PROCEEDINGS OF SPIE

Satellite Data Compression, Communications, and Processing IX

Bormin Huang Antonio J. Plaza Chein-I Chang Editors

26–27 August 2013 San Diego, California, United States

Sponsored and Published by SPIE

Volume 8871

Proceedings of SPIE 0277-786X, V. 8871

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

Satellite Data Compression, Communications, and Processing IX, edited by Bormin Huang, Antonio J. Plaza, Chein-I Chang, Proc. of SPIE Vol. 8871, 887101 © 2013 SPIE CCC code: 0277-786X/13/\$18 · doi: 10.1117/12.2048436

Proc. of SPIE Vol. 8871 887101-1

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 Satellite Data Compression, Communications, and Processing IX, edited by Bormin Huang, Antonio J. Plaza, Chein-I Chang, Proceedings of SPIE Vol. 8871 (SPIE, Bellingham, WA, 2013) Article CID Number.

ISSN: 0277-786X ISBN: 9780819497215

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 © 2013, 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/13/\$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 as 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 COMPRESSION AND COMMUNICATION I

- 8871 02 Hyperspectral data compression using a Wiener filter predictor [8871-1]
 P. V. Villeneuve, S. G. Beaven, A. D. Stocker, Space Computer Corp. (United States)
- 8871 03 An encoder rate control method for unidirectional distributed video coding [8871-2] J. Song, P. Shen, L. Zhang, K. Wang, Xidian Univ. (China)
- Performance analysis of 2D asynchronous hard-limiting optical code-division multiple access system through atmospheric scattering channel [8871-3]
 Y. Zhao, X. Zhong, D. Wu, Y. Zhang, G. Ren, Z. Wu, Harbin Institute of Technology (China)
- 8871 05 Lossless compression of hyperspectral images using adaptive edge-based prediction [8871-4]
 K. Wang, L. Wang, H. Liao, J. Song, Y. Li, Xidian Univ. (China)
- 8871 06 Improving multispectral satellite image compression using onboard subpixel registration
 [8871-5]
 M. Albinet, R. Camarero, Ctr. National d'Études Spatiales (France); M. Isnard, Thales
 Services (France); C. Poulet, J. Perret, EREMS (France)

SESSION 2 IMAGE CLASSIFICATION

- 8871 07 **Fast implementation of neural network classification** [8871-6] G. Seo, J. Ok, C. Lee, Yonsei Univ. (Korea, Republic of)
- An efficient classification by signal subspace projection and partial filtering for hyperspectral images [8871-7]
 L. Chang, Z.-S. Tang, H.-S. Hung, National Taiwan Ocean Univ. (Taiwan); Y.-L. Chang, National Taipei Univ. of Technology (Taiwan)
- Saline-alkali land classification using MODIS data In Western Jilin Province, China [8871-9]
 L. Gu, R. Ren, Jilin Univ. (China); J. Cao, Changchun Institute of Optics, Fine Mechanics and Physics (China); J. Sun, Jilin Univ. (China)

SESSION 3 IMAGE PROCESSING I

8871 0B Multi-watermarking scheme for copyright protection and content authentication of DubaiSat-1 satellite imagery [8871-10] S. Al-Mansoori, Emirates Institution for Advanced Science and Technology (United Arab Emirates); A. Kunhu, Khalifa Univ. of Science, Technology and Research (United Arab Emirates)

- 8871 0C Anomaly-specified virtual dimensionality [8871-11] S.-Y. Chen, D. Paylor, C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- Spatial correlations constrained sparse unmixing of hyperspectral image using adapting Markov random fields [8871-13]
 J. Li, Y. Li, X. Wu, J. Liu, K. Wang, K. Liu, Xidian Univ. (China)
- Early warning of malaria at Bikaner, Rajasthan in India using AVHRR-based satellite data [8871-14]
 L. Roytman, M. Nizamuddin, K. Akhand, The City Univ. of New York (United States);
 F. Kogan, M. Goldberg, National Oceanic and Atmospheric Administration (United States)

SESSION 4 HIGH-PERFORMANCE COMPUTING

- 8871 0I An FPGA implemented bridge over water recognition for an image evaluation on-board of satellites [8871-17]
 S. Beulig, M. v. Schönermark, F. Huber, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)
- 8871 0K A novel VLSI architecture for pixel purity index algorithm [8871-19]
 F. Yi, J. Guo, Y. Li, Xidian Univ. (China); B. Huang, Univ. of Wisconsin-Madison (United States)

SESSION 5 IMAGE PROCESSING II

- 8871 0M Fusion of hyperspectral remote sensing data for near real-time monitoring of microcystin distribution in Lake Erie [8871-21]
 B. Vannah, N. Chang, Univ. of Central Florida (United States)
- 8871 0N Enhancing DubaiSat-1 satellite imagery using a single image super-resolution [8871-22] S. Al-Mansoori, Emirates Institution for Advanced Science and Technology (United Arab Emirates); A. Kunhu, Khalifa Univ. of Science, Technology and Research (United Arab Emirates)
- High-resolution satellite image recovery by modulation transfer function (MTF) compensation method using phase congruency estimation [8871-23]
 X. Shao, H. Yang, S. Zhang, Z. Jin, J. Du, Xidian Univ. (China)

