperspectral imaging and sounding instruments are on NASA and European research instruments, and some of them will evolve in a few years into operational imaging and sounding systems, for example NPOESS, METOP and GOES-R. Passive hyperspectral imaging and sounding data provide a unique and independent scale of information, such as spatial resolution and spectral resolution required to measure and monitor the intricate characteristic of E-AS. Where sounding information is required to study atmosphere evolution, imaging information is necessary to investigate land and coastal-ocean ecosystems. Complementary active sensors, due to their high signal sensitivity, have a key role in E-AS monitoring because they provide additional microphysical insights into the small targets existing within the EAS. They also provide an important source of information for validating other retrievals from passive sensors.

Synergistic uses of imaging and sounding, and passive and active through collocation processing, in theory, will provide complementary information content to enhance knowledge about the state of E-AS.

Topics to Be Considered

- Algorithm development, research, and applications of current and planned advanced imager and sounders (e.g., NPOESS, GOES-R, MTG, CLARREO);
- Sensor system performance and new results of satellite capabilities from current observations;
- Determination of cloud and aerosol properties from active and passive remote sensing observations and atmospheric soundings of temperature, water vapor and other trace gas constituents;
- Assessment of cloud and aerosol properties derived from both active and passive sensors;
- Assimilation of data from hyperspectral sensors into numerical weather models;
- The development of new radiative transfer models necessary for the interpretation of the data;
- Environmental monitoring using imager and hyperspectral data; and
- Potential offered by new sensors under development.

General Theme

All relevant passive, active, imaging, and sounding hyperspectral remote sensing programs, missions, field campaigns, data processing, applications, validation approaches, basic research, educational outreach and users' feedback are welcome.

Program Committee

Program Chairs

Bryan Baum, *Univ. of Wisconsin-Madison, USA* **Chair**
Ping Yang, *Texas A&M Univ., USA* **Chair**

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Peter Pilewskie, *Univ. of Colorado at Boulder, USA*
Rob Roebeling, *KNMI – Royal Netherlands Meteorological Inst., Netherlands*
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Dave Tobin, *Univ. of Wisconsin-Madison, USA*
Heli Wei, *Chinese Academy of Science, China*
Manfred Wendisch, *Johannes Gutenberg Univ., Germany*
Fuzhong Weng, *NOAA/NESDIS, USA*

Exhibitor Listings

ADVANCES in IMAGING

2009 OSA OPTICS AND PHOTONICS CONGRESS

April 26-30, 2009
Vancouver, BC
Canada

Collated Meetings:

Digital Holography and Three-Dimensional Imaging (DH)

Fourier Transform Spectroscopy (FTS)

Hyperspectral Imaging and Sensing of the Environment (HISE)

Novel Techniques in Microscopy (NTM)

Optical Trapping Applications (OTA)

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The organizers of the Advances in Imaging Congress and Tabletop Exhibit wish to acknowledge the following for their support:

Grants:

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- National Aeronautics and Space Administration (NASA)
- National Institute of Biomedical Imaging and Bioengineering/Department of Health and Human Services / National Institutes of Health
- The OSA Foundation

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Special Events

Meet the Applied Optics Editors Dinner

Date: April 28, 2009
Time: 7:00 PM
Where: The Relish Restaurant & Lounge, 888 Nelson ST. (Between Hornby & Howe), Vancouver, BC, Canada (Website: http://www.relishrestaurants.com/relish/index.asp).

Don’t miss this great opportunity to meet Applied Optics Information Processing Editors:

Prof. T.-C. Poon (Division Editor, Virginia Tech)
Prof. Partha P. Banerjee (Topical Editor, Univ. of Dayton)
Prof. Byoungho Lee (Topical Editor, Seoul National Univ., Korea)

All conference attendees, especially students, are invited to this casual networking dinner. You can sign-up onsite at the OSA Registration Desk at the Grand Ballroom Foyer Coatroom. Please RSVP by Tuesday, April 28 by 1:00 pm. **Please note: Participants pay for their own dinners.**

2009 OSA Optics & Photonics Congress
Advances In Imaging
April 26-30, 2009
Vancouver, British Columbia, Canada

OSA GROUP DINNER

Have Dinner with *Applied Optics* Editors

Students are Welcome!

All OSA conference attendees are invited to a casual networking dinner where you will have the opportunity to meet *Applied Optics Information Processing* Editors:

Prof. T.- C. Poon (Division Editor, Virginia Tech)
Prof. Partha P. Banerjee (Topical Editor, Univ. of Dayton)
Prof. Byoungho Lee (Topical Editor, Seoul National Univ., Korea)

Tuesday, April 28, 2009, 7:00 p.m.

THE RELISH RESTAURANT & LOUNGE
888 Nelson St. (between Hornby & Howe) Vancouver, BC
Website: http://www.relishrestaurants.com/relish/index.asp

Sign up at the OSA Registration Desk
[Grand Ballroom Foyer, Coat Room]
by 1:00 p.m. on Tuesday, April 28

Note: Participants pay for their own dinners

Sponsored by the OSA External Relations Advisory Group

Invited Speakers

Hyperspectral Imaging and Sensing of the Environment (HISE) / Fourier Transform Spectroscopy (FTS) Joint Session

MIPAS Status and Latest Results, Herbert Fischer; *Inst. für Meteorologie und Klimaforschung, Univ. Karlsruhe, Germany.*

Hyperspectral and Multispectral Infrared Sounding of the Environment: A Brief Overview, Allen Huang; *Univ. of Wisconsin-Madison, USA.*

High Spectral Resolution IR Instrument Developments for CLARREO, Hank Revercomb; *Univ. of Wisconsin-Madison, USA.*

The Total Carbon Column Observing Network, Geoff Toon; *JPL, USA.*

Invited Speakers

High Accuracy Observations of Spectrally Resolved IR Radiance from Earth Orbit: Setting the Time Scale in the Energy-Climate Debate, James Anderson; *Harvard Univ., USA.*

On the Problem of Representing the General Scattering Properties of Ice Crystal Ensembles, Anthony Baran; *UK Meteorological Office, UK.*

Challenges in Deriving Greenhouse Gas Concentrations from Hyperspectral Thermal Sounders: Status of the NOAA Trace Gas Products from AIRS, IASI and CrIS, Christopher D. Barnet; *NOAA/NESDIS, USA.*

Remote Sensing of Greenhouse Gases: Analysis and Instrumentation, Peter Chylek; *Los Alamos Natl. Lab, USA.*

Parameterizations of Optical Properties of Nonspherical Particles in the Atmosphere: From Ice Crystals to Dust Aerosols, Qiang Fu; *Univ. of Washington, USA.*

AIRS Radiance Climatology to Detect Climate Change and Validate Atmospheric Model-derived Analyses, Mitchell D. Goldberg; *NOAA, USA.*

Satellite and Ground-Based Measurements of Aerosol and Cloud in East Asia, Tadahiro Hayasaka; *Ctr. for Atmospheric and Oceanic Studies, Graduate School of Science, Tohoku Univ., Japan.*

The Cloud Observing Potential Offered by the Advanced Baseline Imager on the GOES-R Satellite Series, Andy Heidinger; *NOAA/NESDIS, USA.*

How Have Kilochannel Infrared Instruments Improved Numerical Weather Forecasts?, Joanna Joiner; *NASA Goddard Space Flight Ctr., USA.*

Genesis and Evolution of the Use of Polarization in Remote Sensing of Atmospheres and Oceans, George Kattawar; *Texas A&M Univ., USA.*

Remote Sensing of Cloud and Aerosol over Cloud from Multi-Viewing Polarized Measurements, Laurent Labonnote; *Univ. des Sciences et Techniques de Lille, France.*

Retrieval of Surface Emissivity from Hyperspectral and Multispectral IR Measurements, Jun Li; *Univ. of Wisconsin-Madison, USA.*

Ways to Explore Information Content of Hyperspectral Remote Sensing Data, Xu Liu; *NASA Langley Res. Ctr., USA.*

Merging High Spectral Resolution Sounder Data with High Spatial Resolution Imager Data to Infer Global Cloud Cover Properties, Paul Menzel; SSEC, *Univ. of Wisconsin-Madison, USA.*

Advances in Determining Cloud Composition from Infrared Radiances: Application to Advanced Geostationary Sensors, Michael Pavolonis; *NOAA/NESDIS, USA*.

