Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

HDS026-10 Room:101 Time:May 22 16:45-17:00

JMA Tsunami Warning Services' Present Situation and Future Plan

Tomoaki Ozaki[1*]

[1]Japan Meteorological Agency

The Japan Meteorological Agency (JMA) started its tsunami warning operation regulated by the Meteorological Service Act in 1952. In the early years, operators compose tsunami warning bulletins by hand using a tsunami forecast chart, and it took about 20 minutes from the occurrence of earthquakes. But, year by year, the issuance time of tsunami warnings has been speeded up by the upgrade of processing systems and seismic networks. In 1999, JMA introduced quantitative tsunami warning system which stores tsunami numerical simulation results of many cases as a database. This system dramatically shortened the issuance time to around three minutes after events. In 2006, JMA started the earthquake early warning (EEW) services, which has further shorten the issuance time to about two minutes at the earliest cases.

JMA have been installing seismometers for EEW use, and currently, data from about 220 seismometers, including ocean bottom seismometers in Tonankai-oki area, is in use. Data from the National Research Institute for Earth Science and Disaster Prevention (NIED) is also merged into EEW operations. In addition, data from DONET, which is now under construction, would be of help to more swift and accurate tsunami warnings through the improvement of hypocenter determination ability for the earthquakes around the area DONET is installed.

We consider that we have accomplished our goal regarding the immediacy of issuance of tsunami warnings, and that the main challenge remaining is to improve tsunami height forecast. The prompt issuance of tsunami warning involves uncertainties which are inevitably included in various parameters such as focal mechanisms at the initial stage after the event. JMA's tsunami warnings issued within about three minutes are composed based on hypocenter and magnitude calculated from seismological data that is obtained up to that time, and focal mechanism and source region are not clear at this stage. Therefore, JMA assumes 45 degree of reverse faults as the worst case scenario, and in case of a hypocenter close to the Japanese coast, adopts the highest predicted coastal tsunami heights given by all of assumed faults that include the location of hypocenter. We then change/cancel the warning as needed, based on updated data such as CMT solutions.

Sea level change generated by sea bed deformation is the source of tsunami. But it is difficult to grasp this change accurately. This fact gives us a limit for precise tsunami prediction. In addition, for large events such as much larger than M8, there is another issue that it is difficult to determine magnitude within several minutes after the occurrence of events. It is our goal to introduce techniques that enables us to grasp the scale of generated tsunami accurately at an early stage.

For distant tsunamis, JMA establishes tsunami warning system similar to the system for local tsunamis, using simulation database system installed in 1999 and real time numerical tsunami simulation. We are now upgrading our distant tsunami simulation database, referring to the past events such as the 2010 Chilean earthquake tsunami. The main points of improvement are; 1) increase in number of assumed faults from 260 to 1280, 2) applying finer spatial resolution (5 minutes to 1.5 minutes interval for open ocean), and 3) increase in number of tsunami waveform data output points which are used for calibration by comparing with tide gauge observations, from 12 to 99. The new database will be into operation in FY2011.

Keywords: Tsunami warning operation, Quantitative tsunami warning system, Earthquake Early Warning