

S1. Domain masks, and persistent snow and ice masks

The domain masks (Fig. S1 and S2, gray area) are derived based on the reference datasets (WUS-SR and Andes-SR) using an approach similar to Liu et al. (2022). Domain masks at reference resolutions are aggregated to the resolution used in each product.

The persistent snow and ice mask for WUS-SR is derived using the same method from Liu et al. (2021). If the annual minimum SWE of a pixel is greater than 10% of its annual maximum SWE more than once over the data period, the pixel is classified as a persistent snow and ice pixel. The persistent snow and ice for Andes-SR is from Landsat (Cortés and Margulis, 2017). The persistent snow and ice masks from reference datasets are then aggregated to the native resolution of each product (Fig. S1 and S2, red area).

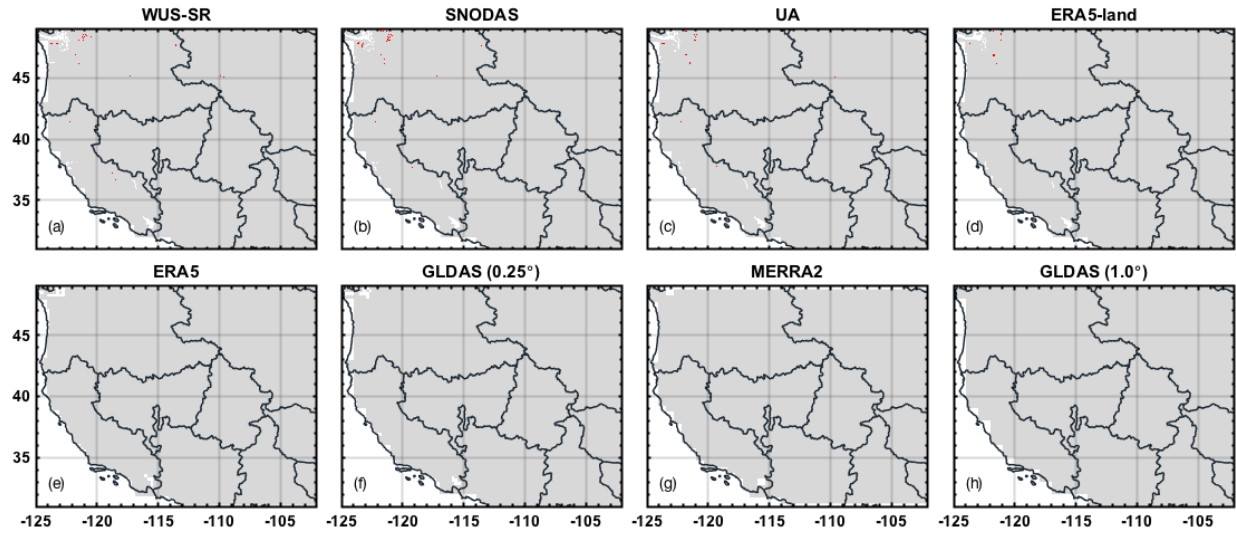


Figure S1. WUS domain masks (gray) and glacier masks (red) for each product.

