

## Japan's approach to the prediction of great earthquakes at plate boundaries

Koshun Yamaoka

Nagoya University.

kyamaoka@seis.nagoya-u.ac.jp

Great earthquakes at plate boundaries are among the biggest threats for people living in Japan, and there have been a lot of demands for intensive researches on earthquakes since more than a hundred years ago. The research on earthquakes has been conducted under national programs since 1892 in various institutions. The current system of earthquake research started in 1965 under a national program of earthquake prediction. The Coordinating Committee for Earthquake Prediction (CCEP), which GSI supports as a secretariat and all related research institutions and governmental organization participated, established to exchange information on the observational results and make a scientific evaluation on them. The national program for earthquake prediction was oriented to finding and elucidation of precursor process rather than a basic research on earthquake process before the 1995 Kobe earthquake. In spite of the research program of more than 30 years, little was revealed about the physical mechanism of precursors, and scientists are criticized for not informed appropriate knowledge on earthquakes.

After the Kobe earthquake the Headquarters for Earthquake Research Promotion (HERP) was established to promote a comprehensive survey and research on earthquake for practical disaster mitigation, and to make a public announcement on the up-to-date results of survey and research products of earthquakes. The Earthquake Research Committee, under the HERP, regularly gives a public announcement on scientific evaluation of earthquakes. The important role of HERP is a coordination of budgets and other administrative works with related governmental organizations. As many governmental organizations and universities are involved in the earthquake research in Japan, the coordination is a very important function to maximize the research output with a limited budget.

The program on earthquake prediction, on the other hand, has been renovated into a new program for basic research in 1999. In the research program it aims for the quantitative forecast of earthquake occurrence through understanding of all process in earthquake cycles, from preparation stage to the process after an earthquake. In the research program heterogeneity of coupling on plate boundaries are of main interest of subjects. So-called asperity-model was established as a kind of working hypothesis, in which the areas of large slip are conserved over earthquake cycles. This hypothesis was supported by analysis of source process in intermediate to large earthquakes.

Japan promotes the research on earthquake at plate boundaries, especially focusing on its prediction or forecast, under the framework as mentioned above. The HERP coordinated the establishment of the nation-wide observation network such as high sensitivity seismometers and GPS stations, which provides excellent data for new finding and monitoring of the process at plate boundaries. The new comprehensive policy by the HERP also states the importance of research and observation on plate boundary earthquakes. The principal subject of the new national program of earthquake prediction is the elucidation and quantitative forecast of plate boundary earthquakes based on numerical simulation and monitoring. Developments of new technologies to monitor the process on the plate boundary are also promoted. The ocean bottom geodesy and

monitoring with high precision active sources are among the cutting edges.

The CCEP, under the new national program, transferred part of its role to the HERP and concentrate its effort on the information-exchange and scientific discussion on the monitoring of various processes relating to earthquakes. The CCEP has four regular meetings a year and share the up-to-date results of research, especially on the process along plate boundaries. In the current CCEP meeting, they selected the issues of discussion as an Intensive Discussion Subject that are selected from recent topics on earthquake monitoring. The selected are 'Various phenomena on the plate boundary deep slip', 'Monitoring of coupling and slip on the shallow plate boundary', 'Seismic Interferometry', 'Monitoring of preparatory process on inland earthquakes', 'Simulation of coupling and slip on the plate boundary' and 'Seismic activities'. These discussions will be very helpful to promote the research activity in each institutions participating CCEP.