



## Comment on **essd-2021-28**

Anonymous Referee #2

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Referee comment on "Evaluation of the global and regional glacier inventories and assessment of glacier elevation changes over the north-western Himalaya" by Shakil Ahmad Romshoo et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-28-RC2>, 2021

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This is a useful contribution and in general seems a well-conducted assessment. Avoiding measurement bias is paramount for geodetic mass balance in particular, and some more evidence is needed to demonstrate that this has been achieved.

Sections 2.1, 2.2 and 2.3: please check the Jhelum minimum temperature - should be negative? Please provide consistent descriptive stats, e.g. annual precip in each case rather than mixing monthly and annual.

Line 279 - area calculation in 'ArcGIS environment' - what projection was used? Please ensure that an area-preserving projection is used when defining the glacier areas and, by extension, their volume changes.

Equation 6: good error quantification is vital in geodetic mass balance calculations. Please explain the  $\sigma_z$  DEM uncertainty term. Is this a generic estimate of DEM quality, or is it specifically applicable to snow-covered surfaces and steep slopes? These are notoriously difficult to map topographically, particularly in optical images. The voidfill error term is not defined. Please explain and justify using the penetration error as a random, uncorrelated error in this case. If penetration is wrong, it will be a systematic error and so should be added and not combined in quadrature.

Line 342: error assessment in off-glacier areas is good to do, but this is not reported or shown in the  $dh/dt$  figures. If it reveals systematic biases then these should be corrected to zero. This requires assessment at as many off-glacier locations as possible, at a range of altitudes, as the DEM biases are often not uniform across a scene. The initial and corrected off-glacier stats should be reported and shown in the figures.

Table 2: KUGI glacier volumes - the calculation of volume is not trivial and is not explained. Where do these come from?

Figures 2 and 3: please show a background map, scale bar and the apparent  $dh/dt$  values off-glacier.