## **PROCEEDINGS OF SPIE**

# Remote Sensing and Modeling of Ecosystems for Sustainability VII

Wei Gao Thomas J. Jackson Jinnian Wang Editors

2–4 August 2010 San Diego, California, United States

Sponsored and Published by SPIE

**Volume 7809** 

Proceedings of SPIE, 0277-786X, v. 7809

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 and Modeling of Ecosystems for Sustainability VII, edited by Wei Gao, Thomas J. Jackson, Jinnian Wang, Proceedings of SPIE Vol. 7809 (SPIE, Bellingham, WA, 2010) Article CID Number.

ISSN 0277-786X ISBN 9780819483058

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 © 2010, 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/10/\$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

#### SESSION 1 BIO-PHYSICAL PROPERTIES OF VEGETATION

7809 02 Remote sensing of leaf chlorophyll content at multiple scales using red, green, and blue bands (Invited Paper) [7809-01]
 E. R. Hunt, Jr., D. S. Long, USDA Agricultural Research Service (United States); J. U. H. Eitel, Univ. of Idaho (United States); C. S. T. Daughtry, USDA Agricultural Research Service (United States)

# 7809 04 Refinement of microwave vegetation indices [7809-03] L. Chai, State Key Lab. of Remote Sensing Science (China) and Beijing Normal Univ. (China); J. Shi, State Key Lab. of Remote Sensing Science (China) and Univ. of California, Santa Barbara (United States); L. Zhang, State Key Lab. of Remote Sensing Science (China) and Beijing Normal Univ. (China); T. Jackson, USDA Agricultural Research Service (United States)

- Scaling effect of fraction of vegetation cover retrieved by algorithms based on linear mixture model [7809-04]
   K. Obata, M. Miura, H. Yoshioka, Aichi Prefectural Univ. (Japan)
- Vegetation isoline equations for atmosphere-canopy-soil system of layer with second order interaction term [7809-06]
   M. Miura, K. Obata, H. Yoshioka, Aichi Prefectural Univ. (Japan)
- 7809 07 Measuring mangrove biomass via remote sensing subpixel analysis [7809-07]
   M. Ji, East China Normal Univ. (China) and Guangxi-ASEAN Marine Research Ctr. (China);
   J. Hu, J. Feng, East China Normal Univ. (China)
- Data assimilation of MODIS and TM observations into CERES-Maize model to estimate regional maize yield [7809-08]
   H. Jin, J. Wang, Y. Bo, State Key Lab. of Remote Sensing Science (China) and Beijing Normal Univ. (China); G. Chen, Jilin Agricultural Univ. (China); H. Xue, State Key Lab. of Remote Sensing Science (China) and Beijing Normal Univ. (China)

#### SESSION 2 LAND SURFACE REMOTE SENSING

7809 0A Classification of hyperspectral remote sensing image based on genetic algorithm and SVM [7809-10]

M. Zhou, J. Shu, Z. Chen, East China Normal Univ. (China)

7809 0C An assessment of ASTER surface reflectance products generated by GEO Grid [7809-13] H. Yamamoto, A. Kamei, ITRI, National Institute of Advanced Industrial Science and Technology (Japan); M. Moriyama, Nagasaki Univ. (Japan); S. Tsuchida, ITRI, National Institute of Advanced Industrial Science and Technology (Japan)

#### SESSION 3 ECOSYSTEM MONITORING AND ASSESSMENT

7809 OE A bio-optical approach to estimating chlorophyll-a concentration from hyperspectral remote sensing [7809-15]

L. Li, L. Li, K. Song, Indiana Univ.-Purdue Univ. Indianapolis (United States)

- 7809 OF Analysis of a serious air pollution event resulting from crop residue burning over Nanjing and surrounding regions [7809-16]
   B. Zhu, J. Su, Nanjing Univ. of Information Science & Technology (China); Z. Han, Institute of Atmospheric Physics (China); Y. Cong, Nanjing Univ. of Information Science & Technology (China); T. Wang, Nanjing Univ. (China); Y. Cai, Nanjing Univ. of Posts and Telecommunications (China)
- 7809 0G Potential of using remote sensing for forecasting malaria in Tripura, India [7809-17]
   M. Nizamuddin, L. Roytman, NOAA/CREST, The City College of New York (United States);
   M. Goldberg, F. Kogan, NOAA/NESDIS (United States)
- 7809 0H IR laser network and tomography for the greenhouses gas emission control by sensitive areas: performance analysis of the laser network topologies by software simulations [7809-18]
   F. Cuccoli, L. Facheris, Univ. of Florence (Italy)

 7809 01 Development of airborne remote sensing instrumentations for NEON (Invited Paper) [7809-19]
 B. R. Johnson, T. U. Kampe, M. Kuester, The National Ecological Observatory Network, Inc. (United States)

