

Supplementary material

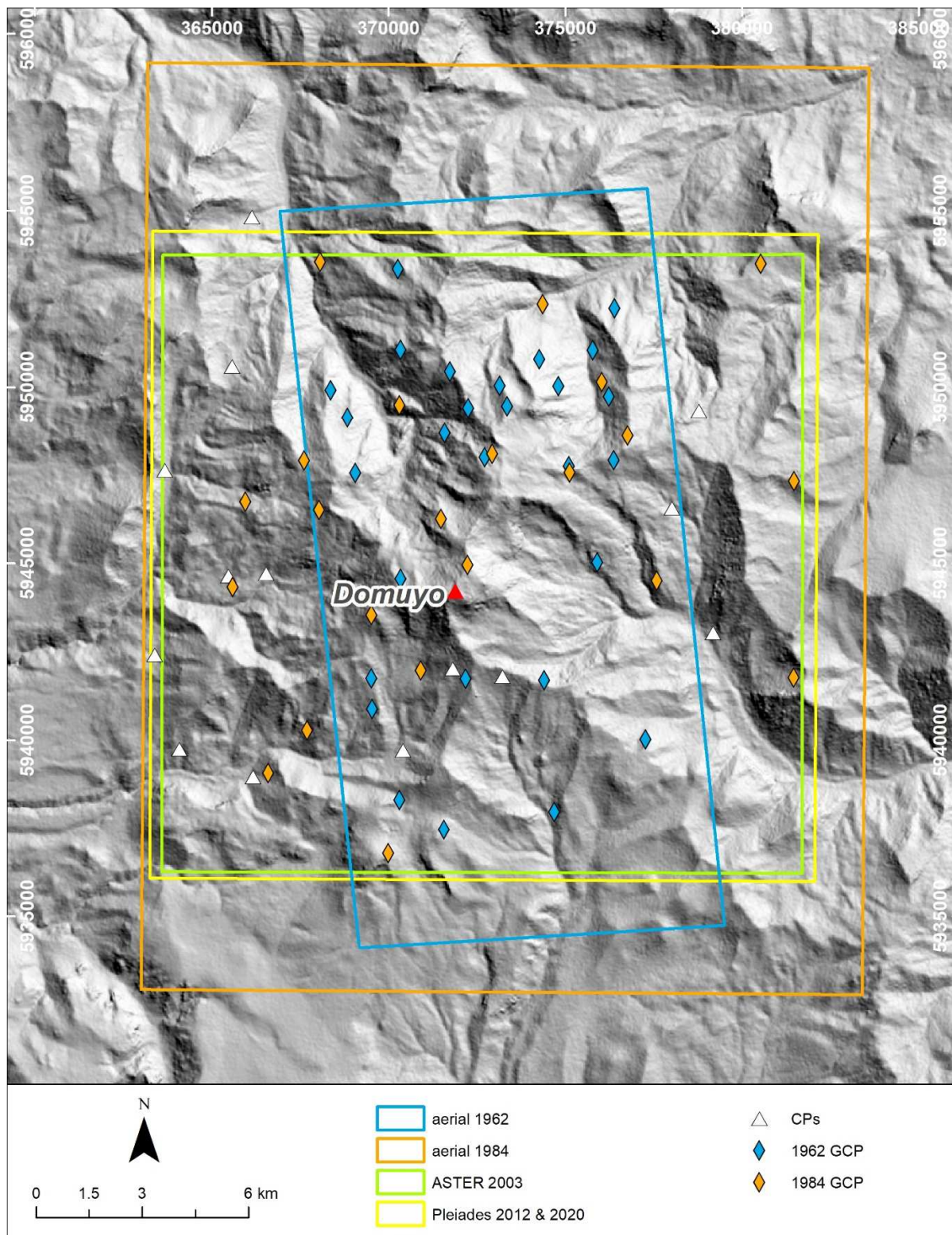


Fig. S1. Footprint of the aerial photographs and satellite imagery used in this study and location of CGPs and CPs. The background image is a hillshade model of the 1-arc second SRTM DEM. Note that the full ASTER raw images covered a wider area but we only show the part processed to a DEM.

