PROCEEDINGS OF SPIE

Remote Sensing of the Ocean, Sea Ice, and Large Water Regions 2007

Charles R. Bostater, Jr. Stelios P. Mertikas Xavier Neyt Miguel Vélez-Reyes Editors

17–18 September 2007 Florence, Italy

Sponsored by SPIE Europe

Cooperating Organisations SPIE EOS—European Optical Society NASA—National Aeronautics and Space Administration (USA) SIOF—Società Italiana di Ottica e Fotonica (Italy)

Published by SPIE

Volume 6743

Proceedings of SPIE, 0277-786X, v. 6743

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 the Ocean, Sea Ice, and Large Water Regions 2007, edited by Charles R. Bostater, Jr., Stelios P. Mertikas, Xavier Neyt, Miguel Vélez-Reyes, Proceedings of SPIE Vol. 6743 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X ISBN 9780819469014

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 © 2007, 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/07/\$18.00.

Printed in the United States of America.

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



SPIEDigitalLibrary.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 SENSING THE WIND ROUGHENED AIR-SEA INTERFACE

- Multiresolution optical properties of rough sea surface in infrared [6743-01]
 K. Caillault, S. Fauqueux, ONERA (France); C. Bourlier, Univ. de Nantes (France);
 P. Simoneau, L. Labarre, ONERA (France)
- 6743 03 Remote polarization measurements of the air-sea interface [6743-02]
 G. Gilbert, J. Schoonmaker, Y. Podobna, I. Petrosyuk, Advanced Coherent Technologies (USA); J. Dirbas, PAR Government System Corp. (USA); V. Contarino, Naval Air Development Ctr. (USA)
- 6743 05 Cramér-RAO lower bounds for sinusoidal models from Topex/Poseidon data in the Indian Ocean [6743-04]
 M. Arias Ballesteros, C. Medina, J. J. Alonso del Rosario, P. Villares Durán, J. Gómez-Enri, M. Catalán Pérez-Urquiola, I. Labrador Costero, Univ. de Cádiz (Spain)
- 6743 06 High resolution multispectral photogrammetric imagery: enhancement, interpretation and evaluations (Invited Paper) [6743-05] A. Roberts, M. Haefele, C. Bostater, T. Becker, Simon Fraser Univ. (Canada)

SESSION 2 ACTIVE AND PASSIVE SENSING OF THE WATER COLUMN AND BOTTOM FEATURE ANALYSIS

- 6743 07 Impact of scattering and absorption of photosynthetic pigments on fluorescence retrieval algorithms for coastal waters [6743-06]
 S. Ahmed, A. Gilerson, J. Zhou, S. Hlaing, I. Ioannou, W. Jerez, B. Gross, F. Moshary, CUNY (USA)
- 6743 09 **Subsurface unmixing with application to underwater classification (Invited Paper)** [6743-09] M. Vélez-Reyes, J. A. Goodman, S. Rosario, A. M. Castrodad, Univ. of Puerto Rico at Mayagüez (Puerto Rico)

SESSION 3 COASTAL ISLAND AND SHALLOW WATER REMOTE SENSING

6743 0A Sea surface temperature (AVHRR, MODIS) and ocean colour (MODIS) seasonal and interannual variability in the Macaronesian islands of Azores, Madeira, and Canaries (Invited Paper) [6743-11]
A. M. Martins, Univ. Azores (Portugal); A. S. B. Amorim, Regional Directorate of Fisheries of Madeira (Portugal); M. P. Figueiredo, Univ. Azores (Portugal); R. J. Souza, Regional Directorate of Fisheries of Madeira (Portugal); A. P. Mendonça, Univ. Azores (Portugal); I. L. Bashmachnikov, D. S. Carvalho, Regional Directorate of Fisheries of Madeira (Portugal)

6743 0D Integrated coastal zone management plan for Udupi Coast using RS, GIS and GPS [6743-14] G. S. Dwarakish, S. A. Vinay, S. M. Dinakar, P. B. Jagadeesha, K. Mahaganesha, National Institute of Technology Karnataka (India); U. Natesan, Anna Univ. (India)

SESSION 4 SATELLITE AND IN-SITU STUDIES OF CHINA COASTAL WATERS

- 6743 OE The quasi-analytical algorithm of ocean inherent optical properties using two reference wavelengths [6743-15] D. Pan, Y. Bai, T. Mao, X. He, State Oceanic Administration (China)
- 6743 OF The effect of aerosol scattering on the ocean color polarization correction [6743-16] X. He, State Oceanic Administration (China) and Shanghai Institute of Technical Physics (China); T. Mao, D. Pan, State Oceanic Administration (China); Z. Hao, Nanjing Univ. of Information Science and Technology (China)
- 6743 0G The spectral absorption coefficients model of phytoplankton [6743-17] Z. Mao, X. He, D. Wang, Q. Zhu, State Oceanic Administration (China)

