River landscape and extreme flood reconstructions in the Lower Rhine valley and delta

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The aim of my research is to quantify past extreme floods of the Rhine, specifically in the German-Dutch border region where the Lower Rhine transitions into the Rhine delta. The first step in accurately quantifying past flood magnitudes in a dynamic lowland area is landscape reconstruction. The resulting palaeo-DEM can then be used in hydraulic model simulations with a range of flood waves. Comparing the simulation output with independent reconstructions of past flood levels allows for a good assessment of the discharge of a past extreme flood. This is what I did for the Lower Rhine river and its distributaries for two different time frames. For the quantification of medieval floods, I applied various archaeological and geological-geomorphological data. For the study of 19th-century floods in the area, I relied mostly on historical data. Both cases included extensive landscape reconstruction in GIS followed by analysis of palaeoflood hydraulic model results. In this talk, I will mainly focus on the medieval time frame and the palaeo-DEM construction methods for this period. The results of my research contribute to flood risk assessments for the Lower Rhine and to fluvial system understanding in general.