The Cryosphere Discussions

The Cryosphere Discuss., author comment AC2
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Reply on RC2

Sajid Ghuffar et al.

Author comment on "Brief communication: Glacier mapping and change estimation using very high-resolution declassified Hexagon KH-9 panoramic stereo imagery (1971–1984)" by Sajid Ghuffar et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2022-203-AC2, 2022

Anonymous Referee #2

We thank the reviewer for a positive and careful review of the paper. A detailed reply to each comment and the suggested revisions are listed below.

In this manuscript, the authors have presented a comparison of results of geodetic mass changes obtained by applying existing methods to a largely untapped resource. The results are well-presented and very promising, and the potential of this method for extending and improving observations of geodetic mass changes into the past is very exciting. I only have a few small comments/questions that should be considered before the paper is accepted for publication.

Thank you very much for the overall positive evaluation.

Section 4.1: After stitching the images, do you use the image frame or rail holes to resample/align the fore and aft images? Do you crop the image border? A little bit more information about the process here would be helpful.

Yes, we crop the exposed image area from the film and align it with the image's horizontal and vertical axis, and then use it for further processing. However, we do not perform any bending correction using the markers in this work. We will clarify that in the revised version.

Are the different scanned parts of the images radiometrically similar, or do you need to balance/blend the parts together?

We do not perform any radiometric corrections to the individual scan parts. Visually they appear quite similar. The feature extraction and dense matching are robust to global illumination changes, therefore, we do not expect significant differences due to any slight radiometric differences.

In addition to the references, could you mention how/where each of the different steps described here are implemented? (e.g., software/programming languages)?

We have used the same set of software/programming languages as was used in Corona Stereo Pipeline [2] i.e. a combination of Python (Feature Matching), MATLAB (bundle adjustment), MicMac (Epipolar Resampling and dense matching) and OPALS (DEM coregistration). We will specify this in the revised version.

[2] Ghuffar, S., Bolch, T., Rupnik, E., & Bhattacharya, A. (2022). A Pipeline for Automated Processing of Declassified Corona KH-4 (1962–1972) Stereo Imagery. *IEEE Transactions on Geoscience and Remote Sensing*, *60*, 1-14.

Section 4.3: l. 110: what correlation length did you use for the Fischer et al. formula?

The correlation length we calculated varied between the different dH grids. The correlation length was 605 m in the case of the KH-9PC dH data, and 873 m in the case of the KH-9MC data over the Passu Glacier. Over the Petrov Glacier, the correlation length was 1488 m in the case of the KH-9PC derived dH data and 1220 m for the KH-9MC derived dH data. We will add these values to the revised version of the manuscript.