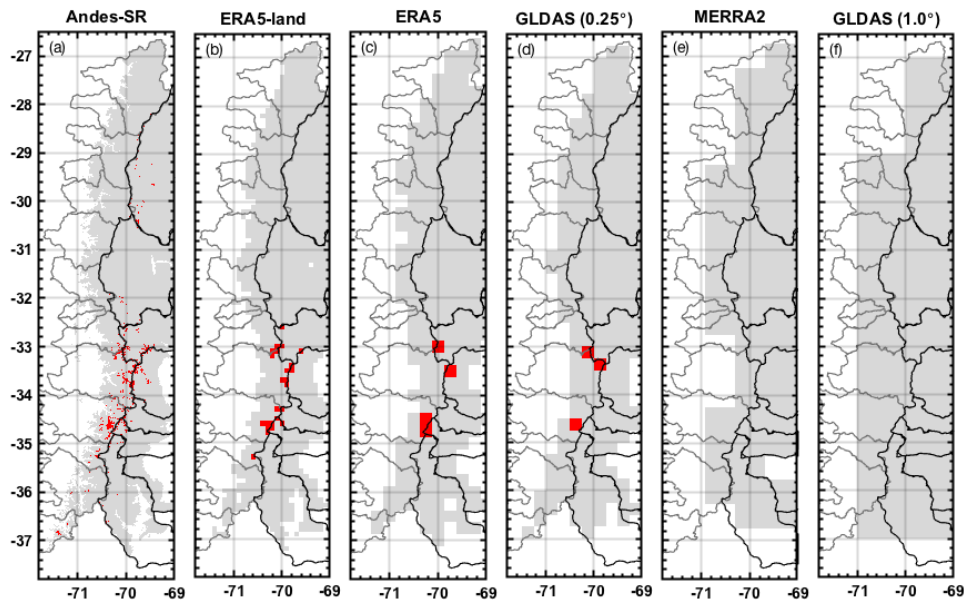


Figure S2. Andes domain masks (gray) and glacier masks (red) for each product. For the Andes-SR, SWE was only estimated for locations above 1500 m.

S2. Windward and leeward watersheds

For analysis related to windward-leeward SWE storage gradients, the analysis is applied at the relevant watershed scale. For moderate and coarse resolution products, a single pixel may be partially inside two different watersheds. To account for this, windward and leeward watershed masks are derived by intersecting the watersheds and product grids. For high resolution products (Andes-SR, WUS-SR and SNODAS), the centered coordinates of a pixel are used to determine if the pixel is inside a windward or leeward watershed. The fractional areas of pixel within the windward or leeward watersheds are shown in Figure S3 and S4.

