Geochronological (OSL) and geochemical investigations of loess/palaeosol sequences in the Mainz Basin (Upper Rhine Area, Germany)

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The study is focused on the loess paleosol sequence near Alsheim in the eastern part of the Mainz Bain. 12 m thick quaternary sediments including the late Pleistocene loess paleosol sequence are exposed at an abandoned quarry. An extensive luminescence dating study was carried out to set up a more reliable chronological framework for penultimate and last glacial loess/paleosol sequences in the Mainz Basin. These investigations are part of ongoing studies to reconstruct climate and environmental change of the Upper Pleistocene in the region of the Upper Rhine Area.

Loess and loess derivatives were sampled in six sections. The complete exposure gives evidence for intensive channel structures, indicating periods of erosion and re-filling of the channels. Based on lithostratigraphical observations four cycles of sedimentation could be identified. In previous studies polymineral fine grain samples were investigated using the multiple aliquot addiive dose and the post IR infrared luminescence at 225°C (pIRIR 225) protocol. In this study OSL quartz ages and additional pIRIR 225 ages were estimated for samples on two profiles. The aim of the quartz OSL study was to improve the chronological framework for the Upper Pleistocene in this region and to verify the polymineral pIRIR-225 ages with an independent method.

In addition bulk samples of distinct soil horizons, loess and loess derivatives were taken to characterize the lower to middle Weichselian part of the sediments by using particle size analyses, micromorphologiacal investigations and geochemical data [1]. Major component geochemistry was used for calculation mean annual palaeotemperature and palaeoprecipitation [2].

[1]Kühn, Techmer, Weidsenfeller (2013): QSR,75,43-58
[2]Sheldon, Tabor, (2009):ESR,95(1-2)1-52