Forum Katastrophenvorsoge und Gefahrentag

Potsdam (Germany), October 2002

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HOW GOOD ARE THE SHEAR WAVE VELOCITY MODELS IN THE LOWER RHINE EMBAYMENT OBTAINED FROM INVERSION OF AMBIENT VIBRATIONS?

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In a recent study, we have proposed a method to determine shallow shear wave velocity profiles in the Lower Rhine embayment by combined inversion of single station and array measurements of ambient vibrations (Scherbaum et al., 2001, 2002). In order to validate the resulting models, we have performed several tests.
First, we have applied the technique to several sites which have been analyzed by Budny (1984)using an active source. The comparison of the models obtained by inversion of ambient vibrations show a good agreement with the results obtained by Budny (1984).
Furthermore, between fall of 2000 and spring of 2002 we have operated a 5 sec seismometer simultaneously to the borehole recording at station PLH of the Geological Survey of NRW to obtain wide band recordings of earthquakes from the region. The largest recorded event (Ml=4.1) enabled us to calculate a full moment tensor solution to constrain the source parameters. This made it possible to test how well the ground motion at station PLH can be explained by the regional optimum 1D crustal model combined with the site model obtained from ambient vibrations. The main features of the seismogram are matched surprisingly well. However, the overall signal duration of the observed signal is larger than predicted from the 1-D model.
As a third test, we have used 9 surface and downhole records of local earthquakes at station PLH to compare observed plane wave site amplification functions to those computed for the site models obtained from the analysis of ambient vibrations. The frequencies for the fundamental resonance peaks were found to be in good agreement. Amplification factors, however, could not be determined robustly due to the large S-wave coda.