

Deep Basin record evolution of chemical weathering and physical erosion as response to the tectonic uplift of the South African Plateau during the upper Cretaceous

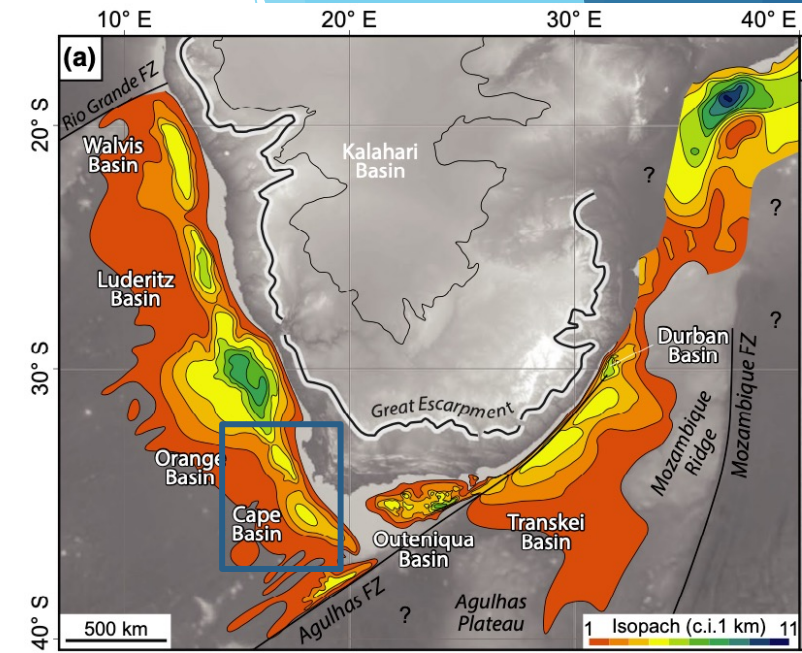