The Earth-Reflected Solar Spectral Radiance for Climate Benchmarking, Peter Pilewskie; *Lab for Atmospheric and Space Physics, Univ. of Colorado at Boulder, USA.*

The MODIS Cloud Optical and Microphysical Product: An Evaluation of Effective Radius Retrieval Statistics and Model Simulations, Steven Platnick; *NASA, USA.*

Validation of Aerosol and Cloud Environmental Data Records Produced by the NPOESS Prepatory Project (NPP) - Approaches and Issues, David Starr; *NASA Goddard Space Flight Ctr., USA.*

Infrared Spectral Radiance Validation and Plans for the Cross-track Infrared Sounder, David C. Tobin; *Univ. of Wisconsin-Madison, USA.*

Combining AIRS and MODIS Measurements to Determine Cloud Characteristics, Elisabeth Weisz; *Univ. of Wisconsin-Madison, USA.*

Advances in Radiative Transfer Modeling in Support of Satellite Data Assimilation, Fuzhong Weng; *NOAA/NESDIS, USA.*

	Grand Ballroom A	*Junior Ballroom D*	*Junior Ballroom C*	*Grand Ballroom B*	*Junior Ballroom A/B*
Sunday, April 26					
3:00 p.m.–6:00 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
Monday, April 27					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**DMA • Advances in Digital Holography**	**JMA • FTS/HISE Joint Session**		**NMA • Superresolution I**	**OMA • Transport, Guiding and Sorting**
10:30 a.m.–11:00 a.m.	**Coffee Break,** *Grand Ballroom C/D*				
10:30 a.m.–4:30 p.m.	**Exhibits Open,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.	**DMB • Novel Technologies in Holography (ends at 1:00 p.m.)**	**FMA • James W. Brault Memorial Session**	**HMA • Climate Absolute Radiance and Refractivity Observatory**	**NMB • Superresolution II**	**OMB • Physics Insights by Means of Optical Trapping I**
12:30 p.m.–2:00 p.m.	**Lunch Break (on your own)**				
2:00 p.m.–4:00 p.m.	**JMB • DH/OTA Joint Session**	**FMB • Combs and Static FTS**	**HMB • Clouds and Aerosols I**	**NMC • Nonlinear Microscopy I**	
4:00 p.m.–4:30 p.m.	**Coffee Break/Exhibits,** *Grand Ballroom C/D*				
4:30 p.m.–6:00 p.m.	**DMC • Metrology by Digital Holography and Profilometry (ends at 6:15 p.m.)**	**FMC • Space and Flight Projects**	**HMC • Future Missions and Sensor Calibration**	**NMD • Nonlinear Microscopy II**	**OMC • Physics Insights by Means of Optical Trapping II**
6:30 p.m.–8:00 p.m.	**Conference Reception,** *Junior Ballroom Foyer*				
Tuesday, April 28					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**JTuA • DH/NTM Joint Session: Digital Holographic Microscopy**	**FTuA • FTS for Astronomy and Astrophysics**	**HTuA • Interpretation of Hyperspectral/Multispectral Data Through Observations and Simulations**		**OTuA • Biophotonics Applications**
10:30 a.m.–11:00 a.m.	**Coffee Break,** *Grand Ballroom C/D*				
10:30 a.m.–6:00 p.m.	**Exhibits Open,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.	**DTuA • Holographic Microscopy**	**FTuB • Combs, Optical Fiber and Fast-Scanning**	**HTuB • Particle Scattering Models**	**NTuA • Phase Microscopy and Tomography**	**OTuB • Novel Uses and Applications**
12:30 p.m.–2:00 p.m.	**Lunch Break (on your own)**				
2:00 p.m.–4:00 p.m.	**DTuB • Holography Applications**	**FTuC • Gosat and Akari**	**HTuC • New Remote Sensing Perspectives**	**NTuB • Optical Coherence Tomography**	**OTuC • Dynamics of Multiple and Parallel Trapping (ends at 3:30 p.m.)**
4:00 p.m.–4:30 p.m.	**Coffee Break/Exhibits,** *Grand Ballroom C/D*				
4:30 p.m.–6:00 p.m.	**JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session,** *Grand Ballroom C/D*				
6:00 p.m.–6:45 p.m.	**DTuC • Optical Scanning Holography**				

	Grand Ballroom A	*Junior Ballroom D*	*Junior Ballroom C*	*Grand Ballroom B*	*Junior Ballroom A/B*
Wednesday, April 29					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**DWA • Three-Dimensional Imaging and Display**	**FWA • Earth Sensing**	**HWA • Hyperspectral IR and Imager Data Analyses (ends at 10:00 a.m.)**	**NWA • New Techniques I**	
10:30 a.m.–11:00 a.m.	**Coffee Break,** *Grand Ballroom C/D*				
10:30 a.m.–12:30 p.m.	**Exhibits Open,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.	**DWB • DH Poster Session,** *Grand Ballroom C/D*				
11:00 a.m.–12:30 p.m.		**FWB • Visible and Ultra Violet**	**HWB • Clouds and Aerosols II**	**NWB • Superresolution III**	
12:30 p.m.–2:00 p.m.	**Lunch Break (on your own)**				
2:00 p.m.–4:00 p.m.	**DWC • Computer-Generated Holograms**	**FWC • Spatial Heterodyne**	**HWC • Validation of Cloud and Aerosol Products**	**NWC • Endomicroscopy**	
4:00 p.m.–4:30 p.m.	**Coffee Break,** *Grand Ballroom C/D*				
4:30 p.m.–6:30 p.m.	**DWD • Electro-Holography and Computer-Generated Holography**	**FWD • Laboratory and Miniature FTS (ends at 6:00 p.m.)**	**HWD • Hyperspectral Applications (ends at 6:00 p.m.)**	**NWD • New Techniques II (ends at 5:30 p.m.)**	
Thursday, April 30					
7:30 a.m.–10:30 a.m.	**Registration Open**, *Grand Ballroom Foyer Coatroom*				
8:30 a.m.–10:30 a.m.	**FThA • Spectral Imaging,** *Grand Ballroom A*				

Key to Shading	
DH Sessions	No Shading
FTS Sessions	
HISE Sessions	
NTM Sessions	
OTA Sessions	

Hyperspectral Imaging and Sensing of the Environment (HISE) Abstracts

• Sunday, April 26, 2009 •

Grand Ballroom Foyer Coatroom
3:00 p.m.–6:00 p.m.
Registration Open

• Monday, April 27, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–6:30 p.m.
Registration Open

JMA • FTS/HISE Joint Session

Junior Ballroom D
8:30 a.m.–10:30 a.m.
Peter Bernath; Univ. of York, UK, Presider

JMA1 • 8:30 a.m. **Invited**
Hyperspectral and Multispectral Infrared Sounding of the Environment: A Brief Overview, *Allen Huang; Univ. of Wisconsin-Madison, USA.* Hyperspectral and multispectral sensors are the back-bone of the atmospheric and surface remote sensing community. Over the past few decades these sensors have provided crucial measurements of the Earth environment from multiple satellite platforms.

