

## Recent efforts for GPS/acoustic seafloor geodetic observation by Japan Coast Guard

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We have been developing a system for precise seafloor geodetic positioning with the GPS/Acoustic combination technique and deploying seafloor reference points on the land-ward slope of the major trenches around Japan, such as the Japan Trench and the Nankai Trough.

In March, 2008, we permanently installed an acoustic transducer on the hull of the middle-sized survey vessel "Meiyo" and started sailing observations. This improvement enabled us to obtain more stable observation results. In addition, we have started the replacement of seafloor stations since 2009 to ensure the long-term observation.

From the past observations, we have successfully detected seafloor crustal deformation caused by the subduction of the oceanic plate and co-seismic displacements associated with large earthquakes. In particular, for the 2011 Tohoku-oki earthquake, huge co-seismic displacement of about 24 m toward ESE and about 3 m upward has detected at the seafloor reference point just above the hypocenter.

In this presentation, we introduce our recent efforts on seafloor geodetic observation.

### 1. Observational aspect

#### (1) Additional deployment of seafloor reference points to the Nankai Trough

To monitor seafloor movement spatially in the focal regions of Tokai, Tonankai and Nankai earthquake, we have deployed nine new seafloor reference points on the landward slope of the Nankai Trough in addition to the existing six points from off-Omaezaki to off-Muroto.

#### (2) Installment of observation equipment to the S/V "Kaiyo"

Subsequent to the S/V "Meiyo" in March 2008 and the S/V "Takuyo" in December 2010, we installed observation equipment to the middle-sized S/V "Kaiyo" in February 2012.

### 2. Analysis aspect

We have been considering the application of a new analysis method using the advantages of sailing observation for further precise seafloor positioning. This method is to determine the 3D position of the array of four seafloor stations under fixing the configuration and has the potential to detect not only horizontal movement but also vertical movement on the seafloor.

We have reanalyzed observation data obtained before the 2011 event by this method and determined crustal deformation at all seafloor reference points. We plan to report observation results by this method for the future.

Keywords: seafloor geodetic observation, off Miyagi Prefecture, Nankai Trough