

PROCEEDINGS OF SPIE

Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2016

Charles R. Bostater, Jr.
Xavier Neyt
Caroline Nichol
Oscar Aldred
Editors

26–27 September 2016
Edinburgh, United Kingdom

Sponsored and Published by
SPIE

Volume 9999

Proceedings of SPIE 0277-786X, V. 9999

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

Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2016, edited by
Charles R. Bostater, Jr., Xavier Neyt, Caroline Nichol, Oscar Aldred, Proc. of SPIE Vol. 9999,
999901 · © 2016 SPIE · CCC code: 0277-786X/16/\$18 · doi: 10.1117/12.2264473

Proc. of SPIE Vol. 9999 999901-1

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings:

Author(s), "Title of Paper," in *Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions 2016*, edited by Charles R. Bostater Jr., Xavier Neyt, Caroline Nichol, Oscar Aldred, Proceedings of SPIE Vol. 9999 (SPIE, Bellingham, WA, 2016) Six-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-786X (electronic)

ISBN: 9781510604025

ISBN: 9781510604032 (electronic)

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 © 2016, 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/16/\$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. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a six-digit CID article numbering system structured as follows:

- 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.

Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

RADAR SENSING OF THE OCEANS

9999 02	A note on radar altimeter signatures of internal solitary waves in the ocean (Invited Paper) [9999-1]
9999 03	Damping of short gravity-capillary waves due to oil derivatives film on the water surface [9999-2]
9999 04	ICESat-2 bathymetry: an empirical feasibility assessment using MABEL [9999-3]
9999 05	Doppler shifts of radar return from the sea surface [9999-4]
9999 06	EM scattering and SAR image simulation from composite sea-ship scene based on a weighted multi-path model [9999-5]

ACTIVE AND PASSIVE SENSING OF THE OCEAN

9999 07	Internal solitons in the Andaman Sea: a new look at an old problem [9999-6]
9999 08	Analysis of the ice gyre extent in a sequence of Cosmo-SkyMed images [9999-7]
9999 0A	Radar probing of surfactant films on the water surface using dual co-polarized SAR [9999-9]
9999 0B	A decade of changing surface energy balance components over a large water region [9999-10]

INFRARED AND VISIBLE SENSING OF WATER

9999 0D	Infrared polarimetric sensing of oil on water (Invited Paper) [9999-11]
9999 0E	Correction and evaluation of thermal infrared data acquired with two different airborne systems at the Elbe estuary [9999-12]
9999 0F	Applications of SMAP data to retrieval of ocean surface wind and salinity [9999-13]
9999 0G	River plumes investigation using Sentinel-2A MSI and Landsat-8 OLI data [9999-14]

MULTISPECTRAL AND HYPERSPECTRAL SENSING II: WATER

- 9999 0M **Airborne hyperspectral sensor radiometric self-calibration using near-infrared properties of deep water and vegetation (Invited Paper) [9999-19]**
- 9999 0N **Hyperspectral reflectance signature protocol for predicting subsurface bottom reflectance in water: *in-situ* and analytical methods [9999-20]**
- 9999 0O **Lyzenga multispectral bathymetry formula for shallow Indonesian coral reef: evaluation and proposed generalized coefficient [9999-21]**
- 9999 0Q **Improving the accuracies of bathymetric models based on multiple regression for calibration (case study: Sarca River, Italy) (Best Student Paper Award) [9999-23]**

