

Temporal variation in Coda Q in the northeastern part of Niigata-Kobe Tectonic Zone in 2009-2014

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Large earthquakes modulate the stress state in the crust, resulting a temporal change in seismicity and/or heterogeneity of the crust. Hiramatsu et al. (2000) and Sugaya et al. (2009) reported a temporal change in coda Q in Tamba region associated with the 1995 Hyogoken-Nanbu earthquake. Padhy et al. (2013) also reported a temporal change in coda Q along the Pacific coast of Tohoku caused by the 2011 Tohoku earthquake. However, Tsuji et al. (2014) reported no statistically significant temporal change in coda Q around the Nobi fault zone, the central part of the NKTZ due to the 2011 Tohoku earthquake. We investigate here details of the temporal variation of coda Q in the northeastern part of the NKTZ during January 2009 to February 2011 (period I) and January 2012 to October 2014 (period II).

We have analyzed 646 events in the period I and 2194 events in the period II in the northeastern part of the NKTZ. Those magnitudes are greater than 1.8 and the depths shallower than 30 km. For each station, we select events of which epicentral distance are within 30 km for the analysis of coda Q. We applied the single back-scattering model (Aki and Chouet 1975) for the estimation of coda Q.

We compare the obtained coda Q between the periods I and II. The change in $\log(\text{coda } Q^{-1})$ is smaller than 13% between the periods I and II. We investigate the spatial variation of the change between the periods I and II. Spatial distributions of increase $\log(\text{coda } Q^{-1})$ variation at 1-2 and 2-4 Hz frequency bands is volcanic area and it is difficult to find a distinct pattern of the spatial distribution of $\log(\text{coda } Q^{-1})$ variation at 4-8, 8-16, and 16-32 Hz frequency bands that is related closely to the fault zones, volcanic area, or the high strain rate zone. We apply t tests to analyze the significance of these temporal variations and find that little variations are statistically significant. These facts imply that the temporal variation in coda Q caused by the 2011 Tohoku earthquake is not significant in this study area.

Keywords: the 2011 Tohoku earthquake, high strain rate zone