RISK AND UNCERTAINTY ASSESSMENT FOR NATURAL HAZARDS

Recent natural disasters remind us of our society's increasing vulnerability to the consequences of population growth and urbanisation, economic and technical interdependence, and environmental change. Assessment of risk and uncertainty is crucial for natural hazard risk management, both in the evaluation of strategies to increase resilience, and in facilitating risk communication and successful mitigation.

Written by some of the world's leading experts on natural hazard science, this book provides a state-of-the-art overview of risk and uncertainty assessment in natural hazards. Using clearly defined terminology, it presents the core statistical concepts in a unified treatment applicable across all types of natural hazards, and addresses the full range of sources of uncertainty: from sparse and noisy measurements to imperfect scientific and societal knowledge and limited computing power. The role of expert judgement and the practice of uncertainty elicitation are discussed in detail. The core of the book provides detailed coverage of individual hazards: earthquakes, volcanoes, landslides and avalanches, tsunamis, weather events such as flooding, droughts and storms (including the consequences of climate change) and wildfires, with additional chapters on risks to technological facilities, and on ecotoxicological risk assessment. Concluding chapters address the wider context of risk management, studying societal perceptions of natural hazard risk and human responses.

This is an invaluable compendium for academic researchers and professionals working in the fields of natural hazards science, risk assessment and management, and environmental science, and will be of interest to anyone involved in natural hazards policy.

JONATHAN ROUGIER is a Reader in Statistics at the University of Bristol. He specialises in uncertainty assessment for complex systems, notably environmental systems such as climate and natural hazards. He has made several important contributions in the statistical field of computer experiments, including general approaches for representing model limitations, informal and formal approaches to model calibration and multivariate emulation for expensive models such as climate models. Dr Rougier's recent and current collaborations include climate prediction and palaeo-climate reconstruction, ice-sheet modelling and sea-level rise and inference for dynamical systems such as glacial cycles, avalanches and hydrocarbon reservoirs.

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Preface

This collection originated in a scoping study commissioned in 2009 by the UK Natural Environment Research Council (NERC) on uncertainty and risk in natural hazards. This study brought together natural hazards experts and specialists in uncertainty assessment, perception and communication, in compiling a report with sections that covered each of the major hazards, cross-cutting themes and related but non-hazard risks. It found that there was a substantial opportunity for greater integration in natural hazards risk assessment, both *horizontally*, across hazards which shared common features, and *vertically* within a hazard, from the hazard event itself, to risk assessment and decision support. More recently, the study members have updated their contributions, to provide more detail than was possible at the time, and to take account of more recent progress. This volume is the result.

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