POSTER SESSION

- 9999 0T **Analysis on long-term variability of sea ice albedo and its relationship with sea ice concentration over Antarctica [9999-26]**
- 9999 0U **Assessment of satellite retrieval algorithms for chlorophyll-a concentration under high solar zenith angle [9999-27]**
- 9999 0W **Impact of sea surface temperature on satellite retrieval of sea surface salinity [9999-29]**
- 9999 0X **Effects of ocean products variability from PSF blurring in NIR band [9999-30]**
- 9999 0Y **A temperature calibration method for CDOM fluorescence LIF LiDAR [9999-31]**
- 9999 0Z **Satellite views of the massive algal bloom in the Persian Gulf and the Gulf of Oman during 2008-2009 [9999-32]**
- 9999 13 **Investigation of electromagnetic backscattering from nearshore sea surfaces modulated by shoaling effect [9999-37]**
- 9999 14 **A coordinated retrieval method for sea surface salinity based on SMOS and ocean color data [9999-38]**
- 9999 15 **An improved profiling method for the measurement of hyperspectral diffuse attenuation coefficients in shallow turbid waters [9999-40]**
- 9999 17 **Comparison and evaluation of atmospheric correction algorithms of QUAC, DOS, and FLAASH for HICO hyperspectral imagery [9999-42]**
- 9999 18 **Relationship of the wind-wave from HY-2 scatterometer and radar altimeter data [9999-43]**
- 9999 19 **Evaluating of the rain effect on Ku-band radar backscatter at low incidence angles [9999-44]**
- 9999 1A **The vertical distribution of the beam attenuation coefficient and its correlation to the particulate organic carbon in the north South China Sea [9999-45]**

- 9999 1B **Results of the Caspian Sea satellite survey: internal wave climate [9999-46]**
- 9999 1C **A new mapping method of underwater bottom topography in the shallow sea by using SAR images [9999-47]**
- 9999 1D **Underwater sky image as remote sensing instrument of sea roughness parameters and its variability [9999-48]**
- 9999 1E **Monitoring thermal discharge from a nuclear plant through Landsat 8 [9999-50]**

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abdalati, Waleed, 0B	Magalhaes, J. M., 07
Ahn, Jae-Hyun, 0X	Manessa, Masita Dwi Mandini, 0O
Ahn, Ki-Beom, 0X	Mao, Zhihua, 0Y, 14, 17
Bai, Yan, 0U, 0Y, 0Z, 14, 1A	Merminod, Bertrand, 0M
Barbieux, Kévin, 0M	Mitchell, Douglas A., 0D
Baschek, Björn, 0E	Mityagina, Marina I., 1B
Blanken, Peter D., 0B	Moctezuma-Flores, M., 08
Bocharova, Tatiana Yu., 0G	Molkov, Alexander A., 05, 0A, 1D
Bongartz, Jens, 0E	Nie, Ding, 06, 13
Bostater, Charles R., Jr., 0N	Niroumand-Jadidi, Milad, 0Q
Cerqueira, A. L. F., 02	Nouchi, Vincent, 0M
Chen, Peng, 0W, 0Y, 0Z, 14, 17, 1A, 1E	Nurdin, Nurjannah, 0O
Chen, Xiaoyan, 0U	Oh, Eunsong, 0X
Chenault, David B., 0D	Oney, Taylor, 0N
Cho, Seongick, 0X	Pan, Delu, 1E
Cui, Wansong, 1A	Park, Young-Je, 0X
da Silva, J. C. B., 02, 07, 0A	Parmiggiani, F., 08
Demicco, Erik D., 0D	Parrish, Christopher, 04
Dolin, Lev S., 1D	Petchprayoon, Pakorn, 0B
Ermakov, Stanislav A., 03, 05, 0A	Ren, Lin, 19, 1C
Fore, Alexander, 0F	Reul, Nicolas, 0F
Forinski, Nick, 04	Rotkiske, Tyler, 0N
Fricke, Katharina, 0E	Schöl, Andreas, 0E
Gong, Fang, 0U, 0Z, 17, 18, 1A, 1E	Sekine, Masahiko, 0O
Haidar, Muhammad, 0O	Seo, Minji, 0T
Han, Kyung-Soo, 0T	Seong, Noh-hun, 0T
Han, Sha'ou, 17	Sergievskaia, Irina A., 03, 05, 0A, 1D
Hao, Zengzhou, 0W, 14, 18	Shi, Liangliang, 15, 17
Hayashi, Akiko, 0F	Shomina, Olga V., 05, 0A, 1D
He, Xianqiang, 0U, 0W, 0Z	Soloviev, Dmitry M., 0G
Hu, Zifeng, 0U	Stiles, Bryan, 0F
Huang, Haiqing, 0W, 0Y	Strochkov, Mikhail A., 0G
Hussein, Khalid, 0B	Tang, Wenqing, 0F
Jenal, Alexander, 0E	Tao, Bangyi, 15
Jin, Xuchen, 0W	Vaden, Justin P., 0D
Kanno, Ariyo, 0O	Vitti, Alfonso, 0Q
Kapustin, Ivan A., 05, 0A, 1D	Wang, Difeng, 0W, 0Z, 18, 1A, 1E
Kashnitsky, Alexandr V., 0G	Wang, Juan, 19, 1C
Kim, Honghee, 0T	Wang, Tianyu, 0Y, 14
Kim, Hyun-cheol, 0T	Wang, Xiaozhen, 1C
Kim, Suk-Whan, 0X	Weber, Immanuel, 0E
Kneer, Caspar, 0E	Wei, Ji-An, 1E
Kwon, Chaeyoung, 0T	Weng, Yonghui, 0F
Lavrova, Olga Yu., 0G, 1B	Wyrwa, Jens, 0E
Lawavirotwong, Siam, 0B	Yang, Jingsong, 19, 1C
Lazareva, Tatyana, 03	Yu, Shujie, 0Z
Li, Hao, 0U	Yueh, Simon, 0F
Li, J., 13	Zhang, Fuqing, 0F
Ma, Li, 15	Zhang, Huaguo, 1C

