

PROCEEDINGS OF SPIE

Algorithms for Synthetic Aperture Radar Imagery XIX

**Edmund G. Zelnio
Frederick D. Garber**
Editors

**25–26 April 2012
Baltimore, Maryland, United States**

Sponsored and Published by
SPIE

Volume 8394

Proceedings of SPIE, 0277-786X, v. 8394

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

Algorithms for Synthetic Aperture Radar Imagery XIX, edited by Edmund G. Zelnio, Frederick D. Garber,
Proc. of SPIE Vol. 8394, 839401 · © 2012 SPIE · CCC code: 0277-786X/12/\$18 · doi: 10.1117/12.970999

Proc. of SPIE Vol. 8394 839401-1

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 *Algorithms for Synthetic Aperture Radar Imagery XIX*, edited by Edmund G. Zelnio, Frederick D. Garber, Proceedings of SPIE Vol. 8394 (SPIE, Bellingham, WA, 2012) Article CID Number.

ISSN 0277-786X
ISBN 9780819490728

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 © 2012, 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/12/\$18.00.

Printed in the United States of America.

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

The logo for SPIE Digital Library features the word "SPIE" in a bold, sans-serif font above the words "Digital Library" in a smaller, similar font. To the right of the text is a stylized graphic consisting of four vertical bars of increasing height from left to right, with a red swoosh above them.

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

vii *Conference Committee*

SESSION 1 IMAGE FORMATION

- 8394 02 **Approximation and bounding of distortion errors in polar format SAR imaging for squinted geometries** [8394-01]
M. S. Horvath, B. D. Rigling, Wright State Univ. (United States)
- 8394 03 **Dual format algorithm implementation with gotcha data** [8394-02]
L. A. Gorham, Air Force Research Lab. (United States); B. D. Rigling, Wright State Univ. (United States)
- 8394 05 **Preliminary results of SAR image compression using MatrixView™ on coherent change detection (CCD) analysis** [8394-04]
L. S. Gresko, MV Holding Corp. (United States); L. A. Gorham, Air Force Research Lab. (United States); A. Thiagarajan, MV Holding Corp. (United States)
- 8394 07 **Sparse and accurate high resolution SAR imaging (Invited Paper)** [8394-06]
D. Vu, K. Zhao, W. Rowe, J. Li, Univ. of Florida (United States)
- 8394 08 **Reconstruction of interrupted SAR imagery for persistent surveillance change detection (Invited Paper)** [8394-07]
I. Stojanovic, W. C. Karl, Boston Univ. (United States); L. Novak, Scientific Systems Co. (United States)

SESSION 2 IMAGING DIVERSITY

- 8394 09 **Flying blind: a challenge problem for SAR imaging without navigational data** [8394-08]
B. D. Rigling, Wright State Univ. (United States)
- 8394 0A **Autofocus algorithm for curvilinear SAR imaging** [8394-09]
E. Bleszynski, M. Bleszynski, T. Jaroszewicz, Monopole Research (United States)
- 8394 0B **Mono-static synthetic aperture radar interferometry with arbitrary flight trajectories** [8394-10]
H. C. Yanik, B. Yazıcı, Rensselaer Polytechnic Institute (United States)
- 8394 0C **Bistatic SAR coherence over non-planar topographies** [8394-11]
D. B. Andre, Defence Science and Technology Lab. (United Kingdom); K. Morrison, Cranfield Univ. (United Kingdom)
- 8394 0D **Generating lunar bistatic SAR images using Arecibo and Mini-RF** [8394-12]
D. E. Wahl, D. A. Yocky, Sandia National Labs. (United States); B. Bussey, Johns Hopkins Applied Physics Lab. (United States); C. V. Jakowatz, Jr., Sandia National Labs. (United States)

