Latest results of seafloor geodetic observation by Japan Coast Guard

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We have been developing a system for precise seafloor geodetic observation with the GPS/Acoustic combination technique and deploying reference points on the land-ward slope of the major trenches around Japan, such as the Japan Trench and the Nankai Trough. The primary purpose of our observation is to detect and monitor the crustal deformation caused by the subduction of the oceanic plate near the plate boundary.

The site labeled as MYGI is located about 100km landward from the axis of the Japan Trench. An array of four acoustic transponders has been installed on the seafloor, at a depth of about 1700m. This reference point has been working since 2001, and intensively observed since 2002. In October 2004, another array of acoustic transponders labeled as MYGW has been installed on the seafloor about 50km west of MYGI, at a depth of about 1100m. Off Fukushima prefecture, the seafloor reference point labeled as FUKU has been installed in 2001. From the repeated observations, we have obtained the crustal velocity vector of 7.3 cm/year WNW at MYGI and the crustal velocity vector of about 3.1cm/year W at FUKU, relative to the stable part of the Eurasian plate. The crustal velocity at MYGI is fast and close to the subduction velocity of the Pacific plate. In contrast, the crustal velocity of FUKU is significantly slow. The contrast of the results about 100km apart infers the difference of strength of interplate coupling between the regions. In addition, a co-seismic crustal movement of about 10cm eastward, associated with the 2005 Off Miyagi Prefecture Earthquake (M_W7.2), was found at MYGW. We have been carrying out observations at the seafloor reference points for monitoring the crustal deformation more precisely. In particular, as for MYGW, we are keeping an eye on the crustal deformation after the earthquake.

On the other hand, starting with the installation of the first seafloor reference point at Kumano-Nada in 2000, we have deployed a chain of reference points along the Nankai Trough: Off Tokai (TOKE, TOKW), Off Cape Shiono-Misaki (SIOE, SIOW) and Off Cape Muroto-Misaki (MURO). From the repeated observations at TOKE, which is near the Tokai earthquake's assumed focal region, we have obtained the crustal velocity vector of 2.9cm/year WNW relative to the stable part of the Eurasian plate. We also have obtained the preliminary crustal velocity vector at TOKW. As for the other seafloor reference points, we have been carrying out observations to detect the crustal deformations.

In this presentation, we will report the latest results of our observations.