Seafloor geodetic observation by Japan Coast Guard- Intensive campaign observations off Miyagi -

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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 Japan Trench and 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. In this presentation, we summarize the latest results and future plan of our observations.

1. Intensive observation off Miyagi Prefecture

The site labeled as MYGI is situated about 100km landward from the axis of the Japan Trench. A set 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.

The other site labeled as MYGW is situated about 150km landward from the axis of the Japan Trench. A set of three acoustic transponders has been installed on the seafloor, at a depth of about 1100m.

In 2005, we have carried out six campaign observations for each site for the period from April to December in 2005. The obtained coordinates shows the repeatability of several centimeters.

2. Results at the seafloor reference point MYGI

The epicenter of the Off Miyagi Earthquake (Aug 16, 2005; M7.2) is located about 60km west of MYGI. The time series of horizontal coordinates of MYGI, obtained from 10 campaign observations for the period May 2002 - August 2005 before the earthquake exhibits a linear trend. A linear fit, adding the intraplate velocity of the position reference Shimosato relative to the stable part of the Eurasian continent (3.2 cm/year, 291 deg), gives a rate of approximately 8.1 cm/year towards WNW. Both the value and the direction of this result have enough reality as an intraplate strain velocity vector affected by the subduction of the Pacific Plate.

We carried out two campaign observations at MYGI after the earthquake, and obtained data of five days for the period of September 9 - 18 and six days for the period of October 22 - 30. As a result, the estimated coordinates are along the trend mentioned above, and no prominent movement was detected. Although GSI's rectangular model using GEONET GPS data predicts an easterly movement of 2.6cm at this point, in view of the precision of our observation at several centimeters, this fact is regarded to be still consistent, since such a scale of the movement is below the detectable level.

3. Results at the seafloor reference point MYGW

The epicenter of the earthquake is located as close as 10km west of MYGI. We carried out three campaign observations at MYGW after the earthquake, and obtained data of five days for the period of August 29 - September 2, six days for the period of October 10 - 21 and three days for the period of December 17 - 25. We have five campaign epochs, June, August, September, October and December 2005 before and after the earthquake available for estimating the crustal movement. Difference between average positions of the epochs before and after the earthquake indicates easterly co-seismic movement of about 10cm. This result is highly consistent with the movement vector predicted by GSI's rectangular fault model.

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