

# PROCEEDINGS OF SPIE

## **Remote Sensing of Clouds and the Atmosphere XI**

**James R. Slusser  
Klaus Schäfer  
Adolfo Comerón  
Chairs/Editors**

SUB Göttingen

219 221 316



7

94

2007 B 1218

**11–14 September 2006  
Stockholm, Sweden**

**Sponsored by  
SPIE Europe**

**Cooperating Organisations  
NASA—National Aeronautics and Space Administration (USA)  
EOS—European Optical Society**

**Published by  
SPIE—The International Society for Optical Engineering**

**Volume 6362**



**The International Society  
for Optical Engineering**

**SPIE is an international technical society dedicated to advancing engineering and scientific  
applications of optical, photonic, imaging, electronic, and optoelectronic technologies.**

# Contents

xi	Conference Committee
xiii	Symposium Committee
xv	Introduction
xvii	<i>Cloud remote sensing from space in the era of the A-Train (Plenary Paper) (6359-201)</i> G. L. Stephens, Colorado State Univ. (USA); D. G. Vane, Jet Propulsion Lab. (USA)

---

## SESSION 1 AEROSOL PROPERTIES FROM SUN PHOTOMETRY

---

- 636201 **Genesis of sun photometry (Invited Paper) [6362-01]**  
G. E. Shaw, Univ. of Alaska (USA)
- 636202 **Remote sensing of absorbing aerosols and precipitable water vapor using MFRSR measurements [6362-03]**  
M. D. Alexandrov, B. Cairns, Columbia Univ. (USA) and NASA Goddard Institute for Space Studies (USA); A. A. Lacis, B. E. Carlson, NASA Goddard Institute for Space Studies (USA)
- 636203 **Ultraviolet aerosol optical properties retrieved during the 2006 MIRAGE-Mex experiment: initial results [6362-04]**  
T. E. Taylor, J. Slusser, Colorado State Univ. (USA); A. Hernández, M. Grutter, Univ. Nacional Autónoma de México (Mexico); B. Lefer, Department of Geosciences (USA)
- 636204 **Aerosol climatology in Kathmandu using sun photometry [6362-05]**  
B. K. Bhattacharai, B. Kjeldstad, Norwegian Univ. of Science and Technology (Norway); T. M. Thorseth, Sør Trøndelag Univ. College (Norway); A. Bagheri, Norwegian Univ. of Science and Technology (Norway)

---

## SESSION 2 SATELLITE RETRIEVAL OF AEROSOL PROPERTIES

---

- 636205 **Increasing trend of submicron aerosol particles over East Asian waters observed in 1998-2004 by Sea-Wide-Field-of-view Sensor (SeaWiFS) [6362-06]**  
H. Fukushima, Tokai Univ. (Japan); L.-P. Li, Tokai Univ. (Japan) and Ocean Univ. of China (China); K. Takeno, Tokai Univ. (Japan)
- 636206 **The Earth surface reflectance retrieval by exploiting the synergy of TERRA and AQUA MODIS data [6362-07]**  
W. Ying, State Key Lab. of Remote Sensing Science (China), Institute of Remote Sensing Applications (China), Beijing Normal Univ. (China), and Chinese Academy of Sciences (China); Y. Xue, State Key Lab. of Remote Sensing Science (China), Institute of Remote Sensing Applications (China), Beijing Normal Univ. (China), and London Metropolitan Univ. (United Kingdom); J. Guo, State Key Lab. of Remote Sensing Science (China), Institute of Remote Sensing Applications (China), Beijing Normal Univ. (China), and Chinese Academy of Sciences (China); Y. Hu, State Key Lab. of Remote Sensing Science (China), Institute of Remote Sensing Applications (China), and Beijing Normal Univ. (China); Y. Luo, L. Zheng, W. Wan, State Key Lab. of Remote Sensing Science (China), Institute of Remote Sensing Applications (China), Beijing Normal Univ. (China), and Chinese Academy of Sciences (China); S. Qi, Jiangxi Normal Univ. (China)

- 636208 **Aerosols detection for urban air pollution monitoring** [6362-59]  
A.-I. Beaulant, L. Wald, Paris School of Mines (France)
- 636209 **Results of the 50 year ground-based measurements in comparison with satellite remote sensing of two prominent dust emission sources located in Iran** [6362-09]  
O. Esmaili, M. Tajrishy, Sharif Univ. of Technology (Iran); P. Daneshkar Arasteh, IK International Univ. (Iran)