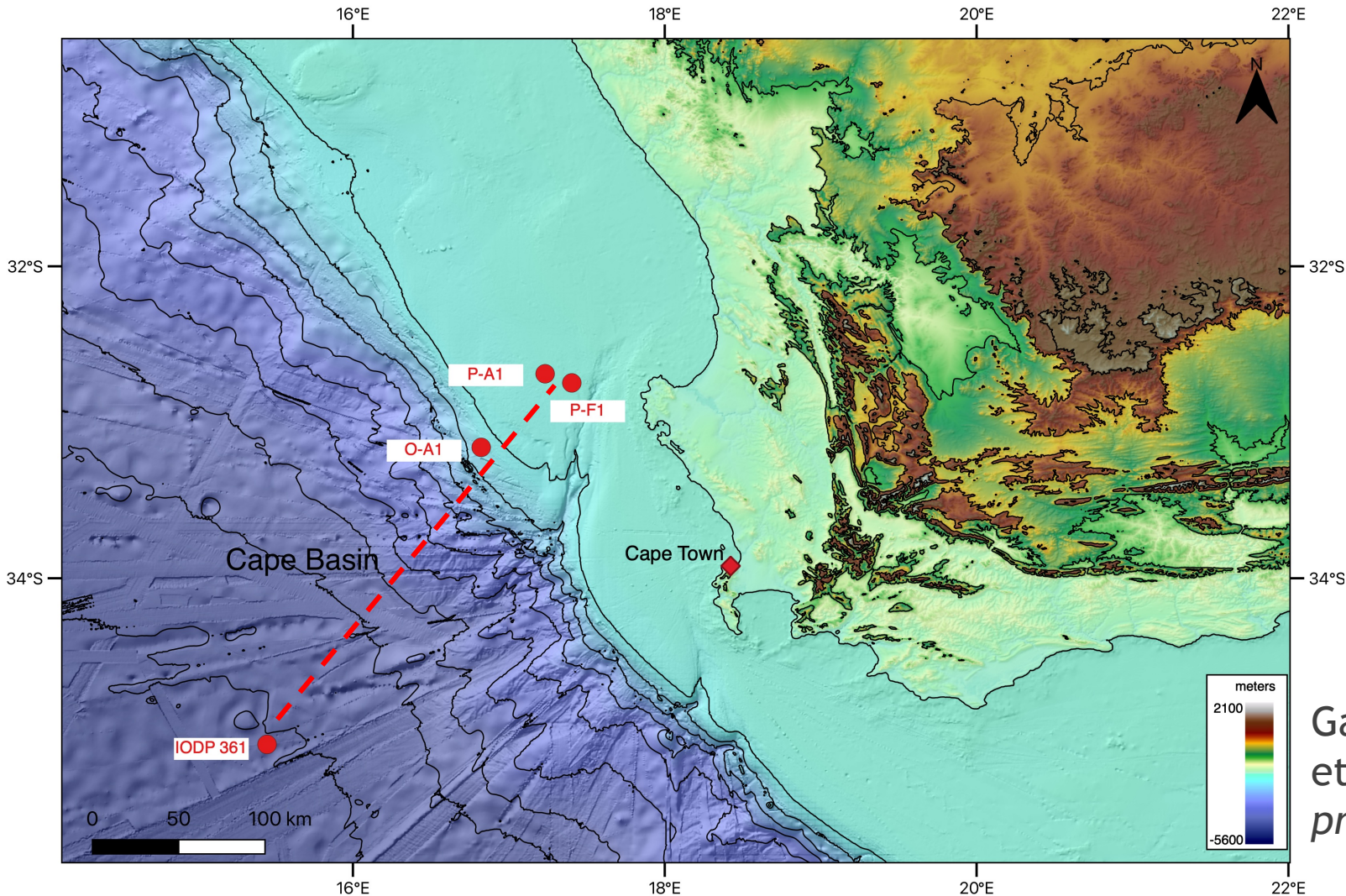
Camilo E. Gaitan¹, Emmanuelle Pucéat², Pierre Pellenard², Justine Blondet², François Guillocheau³, Cécile Robin³, Germain Bayon⁴, and Thierry Adatte⁵