JMA2 • 9:00 a.m. **Invited**
MIPAS Aboard ENVISAT: Status and Latest Results, *Herbert Fischer, MIPAS-Team ; Inst. für Meteorologie und Klimaforschung, Univ. Karlsruhe, Germany.* The status of the MIPAS experiment onboard ENVISAT will be described. The latest scientific results will be presented and an outlook will be given.

JMA3 • 9:30 a.m. **Invited**
Total Column Carbon Observing Network (TCCON), *Geoff Toon[1], Jean-Francois Blavier[1], Rebecca Washenfelder[2,3], Debra Wunch[3], Gretchen Keppel-Aleks[3], Paul Wennberg[3], Brian Connor[4], Vanessa Sherlock[4], David Griffith[5], Nick Deutscher[5], Justus Notholt[6]; [1]JPL, Caltech, USA, [2]Earth System Res. Lab, NOAA, USA, [3]Caltech, USA, [4]Natl. Inst. of Water and Air, New Zealand, [5]Univ. of Wollongong, Australia, [6]Univ. of Bremen, Germany.* A network of ground-based, sun-viewing, near-IR, Fourier transform spectrometers has been established to accurately measure atmospheric greenhouse gases such as CO_2, CO, N_2O, and CH_4.

JMA4 • 10:00 a.m. **Invited**
High Spectral Resolution IR Instrument Developments for CLARREO, *Hank E. Revercomb[1], Fred A. Best[1], John A. Dykema[2], Joe Taylor[1], David C. Tobin[1], Robert O. Knuteson[1], Douglas Adler[1], Mark Mulligan[1]; [1]Univ.of Wisconsin-Madison, USA, [2]Harvard Univ., USA.* The infrared component of the CLimate Absolute Radiance and Refractivity Observatory (CLARREO) benchmark climate system under development at NASA will include on-orbit standards and test equipment to directly verify very high end-to-end instrument accuracy on-orbit.

Grand Ballroom C/D
10:30 a.m.–11:00 a.m.
Coffee Break/ Exhibits

HMA • Climate Absolute Radiance and Refractivity Observatory

Junior Ballroom C
11:00 a.m.–12:30 p.m.
Bryan A. Baum; Space Science and Engineering Ctr., Univ. of Wisconsin-Madison, USA, Presider

HMA1 • 11:00 a.m. **Invited**
High Accuracy Observations of Spectrally Resolved IR Radiance from Earth Orbit: Setting the Time Scale in the Energy-Climate Debate, *James Anderson, John Dykema, Stephen Leroy; Harvard Univ., USA.* The development optical-systems capable of determining the absolute, spectrally-resolved, infrared-radiance emitted from the Earth to Space to an accuracy of 0.1 K from Earth-orbit are reviewed in the context of a national climate research strategy.

HMA2 • 11:30 a.m. **Invited**
The Earth-Reflected Solar Spectral Radiance for Climate Benchmarking, *Peter Pilewskie, G. Kopp, Y. Roberts, B. Kindel, N. Shanbhag; Lab for Atmospheric and Space Physics, Univ. of Colorado at Boulder, USA.* We present current results of a study that will aid in defining the requirements of an Earth-viewing spectrometer over the solar spectral domain for climate benchmarking, a driving imperative for CLARREO.

HMA3 • 12:00 p.m.
Short-Wave Instrument Development for CLARREO, *Greg Kopp, Peter Pilewskie, Ginger Drake, Joey Espejo, Dave Harber, Karl Heuerman, Yolanda Roberts; Lab for Atmospheric and Space Physics, Univ. of Colorado, USA.* Benchmarking Earth's climate via remote sensing from space, as planned by CLARREO, requires radiometry with high absolute accuracy and SI-traceability. We present an on-orbit radiometric calibration approach for hyperspectral imaging from 300 to 2400 nm.

HMA4 • 12:15 p.m.
CLARREO Science Applications: Infrared Spectra with on-Orbit SI Traceability for Climate, *John A. Dykema, Stephen Leroy, Yi Huang, James G. Anderson; Harvard Univ., USA.* This paper focuses on the climate science applications of the infrared sensor of the CLARREO mission. These applications are predicated on its on-orbit

traceability, with empirically proven uncertainty, to the international definition of radiometric units.

12:30 p.m.–2:00 p.m.
Lunch Break (on your own)

HMB • Clouds and Aerosols I

Junior Ballroom C
2:00 p.m.–4:00 p.m.
Rob Roebeling; KNMI – Royal Netherlands Meteorological Inst., Netherlands, Presider

HMB1 • 2:00 p.m. Invited
The Cloud Observing Potential Offered by the Advanced Baseline Imager on the GOES-R Satellite Series, *Andy Heidinger; NOAA/NESDIS, USA.* Abstract not available.

HMB2 • 2:30 p.m. Invited
How Have Kilochannel Infrared Instruments Improved Numerical Weather Forecasts? *Joanna Joiner; NASA Goddard Space Flight Ctr., USA.* This talk will cover the progress to date on assimilating data from hyper-spectral infrared sounders such as AIRS and IASI into global numerical weather prediction systems to improve forecasts and climate analyses.

HMB3 • 3:00 p.m. Invited
Advances in Determining Cloud Composition from Infrared Radiances: Application to Advanced Geostationary Sensors, *Michael Pavolonis; NOAA/NESDIS, USA.* This work is aimed at developing advanced techniques for inferring information on cloud microphysics from infrared measurements, with a focus on cloud composition. The techniques are applicable to narrow band or hyperspectral.

HMB4 • 3:30 p.m.
Some New Progresses in the Optical Properties of Nonspherical Ice Crystals and Dust Aerosols, *Ping Yang[1], Lei Bi[1], Zhaokai Meng[1], George W. Kattawar[1], Bryan A. Baum[2], Hung-Lung (Allen) Huang[2]; [1]Texas A&M Univ., USA, [2]Univ. of Wisconsin-Madison, USA.* Steady progress has been made in the simulation of the single-scattering properties of nonspherical ice particles and dust aerosols. An updated database is being built of the optical properties of ice crystals and dust particles.

HMB5 • 3:45 p.m.
Improvement of Ice Cloud Optical Models at Visible through Far-Infrared Wavelengths, *Bryan A. Baum[1], Ping Yang[2], Andrew J. Heymsfield[3]; [1]Space Science and Engineering Ctr., Univ. of Wisconsin-Madison, USA, [2]Texas A&M Univ., USA, [3]Natl. Ctr. for Atmospheric Res., USA.* Improvements are discussed regarding the development of ice cloud bulk scattering models based on a comprehensive set of microphysical *in situ* measurements and a set of modeled ice particles used for light scattering calculations.

Grand Ballroom C/D
4:00 p.m.–4:30 p.m.
Coffee Break/ Exhibits

HMC • Future Missions and Sensor Calibration

Junior Ballroom C
4:30 p.m.–6:00 p.m.
Hank Revercomb; Univ. of Wisconsin-Madison, USA, Presider

HMC1 • 4:30 p.m. Invited
Infrared Spectral Radiance Validation and Plans for the Cross-track Infrared Sounder, *David C. Tobin; Space Science and Engineering Ctr., Univ. of Wisconsin-Madison, USA.* This presentation will summarize the expected performance of CrIS based on analysis of pre-launch test data and describe plans for post-launch validation of Earth observations, with examples drawn from similar efforts for current sounders.

