**Reconstructing glacier mass balances in the Central Andes using local and regional hydro-climatic data**

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Despite the great number and variety of glaciers in southern South America, glacier mass balance records are extremely scarce and glacier-climate relationships are still poorly understood in this region. Here we use the only complete mass balance record longer than 30 years, available for glaciar Echaurren Norte in the Central Andes of Chile (~34°S), to develop a minimal glacier surface mass balance model that relies on nearby monthly precipitation and air temperature data as forcing. This simple model is able to explain 78% of the variance in the annual glacier mass balance record over the 1977-2010 calibration period. An attribution assessment indicates that precipitation variability constitutes, by far, the single most important forcing modulating annual glacier mass balances at this site. We then use two well-correlated, regionally-averaged series of mean annual streamflow from both sides of the Andes and annual total rainfall from central Chile to reconstruct annual mass balance records back to 1866. A nested regression reconstruction approach that captures 70% of the observed glacier mass balance variability shows three periods of sustained positive mass balances embedded in an overall negative trend totaling almost -40 meters weq. since 1866. These three periods of sustained positive mass balances (centered in the 1920s-30s, in the mid-1980s and in the first decade of the 21st century) coincide with several documented glacier advances in this region. Despite being based on only one record, this glacier mass balance reconstruction appears to be representative of larger-scale conditions and could be useful for glaciological, hydrological and climatological assessments in this portion of the Andes.