PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 7830

, "Front Matter: Volume 7830," Proc. SPIE 7830, Image and Signal Processing for Remote Sensing XVI, 783001 (10 November 2010); doi: 10.1117/12.883009

Event: SPIE Remote Sensing, 2010, Toulouse, France

PROCEEDINGS OF SPIE

Image and Signal Processing for Remote Sensing XVI

Lorenzo Bruzzone
Editor

20–22 September 2010
Toulouse, France

Sponsored by
SPIE

Cooperating Organizations
European Association of Remote Sensing Companies (Belgium)
EOS—European Optical Society
CNES—Centre National d'Etudes Spatiales (France)
Deutsche Gesellschaft für Photogrammetrie, Fernerkundung, und Geoinformation e.V.
(Germany)
Remote Sensing and Photogrammetry Society (United Kingdom)
SFPT—Société Française de Photogrammétrie et de Télédétection (France)

Published by
SPIE

Volume 7830

Proceedings of SPIE, 0277-786X, v. 7830

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 *Image and Signal Processing for Remote Sensing XVI*, edited by Lorenzo Bruzzone, Proceedings of SPIE Vol. 7830 (SPIE, Bellingham, WA, 2010) Article CID Number.

ISSN 0277-786X

ISBN 9780819483478

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.

SPIE
Digital Library

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 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

xi Conference Committee

PAPERS FROM JOINT SESSION WITH CONFERENCE 7829: SAR IMAGE ANALYSIS, MODELING, AND TECHNIQUES X

xiii *An evaluation of Bayesian estimators and PDF models for despeckling in the undecimated wavelet domain (7829 02)*
L. Alparone, F. Argenti, T. Bianchi, A. Lapini, Univ. degli Studi di Firenze (Italy)

xxv *Variance ratio for change detection in SAR imagery (7829 03)*
C. J. Willis, BAE Systems (United Kingdom)

xxxvii *A SAR multilook optronic processor for operational Earth monitoring applications (7829 04)*
L. Marchese, P. Bourqui, S. Turgeon, M. Doucet, C. Vachon, INO (Canada); B. Harnisch, M. Suess, European Space Research and Technology Ctr. (Netherlands); F. Châteauneuf, A. Bergeron, INO (Canada)

xlvi *Automatic object extraction from VHR satellite SAR images using pulse coupled neural networks (7829 05)*
F. Del Frate, D. Latini, C. Pratola, Univ. degli Studi di Roma Tor Vergata (Italy)

PANSHARPENING, SUPER-RESOLUTION, AND STEREO

7830 02 **A theoretical evaluation of aliasing and misregistration effects on pansharpening methods** [7830-01]
B. Aiazzi, Istituto di Fisica Applicata Nello Carrara, CNR (Italy); L. Alparone, Univ. degli Studi di Firenze (Italy); S. Baronti, Istituto di Fisica Applicata Nello Carrara, CNR (Italy); A. Garzelli, Univ. degli Studi di Siena (Italy); M. Selva, Istituto di Fisica Applicata Nello Carrara, CNR (Italy)

7830 03 **Super-resolution mapping using multiple observations and Hopfield neural network** [7830-02]
A. M. Muad, G. M. Foody, The Univ. of Nottingham (United Kingdom)

7830 05 **Review of low-baseline stereo algorithms and benchmarks** [7830-04]
N. Sabater, Ctr. de Mathématiques et de Leurs Applications, CNRS, École Normale Supérieure de Cachan (France); G. Blanchet, Ctr. National d'Études Spatiales (France); L. Moisan, MAP5, CNRS, Univ. Paris Descartes (France); A. Almansa, Télécom ParisTech (France); J.-M. Morel, Ctr. de Mathématiques et de Leurs Applications, CNRS, École Normale Supérieure de Cachan (France)

