N-net: Nankai Trough Seafloor Observation Network for Earthquakes and Tsunamis

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Based on the fundamental observation plan of the Headquarters of Earthquake Research Promotion (HERP) that established after the Great Hanshin-Awaji Earthquake Disaster, fundamental seismic observation networks in land were constructed in early 2000s by NIED. As for the Great Eastern Japan Earthquake and Tsunami, observation in seafloor is insufficient, and cased underestimates of magnitude, and resulted in underestimates tsunami and earthquake early warning. To enrich seafloor observations, S-net was constructed off the Pacific Coast of eastern Japan, and the construction of DONET from the Kumano-Nada to the Kii Channel water was promoted. These observation networks are integrally operated as MOWLAS, and provide dense spacing and high-quality data. However, the blank of seismic and tsunami observation exists from off Kochi to the Hyuga-nada that is western half of the anticipating Nankai Trough earthquakes. To fill in the blank, NIED starts to construct N-net (Nankai Trough Seafloor Observation Network for Earthquakes and Tsunami) as a subsided project sponsored by MEXT. N-net observes tsunami and ground motion just above the source region, and is capable to accelerate the detection of tsunami and earthquake early warning with accuracy. The objectives of N-net are to understand and simulate the source phenomena such as coupling and spatial and temporal change of the slip on the plate boundary by monitoring of the offshore seismicity, to promote utilization of observations and related information toward the feedback to the society, and to mitigate disaster of giant earthquakes. N-net consists of the two systems of inshore and offshore to link landing stations in Kochi and Miyazaki Prefectures. Each system holds 18 stations that connect to the fiber optic cable with about 700 -800 km long, and 36 stations will be installed in total. In the inline system adopted in S-net, each observation equipment is broke in the main cable, and cable ships can install in the wider region with relatively low cost. On the other hand, in the node system with expandability adopted in DONET, the observation node is installed by ROV (Remotely Operated Vehicle) as the extended branch that is branched from the main cable equipped by cable ships via the branching unit. N-net is basically designed as the inline system but to adopt the hybrid system to node system. Each observation system is equipped by a pair of pressure gauges to detect tsunamis and a pair of the acceleration and short-period velocity sensors are installed to keep redundancy. The construction of N-net is expected to shorten 20 min and 20 sec at maximum to detect tsunamis and earthquakes. The observed data is planned to transmit to the JMA in realtime, and to use for the tsunami and earthquake early warning. In this presentation, we introduce N-net that NIED is newly constructing along the Nankai Trough.

Keywords: N-net, Nankai Trough earthquake, earthquake observation, tsunami observation, seafloor observation network for earthquakes and tsunamis, early warning