Contents

List of Contributors vii
Preface xi

1 Earth Observation for Land and Emergency Monitoring Core Services 1
Heiko Balzter

Part I Forest Monitoring 5

2 Methodology for Regional to Global Mapping of Aboveground Forest Biomass: Integrating Forest Allometry, Ground Plots, and Satellite Observations 7
P. Rodriguez-Veiga, S. Saatchi, J. Wheeler, K. Tansey and Heiko Balzter

3 Remote Sensing for Aboveground Biomass Estimation in Boreal Forests 33
M.A. Stelmaszczuk-Górska, C.J. Thiel and C.C. Schmullius

4 Forest Mapping of the Congo Basin using Synthetic Aperture Radar (SAR) 57
J. Wheeler, P. Rodriguez-Veiga, Heiko Balzter, K. Tansey and N.J. Tate

Part II Land Cover and Land Cover Change Monitoring 75

5 Multi-Frequency SAR Applications for Land Cover Classification Within Copernicus Downstream Services 77
B.F. Spies, A. Lamb and Heiko Balzter

6 Unsupervised Land Use/Land Cover Change Detection with Integrated Pixel and Object Based Approaches for High Resolution Remote Sensing Imagery 101
S. Shrestha, C. Smith and Z. Bochenek

7 Earth Observation Land Data Assimilation System (EO-LDAS) Regularization Constraints over Barrax Site 117
M. Chernetskiy, N. Gobron, J. Gómez-Dans, P. Lewis and C.C. Schmullius
### Part III Coastal Zone and Freshwater Monitoring 141

8 **SAR-Based EO of Salt Marsh Habitats in Support of Integrated Coastal Zone Management** 143  
*S.J. van Beijma, A. Comber and A. Lamb*

9 **A Framework for Lakeshore Vegetation Assessment Using Field Spectroscopy and Airborne Hyperspectral Imagery** 159  
*D. Stratoulias, I. Keramitsoglou, P. Burai, L. Csaba, A. Zlinszky, V.R. Tóth and Heiko Balzter*

10 **Copernicus Framework for Monitoring Lake Balaton Phytoplankton** 173  
*S.C.J. Palmer, A. Zlinszky, Heiko Balzter, V. Nicolás-Perea and V.R. Tóth*

### Part IV Land Deformation Mapping and Humanitarian Crisis Response 193

11 **InSAR Techniques for Land Deformation Monitoring** 195  
*P. Kourkouli, U. Wegmüller, A. Wiesmann and K. Tansey*

12 **Mapping Land Surface Displacements in the Swiss Alps with Radar Interferometry** 209  
*J. Papke, T. Strozzi and N.J. Tate*

13 **Sample Supervised Search-Centric Approaches in Geographic Object-Based Image Analysis: Concepts, State of the Art and a Future Outlook** 223  
*C. Fourie and E. Schoepfer*

### Part V Earth Observation for Climate Adaptation 245

14 **Remote Sensing of Wetland Dynamics as Indicators of Water Availability in Semi-Arid Africa** 247  
*L. Moser, A. Schmitt, S. Voigt and E. Schoepfer*

15 **Satellite Derived Information for Drought Detection and Estimation of Water Balance** 285  
*M. Ofwono, K. Dabrowska-Zielinska, J. Kaduk and V. Nicolás-Perea*

16 **Conclusions** 301  
*Heiko Balzter*

Index 305