



## **Fluvial dynamics of the Meuse-Rhine system at the SW-border of the Roer Valley Graben (Belgium-Netherlands) during the Early to Middle Pleistocene transition**

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The evolution of the Meuse-Rhine confluence area during the late Early and early Middle Pleistocene is still poorly understood. The key in unravelling the complex history of the confluence area during the time period mentioned is located along a segment of the southwestern bounding faults of the Roer Valley Graben, where the elevated (uplifted) Campine Plateau borders the subsiding graben. Traditionally, the central and eastern part of the plateau is thought to have been occupied by the Meuse (Zutendaal Formation) during some stages of the Early-Middle Pleistocene, while clear evidence is found for the presence of supposedly time-equivalent Rhine deposits (Sterksel Formation) in the graben (Gullentops et al., 2001). However, the stratigraphical relationship between both formations is very unclear. Here, we present results of detailed investigations of borehole cores distributed along the southwestern border of the graben that allow to develop a framework for the fluvial evolution in the area.

New grain size, sedimentary petrology (microgravel) and pollen analyses are presented, and incorporated in the results of detailed mapping of the area that is based on borehole data from the subsurface databases of Flanders and the Netherlands.

The time window of this study is set by pollen and heavy mineral data. The almost complete absence of pollen from heather and warm loving trees suggests a post-Bavelian age, while the absence of volcanic augite (Gullentops et al., 2001) suggests a pre-Elsterian age for the Rhine sediments. This limits most of the sedimentary record in that area to the Cromerian.

The results show that initially, the Rhine deposited coarse-grained (mostly gravelly sand) material over large parts of the graben area, while sedimentation of the Meuse was restricted to the region south of the graben. In the lower part of the here studied sequence a fine-grained flood plain facies of the Rhine is preserved in the tectonically deeper part of the SW graben area. Deposition of Rhine sediments was interrupted when the Meuse prograded deeper into the graben, as can be inferred from gravel petrology and grain size. The sequence ends with another episode of deposition by the Rhine, after which the graben area evolves into a local sedimentation system (Boxtel Formation). The pollen spectra suggest that sedimentation took place during stadials and interstadials, while interglacial sediments are not preserved.

We conclude that the poor development of Cromerian Meuse sediments in the Roer Valley Graben is probably due to a drastic decrease of river competence and capacity when it leaves the Campine block and enters the flat graben floor. There, the competence of the sand-dominated Rhine is insufficient to transport the (very) coarse gravels of the Meuse.