PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

Front Matter: Volume 7107

, "Front Matter: Volume 7107," Proc. SPIE 7107, Remote Sensing of Clouds and the Atmosphere XIII, 710701 (29 October 2008); doi: 10.1117/12.817163

SPIE.

Event: SPIE Remote Sensing, 2008, Cardiff, Wales, United Kingdom

PROCEEDINGS OF SPIE

Remote Sensing of Clouds and the Atmosphere XIII

**Richard H. Picard
Adolfo Comeron
Klaus Schäfer
Aldo Amodeo
Michiel van Weele**
Editors

**15–17 September 2008
Cardiff, Wales, United Kingdom**

Sponsored by
SPIE Europe

Cooperating Organisations
EARSC—European Association of Remote Sensing Companies
EOS—European Optical Society
Technium OptIC (United Kingdom)
NASA—National Aeronautics and Space Administration (United States)
WOF—Welsh Opto-electronics Forum (United Kingdom)

Published by
SPIE

Volume 7107

Proceedings of SPIE, 0277-786X, v. 7107

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Remote Sensing of Clouds and the Atmosphere XIII*, edited by Richard H. Picard, Adolfo Comeron, Klaus Schäfer, Aldo Amodeo, Michiel van Weele, Proceedings of SPIE Vol. 7107 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 0277-786X

ISBN 9780819473387

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2008, Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/08/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE
Digital Library

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

vii	Conference Committee
ix	Introduction

SESSION 1 REMOTE SENSING OF CLOUDS

- 7107 02 **Robust cloud estimation for GMS images considering the dynamic changes on VIS/IR data** [7107-01]
H. Hiranaka, A. N. Van, Y. Aoki, Shibaura Institute of Technology (Japan)
- 7107 03 **Near-real time cloud retrievals from operational and research meteorological satellites** [7107-02]
P. Minnis, L. Nguyen, NASA Langley Research Ctr. (United States); R. Palikonda, Science Applications International Corp. (United States); P. W. Heck, CIMSS (United States); D. A. Spangenberg, SAIC (United States); D. R. Doelling, NASA Langley Research Ctr (United States); J. K. Ayers, Science Applications International Corp. (United States); W. L. Smith, Jr., NASA Langley Research Ctr. (United States); M. M. Khaiyer, Q. Z. Trepte, L. A. Avey, Science Applications International Corp. (United States); F.-L. Chang, National Institute of Aerospace (United States); C. R. Yost, T. L. Chee, S. Szedung, Science Applications International Corp. (United States)
- 7107 04 **Studying the potential of terahertz radiation for deriving ice cloud microphysical information** [7107-03]
J. Mendrok, P. Baron, Y. Kasai, National Institute of Information and Communications Technology (Japan)
- 7107 05 **ASTER nighttime cloud mask database using MODIS cloud mask (MOD35) products** [7107-04]
H. Tonooka, Ibaraki Univ. (Japan)
- 7107 06 **In-scene-based atmospheric correction of uncalibrated VISIBLE-SWIR (VIS-SWIR) hyper- and multi-spectral imagery** [7107-48]
L. S. Bernstein, S. M. Adler-Golden, R. L. Sundberg, Spectral Sciences, Inc. (United States); A. J. Ratkowski, Air Force Research Lab. (United States)

SESSION 2 LIDAR, RADAR, AND PASSIVE ATMOSPHERIC MEASUREMENT TECHNIQUES

- 7107 07 **An overview of the EarthCARE mission and end-to-end simulator** [7107-06]
D. Lajas, T. Wehr, M. Eisinger, A. Lefebvre, European Space Agency (Netherlands)
- 7107 08 **Sub-visual cirrus LIDAR measurements for satellite masking improvement** [7107-07]
E. Landulfo, E. G. Larroza, F. J. S. Lopes, W. C. de Jesus, Instituto de Pesquisas Energéticas e Nucleares (Brazil); M. Bottino, Instituto Nacional de Pesquisas Espaciais (Brazil); W. M. Nakaema, Instituto de Pesquisas Energéticas e Nucleares (Brazil); J. Steffens, Escola Politécnica da Univ. de São Paulo (Brazil)