MATHEMATICAL MORPHOLOGY AND IMAGE ANALYSIS

- 7830 06 **Alternating sequential filters with morphological attribute operators for the analysis of remote sensing images** [7830-05]
M. Dalla Mura, Univ. degli Studi di Trento (Italy) and Univ. of Iceland (Iceland);
J. A. Benediktsson, Univ. of Iceland (Iceland); L. Bruzzone, Univ. degli Studi di Trento (Italy)
- 7830 07 **A new generic method for semi-automatic extraction of river and road networks in low- and mid-resolution satellite images** [7830-06]
J. Grazzini, Los Alamos National Lab. (United States); S. Dillard, Pacific Northwest National Lab. (United States); P. Soille, European Commission Joint Research Ctr. (Italy)
- 7830 08 **Parameter free image artifacts detection: a compression based approach** [7830-07]
A. Roman-Gonzalez, Télécom ParisTech (France); M. Datcu, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)
- 7830 09 **Object oriented image segmentation by means of multichannel mathematical morphology** [7830-08]
W. Torres, R. Salcedo, Fundación Instituto de Ingeniería (Venezuela)

HYPERSPECTRAL DATA ANALYSIS

- 7830 0A **Hyperspectral unmixing: geometrical, statistical, and sparse regression-based approaches (Invited Paper)** [7830-09]
J. M. Bioucas-Dias, Univ. Técnica de Lisboa (Portugal); A. Plaza, Univ. de Extremadura (Spain)
- 7830 0B **A non-parametric approach to anomaly detection in hyperspectral images** [7830-10]
T. Veracini, S. Matteoli, M. Diani, G. Corsini, Univ. di Pisa (Italy); S. U. de Ceglie, CISAM (Italy)
- 7830 0C **Unmixing hyperspectral intimate mixtures** [7830-11]
J. M. P. Nascimento, Instituto Superior de Engenharia de Lisboa (Portugal) and Instituto de Telecomunicações (Portugal); J. M. Bioucas-Dias, Univ. Técnica de Lisboa (Portugal) and Instituto de Telecomunicações (Portugal)
- 7830 0D **Gas plume quantification in downlooking hyperspectral longwave infrared images** [7830-12]
C. S. Turcotte, Defence Research and Development Canada (Canada); M. R. Davenport, Salience Analytics Inc. (Canada)

SEGMENTATION

- 7830 0E **Segmentation of very high spatial resolution panchromatic images based on wavelets and evidence theory** [7830-13]
A. Lefebvre, CNRS/LIAMA, Chinese Academy of Sciences (China) and COSTEL, CNRS, Univ. de Rennes 2 (France); T. Corpetti, CNRS/LIAMA, Chinese Academy of Sciences (China); L. Hubert Moy, COSTEL, CNRS, Univ. de Rennes 2 (France)

- 7830 OF **Simultaneous hierarchical segmentation and vectorization of satellite images through combined non-uniform data sampling and anisotropic triangulation** [7830-14]
J. Grazzini, Los Alamos National Lab. (United States); S. Dillard, Pacific Northwest National Lab. (United States); L. Prasad, Los Alamos National Lab. (United States)
- 7830 OG **A waterfall segmentation algorithm for coastline detection in SAR images** [7830-15]
F. Soares, G. Nico, Univ. de Lisboa (Portugal)
- 7830 OH **Object based and geospatial image analysis: a semi-automatic pre-operational system** [7830-16]
J. Michel, Ctr. National d'Études Spatiales (France); J. Inglada, Ctr. d'Études Spatiales de la Biosphère (France); J. Malik, CS (France)
- 7830 OI **Stochastic band selection method based on a spectral angle class separability criterion** [7830-62]
Ph. Déliot, M. Kervella, ONERA (France)

MACHINE LEARNING FOR CLASSIFICATION

- 7830 OJ **Supervised super-resolution to improve the resolution of hyperspectral images classification maps** [7830-18]
A. Villa, Institut National Polytechnique de Grenoble (France) and Univ. of Iceland (Iceland); J. Chanussot, Institut National Polytechnique de Grenoble (France); J. A. Benediktsson, Univ. of Iceland (Iceland); C. Jutten, Institut National Polytechnique de Grenoble (France)
- 7830 OK **Unbiased query-by-bagging active learning for VHR image classification** [7830-19]
L. Copa, Univ. de Lausanne (Switzerland); D. Tuia, Univ. de Lausanne (Switzerland) and Univ. de València (Spain); M. Volpi, M. Kanevski, Univ. de Lausanne (Switzerland)
- 7830 OL **Multitask SVM learning for remote sensing data classification** [7830-20]
J. M. Leiva-Murillo, Univ. Carlos III de Madrid (Spain); L. Gómez-Chova, G. Camps-Valls, Univ. de València (Spain)
- 7830 OM **Classification of filtered multichannel images** [7830-21]
D. V. Fevrale, V. V. Lukin, N. N. Ponomarenko, National Aerospace Univ. (Ukraine); B. Vozel, K. Chehdi, Univ. de Rennes 1 (France); A. Kurekin, Plymouth Marine Lab. (United Kingdom); L.-K. Shark, Univ. of Central Lancashire (United Kingdom)

