

# Seafloor geodetic observation network using seafloor pressure gauges for monitoring of real-time plate coupling strength in the Nankai trough seismogenic zone

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Long-term and precise pressure measurements on the seafloor has been a key to understand geophysical phenomena such as occurrences of large inter plate earthquakes. However long-term pressure measurements contain inherent instrument drift up to 10 hPa/year (equivalent to 10 cm/year) in addition to the seafloor displacements. As the expected vertical displacements rate on the seafloor are less than 1 hPa/year (i.e., = 1 cm seawater height/year), a correction of the inherent drift component using an absolute calibration system with a resolution better than 1 hPa is necessary when measuring long-term precise pressure on the seafloor. Machida et al. (2018) has developed a mobile pressure calibrator (MPC) for calibration of seafloor pressure gauges. A concept of the MPC is to carry a reference pressure from laboratory to the seafloor, and calibrate the seafloor pressure gauge with the reference pressure via the MPC. In the Nankai trough seismogenic zone, a dense ocean-floor network system for earthquakes and tsunamis (DONET) was installed. The system has a total of 51 observatories, and each observatory has a pressure gauge for monitoring of tsunami activity. We have repeatedly carried out in situ calibrations of the DONET pressure gauges which were installed in the stations of MRC10 and KMB08 in Oct. 2018, Feb. 2019, and May 2019. The drift components of each observatories including inherent instrument drift components and seafloor displacements for the last two years are 5.2 hPa/year and 1.3 hPa/year for the MRC10 and KMB08, respectively. The inherent drift component estimated by the repeatedly calibration using the MPC were 4.4 hPa/year and 0.56 hPa/year for the MRC10 and KMB08, respectively. The results indicate that the long-term vertical displacements are 0.81 hPa/year and 0.74 hPa/year for the MRC10 and KMB08, respectively. We will continue to carry out in situ calibrations of the DONET pressure gauges to increase measurement accuracies by repeatedly measuring at the same observatories and to increase number of observatories to understand high-dense and broad area of deformations on the seafloor. The results would contribute to understand a real-time plate coupling strength on the subducting oceanic plate in the Nankai trough seismogenic zone.

Keywords: DONET, seafloor pressure gauge calibration, long-term crustal deformation on the seafloor, subduction zone, the Nankai trough seismogenic zone