

ISSN 1682-1750

THE INTERNATIONAL ARCHIVES OF THE PHOTOGRAMMETRY, REMOTE SENSING AND SPATIAL INFORMATION SCIENCES
ARCHIVES INTERNATIONALES DE PHOTOGRAMMÉTRIE, DE TÉLÉDÉTECTION ET DE SCIENCES DE L'INFORMATION SPATIALE
INTERNATIONALES ARCHIV FÜR PHOTOGRAMMETRIE, FERNERKUNDUNG UND RAUMBEZOGENE INFORMATIONSWISSENSCHAFTEN

PROCEEDINGS

VOLUME
VOLUME
BAND

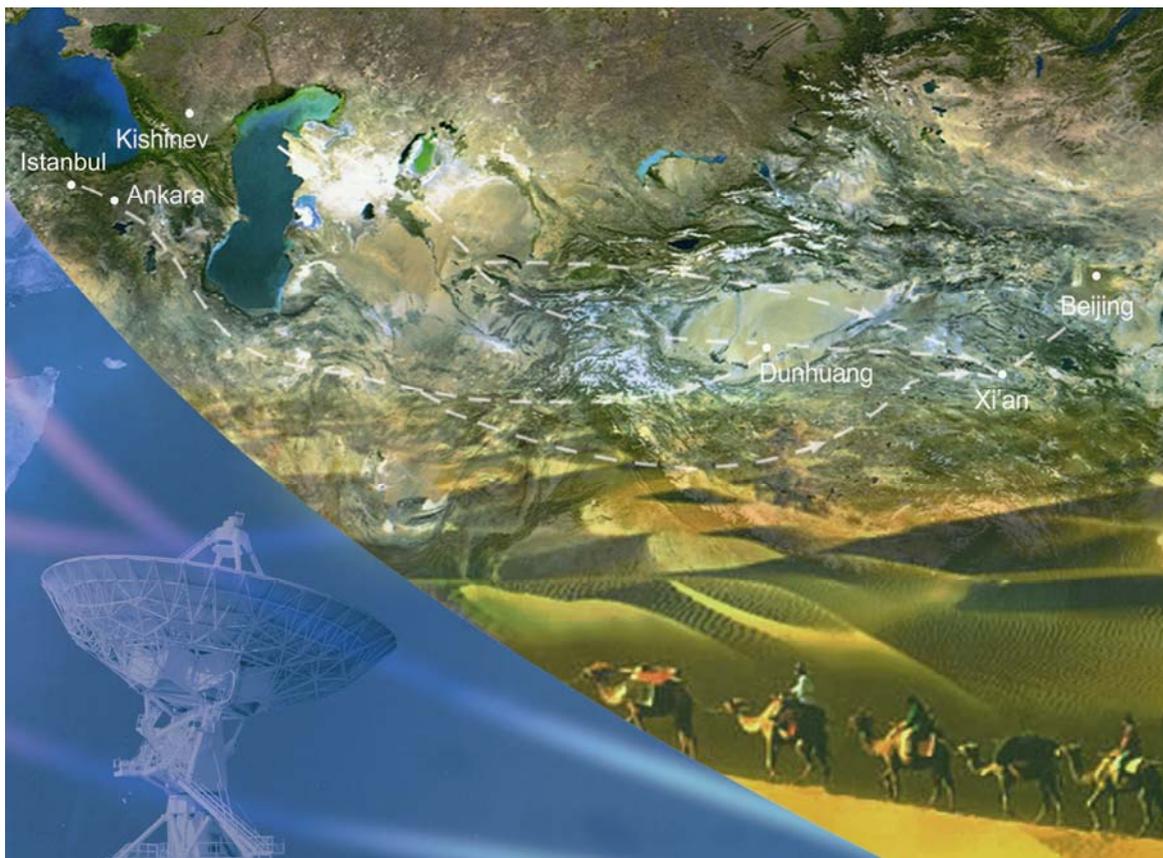
XXXVII

PART
TOME
TEIL

B3a

COMMISSION
COMMISSION
KOMMISSION

III



Edited by:
CHEN Jun, JIANG Jie, Wolfgang FÖRSTNER

This compilation © 2008 by the International Society for Photogrammetry and Remote Sensing. Reproduction of this volume or any parts thereof (excluding short quotations for the use in the preparation of reviews and technical and scientific papers) may be made only after obtaining the specific approval of the publisher. The papers appearing in this volume reflect the authors' opinions. Their inclusion in this publication does not necessarily constitute endorsement by the editors or by the publisher. Authors retain all rights to individual papers.

