

## ISPRS Book Series

in Photogrammetry, Remote Sensing and Spatial Information Sciences

Book Series Editor: Paul Aplin

### Volume 7

## Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book

Published on the occasion of the XXIst Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS) in Beijing, China in 2008, *Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book* is a compilation of 34 contributions from 62 researchers active within the ISPRS. The book covers the state-of-the-art in photogrammetry, remote sensing, and spatial information sciences, and is divided into six parts:

- Introduction
- Sensors, Platforms and Data Acquisition Systems
- Data Processing and Analysis
- Data Modelling, Management and Visualisation
- Applications
- Education and Cooperation.

*Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book* provides a comprehensive overview of the progress made in these areas since the XXth ISPRS Congress, which was held in 2004 in Istanbul, Turkey. The volume will be invaluable not only to scientists and researchers, but also to university students and practitioners.

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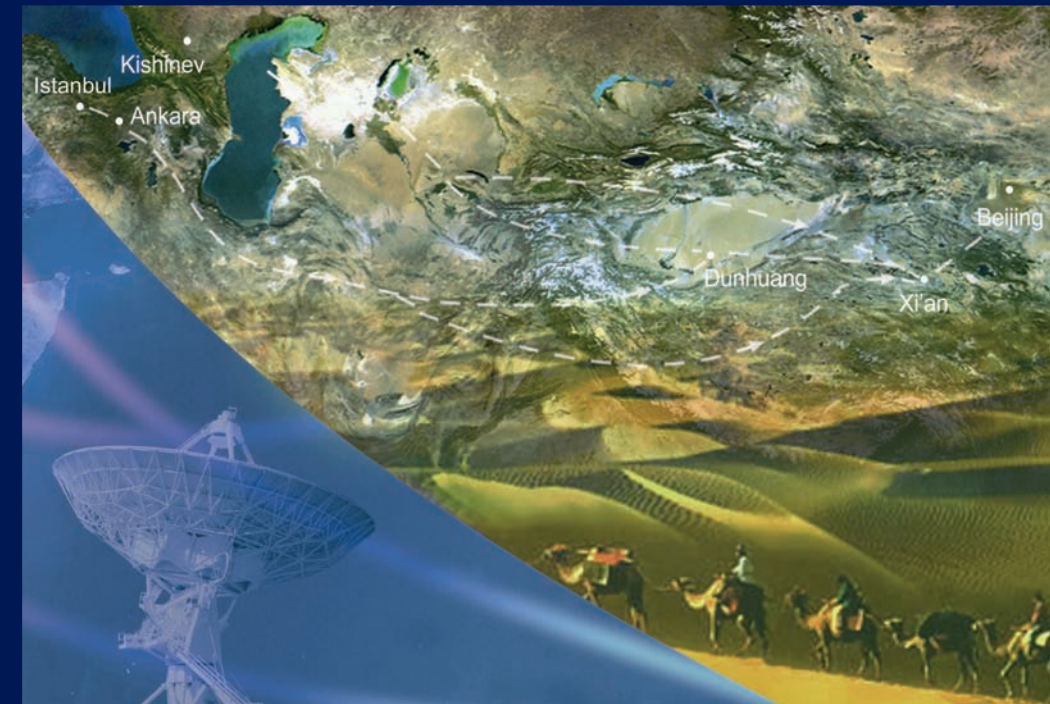


Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book  
Li, Chen & Baltsavias

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ISPRS Book Series



## Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book

Edited by Zhilin Li, Jun Chen and Emmanuel Baltsavias

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ADVANCES IN PHOTOGRAMMETRY, REMOTE SENSING AND SPATIAL INFORMATION:  
2008 ISPRS CONGRESS BOOK

# International Society for Photogrammetry and Remote Sensing (ISPRS) Book Series

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**information from imagery**

# Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences:

2008 ISPRS Congress Book

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The cover image relates to the ISPRS 2008 Congress motto “Silk Road for Information from Imagery”.

The ancient Silk Roads were regarded as the information super-highway of their age, serving as the conduit not only for goods but also for the transmission of knowledge and ideas between east and west.

Nowadays, the need for timely, quality, long-term, global spatial information requires building and operating new Silk Roads based on knowledge sharing and international cooperation that can transfer information from an unprecedented amount of imagery to everyone in an emerging, people-centered, inclusive and development-oriented Information Society.

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## Foreword

ISPRS holds a Congress every four years and although scientific work goes on all the time, the Congress provides an occasion to review progress and think about what is important for the coming years. The proceedings of the Congress normally fill eight or nine bulky volumes and it is not easy to pick out the papers which review progress. This Congress Book provides the solution: experts have provided a review of developments in their fields of interest, and these reviews have been refereed by other specialists so that the book provides a comprehensive, expert view on the sciences of ISPRS during the previous four years.

The first volume of the ISPRS Book Series was published in 2004 and the sixth hit the bookshops early this year. The volumes have covered a range of topics, but have not been planned to be comprehensive. This volume is different in that it has been carefully designed and covers most of the topics covered by ISPRS and is an excellent companion for the Congress and will be a valuable resource until the next congress.

ISPRS Council believes that this book will be a valuable resource for anybody interested in photogrammetry, remote sensing and the spatial information sciences, and that the book is authoritative and comprehensive. After two introductory chapters, historical and technical, the five sections cover sensors, platforms and data acquisition; data processing and analysis; data modelling, management and visualisation; applications and education. These closely follow the technical commissions of ISPRS, but with photogrammetry, remote sensing and spatial information sciences covered in all sections. The applications section could have taken up a whole book, so the most important applications, in the eyes of the editors have been selected. The authors come from Europe, North America and Asia, reflecting the main regions where research and development takes place; most come from academia, but all are experts in their fields.

