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Development and Utilization of the Ocean floor observatory DONET/DONET2 (Dense Ocean Network for Earthquakes and Tsunamis)

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After East Japan Earthquake 2011, the real time monitoring system of earthquakes and tsunamis is recognized as very important system for precise early warning. Furthermore, the Ocean floor network equipped with multi kinds of sensors such as seismometers and pressure gauges are very important and significant tool to monitor the broad band phenomena in seismogenic zones. The two days before East Japan earthquake 2011, M7 earthquake occurred near the epicenter of East Japan earthquake, and after slip propagated to the epicenter of East Japan earthquake. This phenomenon is very important information to understand the occurrence system of East Japan.
Not only after slips but also slow events such as long period tremors, slow earthquakes and ocean floor deformations are important, too. In the Nankai trough southwestern Japan, there are three mega thrust earthquake seismogenic zones such as the Tokai, Tonankai and Nankai seismogenic zones. In 1944/46 and 1854 mega thrust earthquakes around the Nankai trough, first ruptures were starting from the Tonankai seismogenic zone. Therefore, to understand seismic linkage around the Nankai trough and improve early warning, we constructed DONET which is Dense Ocean floor Network for Earthquakes and Tsunamis around the Tonankai seismogenic zone with 20 observatories. Multi kinds of sensors such as an accelerometer, a broad band seismometer, a precise pressure gauge, a differential pressure gauge and a precise thermometer are equipped in each observatory. Furthermore we are already developing DONET2 with 31observatories around the Nankai seismogenic zone. DONET2 system is more powerful rather than DONET to monitor large seismogenic zone area.
As advanced simulation researches, we are developing data assimilation methods to improve the simulation model of mega thrust earthquake recurrence cycle using DONET/ DONET2 data. These approaches are significant and important to precise estimation of next mega thrust earthquakes around the Nankai trough seismogenic zone. We will explain utilization of DONET data and DONET2 system in details.