Université Bourgogne Franche-Comte¹, Université de Bourgogne², Université de Rennes³, IFREMER⁴, and Université de Genève⁵



Introduction : Objective

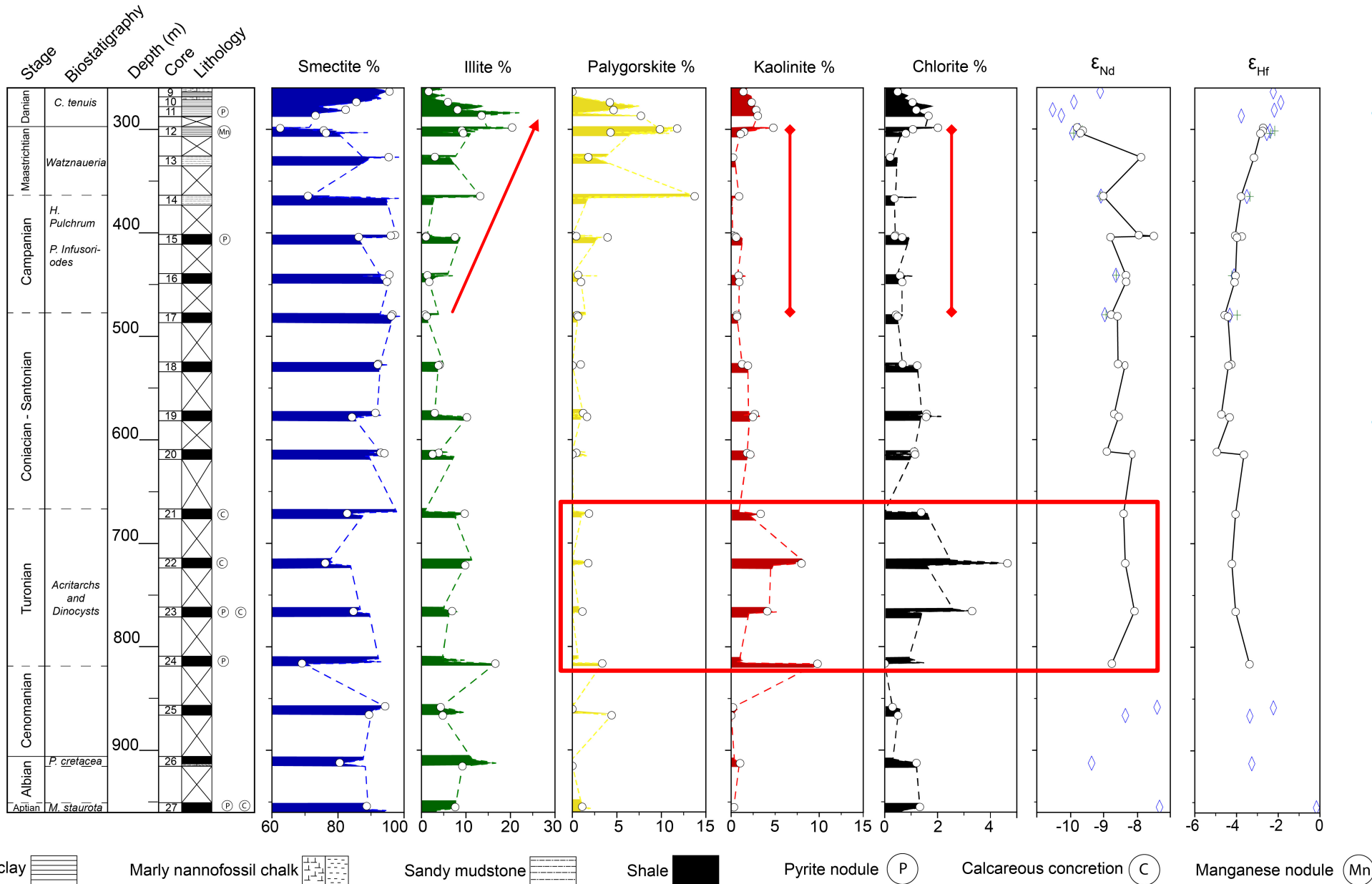
Explore the long-term response of chemical weathering and mechanical erosion of the southern African continental margin in response to tectonic uplift within a greenhouse climate context.



Taken from Baby et al. 2020

Gaitan, C.E.
et al, *in prep.*

Results IODP site 361 - Clay assemblages and Hf-Nd isotopic compositions in the clay fraction



