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Shear wave splitting measurements and shallow crustal structure of Mt. Fuji region

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Seismic activity in volcanic region have been reportedly changing after the Great 2011 Tohoku Earthquake. An aftershock(Mw 5.9) occurred on 15 March 2011 in Mt. Fuji region after 11 March 2011. The stress fields of the area can be affected by these events. A clear NW-SE trend of dike formations is observed in the vicinity of the volcanic edifice of Mt. Fuji and the maximum horizontal stress of the regional stress field in the area is presumed to be parallel to the strike of dike formations. The interactions of these major events and the regional stress field may affect the geologic processes in Mt. Fuji region. Seismic anisotropy can provide us with timely and spatial information about the seismic structure and stress fields. We measure shear wave splitting (SWS) by using MFAST (Savage et al., 2010) to interpret the upper crustal structure and stress fields of the region. We use data retrieved from seismic stations installed by ERI or NIED from 2009 to 2011. The measure trend of fast polarization directions (depth$<$20 km) in 2009 are almost N-S and the trend is not consistent with the regional maximum horizontal stresses (NW-SE). The trends of fast polarization directions did not change significantly after 11 March 2011. The number of events increased after March 2011 while the number of events whose SWS can be measured did not increase significantly. Previous studies indicate increase of the dilatational strain from 2006 and stress perturbations by the Great Tohoku earthquake and an aftershock (Mw 5.9). Lack of significant temporal change of fast polarization directions may indicate that the seismic anisotropy of the area is not sensitive to changes of the stress field by the events. At least, the stress perturbations by the Great Tohoku earthquake did not significantly affect the seismic anisotropy in the shallow ($<$20km) crust around Mt. Fuji region at the end of 2011. By contrast, Results of SWS from deep events ($>$20km) were unstable due to number of events and noise level. We expect that we can infer the relationships between regional or local stress field and seismic anisotropy from further analysis of SWS and comparison with focal mechanism and seismic structures.

Keywords: Mt. Fuji, Shear wave splitting, Volcano monitoring