- 7107 09 **Evaluation of the atmospheric correction procedure for the APEX level 2/3 processor** [7107-08]
D. Schlpfer, Univ. of Zrich (Switzerland); J. Biesemans, VITO (Belgium); A. Hueni, Univ. of Zrich (Switzerland); K. Meuleman, VITO (Belgium)
- 7107 0A **New results from continuous mixing layer height monitoring in urban atmosphere** [7107-09]
K. Schfer, S. Emeis, C. Jahn, Forschungszentrum Karlsruhe GmbH (Germany); C. Mnkel, Vaisala GmbH (Germany); S. Schrader, M. Hb, Forschungszentrum Karlsruhe GmbH (Germany)
- 7107 0B **Superresolution multispectral imaging polarimetric space surveillance LADAR sensor design architectures** [7107-10]
G. C. Giakos, Univ. of Akron (United States); R. H. Picard, P. D. Dao, Air Force Research Lab. (United States)

SESSION 3 RADIATIVE TRANSFER

- 7107 0D **Improved full spectrum cloudy scene simulation** [7107-12]
R. Sundberg, S. Richtsmeier, Spectral Sciences, Inc. (United States); R. Haren, Air Force Research Lab. (United States)
- 7107 0E **Atmospheric property retrievals from infrared atmospheric sounding interferometer (IASI)** [7107-14]
X. Liu, D. K. Zhou, A. Larar, NASA Langley Research Ctr. (United States); W. L. Smith, Hampton Univ. (United States); P. Schluessel, EUMETSAT (Germany)
- 7107 0F **TITAN: a new infrared radiative transfer model for the study of heterogeneous 3D surface** [7107-15]
G. Fontanilles, ONERA (France) and Univ. de Toulouse (France); X. Briottet, S. Fabre, ONERA (France); T. Trmas, P. Henry, Ctr. National d'tudes Spatiales (France)
- 7107 0G **Comparison of atmospheric radiative transfer with statistical wave approach** [7107-16]
S. Mudaliar, Air Force Research Lab. (United States)
- 7107 0H **The application of atmospheric correction algorithms for monitoring atmospheric pollution using Landsat TM images** [7107-17]
D. G. Hadjimitsis, K. P. Themistokleous, G. Papadavid, Cyprus Univ. of Technology (Cyprus)
- 7107 0J **The influence of sea fog inhomogeneity on its microphysical characteristics retrieval** [7107-19]
Z. Hao, D. Pan, F. Gong, X. He, State Oceanic Administration (China)

SESSION 4 ULTRAVIOLET GROUND- AND SPACE-BASED MEASUREMENTS, RETRIEVALS, AND MODELS

- 7107 0M **3D OMI observations of aerosol plumes released from December 2006 Australian forest fires** [7107-23]
R. Dirksen, F. Boersma, J. de Laat, P. Stammes, Royal Netherlands Meteorological Institute (Netherlands); O. Torres, Joint Ctr. for Earth Systems Technology (United States); P. Veefkind, Royal Netherlands Meteorological Institute (Netherlands)

SESSION 5 REMOTE SENSING BY FTIR, DOAS, AND OTHER SPECTROMETRIC METHODS

- 7107 ON **Cloud and thermodynamic parameters retrieved from satellite ultraspectral infrared measurements** [7107-24]
D. K. Zhou, NASA Langley Research Ctr. (United States); W. L. Smith, Hampton Univ. (United States) and Univ. of Wisconsin, Madison (United States); A. M. Larar, X. Liu, NASA Langley Research Ctr. (United States); J. P. Taylor, United Kingdom Meteorological Office (United Kingdom); P. Schlüssel, EUMETSAT (Germany); L. L. Strow, Univ. of Maryland, Baltimore County (United States); S. A. Mango, NPOESS Integrated Program Office (United States)
- 7107 OO **Aerosols in urban areas: optical properties and impact on the signal incident to an airborne high-spatial resolution camera** [7107-25]
C. Thomas, ONERA (France) and Univ. de Toulouse (France); X. Briottet, ONERA (France); R. Santer, Univ. du Littoral Côte d'Opale (France); S. Lacherade, ONERA (France)
- 7107 OP **Comparative study of wintertime NO and NO₂ measured by DOAS near a motorway in the Inn Valley** [7107-26]
K. Schäfer, Forschungszentrum Karlsruhe GmbH (Germany); F. Obleitner, Univ. of Innsbruck (Austria); M. Hoffmann, Forschungszentrum Karlsruhe GmbH (Germany); J. Wittig, B. Ruille, Univ. of Innsbruck (Austria); S. Emeis, P. Suppan, W. Gurgiser, F. Bilgeri, Forschungszentrum Karlsruhe GmbH (Germany)
- 7107 OQ **Athens airport air quality study by remote sensing with DOAS, FTIR, and ceilometer** [7107-27]
K. Schäfer, S. Emeis, C. Jahn, M. Hoffmann, C. Heyder, F. Haas, Forschungszentrum Karlsruhe GmbH (Germany); C. Helmis, G. Scouros, National and Kapodistrian Univ. of Athens (Greece); R. Kurtenbach, A. Niedojadlo, Bergische Univ. Wuppertal (Germany); E. Anamaterou, M. O'Connor, Athens International Airport S.A. (Greece)

