

GPS/Acoustic Seafloor Geodetic Observation for Monitoring Crustal Movements Around Offshore Plate Boundary Regions

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Abstract

Three research groups, the Hydrographic and Oceanographic Department, Japan Coast Guard and the Institute of Industrial Science, University of Tokyo, Tohoku University, and Nagoya University have been developing precise seafloor positioning systems using the GPS/acoustic combination technique and carrying out observations along the major trenches in the Pacific Ocean, such as the Japan Trench and the Nankai Trough. The primary purpose of these observations is to detect and monitor the crustal deformation caused by the subduction of the oceanic plate near the plate boundary where huge earthquakes repeatedly occur. From past observations, we have succeeded in detecting intraplate crustal movements and co-seismic movements at seafloor reference points with centimeter resolution. As an example, offshore of Miyagi prefecture, which is one of the most seismogenic zones in Japan, for the first time in the world, we detected a series of crustal movements indicating the beginning of the reaccumulation from the release of the strain by the 2005 Off-Miyagi Prefecture Earthquake ($M_w=7.2$). Seafloor crustal movements close to the focal region expect to provide valuable information for detailed discussion on interplate coupling and slip distribution of the source fault.