Session GM3.4/CL1.27/HS11.11/SSS3.9: Sediment archives in dryland areas: New approaches, perspectives and challenges

Towards a better understanding ephemeral stream morphodynamics during the last 100 ka in the vicinity of the prehistoric site of Ifri n'Ammar (Morocco)

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Our study focusses on the ephemeral stream deposits of Wadi Selloum to reconstruct the palaeoenvironmental evolution in direct vicinity of the rock shelter Ifri n'Ammar. As one of the oldest settlement sites of anatomically modern humans (AMH) in North Africa, Ifri n'Ammar documents periodical occupations since ~170 ka. Since these discontinuous settlement dynamics may be related to or influenced by landscape changes and climate forcing, our study aims (i) to identify phases of morphodynamic activity and stability in the deposits of Wadi Selloum by using micromorphological (sixteen thin sections), sedimentological (laser diffractometry, loss on ignition, magnetic susceptibility), geochemical (XRF and Scheibler method) and mineralogical (X-ray diffractometry) proxies. Furthermore, (ii) a robust chronology for the ephemeral stream deposits is established by applying a combination of optically stimulated luminescence (OSL) and post infrared infrared stimulated luminescence ($pIRIR_{290}$) dating. Additionally, one collected pottery shard was dated by thermoluminescence (TL) dating for an inter method comparison.

The application of luminescence dating techniques to Wadi Selloum deposits yielded burial ages between 1.3 ± 0.2 ka and 102 ± 8 ka covering different phases of morphodynamically stable and active phases. Enhanced aggradation is evident between ~100 and 60 ka, ~21 and 14 ka and during the Holocene.

Overbank fines are distinguished by high amounts of allochtonous minerals such as quartz, K-feldspar and plagioclase which give rise to higher eolian activity. This leads to the suggestion that morphodynamical activity was dominant during more arid phases. Landscape stability was observed in form of one palaeosol (2B-2C-sequence; OIS 3) and a recent soil (Ap/Ah-Bw-Bk-BC-C-sequence; after LGM), both attributed to the Calcisol group. Pedogenenesis is evident in thin sections by well-developed subangular blocky peds. The main soil forming process is secondary carbonate precipitation in subsoil horizons, supported by pedofeatures such as calcite infillings and hypocoatings. Holocene deposits (6.4 ± 4 to 1.3 ± 0.2 ka) seem to be affected by short-termed changes between landscape stability and hydromorphic activity due to strong variations in its mineralogical and geochemical characteristics. This is supported by a homogeneous and sterile stratigraphy and an insignificant differentiation in soil horizons with only weakly developed pedofeatures. The sediment characteristics present a weak Ap-C-sequence of a calcaric Fluvisol. After ~1.3 ± 0.2 ka fluvial discharge was reduced and incision took place in the Wadi Selloum.

Our study provides first insights in the palaeoenvironment around Ifri n'Ammar during the last glacial interglacial cycle and gives first suggestions about climatic conditions during the time of human occupation in Ifri n'Ammar.

Keywords: semi-arid climate, fluvial sediments, environmental change, luminescence dating