Preface to Special Issue on "Seismogenic Zone Drilling for Earthquake Generation Process"

Information on ambient conditions and in-situ physical/mechanical properties of active faults at depth provide us with answers to fundamental questions about the earthquake generation process. From this point of view, drilling to the seismogenic zone of a plate boundary, where great earthquakes have occurred frequently and damaged human society, is believed to be essential for understanding the earthquake generation process. However, drilling to the seismogenic zone had been impossible due to its depth. The Integrated Ocean Drilling Program (IODP) is scheduled to start in October 2003. Under the IODP, a new drilling vessel named "Chikyu" will be provided and we will be able to drill up to 6 km under the sea floor with state-of-the-art riser drilling technology. This means that sampling and monitoring by drilling into the seismogenic zone of an active plate boundary fault system will become possible. It will take long time and be costly to reach the seismogenic zone in a plate boundary, even if we use state-of-the-art drilling technology. Therefore, we must make the most of the opportunities of deep drilling to obtain important information for the earthquake generation process. The success of this type of scientific drilling project depends on active plans based both on scientific background/objectives, and technology developments.

To discuss the scientific objectives and the necessary technological developments for seismogenic zone drilling, we had a two-day meeting at the Earthquake Research Institute, the University of Tokyo on June 12th and 13th, 2002, with approximately 90 scientists and engineers. The first object of the workshop was to review the current research on the Nankai seismogenic zone, which is thought to be one of the major targets of drilling under the IODP. The reviewed research consisted of microearthquake activity observed by ocean bottom seismometer array, asperity distribution estimated from great earthquakes, slip distribution from Tsunami, geodetic and earthquake inversion, thermal structure, and seismic structures. The second object was to discuss scientific objectives and targets of seismogenic zone drilling. Some of the targets are to understand the nature of asperity and to obtain critical parameters for earthquake generation. This special issue is based on the discussions during the workshop.

We believe this special issue will provide us with basic data and ideas on Nankai seismogenic zone drilling to better understand seismic and aseismic faulting processes and mechanism that controls the transition from aseismic to seismic fault slip.

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Invited editors of the special issue on
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