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A 13 km Long Paleoseismological Trench in Western Germany

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The expansion of an open pit lignite mine in this area makes it necessary to translocate one of Germany's most frequented, E-W trending highways for a length of 13 km during the next months and years. By this occasion, one of the largest faults of the Lower Rhine Embayment (LRE), the Rurrand Fault, was already cut in 2010. We applied geological mapping and surface-near geophysical techniques for investigating this possible candidate for the 1756 Düren earthquake (M>6; and considered as the strongest historical earthquake in Germany), and found clear hints for recent active faulting.

The LRE in western Germany is one of the seismically most active areas in Central Europe. Earthquakes stronger than M6 have been documented by paleoseismological and archeoseismological investigations and written sources. Instrumental seismicity reached ML5.9 (Mw5.4; April 13th, 1992) in this densely populated area with alone nearby Cologne having more than one million inhabitants.

Active faults trend NW-SE in a horst-graben system, parallel to the rivers Rhine and Rur. Recent studies reported that active faults in the study area are characterized by recurrence periods in the order of tens of ka. Those faults in western Germany are often not visible in the field due to relatively high erosion rates and therefore, the seismic hazard might be underestimated.

The ongoing highway construction works will cut more (active) faults. We expect at least eight already mapped faults to be cut by the earth works, some of which capable of causing damaging earthquakes judging from their mere length. The construction work is a unique opportunity for paleoseismological investigations at already known, but yet unstudied faults. We hope to gather additional data for an improvement of seismic hazard estimations in Western Germany.