SESSION 3 EXPLOITATION OF MOTION

- 8394 0E **Passive synthetic aperture radar imaging of ground moving targets** [8394-13]
S. Wacks, B. Yazıcı, Rensselaer Polytechnic Institute (United States)
- 8394 0F **Three-channel processing for improved geo-location performance in SAR-based GMTI interferometry** [8394-14]
R. W. Deming, Solid State Scientific Corp. (United States); S. MacIntosh, Consultant (United States); M. Best, Air Force Electronic Systems Ctr. (United States)
- 8394 0G **Detection and tracking of prominent scatterers in SAR data** [8394-15]
B. Shapo, Integrity Applications, Inc. (United States); M. Stuff, Michigan Tech Research Institute (United States); C. Kreucher, R. Majewski, Integrity Applications, Inc. (United States)
- 8394 0H **Detection and imaging of multiple ground moving targets using ultra-narrowband continuous-wave SAR** [8394-16]
L. Wang, Nanjing Univ. of Aeronautics and Astronautics (China); B. Yazıcı, Rensselaer Polytechnic Institute (United States)
- 8394 0I **Separation of vibrating and static SAR object signatures via an orthogonal subspace transformation** [8394-17]
M. Pepin, M. M. Hayat, The Univ. of New Mexico (United States)
- 8394 0K **A generalizable hierarchical Bayesian model for persistent SAR change detection** [8394-19]
G. E. Newstadt, Univ. of Michigan (United States); E. G. Zelnio, Air Force Research Lab. (United States); A. O. Hero III, Univ. of Michigan (United States)
- 8394 0L **A synopsis of challenge problems (Invited Paper)** [8394-20]
B. D. Gorham, E. G. Zelnio, L. A. Gorham, Air Force Research Lab. (United States); F. D. Garber, Wright State Univ. (United States)

SESSION 4 IMAGE EXPLOITATION

- 8394 0M **Wide angle SAR data for target discrimination research** [8394-21]
K. E. Dungan, Dynamics Research Corp. (United States); J. N. Ash, The Ohio State Univ. (United States); J. W. Nehrbass, Dynamics Research Corp. (United States); J. T. Parker, L. A. Gorham, S. M. Scarborough, Air Force Research Lab. (United States)
- 8394 0N **Filtered back projection type direct edge detection of real synthetic aperture radar images** [8394-22]
N. Pena, G. Garza, Z. Qiao, The Univ. of Texas-Pan American (United States)
- 8394 0O **Region based target detection approach for synthetic aperture radar images and its parallel implementation** [8394-23]
F. Nar, C. Demirkesen, O. E. Okman, SDT Space and Defence Technologies (Turkey); M. Cetin, Sabanci Univ. (Turkey)
- 8394 0Q **Simultaneous tracking and recognition performance model** [8394-25]
B. Kahler, SAIC (United States)

- 8394 OR **Using glint to perform geometric signature prediction and pose estimation** [8394-27]
C. Paulson, Univ. of Florida (United States); E. Zelnio, L. Gorham, Air Force Research Lab. (United States); D. Wu, Univ. of Florida (United States)
- 8394 OS **Performance estimation of SAR using NIIRS techniques** [8394-28]
A. R. Nolan, G. S. Goley, Etegent Technologies, Ltd. (United States); M. Bakich, Air Force Research Lab. (United States)
- 8394 OT **Combination of different SAR modalities for geospatial intelligence applications in a harbor environment** [8394-30]
D. C. Borghys, Royal Military Academy (Belgium); A. Bouaraba, Ecole Militaire Polytechnique (Algeria); C. Perneel, Royal Military Academy (Belgium)
- 8394 OU **Color-based features for registering image time series** [8394-31]
P. Duraisamy, Y. Belkhouche, S. Jackson, K. Namuduri, B. Buckles, Univ. of North Texas (United States)

Author Index

Conference Committee

Symposium Chair

Kevin P. Meiners, Office of the Secretary of Defense (United States)

Symposium Cochair

Kenneth R. Israel, Lockheed Martin Corporation (United States)

Conference Chairs

Edmund G. Zelnio, Air Force Research Laboratory (United States)

Frederick D. Garber, Wright State University (United States)

Program Committee

David Blacknell, Defence Science and Technology Laboratory (United Kingdom)

Mujdat Cetin, Sabanci University (Turkey)

Gil J. Ettinger, BAE Systems (United States)

Charles V. Jakowatz, Jr., Sandia National Laboratories (United States)

Eric R. Keydel, SAIC (United States)

Jian Li, University of Florida (United States)

Michael J. Minardi, Air Force Research Laboratory (United States)

Randolph L. Moses, The Ohio State University (United States)

Les Novak, Scientific Systems Company, Inc. (United States)

Lee C. Potter, The Ohio State University (United States)

Brian Rigling, Wright State University (United States)

Timothy D. Ross, Air Force Research Laboratory (United States)

Michael A. Saville, Air Force Institute of Technology (United States)

Gerard W. Tifi, BAE Systems (United States)

Session Chairs

1 Image Formation
Charles V. Jakowatz, Jr., Sandia National Laboratories (United States)

2 Imaging Diversity
Edmund G. Zelnio, Air Force Research Laboratory (United States)

- 3 Exploitation of Motion
Joshua N. Ash, The Ohio State University (United States)
- 4 Image Exploitation
Edmund G. Zelnio, Air Force Research Laboratory (United States)