

## Core Device for Nankai Trough Seafloor Observation Network for Earthquakes and Tsunamis (N-net)

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NIED is now constructing N-net in the western half of the anticipated source area of the Nankai trough earthquake, and 36 observatories will be deployed on the deep seafloor. The whole system is designed for long life because it is not easy to repair troubled devices on the seafloor. To enhance reliability of the system, we adopted several redundancies such as two subsystems of offshore and inshore, two landing stations, and duplicated sensors. N-net is designed to keep running over 20 years.

A core device, called S-UNIT, is incorporated in an observatory and plays the main role of seismic and tsunami observation. It has many functions to communication with terminal equipment on land, to control each sensor, and to feed power to each device. It mainly consists of four devices, which are seismic sensor device, measurement device, power supply device, and transmission device. For parts incorporated in the S-UNIT, redundant configuration was adopted as much as possible for long life, while, for parts that cannot be made redundant, highly reliable parts were selected.

The observed data is time-stamped with a precision of 1  $\mu$ sec or better at each observatory. To maintain time accuracy, the S-UNIT receives the precise time clock synchronized to the GNSS disciplined clock from the landing stations. It also receives the delay information to compensate for delays associated with the processing and transmission of the time clock between the landing stations and its observatory.

Concretely, the measurement device receives 1PPS, GNSS sentence, and delay information that transmitted from the GPS receiver on land, is synchronized with the precise time clock, and adds the timestamp based on the received GNSS sentences to the observation data at the observatory on the seafloor.

The communication between the observatory and the landing station is peer-to-peer through the submarine optical cable and performs reception of STM-4 data compliant with SDH transmission technology. N-net communication system allows IP communication, implementing IP packets in SDH payload.

Keywords: N-net, Tsunami, earthquake, the anticipated Nankai Trough Megathrust Earthquake