

Shallow crustal stress field deduced from shear wave splitting measurements in Mt. Fuji region

Kohtaro Araragi¹, Martha K Savage², Takao Ohminato³, Yosuke Aoki³

¹University of Oregon, Department of Geological Sciences, USA, ²Victoria University of Wellington, New Zealand, ³Earthquake Research Institute, University of Tokyo, Japan

E-mail: kalessinlord@gmail.com

The 2011 Great Tohoku Earthquake affects seismic activity in the volcanic regions of Japan islands. After 11 March 2011, an aftershock (Mw5.9) occurred in Mt. Fuji region. These two earthquakes may influence the geologic processes in the area. In addition to these recent major events, it has been more than a few hundred years since the last eruption of Mt. Fuji and a future increase of volcanic activity is expected. Consequently, quantitative approaches to understand the upper crustal structure of Mt. Fuji region are important not only for scientific purposes but also for disaster mitigations. We measure shear wave splitting in Mt. Fuji region from 2009 to 2011 to interpret the upper crustal structure and stress fields by using MFAST (Savage et al., 2010).

SWS measurement results from earthquakes with shallow depths (<20km) indicate that the trends of fast polarization direction in the shallow crust of area are N-S to NE-SW. We did not observe significant temporal change of fast polarization directions or delay times before and after 11 March 2011. Results of SWS from deep events were unstable due to noise levels and to a few number of events.

The maximum horizontal stress of the regional stress field in the area is presumed to be NW-SE from the nearby earthquake focal mechanism and the strike of dike formations. Thus, the fast polarization directions are not parallel to the regional maximum horizontal stresses, as is expected for stress-aligned microcracks. The fast polarization directions of a station close to the hypocenter of the Mw5.9 event are consistent with the strike of the fault plane of the event. These observations suggest that the area is affected by factors such as nearby structures or local stress perturbations in addition to the regional ones.

Lack of significant temporal change of fast polarization directions may indicate that the shallow stress fields of Mt Fuji area is constant before and after 11 March 2011. At least, the stress perturbations by the Great Tohoku earthquake does not significantly affect the seismic anisotropy in the shallow(<20km) crust around Mt. Fuji region at the end of 2011.