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# Interpretation: Near-surface S-wave velocities estimated from traffic-induced Love waves using seismic interferometry with double beamforming

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I use ambient noise, especially traffic noise, to estimate the 2D near-surface S-velocity distribution. Near-surface velocities are useful for understanding structure, stiffness, porosity, and pore pressure for engineering/environmental purposes and static correction of active-source imaging. I extract Love waves propagating between each receiver pair from 12 h of traffic noise using seismic interferometry with power-normalized crosscorrelation. The receiver array contained three parallel lines, each of which had 100 transverse-component geophones. I apply double beamforming to the correlations at the parallel lines for improving the signal-to-noise ratio of the extracted Love waves to satisfy the stationary phase assumption for seismic interferometry. I use these Love waves for a dispersion analysis to estimate a 2D near-surface S-wave velocity model based on the multichannel analysis of surface waves. To improve the lateral resolution of the velocity model, I sort the extracted waves according to common midpoints (CMPs) and limited the maximum offset of receiver pairs. The dispersion analysis at each CMP is based on the assumption of layered media, and using all CMPs, I can estimate high-resolution 2D velocities down to 80 m depth. The velocity variations are similar to the location of strong reflectors obtained by a previous study. The main features of the velocity model are recovered even from 1 h of continuous traffic-noise data, which means that the proposed technique can be used for efficient 4D surveys.

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