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Surface wave array tomography in SE Tibet with empirical Green's functions from ambient noise, direct waves, and coda waves

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Empirical Green's functions (EGFs) between pairs of seismometers can be recovered from the long-time correlation of ambient seismic noise. We obtain EGFs from continuous broad-band recordings from a temporary seismic network on the southeastern part of the Tibetan plateau. Some of the EGFs are not time-symmetric and show apparent seasonal variations. This is especially the case for two-station pairs aligned in the N-S direction due to the uneven distribution of background seismicity, which is often attributed to ocean microseisms. Phase information of the surface-wave part of the EGFs can also be recovered from data from different regimes, e.g., direct surface waves from large earthquakes, surface-wave coda, or ambient noise (approximated by records without signal from large earthquakes with magnitude $m_b \geq 4$). Phase velocity dispersion curves for EGFs obtained from the correlation of data from different regimes are generally similar and fairly stable. From the early surface-wave coda results, we conclude that the scatters under the array are sufficiently strong to allow a good estimate of both the causal and anti-causal part Green's function.

EGFs from monthly ambient seismic noise can be used to obtain shorter period phase velocity dispersion data, which is essential to resolve structure in the crust. We show an application of multi-scale surface wave array tomography using data from two temporary arrays operated by MIT, Lehigh University, and CIGMR in SE Tibet. Phase velocity variations in the period band 10 – 30 s suggest that a low velocity layer exists in the middle/lower crust beneath the southeastern Tibetan plateau. By combining the

phase velocity dispersion data in the period band 20 – 120 s from traditional two-station analysis, we are able to obtain high resolution tomographic images in the crust and upper mantle which provides important new insight into the regional tectonics of SE Tibet and nearby regions.