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Ocean bottom seismic and tsunami network along the Japan Trench (2)

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Huge tsunami, which was generated by the 2011 off the Pacific Coast of Tohoku Earthquake of M9 subduction zone earthquake, attacked the coastal areas in the north-eastern Japan and gave severe casualties (about 20,000 people) and property damages in the areas. The present tsunami warning system, based on land seismic observation data, did not work effectively in the case of the M9 earthquake. It is strongly acknowledged that marine observation data is necessary to make tsunami height estimation more accurately. Therefore, new ocean bottom observation project has started in 2011 that advances the countermeasures against earthquake and tsunami disaster related to subduction zone earthquake and outer rise earthquake around Japan Trench and Kuril Trench. A large scale ocean bottom cabled observation network is scheduled to be deployed around Japan Trench and Kuril Trench by 2015. Concepts of this network are: 1) Locate one station by each M7-7.5 class seismic source region (that is minimum size tsunami generation earthquake). 2) Incorporate the land and sea networks in on observation network. The network consists of about 150 ocean bottom observation stations. Ocean bottom fiber optic cables, about 5,700 km in total length, connect the stations to land. Observation stations with tsunami meters and seismometers will be placed on the seafloor off Hokkaido, off Tohoku and off Kanto, in a spacing of about 30 km almost in the direction of East-West (perpendicular to the trench axis) and in a spacing of about 50 - 60 km almost in the direction of North-South (parallel to the trench axis).

This cable system is divided into 6 subsystems. Both ends of each cable subsystem will be landed, and electric power will be fed from both sides. And also all data will be acquired from both sides in order to ensure operation in case of cable trouble. In addition, the neighboring cables will be brought into the same landing station, and 6 subsystems are going to be finally connected into one big loop. By do this, the minimum data necessary for the warning which is acquired the whole cable subsystems can be transmitted from one landing station of somewhere.

Two sets of JAE three component servo accelerometers, a Geospace Technologies three component velocity seismometers, and two Paroscientific quartz type depth sensors and a three-component quartz type accelerometers (frequency outputs) will be installed. Tsunami data and seismometer data will be digitized at sampling frequency of 10 Hz and 100 Hz, respectively, and will be added clock information at land stations. These digitized data will be transmitted to the data centers (main at NIED and backup at ERI), JMA (Japan Meteorological Agency), universities, and so on, using IP-VPN network.