Late Quaternary fluvial landscapes of the Río Grande (Eastern Bolivia) – past processes and present problems

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The Río Grande (Guapay) catchment in the Central Andes of South America feeds the largest river in Eastern Bolivia, and constitutes the southernmost extension of the Amazonian drainage system. This fluvial system is of importance for a variety of issues related to the social and economic development of lowland Bolivia (water use, risk management etc.). Recently, severe inundations triggered by rapid channel changes (avulsion events) have shown to contain significant damage potential. This study aims at an improved understanding of the dynamic fluvial system of the Río Grande. It explores the different geomorphological processes active on Late Quaternary time scales, which have contributed to the development of the present fluvial landscape of the Río Grande megafan:

The investigation of two recent avulsion events using field and remote sensing data has provided valuable insights for the understanding of these low-frequency high-magnitude events with regard to the involved sediment types and volumes. A GIS-based analysis of multi-temporal remote sensing data (Landsat and Corona imagery) and comparison to available climate and discharge records has allowed the reconstruction and interpretation of decadal channel changes and avulsion frequencies. On late Holocene time scales, a detailed investigation of the geomorphological and sedimentary archives along the lower Río Grande has revealed fluvial processes characteristic for a highly avulsive river system with average sedimentation rates of > 1 cm/yr. The Holocene and Pleistocene evolution of the Río Grande was characterized by a complex interplay between intense fluvial sedimentation and aeolian processes causing large-scale channel shifts, which are responsible for the large geomorphological and

hydrogeological complexity inherent to all Andean foreland megafans.

In conclusion, these results enable a preliminary interpretation regarding the dominant controls on the fluvial geomorphology of the Río Grande such as environmental and land use changes. Knowledge of the various geomorphic processes active on the Río Grande fluvial megafan, and an improved understanding of the their spatial and temporal dynamics at different time scales therefore not only contribute to Late Quaternary paleoenvironmental research, but also provide relevant data for a variety of applications in Eastern Bolivia.