



Earthquake Microzonation Map Lörrach and Weil am Rhein, Southern Upper Rhine Graben

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The area of interest is situated around Lörrach and Weil am Rhein in SW-Germany, next to the Swiss and French borders in the southern part of the Upper Rhine Graben (URG). Since in the event of a major earthquake, seismic ground motion strongly depends on local geology and tectonic features, an earthquake microzonation map has been compiled to describe the amplification effects of seismic waves in the study area. The complicated geological situation is dominated by the eastern master fault of the URG which is developed as a flexure zone in this region.

In order to directly examine the site-effects above different geological units, seven temporary and two permanent seismic stations were installed along an EW-profile. In a time span of slightly over a year ten medium-size earthquakes could be recorded at a majority of the stations. A rather clear impression of the actual site dependent amplifications and deamplifications emerged from the data compilation. Most surprising was the strong amplification within the flexure zone in contrast to the relative deamplification in the gravel-covered valley, only a few hundred meters away. In order to transfer the point discrete geophysical information into the whole area, ambient noise measurements (H/V) were used. Distributed over the area of interest, 1100 measurements were performed. Regions with rather homogeneous frequency distribution were mapped and separated from those areas with discernible frequency trends or quite inhomogeneous distributions. This interpretation was merged with the geological model to actually define zones of supposedly uniform amplification in the case of an earthquake. These zones then formed the base of the zonation mapping, while the actual hazard level within each zone was qualitatively derived from the earthquake recordings mentioned above.