**Supplementary Table 1.** ELA dataset of Sierra Nevadan glaciers in 2012-2013 from Landsat Google Earth© images (n = 57).

Top and the bottom elevations correspond to the mean elevation along each glacier’s top and termination, respectively, and

the elevation range is the difference between the two. ELA values were calculated for two common values of THAR

coefficients used is the Sierra Nevada. Those calculated with THAR = 0.5 were used in the final calibration. The comments

indicate whether the surface of each glacier is partially covered or fully covered by debris/rocks. Mean annual precipitation (P) and mean annual temperature (T) are computed from the 1981–2010 PRISM reanalysed grid database with a 800x800m

resolution. σ(ELA) combine both the uncertainty of the THAR variable and the one arising from the resolutions of the DEM

and Landsat images. σ(Y) also includes the uncertainty resulting from the computation of the 0°C isotherm.

*See attached Excel file.*

**Supplementary Table 2.** ELA dataset of Sierra Nevadan glaciers in 1972 from aerial photography (Raub et al., 2006) (n= 11). Mean annual precipitation (P) and mean annual temperature (T) are computed from the 1941–1970 PRISM reanalysed grid database with a 4x4 km resolution.

*See attached Excel file.*

Supplementary Table 3. Climatic station of the Sierra Nevada used for cross-validation of the lapse rates estimated with the PRISM reanalysed data. Data from the National Weather Service (NWS) Cooperative Observer Program (<https://www.ncdc.noaa.gov/>).

*See attached Excel file.*