CLASSIFICATION

- 7830 OO **Classification of very high resolution SAR images of urban areas by dictionary-based mixture models, copulas, and Markov random fields using textural features** [7830-23]
A. Voisin, INRIA Sophia Antipolis Méditerranée (France); G. Moser, Univ. degli Studi di Genova (Italy); V. A. Krylov, INRIA Sophia Antipolis Méditerranée (France) and Lomonosov Moscow State Univ. (Russian Federation); S. B. Serpico, Univ. degli Studi di Genova (Italy); J. Zerubia, INRIA Sophia Antipolis Méditerranée (France)

- 7830 OP **A novel approach to land-cover maps updating in complex scenarios based on multitemporal remote sensing images** [7830-24]
K. Bahirat, Indian Institute of Technology Bombay (India); F. Bovolo, L. Bruzzone, Univ. degli Studi di Trento (Italy); S. Chaudhuri, Indian Institute of Technology Bombay (India)
- 7830 OR **Gaussian process classification using automatic relevance determination for SAR target recognition** [7830-26]
X. Zhang, L. Gou, B. Hou, L. Jiao, Xidian Univ. (China)

CHANGE DETECTION

- 7830 OS **Linear and kernel methods for multi- and hypervariate change detection (Invited Paper)** [7830-27]
A. A. Nielsen, Technical Univ. of Denmark (Denmark); M. J. Canty, Forschungszentrum Jülich GmbH (Germany)
- 7830 OT **An automatic approach to the unsupervised detection of multiple changes in multispectral images** [7830-28]
F. Bovolo, S. Marchesi, L. Bruzzone, Univ. degli Studi di Trento (Italy)
- 7830 OU **Multiresolution segmentation adapted for object-based change detection** [7830-29]
C. Listner, Forschungszentrum Jülich GmbH (Germany) and Technische Univ. Bergakademie Freiberg (Germany); I. Niemeyer, Forschungszentrum Jülich GmbH (Germany)
- 7830 OV **Unsupervised change detection by kernel clustering** [7830-30]
M. Volpi, Univ. de Lausanne (Switzerland); D. Tuia, Univ. de Lausanne (Switzerland) and Univ. de València (Spain); G. Camps-Valls, Univ. de València (Spain); M. Kanevski, Univ. de Lausanne (Switzerland)

DATA ANALYSIS

- 7830 OW **Analysing multitemporal SAR images for forest mapping** [7830-31]
Y. Maghsoudi, M. J. Collins, Univ. of Calgary (Canada); D. G. Leckie, Pacific Forestry Ctr. (Canada)
- 7830 OX **A new type of remote sensors which allow directly forming certain statistical estimates of images** [7830-32]
B. Podlaskin, E. Guk, A. Karpenko, Ioffe Physico-Technical Institute (Russian Federation)
- 7830 OY **Real-time orthorectification by FPGA-based hardware acceleration** [7830-33]
D. Kuo, D. Gordon, Cardio Logic, Inc. (United States)
- 7830 OZ **Nonlinear retrieval of atmospheric profiles from MetOp-IASI and MTG-IRS data** [7830-34]
G. Camps-Valls, Univ. de València (Spain); L. Guanter, Freie Univ. Berlin (Germany); J. Muñoz-Marí, L. Gómez-Chova, Univ. de València (Spain); X. Calbet, European Organisation for the Exploitation of Meteorological Satellites (Germany)
- 7830 IO **Assessment of soil surface BRDF using an imaging spectrometer** [7830-35]
Z. Wang, C. A. Coburn, X. Ren, D. Mazumdar, S. Myshak, A. Mullin, P. M. Teillet, Univ. of Lethbridge (Canada)

