Preface

Natural hazards are associated with land, ocean and atmospheric processes, and their impacts on human societies. Over the years, the interactions between land, ocean, biosphere and atmosphere have increased, mainly due to population growth and anthropogenic activities, which have impacted the climate and weather conditions at local, regional and global scales. Due to population growth, the changes in land use and land cover and underground natural resources, in situ stress, pore pressure and surface albedo have led to various kinds of natural hazards associated with land (such as earthquakes, volcanoes, landslides, subsidence, desertification and droughts), oceans (cyclones, typhoons and hurricanes; harmful algal blooms; and tsunamis) and the atmosphere (lightning and dust storms). Natural hazards significantly impact human life and health on different spatiotemporal scales and also have socioeconomic bearings. In recent years, satellite data have been widely used by many developed and developing countries, in an effort to better understand and characterize the various underlying processes influencing natural hazards, and to carry out related impact assessments. Efforts have also been made to launch dedicated satellite missions for monitoring hazards and studying changes in land, ocean and atmospheric parameters. Satellite remote sensing, in general, is now routinely used to collect and analyze global and regional data for understanding Earth system processes, ranging from subsurficial features to upper atmospheric composition.

This book provides an overview of the physical processes associated with earthquakes, volcanoes, landslides, subsidence, desertification and dust storms. The Gujarat Earthquake of 26 January 2001 was deadly, killing more than 20,000 people and resulting in multimillion-dollar damages to properties and businesses. Widespread liquefaction, rupture and surface manifestations were observed, which are discussed in the chapters authored by Thakkar.

Susan Bartels and colleagues discuss medical complications associated with earthquakes. T.J. Majumdar explains satellite-retrieved geophysical data as possible precursors of earthquakes. Matt Pritchard and Sang-Ho Yun cover satellite radar imaging techniques for applications to natural hazards. Michel Parrot examines DEMETER satellite data and their observations to infer early warning signals associated with seismic and volcanic activity.

Luca Piroddi provides information on thermal infrared anomalies associated with earthquakes. Kalpna Gahalaut examines the role of fluids in triggering earthquakes that are common in intraplate earthquakes, which are believed to trigger earthquakes in shield and stable continental areas. Brijesh Bansal and Mithila Verma provide an overview of earthquake precursory studies in India.

Niki Evelpidou et al. discuss the geomorphic features associated with erosion, and Priyabrata Santra et al. provide details of the Thar Desert as a source for dust storms, its ground and satellite monitoring, and its impact on dust storms over the Indo-Gangetic plains and surrounding regions.

Andrea Taramelli et al. examine the causes, mapping and monitoring of coastal subsidence, and Mukesh Gupta explains the use of InSAR technology in subsidence studies. Landslides associated with earthquakes in Pakistan are presented by Shah Khan et al. The cause, distribution and monitoring of landslides in Jamaica are covered by Servel Miller et al., and landslides in Malaysia are covered by Omar Althuwaynee and Biswajeet Pradhan. Michel Jaboyedoff et al. discuss the use of LIDAR for mapping and monitoring landslides.