GNSS-A観測によって得られた日本周辺の海底の地殻変動
Present seafloor movement around Japan inferred from GNSS-A observation

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The Hydrographic and Oceanographic Department of Japan Coast Guard has been developing a system for precise seafloor geodetic positioning with the GPS-Acoustic combination technique and deploying seafloor observation sites on the landward slope of the major trenches around Japan, such as the Japan Trench and the Nankai Trough.

After the 2011 Tohoku-oki earthquake (M9.0), we directly measured huge coseismic seafloor displacements at seafloor sites just above the source region (Sato et al., 2011). We have repeatedly performed the GNSS-A seafloor geodetic observation to monitor the postseismic movement in and around the rupture zone. In contrast to the coastal GNSS sites where trenchward-upward movements were reported, the offshore seafloor sites above the main rupture zone exhibit landward displacements with significant subsidence (Watanabe et al., 2014). Seven years have passed since the earthquake occurred. In recent years, the movement velocity has changed compared to several years after the earthquake. We will report and discuss the most recent results of postseismic seafloor movement.

The present accuracy of this technique is about 2-3 centimeter-level and less than the GNSS observation. The accuracy is affected by ocean disturbances strongly. Because of the complex spatial and temporal variations of the undersea sound speed structures, it is impossible in practice to make enough observations to cover all these variations in detail. Thus, we have reduced this effect using analytical approaches. Temporal changes of undersea sound speed structures were approximated as polynomial functions. In the recent study, we found out a possibility that spatial changes were also able to be modelled by using the similar method. These methods could make contributions to upgrade the accuracy of the observation. In this presentation, we also review our current analysis flow and discuss effects of these analytical approaches.

キーワード：海底地殻変動観測、GNSS-A、海溝型地震
Keywords: seafloor geodesy, GNSS-A, subduction zone earthquake

