

Seismotectonics in Convergent Plate Boundary

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Edited by

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Preface

We have been suffering severely from earthquakes and volcanic eruptions around the convergent plate margins known as plate subduction zones and collision zones. A fuller understanding of the seismic activity due to these plate movements is essential to refining risk assessments of these hazards. Above all, we need detailed images of the structures of the crust and upper mantle, as well as their movements that give rise to those structures.

We therefore organized a workshop to review the investigation of seismotectonics during the last 10 years of the 20th century, and to consider the direction of new development in the first decade of 21st century. Our aim was to stimulate the interest of multidisciplinary community in this field of investigation to find breakthroughs and open new schemes of coordinated efforts.

The workshop was held in Tsukuba from November 29, 1999 to December 2, 1999 and consisted of 11 sessions, including the keynote presentations and closing discussion session. Almost all aspects related to the study of seismotectonics were covered in the conference topics including: 1) investigating crustal structure-through the seismic and geoelectric conductivity, 2) determining seismic activity by means of a dense networks, 3) detecting crustal movement by means of GPS and INSAR, 4) studying active faults and, their morphology, and geology, 5) developing case studies on several convergent zones, 6) simulation modeling of subduction zones and seismicity, 7) performing in-situ measurements in the subduction zone, and 8) earthquake potential evaluation and micro-zoning. This volume is composed of papers by selected workshop participants.

We briefly summarize this volume as follows.

1) To understand the seismotectonics, it is more beneficial to adopt a synthetic approach of imaging crustal structure using seismic velocity, electrical conductivity, gravity, heat flow, and geology.

2) In particular, electromagnetic measurements should be conducted simultaneously with the seismic crustal survey because the resistivity is sensitive to the fluid phase of the crust, which plays an important role in the earthquake generation process.

3) Seismotectonic investigations should be significantly improved by increasing the spatial resolving power of each kind of measurement in the next decade.

4) Surveys must be extended to the adjacent ocean area to better understand the seismotectonics and increase reliability of seismic potential evaluation around the subduction zone.

- 5) Measurements are to be conducted in three-dimensional space, taking into account the 3-D heterogeneity of the crust.
- 6) Breakthroughs in investigations are expected through development of measurement techniques extending the depth limit in the crust as well as of development signal analysis techniques.
- 7) Earth observation technology using satellites such as INSAR and GPS is to be widely applied to monitor crustal movement.
- 8) International collaboration is important in investigating complex features of seismotectonics.

We would like to express our sincere thanks to all who contributed to this volume. We are greatly indebted to the personnel who organized and supported the workshop, especially, Mr. Nobuo Yamashita, Mr. Shuichi Iio, Ms. Yumiko Yamauchi and Ms. Eriko Furuuchi. Likewise, we deeply appreciate the efforts of the members of the organizing committee, especially Drs. Takanobu Yokokura and, Makoto Murakami who made great contributions in coordinating the workshop. Lastly, this volume was printed through the dedication and patient cooperation of the publisher Mr. Keiji Oshida and the person in charge, Ms. Yuko Cho of TERRAPUB. We would also like to express our gratitude to the Ministry of Education, Culture, Sports, Science and Technology for funding the workshop and to the Japan Society of Promotion of Science for funding publication of this volume.

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