History of tsunamis, education and awareness in Japan

Tsunamis in Japan have been frequently generated by under-water earthquake, volcano, and landslide at the zone of subduction in the ocean plates, causing the serious damage which has been reported since A.D.684 (Hakuo). The number of tsunami in Japan exceeds 195 during the period of 1,133 years, meaning their frequency becomes one event every 6.7 years, which is much less than floods or earthquakes. This is why the awareness of tsunami among Japanese is low, and why it is difficult for many to understand tsunami.

We have the knowledge, experiences and regional countermeasure to reduce damage of tsunami in Japan. How can we make action to remind the experience for long time? How can we mitigate damage in the wide coastal area? There are both hard and soft countermeasure; breakwater, sea-wall, tsunami memorial and history of heroes are introduced to be shared with us. Although the most important rule is to evacuate as soon as a tsunami is generated, it is rather difficult to keep a consciousness and to prepare rapid action at anytime. How can we overcome this problem and make tsunami awareness among Japanese?

Although tsunami is known as the big wave, the awareness is rather low. In the past, we have had many tsunamis, but not enough. Constant awareness of ground levels and dangerous areas, as well as safe zones, is necessary for an adequate response.

Japan, surrounded by seas, is one of the most tsunami-prone countries in the world, and has suffered from serious tsunami disasters. Considering such circumstances, Japan Meteorological Agency (JMA) has been implementing seismological observation since 1880s, and initiated tsunami warning services in 1952. JMA maintains the nation-wide seismic network composed of 180 stations at present. Continuous seismic waveform data at these stations are sent via dedicated telephone lines to six Regional Tsunami Warning Centers (Fig. 1), and processed in real time. Seismic activities are monitored 24 hours a day, 7 days a week. When an earthquake occurs, the event will be automatically detected and checked in a man-machine interactive manner. Within three to five minutes after the occurrence of the earthquake, tsunami forecast and related information will be issued, if necessary. It is very important to improve the accuracy of tsunami forecast and to reduce false alarm. In order to estimate a possibility of tsunami generation using quickly determined hypocenter and magnitude of the earthquake, JMA introduced a numerical simulation technique in April 1999.

Tsunami Warning System in Japan

JMA has started to provide Tsunami Watch Information (TWI) for Indian Ocean countries on their demand, in coordination with the Pacific Tsunami Warning Center, as an interim measure until the Tsunami Early Warning System is established in the Indian Ocean. TWI is to be provided at the occurrence of a large earthquake in the Indian Ocean, and conveys information on the earthquake and the possibility of tsunami generation. In the case of earthquakes with magnitude greater than 7.0, it also conveys estimated tsunami travel time to 43 segmented coastal zones of the Indian Ocean.