SESSION 6 ATMOSPHERIC PROFILING OF AEROSOLS, TRACE GASES, AND METEOROLOGICAL PARAMETERS

- 7107 OT **Data analysis and retrieval algorithms for the ozone mapping and profiler suite/limb profiler instrument** [7107-30]
D. F. Rault, NASA Langley Research Ctr. (United States); R. P. Loughman, Hampton Univ. (United States); G. Taha, Science Systems and Applications, Inc. (United States)
- 7107 OU **Correction of atmospheric scattering effects in space-based observations of methane and carbon dioxide: model study for synthesized GOSAT spectra** [7107-31]
A. Bril, S. Oshchepkov, T. Yokota, National Institute for Environmental Studies (Japan)
- 7107 OV **Retrieval of aerosol optical depth in vicinity of broken clouds from reflectance ratios: a novel approach** [7107-32]
E. Kassianov, M. Ovtchinnikov, L. Berg, S. McFarlane, C. Flynn, Pacific Northwest National Lab. (United States)
- 7107 OW **Improved MODIS aerosol retrieval using modified VIS/MIR surface albedo ratio over urban scenes** [7107-33]
A. Picon, M. M. Oo, E. Hernandez, M. Jerg, B. M. Gross, F. Moshary, S. A. Ahmed, City College, CUNY (United States)

- 7107 0X **Geostationary imaging Fabry-Perot spectrometer (GIFS): measurement of clouds and trace gases** [7107-34]
J.-H. Yee, R. DeMajistre, W. H. Swartz, M. F. Morgan, J. D. Boldt, The Johns Hopkins Univ. Applied Physics Lab. (United States); W. R. Skinner, Univ. of Michigan (United States); M. C. Pitts, C. A. Hostetler, NASA Langley Research Ctr., (United States)
- 7107 0Y **Aerosol characterization and transport pathway using ground-based measurement and space borne remote sensing** [7107-49]
N. Boyouk, J.-F. Léon, Lab d'Optique Atmosphérique, CNRS, Univ. des Sciences et Technologies de Lille (France); H. Delbarre, Lab. de Physico-chimie de l'Astmosphère, Univ. du Littoral Cote d'Opale (France)

POSTER SESSION

- 7107 10 **Pursuing atmospheric water vapor retrieval through NDSA measurements between two LEO satellites: evaluation of estimation errors in spectral sensitivity measurements** [7107-40]
L. Facheris, Univ. degli Studi di Firenze (Italy); F. Cuccoli, CNIT, Univ. degli Studi di Firenze (Italy); F. Argenti, Univ. degli Studi di Firenze (Italy)
- 7107 11 **Analysis of aerosol characteristics over the China Sea by MODIS data** [7107-41]
X. Deng, Anhui Institute of Meteorology (China) and State Oceanic Administration (China); D. He, Anhui Climate Ctr. (China); D. Pan, X. He, Z. Hao, State Oceanic Administration (China)
- 7107 12 **Analyses of scattering characteristics of chosen anthropogenic aerosols** [7107-42]
M. Kaszczuk, Z. Mierczyk, M. Muzal, Military Univ. of Technology (Poland)
- 7107 13 **A review of satellite remote sensing of aircraft-induced contrails and investigation of their potential role in regional climate change** [7107-43]
G. M. Whelan, F. Cawkwell, Univ. College Cork (Ireland)
- 7107 14 **Cloud microphysical characterization in the presence of a desert dust event over Portugal: a study based on atmospheric modeling and satellite remote sensing** [7107-44]
D. Santos, M. J. Costa, A. M. Silva, R. Salgado, Univ. de Évora (Portugal)
- 7107 15 **Comparative study on Doppler weather radar products from strong convective weather** [7107-45]
J. Lu, Nanjing Univ. of Information Science and Technology (China) and Tianjin Meteorological Bureau (China); Z. Jiang, J. He, Nanjing Univ. of Information Science and Technology (China)
- 7107 16 **Improving ocean surface wind speed retrieval from SSM/I data by channel combinations** [7107-46]
L. Lei, State Oceanic Administration (China); J. Zou, State Oceanic Administration (China) and Shanghai Institute of Technical Physics (China); Z. Mao, State Oceanic Administration (China)

Author Index

Conference Committee

Symposium Chairs

Guido D'Urso, Università degli Studi di Napoli Federico II (Italy)
Steven P. Neeck, NASA Headquarters (United States)

