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Determination of Vs-models for the Basel region: Comparison between Array measurements, SASW and S-wave reflection

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In the frame of a new seismic microzonation of the Basel region, an extensive geophysical survey has been carried out in order to better constrain the S-wave velocities and geometrical properties of the surface layers. The survey included array measurements, SASW, and S-wave reflection seismics. Here, we will focus on the application of the array technique applied by the SED. The array method consists of recording ambient noise with a series of seismological stations. The signals are processed through FK-analysis in order to determine the dispersion of surface waves contained in the noise. The inversion of the dispersion curve provides a 1D Vs-model for the investigated site. The investigation depth is related to the size of the array – which is in general less limited than the size of seismic profiles. Therefore, the array method is particularly well adapted to determine S-wave velocities of sites with a thick sediment cover – such as sedimentary basins.

Basel is located in the upper Rhine Graben filled with several hundreds of meters of sediments. In this region about 30 measurements with stations in different array configurations have been carried out to determine the Vs properties of various geological layers down to a depth of 100-250 m. At eight sites, SASW and S-wave reflection seismics were carried out by the BRGM and GGA, respectively. For these sites, we could compare the outputs of the array measurements with the results of the two other investigations. Similarities and differences between the results can be related to the advantages and disadvantages of each method. Thereby, array measurements and SASW revealed to be quite complementary. The combination of the dispersion curves produced by both techniques allowed us to both determine precisely the properties of

the shallow layers (contribution of SASW) and get valuable information about the Vs of the deeper layers (contribution of array measurements). The outputs of all measurements (including also H/V data) were implemented in a new geophysical model, which is now used as input for earthquake ground motion simulations.