---

### SESSION 3 RADIATIVE TRANSFER

---

- 63620B **Atmospheric correction of airborne infrared hyperspectral images using neural networks** [6362-11]  
S. Lesage, V. Achard, ONERA (France); A. Chédin, École Polytechnique (France); L. Poutier, ONERA (France)
- 63620D **Hyperspectral remote sensing of biomass burning aerosol plumes: sensitivity to optical properties modeling** [6362-32]  
A. Alakian, Commissariat à l'Energie Atomique (France) and ONERA (France); R. Marion, Commissariat à l'Energie Atomique (France); X. Briottet, ONERA (France)
- 63620F **Variations of solar radiation at the Earth's surface during the total solar eclipse of 29 March 2006** [6362-14]  
M. Blumthaler, Innsbruck Medical Univ. (Austria); A. Bais, Aristotle Univ. (Greece); A. Webb, Univ. of Manchester (United Kingdom); S. Kazadzis, Aristotle Univ. (Greece); R. Kift, Univ. of Manchester (United Kingdom); N. Kouremeti, Aristotle Univ. (Greece); B. Schallhart, Innsbruck Medical Univ. (Austria); A. Kazantzidis, Aristotle Univ. (Greece)

---

### SESSION 4 REMOTE SENSING OF CLOUDS

---

- 63620H **Recent field campaigns with CERES instruments** [6362-18]  
Z. P. Szewczyk, SAIC (USA); K. J. Priestley, NASA Langley Research Ctr. (USA)
- 63620K **Test and first validation of FRESCO+** [6362-21]  
P. Wang, P. Stammes, N. Fourrier, Royal Netherlands Meteorological Institute (Netherlands)

---

### SESSION 5 MIDDLE ATMOSPHERE

---

- 63620N **Global measurements and modeling of 4.3 um NLTE using AIRS** [6362-54]  
S. De Souza-Machado, L. L. Strow, S. E. Hannon, Univ. of Maryland, Baltimore County (USA); M. Lopez-Puertas, B. Funke, Instituto de Astrofísica de Andalucía (Spain); D. P. Edwards, National Ctr. for Atmospheric Research (USA)
- 63620P **A microwave radiometer for the remote sensing of nitric oxide and ozone in the middle atmosphere** [6362-75]  
P. J. Espy, The British Antarctic Survey (United Kingdom); P. Hartogh, The Max Planck Institute for Solar System Research (Germany); K. Holmén, The Norwegian Polar Institute (Norway)

---

**SESSION 6 LIDAR, METEOROLOGICAL INSTRUMENTATION**

---

- 63620Q **Lidar mixing height determination during Helsinki testbed [6362-26]**  
C. Münkel, Vaisala GmbH (Germany)
- 63620R **Determination of mixing layer height from ceilometer backscatter profiles [6362-29]**  
M. de Hajj, W. Wauben, H. K. Baltink, Royal Netherlands Meteorological Institute (Netherlands)
- 63620T **Automated backscatter lidar for PBL and troposphere measurements: experience from one-year operation [6362-31]**  
V. Mitev, G. Martucci, R. Matthey, Observatory of Neuchâtel (Switzerland)

