20 December, 2023

Detailed Response to Reviewers and Editor:

(Reviewer): In my view, the paper is now acceptable for publication, pending one strong recommendation:
Using a compiled DEM for avalanche modelling (the DEM layer of ASF PALSAR data), the roots of which the authors are not able to find, should be avoided in the sense of open and reproducible science. As the DEM used is not an original DEM, ASF may change it at any time. At the same time, I thank the authors to present a sensitivity test based on the (original) HMA DEM. Taken both together, I strongly recommend to include Fig 1 of their response (the ALOS vs. HMA-DEM comparison) in the final paper together with a few words of explanation, or in a Supplement. I leave to the editor whether the Figure can be added to the main paper (preferred), or needs to go to a Supplement for space reasons.

Thank you very much for this recommendation. Additional panels showing a comparison of the deposit from the two different DEMs have been added to Figure 3 (please see revised manuscript). Figure 3's caption now reads:

Figure 3. Base change modeled with R.Avaflow for three different avalanche volumes: (a) 1 x10^6 m^3 using an ALOS PALSAR RTC DEM, (b) 1 x10^6 m^3 using the void filled HMA-DEM, (c) 2.5 x10^6 m^3 (bottom left) using an ALOS PALSAR RTC DEM, and (d) 5 x10^6 m^3 (bottom right) using an ALOS PALSAR RTC DEM. Of the three estimates and 2 DEMs, 1 x 10^6 m^3 using an ALOS PALSAR RTC DEM most consistently matched the extent and depth of the new debris cone deposited in August 2022 (red line; the yellow line represents the extent of the historic debris cone).

Associated edits include line 92, which now reads as:

For the terrain elevation, two DEMs were used: the ALOS PALSAR Radiometric Terrain Corrected high resolution 12.5 m DEM (AP_13152_FBD_F0540_RT1) (ASF DAAC 2014) and the High Mountain Asia 8m resolution DEM (Shean, 2017), that was void filled using the Elevation Void Fill function in ArcGIS 10.8.

And line 123:

Of the three different volume estimates tested (1, 2.5, and 5 million m^3) using two DEMs and R.Avaflow, an avalanche volume of 1 x 10^6 m^3 using an ALOS PALSAR RTC DEM most consistently matched the extent (red line) and depth of the new debris cone deposited as determined by our field observations (Figure 3).

On line 19, Data Availability now reads as:

Data availability. Declassified KH-9 Hexagon satellite imagery is available at https://earthexplorer.usgs.gov/. Planet Dove and SuperDove satellite imagery is available at https://www.planet.com/explorer/. The ALOS PALSAR Radiometric Terrain Corrected high-res DEM "AP_13152_FBD_F0540_RT1" is available at https://search.asf.alaska.edu/. The High Mountain Asia 8-meter DEM is available at https://nsidc.org/data/hma_dem8m_ct/versions/1#anchor-1

In the References, a new related reference is cited as:

Shean, D. (2017). High Mountain Asia 8-meter DEMs Derived from Cross-track Optical Imagery. Boulder, CO: NASA NSIDC DAAC: NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/0MCWJJH5ABYO. Accessed on July 20, 2023.

Thank you again for your valuable comments and guidance throughout the preparation of our paper. We hope that the above changes will now certify the paper as suitable for publication in *The Cryosphere*.

All the best,

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