



## **Dynamics of continental sedimentary systems : the role of coupling erosion and sedimentation in a numerical landscape evolution model**

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Erosion and sedimentation are key in the evolution of Earth's landscapes as they insure the transfert of material from the sources down to the continental and marine sinks. These two major processes interact together by constantly modifying loading pattern or local base level, but the dynamics of eroding areas is often studied independently of its associated sedimentary basin, and reciprocally. Therefore, our understanding of sedimentary system dynamics might be incomplete, as well as our interpretations of sedimentary archives.

Here, we use an improved of a numerical landscape evolution model, Fastscape, which now integrates a term for continental deposition. Sediments can settle within channels but also in a continental sedimentary basin, thus building a piedmont.

Based on this model, we show that the coupling of the eroding areas with the depositional ones has a strong impact on the morphology of the landscape and on the sedimentary fluxes through time. In addition, we explore the dynamics behavior of a continental sedimentary system, from the sources to the sinks, in response to changes in uplift and precipitation rates. We observe that the equilibrium time scales are short enough for a long-lasting change in climate to have a clear stratigraphic signature. In particular, we show that the precipitation rate can efficiently modify the amount of deposition within the piedmont and that impact the sediment flux to the marine domain on the long-term. This study illustrates that sedimentary systems must be considered from sources to sinks because erosion and deposition are strongly coupled