



Supplement of

Brief communication: Potential of satellite optical imagery to monitor glacier surface flow velocity variability in the tropical Andes

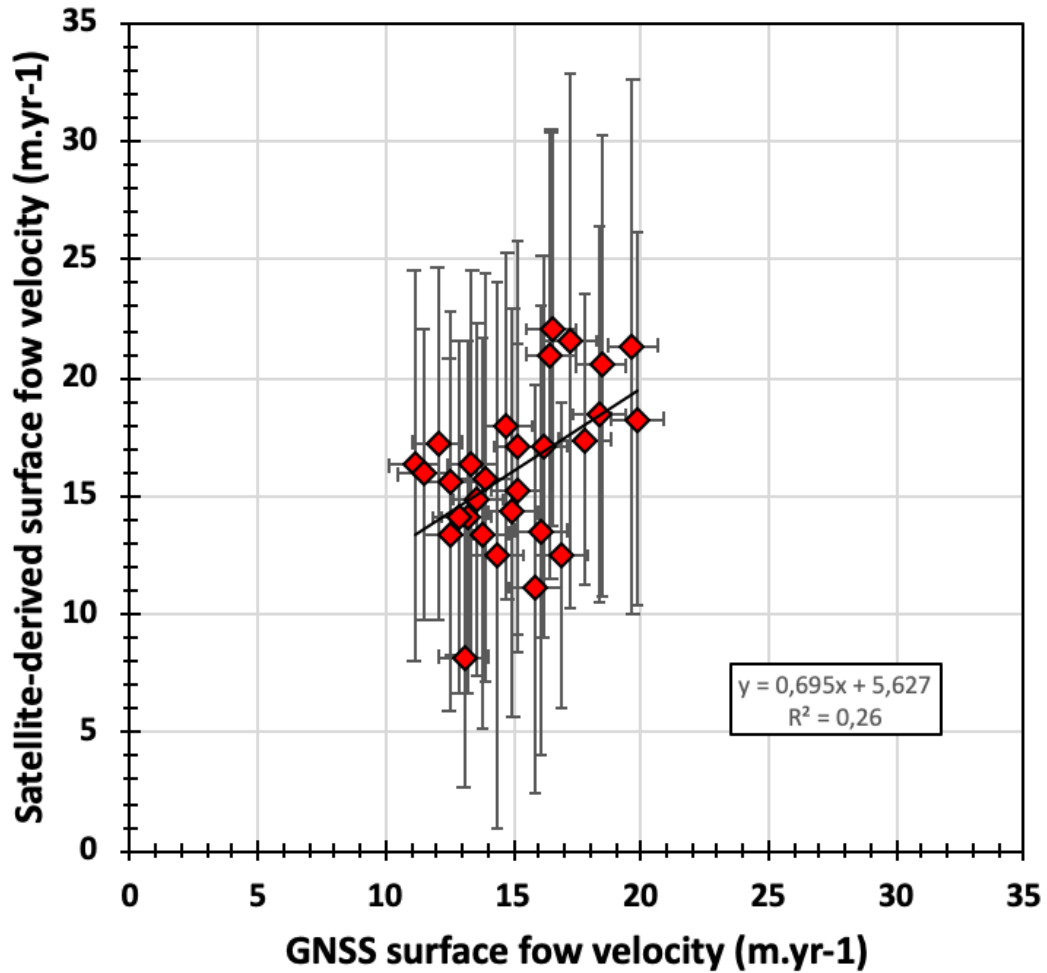
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Supplementary Figures

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15 **Figure S1:** Comparison for the period 2013-14 to 2021-22 of the surface flow velocity measured with GNSS at the level of the ablation stakes of Zongo Glacier (Cordillera Real of Bolivia) and the satellite-derived velocity of the pixel that encompasses the stake. Each diamond represents one stake for a given year.

