

# PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

## Front Matter: Volume 9124

, "Front Matter: Volume 9124," Proc. SPIE 9124, Satellite Data Compression, Communications, and Processing X, 912401 (12 June 2014); doi: 10.1117/12.2072315

**SPIE.**

Event: SPIE Sensing Technology + Applications, 2014, Baltimore, Maryland, United States

PROCEEDINGS OF SPIE

# ***Satellite Data Compression, Communications, and Processing X***

**Bormin Huang  
Chein-I Chang  
José Fco. López**  
*Editors*

**8–9 May 2014  
Baltimore, Maryland, United States**

*Sponsored and Published by*  
SPIE

**Volume 9124**

Proceedings of SPIE 0277-786X, V. 9124

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

**Satellite Data Compression, Communications, and Processing X, edited by Bormin Huang,  
Chein-I Chang, José Fco. López, Proc. of SPIE Vol. 9124, 912401 · © 2014 SPIE  
CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2072315**

**Proc. of SPIE Vol. 9124 912401-1**

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 X*, edited by Bormin Huang, Chein-I Chang, José Fco. López, Proceedings of SPIE Vol. 9124 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628410617

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 © 2014, 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](http://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/14/\$18.00.

Printed in the United States of America.

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



[SPIDigitalLibrary.org](http://SPIDigitalLibrary.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

ix *Conference Committee*

---

## SESSION 1 DATA PROCESSING I

---

- 9124 02 **A theory of least-squares target-specified virtual dimensionality in hyperspectral imagery** [9124-1]  
D. Paylor, C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- 9124 03 **Investigation on the GPS single scattering from a 2D largescale sea surface** [9124-2]  
Y. Wei, L. Guo, Xidian Univ. (China)
- 9124 04 **Applying region growing algorithm to hyperspectral image for oil segmentation** [9124-3]  
M. Song, X. Xu, S. Lu, W. Xu, H. Bao, Dalian Maritime Univ. (China)
- 9124 05 **High-resolution remote sensing image restoration based on double-knife-edge method** [9124-4]  
S. Zhang, L. Wang, X. Shi, X. Wang, X. Shao, Xidian Univ. (China)
- 9124 07 **Multi-dimensional edge detection operators** [9124-6]  
S. Youn, C. Lee, Yonsei Univ. (Korea, Republic of)

---

## SESSION 2 DATA COMPRESSION I

---

- 9124 08 **Efficient lossy compression implementations of hyperspectral images: tools, hardware platforms, and comparisons** [9124-7]  
A. García, L. Santos, S. López, G. M. Callicó, J. F. Lopez, R. Sarmiento, Univ. de Las Palmas de Gran Canaria (Spain)
- 9124 09 **Lossy hyperspectral image compression using improved classified DCT and 3DSPIHT** [9124-8]  
K. Wang, Z. Hu, R. Han, J. Zhang, Y. Li, Xidian Univ. (China)
- 9124 0A **Hyperspectral data compression using lasso algorithm for spectral decorrelation** [9124-9]  
S. A. Alissou, Y. Zhang, Harbin Institute of Technology (China)
- 9124 0B **Wavelet-based compression of multichannel climate data** [9124-10]  
E. Sharifahmadian, Y. Choi, S. Latifi, Univ. of Nevada, Las Vegas (United States); S. Dascalu, F. C. Harris, Univ. of Nevada, Reno (United States)

---

**SESSION 3 DATA PROCESSING II**

---

- 9124 0C **Anomaly discrimination in hyperspectral imagery** [9124-11]  
S.-Y. Chen, D. Paylor, C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- 9124 0D **MTF compensation method utilizing the curved edge for high-resolution satellite image recovery** [9124-12]  
Q. Luo, L. Wang, H. Yang, S. Zhang, X. Shao, Xidian Univ. (China)
- 9124 0E **Adaptive sparse signal processing of satellite-based radio frequency (RF) recordings of lightning events** [9124-13]  
D. I. Moody, D. A. Smith, Los Alamos National Lab. (United States)
- 9124 0F **A compressed coded aperture imaging warning system** [9124-14]  
X. Shao, J. Du, L. Wang, Xidian Univ. (China)
- 9124 0G **An adaptive filtering based on generalized sidelobe cancellation for target detection of hyperspectral images** [9124-15]  
L. Chang, Z.-S. Tang, National Taiwan Ocean Univ. (Taiwan); Y.-L. Chang, National Taipei Univ. of Technology (Taiwan); B. Huang, Univ. of Wisconsin-Madison (United States)