---

**SESSION 7 UV GROUND-BASED MEASUREMENTS**

---

- 63620V **Influence of surface reflectivity on radiation in the Antarctic environment (Invited Paper) [6362-33]**  
I. Smolskaia, Leibniz Univ. Hannover (Germany); S. Wuttke, Alfred Wegener Institute for Polar and Marine Research (Germany); G. Seckmeyer, Leibniz Univ. Hannover (Germany); K. Michael, Univ. of Tasmania (Australia)
- 63620W **International intercomparison of multiband filter radiometers in Oslo 2005 [6362-34]**  
B. Johnsen, Norwegian Radiation Protection Authority (Norway); B. Kjeldstad, Norwegian Univ. of Science and Technology (Norway); T. N. Aalerud, L. T. Nilsen, Norwegian Radiation Protection Authority (Norway); J. Schreder, Calibration Measurement Software Solutions (Austria); M. Blumthaler, Innsbruck Medical Univ. (Austria); G. Bernhard, Biospherical Instruments Inc. (USA); A. Bagheri, B. Bhattachari, Norwegian Univ. of Science and Technology (Norway); C. Topaloglou, Aristotle Univ. of Thessaloniki (Greece); G. Zablocki, Institute of Meteorology and Water Management (Poland); O. Meinander, Finnish Meteorological Institute (Finland); B. A. Høiskar, R. Haugen, Norwegian Institute for Air Research (Norway); W. S. Durham, G. Janson, Colorado State Univ. (USA); A. R. Marrero, Observatorio Atmósferico de Izaña, Instituto Nacional de Meteorología (Spain); A. Dahlback, Univ. of Oslo (Norway); D. Bolsée, Belgian Institute for Space Aeronomy (Belgium); J. R. Slusser, Colorado State Univ. (USA); J. Stamnes, Univ. of Bergen (Norway); C. Torres, Observatorio Atmósferico de Izaña, Instituto Nacional de Meteorología (Spain); A. R. D. Smedley, Univ. of Manchester (United Kingdom); L.-E. Paulsson, Swedish Radiation Protection Authority (Sweden); K. Lakkala, Finnish Meteorological Institute (Finland); A. R. Webb, Univ. of Manchester (United Kingdom); J. B. Ørbæk, Norwegian Polar Institute (Norway); A. A. Grimes, T. Ringstad, Norwegian Univ. of Life Sciences, Mathematics, and Technology (Norway); T. Lange, Univ. of Bergen (Norway); W. Josefsson, Swedish Meteorological and Hydrological Institute (Sweden)
- 63620X **Long-term evaluation of the calibration of YES UVB-1 broadband radiometers of the Central UV Calibration Facility (1994-2005) and the suite of UV radiometers in the USDA UV Monitoring Network [6362-35]**  
K. Lantz, P. Disterhoff, C. Wilson, Univ. of Colorado (USA); G. Janson, B. Durham, J. Slusser, Colorado State Univ. (USA)

- 63620Y **A laboratory intercomparison of broadband radiometers used for solar erythemal irradiance measurements** [6362-36]  
J. M. Vilaplana, Instituto Nacional de Técnica Aeroespacial (Spain); J. Gröbner, Physikalisch-Meteorologisches Observatorium Davos (Switzerland); A. Serrano, M. Antón, M. L. Cancillo, Univ. de Extremadura (Spain)
- 63620Z **Quality considerations on meteorological parameters to be used for modelling UV radiation** [6362-37]  
T. H. Sivertsen, Norwegian Institute for Agricultural and Environmental Research (Norway)
- 636210 **Shipborne measurements of UV irradiance on a north-south Atlantic transect** [6362-38]  
S. Wuttke, S. El Dine El Naggar, T. Bluszcz, O. Schrems, Alfred Wegener Institute for Polar and Marine Research (Germany)
- 636211 **Validation of ozone and aerosol retrieval methods with UV rotating shadowband spectroradiometer (RSS)** [6362-39]  
P. Kiedron, J. Schlemmer, SUNY, Univ. at Albany (USA); J. Slusser, Colorado State Univ. (USA); P. Disterhoff, National Oceanic and Atmospheric Administration (USA)

---

## SESSION 8 UV MODELLING AND DATA ANALYSIS

---

- 636213 **Use of the visibility in the radiation transfer modeling in UV range** [6362-40]  
B. M. Lapeta, Institute of Meteorology and Water Management (Poland); Z. Ustrnul, Univ. of Silesia (Poland); A. Curylo, Institute of Meteorology and Water Management (Poland)
- 636214 **UV climatology from quality controlled ground-based spectral UV measurements** [6362-41]  
P. den Outer, H. Slaper, National Institute for Public Health and the Environment (Netherlands); A. Bais, Aristotle Univ. of Thessaloniki (Greece); U. Feister, Deutscher Wetterdienst (Germany); M. Janouch, Czech Hydrometeorological Institute (Czech Republic); W. Josefsson, Swedish Meteorological and Hydrological Institute (Sweden); J. Kaurola, T. Koskela, Finnish Meteorological Institute (Finland)
- 636215 **Modelling solar UV radiation in the past: comparison of algorithms and input data** [6362-42]  
P. Koepke, Ludwig-Maximilians-Univ. Munich (Germany); H. De Backer, Royal Meteorological Institute of Belgium (Belgium); A. Bais, Aristotle Univ. of Thessaloniki (Greece); A. Curylo, Institute of Meteorology and Water Management (Poland); K. Eerme, Tartu Observatory (Estonia); U. Feister, Richard Aßmann Observatory Lindenberge (Germany); B. Johnsen, Norwegian Radiation Protection Authority (Norway); J. Junk, Univ. Trier (Germany); A. Kazantzidis, Aristotle Univ. of Thessaloniki (Greece); J. Krzyscin, Institute of Geophysics (Poland); A. Lindfors, Finnish Meteorological Institute (Finland); J. A. Olseth, Univ. Bergen (Norway); P. den Outer, National Institute of Public Health and the Environment (Netherlands); A. Pribulová, Geophysical Institute (Slovak Republic); A. W. Schmalwieser, Univ. of Veterinary Medicine Vienna (Austria); H. Slaper, National Institute of Public Health and the Environment (Netherlands); H. Staiger, German Meteorological Service (Germany); J. Verdebout, Joint Research Ctr. (Italy); L. Vuilleumier, Federal Office of Meteorology and Climatology MeteoSwiss (Switzerland); P. Weihs, Institute of Meteorology, BOKU (Austria)
- 636216 **Year-to-year variations of the vitamin D synthesis related UV-B radiation in Estonia in autumn and spring** [6362-43]  
K. Eerme, U. Veismann, I. Ansko, S. Lätt, Tartu Observatory (Estonia)

