

Recent Trend of Comprehensive Studies Toward Earthquake Disaster Prevention in Japan

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Abstract

In view of uncertainties in progress of observational and theoretical earthquake prediction, more emphasis has been directed, in recent years, toward a multidisciplinary approach to reduction and mitigation of earthquake disaster in Japan under the comprehensive and basic policy of the Headquarters for Earthquake Research Promotion (HERP). The basic approach is as follows. The primary step is the understanding of processes of earthquake generation through analyses of seismic and crustal deformation data derived from nationwide networks of seismometers and GPS receivers. In fact, earthquake generation processes have been well studied for subduction-zone earthquakes, resulting in a new concept based on the so-called asperity model combined with newly found slow slips. For inland earthquakes, extensive studies of active faults have provided rather statistical information on probable earthquakes. Once an earthquake source model is established from this step for areas to be considered, generation of strong ground motion can be estimated theoretically. Combined with dense surveys of crustal structure and local near-surface structures, detailed distribution of ground motion is estimated at the local level. For large earthquakes in the ocean areas, tsunami distribution is also estimated with its arrival time. These lead to practical forecast of strong ground motion and tsunami for potential large earthquakes. It should be emphasized here that the approach outlined above will not be feasible without effective collaboration of various research organizations, as typically demonstrated by nationwide observations networks with the firm policy that routine data are made open to the research community and the public in general. In this workshop, some of the recent results are presented by representative Japanese researchers so that the above approach can be well understood and its effectiveness can be evaluated properly. In addition, as further steps toward more practical measures for disaster prevention, two examples of recent advances are taken up. One is an extensive earthquake early warning system based on nation-wide seismic networks including the ocean-floor network system. The other is a shaking experiment of buildings with realistic inputs of strong motion estimated for specific cases.