



Fill terraces and evolution of river profiles in a mountain belt: a view from a numerical modelisation of the upper catchment of the Rio Pilcomayo (Bolivia)

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The upper catchment of the Rio Pilcomayo (Bolivia) is located at an altitude of more than 2000 m, its length is 130 km, and its drainage area 22 000 km². Numerous terraces and sediment layers are incised in this zone. The formation of the younger fill terrace located in this zone of regional uplift has been studied. Field mapping, topographic survey and numerical modelling has been performed. We show that the aggradation of a stratiform body, more than 50 m thick, occurred with a river slope greater than the present day slope, and we suggest that its deposition is caused by sediment supplies larger than the rivers transport capacity during the Pleni-glacial phase. Mapping of a peculiar volcanic tuff level allows us establishing the chronology of terraces abandonment. We show that the abandonment begun in the upper part whereas the aggradation of pebbles persisted in the lower catchment. A numerical modelling has been performed to interpret this diachronic abandonment. The numerical model "COBASE" is an extension of software developed by the Institut Français du Pétrole and allows stratigraphic modelling in a mountaineering context.

The result of the modelling shows that 1) the fill terraces are deposited after a climatic transition towards a drier climate ; 2) this deposition is related to a short transient state (few thousand to few ten thousand years) that allows the river to increase its slope; 3) after this transient state, the terraces are affected by erosion ; the abandonment is synchronous if incision is linked to a return to a steady-state profile ; 4) the abandonment is diachronous if a more humid climate occurs before the end of the transient period. This last case presumably applies to the Pilcomayo case.