- 636217 **Long-term erythemal UV at Abisko and Helsinki estimated using total ozone, sunshine duration, and snow depth** [6362-44]  
A. V. Lindfors, Finnish Meteorological Institute (Finland); B. Holmgren, Abisko Scientific Research Station (Sweden); G. Hansen, Norwegian Institute for Air Research (Norway)

---

## SESSION 9 UV SATELLITE-BASED RETRIEVALS

---

- 636219 **Modeling natural surface UV radiation with satellite data: examples of applications** [6362-46]  
J. Verdebout, Institute for Health and Consumer Protection (Italy)
- 63621A **On the use of quantitative diurnal cloud information for the calculation of daily UV dose maps over Europe** [6362-47]  
M. van Weele, R. J. van der A, Royal Netherlands Meteorological Institute (Netherlands)
- 63621B **The UV service of the ESA-GSE Project PROMOTE** [6362-48]  
R. Meerkötter, T. Erbertseder, J. Kammann, Deutsches Zentrum für Luft- und Raumfahrt (Germany); R. Blumenthal, Berufsverband der Deutschen Dermatologen (Germany); F. Flore, E. Simeone, Flyby srl (Italy); G. Licitra, Agenzia Regionale per la Protezione Ambientale della Toscana (Italy); A. Tanskanen, Finnish Meteorological Institute (Finland)
- 63621C **Requirements for the spatial resolution, temporal resolution, and measuring uncertainties of total ozone measurements to calculate the erythemally effective UV radiation with a pre-selected accuracy** [6362-49]  
A. W. Schmalwieser, G. Schaubberger, Univ. of Veterinary Medicine (Austria); T. Erbertseder, Deutsches Zentrum für Luft und Raumfahrt (Germany); M. Janouch, Czech Hydrometeorological Institute (Czech Republic); G. J. R. Coetze, South African Weather Service (South Africa); P. Weihs, Univ. of Natural Resources and Applied Life Sciences (Austria)

---

## SESSION 10 TRACE GASES FROM THE GROUND

---

- 63621D **Highway emission study by DOAS within the Inn valley near Innsbruck (Invited Paper)** [6362-50]  
K. Schäfer, H. Hoffmann, S. Emeis, Forschungszentrum Karlsruhe GmbH (Germany); J. Wittig, J. Vergeiner, Univ. of Innsbruck (Austria)
- 63621E **Airport air quality and emission studies by remote sensing and inverse dispersion modelling** [6362-52]  
G. Schürmann, K. Schäfer, C. Jahn, H. Hoffmann, Forschungszentrum Karlsruhe GmbH (Germany); V. Groma, S. Török, KFKI Atomic Energy Research Institute (Hungary); S. Emeis, Forschungszentrum Karlsruhe GmbH (Germany)
- 63621F **Quantitative analysis of open-path FTIR spectra by using artificial neural networks** [6362-53]  
S. Briz, Univ. Europea de Madrid (Spain); E. García-Cuesta, I. Fernández-Gómez, A. J. de Castro, Univ. Carlos III de Madrid (Spain)
- 63621G **Continuous monitoring of multiple layering by ceilometer in the Inn valley** [6362-27]  
K. Schäfer, S. Emeis, C. Jahn, Forschungszentrum Karlsruhe GmbH (Germany); C. Mükel, Vaisala GmbH (Germany); C. Matuse, Forschungszentrum Karlsruhe GmbH (Germany)