Copies of this book/CDROM are available from:

Reed Business - Geo (former GITC) by
P.O.Box 112
8530 AC Lemmer
The Netherlands
Tel: +31 (0) 514 56 18 54
Fax: +31 (0) 514 56 38 98
E-mail: geo@reedbusiness.nl
<http://www.reedbusiness-geo.nl>

Copyright 2008

ISPRS Council 2004-2008

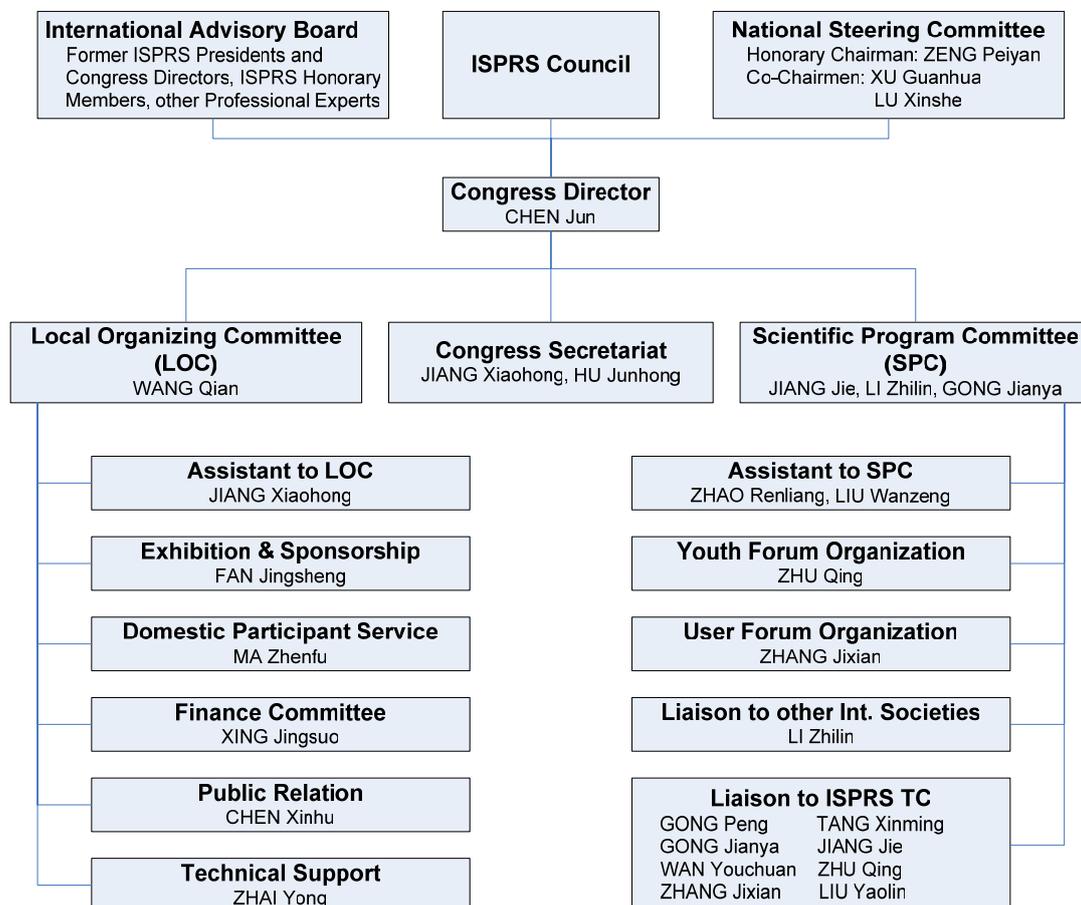
President	Ian Dowman	United Kingdom
Secretary General	Orhan Altan	Turkey
Congress Director	Chen Jun	P. R. China
First Vice President	John Trinder	Australia
Second Vice President	Emmanuel Baltsavias	Switzerland
Treasurer	Stanley Morain	USA

Technical Commission Presidents 2004-2008

Commission I	Alain Baudoin	France
Commission II	Wolfgang Kainz	Austria
Commission III	Wolfgang Foerstner	Germany
Commission IV	Shailesh Nayak	India
Commission V	Hans-Gerd Maas	Germany
Commission VI	Kohei Cho	Japan
Commission VII	John van Genderen	The Netherlands
Commission VIII	Ammatzia Peled	Israel

In cooperation with Working Group Chairpersons responsible for the reviewing of extended Abstracts and acceptance of contributions. Authors delivered camera ready manuscripts and selected the keywords.

Congress Organising Committee



Introduction

The work in ISPRS Commission III “Photogrammetric Computer Vision and Image Analysis“ is devoted to the design, development, and evaluation of mathematical models and methods for automatic orientation and calibration of images, surface reconstruction, fusion of multi-modal data, processing and interpretation of laser range data, interpretation of images, and image sequence analysis with emphasis on integration of geometry, statistics, and semantics, modelling of spatial objects and temporal events, modelling context, scale behaviour of appearance models, use of graphical models, especially Markov random fields and Bayesian networks.

