



Quaternary river incision in the uplifted Rhenish massif (Ardennes, Belgium) - Insights from $^{10}\text{Be}/^{26}\text{Al}$ dating of river terraces

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Although it constitutes the main tool to unravel the regional recent tectonics, the chronology of the Pleistocene river incision is still poorly constrained within the uplifted Rhenish-Ardennes massif (Belgium, western Europe). Here, we measure cosmogenic nuclides concentrations (^{10}Be and ^{26}Al) in terrace quartz or quartzite sediments of several Ardennian rivers (Meuse, Ourthe and Amblève) in order to date the so-called Younger Main Terrace (YMT), a key-level in the network evolution. Though these dating methods are successfully used to determine ages of superficial (e.g., glacial) deposits, dating of fluvial terraces remains difficult. Possible predepositional exposures of the sampled material (inherited ^{10}Be and ^{26}Al) may indeed bias the measurements towards higher nuclide concentrations while several postdepositional processes (burial, erosion) may cause a lowering of the ^{10}Be and ^{26}Al concentrations. In an attempt to overcome these difficulties, the selected fluvial deposits (five locations) were sampled using a profiling technique on as thick as possible sections (more than 3 m).

We present the first absolute dating of the YMT in the lower Meuse valley (nearby the Dutch boundary), where we obtained an age of 630 ka for a terrace deposit buried beneath 3 m of Weichselian loess. This age is consistent with some previously published estimates based on paleomagnetic data and MIS correlations. However, our ages for the same terrace level within the Ardennes are significantly younger: >400 ka in the lower Ourthe, and only ~ 220 ka still farther upstream, in the lower Amblève. We thus demonstrate that the post-YMT incision occurred diachronically in NE Ardennes. The ~ 0.5 Ma timespan needed by the erosion wave to propagate from the lower Meuse towards the Ardennian headwaters contradicts the long-held statement of a climatically driven incision that would have been synchronous throughout the catchment.