

Preface

In the last decade of the 20th century, there has been great progress in modelling the physics of earthquake generation; that is, the introduction of laboratory-based fault constitutive laws as a basic equation governing earthquake rupture processes and the quantitative description of tectonic loading processes driven by plate motion. The fault constitutive law plays the role of an interface between microscopic processes in fault zones and macroscopic processes of a fault system, and the plate motion connects diverse crustal activities and mantle dynamics. The APEC Cooperation for Earthquake Simulation (ACES) aims to develop realistic computer simulation models for the complete earthquake generation process on the basis of microscopic physics in fault zones and macroscopic dynamics in the crust-mantle system, and to assimilate seismological and geodetical observations into such models.

The inaugural workshop of ACES was held on January 31- February 5, 1999 in Brisbane and Noosa, Queensland, Australia. Following the fruitful results in the inaugural workshop, the 2nd ACES workshop was held on October 15 - 20, 2000 in Tokyo and Hakone, Japan. The number of participants doubled, including more than 100 researchers in earthquake physics and computational science from Australia, China, United States, France, Germany, Italy, Mexico, Israel and Japan. The theme of the meeting was "microscopic and macroscopic simulation of fault zone processes and evolution, earthquake generation and cycles, and fault system dynamics. The 3rd ACES workshop was held on May 5 - 10, 2002 in Maui, Hawaii, USA. More than 100 researchers participated from nine countries. This international participation indicates continued development of earthquake physics and earthquake simulation studies in the world since the founding of ACES.

The focus of the 3rd workshop was "computational science, data assimilation, and information technology for understanding earthquake physics and dynamics. The theme was addressed in a series of seven working group session for microscopic simulation, scaling physics, earthquake generation and cycles, dynamic rupture and wave propagation, computational environment and algorithms, data assimilation and understanding, and model applications. Through these working group meetings and additional poster sessions on the research of participants, the present state of the art in earthquake physics and computational science was discussed, exchange of ideas between participants was achieved, and new scientific goals and/or activities were identified. The progress of national projects, such as the Earth Simulator, SNARK, and the General Earthquake Model Computational System was presented and the interaction is facilitating the development of compatible interfaces between the developing projects. The outcomes of the workshop are recorded in this volume.

We believe that the success of this workshop will foster international and interdisciplinary collaboration and accelerate further progress in earthquake physics and earthquake simulation studies.

Acknowledgments

The 3rd ACES workshop (2002) was planned by the International Science Board, consisting of Peter Mora (Australia), Xiang-chu Yin (China), Mitsuhiro Matsu'ura (Japan) and Andrea Donnellan (USA), and hosted by the Southern California Earthquake Center and Jet Propulsion Laboratory, California Institute of Technology. Many people and organizations helped make a successful workshop.

Thanks to each representative to ISB for their efforts in organizing their country's delegation to the workshop.

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Andrea Donnellan (Chairman, LOC)
John McRaney (Secretary General, LOC)
Peter Mora (Executive Director, ACES)

Introduction and Background to ACES

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