# Preface

The 17th International Symposium on Spatial Data Handling (SDH) was held on 18–20 August 2016 in Beijing. As one of the oldest GIS conferences, this symposium aims to bring together geographers, cartographers, computer scientists and others from the international community of geospatial information sciences and geomatics engineering to present the latest achievements and to share experiences in GIS research.

The International Symposium on Spatial Data Handling (SDH) is the biennial international research forum for Geospatial Information Science (GIScience), co-organized by the Commission on Geographic Information Science and the Commission on Modelling Geographical Systems of the International Geographical Union (IGU). It commenced in 1984 in Zurich, Switzerland and has ever since been held in Seattle, USA; Sydney, Australia; Zurich, Switzerland; Charleston, USA; Edinburgh, UK; Delft, The Netherlands; Vancouver, Canada; Beijing, China; Ottawa, Canada; Leicester, UK; Vienna, Austria; Montpellier, France; Hong Kong, China; Bonn, Germany and Toronto, Canada.

This is the second time SDH hold in Beijing, China (last time SDH 2000), again hosted by the State Key Laboratory of Resources and Environmental Information System (LREIS), the Institute of Geographic Sciences and Natural Resources Research (IGSNRR), Chinese Academy of Sciences. This year, the theme of the symposium is "face the challenges of big data within GIS". During two and half days of conference, the participants introduced their recent work and discussions were held on the storage, retrieval, visualization and knowledge discovery of spatial big data; multi-scale spatial data representations; data-intensive geospatial computing, and space-time modeling in open source environment; quality issues, spatial analysis and geographical applications of spatial data.

For SDH 2016, over 65 paper proposals were received and reviewed by the international program committee and additional reviewers. Based on the peer review of abstracts, 54 papers have been accepted to be presented in the conference,

in which 35 are recommended to be developed to full papers. Finally, 20 papers were submitted to the second round of peer review, and 15 papers were selected to be included in the proceedings. For convenience, they were classified into four topics, though some papers may be involved in more than one topic.

The growing volume of geo-referenced data has caused increasing needs of efficient storage, processing and retrieval of the massive data. In the first part of the SDH 2016 proceedings, Data Intensive Geospatial Computing and Data Quality, Mudabber Ashfaq and co-authors test the performance of spatiotemporal queries on T-drive and BerlinMOD trajectory datasets in Parallel Secondo environment. The results of their experiments indicate that the optimal number of nodes depends on the volume of data and the complexity of the query. Peng Wang and co-authors introduced their work of integrating a few hundred GB of multidisciplinary data in a system for geological disposal of high-level radioactive waste, including geo-information model design, metadata management development, and data management system implementation. Uncertainty and error are still unavoidable issues in Big Data Era. In the paper of Bo Sun and co-authors, they deem that the ground reference used as ground truth in validation and assessment of remote sensing land-cover classification contains errors, especially those coming from big geographic data. By cross-validation of ground references sampled by image interpretation and filed investigation, they find the uncertainties in ground reference data, and suggest the need for new evaluation system. Taking the error in Predictive Vegetation Mapping (PVM) as an example, Brian Lees discusses problem of keeping balance between accuracy and cost of efficiency when visualizing spatial data in his paper, and points out that some types of errors are acceptable for the convenience of representation.

In the second part, Web and Crowd Sourcing Spatial Data Mining, Shuang Wang and co-authors introduce an Emergency Event Information Extraction System. With the help of knowledge base and learning patterns form examples, the system can automatically extract event information from unstructured online news and save it in machine-readable database. Hou and Murayama describe an approach to evaluate people's utilitarian walking behavior using People Flow Data, and compared the result with neighborhood environment acquired with multi-criteria evaluation of residential density, street connectivity, land-use density, bus stop density and railway station accessibility. Their work provides a method to study neighborhood environment at metropolitan-level. Aiming at analysis of large tracking datasets of moving objects, Hongbo Yu proposes concepts of space-time path and station to model trajectories and locate spatial and temporal cluster of paths. He implements these concepts and some aggregation methods in a 3D space-time GIS environment, and the spatiotemporal patterns of large trajectory dataset are explored and visualized at different levels in the space-time GIS environment. The flow data can form network connecting different locations. To detect the interaction of locations, Zhixiang Fang and co-authors propose an extended

community detection algorithm based on CNM algorithm to find communities constrained by already partitioned source nodes. With human mobility flows derived from mobile phone data in Shenzhen City, they find the human communities and compare them with the planned urban polycentric clusters.

The third part, Visualization of Big Geographical Data, points to the representation of complex patterns and processes of GIScience. Addressing the theoretical and representational limits of cartographic visualization in scientific research, Francis Harvey suggests a new methodology for GIScience visualization that rests on transformational approach. A heuristic approach and the process to build the representation are introduced and the conceptual framework and foundation of the methodology are explained. From the perspective of visual analytics, Alan MacEachren discusses the importance and feasibility of understanding and constructing place from unstructured big data. The concept of place in different dimensions and the "5Vs" character of big data are explicated, and some (geo)visual analytical tools concerning three of the five "Vs" to leverage big data are introduced. Xun Wu and co-authors deal with the generalization of road network. To decide the roads that should be selectively omitted, they analyze four structure indices and one geometric index of road network and find a composite index to define the importance of the roads. The composite index is then validated with a road removing approach. The paper from Xiaoqiang Cheng and co-authors deals with the visualization of VGI data on different devices. Based on the scale-dependent feature of coalescence, they propose an index called degree of coalescence to measure the degree of visual coalescence, and use it in a detail resolution model which describes the level of detail information of vector lines. The model can be used in map generalization and overcome the scale heterogeneity of VGI.

The three papers in the final part of the proceedings, Spatial Analysis and Simulation, all point to the urban issues. Nowadays, a lot of approaches have been explored in data rich environment. However, sometimes we still are faced with data limitation. Shyamantha Subasinghe and Yuji Murayama develop an Urban Growth Evaluation Approach (UGEA) to detect urban growth in data poor situation by integrating the neighborhood interactions of urban land-use categories. Masahiro Taima, Yasushi Asami and Kimihiro Hino examine the city blocks with only office buildings to predicate the building footprint and office shape in Tokyo. A building location estimation (BLE) model is developed to estimate building locations based on the shape of a city block, and the probability of building coverage for each point on every floor is visualized as a spatial image. Cellular automata (CA) is a widely used approach for spatial simulation of land-use and land-cover changes. Wenyou Fan and co-authors adopt the CA SLEUTH model to simulate the urban expansion of Wuhan City, and predict future urban boundary in different scenarios.

Finally, we would like to express our appreciation to all those who have submitted their research and attended the meeting. Your participation made SDH 2016

successful. We also thank the program committee and additional reviewers for reviewing and sharing their experience, and thank the steering committee for their support. Thanks also go to the local organizing committee, and the staff and student volunteers in LREIS.

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