



The natural hazard of avulsive fluvial systems - an example from Eastern Bolivia

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The Eastern Bolivian lowlands form the southernmost extension of the Amazon basin. There, the Río Grande (Guapay) has developed a 13.000 km² megafan in the Andean foreland which receives sediment and discharge from a 70.000 km² large catchment in the Eastern Cordillera. Along its course towards the Río Mamoré, the Río Grande floodplain is characterized by marked planform changes from a wide sand-bed to a narrow meandering river of mainly suspended sediment load. This roughly coincides with the transition from the Río Grande megafan to the Amazonian lowlands morphology. During the last decades the Río Grande has repeatedly changed its course by avulsion approximately 80-100 km northeast of the city of Santa Cruz. Most of these avulsions caused significant loss of lives and financial damage. Particularly the avulsion event of February 2006 has shown to exhibit a substantial hazard to the local population as well as the economic development of the Bolivian lowlands. However, only few geomorphological, hydrological or sedimentological studies are available that could place these recent events into the context of background process rates and fluvial dynamics.

Therefore, this study aims at investigating the channel-belt mobility of the lower Río Grande using morphostratigraphic field and remote sensing data. This includes i) a geomorphic and sedimentological characterisation of the youngest avulsion events, ii) the assessment of historical channel changes based on multi-temporal interpretation of satellite imagery and iii) using these findings for a sedimentological and geomorphic analysis of the Late Holocene megafan in order to constrain both the avulsion history and underlying process rates. This provides information for the preliminary interpretation of spatial and temporal variability of avulsion events, which have been a dominant

process of megafan construction since at least 3 ka BP. Sedimentation rates of ~ 1.4 cm/yr were estimated for the last 500 years. Preliminary results indicate an increase of decade-scale sedimentation rates and lowering of mean channel gradients in historic times. We speculate that longer term precipitation trends as well as large scale land use changes in the catchment area are possible controls of enhanced susceptibility to avulsion along the lower Río Grande.