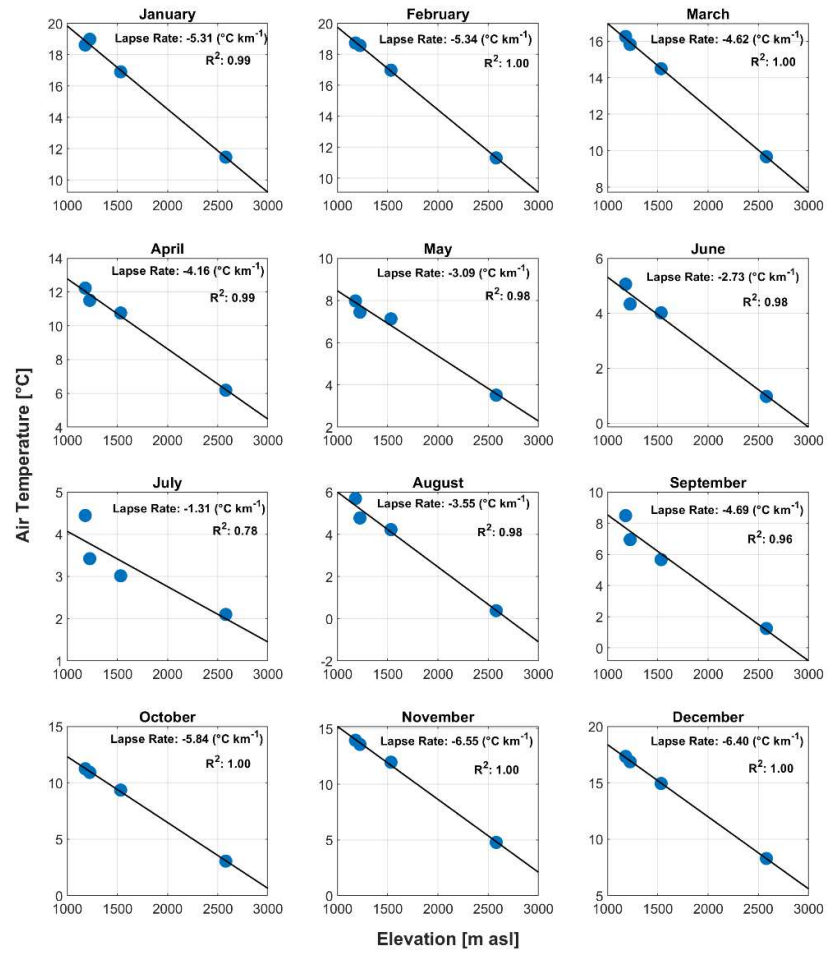


Fig. S2. Monthly Temperature lapse rates for the Volcán Domuyo area, calculated for the 1997-2010 period. See main text for details.

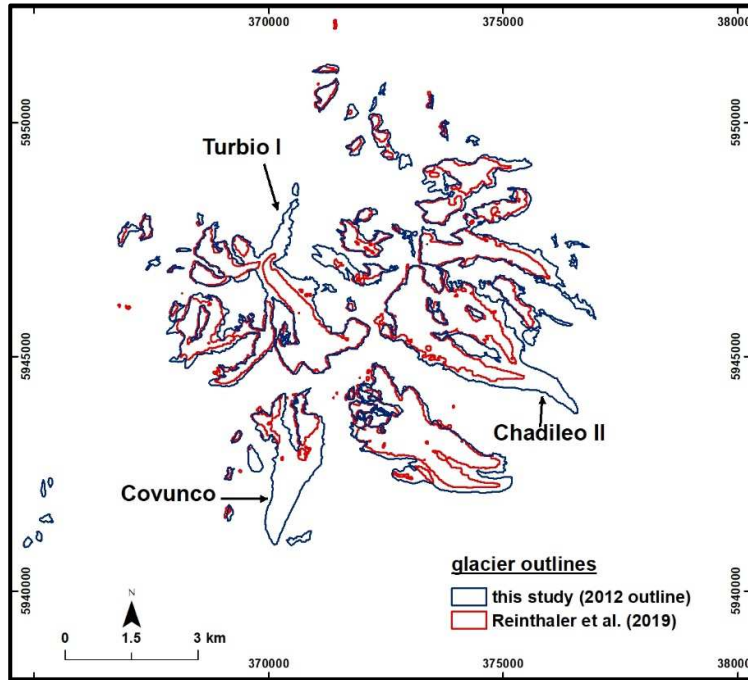


Fig. S3. Comparison of the glacier inventories used in Reinthal et al. (2019) and this study, showing missing debris-covered ice on Turbio I, Covunco and Chadileo II (black arrows).

