

Preface

The Earth is the only known blue planet in the universe. Approximately 71 % of the Earth's surface is covered by oceans, which operate as an elementary component of the global life support system and act as a balance for the human resource treasury and environment. Coastal regions all over the world are densely populated. Oceans and coastal regions are changing at faster rates, over broader scales, than ever before and in fundamentally new ways. Digital analysis based on multisource data can greatly improve the knowledge about the oceans and coasts. The data are obtained by diverse observation systems such as satellites, airplanes, ships, high-frequency ground-wave radars, buoys (moored and drifting), and land-based stations. Though there are many global information systems, such as Google Ocean, which can provide information, such as videos of ocean life, and allow the public to watch unseen footage of historic ocean expeditions, more studies should be carried out to meet the requirements of scientific research and governmental applications, especially from the Digital Ocean and Digital Coast perspective.

Based on various types of data analysis of the ocean, including survey and evaluation data, historic data, basic geographic data, remote sensing data, socio-economic data, and model estimate data, the specific content of the Digital Ocean and Digital Coast system construction modeling theories and technologies is included in this book. The modeling theories and technologies in this book are described from data, computation, analysis, application, and decision-making perspectives.

As modeling with Digital Ocean and Digital Coast relates to a number of research areas on a technical level, such as remote sensing, geographical information systems (GIS), virtual reality, scientific data visualization, computer network, geodesy, and data warehouse, the study content of modeling with the Digital Ocean and Digital Coast is introduced in Chap. 1 by Xin Zhang, Lei Wang, Xiaoyi Jiang, and Changming Zhu. Then ocean big data characteristics, acquisition, integration, and web service technologies are introduced in Chaps. 2 and 3 by Xin Zhang. In Chaps. 4, 5 and 6, the coastal flood forecasting modeling and analysis, coastal flood frequency modeling, spatial decision-making, and analysis theories and

technologies are introduced by Lei Wang and Xin Zhang. In Chap. 7, the ocean and coast disaster data modeling technologies are introduced by Xin Zhang. Chapter 8 by Changming Zhu and Xin Zhang investigates several new methods, including coastline automatic extraction, intertidal zone identification, coastal wetland classification, and coastal invasive plant detection using remote sensing. In the end, some applications and practical achievements of Digital Ocean and Digital Coast study in the China Offshore Digital Ocean Information Infrastructure Program are introduced by Xiaoyi Jiang.

In terms of modeling with Digital Ocean and Digital Coast, these preliminary results and applications push Digital Ocean a step forward from an unrealized concept to realistic systems. For more powerful Digital Ocean and Digital Coast studies and applications, more in-depth future research is needed.

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