PROCEEDINGS OF SPIE

International Symposium on Lidar and Radar Mapping 2011

Technologies and Applications

Xiufeng He
Jia Xu
Vagner G. Ferreira
Editors

26–29 May 2011
Nanjing, China

Organized by
Hohai University (China)
The Hong Kong Polytechnic University (Hong Kong, China)

Sponsored by
ICA—International Cartographic Association
ISPRS—International Society for Photogrammetry and Remote Sensing
FIG—International Federation of Surveyors
IAG—International Association of Geodesy

Cooperating Organization and Publisher
SPIE

Volume 8286

Proceedings of SPIE, 0277-786X, v. 8286

International Symposium on Lidar and Radar Mapping 2011: Technologies and Applications,
edited by Xiufeng He, Jia Xu, Vagner G. Ferreira, Proc. of SPIE Vol. 8286, 828601
 · doi: 10.1117/12.915559

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 *International Symposium on Lidar and Radar Mapping 2011: Technologies and Applications*, edited by Jonathan Li, Proceedings of SPIE Vol. 8286 (SPIE, Bellingham, WA, 2011) Article CID Number.

ISSN 0277-786X
ISBN 9780819489333

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

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

Conference Committee

Conference Chairs

Cheng Wang, Hohai University (China)
Xiufeng He, Hohai University (China)
Xiaoli Ding, The Hong Kong Polytechnic University (Hong Kong, China)

Steering Committee

Orhan Altan, Istanbul Technical University (Turkey)
Jun Chen, National Geomatics Center of China (China)
Yongqi Chen, The Hong Kong Polytechnic University (Hong Kong, China)
Ian Downman, University of College London (United Kingdom)
Naser El-Sheimy, University of Calgary (Canada)
Alojz Kopáčik, Slovak University of Technology (Slovakia)
Deren Li, Wuhan University (China)
Zhilin Li, The Hong Kong Polytechnic University (Hong Kong, China)
Marguerite Madden, University of Georgia (United States)
Jon Mills, Newcastle University (United Kingdom)
Chris Rizos, University of New South Wales (Australia)
Heinz Ruther, University of Cape Town (South Africa)
Wolfgang Wagner, Vienna University of Technology (Austria)
Yuanxi Yang, Xi'an Research Institute of Surveying and Mapping (China)
Zuxun Zhang, Wuhan University (China)

Program Committee

Jonathan Li, *Chair,* University of Waterloo (Canada)
Xiaojun Yang, *Co-Chair,* Florida State University (United States)
Pedro Arias-Sánchez, Universidade de Vigo (Spain)
Yifang Ban, Royal Institute of Technology (Sweden)
David Belton, Curtin University of Technology (Australia)
Frédéric Bretar, Institut Géographique National (France)
Michael Chapman, Ryerson University (Canada)
Qi Chen, University of Hawaii (United States)
Xuezhi Feng, Nanjing University (China)
Zequn Guan, Tongji University (China)
Manchun Li, Nanjing University (China)
Qingquan Li, Wuhan University (China)
Zhenhong Li, University of Glasgow (United Kingdom)
Samsung Lim, University of New South Wales (Australia)
Guoxiang Liu, Southwest Jiaotong University (China)
Yanxiong Liu, First Oceanographic Institute (China)

Hongchao Ma, Wuhan University (China)
Junhuan Peng, China University of Geosciences (China)
Liliang Ren, Hohai University (China)
Zhaoliang Shi, Jiangsu Bureau of Surveying and Mapping (China)
Lichun Sui, Changan University (China)
Jicang Wu, Tongji University (China)
Bisheng Yang, Wuhan University (China)
Qin Zhang, Changan University (China)
Xingnan Zhang, Hohai University (China)
Shuhe Zhao, Nanjing University (China)
Guoqing Zhou, Old Dominion University (United States)
Jianjun Zhu, Central South University (China)

Introduction

Both LiDAR and radar mapping technologies are the two fastest-growing active remote sensing technologies with many scientific and practical applications. LiDAR and laser scanning has become a million-dollar industry with applications ranging from topographic mapping, heritage documentation, architectural modeling, and civil engineering, to forestry inventory and vegetation analysis. The development and use of laser scanners on various platforms (airborne, land-based, etc.), together with adapted data processing techniques, made these applications possible. In the past decade, LiDAR has become the most prestigious topic at international meetings on this subject in Europe and the United States, which gives a unique opportunity for scientists, engineers, surveyors, and project managers from around the world to recognize the trends and achievements in this area, exchange ideas, and present and discuss the most recent developments and applications.

In recent years, several new generations of radar imaging satellites have been launched successfully (e.g., TerraSAR-X, COSMO-SkyMed, ALOS, RADARSAT-2, SAC-D), and many new developments have been made in the field of SAR image analysis and the application in the domain of risk management and damage assessment. In fact, the incoming growing capabilities of the new SAR sensors, in terms of the improved spatial resolution and temporal revisit time, offer a potential tool for prevention, monitoring and damage assessment in relation to natural disasters such earthquake, flood, landslide, and fires. It is clear that there are particular properties of SAR images that demand fundamentally different interpretation techniques from conventional image analysis methods.

The Lidar and Radar 2011 symposium in Nanjing, China is the first time this type of event on active remote sensing has been held in Asia. The conference is designed to promote the development and applications of LiDAR and radar mapping technologies in Asia, to meet the scientific, technical, and business needs of the photogrammetry and remote sensing, surveying and mapping, as well as geosciences, forestry, renewable energy, environment, transportation, and disaster management communities.

The Lidar and Radar 2011 Symposium is jointly organized by Hohai University and the Hong Kong Polytechnic University; co-sponsored by the International Cartographic Association (ICA), International Society for Photogrammetry and Remote Sensing (ISPRS), International Federation of Surveyors (FIG), and International Association of Geodesy (IAG) and published by SPIE.

Cheng Wang
Xiufeng He
Xiaoli Ding