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Glacier area changes in the Rio Olivares catchment, Central Andes 1955–2013

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Here, we present a new glacier inventory for the Rio Olivares catchment (531 km2), Central Chilean Andes (33˚14‘44 S, 70˚07‘26 V). Area changes for 145 glaciers were analyzed for the period 1955 through 2013 based on terrestrial photogrammetry, aerial photography, and satellite imagery. The results show that glacier area not including rock glaciers reduced by ∼18 % – from 93.8 (1955) to 75.9 km2 (2013), equivalent to an estimated volume loss of 40 % (2.9 km3) based on volume-area scaling functions. Rock glacier area increased from 10.4 (1955) to 10.7 km2 (2013). Additionally, a detailed area, hypsometry, and elevation time series analysis for the five largest glaciers in the catchment was conducted, showing that terminus positions ascended by an average of 351 ± 8 meters and slope increased 0.7° on average. A comparison between changes in glacier area and variations in the El Niño Southern Oscillation index indicates a significant climatic link.