Development of Indonesia Tsunami Early Warning System (InaTEWS) toward Regional Tsunami Watch Provider (RTWP)

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Indonesian Tsunami Early Warning System (InaTEWS) is set up to produce Tsunami Warning in 5 minutes after the earthquake. This scenario is based on the experience of local tsunami where the first tsunami attacks the coast within 20-40 minutes after the earthquake. To reach the goal, it requires 160 Broadband seismic stations, 500 accelerograph stations, 60 tide gauges, 20 DART buoys, and several continues GPS stations for monitoring purposes. The whole InaTEWS system consists of 4 subsystems namely; 1. Monitoring, 2. Processing, 3. Dissemination, and 4.Preparedness. The monitoring system has 3 types of network; 1. Earthquake monitoring, 2. Sea Monitoring, and 3. Earth Deformation.

The earthquake monitoring system is used to forecast whether the earthquake is potentially tsunami or not, and if potentially tsunami, the warning is issued and then tsunami wave is monitored using sea monitoring network. Tectonic deformation and the impact of the earthquake-tsunami can be seen by using Global Positioning Satellite (GPS) and satellite image by comparing the data before and after the earthquake.

The goal to develop InaTEWS is to be able to produce the first tsunami warning in 5 minutes after the earthquake. There is a possibility to have observation of tsunami within 5 minutes after the earthquake. If no observation is available, the first tsunami warning message is estimated from earthquake parameters and tsunami modeling scenario which contains highly uncertainty. To reduce uncertainty is always trade off with time. The effort to reduce uncertainty needs to develop the network of observation as dense as possible. The effort to reduce time consuming before dissemination needs to develop an integrated system called DSS (Decision Support System) for tsunami and mitigation system.

DSS is basically integrated parameters and aggregated of all monitoring earthquake and tsunami system to support operators on duty to prepare timely the tsunami messages and earthquake information. The tsunami message is updated based on the available observation in a way that DSS links and match between the observation and simulation to produce robust information for distance recipients.

Currently, 148 Broadband seismograph stations, 85 accelerographs, 57 tide gauges, 19 DART – OBU-buoy and 19 GPS stations have been installed in well distributed at tsunami and earthquake prone area in Indonesia. All seismic stations are transmitted to BMKG as National Tsunami Warning Center in real time and provided to the countries in Indian Ocean and ASEAN member states to access the data in real time based on IOTWS and TTF of ASEAN (Technical Task Force) recommendation. All Tide gauge stations are transmitted in real time to BAKOSURTANAL who runs the network in daily basis. Some of the stations are already available in near real time to BMKG and all will be available in near real time in BMKG Jakarta for tsunami warning purposes. DART buoy data is also available in near real time in BMKG and will be available in real time in BMKG based on tsunami mode status.

Using the current capabilities, BMKG is able to issue tsunami warning within 5 minutes after the earthquake based on the earthquake parameters criteria or service level 1. The next effort is to complete the system by early 2010, where tsunami warning contains estimation of tsunami arival and tsunami height as well as inundation.