Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SCG64-38 Room:A05 Time:May 28 16:30-16:45

Postseismic deformation following the 2011 Tohoku-oki earthquake measured by seafloor geodetic observation

TOMITA, Fumiaki[1*] ; KIDO, Motoyuki[2] ; OSADA, Yukihito[1] ; HINO, Ryota[2] ; OHTA, Yusaku[1] ; IINUMA, Takeshi[2] ; AZUMA, Ryosuke[1] ; WADA, Ikuko[2] ; MIURA, Satoshi[1]

[1]Graduate School of Science, Tohoku University, [2]International Research Institute of Disaster Science, Tohoku University

Using GPS/Acoustic seafloor geodetic observation (GPS/A observation), we can directly measure seafloor movements, which cannot be obtained from on-shore geodetic observation. Watanabe *et al.* (2014, GRL) indicate significant contribution of viscoelastic relaxation to the postseismic deformation based on the fact that off-shore GPS/A sites just above the source region of the 2011 Tohoku-oki earthquake show significant landward movement while on-shore GPS sites show trenchward movement. Furthermore, Sun *et al.* (2014, Nature) show the viscoelastic relaxation is a dominant postseismic mechanism based on their numerical simulation explaining both off-shore and on-shore geodetic data. However, since GPS/A sites used in these studies are limited in the Miyagi-oki region and not above the shallow portion of the plate interface which caused large coseismic slip, it is not sufficient to reveal the spatial extent of the postseismic deformation. Hence, we aim to constrain the spatial extent and distribution of postseismic deformation using 23 GPS/A sites deployed along the Japan trench from Aomori-oki to Ibaraki-oki. Twenty out of these sites were newly deployed in Sep. 2012 in order to observe postseismic deformation following the Tohoku-oki earthquake.

So far, we conducted six campaign surveys from Sept. 2012 to Sept. 2014 (9-10/2012, 11/2012, 7-8/2013, 10-11/2013, 2-3/2014, 9/2014) completing three surveys at most of the sites. Based on the method derived by Kido *et al.* (2006, EPS), we estimate the seafloor transponder array positions for each survey and calculate the postseismic displacement rate at each site by applying linear regression to the time-series of the array positions.

Since errors in the postseismic displacement rates are estimated to be about 5-10 cm/yr, it is difficult to discuss the postseismic deformation at individual sites. However, sites above the heavily ruptured area in Miyagi-oki show a tendency of landward movement as previous studies indicate, and sites to the north and south of the heavily ruptured area show slight northward and southward movements, respectively. Moreover, these observed postseismic deformation patterns are consistent with the result of the viscoelastic model constructed by Sun *et al.* (2014). Consequently, the viscoelastic relaxation is likely a dominant postseismic deformation process during the observation period.

Next campaign survey is planned in Feb. – Mar. 2015 and will expand the time-series of seafloor array positions improving the estimation accuracy of postseismic displacement rates at individual sites. In this talk, we report these observation results including the data to be obtained in the next campaign survey and discuss detailed postseismic deformation following the Tohoku-oki earthquake.

Keywords: Tohoku-oki Earthquake, postseismic deformation, GPS/Acoustic observation, seafloor geodesy