Conference Chairs

Richard H. Picard, Air Force Research Laboratory (United States)
Adolfo Comeron, Universitat Politècnica de Catalunya (Spain)
Klaus Schäfer, Forschungszentrum Karlsruhe (Germany)
Aldo Amodeo, Consiglio Nazionale delle Ricerche (Italy)
Michiel van Weele, Koninklijk Nederlands Meteorologisch Instituut (Netherlands)

Program Committee

Michel R. Carleer, Université Libre de Bruxelles (Belgium)
Sonnik Clausen, Risø National Laboratory (Denmark)
Wei Gao, Colorado State University (United States)
Roland Harig, Technische Universität Hamburg-Harburg (Germany)
Nicolaos I. Sifakis, National Observatory of Athens (Greece)
James R. Slusser, Colorado State University (United States)
Konradin Weber, Fachhochschule Düsseldorf (Germany)

Session Chairs

- 1 Remote Sensing of Clouds
Michiel van Weele, Koninklijk Nederlands Meteorologisch Instituut (Netherlands)
- 2 Lidar, Radar, and Passive Atmospheric Measurement Techniques
Adolfo Comeron, Universitat Politècnica de Catalunya (Spain)
- 3 Radiative Transfer
Richard H. Picard, Air Force Research Laboratory (United States)
- 4 Ultraviolet Ground- and Space-Based Measurements, Retrievals, and Models
Michiel van Weele, Koninklijk Nederlands Meteorologisch Instituut (Netherlands)

- 5 Remote Sensing by FTIR, DOAS, and Other Spectometric Methods
Aldo Amodeo, Consiglio Nazionale delle Ricerche (Italy)
- 6 Atmospheric Profiling of Aerosols, Trace Gases, and Meteorological
Parameters
Klaus Schäfer, Forschungszentrum Karlsruhe (Germany)

Introduction

The Thirteenth Conference on Remote Sensing of Clouds and the Atmosphere, held in Cardiff, UK, included 40 papers divided into six oral sessions and a poster session. The areas covered were: radiative transfer; cloud remote sensing; lidar, radar, and passive atmospheric measurement techniques; spectroscopic methods, including FTIR and DOAS; profiling of aerosols, trace gases, and meteorological parameters; and ultraviolet measurements, retrievals, and models. The papers presented included a broad range of methodologies from basic theoretical principles of atmospheric phenomena and remote-sensing techniques to end-user applications of remote-sensing products. Modeling, experimental and instrumental techniques and methods, and inversion algorithms were all addressed. Summary conclusions relating to particular areas and arising from conference papers are addressed in the following paragraphs.

Space-based remote sensing is well suited to producing global data products. Current satellite instruments have matured and are producing useful data products. Long-term data sets are being acquired, and there is a trend to pushing satellite-derived products to finer spatial scales and to lower near-surface altitudes. Planning for the future is apparent, and it seems likely that new satellite instruments and an entirely new range of capabilities will be available in the future.

Ground-based sensing, yielding valuable local data, has also shown significant advances. Ground-based measurements are especially valuable for studying small-scale phenomena. While such data are extremely valuable in their own right, they are also essential to provide ground truth for space-based sensors. By forming networks of ground-based instruments, coordinated data on extended regions (and perhaps eventually on regions of global extent) can be obtained. Effective coordinated measurements may also depend on accurate cross-calibration methods and the availability of powerful computational facilities.

Models are essential partners in the interpretation of remote-sensing measurements, and the modeling area is responding to the challenges offered by ever more sophisticated remote-sensing instruments. There is continuing progress on atmospheric radiative transfer, with attention being directed to more complex geometries and boundary conditions. For sensing of the earth surface, atmospheric correction techniques have become more sophisticated and more physically grounded.

The trends noted above are expected to continue in the future, with more reliable long-term global data sets of finer-scale phenomena available from space, along with extended networking of more powerful ground-based instruments. In addition, there is a significant opportunity to expand small-scale

measurements to remote or difficult-to-reach areas through reliance on a broader range of platforms, including ships, aircraft, and unmanned aerial vehicles. Models will continue to improve, taking advantage of more powerful computers and computational techniques, and fusion of separate data sets and of data with models will become more accessible and routine.

These proceedings contain the reviewed and revised papers corresponding to the conference presentations.

We would like to thank the authors for the very high quality of their papers and thank the SPIE staff for their invaluable work in the organization of the conference and the editing of these proceedings.

Richard H. Picard
Adolfo Comeron
Klaus Schäfer
Aldo Amodeo
Michiel van Weele