POSTER SESSION

6743 OI Optical model for the water characterization of the highly turbid water of the Winam Gulf (Victoria Lake) [6743-19] F. Santini, R. M. Cavalli, Institute of Atmospheric Pollution, CNR (Italy); A. Palombo, Institute of Methodologies for Environmental Analysis, CNR (Italy); S. Pignatti, Institute of Atmospheric Pollution, CNR (Italy) and Institute of Methodologies for Environmental Analysis, CNR (Italy) 6743 OJ Preliminary study of atmospheric correction of the marine airborne multi-spectrum scanner (MAMS): a case study in East China Sea [6743-20] D. Wang, State Oceanic Administration (China), Shanahai Institute of Technical Physics (China), and Graduate School of Chinese Academy of Sciences (China); D. Pan, T. Mao, J. Chen, State Oceanic Administration (China) 6743 OK Wind field retrieval under high wind conditions by combined scatterometer and radiometer data [6743-21] J. Zou, State Oceanic Administration (China) and Shanghai Institute of Technical Physics (China); M. Lin, National Satellite Ocean Application Service (China); D. Pan, L. Yang, Z. Chen, Q. Zhu, X. He, State Oceanic Administration (China) 6743 OL Interannual water level variations in Lake Izabal, Guatemala, Centroamerica using radar altimetry and its relationship with oceanographic features [6743-22] C. Medina, J. Gomez-Enri, J. Alonso, P. Villares, M. Arias, M. Catalan, I. Labrador, Univ. of Cadiz (Spain) 6743 OM Use of MODIS images to monitor water constituent concentrations in the Tuscany Sea [6743-23] C. Santini, F. Maselli, IBIMET, CNR (Italy); L. Massi, Univ. di Firenze (Italy); M. Pieri, LaMMA (Italy)

6743 00 Ocean color atmospheric correction over the coastal region with multi-viewing satellite data [6743-25]

Y. Mitomi, Remote Sensing Technology Ctr. of Japan (Japan)

6743 OP Water analysis from LIDAR investigations on the Romanian Black Sea coast [6743-26]
 G. Pavelescu, J.-G. Vasilescu, National Institute of R&D for Optoelectronics (Romania);
 S. Babichenko, AS Laser Diagnostics Instruments (Estonia); D. Davastru, National Institute of R&D for Optoelectronics (Romania); A. Lisin, AS Laser Diagnostics Instruments (Estonia);
 T. Onciu, Ovidius Constanta Univ. (Romania); C. Strechie, National Institute for Marine Geology and Geo-Ecology (Romania); L. Belegante, National Institute of R&D for Optoelectronics (Romania)

Author Index

Conference Committee

Symposium Chair

Guido D'Urso, Università degli Studi di Napoli Federico II (Italy)

Symposium Cochair

Steven P. Neeck, NASA Headquarters (USA)

Conference Chairs

Charles R. Bostater, Jr., Florida Institute of Technology (USA) Stelios P. Mertikas, Technical University of Crete (Greece) Xavier Neyt, Royal Belgian Military Academy (Belgium) Miguel Vélez-Reyes, Universidad de Puerto Rico at Mayagüez (Puerto Rico)

Session Chairs

- 1 Sensing the Wind Roughened Air-Sea Interface **Karine Caillault**, ONERA (France)
- Active and Passive Sensing of the Water Column and Bottom Feature Analysis
 Miguel Vélez-Reyes, Universidad de Puerto Rico at Mayagüez (Puerto Rico)
- 3 Coastal Island and Shallow Water Remote Sensing Ana M. Martins, Universidade dos Açores (Portugal) Carlton R. Hall, Dynamac Corporation (USA)
- Satellite and In-Situ Studies of China Coastal Waters
 Charles R. Bostater, Jr., Florida Institute of Technology (USA)
 Xavier Neyt, Royal Belgian Military Academy (Belgium)

Introduction

The editors and conference chairs thank the participants who attended the Remote Sensing of the Ocean and Sea Ice and Large Water Regions 2007 conference in Florence, Italy. The papers reviewed and accepted for publication in this volume represent the authors' most recent research contributions to help improve our global knowledge.

Several additional excellent invited talks and papers that dealt with air-sea interaction, airborne imaging and models coupling remote sensing data with numerical models and related image analysis were presented. Readers may want to note these papers.

We thank the session chairs for their participation and assistance in conducting the conference.

A kind thank you is given to the efforts of the staff at SPIE. The conference and resulting publication could not have been held without their assistance, patience, and support in the publication of the proceedings and coordination of the conference for all of the participants.

Charles R. Bostater, Jr. Stelios P. Mertikas Xavier Neyt Miguel Vélez-Reyes