Observation of seafloor movement off Miyagi

Yukihito Osada[1]; Motoyuki Kido[1]; Satoshi Miura[1]; Hiromi Fujimoto[1]

[1] RCPEV, Graduate School of Sci., Tohoku Univ.

Large earthquakes occurred around northeastern Japan associated with subduction of oceanic plates such as the Pacific plate. Spatial distribution of the seismic coupling into he subduction zone of the Japan Trench has been estimated based on GPS observation (a.g., Suwa et al., 2006). This result shows the strong coupling in the area off Miyagi. In this study, however, the lack of data in sea area limits the resolution and repeatability of back slip estimation on the undersea plate boundary. Therefore it is important to extend the geodetic observation into the seafloor. GPS/Acoustic (GPS/A) observation, which combined kinematic GPS and acoustic ranging technique, can be the most probable method for monitoring seafloor crustal movement.

We present the results of experiments carried out off Miyagi in the Japan Trench subduction among 2003 and 2007. We have two sites to monitor the crustal movement using the GPSA method. We have started the observation at GJT4 since August 2003 and at GJT3 since August 2005. We then estimated the position of each PXP using data collected while the buoy shifted around the PXP. We had little time during the cruise to precisely locate the center of the PXP array. We revisited GJT4 site in August 2004, June 2005, August 2005, November 2005, November 2006 and November 2007 for precise positioning of the PXP array center using the data collected with the buoy above the array center. At Another site (GJT3) we revisited in August 2005, November 2006, and November 2007.Throughout the observation epochs, shore stations at SNR and AOB were maintained as the GPS reference stations. The baseline length at GJT4 for KGPS positioning was about 120km on SNR and about 180km on AOB.

We estimate the slip vector associated with the plate motion to be about 5.7cm NW between August 2004 and June 2005 at GJT4. And we estimate the slip vector associated with the plate motion to be about 6.4 cm NNW between August 2005 and November 2006 at GJT4. This slip vector roughly agrees with that estimated from GPS observation on land (Suwa et al., 2006). And we estimate the plate motion adding the result of the observation last year.

This research was done as part of RR2002 and DONET projects.