Evolution of weathering and erosion in the South Atlantic during the Late Cretaceous

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The Late Cretaceous period is marked by a long-term climatic cooling [1] and by major geodynamic changes, with modifications of the pole of rotation for the opening of the Atlantic [2]. The African continent underwent a major uplift event, that is most pronounced in its southern part [2,3]. These geodynamic changes may have led to modifications in weathering and erosion rates, that may have initiated or enhanced the recorded long-term cooling through CO_2 drawdown linked to silicate weathering.

In this study we aim to better constrain the changes in continental weathering and erosion linked to the uplift of South Africa, in order to clarify its possible link with the long-term climate evolution. We focused on DSDP site 364 in the Angola Basin, as a quite detailed stratigraphic framework exists for this site and as it was located near an area of Africa that should have encountered a significant uplift, although less intense than in southern Africa. We conducted about 100 analyses of clay mineral assemblages, that reflect evolution of humid/arid conditions on the nearby continent and can give insights on the respective importance of chemical weathering and physical erosion on the local sedimentation. The first mineralogical results highlight major changes in the hydric regime on the nearby continent, with an increase of aridity during the Campanian. In parallel, we tentatively used the isotopic composition of both Hf and Nd of the sediment clay fraction as a proxy of chemical weathering intensity on about 20 samples from site 364. Deviation from the clay array of the ε_{Hf} and ε_{Nd} values of clay-size sediments has been related to the intensity of chemical weathering [4]. This approach is here attempted for the first time to ancient environments.

[1] Friedrich *et al* (2012) *Geology* **40**, 107-110. [2] Guiraud & Bosworth (1997) *Tectonophysics* **282**, 39-82. [3] Braun *et al.* (2014) *J. Geophys. Res.* **119**, 6093-6112. [4] Bayon *et al.* (2016) *EPSL* **438**, 25-36.