HMC2 • 5:00 p.m.
IASI L1 NRT Product Quality Monitoring at EUMETSAT: Results from 2 Years of Operations, *Lars Fiedler, Jörg Ackermann, Yakov Livschitz, Francois Montagner; European Organisation for the Exploitation of Meteorological Satellites, Germany.* Results from the first 2 years of NWP based IASI L1 radiance monitoring and the comparison of IASI and HIRS/3 infrared channels using IASI based HIRS pseudo channels are presented.

HMC3 • 5:15 p.m.
On-Orbit Characterization of Blackbody Emissivity and Spectrometer Instrument Line-Shape Using Quantum Cascade Laser Based Reflectometry, *P. Jonathan Gero[1], John A. Dykema[2], James G. Anderson[2]; [1]Space Science and Engineering Ctr., Univ. of Wisconsin-Madison, USA, [2]Harvard Univ., USA.* We present a method to characterize the emissivity of a spaceborne blackbody and the instrument line-shape of a spectrometer, on orbit, using a quantum cascade laser based reflectometer.

HMC4 • 5:30 p.m.
Sensitivity Analysis of MTG-IRS L2 Prototype Processor, *Xavier Calbet[1], Ed Pavelin[2], Stephen English[2], Jorge Bornemann[2], Stephen Tjemkes[1], Rolf Stuhlmann[1]; [1]European Organisation for the Exploitation of Meteorological Satellites, Germany, [2]Met Office, UK.* A sensitivity analysis of the MTG-IRS L2 prototype processor has been performed to document the performance and to understand the critical components. The outcome and application to real IASI observations will be presented.

HMC5 • 5:45 p.m.
NASA ESTO Instrument Incubator Program (IIP) Tropospheric Infrared Mapping Spectrometers (TIMS) Demonstration of Multi-Layer CO Retrieval from Atmospheric Data Acquired Simultaneously in the Solar Reflective Region near 2330 nm and the Thermal Emissive Region near 4680 nm, *John (Jack) B. Kumer[1], Aidan E. Roche[1], Rick L. Rairden[1], Sergio Desouza-Machado[2], Ron Blatherwick[3], Toufic Hawat[3], Robert Chatfield[4]; [1]Lockheed Martin ATC, USA, [2]Consultant, USA, [3]Denver Univ., USA, [4]NASA Ames Res. Ctr., USA.* We present multi-layer CO retrieval from atmospheric data acquired simultaneously in the solar reflective region near 2330 nm and the thermal emissive region 4680 nm by the demonstration version IIP Tropospheric Infrared Mapping Spectrometers (TIMS).

Junior Ballroom Foyer
6:30 p.m.–8:00 p.m.
Conference Reception

NOTES

• Tuesday, April 28, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–6:30 p.m.
Registration Open

HTuA • Interpretation of Hyperspectral/Multispectral Data Through Observations and Simulations

Junior Ballroom C
8:30 a.m.–10:30 a.m.
Christopher D. Barnet; NOAA/NESDIS, USA, Presider

HTuA1 • 8:30 a.m. Invited
Ways to Explore Information Content of Hyperspectral Remote Sensing Data, *Xu Liu[1], A. M. Larar[1], D. K. Zhou[1], W. L. Smith[2], D. F. Young[1], B. A. Wielicki[1]; [1]NASA Langley Res. Ctr., USA, [2]Hampton Univ., USA.* A principal component (PC) analysis will be used to analyze the information content of hyperspectral remote sensing data based on a priori information, data error, and Jacobians.

HTuA2 • 9:00 a.m. Invited
Retrieval of Surface Emissivity from Hyperspectral and Multispectral IR Measurements, *Jun Li[1], Jinlong Li[1], Xin Jin[1], Lihang Zhou[2], Mitchell D. Goldberg[2]; [1]Univ. of Wisconsin-Madison, USA, [2]Ctr. for Satellite Applications and Res., NESDIS, USA.* An algorithm has been developed for retrieving global map of emissivity spectra from AIRS. In order to retrieve surface emissivity from multispectral band instrument such as SEVIRI, the time continuity of measurements is used.

HTuA3 • 9:30 a.m.
Observations and Simulations of Small-Scale Variability of Temperature, Water Vapor, and Cloud Liquid and Ice Water Content, *Brian H. Kahn, João Teixeira, Svetla Hristlova-Veleva, Seungwon Lee, Eric J. Fetzer; JPL, Caltech, USA.* Small-scale variability of temperature, water vapor, and cloud water content observations from the AIRS and CloudSat instruments, and simulated fields from WRF for selected regimes, are compared and implications are discussed.

HTuA4 • 9:45 a.m.
Hyperspectral Retrieval of Surface Emissivities, *Jean-Claude Thelen, S. Havemann, J. P. Taylor; Met Office, UK.* We apply a fast radiative transfer code, based on empirical orthogonal functions, in conjunction with a 1D-VAR retrieval scheme to airborne hyperspectral radiance measurements in order to retrieve the emissivity spectra of the underlying surface.

HTuA5 • 10:00 a.m.
Evaluation of the Impact of Radiative Transfer Models on SEVIRI/ABI Profile Retrieval, *Xin Jin[1], Jun Li[1], Timothy J. Schmit[2], Mitchell D. Goldberg[2]; [1]Univ. of Wisconsin-Madison, USA, [2]Ctr. for Satellite Applications and Res., NOAA, USA.* The impacts of CRTM and RTTOV on atmospheric profile retrieval are evaluated using SEVIRI observations and radiosonde dataset. These two models have noticeable differences at some bands but the impact on profile retrieval is trivial.

HTuA6 • 10:15 a.m.
Comparison of Dust Detection by Using Reflected Solar Bands and Thermal Bands, *Jhoon Kim[1], Jaehwa Lee[1], Mijin Kim[1], Sang Seo Park[1], Chul Han Song[2]; [1]Yonsei Univ., Republic of Korea, [2]Gwangju Inst. of Science and Technology, Republic of Korea.* Dust detection from solar and thermal bands is compared to investigate the performance of each algorithm. Three different algorithms show reasonable consistency to detect dust layer. The consistency increases with aerosol optical depth (AOD).

Grand Ballroom C/D
10:30 a.m.–11:00 a.m.
Coffee Break/ Exhibits

HTuB • Particle Scattering Models

Junior Ballroom C
11:00 a.m.–12:30 p.m.
Ping Yang; Texas A&M Univ., USA, Presider

HTuB1 • 11:00 a.m. Invited
Genesis and Evolution of the Use of Polarization in Remote Sensing of Atmospheres and Oceans, *George Kattawar; Texas A&M Univ., USA.* We will give an overview of the importance of polarization sensing in the atmosphere and ocean. The Stokes vector/Mueller matrix formalism is used to show how the method gives distinct advantages over ordinary radiance sensing.

HTuB2 • 11:30 a.m. Invited
On the Problem of Representing the General Scattering Properties of Ice Crystal Ensembles, *Anthony Baran; Met Office, UK.* Cirrus consists of differing crystal shapes and sizes making it difficult to theoretically represent their general scattering properties. This paper explores modeling approaches to this problem and how these models should be experimentally constrained.

HTuB3 • 12:00 p.m.
Discontinuous Galerkin Time-Domain Calculation of Single Particle Scattering: A Tutorial Example, *R. L. Panetta, Guanglin Tang; Dept. of Atmospheric Sciences, Texas A&M Univ., USA.* The elementary features of discontinuous Galerkin methods in calculating scattering properties of single particles are discussed in the context of a simple

1-dimensional problem. A comparison with finite difference methods is shown.