---

**SESSION 11 TRACE GASES FROM SPACE**

---

- 63621I **Low-cost microsatellite UV instrument suite for monitoring ozone and volcanic sulphur dioxide** [6362-55]  
J. A. Fernandez-Saldivar, C. I. Underwood, S. Mackin, Surrey Space Ctr., Univ. of Surrey (United Kingdom)
- 63621K **Climate research with the atmospheric infrared sounder** [6362-57]  
T. S. Pagano, M. T. Chahine, H. H. Aumann, B. Tian, S.-Y. Lee, E. T. Olsen, B. Lambrightsen, E. Fetzer, F. W. Irion, Jet Propulsion Lab. (USA); X. Fu, Univ. of Hawaii at Manoa (USA); W. McMillan, L. Strow, Univ. of Maryland Baltimore County (USA); C. Barnet, M. Goldberg, NOAA/NESDIS (USA); J. Susskind, J. Blaisdell, NASA Goddard Space Flight Ctr. (USA)

---

**POSTER SESSION**

---

- 63621L **905-nm biaxial lidar ceilometer prototype** [6362-28]  
E. Gregorio, F. Rocadenbosch, A. Comerón, Univ. Politècnica de Catalunya (Spain)
- 63621O **Atmospheric particles over an urban area** [6362-62]  
S. Mukai, I. Sano, M. Yasumoto, M. Nishina, Kinki Univ. (Japan)
- 63621R **Aerosol retrieval based on combination use of POLDER and GLI data** [6362-65]  
I. Sano, Kinki Univ. (Japan)
- 63621T **Cloud detection and height estimation through registration of Disaster Monitoring Constellation imagery** [6362-67]  
D. C. Bamber, S. Mackin, P. Palmer, Univ. of Surrey (United Kingdom)
- 63621V **Polysulphone and spore-film UV-dosimeters compared to two radiation transfer models and an instrument that measures the UV index: an evaluation for a UV-dosimetry study of preschool children in Stockholm** [6362-68]  
U. Wester, Swedish Radiation Protection Authority (Sweden)
- 63621W **Comparison of cloudiness derived from MSG satellite data with standard surface observations: preliminary results for Poland** [6362-70]  
B. Lapeta, I. Dyras, D. Serafin-Rek, Institute of Meteorology and Water Management (Poland); Z. Ustrnul, Univ. of Silesia (Poland)
- 63621Z **Ground-based remote sensing of the atmospheric ozone over Moscow at millimeter waves** [6362-74]  
S. B. Rozanov, S. V. Solomonov, E. P. Kropotkina, A. N. Ignatyev, A. N. Lukin, P.N. Lebedev Physical Institute (Russia)
- 636221 **Incorporating weather conditions and various scatterers into volumetric radar clutter simulation** [6362-77]  
R. Kerminen, J. Jylhä, T. Ala-Kleemola, J. Vihonen, A. Visa, Tampere Univ. of Technology (Finland)
- 636223 **A straightforward signal-to-noise ratio estimator for elastic/Raman lidar signals** [6362-80]  
M. N. Md Reba, F. Rocadenbosch, M. Sicard, Univ. Politècnica de Catalunya (Spain)

