

Uncertainties in Paleoseismic Investigations Along the Rhine Graben: PALEOSIS Project

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Earthquake hazard assessment in stable continental regions, such as northern Europe, has traditionally been evaluated on the basis of the instrumentally and historically recorded seismicity, which indicates relatively low hazard levels. Reliability of such estimates is a matter of debate as the long-term potential of large earthquakes usually cannot be determined based on short observational periods generally less than a few hundred years. Paleoseismic investigations can provide valuable information to bridge this gap.

A simple method, based on qualitative description of the uncertainties related to the paleoseismic data and especially in its interpretation, is used in the recent investigations performed on three sites along the Lower Rhine Embayment (PALEOSIS-Project). The cumulative uncertainties associated with the different stages of the study are expressed as the Paleoseismic Quality Factor (PQF), which can directly be used in seismic hazard analysis.

Results show clear differences mainly reflecting the level of background knowledge about each of the sites and the amount of scientific input prior to the decision on trenching. Paleoseismic Quality Factors (PQF), indicate 0.76 for the Feldbiss fault at Bree, Belgium, 0.45 for the Peel fault at Neer, The Netherlands, and 0.52 for the Rurand fault at Jülich, Germany. This study illustrates that the proposed methodology can be used as a relative indicator for the reliability of the paleoseismic investigations. The absolute values, on the other hand, need to be calibrated once an appropriate scale is established.