

Surface exposure dating of the Campine Plateau, NE Belgium: First results

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The Campine Plateau, situated in the sandy Campine area (Belgium and the Netherlands) is considered a classical case of relief inversion. As a result of differential uplift, its surface altitude dips from 100 m (T.A.W.) in the south to 30 m in the north over a distance of ca. 60 km. It is covered by Early and Middle Pleistocene erosion-resistant fluvial sediments from the Rhine and Meuse and can thus be regarded as a fluvial terrace. There is still much debate about the age of this terrace, both in terms of deposition and abandonment. We apply the cosmogenic radionuclide (CRN) profiling technique that, in ideal circumstances, would allow to constrain the exposure age, burial age and amount of post-depositional erosion of the studied landform.

Samples were taken from a 3.5 m deep cross-section in coarse river sands deposited by the Rhine (Sterksel Formation), topped by a thin layer of aeolian sand, in a sand extraction pit at an altitude of ca. 50 m near the crest of the plateau. Seven of them were prepared for CRN measurements according to state-of-the-art techniques. The ¹⁰Be concentration was measured using accelerator mass spectrometry (ETH, Zurich). The resulting in-situ ¹⁰Be concentrations are 1.5×10^5 atoms/g (at/g) for the uppermost sample (at 0.3 m depth) and 0.9×10^5 at/g for the lowermost sample (at 3.1 m depth), yielding an estimated 0.6×10^5 at/g of radionuclide accumulation following deposition. Assuming zero erosion, these concentrations correspond with an apparent exposure age of 21.5 ± 1.5 ka, which is a very strong underestimate of the anticipated geological age of the sediments (between ca. 0.6-1 Ma). Instead, according to calculations, the ¹⁰Be concentration of the uppermost sample would be more in line with scenarios involving erosion rates of between 10-20 m/Ma, depending on the assumed age of the plateau. More samples are being analysed, also focussing on the ²⁶Al concentration, which would help in reducing the amount of scenarios for the geological and geomorphological evolution of the Campine Plateau.