HTuB4 • 12:15 p.m.
Theory for Specular Scattering by Preferentially Oriented Ice Crystals, *Anatoli Borovoi, Natalia Kustova; Inst. of Atmospheric Optics, Russian Federation.* Specular patterns in the atmosphere caused by ice crystals with preferentially horizontal orientation are quantitatively described by use of a bidirectional phase function for a fluttering plate. Certain inverse scattering problems are discussed.

12:30 p.m.–2:00 p.m.
Lunch Break (on your own)

HTuC • New Remote Sensing Perspectives

Junior Ballroom C
2:00 p.m.–4:00 p.m.
Anthony Baran; Met Office, UK, Presider

HTuC1 • 2:00 p.m. Invited
Remote Sensing of Greenhouse Gases: Analysis and Instrumentation, *Steven P. Love, Petr Chylek, Tom Hale; Los Alamos Natl. Lab, USA.* Hyperspectral remote sensing applied to the detection of Greenhouse Gases (GHG) will have to deal simultaneously with interference by water vapor, aerosols and clouds (especially an invisible cirrus and sub-pixel size clouds).

HTuC2 • 2:30 p.m. Invited
Challenges in Deriving Greenhouse Gas Concentrations from Hyperspectral Thermal Sounders: Status of the NOAA Trace Gas Products from AIRS, IASI and CrIS, *Christopher D. Barnet[1], Eric Maddy[2], Xiaozhen Xiong[2]; [1]NOAA/NESDIS, USA, [2]Perot Systems Government Service at NOAA/NESDIS/Ctr. for Satellite Applications and Res., USA.* We present measurements of mid-tropospheric atmospheric carbon derived from the Aqua Atmospheric Infrared Sounder and the EUMETSAT Infrared Atmospheric Sounding Interferometer and inter-comparisons with NOAA Earth System Research Laboratory/Global Monitoring Division CarbonTracker assimilation system.

HTuC3 • 3:00 p.m.
MTG-IRS L2 Prototype Processor, *Stephen Tjemkes[1], Xavier Calbet[1], Sebastian Wagner[2], Alessio Lattanzio[3], Rolf Stuhlmann[1]; [1]European Organisation for the Exploitation of Meteorological Satellites, Germany, [2]Wagner Consultancy, Germany, [3]MakaluMedia, Germany.* A full description of the end-to-end L2 prototype processor for the meteosat third generation hyperspectral sounder (MTG-IRS), including background physical principles, and the numerical implementation, input data, pre-processing steps, accuracy, efficiency, output data is proposed.

HTuC4 • 3:15 p.m.
Design and Characterization of the 4STAR Sun-Sky Spectrometer with Results from 4-Way Intercomparison of 4STAR, AATS-14, Prede, and Cimel Photometers at Mauna Loa Observatory, *Connor J. Flynn[1], Jens Redemann[2], Beat Schmid[1], Steve Dunagan[2], Roy R. Johnson[2], Yohei Shinozuka[2], John M. Livingston[2], Phil B. Russell[2], Evgueni Kassianov[1], Alex K. Tran[3], Aliaksandr Siniuk[3], Brent N. Holben[3]; [1]Pacific Northwest Natl. Lab, USA, [2]NASA Ames Res. Ctr., USA, [3]NASA Goddard Space Flight Ctr., USA.* The 4STAR concept combines capabilities of the Ames Airborne Tracking Sun Photometer (AATS-14) and Aeronet-like sky scanning capability with monolithic spectrometry. Results from extensive tests and recent results from an intercomparison on Mauna Loa Observatory will be presented.

HTuC5 • 3:30 p.m.
What's Going on around Cloud Edges: A View from Above and Below, *Alexander Marshak[1], Yuri Knyazikhin[2], Jui-Yuan Christine Chiu[3], Tamas Varnai[3], Warren Wiscombe[1]; [1]NASA Goddard Space Flight Ctr., USA, [2]Boston Univ., USA, [3]Univ. of Maryland, Baltimore County, USA.* The paper studies the transition zone between cloud-free and cloudy air using spectral measurements of zenith and nadir radiance around cloud edges obtained from the ARM's Shortwave Spectrometer and Moderate-resolution Imaging Spectroradiometer, respectively.

HTuC6 • 3:45 p.m.
What Can We Expect to Learn about Clouds from the Space-Based O2 A-Band Spectrometer Aboard OCO? *Anthony B. Davis; Los Alamos Natl. Lab, USA.* In a striking illustration of the equivalence theorem, OCO A-band observations of reflected sunlight wield all the remote-sensing power of wide-footprint (multiple-scattering) lidar, viz. LITE. Beyond cloud-top pressure/altitude, geometrical and optical thicknesses are readily retrieved.

Grand Ballroom C/D
4:00 p.m.–4:30 p.m.
Coffee Break/ Exhibits

JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session

Grand Ballroom C/D
4:30 p.m.–6:00 p.m.

JTuB17
Hyperspectral Sounding Measurements-Specification of CLARREO FOV Size, *William L. Smith, Henry Revercomb, Elisabeth Weisz, Steven Dutcher, Robert Knuteson, Jun Li; Univ. of Wisconsin-Madison, USA.* AIRS data are used to perform global hyperspectral atmospheric sounding retrievals for different horizontal resolutions (15 km - 100 km). The purpose of this research is to optimize the CLARREO field of view size specification.

JTuB18
Validation of MODIS-Derived Aerosol Optical Thickness Using AERONET and SKYNET Measurements over East Asia, *Hyun-Sung Jang, Hwan-Jin Song, Byung-Ju Sohn; Seoul Natl. Univ., Republic of Korea.* AERONET and SKYNET measurements are used to validate MODIS-derived aerosol optical thickness over East Asia. MODIS-SKYNET and MODIS-AERONET collocated points hit in expected error lines but correlation between MODIS-AERONET is relatively higher than MODIS-SKYNET.

JTuB19
Infrared Spectral Signatures of Dust from Ground-Based FT-IR and Satellite in Anmyon, Korea, *Byung-Il Lee, Eun-Ha Sohn, Mi-Lim Ou, Kum-Lan Kim, Yoonjae Kim; Natl. Inst. of Meteorological Res., Republic of Korea.* Dust observation was performed during spring time in Korea. Measured up- and down-ward radiances from FT-IR and AIRS were compared with simulated radiances with RTM to estimate the hyper spectral properties of the dust.

JTuB20
Typhoon Case Analysis with Remote Sensing Data in the Southeast of China, *Ming Wei, Yan-an Liu, Ya-ting Zhan; Nanjing Univ. of Information Science and Technology, China.* Typhoon is analyzed with MODIS and atmospheric soundings data. The purpose is to understand the relationship between the temperature and humidity on cloud top, and to find the structure evolution information ahead of precipitation.

JTuB21
Transition of Cloud Products from MODIS to VIIRS, *Geoff P. Cureton; Space Science and Engineering Ctr., Univ. of Wisconsin-Madison, USA.* The activities of the Atmosphere PEATE are discussed with respect to the evaluation of MODIS and VIIRS cloud products within the LEOCAT development framework. The relevant properties of the MODIS and VIIRS sensors are compared.

Posters JTuB1–JTuB7 can be found in the DH abstracts section.
Posters JTuB8–JTuB16 can be found in the FTS abstracts section.
Posters JTuB22–JTuB29 can be found in the NTM abstracts section.
Posters JTuB30–JTuB35 can be found in the OTA abstracts section.

