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Holocene to historical paleohydrology deduced from geomorphology and paleosol-sediment-sequences along the Andean piedmont in semi-arid Eastern Bolivia

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Eastern Bolivia is situated at the transition between the tropical humid and the subtropical semi-arid climate regime. The north-south decrease in precipitation is reflected by variations of active geomorphic processes, e.g. changes in fluvial dynamics and channel morphology along the piedmont. Several small watersheds contributed and/or still contribute sediments to the piedmont. In order to reconstruct Holocene paleoenvironmental, especially paleohydrological conditions we have studied the surface morphology and a series of paleosol-sediment-sequences along natural exposures of the piedmont. Variations in sedimentology and stratigraphy have been derived from grainsize and basis geochemical analyses; radiocarbon dating on charcoal, organics and biogenic carbonates was performed to establish an absolute chronology.

At Charagua, streams are deeply incised into the proximal areas of the piedmont. The streams terminate in active floodouts in the medial areas of the piedmont depositing thick sand accumulations. Analyses of satellite imagery has shown that floodouts once occurred in the presently inactive distal areas of the piedmont. This documents more intensive discharge events and increased sediment supply in the past. Sedimentological analyses and stratigraphic correlation of paleosol-sediment-sequences along natural piedmont exposures corroborate the morphological findings and are largely in agreement with other paleoclimatic data from subtropical lowlands in South America: The piedmont was subject to extensive fluvial activity and sedimentation during the dry Mid-Holocene ($\sim$8-4 ^{14}C ka BP), whereas well-developed paleosols document landscape stability under generally more humid conditions from $\sim$4-1 ^{14}C ka

BP. During the last thousand years, however, entire forests have been buried by thick fluvial sand deposits. Within the past ∼200 years streams have deeply incised into the proximal part of the piedmont.

Shifts between incision and subsequent sedimentation are typical for many semi-arid fluvial systems (“arroyo problem”). In this regard, the process of rapid incision in the study area may reflect natural internal variability of the fluvial system, or can be interpreted as the result of paleoclimatic and paleohydrologic changes (such as the Little Ice Age).