The role of the Béni floodplain on the chemical weathering fluxes in the upper Madeira basin, Bolivia

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On a global scale, several authors have reported good correlations between physical erosion fluxes and chemical weathering fluxes (Gaillardet et al., 1999). This linkage have several origins, one being that the active floodplains can act as a biogeochemical reactor in which the sediments produced in mountainous zones and transported by the rivers, once deposited in foreland basins, are deeply weathered.

We have tested this idea in the floodplain of the Rio Beni, in the upper Madeira Basin, in Bolivia.

Extreme physical denudation rates are found in the Bolivian Andes, in particular due to the abundance of poorly lithified shales and of extensive outcrops of fluviolacustrine deposits in the Upper Andes. These river sediments are exported and 40% is deposited in the foreland basin of the Beni R. where extensive floodplains are submitted to wet tropical conditions.

We compare here monthly collected river samples upstream (Rurrenabaque) and downstream (Riberalta) the Rio Beni floodplain and averaged dissolved fluxes (over one year). Concentrations of major elements are corrected from atmospheric inputs.

The main result is that the floodplain has almost no effect on the chemical denudation rates of the Rio Beni, except lowering them because of an increase in the drainage surface area. Although long-term weathering in the floodplain is more intense than in the Andes, the flux of dissolved material released does not impact the Rio Beni chemical denudation rates. The different elements show particular behavior that we will discussed in detail.

We conclude that the foreland basin of the Rio Beni acts above all as a deposition area and does not contribute to the actual chemical weathering rates. This conclusion supports the idea that chemical erosion is essentially active in mountainous areas and that the high temperatures of the plain do not increase the chemical denudation rates. In the Beni river basin, tectonic characteristics (uplift and subsidence zone) appear as the first-order factors controlling chemical weathering fluxes.

Reference

Gaillardet, J. et al., 1999. *Chem. Geol.* **159**, 3–30.