NOTES

• Wednesday, April 29, 2009 •

Grand Ballroom Foyer Coatroom
7:30 a.m.–6:30 p.m.
Registration Open

HWA • Hyperspectral IR and Imager Data Analyses

Junior Ballroom C
8:30 a.m.–10:00 a.m.
Allen Huang; Univ. of Wisconsin-Madison, USA, Presider

HWA1 • 8:30 a.m. Invited
Merging High Spectral Resolution Sounder Data with High Spatial Resolution Imager Data to Infer Global Cloud Cover Properties, *Paul Menzel; Space Science and Engineering Center, Univ. of Wisconsin-Madison, USA.* Upper tropospheric clouds have been studied with NOAA/HIRS and EOS/MODIS data from 1979 onwards using CO2 slicing. Algorithm adjustments including AIRS data have been tested using CALIPSO measurements for verification.

HWA2 • 9:00 a.m. Invited
Combining AIRS and MODIS Measurements to Determine Cloud Characteristics, *Elisabeth Weisz, Paul Menzel, Jun Li, Eva Borbas, Robert Holz; Cooperative Inst. for Meteorological Satellite Studies, Univ. of Wisconsin-Madison, USA.* Synergistic use of AIRS and MODIS measurements enables accurate cloud characterization and provides improved cloud property retrievals as shown in this paper with a focus on cloud top height.

HWA3 • 9:30 a.m.
Progress in Infrared Cloud Phase Determination Using AIRS, *Shaima L. Nasiri[1], Brian H. Kahn[2], Hongchun Jin[1]; [1]Texas A&M Univ., USA, [2]JPL, USA.* Recent progress in the determination of cloud phase using infrared AIRS hyperspectral observations is presented. CALIPSO lidar products are used to create a database of manually classified AIRS pixels for algorithm development.

HWA4 • 9:45 a.m.
New Understanding of Split-Window Emissions Provides Insight on Small Ice Crystal Concentrations, *David L. Mitchell; Desert Res. Inst., USA.* The physics governing absorption by ice crystals at 11 and 12 microns can provide a means of remotely sensing the relative concentration of small ice crystals in cirrus clouds.

Grand Ballroom C/D
10:30 a.m.–11:00 a.m.
Coffee Break/ Exhibits

HWB • Clouds and Aerosols II

Junior Ballroom C
11:00 a.m.–12:30 p.m.
Peter Pilewskie; Lab for Atmospheric and Space Physics, Univ, USA, Presider

HWB1 • 11:00 a.m. Invited
The MODIS Cloud Optical and Microphysical Product: An Evaluation of Effective Radius Retrieval Statistics and Model Simulations, *Steven Platnick[1], Paul A. Hubanks[1,2], Galina Wind[1,3], Michael D. King[4], Steven A. Ackerman[5], Brent Maddux[5], Tobias Zinner[6], Andrew Ackerman[1]; [1]NASA Goddard Space Flight Ctr., USA, [2]Wyle Information Systems, USA, [3]Science Systems and Applications Inc., USA, [4]Lab for Atmospheric and Space Physics, Univ. of Colorado, USA, [5]Cooperative Inst. for Meteorological Satellite Studies, Univ. of Wisconsin-Madison, USA, [6]Inst. für Physik der Atmosphäre, Deutsches Zentrum für Luft- und Raumfahrt, Germany.* Retrieved cloud optical and microphysical global statistics from the MODIS Collection 5 processing stream will be discussed. Evaluation includes algorithm sensitivities, aggregation sensitivities, and retrievals run on cloud resolving models of marine boundary layer clouds.

HWB2 • 11:30 a.m. Invited
Remote Sensing of Cloud and Aerosol over Cloud from Multi-Viewing Polarized Measurements, *Laurent Labonnote, Jerome Riedi, Fabien Waquet, POLDER Aerosol/Cloud Teams ; Univ. des Sciences et Techniques de Lille, France.* We are revisiting the use of multi-viewing polarized reflectances to retrieve atmospheric component properties. We will focus first on cloud microphysical retrieval, then will demonstrate the potentiality of such measurements to detect aerosol above clouds.

HWB3 • 12:00 p.m.
Simulation of Fifteen MODIS Bands for the Assessment of MODIS Cloud Products, *Byung-Ju Sohn[1], Seung-Hee Ham[1], Ping Yang[2], Bryan A. Baum[3]; [1]Seoul Natl. Univ., Republic of Korea, [2]Texas A&M Univ., USA, [3]Univ. of Wisconsin-Madison, USA.* Radiances at fifteen bands are simulated from the operational MODIS-retrieved cloud optical thickness, effective radius, and cloud top pressure collocated with the AIRS-retrieved temperature and humidity profiles for the assessments of MODIS cloud products.

HWB4 • 12:15 p.m.
MODIS Thin Cirrus Retrievals Using the 1.38 μm Channel, *Kerry Meyer, Steven Platnick; NASA Goddard Space Flight Ctr., USA.* Retrievals of ice cloud optical thickness using the 1.38 μm MODIS channel will be discussed. In particular, this will focus on the case of thin cirrus, in which the current MODIS retrievals have difficulty detecting.

12:30 p.m.–2:00 p.m.
Lunch Break (on your own)

HWC • Validation of Cloud and Aerosol Products

Junior Ballroom C
2:00 p.m.–4:00 p.m.
Steven Platnick; NASA, USA, Presider

HWC1 • 2:00 p.m. **Invited**
Validation of Aerosol and Cloud Environmental Data Records Produced by the NPOESS Prepatory Project (NPP)— Approaches and Issues, *David Starr; NASA Goddard Space Flight Ctr., USA.* Current plans to validate the aerosol and cloud environmental data records (EDR's) to be operationally produced from the NPOESS Prepatory Project (NPP) satellite observations will be described, including the planned approaches and issues.

HWC2 • 2:30 p.m. **Invited**
Satellite and Ground-Based Measurements of Aerosol and Cloud in East Asia, *Tadahiro Hayasaka; Ctr. for Atmospheric and Oceanic Studies, Tohoku Univ., Japan.* Observational studies of aerosol and cloud in East Asia are reviewed focusing on the comparison and collaboration between ground-based measurements and satellite remote sensing.

HWC3 • 3:00 p.m.
Towards a Standard Procedure for Validation of Satellite Derived Cloud Properties with Ground-Based Observations, *Rob A. Roebeling[1], Hartwig M. Deneke[1], Wouter Greuell[1], Nick Schutgens[2]; [1]Royal Netherlands Meteorological Inst., KNMI, Netherlands, [2]Ctr. for Climate System Res., Tokyo Univ., Japan.* A standard procedure for validation of cloud properties retrievals is presented. We use cloud properties datasets from synthetic simulations and ground-based observations to disentangle validation uncertainties from retrieval errors, and suggest an optimum validation procedure.

HWC4 • 3:15 p.m.
A Characterization of Cirrus OD Retrievals from Active and Passive A-Train Measurements, *Robert E. Holz[1], Andrew Heidinger[1], Daved Turner[1], Steve Ackerman[1], Ralph Kuehn[2], Mark Vaughan[2], Steven Platnick[3]; [1]Univ. of Wisconsin-Madison, USA, [2]NASA Langley Space Flight Ctr., USA, [3]NASA Goddard Space Flight Ctr., USA.* We compare retrievals of cirrus cloud optical depth from active (CALIOP) and passive (MODIS) measurements. Systematic differences are found and investigated using TOA radiative closure.

