IMPACT OF THE MID-PLEISTOCENE TRANSITION ON MEUSE RIVER TERRACES IN THE SOUTHERN NETHERLANDS

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River terrace deposits are excellent archives of paleoenvironmental conditions. The Meuse river terraces are an example thereof. In the region of South Limburg, in the Netherlands, the flight of terraces carved by the Meuse, a major tributary of the Rhine, is well preserved and, for decades, has been intensely investigated. This study aims to find in these terraces sedimentary and depositional trends resulting from the Mid-Pleistocene climate transition (MPT). More specifically, the trends are identified according to different groups of terraces: East Meuse, Higher, Middle and Lower terraces. The groups are, then, assessed regarding whether they were formed before or after the MPT. Accordingly, a comparison between the different sedimentary and depositional trends will be made in order to clarify to what extent these trends are a product of climate change and/or tectonic forcing. For example, the transition from Higher to Middle terraces is topographically represented by steep escarpments formed during the main uplift-driven incision phase of the Meuse river (ca. 700 – 780 ka). This observation is well accepted among peers to be a product of tectonic forcing (e.g., [1], [2]). However, what is the role of the climate in this transition? Is the MPT somehow related to the onset of this main incision phase? It is expected that the sedimentary and depositional trends can provide new insights on how the MPT might have contributed to changes in the incision rates. Even more relevant, it is also expected that the analysis of these trends will point out how the Meuse river system responded to the MPT.

To achieve the proposed goals, this study updates the Meuse terrace maps for the Netherlands, and integrates it with the maps for the adjacent regions in Germany and Belgium that also encompass remnants of the Meuse terraces. For that, this study relies on existing maps [3–6], a high resolution DEM, and a dense borehole database together with sediment core archives provided by the Geological Survey of the Netherlands (TNO). Using the DEM, the flat surfaces representing terrace fragments are mapped with the support of the TerEx tool, a GIS application that semi-automates the identification of potential terrace surfaces according to user-defined parameters [7]. The data generated by this tool is then complemented by TNO's borehole and sedimentary core databases, which allows for the identification of the top and base of specific terrace levels. Once mapped, sedimentary parameters of specific terrace groups can be compared, for instance, terrace thickness, gravel content, gravel size, lithology and heavy mineral content. Furthermore, as part of the development plan of this study, isochron burial dating will be applied at a later stage in order to build a robust age control on the terraces that mark the MPT. The results of this dating method will allow for the estimation of paleodenudation rates and, consequently, the paleo sediment fluxes of the Meuse catchment in periods pre- and post-MPT.

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