P-02

The HIZUMI project - Intensive Observations and Researches in the High-Strain-Rate Zone of Japan -

Tetsuya Takeda
National Research Institute for Earth Science and Disaster Prevention
ttakeda@bosai.go.jp

"HIZUMI" means strain in Japanese. High-strain-rate zone along the eastern margin of the Japan Sea has been extensively and continuously recognized through analysis of GPS data (Sagiya et al., 2000). This zone contains many active reverse faults and frequently causes M7 class inland earthquakes. In 2004 and 2007, two M6.8 inland earthquakes with reverse fault type focal mechanism, having NW-SE compression, occurred in the Niigata Chuetsu area in the central part of the high-strain-rate zone, causing serious human and economic damages.

In 2008, the Ministry of Education, Culture, Sports, Science and Technology decided to start the special multidisciplinary research project. The purpose of the project is to resolve the general feature of the active tectonics in this region and to construct the earthquake fault model that contributes to improvement of long-term evaluation of earthquake occurrence, and evaluation of strong motion. In this project, comparative studies are carried out at some volcanoes and other fault systems located in high-strain-rate areas to clarify the formation mechanism of the high-strain-rate zone. The main programs are as follows.

(1) Earthquake observation: A temporary dense earthquake observation network composed of 300 instruments has been deployed in and around the Niigata area. Also, ocean-bottom-cable-type seismometers have been installed in the sea. Based on analysis of the data, precise hypocenters, three-dimensional structure of seismic velocity, and attenuation factor, are obtained to provide information of deep structure of active fault system.

(2) Seismic survey: Deep seismic reflection, refraction, and high resolution reflection surveys by using active sources are carried out in order to obtain the active structure, configuration of deep fault plane, absolute value of the seismic velocity, and so on. In the Japan Sea, the multichannel surveys are also carried out along some profiles.

(3) GPS observation: Two profiles composed of 50 GPS sites are constructed across the high-strain-rate zone. Based on repetition of the GPS measurement, detail distribution of the crustal deformation is obtained, and a physical model that explains the observed deformation is constructed.

(4) Geomorphologic and geological surveys of the active faults: Based on tectonic geomorphology, shallow borehole stratigraphy, high-resolution marine reflection survey, and dating of sediment materials, tectonic landforms and late Quaternary slip rates are resolved.

(5) Strong motion evaluation: Based on collection of surface soil data and microtremor survey, combined model of surface and deep soil structure in the sedimentary plain in the high-strain-rate zone is constructed. The source propertyies of the earthquake in the high-strain-rate zone are analyzed. Models of the source fault and underground structure are tested based on the evaluation of strong motion.

(6) Collection and analysis of records of historical earthquakes: Based on the geological, historical, and seismological records of historical earthquakes in the high-strain-rate zone, precise distribution of seismic intensity is resolved in order to improve the long-term seismic hazard assessment.