This volume collects the papers which have been selected by the program committee consisting of the presidents and one representative of each Working Group. We received 137 full papers which were reviewed by three reviewers each. The reviewers were asked to evaluate the papers as they were submitted according to content, significance, originality, relevance of the paper, and clearness of presentation. Based on the reviews the program committee selected 48 papers for publication in this volume.

We thank the authors for their contribution, the reviewers for their effort and wish the reader an interesting reading.

Wolfgang Förstner, President of ISPRS Technical Commission III
Helmut Mayer, Vice-President of ISPRS Technical Commission III

Reviewers for Commission III:

Christian Beder	Matthias Ockermüller
Niclas Börlin	Nicolas Paparoditis
Claus Brenner	Norbert Pfeifer
Christian Briese	Camillo Ressel
Jan-Michael Frahm	Andreas Roncat
Markus Gerke	Franz Rottensteiner
Norbert Haala	Michel Roux
Alexander Haring	Daniel Scharstein
Olaf Hellwich	Uwe Soergel
Frank A. van den Heuvel	Andrea Spitzer
Stefan Hinz	Uwe Stilla
Juha Matti Hyyppä	Christoph Strecha
Boris Jutzi	Peter Sturm
Wilfried Karel	Alexandra von Beringe
Chris McGlone	George Vosselman
Eckart Michaelsen	Wolfgang Wagner
Ilkka Niini	Uwe Weidner

Table of Contents

WG III/1: Automatic Calibration and Orientation of Optical Sensors

A Simplified Ortho-Rectification Approach for Satellite Imagery <i>X. Wu</i>	1
Benchmarking Automatic Bundle Adjustment Results <i>Timo Dickscheid, Thomas Labe and Wolfgang Forstner</i>	7
Linear Constraints in Two-View Multiple Homography Estimation of Uncalibrated Scenes <i>Michael Kirchhof</i>	13
Issues for Image Matching in Structure from Motion <i>Helmut Mayer</i>	21
Study on Chromatic Aberrations of Two Fisheye Lenses <i>Petteri Pöntinen</i>	27
A Multi-Photo Least Squares Matching Algorithm for Urban Area DEM Refinement Using Breaklines <i>A. Elaksher</i>	33
Multi-Image Matching Using Neural Networks and Photogrammetric Conditions <i>Ahmed F. Elaksher</i>	39
Real-time Estimation of the Camera Path from a Sequence of Intrinsically Calibrated PMD Depth Images <i>Christian Beder, Ingo Science and Reinhard Koch</i>	45

WG III/2: Surface Reconstruction

Robust Spatio-Temporal Feature Tracking <i>Matthias Heinrichs, Olaf Hellwich and Volker Rodehorst</i>	51
On Visual Real Time Mapping for Unmanned Aerial Vehicles <i>Richard Steffen and Wolfgang Förstner</i>	57
Evaluation of Different Methods for Using Colour Information in Global Stereo Matching Approaches <i>Michael Bleyer Sylvie Chambon, Uta Poppe and Margrit Gelautz</i>	63
An Implicit Geometric Regularization of 3D Building Shape Using Airborne LIDAR Data <i>Y. Jwa, G. Sohn, V. Tao, W. Cho</i>	69

WG III/3: Processing of Point Clouds from Laser Scanners and Other Sensors

3D Segmentation of Full Waveform LIDAR Data for Single Tree Detection Using Normalized Cut <i>J. Reitberger, Cl. Schnörr, P. Krzystek and U. Stilla</i>	77
Analysis of Full-Waveform LIDAR Data for an Accurate Classification of Urban Areas <i>C. Mallet, U. Soergel, F. Bretar</i>	85
Problems in Automated Building Reconstruction Based on Dense Airborne Laser Scanning Data <i>Sander Oude Elberink</i>	93
Analysis of Planimetric Accuracy of Airborne Laser Scanning Surveys <i>George Vosselman</i>	99
Pre-classification of Points and Segmentation of Urban Objects by Scan Line Analysis of Airborne LIDAR data <i>M. Hebel and U. Stilla</i>	105
Detection of Subtle Ridgelines from Laser Scanning Data <i>Amit Baruch and Sagi Filin</i>	111