HWC5 • 3:30 p.m.
Validation of AIRS and IASI Temperature and Water Vapor Retrievals with Global Radiosonde Measurements and Model Forecasts, *Murty G. Divakarla[1], Christopher Barnet[2], Mitchell Goldberg[2], Tom King[3], Eric Maddy[3], Xingpin Liu[3], Fengying Sun[3], Zhaohui Cheng[3], Antonia Gambacorta[3], Lihang Zhou[3]; [1]IM Systems Group, Inc., USA, [2]Ctr. for Satellite Applications and Res., NESDIS, NOAA, USA, [3]QSS, Group Inc., USA.* Atmospheric temperature and water vapor profiles retrieved from the Aqua-Atmospheric Infrared Sounder instrument and the MetOp-Infrared Atmospheric Sounding Interferometer instrument are validated with global radiosonde measurements and forecasts.

HWC6 • 3:45 p.m.
The Recent Field Measurement Campaign of the Continuum Absorption by Visible and Infrared Radiation and Its Atmospheric Relevance (CAVIAR) Project, *Paul D. Green[1], Ralph Beeby[1], Alan Last[1], John E. Harries[1], Juliet C. Pickering[1], Stuart Newman[2]; [1]Imperial College London, UK, [2]Met Office, UK.* The objectives and component parts of the CAVIAR consortium are described. Preliminary data from the recent UK-based airborne field campaign are discussed, with a description of the analysis method and its expected scientific merit.

Grand Ballroom C/D
4:00 p.m.–4:30 p.m.
Coffee Break/ Exhibits

HWD • Hyperspectral Applications

Junior Ballroom C
4:30 p.m.–6:00 p.m.
Joanna Joiner; NASA Goddard Space Flight Ctr., USA, Presider

HWD1 • 4:30 p.m. **Invited**
Advances in Radiative Transfer Modeling in Support of Satellite Data Assimilation, *Fuzhong Weng; NOAA/NESDIS, USA.* This paper presents an overview of the development of the Community Radiative Transfer Model (CRTM), an effort led by the Joint Center for Satellite Data Assimilation (JCSDA) program in the United States of America.

HWD2 • 5:00 p.m. **Invited**
AIRS Radiance Climatology to Detect Climate Change and Validate Atmospheric Model-Derived Analyses, *Mitchell D. Goldberg, Lihang Zhou; NOAA, USA.* This study uses the raw AIRS data to generate the first ever spectrally resolved infrared radiance (SRIR) dataset (2002- 2006) for monitoring changes in atmospheric temperature and constituents, for assessing the accuracy of climate/weather models.

HWD3 • 5:30 p.m.
Sensor System Performance Evaluation and Benefits from the NPOESS Airborne Sounder Testbed - Interferometer (NAST-I), *Allen M. Larar[1], Daniel K. Zhou[1], Xu Liu[1], William L. Smith[2,3]; [1]NASA Langley Res. Ctr., USA, [2]Hampton Univ., USA, [3]Univ. of Wisconsin-Madison, USA.* Advanced satellite sensors are tasked with improving global Earth-system measurements benefiting weather prediction, climate monitoring, and environmental change detection. Validation

of the entire measurement system by including airborne-FTS sensors is crucial to achieving this goal.

HWD4 • 5:45 p.m.
Developing a Geosynchronous Microwave Sounder, *Bjorn Lambrigtsen, Todd Gaier, Pekka Kangaslahti, Alan Tanner; JPL, Caltech, USA.* The Precipitation and All-weather Temperature and Humidity (PATH) "decadal-survey" mission will place a microwave sounder - GeoSTAR - in geostationary orbit. We discuss technology development, applications and mission plans.

NOTES

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

Advances in Imaging
OSA Optics & Photonics Congress and Tabletop Exhibit 2009
UPDATE SHEET

Withdrawals:

NMC6	JTuB34
FTuA4	JTuB35
OTuA5	HTuC6
JTuB23	DWA3
JTuB29	DWB2
JTuB30	HWD4

Substituted Papers:

The paper **HTuC6** that is in your program will not be presented. During this time slot, the following postdeadline paper will be presented in its place: **PHTuC6, Airborne Radiometer Measurements of Above Cloud Reflectance in the Presence and Absence of Aerosols,** *Odele Coddington[1], Peter Pilewskie[1], Tomislava Vukicevic[1], John Livingston[2], Steve Platnick[3], Gala Wind[3], Jens Redemann[4], Philip B. Russell[4]; [1]Univ. of Colorado at Boulder, USA, [2]SRI Intl., USA, [3]NASA GSFC, USA, [4]NASA AMES, USA.*

The poster **JTuB17** will be presented during the session **HWA•Hyperspectral IR and Imager Data Analyses** (April 29, 2009, 8:30 a.m.–10:30 a.m., Junior Ballroom C) as oral presentation **HWA5.**

Presider Updates:

Nickolai V. Kukhtarev; Alabama A&M Univ., USA, will preside over session **DMB• Novel Technologies in Holography,** on Monday, April 27, 2009, 11:00 a.m. –1:00 p.m. in Grand Ballroom A.

Yoshio Hayasaki; Utsunomiya Univ., Japan, will preside over session **DWC•Computer-Generated Holograms**, on Wednesday, April 29, 2009, 2:00 p.m.–4:00 p.m. in Grand Ballroom A.

Presenter Changes:

DTuA1, Harmonic Holography will now be presented by *Chia-Lung Hsieh[1,2], [1]Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, [2]Caltech, USA.*

NTuA5, Linear Phase-Gradient Imaging with Asymmetric Illumination Based Differential Phase Contrast (AIDPC), will now be presented by *Colin J. R. Sheppard, Natl. Univ. of Singapore, Singapore.*

Time Changes:

HWA will end a half hour later at 10:30 a.m.
Exhibits will end at 12:30 p.m. on Wednesday, April 29, 2009.

Postdeadline Paper Programs:

Post deadline Paper Programs are available at Registration.

Special Events:

Meet the *Applied Optics* Editors Dinner on Tuesday, April 28, 2009, 7:00 p.m. All conference attendees, especially students, are invited to this casual networking dinner. More information is available at Registration.

2009 | OSA Optics & Photonics Congress

POSTDEADLINE PAPERS

ADVANCES IN IMAGING

- Digital Holography and Three-Dimensional Imaging (DH)
- Fourier Transform Spectroscopy (FTS)
- Hyperspectral Imaging and Sensing of the Environment (HISE)
- Novel Techniques in Microscopy (NTM)
- Optical Trapping Applications (OTA)

April 26-30, 2009

Sheraton Vancouver Wall Centre Hotel
VANCOUVER, BRITISH COLUMBIA, CANADA

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•Tuesday, April 28, 2009•

Junior Ballroom C
2:00 p.m.–4:00 p.m.
HTuC • New Remote Sensing Perspectives
Anthony Baran; Met Office, UK, Presider

PHTuC6 • 3:45 p.m.
Airborne Radiometer Measurements of above Cloud Reflectance in the Presence and Absence of Aerosols, *Odele Coddington[1], Peter Pilewskie[1], Tomislava Vukicevic[1], John Livingston[2], Steve Platnick[3], Gala Wind[3], Jens Redemann[4], Philip B. Russell[4]; [1]Univ. of Colorado at Boulder, USA, [2]SRI Intl., USA, [3]NASA GSFC, USA, [4]NASA AMES, USA.* We present cloud retrieval results from SSFR measurements made in the presence and absence of aerosols and show comparisons to MODIS. A method for treating aerosol bias in retrievals as systematic model uncertainty is described.

