

Technical developments for continuous seafloor deformation monitoring of seismically coupled plate interface in the Nankai Trough.

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Significant efforts have been made in improving seismic monitoring in the Nankai Trough seafloor in this decade, where next large earthquake is anticipated in coming future. Development and deployment of dense seafloor observation network using seafloor cable in the Nankai Trough known as DONET has been conducted by 2016, and further extension of seafloor observation network using deep seafloor borehole observatories in NantroSEIZE experiment of Integrated Ocean Drilling Program (IODP) followed, so far establishing three borehole observatories linked to DONET. Observation with these observation network resulted in discovery of repeating slow slip events in the shallower part of the coupled Nankai Trough plate interface, often accompanying very low frequency earthquakes, although relation between these family of slow earthquakes leaves much to be studied. Existence of slow slip events may suggest heterogeneous coupling of seismogenic plate interface, but our sensitivity for such slow events are still very limited in areal coverage. Therefore, we started technical development of seafloor observation mainly aiming at monitoring slow deformation of seafloor caused by such slip events in the plate interface, in wide area in the Nankai Trough seismogenic zone. We started three major technical development projects in 2017; 1) slow crustal deformation monitoring by seafloor pressure gauges by repeated calibration of pressure gauges in the seafloor network. 2) Development of seafloor observation sensors for slow crustal deformation monitoring. 3) Deployment of deep borehole observatories. The first cruise for calibrating seafloor pressure gauges for project 1) will be conducted in March, 2018, and will be reported in JpGU 2018 meeting. In project 2), we are testing prototype sensors for seafloor deployment in JAMSTEC's test facility at Kamioka mine. Deployment in the first seafloor test site, planned in off Kumano-basin, will take place in 2018-2019. In seafloor deployment, tilt sensor will be deployed by seafloor drilling platform called BMS to ensure deployment of sensors in 5-10 m below seafloor to avoid influence from seafloor current and seafloor temperature fluctuation. Seafloor pressure is also monitored in the same site to correct for effects from seafloor deformation due to oceanographic seafloor loading, known to be significant even in very deep borehole environment. Seafloor fiber optic strainmeter will also be tested at the site to verify ability of these sensors to monitor slow crustal deformation at depth.

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