---

**SESSION 4 SPECTRAL UNMIXING**

---

- 9124 0H **On the acceleration of the N-FINDER algorithm for hyperspectral endmembers extraction** [9124-16]  
R. Guerra, S. López, G. M. Callicó, J. F. Lopez, R. Sarmiento, Univ. de Las Palmas de Gran Canaria (Spain)
- 9124 0I **Endmember variability resolved by pixel purity index in hyperspectral imagery** [9124-17]  
Y. Li, C. Gao, S.-Y. Chen, C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- 9124 0J **On performance improvement of vertex component analysis based endmember extraction from hyperspectral imagery** [9124-18]  
Q. Du, Mississippi State Univ. (United States); N. Raksuntorn, Suan Sunandha Rajabhat Univ. (Thailand); N. H. Younan, Mississippi State Univ. (United States)
- 9124 0K **Fisher's ratio-based criterion for finding endmembers in hyperspectral imagery** [9124-19]  
C. Gao, S.-Y. Chen, C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- 9124 0L **Progressive band processing of simplex growing algorithm for finding endmembers in hyperspectral imagery** [9124-20]  
R. C. Schultz, M. Hobbs, U.S. Naval Academy (United States) and Univ. of Maryland, Baltimore County (United States); C.-I. Chang, Univ. of Maryland, Baltimore County (United States)
- 9124 0N **Nonlinear hyperspectral unmixing based on constrained multiple kernel NMF** [9124-22]  
J. Cui, X. Li, Zhejiang Univ. (China); L. Zhao, Hangzhou Dianzi Univ. (China)

---

**SESSION 5 HIGH-PERFORMANCE COMPUTING**

---

- 9124 0O **Above the cloud computing orbital services distributed data model** [9124-23]  
J. Straub, Univ. of North Dakota (United States)
- 9124 0P **Parallelized physical optics computations for the RCS prediction of rough surface by CUDA**  
[9124-24]  
X. Meng, L. Guo, Xidian Univ. (China)
- 9124 0Q **Optimizing Weather and Research Forecast (WRF) Thompson cloud microphysics on Intel Many Integrated Core (MIC)** [9124-25]  
J. Mielikainen, B. Huang, A. Huang, Univ. of Wisconsin-Madison (United States)
- 9124 0R **Computational design of miniaturized microstrip antenna for satellite communications in the S and C bands** [9124-26]  
J. I. Marulanda Bernal, D. A. Campo Caicedo, Univ. EAFIT (Colombia)
- 9124 0S **Massive parallel implementation of JPEG2000 decoding algorithm with multi-GPUs**  
[9124-27]  
X. Wu, Y. Li, K. Liu, K. Wang, L. Wang, Xidian Univ. (China)
- 9124 0T **Using Intel Xeon Phi to accelerate the WRF TEMF planetary boundary layer scheme**  
[9124-28]  
J. Mielikainen, B. Huang, A. Huang, Univ. of Wisconsin-Madison (United States)

---

**SESSION 6 DATA COMPRESSION II**

---

- 9124 0W **Lossless compression of hyperspectral images using C-DPCM-APL with reference bands selection** [9124-31]  
K. Wang, H. Liao, Y. Li, S. Zhang, X. Wu, Xidian Univ. (China)
- 9124 0X **Remote sensing image progressive transmission based on socket with retry broken downloads** [9124-32]  
H. Qu, Liaoning Technical Univ. (China) and Harbin Institute of Technology (China);  
Y. Meng, W. Liu, X. Shan, J. Yu, Liaoning Technical Univ. (China)

---

**SESSION 7 IMAGE CLASSIFICATION**

---

- 9124 0Y **Land cover classification in multispectral satellite imagery using sparse approximations on learned dictionaries** [9124-33]  
D. I. Moody, S. P. Brumby, J. C. Rowland, G. L. Altmann, Los Alamos National Lab. (United States)
- 9124 0Z **Sparse classification of hyperspectral image based on first-order neighborhood system weighted constraint** [9124-34]  
J. Liu, Xidian Univ. (China); H. Guan, Beijing Institute of Spacecraft System Engineering (China); J. Li, Y. Li, Xidian Univ. (China)

- 9124 10 **An efficient spatial-spectral classification method for hyperspectral imagery** [9124-35]  
W. Li, Beijing Univ. of Chemical Technology (China); Q. Du, Mississippi State Univ. (United States)
- 9124 11 **A stereo remote sensing feature selection method based on artificial bee colony algorithm** [9124-36]  
Y. Yan, P. Liu, Y. Zhang, N. Su, S. Tian, Harbin Institute of Technology (China); F. Gao, Heilongjiang Academy of Sciences (China); Y. Shen, Harbin Institute of Technology (China)

---

**SESSION 8 DATA PROCESSING III**

---

- 9124 13 **Background suppression issues in anomaly detection for hyperspectral imagery** [9124-38]  
Y. Wang, Univ. of Maryland, Baltimore County (United States) and Harbin Engineering Univ. (China); S. Chen, Harbin Engineering Univ. (China); C. Liu, China Agricultural Univ. (China); C.-I. Chang, Harbin Engineering Univ. (China)
- 9124 14 **No-reference remote sensing image quality assessment using a comprehensive evaluation factor** [9124-39]  
L. Wang, X. Wang, X. Li, X. Shao, Xidian Univ. (China)
- 9124 15 **Impact of a revised standard for best practices for academic, governmental and industrial ground station scheduling and communications design** [9124-40]  
S. D. Kerlin, J. Straub, C. Korvald, Univ. of North Dakota (United States)
- 9124 18 **Manifold regularized sparsity model for hyperspectral target detection** [9124-43]  
J. Li, X. Li, Zhejiang Univ. (China); L. Zhao, Hangzhou Dianzi Univ. (China)