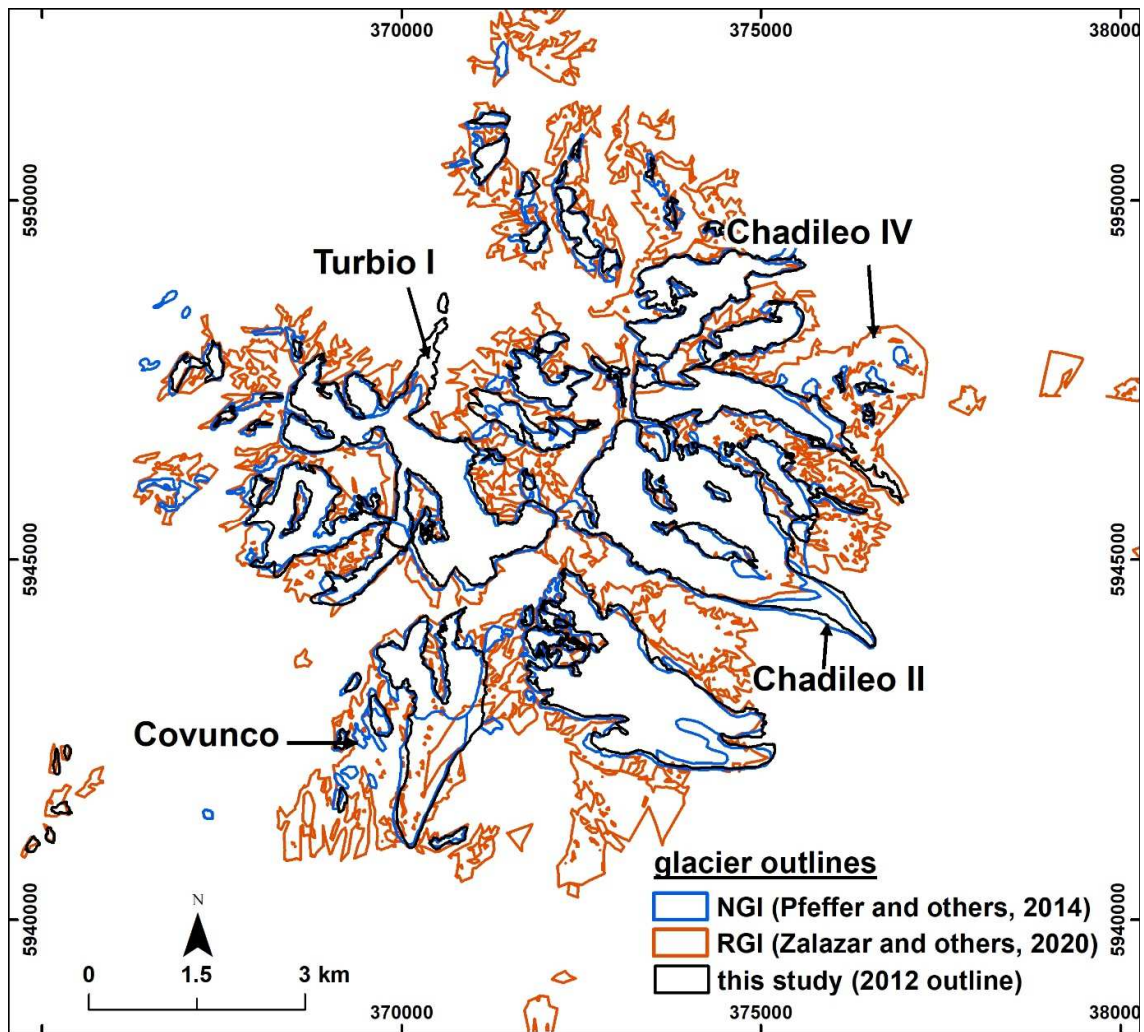


Fig. S4. Comparison of glacier outlines in the RGI (Pfeffer and others, 2014) used in the studies of Dussillant and others (2019) and Braun and others (2019), and the NGI (Zalazar and others, 2020) used in Ferri and others (2020). The total glacier area is 45.2 km² and 25.4 km² for the RGI and NGI inventories, respectively. The RGI outlines show missing debris-covered ice on Turbio I and Chadileo II, and seasonal snow on Covunco and Chadileo IV (black arrows).

