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Development and Utilization of the Ocean floor observatory -DONET (Dense Ocean Network for Earthquakes and Tsunamis) around southwestern Japan-

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Abstract

The Ocean floor network equipped with multi kinds of sensors such as seismometers and pressure gauges is the very important and significant tool to monitor the broad band phenomena in seismogenic zones. Especially, slow events such as long period tremors, slow earthquakes and ocean floor deformations are possibly observed around the Nankai trough south western Japan. In the Nankai trough south western Japan, there are three mega thrust earthquake seismogenic zones such as the Tokai, Tonankai and Nankai seismogenic zones.

These mega thrust earthquakes are occurring with an interval of 100-200 years. However, the occurrence pattern in each cycle is quite different. In the 1944 Tonankai earthquake and the 1946 Nankai earthquake, the Tonankai earthquake occurred 2 years ahead of the Nankai earthquake, in 1854 the Tonankai /Tokai earthquakes occurred 32 hours ahead of the Nankai earthquake, and in 1707 Tonankai/Tokai earthquakes and the Nankai earthquake occurred simultaneously. Therefore, the real time monitoring of seismogenic zone using multi kinds of sensors is very important to understand seismic linkages around the Nankai trough.

In 1944/46 and 1854 mega thrust earthquakes around the Nankai trough, first ruptures were starting from the Tonankai seismogenic zone. Because of these facts, we are developing ocean floor network observatory, DONET, which is Dense Oceanfloor Network for Earthquakes and Tsunamis around the Tonankai seismogenic zone. In DONET system, the backbone cable length is about 250km and brunch cable length is about 200km, 20 observatories are deployed and multi kinds of sensors such as an accelerometer, a broad band seismometer, a pressure gauge, a differential pressure gauge and a thermometer are equipped in each observatory. By these precise sensors, we could observe broad band phenomena such as strong motions, slow earthquakes and ocean floor deformations around the Nankai trough. Especially, using broadband seismometers and pressure gauges, we can detect low frequency tremors, very low frequency earthquakes and ocean floor deformations.

In recent simulation researches, according to the coming next mega thrust earthquakes, moving velocities and occurrence intervals of slow events increase. Therefore, if such research results are true, we will be able to observe these phenomena using DONET. Finally, we are developing data assimilation methods to improve the simulation model of mega thrust earthquake recurrence cycle using DONET data. And, we will develop the advanced DONET with the high voltage system around the Nankai seismogenic zone western part of the Tonankai seismogenic zone. We will explain the ocean floor network projects for the next Nankai trough mega thrust earthquake seismogenic zones in details.