- 636224 **AIRS retrieval validation during the EAQUATE [6362-8]**  
D. K. Zhou, NASA Langley Research Ctr. (USA); W. L. Smith, Hampton Univ. (USA) and Univ. of Wisconsin, Madison (USA); V. Cuomo, Istituto di Metodologie per l'Analisi Ambientale, CNR (Italy); J. P. Taylor, UK Met Office (United Kingdom); C. D. Barnet, National Oceanic and Atmospheric Administration (USA); P. Di Girolamo, Univ. degli Studi della Basilicata (Italy); G. Pappalardo, Istituto di Metodologie per l'Analisi Ambientale, CNR (Italy); A. M. Larar, X. Liu, NASA Langley Research Ctr. (USA); S. M. Newman, C. Lee, UK Met Office (United Kingdom); S. A. Mango, NPOESS (USA)
- 636227 **Analysis of pseudo-noise for infrared sounder instruments in geostationary orbit [6362-84]**  
M. Quatrevaelet, D. Aminou, European Space Research and Technology Ctr. (Netherlands); C. Standfuss, Noveltis (France)
- 636228 **Estimation of UV irradiance from ancillary data and comparison with measurements at Thessaloniki, Greece (40.5°N, 23°E) [6362-85]**  
A. Kazantzidis, A. Bais, K. Garane, S. Kazadzis, C. Meleti, Aristotle Univ. of Thessaloniki (Greece)
- 636229 **Quality assurance of the Greek UV Network: preliminary results from the pilot phase operation [6362-86]**  
A. Kazantzidis, A. Bais, C. Topaloglou, K. Garané, M. Zempila, C. Meleti, Aristotle Univ. of Thessaloniki (Greece); C. Zerefos, Academy of Athens (Greece)
- 63622A **Spectral solar UV monitoring: worth it? [6362-87]**  
T. Koskela, A. Heikkilä, J. Kaurola, A. Lindfors, A. Tanskanen, Finnish Meteorological Institute (Finland); P. den Outer, Rijksinstituut voor Volksgezondheid en Milieu (Netherlands)
- 63622B **UV reconstruction modelling for selected European sites [6362-88]**  
A. Curylo, Institute of Meteorology and Water Management (Poland)
- 63622C **A first approach in measuring, modeling, and forecasting the vitamin D effective UV radiation [6362-89]**  
A. W. Schmalwieser, G. Schuberger, Univ. of Veterinary Medicine (Austria); W. B. Grant, SUNARC (USA); S. J. Mackin, S. Pope, Solartech Inc. (USA)
- 63622D **Validation of TOMS UV irradiance with Brewer ground-based measurements at southwestern Spain [6362-90]**  
M. Antón, Univ. de Extremadura (Spain); V. E. Cachorro, Univ. de Valladolid (Spain); J. M. Vilaplana, INTA, Estación de Sondeos Atmosféricos El Arenosillo (Spain); N. Krotkov, Univ. of Maryland, Baltimore County (USA); A. Serrano, Univ. de Extremadura (Spain); C. Toledano, Univ. de Valladolid (Spain); B. de la Morena, INTA, Estación de Sondeos Atmosféricos, El Arenosillo (Spain); J. R. Herman, NASA Goddard Space Flight Ctr. (USA); M. L. Cancillo, Univ. de Extremadura (Spain)
- 63622F **Calibrating six years of multiband UV measurements at Ushuaia and Marambio for model and satellite comparisons [6362-92]**  
O. Meinander, Finnish Meteorological Institute (Finland); C. Torres, Observatorio Atmosférico de Izaña, Instituto Nacional de Meteorología (Spain); K. Lakkala, T. Koskela, Finnish Meteorological Institute (Finland); A. Redondas, E. Cuevas, Observatorio Atmosférico de Izaña, Instituto Nacional de Meteorología (Spain); G. Deferrari, Ctr. Austral de Investigaciones Científicas (Argentina); A. Tanskanen, Finnish Meteorological Institute (Finland)

- 63622G **Surface UV radiation monitoring at two Italian Brewer stations (Rome and Ispra): a first comparison with OMI data [6362-93]**  
A. M. Siani, I. Ialongo, R. Giannini, G. R. Casale, M. Cacciani, Univ. of Rome La Sapienza (Italy)
- 63622H **Reconstruction of daily solar UV irradiation by an artificial neural network (ANN) [6362-94]**  
U. Feister, Deutscher Wetterdienst, Richard Aßmann Observatorium Lindenberg (Germany); J. Junk, Univ. of Trier (Germany)
- 63622I **Validation of OMI UV products: first results of comparisons with an Austrian ground station [6362-95]**  
P. Weihs, S. Simic, Univ. für Bodenkultur Wien (Austria)
- 63622K **Wide-band spectrally resolved measurement of the Earth's up-welling radiation with the REFIR-PAD spectroradiometer [6362-97]**  
G. Bianchini, L. Palchetti, C. Belotti, S. Del Bianco, U. Cortesi, Istituto di Fisica Applicata Nello Carrara, CNR (Italy)
- 63622P **Improved reflectance retrieval from hyper- and multispectral imagery without prior scene or sensor information [6362-102]**  
L. S. Bernstein, S. M. Adler-Golden, R. L. Sundberg, Spectral Sciences, Inc. (USA); A. J. Ratkowski, Air Force Research Lab. (USA)

*Author Index*