Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09724, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09724
EGU General Assembly 2008

Precipitation, focussed erosion and crustal flexural accommodation in the Eastern Altiplano (Bolivia)

G. Zeilinger (1), M. Strecker (1), B. Bookhagen (2), S. Tawakholi (3), E. Baldellon (4)

(1) Institute of Geosciences, University of Potsdam, Karl-Liebknecht-Str. 24/25, D-14476 Golm/Potsdam (zeilinger@geo.uni-potsdam.de), (2) School of Earth Sciences, Stanford University, 397 Panama Mall, Stanford, CA 94305-2210, (3) APEMIN II, Av. del Minero 54, Oruro - Bolivia, (4) Sergeotechmin, Calle Federico Zuazo No. 1673, La Paz, Bolivia

The Rio Consata and the Rio La Paz drain the Bolivian Altiplano and cut across the Eastern Cordillera, immediately adjacent to the highest peak of the Cordillera Real (e.g., the 6.368 m-high Illampú). Both rivers are important in routing sediments from the orogen interior to the Andean foreland.
Previous studies of the Rio La Paz (ca. 175 km SSE of Rio Consata) have shown that deep incision in the Cordillera Oriental and the removal of sediments from the catchment on the Altiplano have had an important effect on the general pattern of rock uplift and the evolution of drainages beyond the watershed on the Altiplano.
Overall, the Rio Consata has removed approx. 1320 km^3 of rock from the Altiplano catchment area (ca. 2600 km^2) and has cut down into the Eastern Cordillera more than 2500 m. The timing of initiation of the sediment removal from the Rio Consata catchment is yet not known. However, based on field relationships and correlation of volcanic ash layers the onset of sediment removal most likely coincides with the Rio La Paz, which began downcutting approx. 2.7 m.y. ago. Sediments related to glacial overprint in the past are efficiently removed in the headwaters of the catchment, whereas they are stored beyond the watershed. Farther downstream, the presence of braided alluvial channels and gravel sheets indicate sediment bypassing. However, fluvial incision has resulted in partial exposure of bedrock on the channel floor where the river cuts through the Cordillera. Two locations correspond to enhanced surface erosion: the

area of the drainage on the Altiplano and the sector in the Eastern Cordillera affected by bedrock incision. Interestingly, the rainfall pattern along the Eastern Cordillera mimics the patterns of topographic relief and is curved in the region of the Rio Consata valley. Here, based on high-resolution Tropical Rainfall Measurement Mission (TRMM) rainfall data, we observe an influx of higher rainfall along the trend of the valley towards the Altiplano.

Morphometric data and precipitation pattern suggest a significant link between precipitation, topographic evolution and erosion processes. Flexural modelling indicates that crustal flexural uplift is fundamentally influenced by erosional removal of material. Flexural uplift in turn helps intercept westward moisture transport, thus suggesting a positive feedback mechanism between tectonics and climate, which ultimately influences the overall morphology of the Eastern Cordillera.