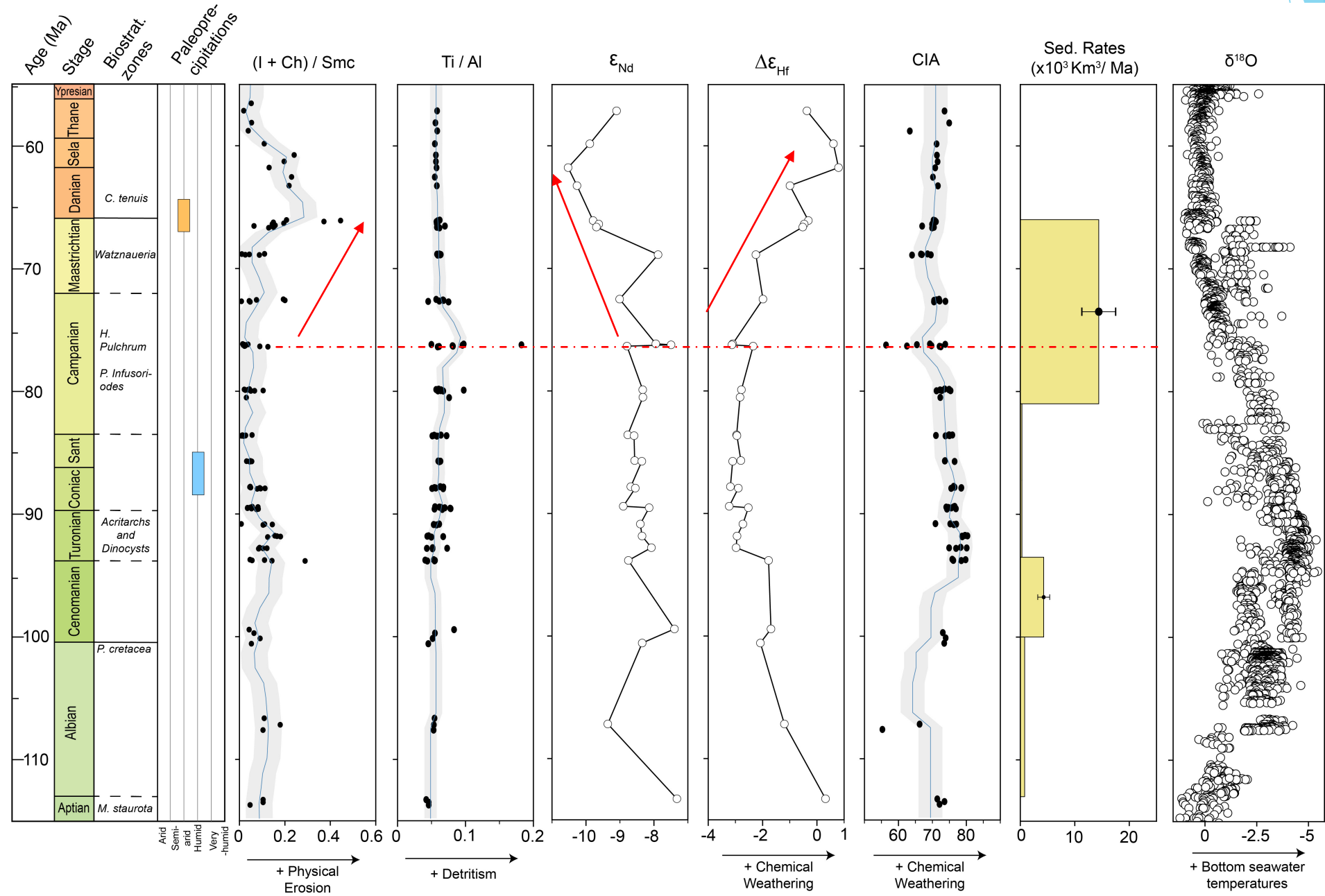
Blue diamonds represent samples digested by alkaline fusion and measured in the PrepFast.

Green crosses represent samples digested by acid solutions and measured in the PrepFast

Gaitan, C.E. et al,
in prep.

Discussion

Gaitan,
C.E. et al,
in prep.



Late tectonic pulse
in the east margin

Early tectonic pulse
in the west margin

Conclusions IODP site 361

- ▶ There are two considerable periods of variation in the clay assemblages. The first during the Turonian in which kaolinite and chlorite increase suggesting an increment in sediment reworking. The second episode at the Campanian - Maastrichtian is instead interpreted as an increase in mechanical erosion due to the increase in while kaolinite and chlorite remain stable.
- ▶ The ϵ_{Nd} curve shows two significant variations along the curve. At the base of the section it drifts towards more positive values indicating potential incorporation of volcanogenic material into the sediment production. In contrast, at the Campanian - Maastrichtian the curve migrates towards more negative values indicating the incorporation of crustal material, this fits with the increase in mechanical erosion and the timing of the late uplift of the South African Plateau.
- ▶ The $\Delta\epsilon_{Hf}$ curve display an increase in chemical weathering at the Campanian - Maastrichtian. This increase is concomitant to the increase in mechanical erosion and the tectonic uplift in the South African Plateau during a climatic cooling trend. This points out that in this setting the main driver in the variation of the denudation process is tectonics.
- ▶ Other proxies like the CIA to track chemical weathering and the Ti/Al ratio to track siliclastic production did not show any clear trend to correlate with the other methods and the geological context. This indicates these proxies have limitations to track continental process in sediments deposited in a deep basin environment.

Thank you for your attention!

✉ camilo-esteban_gaitan-valencia@etu.u-bourgogne.fr



Camilo Esteban Gaitan