



Paleoseismological studies in the Lower Rhine Embayment - The Rurrand fault responsible for the 1756 Düren earthquakes?

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In 1756, several strong earthquakes occurred close to Düren in western Germany. Historical sources claim that two people died and hundreds of houses were destroyed. The events were felt hundreds of kilometres away from the epicentre, therefore, a magnitude of at least 6 seems to be reasonable, despite the seismic source is still unclear. The Rurrand Fault (Rurrandverwerfung) in the Lower Rhine Embayment located between Aachen and Cologne possibly indicates the Düren earthquake sequence.

Recent studies reported that active faults in the study area are characterized by recurrence periods in the order of tens of ka. Active 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.

Archaeological remains (Neolithic, Iron Age, Roman and Medieval) were found in the immediate vicinity of the Rurrand Fault during road construction works in 2010. Beside the Rhine Graben this fault is one of the most prominent NW-SE trending normal faults with a morphological expression in the area. Holocene surface-near sediments with significant offsets covered by thin colluvial sediments were found and a complex fault geometry was observed during the archaeological excavations. Growing displacement of the major fault downsection suggest at least two major, surface-rupturing earthquakes along the Rurrand Fault in the Holocene/Late Pleistocene. Shallow geophysical methods were used to gather additional data. DC geoelectrics and georadar were applied in order to image the deeper parts of the fault zone. A high-resolution DEM was created based on airborne laserscanning data. Radiocarbon and luminescence dating of sediment samples are still in progress, but the morphological expression of the fault, the shallow depths of the offset sediments, and geophysical data allow concluding on very recent seismicity along this active fault.