Geophysical Research Abstracts
Vol. 18, EGU2016-2776, 2016
EGU General Assembly 2016


# Near-surface Seismic Anisotropy of Taiwan Revealed by Coda Interferometry

Li-Wei Chen (1), Ying-Nien Chen (2), Yuancheng Gung (1), Jian-Cheng Lee (3), and Wen-Tzong Liang (3)

(1) Department of Geosciences, National Taiwan University, (2) Institute of Oceanography, National Taiwan University, (3) Institute of Earth Science, Academia Sinica, Taipei, Taiwan

We report the near-surface (<400m) shear wave velocity (Vs) and Vs azimuthal anisotropy of Taiwan by applying seismic interferometry to 34 borehole-surface station pairs. We measure the Vs anisotropy by examining the azimuthal dependence of the empirical Green's functions of shear waves extracted from the coda waves of 398 local earthquakes with ML>4.0 during the time period from 2011 to 2014. We find the clear characteristic azimuthal dependence of Vs in all the measurements. Strengths of the obtained anisotropy are much stronger than those reported in seismic tomography and SWS measurements. Specifically, about half of the measured amplitudes of anisotropy are larger than 10%, and the strongest anisotropy is 34%. Patterns of the resulting anisotropy fall into two categories, and both are well correlated with the surface geology and ambient stress at the borehole sites. In general, the fast Vs polarization directions are parallel to sub-parallel to the mountain strikes in mountains belts, and to the directions of maximum compression stress in coastal plains and lowlands, suggesting that the anisotropy of shallow crust are dominated by orogeny-induced fabrics in mountain area and by stress-aligned cracks in places with sediments, respectively. From these new findings, together with results from our recent studies, we infer that the stress-aligned anisotropy are likely confined to the uppermost portion (< 3km) of the crust. These results represent direct robust measurements of the near–surface seismic structure. The characteristic patterns of observed azimuthal dependence of Vs and strong anisotropy suggest that anisotropy properties are fairly coherent in the near-surface structure. The strong near-surface anisotropy also implies that delay times contributed by the shallow crust might have been underestimated in studies of shear-wave splitting measurements using the direct arrivals of earthquake waves.