



Late Quaternary geomorphic history of a glacial landscape - new sedimentary and chronological data from the Cordillera de Cochabamba (Bolivia)

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Throughout the Central Andes, glacial landscapes have long been used for the reconstruction of Late Quaternary glaciations and landscape evolution. Much work has focused on the Andes in Peru, Chile and the Bolivian Altiplano, whereas relatively little data has been published on glaciation history in the eastern Andean ranges and slopes. Even less is known with regard to the postglacial evolution of these glacial landscapes. In the Cordillera de Cochabamba (Bolivia), local maximum advances probably peaked around 20-25 ka BP and were followed by significant readvances between 12-16 ka BP. This generally points to temperature controlled maximum glacial advances along the humid eastern slopes of the Central Andes, which is supported by glacier-climate-modelling studies. However, most studies include only marginal information with regard to the complex geomorphic and sedimentary situation in the Cordillera de Cochabamba. Furthermore, the chronological results are afflicted with several methodological uncertainties inherent to surface exposure dating and call for application of alternative, independent age dating methods.

Therefore this study aims at i) documenting and interpreting the complex glacial geomorphology of the Huara Loma valley in the Cordillera de Cochabamba (Bolivia), ii) analyzing the involved units of glacial sediments, and iii) improving the chronological framework by applying optically stimulated luminescence (OSL) and radiocarbon dating (¹⁴C).

For this purpose, geomorphic mapping was combined with field documentation of sedimentary profiles. The involved sediments were subject to geochemical and mineralogical analysis in order to deduce information on their erosional and weathering histories. In addition, the interpretation of OSL ages from glacial and proglacial sediments integrated several methodological procedures with regard to sample preparation and statistical analysis of the measurements in order to increase the degree of confidence. These combined efforts confirm two major glacial advances in the Cordillera de Cochabamba, which took place during the global LGM and during the Lateglacial. However, their relative chronologies and sedimentary interpretation indicate that the maximum extent of glaciation at Huara Loma was reached during humid Lateglacial times whereas conditions during the LGM were probably too dry.