

Sailing seafloor geodetic observation using a hull-mounted acoustic transducer

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

By the past observations, we detected intra/interplate crustal movements at seafloor reference points installed off Miyagi Pref., off Fukushima Pref., Sagami Bay and off Tokai region, with the precision of less than 1cm/year. The estimated velocities are generally consistent with those of on-land GPS observation.

However, we had some problems for achieving more efficiency and precision. Because of drifting observation to avoid the noises from the vessel, we had to consume much time for transitting to the next survey line after finishing one line survey. In addition, we can't control configuration of survey lines.

Then, to improve observation efficiency and precision, we permanently mounted observation equipment on the vessel. An acoustic transducer was mounted on the bottom of the vessel's hull and a GPS antenna was mounted at the mast. This enables us to carry out 24-hour sailing observation.

From the past test observation, we confirmed the following.

- The new system enables us to carry out acoustic ranging observation while sailing at a speed up to 11 knots.
- By the sailing observation, spatial distribution of data has been dramatically improved.
- The difference of estimated positions between drifting observation and sailing observation are about 2-3cm.
- The positions by sailing observation are much more stable than those by drifting observation.

In this presentation, we will report the evaluation and the foresight of sailing seafloor geodetic observation.