Generation of Roof Topologies Using Plane Fitting with RANSAC <i>J. Engels, H. Arefi and M. Hahn</i>	119
Automatic Model-Based Building Detection from Single Panchromatic High Resolution Images <i>Konstantinos Karantzas and Nikos Paragios</i>	127
Parametric Reconstruction for Complex Building from LIDAR and Vector Maps Using a Divide-and-Conquer Strategy <i>T. A. Teo</i>	133
SWDC-4 Large Format Digital Aerial Camera System <i>Jian Li, Xianlin Liu, Fengde Liu, Zongjie Liu and Liping Zhao</i>	139
A Robust Surface Matching Technique for DEM Integration in the Context of Coastal Geohazard Monitoring <i>P. E. Miller</i>	147
Intensity Calibration and Imaging with SwissRanger SR-3000 Range Camera <i>A. Jaakkola, S. Kaasalainen, J. Hyypä, H. Niittymäki and A. Ahojärvi</i>	155
Line-Based Registration of Terrestrial and Airborne LIDAR Data <i>Wolfgang von Hansen, Hermann Gross and Ulrich Thoennessen</i>	161
Photogrammetric Model Orientation Using LIDAR Dataset <i>E. Mitishita, A. Habib, A. Machado</i>	167
WG III/4: Automatic Image Interpretation for City-Modeling	
Building Change Detection Using 3-D Texture Model <i>Masafumi NAKAGAWA, Ryosuke SHIBASAKI</i>	173
An Efficient Approach to Building Superstructure Reconstruction Using Digital Elevation Maps <i>F. Dornaika and M. Brédif</i>	179
Building Extraction from High Resolution Color Imagery Based on Edge Flow Driven Active Contour And JSEG <i>Yonghak Song, Jie Shan</i>	185
Building Reconstruction from InSAR Data by Detail Analysis Of Phase Profiles <i>A. Thiele, E. Cadario, K. Schulz, U. Thoennessen and U. Soergel</i>	191
Image Localization in Satellite Imagery with Feature-Based Indexing <i>Changchang Wu, Friedrich Fraundorfer, Jan-Michael Frahm, Jack Snoeyink, Marc Pollefeys</i>	197
Robust and Automatic Vanishing Points Detection with Their Uncertainties from a Single Uncalibrated Image, by Planes Extraction on the Unit Sphere <i>Mahzad Kalantaria, Franck Jung, Nicolas Paparoditis and Jean-Pierre Guedon</i>	203
WG III/5: Models and Algorithms for Road Extraction and Traffic Monitoring	
Extraction of Road Junction Islands from High Resolution Aerial Imagery Using Level Sets <i>M. Ravanbakhsh, C. Heipke and K. Pakzad</i>	209
Extraction of Main and Secondary Roads in VHR Images Using A Higher-Order Phase Field Model <i>Ting Peng, Ian H. Jermyn, Véronique Prinnet and Josiane Zerubia</i>	215
Automatic Analysis of Traffic Scenario from Airborne Thermal Infrared Video <i>W. Yao, S. Hinz and U. Stilla</i>	223
Topology-Preserving Network Snakes <i>M. Butenuth</i>	229
Polygon Feature Extraction from Satellite Imagery Based on Colour Image Segmentation and Medial Axis <i>Ojaswa Sharma, Darka Mioc, François Anton</i>	235
Markov Random Field for Road Extraction Applications in Remote Sensing Images	

XuYong, Zhou Shaoguang and Xu Yuyue..... 241

Theme Session: ThS 7 - 3D City Modeling

Detection, Segmentation and Characterization of Vegetation in High-Resolution Aerial Images for 3D City Modeling

Corina IOVAN, Didier BOLDO and Matthieu CORD 247

Terrestrial Image Based 3D Extraction of Urban Unfoliated Trees of Different Branching Types

Hai Huang..... 253

A New Computationally Efficient Stochastic Approach for Building Reconstruction from Satellite Data

Florent Lafarge, M'elanie Durup, Xavier Descombes, Josiane Zerubia and Marc Pierrot-Deseilligny 259

Automated Updating of Building Data Bases from Digital Surface Models and Multi-Spectral Images: Potential and Limitations

Franz Rottensteiner 265

Building Roof Detection from a Single High-Resolution Satellite Image in Dense Urban Area

Zongying Song, Chunhong Pan, Q Yang, Fuxin Li,Wei Li..... 271

Building Roof Segmentation and Modeling from LIDAR Point Clouds Using Machine Learning Techniques

Aparajithan Sampath, Jie Shan..... 279

Theme Session: ThS 22 - Automation in Image Analysis

Determination of Facade Attributes for Facade Reconstruction

Nora Ripperda..... 285

Interpretation Terrestrial Images of Urban Scenes Using Discriminative Random Fields

Filip Korč, and Wolfgang Förstner..... 291

Calibration of a PMD-Camera Using a Planar Calibration Pattern Together with a Multi-Camera Setup

Ingo Schiller, Christian Beder and Reinhard Koch..... 297

A Generative Model for True Orthorectificatio

Christoph Strecha, Luc Van Gool and Pascal Fua..... 303