The book is the result of a lot of work by the authors and the editors and ISPRS Council is very grateful for their efforts. It is the role of ISPRS to set standards in the promotion of the sciences of photogrammetry and remote sensing and this book sets the standard at a high level. Council very much hopes that this book will be the first of a series of Congress Books published by ISPRS and that the quality and comprehensive coverage will make it attractive to lecturers, students and practitioners.

Ian Dowman & Orhan Altan





## Preface

The Congress is the largest ISPRS event, taking place every four years. It is the most important event in the community of photogrammetry, remote sensing and spatial information sciences.

It is always the case that during the period of four years between two successive ISPRS congresses significant scientific and technological progress will have been made in the fields of photogrammetry, remote sensing and spatial information sciences. As a result, thousands of papers are submitted to each congress, and recorded in many thick volumes of proceedings—the International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences. For example, at the XXth Congress held in Istanbul (Turkey), during 12–23 July 2004, more than 50 poster and 100 oral presentation sessions were scheduled and nearly 2000 papers were presented over the 12 days. At this coming Congress to be held in Beijing during 3–11 July 2008, a total of 2600 papers are to be presented in 143 oral and 45 poster sessions.



It is always pleasant to see significant progress being made in different fields within ISPRS. On the other hand, this also causes difficulties for researchers and practitioners when attempting to digest such a huge body of literature. Therefore, as one can imagine, it would be very desirable to have a few overview/review papers that describe the major achievements and look to future developments in different fields. This motivated Council in 2003 to initiate the ISPRS congress book series on a permanent basis. It was proposed to produce the first book for the Istanbul Congress but it was not materialized due to time constraints. Thus, this is the first attempt to realize such an endeavour. The Congress Director, Chen Jun, discussed the idea with Zhilin Li in the middle of 2005 and together they produced a proposal in June 2006. This proposal was strongly supported by the ISPRS Council and the Second Vice President, Emmanuel Baltsavias, then joined the team as one of the editors.

The volume is intended to cover the major themes in all eight technical commissions. It was not intended to cover the topics of all existing ISPRS Working Groups, for various reasons. The emphasis is on the substantial developments since the Istanbul Congress. After intensive discussions with council members, a list of 36 chapters was finalized. In this volume, a total of 34 chapters are included. They are divided into six parts as follows:

Parts	Title	No. of Chapters
I	Introduction	2
II	Sensors, Platforms and Data Acquisition Systems	7
III	Data Processing and Analysis	8
IV	Data Modelling, Management and Visualization	6
V	Applications	9
VI	Education and Cooperation	2

Apart from the shorter Parts I and VI, the technical chapters have been grouped naturally into four parts, i.e. data acquisition (sensors, platforms and systems), (b) processing and analysis (methods and algorithms)

of image data, (c) modelling and representation of spatial data which are more related to spatial information sciences, and (d) image-based applications (photogrammetry and remote sensing). In Part V Applications, only nine topics were selected although the number of existing applications is large and continuously increasing. This selection was based on the following criteria:

- their importance, i.e. wide applications;
- the availability of contributors, i.e. commitment of authors to contribute chapters; and
- mainstream activities of the ISPRS community.

After approval of the contents by the ISPRS Council, the active members of the Society were invited to contribute. Most of them accepted our invitations and completed their chapters in time, although understandably some of our colleagues were too heavily committed to participate in this project. In the end, we have a list of 68 researchers in the authors' list. From this list, you could also see big names there such as the President Ian Dowman, Past Presidents Shunji Murain (1992–1996), Lawrence W. Fritz (1996–2000) and John Trinder (2000–2004), and the 2008 Brock Gold Medal Award recipient Armin Gruen. All authors completed the drafts according to guidelines, revised their chapters based on reviewers' and editor's comments and proofread edited versions with great efficiency.

This Congress Book is intended for a wide audience, not only for scientists and researchers but also for university students and practitioners. As mentioned previously, it is intended to emphasize the state-of-the-art developments in photogrammetry, remote sensing and spatial information sciences, particularly the major progress in the last four years since the 2004 Congress. However, as this is the first book of its kind, a broad spectrum has been covered to make the book more comprehensive. For example, a chapter on historical development is also included. In the end, this particular ISPRS Congress Book also offers a more general overview instead of just the latest developments.

It is not an easy task to edit such a large volume, written by so many authors and under strict time constraints. Indeed, it is a challenging task. At this stage, we realise that the Book has its imperfections. It can be noted that (a) not all topics that should be covered are included in the book; (b) some chapters don't give the full picture but rather authors' personal views based on their experiences and knowledge; (c) an in-depth review, with multiple revision cycles, was not possible due to the time constraints; (d) better coordination between the different chapters could have been achieved if time permitted this. These points might be taken into consideration in the editing of Congress Books in the future. Anyway, we believe that, in spite of these imperfections, this Book would be a useful product for many persons interested in photogrammetry, remote sensing and spatial information sciences.

Naturally, we now felt relieved after the compilation of the material submitted by authors. At the same time, we feel obliged to express our thanks to:

- All the authors who worked very hard to make this book possible;
- All the reviewers for their swift comments;
- The ISPRS council members and technical commission presidents for their support and help on various topics (e.g. defining book topics and recommending possible contributors);
- The State Bureau of Surveying and Mapping (of China), Chinese Society of Geodesy, Photogrammetry and Cartography, and National Natural Science Foundation of China for their support (including financial support);
- ISPRS book series editor, Paul Aplin, for his assistance;
- Léon Bijnsdorp and his colleagues of Taylor & Francis for making this publication possible; and
- David Tait for editing the English of the chapters.

All in all, we appreciate the efforts made by the various parties on this project and now we are pleased to present this volume to you.

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