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# DONET

## A Real-Time Monitoring System for Megathrust Earthquakes and Tsunamis Around Southwestern Japan

BY YOSHIYUKI KANEDA

DONET (Dense Ocean floor Network for Earthquakes and Tsunamis; <https://www.jamstec.go.jp/donet/e/index.html>) is a cabled seafloor observatory that monitors the Nankai and Tōnankai seismogenic zones, offshore southwestern Japan, in real time. In 1944, two segments of the Nankai megathrust ruptured in the magnitude 8.1 Tōnankai earthquake; two years later, two other segments of the megathrust ruptured in the magnitude > 8 Nankai earthquake. Earthquakes are thought to recur in this region every 100–200 years, based on historical information. Therefore, it is important to monitor the Nankai Trough megathrust earthquake seismogenic zone over long time periods to provide early warnings of impending significant earthquakes and to improve the accuracy of earthquake recurrence cycle simulations.

DONET is composed of two installations labeled DONET1 and DONET2 in the figure. Installation of DONET1's 20 stations began in 2006 and was completed in 2011. The second phase, DONET2, was initiated in 2013 to cover a wider region, and is expected to become operational in 2015. In total, DONET has 51 observatories, each of which has many sensors, including a broadband seismometer, accelerometer, hydrophone, precise pressure gauge, differential pressure gauge, and a thermometer. In addition, a long-term borehole monitoring system was installed in 2013 in the area of the Tōnankai earthquake epicenter using the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) deep-sea drilling vessel *Chikyū*. The borehole is equipped with seismometers, strainmeters, thermometers, and other sensors, and it has been connected with DONET1 so that real-time data can be transmitted through the submarine cabled network. Future borehole observatories linked to DONET are planned for this region.

The real-time DONET sensor data permits rapid detection of earthquakes and tsunamis, allowing researchers to evaluate them and then disseminate notifications. These real-time data soon will be assimilated into sophisticated computer models for earthquake prediction research. A new Japanese research project uses the Kei supercomputer to integrate DONET data into earthquake and tsunami simulations. Integration of real-time monitoring data in earthquake and tsunami analyses and simulations is a significant step toward mitigating potential natural disasters.

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