JOINT SESSION WITH CONFERENCE 7829: SAR DATA ANALYSIS I

- 7830 11 **A PolSAR image despeckle filter based on evidence theory** [7830-36]
S. Kharbouche, Natural Resources Canada (Canada)
- 7830 12 **Waterline extraction in optical images and InSAR coherence maps based on the geodesic time concept** [7830-37]
F. Soares, G. Nico, Univ. de Lisboa (Portugal)

JOINT SESSION WITH CONFERENCE 7829: SAR DATA ANALYSIS II

- 7830 13 **Site-specific land clutter modelling based on radar remote sensing images and digital terrain data** [7830-38]
A. Kurekin, Plymouth Marine Lab. (United Kingdom); L.-K. Shark, Univ. of Central Lancashire (United Kingdom); K. Lever, Cardiff Univ. (United Kingdom); D. Radford, General Dynamics UK Ltd. (United Kingdom); D. Marshall, Cardiff Univ. (United Kingdom)
- 7830 14 **Fringe detection in SAR interferograms** [7830-39]
F. Soares, G. Nico, Univ. de Lisboa (Portugal)

POSTER SESSION

- 7830 15 **Integration between calibrated time-of-flight camera data and multi-image matching approach for architectural survey** [7830-40]
F. Chiabrando, F. Nex, D. Piatti, F. Rinaudo, Politecnico di Torino (Italy)
- 7830 16 **Study on the capabilities of morphological attribute profiles in change detection on VHR images** [7830-41]
N. Falco, Univ. degli Studi di Trento (Italy); M. Dalla Mura, Univ. degli Studi di Trento (Italy) and Univ. of Iceland (Iceland); F. Bovolo, Univ. degli Studi di Trento (Italy); J. A. Benediktsson, Univ. of Iceland (Iceland); L. Bruzzone, Univ. degli Studi di Trento (Italy)
- 7830 17 **Infrared stationary object acquisition and moving object tracking** [7830-42]
S. Amphay, D. Gray, Air Force Research Lab. (United States)
- 7830 18 **Total variation restoration of the defocus image based on spectral priors** [7830-43]
P. Liu, D. Liu, Z. Liu, Ctr. for Earth Observation and Digital Earth (China)
- 7830 19 **Comparison and evaluation of correspondence finding methods in 3D measurement systems using fringe projection** [7830-44]
C. Bräuer-Burchardt, M. Möller, C. Munkelt, P. Kühmstedt, G. Notni, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)
- 7830 1A **Modeling and simulation of high-resolution SAR clutter data** [7830-45]
H. Zhang, Y. Wu, C. Wang, X. Wen, Ctr. for Earth Observation and Digital Earth (China)
- 7830 1C **Semantic structure tree with application to remote sensing image segmentation** [7830-47]
X. Zhang, X. Pan, B. Hou, L. Jiao, Xidian Univ. (China)

- 7830 1D **Experimental research on image motion measurement using optical joint transform correlator for space camera application** [7830-48]
H. Zhao, H. Yi, Y. Li, Xi'an Institute of Optics and Precision Mechanics (China); C. Che, Huazhong Institute of Electro-Optics (China); X. Xiao, Xidian Univ. (China)
- 7830 1E **Post-earthquake road damage assessment using region-based algorithms from high-resolution satellite images** [7830-49]
A. Haghighattalab, A. Mohammadzadeh, M. J. Valadan Zoej, M. Taleai, K.N. Toosi Univ. of Technology (Iran, Islamic Republic of)
- 7830 1F **House damage assesment based on supervised learning method: case study on Haiti** [7830-51]
Y. Kazama, T. Guo, Hitachi, Ltd. (Japan)
- 7830 1G **An automatic stain removal algorithm of series aerial photograph based on flat-field correction** [7830-52]
G. Wang, Institute of Remote Sensing Applications (China); D. Yan, Y. Yang, Ctr. for Earth Observation and Digital Earth (China)
- 7830 1H **Improvement of urban land use and land cover classification approach in arid areas** [7830-53]
J. Qian, Hong Kong Baptist Univ. (Hong Kong, China) and Xinjiang Institute of Ecology and Geography (China); Q. Zhou, Hong Kong Baptist Univ. (Hong Kong, China); X. Chen, Xinjiang Institute of Ecology and Geography (China)
- 7830 1J **A methodology for the detection of land cover changes: application to the Toulouse southwestern region** [7830-55]
D. Ducrot, A. Masse, E. Ceschia, C. Marais-Sicre, Ctr. d'Etudes Spatiales de la Biosphère (France); D. Krystof, Szent István Univ. (Hungary)
- 7830 1L **Characteristic analysis of IR signatures for different optical surface properties by computer modeling and field measurement** [7830-57]
J.-H. Choi, T.-K. Kim, Chung-Ang Univ. (Korea, Republic of)
- 7830 1M **Vegetation cover estimation from CASI and AHS image sensors** [7830-58]
T. J. Arnau, F. Pla, J. M. Sotoca, Univ. Jaume I (Spain)
- 7830 1N **Comparative study of multi-data fusion techniques in mapping geological features: Wadi Ghoweiba, Northwest Gulf of Suez, Egypt** [7830-59]
S. M. Hassan, B. M. El Leithy, National Authority for Remote Sensing and Space Sciences (Egypt)
- 7830 1O **SAR signature analysis for TerraSAR-X-based ship monitoring** [7830-60]
G. Saur, M. Deutsch, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

