Ambient noise techniques for better understanding of seismic hazard in the wider Vienna Basin region

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The Vienna Basin is one of the seismically most active regions in Austria. Because of population density and sensitive infrastructure, seismic hazard assessment in this area is of critical importance. Recently, it has become apparent that ambient noise techniques can be applied to provide additional information for seismic hazard studies. This contribution can be either **a**) indirect by providing detailed 3D tomographic images of the underground, which can be used in further studies, in areas with high seismological station density or **b**) more direct by predicting ground motions resulting from scenario earthquakes directly from ambient noise. While both techniques are based on the retrieval of the inter-station Green's function from ambient noise interferometry, they are utilizing different features of the Green's function. For calculating tomographic images of the underground, phase information is needed to extract surface wave dispersion curves. Ground motion prediction, however, relies heavily on the extracted amplitude information. Commonly applied ambient noise processing techniques, e.g. pre-whitening, alter amplitudes non-linearly in exchange for more stable phase measurements. Therefore, depending on the study goal, different processing strategies have to be applied. Here, we present a case study for each. To construct the tomographic image of the wider Vienna Basin region (**a**), we used continuous seismic records from ~65 seismological stations in the region, evenly covering the region with an inter-station distance of ~40 km. For this, we utilized Love and Rayleigh wave phase and group velocity dispersion curves extracted from ambient noise cross correlations. To demonstrate the applicability of ground motion prediction using ambient noise (**b**), we use 2 months of continuous data from a temporary station, installed near the site of the ML 4.2 Alland earthquake on April 25th 2016 to retroactively reproduce the long-period earthquake seismograms using ambient noise interferometry.