Recent progress in the GNSS-A seafloor geodetic observation: A review and outlook

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Japanese Islands are located in a tectonically active region where multiple tectonic plates interact with each other. Interplate megathrust earthquakes have occurred many times along the undersea plate subduction zone, causing serious damage to human society. Crustal deformation data derived from geodetic observation networks, e.g., GNSS and InSAR, are extremely useful for elucidating the physical mechanisms of such earthquakes.
However, despite the fact that interplate megathrust earthquakes occur in undersea subduction zones, most crustal deformation data to date have been collected by onshore networks only. This lack of data from marine regions limits the estimation resolution and reliability for undersea interplate slip and slip-deficit. Therefore, there is increasing demand for seafloor crustal deformation data with which to elucidate interplate megathrust earthquakes.
The Hydrographic and Oceanographic Department of the Japan Coast Guard (JHOD) has been developing a system for precise seafloor geodetic positioning based on the GNSS-Acoustic ranging combination (GNSS-A) technique and has been constructing a seafloor geodetic observation network along the Japan Islands. The obtained time series of seafloor position represent interplate and intraplate earthquakes, various post-seismic deformations, and interplate coupling condition due to subduction.These data are strongly meaningful for understanding subduction zones and the processes of megathrust earthquakes.
In this presentation, we will review achievements so far and discuss the future outlook from the viewpoint of the seismology and disaster science.

Keywords: seafloor geodesy, GNSS-A, subduction zone earthquake