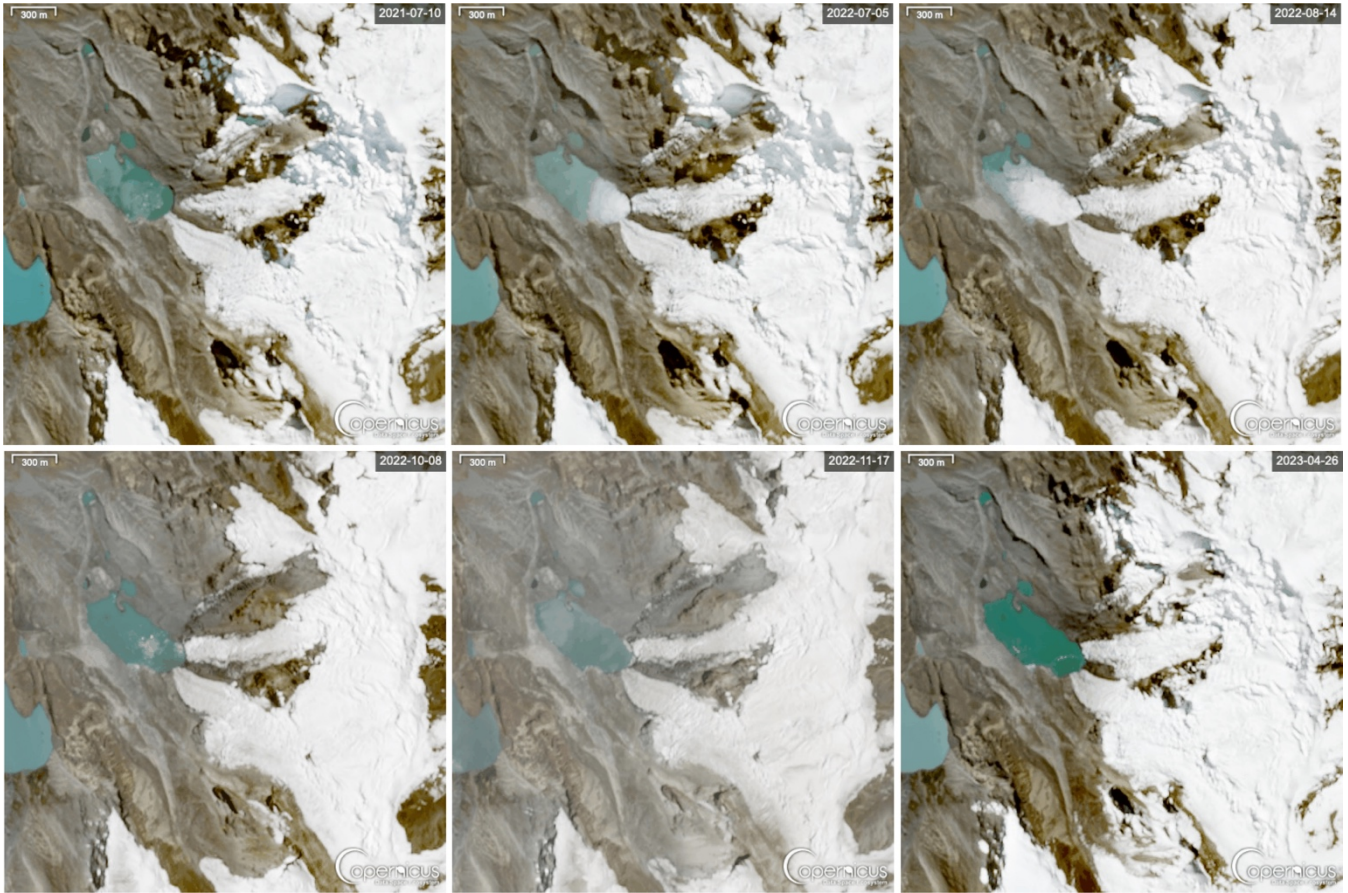
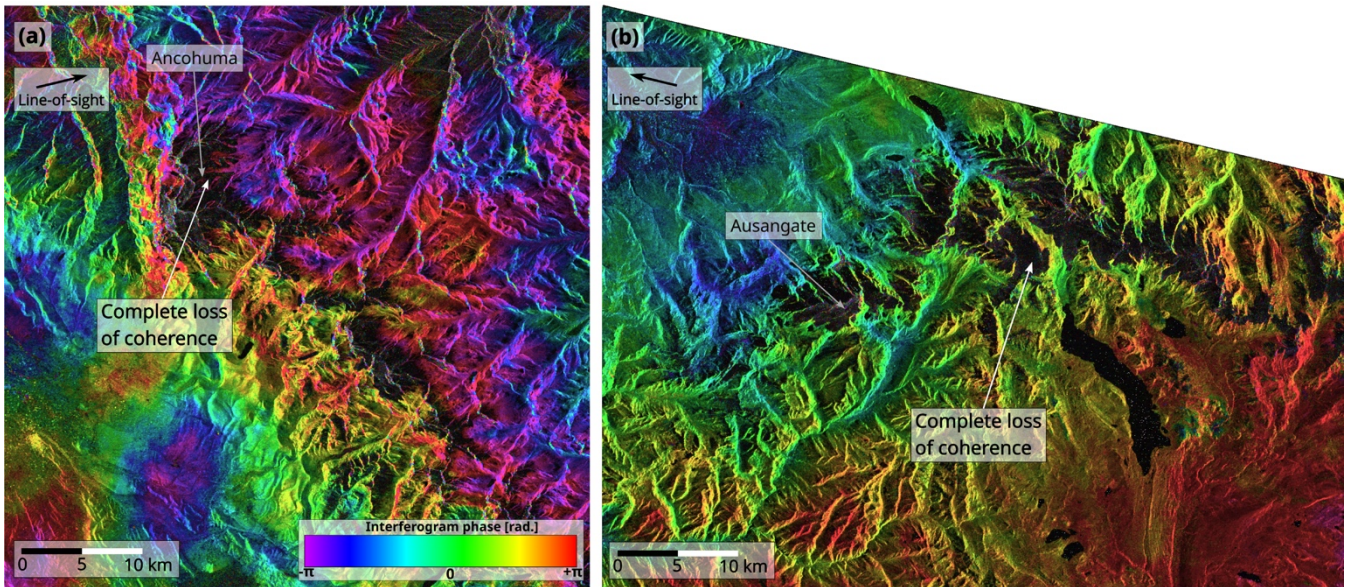
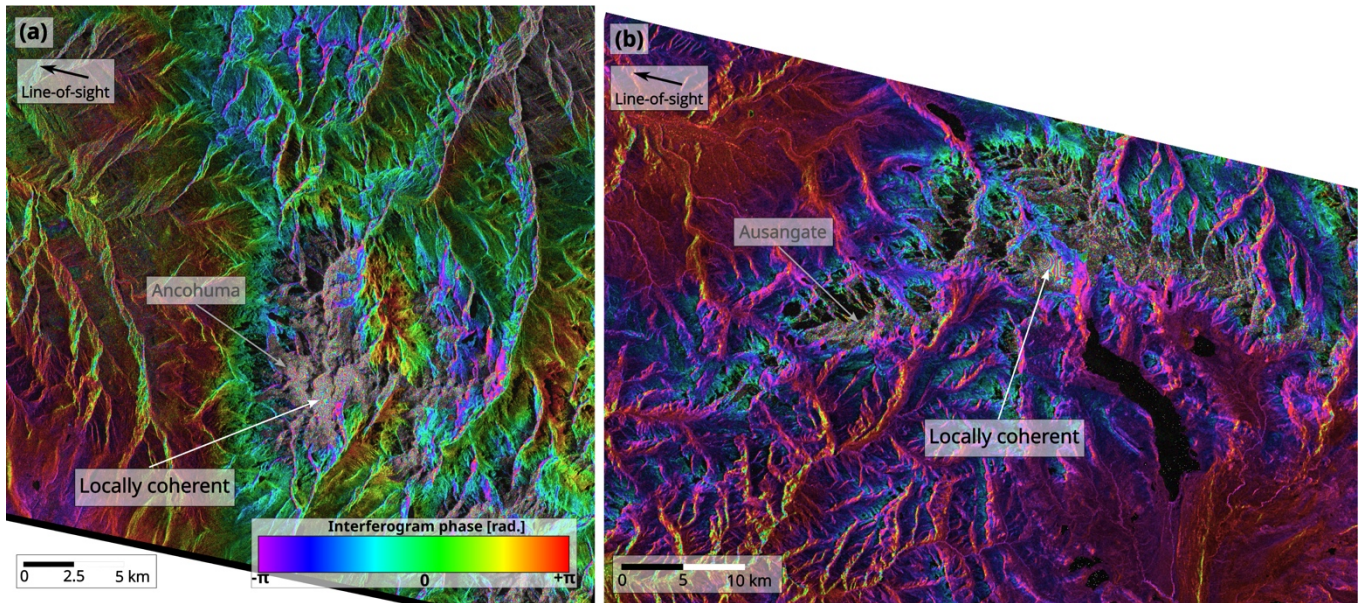