Zhang, Lin, 1A
Zhang, Min, 06, 13
Zhang, Siqi, 18
Zhao, Ye, 06
Zheng, Gang, 19
Zhu, Qiankun, 0U, 0W, 0Z, 15, 17, 18, 1A, 1E

Conference Committee

Symposium Chair

Klaus Schäfer, (Retired) Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research (Germany)

Symposium Co-chairs

Christopher M. U. Neale, University of Nebraska-Lincoln (United States), Daugherty Water for Food Institute (United States)
Iain H. Woodhouse, The University of Edinburgh (United Kingdom), Geography and the Lived Environment Research Institute (United Kingdom)

Conference Chairs

Charles R. Bostater Jr., Florida Institute of Technology (United States)
Stelios P. Mertikas, Technical University of Crete (Greece)
Xavier Neyt, Royal Military Academy (Belgium)
Caroline Nichol, The University of Edinburgh (United Kingdom)
Oscar Aldred, Historic Environment Scotland (United Kingdom)

Conference Program Committee

Richard J. Breiflow, Agfa Corporation (United States)
Jean-Paul Bruyant, ONERA (France)
Alexander Gilerson, The City College of New York (United States)
Carlton R. Hall, NASA Kennedy Space Center (United States)
Frederic Lamy, ONERA (France)
Ana M. Martins, Universidade dos Açores (Portugal)
Petri Pellikka, University of Helsinki (Finland)

Session Chairs

- 1 Radar Sensing of the Oceans
Oscar Aldred, Historic Environment Scotland (United Kingdom)
- 2 Active and Passive Sensing of the Ocean
Xavier Neyt, Royal Military Academy (Belgium)
- 3 Infrared and Visible Sensing of Water
David B. Chenault, Polaris Sensor Technologies, Inc. (United States)

- 4 Multispectral and Hyperspectral Sensing I
Caroline Nichol, The University of Edinburgh (United Kingdom)
- 5 Multispectral and Hyperspectral Sensing II: Water
Samir Ahmed, The City College of New York (United States)

Introduction

The chairs thank all of the authors for submitting their final manuscripts to Remote Sensing of the Ocean, Coastal Waters, Sea Ice, and Large Water Regions. The conference was held in Edinburgh, Scotland. Many the new authors, including students, made an extra effort to submit their current research papers for consideration to be included in the published proceedings. The reviewed and accepted papers for publication in this book represent contributions that will be useful to help improve our knowledge and scientific understanding of remote sensing, physical oceanography, and ocean sciences. In many cases, the accepted papers represent significant efforts of our colleagues in order to share their understanding and experience. Several excellent papers deal with bathymetry and cross calibration of satellite sensing systems for applied ocean science applications.

We thank the session chairs for their participation and assistance with the conference and the authors whose papers were selected for the excellent poster session. Special thanks go to the efforts of the SPIE staff for organizing the conference and for their assistance in producing the final publication and their patience and support during the final paper reviews and publication process.

Charles R. Bostater, Jr.