Advances in airborne remote sensing of ecosystem processes and properties: toward high-quality measurement on a global scale (Invited Paper) [7809-20]
 T. U. Kampe, The National Ecological Observatory Network, Inc. (United States); G. P. Asner, Carnegie Institution (United States); R. O. Green, M. Eastwood, Jet Propulsion Lab. (United States); B. R. Johnson, M. Kuester, The National Ecological Observatory Network, Inc., (United States)

#### **POSTER SESSION**

7809 0L MODIS-derived atmospheric water vapor (AWV) content and its correlation to land use and land cover in Northeast China [7809-12] K. Song, Northeast Institute of Geography and Agricultural Ecology (China) and Indiana Univ.-Purdue Univ. Indianapolis (United States); J. Wu, Northeast Institute of Geography and Agricultural Ecology (China); L. Li, Indiana Univ.-Purdue Univ. Indianapolis (United States); Z. Wang, Northeast Institute of Geography and Agricultural Ecology (China); D. Lu, Jilin Institute of Architecture and Civil Engineering (China); J. Du, B. Zhang, Northeast Institute of Geography and Agricultural Ecology (China)

7809 OP Application of MODIS time series data for drought assessment in East China [7809-26] C. Liu, R. Shi, East China Normal Univ. (China) and Joint Lab. for Environmental Remote Sensing and Data Assimilation (China); W. Gao, East China Normal Univ. (China), Joint Lab. for Environmental Remote Sensing and Data Assimilation (China), and Colorado State Univ. (United States); Z. Gao, Colorado State Univ. (United States) and Institute of Geographic Sciences and Natural Resources Research (China)

- 7809 0Q Comparative analysis of UVB exposure between Nimbus 7/TOMS satellite estimates and ground-based measurements [7809-27]
   Z. Gao, Institute of Geographical Sciences and Natural Resources Research (China), East China Normal Univ. (China), and Colorado State Univ. (United States); W. Gao, East China Normal Univ. (China) and Colorado State Univ. (United States)
- 7809 OR A study on assessment of urbanization and ecosystem changes based on MODIS time series in Shanghai municipality from 2000 to 2009 [7809-28]
  Z. Li, East China Normal Univ. (China) and Joint Lab. for Environmental Remote Sensing and Data Assimilation (China); W. Gao, East China Normal Univ. (China), Joint Lab. for Environmental Remote Sensing and Data Assimilation (China), and Colorado State Univ. (United States); Z. Gao, Institute of Geographical Sciences and Natural Resources Research (China); R. Shi, C. Liu, East China Normal Univ. (China) and Joint Lab. for Environmental Remote Sensing and Data Assimilation (China); R. Shi, C. Liu, East China Normal Univ. (China)
- 7809 12 Using remote sensing data to estimate evapotranspiration over the inhomogeneous landscape [7809-41]
   J. Guo, Nanjing Univ. of Information Science & Technology (China) and Institute of Plateau Meteorology (China); X. Li, B. Zhu, Nanjing Univ. of Information Science & Technology (China)
- 7809 1A Urban expansion and landscape diversity change of Shanghai City, China [7809-49]
   J. Wang, W. Gao, Z. Gao, East China Normal Univ. (China) and Colorado State Univ. (United States); J. Yin, S. Xu, East China Normal Univ. (China)

Author Index

### **Conference Committee**

Program Track Chair

Allen H.-L. Huang, University of Wisconsin, Madison (United States)

**Conference** Chairs

Wei Gao, Colorado State University (United States) Thomas J. Jackson, USDA Agricultural Research Service (United States)

#### Conference Cochair

Jinnian Wang, Institute of Remote Sensing Applications (China)

#### Program Committee

Gregory P. Asner, Stanford University (United States) Ni-Bin Chang, University of Central Florida (United States) John A. Gamon, California State University, Los Angeles (United States) E. Raymond Hunt, Jr., USDA Agricultural Research Service (United States) Xin-Zhong Liang, University of Illinois at Urbana-Champaign (United States) John M. Melack, University of California, Santa Barbara (United States) Dennis Ojima, Colorado State University (United States) Jeffrey L. Privette, National Climatic Data Center (United States) Jiaauo Qi. Michiaan State University (United States) John J. Qu, George Mason University (United States) Daniel L. Schmoldt, U.S. Department of Agriculture (United States) Jiong Shu, East China Normal University (China) Susan L. Ustin, University of California, Davis (United States) Hongije Xie, The University of Texas at San Antonio (United States) Denghua Yan, China Institute of Water Resources and Hydropower Research (China) Xiaobing Zhou, Montana Tech of the University of Montana (United States)

Session Chairs

1 Bio-physical Properties of Vegetation

E. Raymond Hunt, Jr., USDA Agricultural Research Service (United States)

David Riano, University of California, Davis (United States)

- Land Surface Remote Sensing
   Thomas J. Jackson, USDA Agricultural Research Service (United States)
   Hirokazu Yamamoto, National Institute of Advanced Industrial Science and Technology (Japan)
- Ecosystem Monitoring and Assessment
   Ni-Bin Chang, University of Central Florida (United States)
   Brian R. Johnson, NEON, Inc. (United States)