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# 東北地方太平洋沖地震に関する海底地殻変動観測と今後の展開
# Current status and future plan of seafloor geodetic observation for 2011 Tohoku-oki earthquake

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We have detected considerably large coseismic displacement associated with the 2011 Tohoku-Oki earthquake thorough GPS/acoustic geodetic surveys. Taken them together with those observed by Japan Coast Guard and wide-spread array of seafloor pressure gauges, the data definitely contribute to elucidate the coseismic slip distribution of the earthquake based on numerical inversion analysis, the result of which we did not expected with our knowledge before the earthquake, but is supported by many other observations after the earthquake. The unexpected feature is not only in the coseismic slip distribution but also in postseismic deformation. GSI has been monitoring the postseismic deformation using GEONET and reported reasonable slip distribution that compensates the coseismic slip of the main shock mainly in the western (and hence deeper) adjacent area. However, our repeated observations after the earthquake indicate complexity in the postseismic slip, including further slip even at the main coseismic slip area near the trench. In addition, the deformation seems to still continue with a considerable rate.

To elucidate the complexity, Tohoku University and Nagoya University plan to drastically extend the seafloor geodetic survey sites along the Japan Trench by this summer under the accelerated project promoted and funded by MEXT. The total number of survey sites being planned is about 20, to be distributed mainly on deeper seafloor near the trench, in where the deformation cannot be inferred from onshore GPS network. The most of the survey sites consist of four transponders while some important sites consist of six transponders, which can effectively correct the effect of undesired spatial variation in sound speed in ocean. The new transponders are designed against long ranging over 10 km distant at depth and are compatible with both the systems of the university groups and Japan Coast Guard.

The other key of the project is the introduction of an autonomous moving buoy, which can navigate itself along programmed path or remotely operated on demand away from a research vessel. The utilization of this extra buoy will lead surveys to be more efficient or precise taken with an existing towing buoy simultaneously. The power for electronics and propulsion will be supplied by diesel oil lasting for at least two days per fuel. The autonomous buoy is an all-in-one system and the allover length is 3 m at most, which can be dealt with any researcher on any vessel. This promotes new research groups to begin their own GPS/acoustic survey. Systematic result of displacements in postseismic deformation will be obtained after the second time of survey to be conducted by the end of the fiscal year of 2012.

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