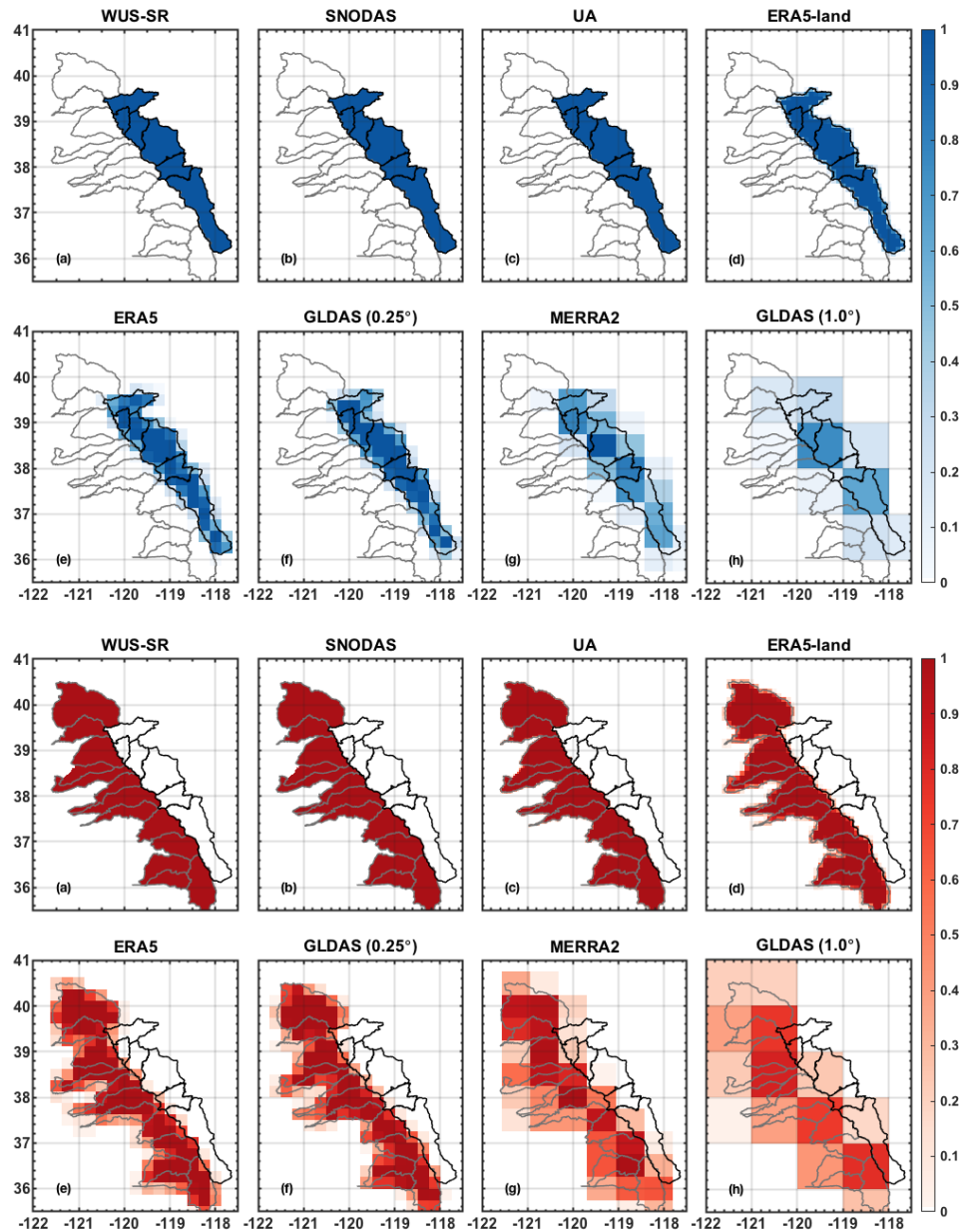


Figure S3. Fractional areas of each native pixel covering windward (red) and leeward (blue) watersheds in the Sierra Nevada.

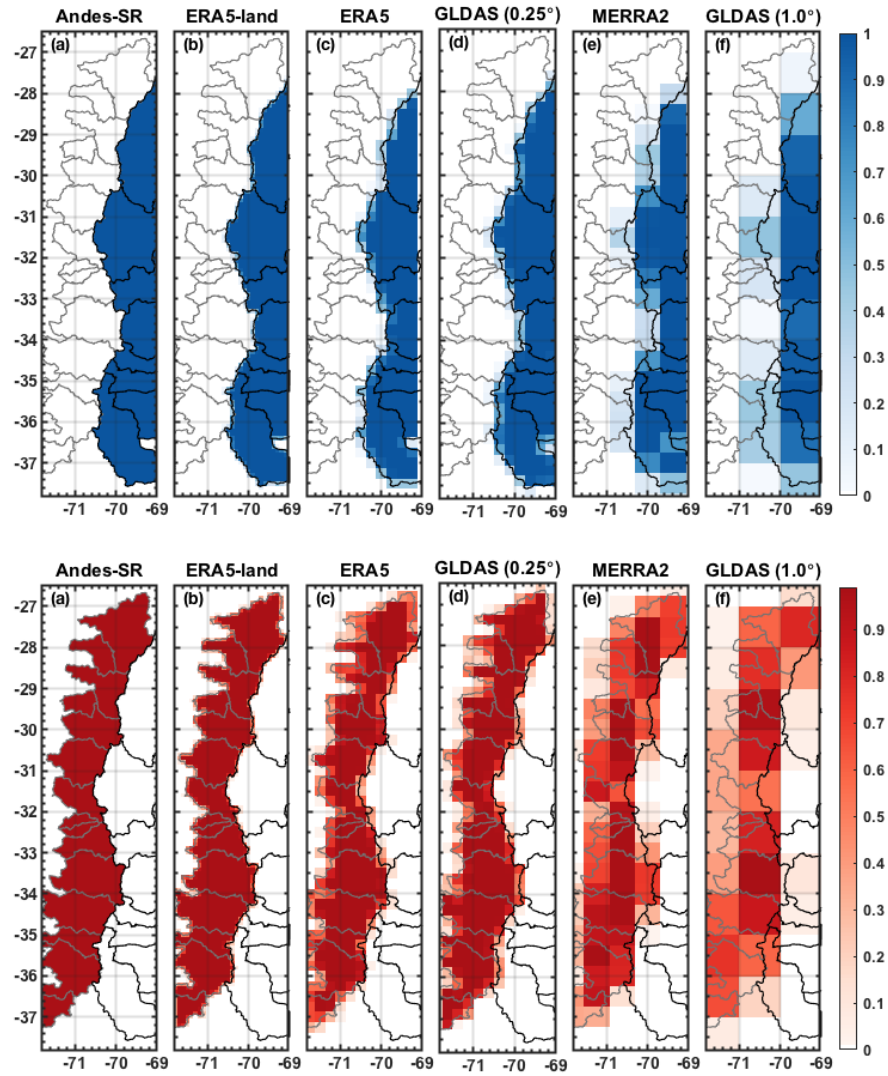


Figure S4. Fractional areas of each native pixel covering windward (red) and leeward (blue) watersheds in the Andes.