Crustal anisotropy of Cascadia subduction zone revealed by ambient noise tomography

*Tzu-Ying Huang[1], Ban-Yuan Kuo[1], Ying-Nien Chen[2], Yuancheng Gung[3]

1. Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan, 2. Institute of Oceanography , National Taiwan University, Taipei, Taiwan, 3. Department of Geosciences, National Taiwan University, Taipei, Taiwan

We construct 3D crustal shear wave velocity models for the Gorda-Juan de Fuca region using ambient seismic noises. Continuous data from Cascadia Initiative Community Experiment - OBS component were used. In our wavelet-based multi-scale inversion technique, both the isotropic and anisotropic components are taken into account. Previous studies of shear-wave splitting (SWS) with SKS and SKKS using OBSs pointed out that fast directions in this region rotate increasingly towards the absolute plate motion direction with increasing distance from the mid-ocean ridge. However, our preliminary result of 2D phase velocities for Rayleigh waves show a trench-parallel fast direction at periods 2 –25 s, i.e., the crustal and shallow upper mantle anisotropy differs from the results of SWS studies. This disparity between our result and the plate motion-parallel fast direction from the earlier studies implies that there might be a two-layer structure with different deformation fabrics in this region. We will integrate our models with the 3D models from body wave tomography and seismic anisotropy from SWS, and discuss their tectonic implications.

Keywords: Crustal anisotropy, Ambient noise tomography, Cascadia subduction zone

