PROCEEDINGS OF SPIE

Remote Sensing and Modeling of the Atmosphere, Oceans, and Interactions VII

Guosheng Liu Ziad S. Haddad Editors

25–26 September 2018 Honolulu, Hawaii, United States

Sponsored by SPIE

Cosponsored by

NASA—National Aeronautics and Space Administration (United States)
RADI—Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (China)
State Key Laboratory of Remote Sensing Science, Chinese Academy of Sciences (China)
Ministry of Earth Sciences (India)

Cooperating Organizations

University of Hawai'i at Mānoa (United States) • JAXA—Japan Aerospace Exploration Agency (Japan) NICT—National Institute of Information and Communications Technology (Japan) • ISRO—Indian Space Research Organization (India) • ESSO—Earth System Science Organization (India)

Published by SPIE

Volume 10782

Proceedings of SPIE 0277-786X, V. 10782

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

Remote Sensing and Modeling of the Atmosphere, Oceans, and Interactions VII, edited by Guosheng Liu Ziad S. Haddad, Proc. of SPIE Vol. 10782, 1078201 · © 2018 SPIE CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2520659

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 and Modeling of the Atmosphere, Oceans, and Interactions VII, edited by Guosheng Liu, Ziad S. Haddad, Proceedings of SPIE Vol. 10782 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510621398

ISBN: 9781510621404 (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 © 2018, 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/18/\$18.00.

Printed in the United States of America.

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



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 seven-digit CID article numbering system structured as follows:

- The first five 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

v Authors	
-----------	--

- vii Symposium Committees
- xi Conference Committee

SESSION 1	UNDERSTANDING ATMOSPHERIC PROCESSES
10782 02	Temporal and spatial evaluation of long-term satellite-based precipitation products across the complex topographical and climatic gradients of Chile [10782-27]
10782 03	Interpreting millimeter-wave radiances over convective clouds [10782-3]
10782 04	The challenges of representing vertical motion in numerical models [10782-4]
SESSION 2	STUDIES ON MONSOON AND HURRICANES
10782 06	Association between upper level diffluence in the Tropical Easterly Jet and the formation of the strongest Atlantic hurricanes in recent years [10782-6]
10782 08	A low-wavenumber analysis of the relative roles of the environmental and vortex-scale variables responsible for rapid intensity changes in landfalling tropical cyclones [10782-8]
10782 0A	Constraining the models' response of tropical clouds to SST forcings using CALIPSO observations [10782-10]
SESSION 4	UNDERSTANDING ATMOSPHERIC RADIATIVE PROPERTIES
10782 0G	Comparison and research of group refractivity models and atmospheric delay to lidar [10782-17]
10782 0H	Drop size distribution observed by dual-frequency precipitation radar onboard global precipitation measurement core satellite [10782-23]

10782 OJ	Effects of turbulence on the transmission of partially coherent vortex beams in the ocean environment [10782-19]
10782 OK	Deriving the slant visibility using the Klett method and the visualization of the slant visibility at the airport [10782-20]
	POSTER SESSION
10782 OM	Aerosol impacts on the atmospheric circulation field over Asia [10782-22]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Ackerman, Andrew, 0A Cesana, Gregory, 0A Chen, Jiuying, 0G Del Genio, Anthony D., 0A Dubey, Sarvesh, 06 Grant, Leah D., 04 Haddad, Ziad S., 03, 04, 06, 08 Hamada, Atsushi, 0H Han, Yiping, 0J He, Wenying, 0N Hristova-Veleva, S., 08 Hu, Jian, 0G Karmakar, Nirupam, 06 Krishnamurti, T. N., 06 Kubota, Takuji, OH Li, Chuanrong, 0G Li, Yongxu, 0J Liu, Jiaqi, 0K Ma, Yuzhao, 0K Marks, F. D., Jr., 08 Misra, Vasubandhu, 06 Moreno Galdon, Raul, 03 Nag, Bappaditya, 06 Nakata, M., 0M Oki, Riko, 0H Posselt, Derek J., 04 Sahu, Dipak, 06 Saiprasanth, B., 08 Sawaya, Randy C., 03 Stephens, Graeme L., 04 Storer, Rachel L., 04 Sy, Ousmane O., 04 Takahashi, Hiroshi G., 0H Takayabu, Yukari N., 0H Tapiador, Francisco J., 03 Teng, Geer, 0G van den Heever, Susan C., 04 Xiong, Xinglong, 0K Yamaji, Moeka, 0H Zambrano-Bigiarini, Mauricio, 02 Zhang, Huijing, 0G Zhou, Mei, 0G

