Preface and Acknowledgements

This book has its origins in the Australasian Remote Sensing and Photogrammetry conference series. The theme for the book, Innovations in Remote Sensing and Photogrammetry, encompasses a broad range of topics in geoinformation and cartography presented over 36 papers. These are characterised in four sections: data fusion techniques and their applications in environmental monitoring; synoptic monitoring and data processing; terrestrial applications of remote sensing; and marine applications of remote sensing. Color figures are an important contribution to many of these papers. Readers are directed to the eBook version of this publication for access to full color reprints of the relevant papers.

The book begins with an introduction to spatial data visualization, with particular focus given to attribute uncertainty, as a critical step in enabling users to assess the suitability of the data for the intended application and to better understand the potential limitations of their data and subsequent outputs. This is important for policy-makers and natural resource managers whose decisions depend on spatial information. Consequences can be severe if data is unknowingly erroneous or misused. This paper provides a setting for the way in which we as spatial data providers and users need to think about, and share information. In addition it provides a linkage between this book and the book series, Lecture Notes in Geoinformation and Cartography, to which it belongs.

The first section begins with a series of papers on remote sensing data fusion techniques and their applications in environmental monitoring. Data synthesis and integration is critical to unlocking the full potential of earth observing sensors. In the context of landcover mapping, Ali et al. explore a method of combing both active and passive imagery. They conclude more accurate land cover mapping is attainable using object-level fusion than using the pixel-level supervised process. Bunting et al. present a technique that uses textural information, derived from image filters, to be used alongside hyperspectral data for the classification of broad forest types. Poon et al. discuss the potential for QuickBird as an effective method of extracting 3D information to be used for high accuracy ground feature determination. Lee et al. calibrate the ICESat laser data with airborne Lidar to generate new data products providing information about forest height and structure. Finally Sheffield et al. describe a native woody vegetation ground data collection protocol that attempts to integrate the spatial resolution of several remotely sensed datasets and the spatial variation of vegetation into a common framework.

The second section presents an overview of the use of remote sensing as a synoptic monitoring tool. The importance of remote sensing in its capacity to monitor the Earth, often in near real time, requires advancing our understanding in sensor technology and in the methods we employ to obtain and use spatial monitoring information. The Landsat program and its data archive are reviewed by Arvidson et al. for its utility in the analysis of global climate and environmental change. Furby et al. and Wu et al. discuss Landsat alternatives and quantify the effects of using SPOT 4, CBERS and Landsat 7 SLC-off images instead of the current Landsat 5 images in the context of continuity in climate change monitoring. The potential of the PALSAR instrument to support the inventory, conservation and management of wetlands in different areas around the world is evaluated by Lowry et al. and a new classification procedure for mapping terrestrial carbon within an operational, satellite based, forest monitoring system is offered by O'Connell et al. Processing methods are overviewed by Broomhall et al. who propose an aerosol optical depth retrieval method to facilitate better atmospheric correction of remotely sensed data particularly at the synoptic resolution level. McAtee et al. present an improved near real time atmospheric correction for MODIS data and Goessmann et al. propose an algorithm for the detection of active fires using the MODIS sensor. Grant presents a paper on operational land surface monitoring, while Griersmith et al. review recent developments in meteorological remote sensing.

The third section on terrestrial applications of remote sensing provides an overview of several key application areas; woody vegetation, landcover, wildfire, agriculture and built environments. The variety presented in this section highlights the enormous breadth of applications afforded by remote sensing technologies. Barry et al. explore a remotely sensed technique with the potential for distinguishing eucalypt phenology (seasonal change) from leaf stress. Vescovo et al. assess the utility of vegetation indices for grassland mapping, whilst Ferwerda et al. assess a range of commonly used vegetation indices for detecting nitrogen status and crop growth/production of wheat under a range of nitrogen fertilizer and irrigation treatments. The paper by Handcock et al. asks 'how remotely-sensed observations of pastures in an intensively managed dairy system change in relation to intensive management practices?' and found the observed spectral response varied with the length of time since the paddock was grazed. An overview of the Pastures from Space program is given by Stovold et al. Hall et al. propose an algorithm to be used in identifying a set of vine pixels with the aim to achieve improved remote viticulture canopy mapping. Hempel et al. use a Generalised Additive Modelling approach to predict weed occurrence and Eustace et al. present a semi-automated method to map gully extent and volume using LiDAR. Land use and land cover mapping is addressed in papers by Schroers et al. and Schmidt et al., and Mauger et al. maps mineralogy using the three HyMap hyperspectral instruments. In contrast to the natural environment, Fulton et al. provide a description for the automated reconstruction of buildings using digital video imagery and photogrammetric techniques. The issue of remote sensing and wildfire is examined in four papers. Goessmann et al. propose an algorithm for the detection of active fires using the MODIS sensor whilst Martin et al. present two papers on the theme of assessing grassland curing (or water content) for enhanced wildfire risk mapping. Cook et al. present a narrative of bushfire remote sensing from experience gained in NSW and the ACT, Australia, during the years 2001–2003.

The fourth section on marine applications of remote sensing begins with papers by Kutser et al. and Thankappan et al. which explore benthic mapping methodologies based on SAR, optical sensors and ancillary datasets. Majewski et al. evaluate methods for the monitoring the optical properties of marine water bodies, and Metsamaa et al. evaluate the performance of the new MERIS Level 2 products in retrieving marine chlorophyll metrics. Radliński et al. uses the diagnostic spectral features of oil to map oil slicks on the ocean.

In conclusion the editors wish to thank all the authors for their involvement and for enabling us to compile their work into this book. On behalf of the authors, the editors would also like to acknowledge and thank the generous contribution made by the many anonymous reviewers. Without this combined effort, this book would not have been realized.

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