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Geo-information for Disaster Management

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(Editors)

Geo-information for Disaster Management

With 516 Figures

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Cover illustration: On 26 December 2004 a magnitude 9 earthquake generated a devastating Tsunami causing many casualties in countries around the Indian ocean. A model prediction of this phenomenon is overlaid with in situ sea level measurements of the Envisat satellite altimeter recorded 3:15 hours after the event. More details on this unique observation can be found in the article of Ambrosius et al. in this book. The original data was kindly provided by Remko Scharroo/NOAA and rendered by an artist.

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Foreword

One thing was sure when we started to organize this symposium last year: there will always be more (natural or man-made) disasters all over the world. Of course, no one could have anticipated the huge disaster of the Tsunami on 26 December 2004 in Asia, just a few months before the symposium. The cover of this book contains an impression of the situation 3 hours and 15 minutes after Tsunami (thanks to Remko Scharroo, NOAA for providing us with these satellite altimetry images; more details can be found in the paper on page 323-336). This extremely disastrous event did give the organizers mixed feelings. Of course, very deep sadness, but also the reinforced belief that geo-information (technology) must be used to optimize the disaster management (both before and after situations).

Researchers, developers, users and geo-information providers all participated in 'The First International Symposium on Geo-information for Disaster Management', Delft, the Netherlands, 21-23 March 2005. This created the most appropriate atmosphere for work and discussions between different professionals. During the symposium two basic types of presentations could be recognized: the ones with more focus on research and development of geo-information technology, and the others with more focus on the practical needs and solutions for users and managers in disaster management. The observation one could make is that these two basic types are often mixed in a presentation that contains both (parts of) users needs and technology solutions.

Geo-information technologies offer a variety of opportunities to aid management and recovery in the aftermath of industrial accidents, road collisions, complex emergencies, earthquakes, fires, floods and similar catastrophes. These context-aware technologies can provide access to needed information, facilitate the interoperability of emergency services, and provide high-quality care to the public.

Disaster management depends on large volumes of accurate, relevant, on-time geo-information that various organizations systematically create and maintain. This information may be described in catalogues and made available through Geo-Information Infrastructures, such as Infrastructure for Spatial Information in Europe (INSPIRE), based on ISO, CEN, and OpenGIS standards. While the semantics of geo-information might be clear to the producer, formal semantics are seldom available. This complicates real-time machine processing in support of disaster management.

Disaster management poses significant challenges for data collection, data management, discovery, translation, integration, visualization and

communication based on the semantics of the heterogeneous (geo-) information sources with differences in many aspects: scale/resolution, dimension (2D or 3D), classification and attributes schemes, temporal aspects (up-to-date-ness, history, predictions of the future), spatial reference system used, etc.

For this reasons the Section GIS Technology at the OTB Research Institute for Housing, Urban and Mobility Studies at the Delft University of Technology took the initiative to organize the First Symposium on Geo-information for Disaster Management. This First Symposium focused primarily on the response and secondarily on the relief phases of Disaster Management encouraging a wide discussion on systems and requirements for use of geo-information under time and stress constraints and unfamiliar situations, environments and circumstances.

The organizers of the First symposium believe: the initiated discussion between technology developers (software and hardware), disaster management bodies, information providers, developers of standards and users will accelerate the development of advanced context-aware technologies for disaster management.

Recognizing the importance of disaster management issues, several universities, international organizations and vendors have taken the initiative to make this symposium an annual event, which will be organized in different continents. Three follow-up symposiums are already planned: India (2006), Canada (2007) and China (2008). These symposia are already officially approved as events of the International Society for Photogrammetry and Remote Sensing (ISPRS)

Goal and Objectives

The fundamental goal of the Symposium was to tackle disaster management problems in their entirety, considering: a. technology (both software and hardware applicable for Disaster Management), b. user requirements for geo-information (both management and mobile users), and c. information providers (data and standards). Therefore, during the Symposium the following aspects were addressed: 1. the state-of-the-art in Disaster Management, 2. a review of tools, software, existing geo-information sources, organizational structures and methods for work in crisis situations, 3. an outline of the drawbacks in current use, discovery, integration and exchange of geo-information, and 4. some suggestions for future research directions.

Conference topics

In order to reach the goal and objectives described above the Symposium focused on the following topics, which are reflected on by the papers included in this book:

- User Needs, Requirements and Technology Developments
- Data Collection and Data Management
- Data Integration and Knowledge Discovery
- End-User Environments
- Positioning and Location-Based Communication
- Information Systems for Specific DM Applications

Paper Selection Process

The Symposium on Geo-information for Disaster Management is a refereed symposium. The papers were submitted as extended abstracts and reviewed by at least two members, but usually three or four members, of the Scientific Program Committee. Nearly 170 full abstracts were submitted. The 22 best were selected for an oral presentation in a plenary session, next another 49 good papers were selected for an oral presentation in a parallel session. Finally, from the 50 submitted poster presentations, 27 submissions were selected for publication in this book. The authors of the selected abstracts were asked to submit a long paper for oral presentations or a short paper for poster presentations. In the preparation of the final papers, the authors had to consider the comments of the reviewers¹.

¹ Every effort has been made to ensure that the advice and information in this book is true and accurate. However, neither the publisher nor the authors, nor the editors can accept any legal responsibility or liability for any errors or omissions that may be made. The information content of papers collected in this volume is the sole responsibility of the respective authors.

Acknowledgement

Any conference takes considerable organization, and this one – being the first – especially. The editors would like to express their appreciation and gratitude towards the members of the Scientific Program Committee for completing the review process in time.

Such an event cannot be organized without the support of the international scientific community and the ICT-industry. A special thanks goes to the sponsors: GIN, RWS-AGI, Intergraph, Bentley, ESRI, and TU Delft/GDMC and the supporting organizations: ISPRS, EuroSDR, AGILE, and UNOOSA for recognizing the importance of this symposium.

This symposium is the result of the research program 'Sustainable Urban Areas' (SUA) carried out by Delft University of Technology.

Peter van Oosterom, Siyka Zlatanova and Elfriede M. Fendel
January 31, 2005

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