Symposium Committees

Symposium Chair

Upendra Singh, NASA Langley Research Center (United States)

Symposium Co-chairs

Toshiyoshi Kimura, Japan Aerospace Exploration Agency (Japan)

K. J. Ramesh, Ministry of Earth Sciences (India)

Jiancheng Shi, Institute of Remote Sensing and Digital Earth (China)

Honorary Symposium Chairs

Huadong Guo, Institute of Remote Sensing and Digital Earth (China)

Stephen Jurczyk, National Aeronautics and Space Administration (United States)

A. S. Kiran Kumar, Indian Space Research Organisation (India)
Jean-Yves Le Gall, Centre National d'Études Spatiales (France)
Robert M. Lightfoot, Jr., National Aeronautics and Space
Administration (United States)

Madhavan N. Rajeevan, Ministry of Earth Sciences (India) **Alain Ratier**, EUMETSAT (Germany)

Hiroshi Yamakawa, Japan Aerospace Exploration Agency (Japan)

Symposium International Organizing Committee

Michael H. Freilich, *Chair*, National Aeronautics and Space Administration (United States)

Jack A. Kaye, National Aeronautics and Space Administration (United States)

Barry L. Lefer, National Aeronautics and Space Administration (United States)

Clayton P. Turner, NASA Langley Research Center (United States)
Pamela Millar, NASA Goddard Space Flight Center
(United States)

David F. Young, NASA Langley Research Center (United States) **Tapsan Misra**, Indian Space Research Organisation

(India)

Kazuo Tachi, Japan Aerospace Exploration Agency (Japan)

Katsuhiro Nakagawa, National Institute of Information and Communications Technology (Japan)

Haruhisa Shimoda, Tokai University (Japan)

Kohei Mizutani, National Institute of Information and Communications Technology (Japan)

Wonkook Kim, Korea Institute of Ocean Science and Technology (Republic of Korea)

YoungJe Park, Korea Institute of Ocean Science and Technology (Republic of Korea)

Jhoon Kim, Yonsei University (Republic of Korea)

Xianqiang He, Second Institute of Oceanography, State Oceanic Administration (China)

Shunling Liang, Beijing Normal University (China)

Conference Committee

Conference Chairs

Guosheng Liu, Florida State University (United States) **Ziad S. Haddad**, Jet Propulsion Laboratory (United States)

Conference Program Committee

Yihui Ding, China Meteorological Administration (China)
 Tiruvalam N. Krishnamurti, Florida State University (United States)
 Michiko Masutani, Joint Center for Satellite Data Assimilation (United States) and Earth System Science Interdisciplinary Center (ESSIC), University of Maryland (United States)
 Ravi S. Nanjundiah, Indian Institute of Science (India)
 Riko Oki, Japan Aerospace Exploration Agency (Japan)
 Madhavan Nair Rajeevan, Indian Institute of Tropical Meteorology (India)

Session Chairs

- Understanding Atmospheric Processes
 Guosheng Liu, Florida State University (United States)
- Studies on Monsoon and Hurricanes
 Ziad S. Haddad, Jet Propulsion Laboratory (United States)
- Observations of Cloud and Precipitation
 Gregory J. Tripoli, University of Wisconsin-Madison (United States)
- 4 Understanding Atmospheric Radiative Properties **Yun-Fei Fu**, University of Science and Technology of China (China)