Figure S2: Sentinel-2 images illustrating the surge of Chaupi Orco glacier. Iceberg discharge in the proglacial lake can be seen on the image of July and August 2022.



25 **Figure S3:** Examples of Sentinel-1 Synthetic Aperture Radar (SAR) interferograms constructed over: (a) the
 Ancohumas region in Bolivia (ascending track #76, images from March 13 and 25 2021); and (b) the Ausangate
 30 region in Peru (descending track #127, images from December 11 and 23 2020). We processed all available
 Sentinel-1 Interferometric Wide swath images from four different tracks (6 to 12 days apart), covering the various
 areas of interest with both ascending and descending tracks over the three years 2019-2021. Generally,
 interferometric coherence is completely lost over all areas of interest whatever the considering time windows and
 whatever the period of the year (with very few exceptions, see Figure S4). This temporal decorrelation is likely due
 to heavy precipitation and surface melt/refreezing events, amplified by the fact that very few 6-day image pairs are
 available in the region. Additionally, some areas are affected by radar layover/shadowing effects, due to the steep
 mountainous terrain.



35 **Figure S4:** Examples of Sentinel-1 Synthetic Aperture Radar (SAR) interferograms constructed over: (a) the Ancohumas region in Bolivia (descending track #54, images from June 16 and 28 2021); and (b) the Ausangate region in Peru (descending track #127, images from July 26 and August 1 2019). These examples are among the most coherent retrievals of the entire processed image archive, and show partially coherent phase values over small parts of the areas of interest. This coverage, however, did not allow us to extract meaningful velocity estimates.

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