- 7830 1P **Selection of regularization parameter based on generalized cross-validation in total variation remote sensing image restoration** [7830-61]
P. Liu, D. Liu, Ctr. for Earth Observation and Digital Earth (China)

Author Index

Conference Committee

Symposium Chair

Steven P. Neeck, NASA Headquarters (United States)

Symposium Cochair

Karin Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

Conference Chair

Lorenzo Bruzzone, Università degli Studi di Trento (Italy)

Conference Cochairs

Jon Atli Benediktsson, University of Iceland (Iceland)

Sebastiano Bruno Serpico, Università degli Studi di Genova (Italy)

Program Committee

Luciano Alparone, Università degli Studi di Firenze (Italy)

Selim Aksoy, Bilkent University (Turkey)

José M. Bioucas-Dias, Universidade Técnica de Lisboa (Portugal)

Francesca Bovolo, Università degli Studi di Trento (Italy)

Gustavo Camps-Valls, Universitat de València (Spain)

Jocelyn Chanussot, Institut National Polytechnique de Grenoble (France)

Chi Hau Chen, University of Massachusetts Dartmouth (United States)

David A. Clausi, University of Waterloo (Canada)

Melba M. Crawford, Purdue University (United States)

Fabio Dell'Acqua, Università degli Studi di Pavia (Italy)

Giles M. Foody, The University of Nottingham (United Kingdom)

Jordi Inglada, Centre National d'Études Spatiales (France)

Gabriele Moser, Università degli Studi di Genova (Italy)

Allan A. Nielsen, Technical University of Denmark (Denmark)

Ryuei Nishii, Kyushu University (Japan)

Antonio J. Plaza, Universidad de Extremadura (Spain)

John A. Richards, The Australian National University (Australia)

Anne S. Solberg, University of Oslo (Norway)

Josiane B. Zerubia, INRIA Sophia Antipolis - Méditerranée (France)

Session Chairs

Pansharpening, Super-resolution, and Stereo

Lorenzo Bruzzone, Università degli Studi di Trento (Italy)

Mathematical Morphology and Image Analysis

Luciano Alparone, Università degli Studi di Firenze (Italy)

Hyperspectral Data Analysis

Gustavo Camps-Valls, Universitat de València (Spain)

Segmentation

Jordi Inglada, Centre d'Etudes Spatiales de la Biosphère (France)

Machine Learning for Classification

Lorenzo Bruzzone, Università degli Studi di Trento (Italy)

Classification

José M. Bioucas-Dias, Universidade Técnica de Lisboa (Portugal)

Change Detection

Allan A. Nielsen, Technical University of Denmark (Denmark)

Data Analysis

Devis Tuia, Université de Lausanne (Switzerland)

Joint Session with Conference 7829: SAR Data Analysis I

Lorenzo Bruzzone, Università degli Studi di Trento (Italy)

Joint Session with Conference 7829: SAR Data Analysis II

Claudia Notarnicola, EURAC research (Italy)