

Sensitivity of tropical Glaciers to Holocene climate changes – A pilot study from Bolivia

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Abstract

Receding mountain glaciers are among the most dramatic impacts of global warming. Glacier change is of particular concern in areas where glaciers form environmental key elements storing water for agriculture and/or hydropower. A prominent example are the tropical Andes.

To design effective adaptation and mitigation strategies for tropical glacier change, it is mandatory to reliably predict the rate of retreat in the near-future. To do so, the sensitivity of glaciers to climate needs to be understood.

Recent breakthroughs in geochronology now afford for direct investigation of glacier-climate sensitivity. We propose to reconstruct in detail the Holocene dynamics of key glaciers in Bolivia (Cerro Charquini). Charquini glaciers in the Cordillera Real, are upstream La Paz, a city struggling considerably with glacier change, and have the potential to yield fundamental climate-glacier information of regional relevance. Our approach is to map and date the Holocene moraine records of Charquini glaciers in detail using high-precision ^{10}Be (from quartz) and ^3He (from pyroxene/olivine) dating of boulders on top of moraines. The Holocene moraine sequences of Charquini are exquisitely preserved and rich in appropriate erratic boulders. We have the field (Bromley and Putnam), the laboratory (Winckler, Schaefer) and the glacier-climate modeling (Rupper) team in place to successfully tackle this important challenge. This pilot study would put our team in a favorable position towards larger-scale funding from the NSF or NOAA.