Co-variations of climate and silicate weathering in the Nile Basin during the Late Pleistocene

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During the Pleistocene, **tropical Africa** was the site of significant hydrologic changes related to variations in the intensity of the African monsoon. The so-called *African Humid Period* (AHP) has been known for some time, the AHP is being revisited today with the aid of innovative geochemical and organic tools such as lithium isotope and molecular biomarkers which allow variations in precipitation and their impact on the formation of soil to be quantified. Recent studies conducted at a high temporal resolution (10-1000 years) in lake and deltaic sedimentary records in Africa have suggested that gradual long-term monsoon intensity oscillations were often punctuated by millennial-scale episodes of hyperaridity. It is suspected that these rapid episodes had (and will have) an impact on human populations, but this remains to be conclusively demonstrated. Deltas are mainly fed by the influx of terrigenous material from flooded rivers and are extremely sensitive to changes in precipitation, vegetal cover, and their catchment areas. The spatio-temporal study of the Nile delta's sediments has demonstrated that approximately 90% of the terrigenous material deposited in the Nile deep sea fan originates from erosion of the Ethiopian Highlands, especially during wet periods. The geochemical (Nd, Li isotopes and Ti/Ca ratio) and molecular biomarker tracers have revealed the rapid development of centennial hyperarid episodes occurred contemporaneously with cold intervals recorded in Greenland ice cores (i.e. Greenland stadials or Heinrich Stadials recorded in North Atlantic sediment. The nature of the links between weathering and these hyperarid episodes are still under debate. In particular, the timescale over which chemical weathering may respond to hydroclimate change is yet to be determined at the continental scale. We will present a synthesis of works recently performed in the Nile Basin, which strongly suggests rapid and significant variations of silicate weathering, and a dominant role of monsoon-precipitation variations in this region. We used Li & Nd isotope and GDGT tracers in a study that investigated sediment records from the Nile delta and Lake Tana (in the Ethiopian Highlands) for the last 110 and 16 thousand years, respectively. Our approach thus opens new perspectives for understanding hydro-climate variations in tropical Africa (long-term arid/humid periods and millennial-scale episode of aridity), and for determining their impact on sediment transport, continental weathering and soil development.