Links between continental weathering and climate in the Nile basin since 30 ka

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In North Africa, arid and humid periods have alternated during the Pleistocene, in response to northward and southward migrations of the African monsoon. Previous reconstructions of past Nile River sedimentary discharge have shown that these hydrological shifts were accompanied with significant variations of physical erosion and sediment transport during this period. Recently, it has been suggested that chemical weathering could also respond rapidly to large disturbances of the hydrological cycle [1]. However, to date, the response of chemical weathering to past climatic events has not yet been investigated for the Nile Basin

In this study, we analyzed fine-grained sediments depositd by Nile River in its delta during the last 30 ka. The Nile River is composed of two main tributaries: the Blue Nile, which mainly drains basaltic and rhyolitic terranes in the Ethiopian Traps, and the White Nile, with source regions dominated by cratonic basement rocks.

We combined geochemical (major/trace elements, measured by ICP-AES), isotopic (lithium and neodymium isotopes, measured by MC-ICP-MS) and sedimentological approaches.

Preliminary results reveal marked differences between the geochemical compositions of clay- and the silt-size fractions. εNd values indicate that clays exported by the Nile mainly come from the Ethiopian Traps during wet periods (i.e. the African Humid Period), in agreement with previous reconstructions of past migrations of the African monsoon system. During dry periods, εNd indicate that clays mainly originate instead from both the Ehtiopian traps and the central African craton. The use of several chemical weathering indices strongly suggest that significant modifications of the alteration regime occurred at two different timescales: fluctuations over several 1000-yr periods, related to past monsoon activity and insolation, and shorter-term variations related to specific climate events, such as the LGM and the late Holocene dry event in Africa.

[1] Dosseto *et al*. (2015) Geochemical Perspect. Lett **1**, 10-19.