- 8871 OP Progressive band processing of anomaly detection [8871-24]
 R. Schultz, U.S. Naval Academy (United States); S.-Y. Chen, Univ. of Maryland, Baltimore County (United States); Y. Wang, Harbin Engineering Univ. (United States); C. Liu, China Agricultural Univ. (China); C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- 8871 0Q Quality control of satellite-retrieved sea surface temperature [8871-25]
 Q. Tu, Zhejiang Univ. (China) and The Second Institute of Oceanography, SOA (China);
 D. Pan, Z. Hao, H. Huang, F. Gong, The Second Institute of Oceanography, SOA (China);
 D. Shi, State Oceanic Administration (China)

SESSION 6 COMPRESSION AND COMMUNICATION II

- A fast forward/backward semi-blind channel estimation for MIMO STC-OFDM systems [8871-26]
 L. Chang, C.-M. Cheng, Z.-S. Tang, National Taiwan Ocean Univ. (Taiwan)
- 8871 0S Hyperspectral image compression and target detection using nonlinear principal component analysis [8871-28]
 Q. Du, W. Wei, B. Ma, N. H. Younan, Mississippi State Univ. (United States)
- 8871 0T **A normal laser warning system model based on Hadamard Transform** [8871-29] F. Liu, X. Shao, P. Han, Xidian Univ. (China); H. Chang, Weihai Vocational College (China)

POSTER SESSION

8871 0U **Digital transceiver design for two-way AF-MIMO relay systems with imperfect CSI** [8871-30] C.-C. Hu, Y.-F. Chou, K.-H. Chen, National Chung Cheng Univ. (Taiwan)

Author Index

Conference Committee

Program Track Chair

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

Conference Chairs

Bormin Huang, University of Wisconsin-Madison (United States) Antonio J. Plaza, Universidad de Extremadura (Spain) Chein-I Chang, University of Maryland, Baltimore County (United States)

Conference CoChairs

Chulhee Lee, Yonsei University (Korea, Republic of) Yunsong Li, Xidian University (China) Shen-En Qian, Canadian Space Agency (Canada)

Conference Program Committee

Saeed H. Al-Mansoori, Emirates Institution for Advanced Science and Technology (United Arab Emirates) Philip E. Ardanuy, Raytheon Intelligence and Information Systems (United States) **Roberto Camarero**, Centre National d'Études Spatiales (France) Lena Chang, National Taiwan Ocean University (Taiwan) Ni-Bin Chang, University of Central Florida (United States) Yang-Lang Chang, National Taipei University of Technology (Taiwan) **Qian Du**, Mississippi State University (United States) Samuel D. Gasster, The Aerospace Corporation (United States) Mitchell D. Goldberg, National Oceanic and Atmospheric Administration (United States) Lingjia Gu, Jilin University (China) Tung-Ju Hsieh, National Taipei University of Technology (Taiwan) Allen H.-L. Huang, University of Wisconsin-Madison (United States) Felix Huber, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) Xiaojie Li, Northeast Institute of Geography and Agroecology (China) Sebastian Lopez Suarez, Universidad de Las Palmas de Gran Canaria (Spain) Enrico Magli, Politecnico di Torino (Italy) Jarno Mielikainen, University of Eastern Finland (United States) **Daniela I. Moody**, Los Alamos National Laboratory (United States) Javier Plaza, Universidad de Extremadura (Spain) Jordi Portell de Mora, Universitat de Barcelona (Spain) Jeffery J. Puschell, Raytheon Space and Airborne Systems (United States) Leonid Roytman, The City College of New York (United States) Xiaopeng Shao, Xidian University (China)

Yuliya Tarabalka, University of Iceland (Iceland)
Carole Thiebaut, Centre National d'Études Spatiales (France)
Pierre V. Villeneuve, Space Computer Corporation (United States)
Raffaele Vitulli, European Space Research and Technology Center (Netherlands)
Maria F. von Schoenermark, Universität Stuttgart (Germany)
Shih-Chieh Wei, Tamkang University (Taiwan)
Zhang Ye, Harbin Institute of Technology (China)

Session Chairs

- Compression and Communication I
 Bormin Huang, University of Wisconsin-Madison (United States)
- 2 Image Classification Saeed H. Al-Mansoori, Emirates Institution for Advanced Science and Technology (United Arab Emirates)
- 3 Image Processing I Yunsong Li, Xidian University (China)
- 4 High-performance Computing
 Qian Du, Mississippi State University (United States)
 Ye Zhang, Harbin Institute of Technology (China)
- 5 Image Processing II Chulhee Lee, Yonsei University (Korea, Republic of)
- 6 Compression and Communication II **Ni-Bin Chang**, University of Central Florida (United States)