Grand Ballroom C/D
4:30 p.m.–6:00 p.m.
JTuB • DH/FTS/HISE/NTM/OTA Joint Poster Session

PJTuB36
Automated Particle Characterization Using Holographic Video Microscopy, *Fook Chiong Cheong, David G. Grier; New York Univ., USA.* With an efficient particle identification algorithm, combine with hardware acceleration and software optimization, holographic microscopy data can be analysis in near real time with sufficient accuracy to enable unattended holographic tracking and particle characterization.

PJTuB37
Incoherent Optical Imaging Using Synthetic Aperture with Fresnel Elements, *Barak Katz, Joseph Rosen; Ben-Gurion Univ. of the Negev, Israel.* We present a new lensless incoherent holographic system operating in a synthetic aperture mode. Spatial resolution exceeding the Rayleigh limit is obtained by tiling several holographic elements into a complete Fresnel hologram of observed objects.

PJTuB38
CrIS Radiance Spectra Modeling and End-to-End Error Analysis, *Nikita Pougatchev, Gregory Cantwell, Gail Bingham; Space Dynamics Lab, Utah State Univ., USA.* We present the Cross-track Infrared Sounder (CrIS) end-to-end error model consisting of instrument model and Validation Assessment Model. Models' descriptions along with examples of application are presented.

PJTuB39
SPDM - Single Molecule Superresolution of Receptor Clusters in *E. coli* Bacteria, *Thomas Ruckelshausen[1], Paul Lemmer[1], Victor Sourjik[2], Christoph Cremer[1,3,4]; [1]Kirchhoff-Inst. for Physics, Univ. of Heidelberg, Germany, [2]Ctr. for Molecular Biologie Heidelberg, Univ. of Heidelberg, Germany, [3]Inst. for Pharmacy and Molecular Biotechnology, Univ. of Heidelberg, Germany, [4]Inst. for Molecular Biophysics, The Jackson Lab, USA.* In *E. coli* bacteria the chemotaxis phosphatase protein CheZ was labeled with YFP (yellow fluorescent protein). Their reversible photobleaching is used for an optical isolation in time. An average localization precision of 22nm was achieved.

•Wednesday, April 29, 2009•

Junior Ballroom C
8:30 a.m.–10:30 a.m.
HWA • Hyperspectral IR and Imager Data Analyses
Allen Huang; Univ. of Wisconsin at Madison, USA, Presider

PHWA6 • 10:15 a.m.
Investigations of Cirrus in the Far Infrared with the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS), *Caroline Cox[1], Neil Humpage[1], Paul Green[1], Juliet Pickering[1], John Harries[1], Jonathan Taylor[2], Anthony Baran[2], Alan Last[1], Jon Murray[1]; [1]Imperial College London, UK, [2]Met Office, UK.* An overview of the results of recent field campaigns performed with the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS) to study the radiative properties of cirrus in the far infrared spectral region is presented.

Grand Ballroom C/D
11:00 a.m.–12:30 p.m.
DWB • DH Poster Session

PDWB37
Femtosecond Time-Resolved Off-Axis Digital Holography, *Tadas Balciunas, Andrius Melninkaitis, Andrius Vanagas, Valdas Sirutkaitis; Laser Res. Ctr., Vilnius Univ., Lithuania.* We present time-resolved off-axis digital holography for investigation of laser-induced plasma filaments in condensed media. An experimental setup with tilted reference pulse allows larger crossing angles to be used for recording of digital holograms.

PDWB38
A High-Definition Full-Parallax CGH Created by the Polygon-Based Method, *Kyoji Matsushima, Sumio Nakahara; Kansai Univ., Japan.* A large-scaled full-parallax CGH with 4 billion pixels is produced by a polygon-based method. The CGH reconstructs a fine 3-D image and gives a large sensation of depth owing to the silhouette-masking technique.

Key to Authors and Presiders
(Bold denotes Presider or Presenting Author)

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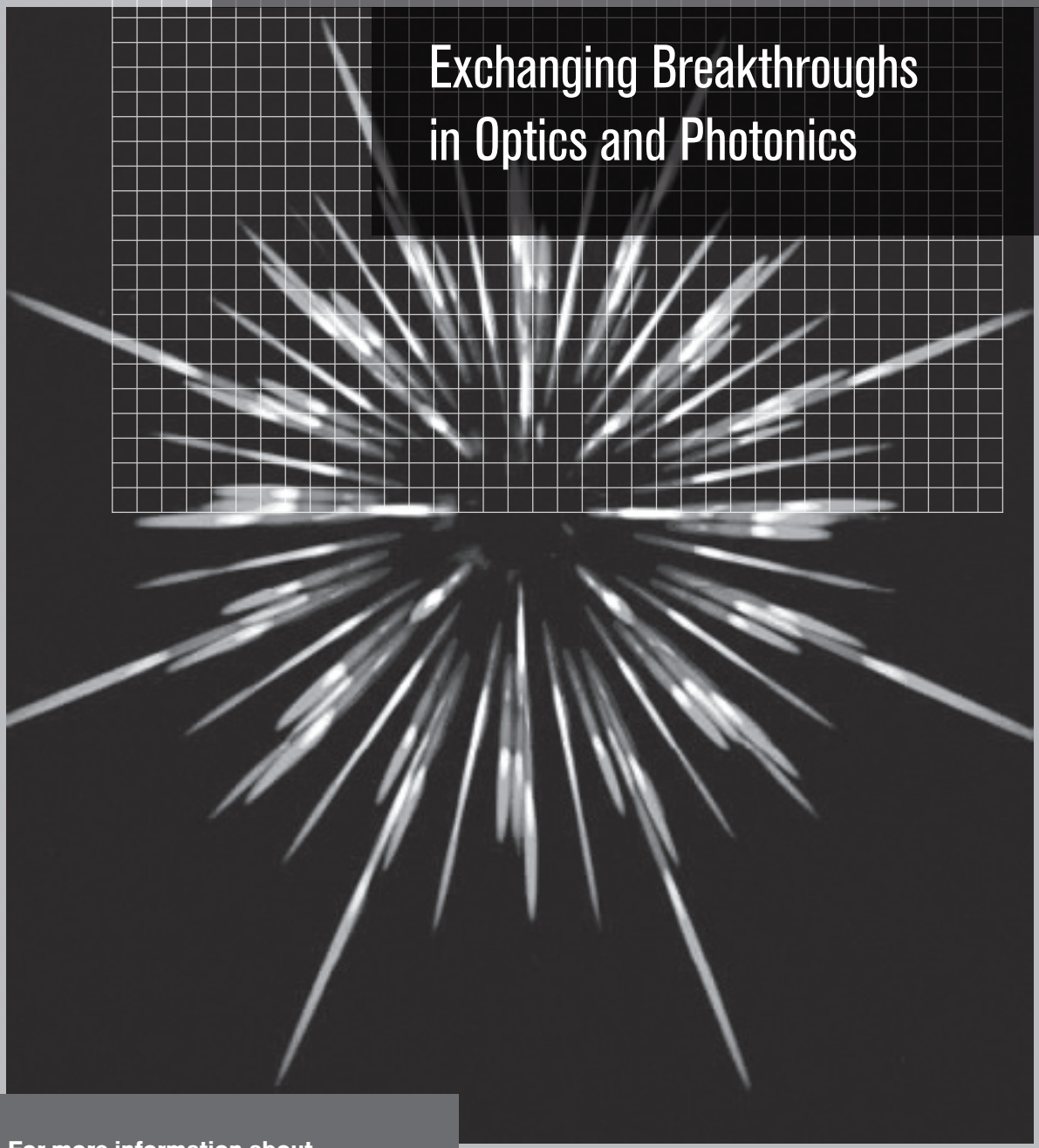

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