---

**POSTER SESSION**

---

- 9124 19 **A novel IR polarization imaging system designed by a four-camera array** [9124-44]  
F. Liu, X. Shao, P. Han, Xidian Univ. (China)
- 9124 1A **Imaging characteristics of ball lens** [9124-45]  
Q. Li, X. Shao, Xidian Univ. (China)
- 9124 1B **Spherical aberration and modulation transfer function** [9124-46]  
Q. Li, X. Shao, Xidian Univ. (China)
- 9124 1C **Focusing through a turbid medium by amplitude modulation with genetic algorithm** [9124-47]  
W. Dai, L. Peng, X. Shao, Xidian Univ. (China)
- 9124 1D **Particle swarm optimization for focusing by phase modulation through scattering media** [9124-48]  
L. Peng, W. Dai, X. Shao, Xidian Univ. (China)
- 9124 1E **Pixel-level image reconstruction method of polarization images acquired by multi-aperture imaging systems** [9124-49]  
P. Han, F. Liu, X. Shao, Xidian Univ. (China)

- 9124 1F **Online visual tracking based on updating with smoothing** [9124-50]  
J. Zhang, K. Liu, F. Cheng, Y. Li, Xidian Univ. (China)
- 9124 1G **Random grid fern for visual tracking** [9124-51]  
F. Cheng, K. Liu, J. Zhang, Y. Li, Xidian Univ. (China)

*Author Index*



# Conference Committee

## *Symposium Chair*

**David A. Whelan**, Boeing Defense, Space, and Security  
(United States)

## *Symposium Co-chair*

**Wolfgang Schade**, Technische Universität Clausthal (Germany) and  
Fraunhofer Heinrich-Hertz-Institut (Germany)

## *Conference Chairs*

**Bormin Huang**, University of Wisconsin-Madison (United States)

**Chein-I Chang**, University of Maryland, Baltimore County  
(United States)

**José Fco. López**, Universidad de Las Palmas de Gran Canaria (Spain)

## *Conference Co-chairs*

**Chulhee Lee**, Yonsei University (Korea, Republic of)

**Yunsong Li**, Xidian University (China)

**Qian Du**, Mississippi State University (United States)

## *Conference Program Committee*

**Philip E. Ardanuy**, Raytheon Intelligence & 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)

**David J. Crain**, GeoMetWatch Corporation (United States)

**Mitchell D. Goldberg**, National Oceanic and Atmospheric  
Administration (United States)

**Lingjia Gu**, Jilin University (China)

**Li-xin Guo**, Xidian 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)

**Roger L. King**, Mississippi State University (United States)

**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)  
**Antonio J. Plaza**, Universidad de Extremadura (Spain)  
**Jordi Portell de Mora**, Universidad de Barcelona (Spain)  
**Jeffery J. Puschell**, Raytheon Space & Airborne Systems  
(United States)  
**Shen-En Qian**, Canadian Space Agency (Canada)  
**Joan Serra-Sagrista**, Universidad Autònoma de Barcelona (Spain)  
**Xiaopeng Shao**, Xidian University (China)  
**Carole Thiebaud**, Centre National d'Études Spatiales (France)  
**Pierre V. Villeneuve**, Space Computer Corporation (United States)  
**Raffaele Vitulli**, European Space Research and Technology Centre  
(Netherlands)  
**Maria F. von Schoenermark**, Universität Stuttgart (Germany)  
**Jiaji Wu**, Xidian University (China)  
**Zhensen Wu**, Xidian University (China)  
**Zhang Ye**, Harbin Institute of Technology (China)

#### *Session Chairs*

- 1 Data Processing I  
**Bormin Huang**, University of Wisconsin-Madison (United States)
- 2 Data Compression I  
**Chein-I Chang**, University of Maryland, Baltimore County  
(United States)
- 3 Data Processing II  
**José Fco. López**, Universidad de Las Palmas de Gran Canaria (Spain)
- 4 Spectral Unmixing  
**Chulhee Lee**, Yonsei University (Korea, Republic of)
- 5 High-Performance Computing  
**Yunsong Li**, Xidian University (China)
- 6 Data Compression II  
**Qian Du**, Mississippi State University (United States)
- 7 Image Classification  
**Daniela I. Moody**, Los Alamos National Laboratory (United States)
- 8 Data Processing III  
**Meiping Song**, Dalian Maritime University (China)