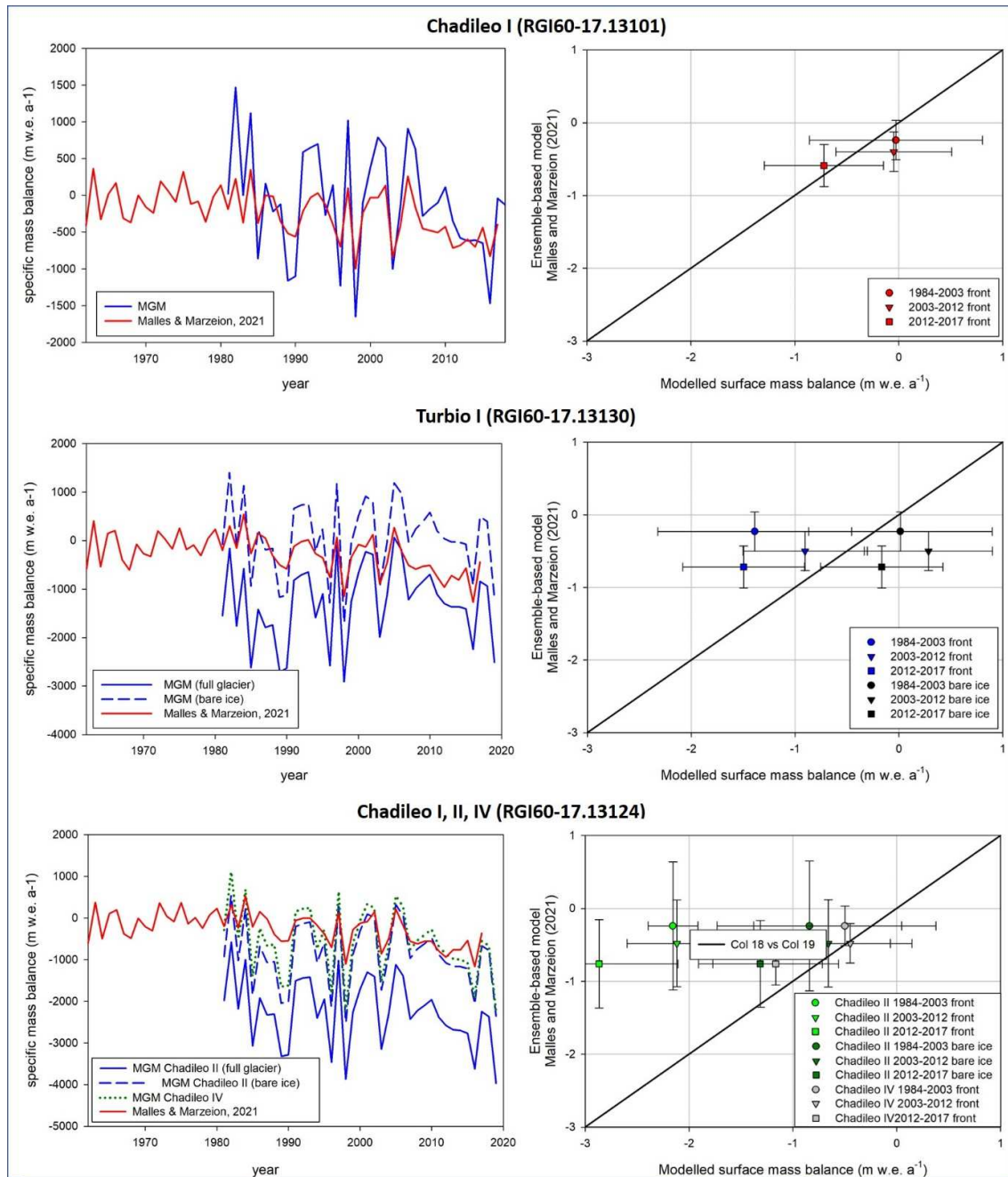


Fig. S5. Comparison of the MGM modelled mass balance against the ensemble-based model results in Malles and Marzeion (2021), the red lines in left panel graphs showing the mean value of the various forcing data sets used by these authors. See main text for details.

Table S1. Averaged mass balance from the DGA glaciological series of Echaurren Norte glacier (1975-2020) (WGMS, 2021).

Time interval	Average mass balance (m w.e. a ⁻¹)
1975-1984	-0.07
1984-2003	-0.30
2003-2012	-0.80
2012-2020	-1.82