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Surface wave dispersion of the central Alps: Utilizing multiple techniques

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A tightly spaced array of permanent high-quality broadband seismometers has been recording waveforms in the central Alps since at least 1999 (Baer et al., 2000). Aperture of this array is increased with the addition of temporary installations peripheral to the central Alps (Fry et al., 2004) and by including measurements from publicly available broadband stations in central Europe. The resulting dataset provides dense measurement coverage over the region. We make phase and group velocity dispersion measurements of fundamental mode Rayleigh and Love waves extracted from these data. Our composite database includes traditional measurements taken from event recordings and non-traditional measurements made from energy contained in ambient noise. Source-station group and phase velocity measurements have been made from both regional and teleseismic event records. Phase velocities have also been measured along station-station paths, using events with raypaths lying approximately on the same great circle as the two stations. Additionally, we have extracted dispersion curves from the cross-correlations of multiple 30-day continuous noise recording windows taken from the dataset (Shapiro et al., 2004). Comparison of the dispersion curves measured from event and noise data reveals a continuity in dispersion that validates our measurement methods and the composite dataset. We are inverting these data for velocity maps of the region. Our inversions utilize adaptive variable-resolution parameterization, with small cell size where the data coverage is very dense and larger cell size globally. This parameterization takes advantage of the dense sampling in the alps while allowing the inversions to also satisfy teleseismic observations, further bridging the gap between tomography on different scales.