



## Two decades of glacier mass loss along the Andes

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Glaciers in the Andes are among the fastest shrinking and largest contributors to sea level rise. They also represent crucial water resources in the tropical and semi-arid portions of this large mountain range. Yet, the magnitude of recent ice loss for the entire mountain range is poorly constrained. Here, we present glacier mass changes for the Andes (from 10°N to 56°S) between 2000 and 2018 using time series of digital elevation models derived from ASTER stereo images. The total glacier mass change over this period is  $-20.0 \pm 4.0$  Gt yr<sup>-1</sup> ( $-0.63 \pm 0.15$  m w.e. yr<sup>-1</sup>), with largest mass losses in the Patagonian Andes ( $-0.68 \pm 0.17$  m w.e. yr<sup>-1</sup>) and the Tropical Andes ( $-0.41 \pm 0.16$  m w.e. yr<sup>-1</sup>), and relatively moderate losses ( $-0.25 \pm 0.14$  m w.e. yr<sup>-1</sup>) between 26° and 37°S in the Dry Andes. Sub-period analysis (2000-2009 vs. 2009-2018) reveals steady mass loss in the Tropics and south of 45°S. Conversely, a shift from slightly positive to strongly negative mass balance is measured between 26° and 45°S. In this latter region, the rapid glacier loss in recent years coincides with extremely dry conditions since 2010 and partially helped to mitigate the negative impacts of this sustained drought. This first fully resolved, multi-decadal dataset of recent glacier mass changes at an Andes scale, improves our understanding of local and regional glacier variations in response to climate change and constitutes a relevant validation basis for climatic, hydrological and glaciological models.