The Cryosphere

Supplement of

Brief communication: Glacier mapping and change estimation using very high-resolution declassified Hexagon KH-9 panoramic stereo imagery (1971–1984)

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Table S1. Specifications of the data used for the evaluation of KH-9PC imagery over the two study sites.

| Site	Sensor	Images	Spatial Resolution (m)	Scan Angle (deg)	Acquisition Date
Ak-Shirak	KH-9PC	D3C1206-100180A062, 063 D3C1206-100180F062	0.7	-45 to +45	31/7/1973
	KH-9MC	DZB1206-500069L010001 DZB1206-500069L011001	7	- -	31/7/1973
	KH-4PC	DS1014-2134DA088, 089, 090 DS1014-2134DF084, 085, 089	4	-35 to +35	27/11/1964
	SPOT-6	DS_SPOT6_201708070515034	1.5	-	7/8/2017
Passu	KH-9PC	D3C1206-200215F051, 052 D3C1206-200215A052	0.7	-60 to +30	4/8/1973
	KH-9MC	DZB1206-500082L020001 DZB1206-500082L021001	7	- -	4/8/1973
	Pléiades	PHR1A_P_202108130559004	0.5	-	13/8/2021
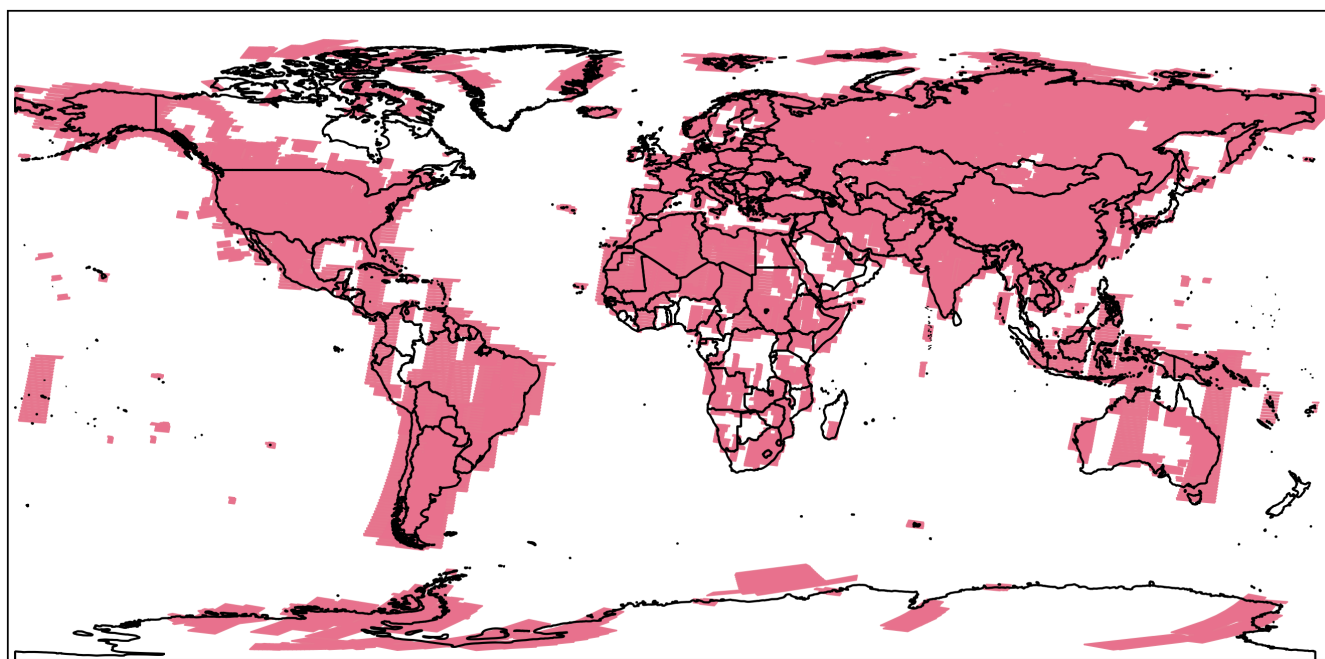
Figure S1. Coverage of the declassified KH-9PC scenes (data source: USGS).
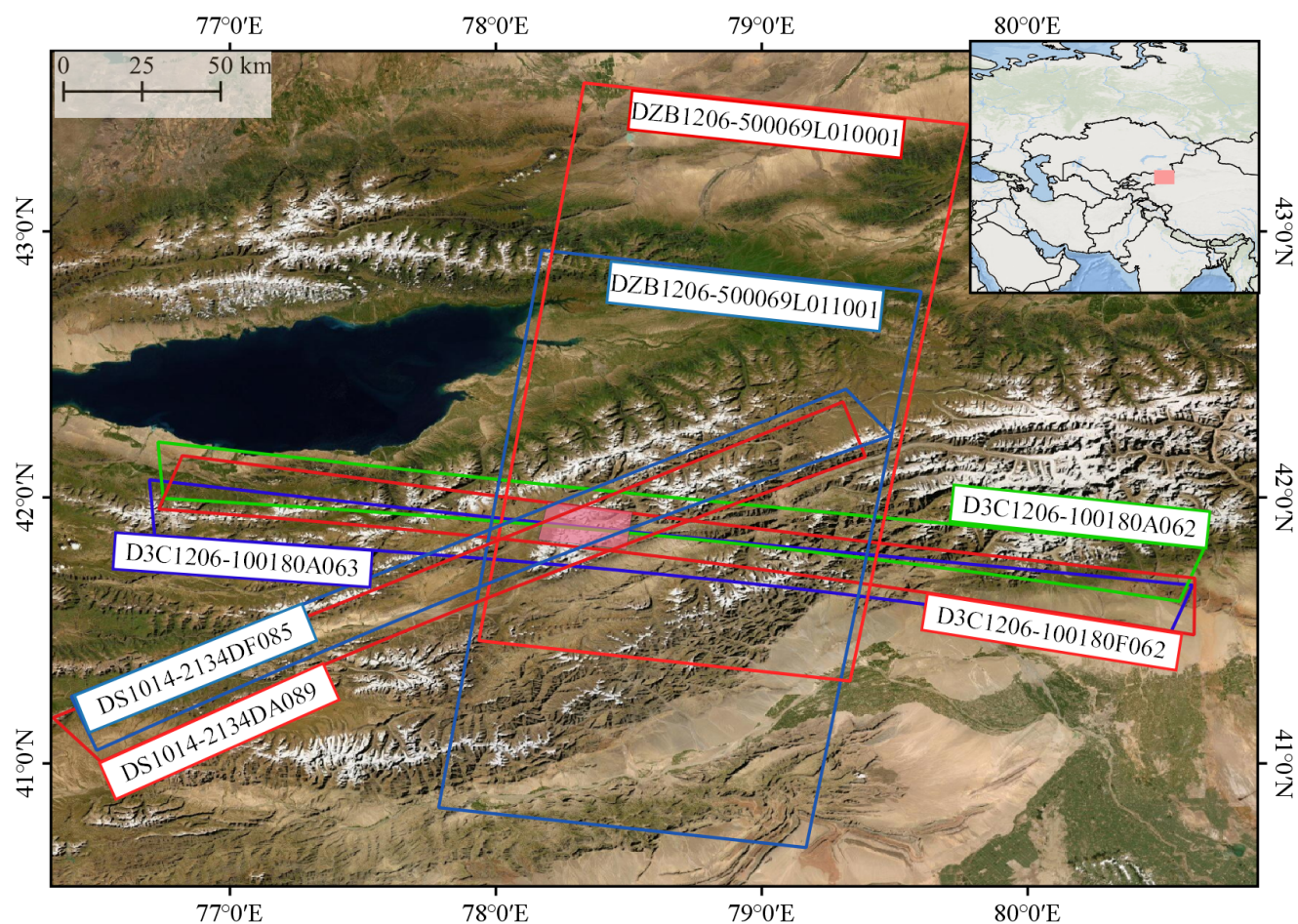
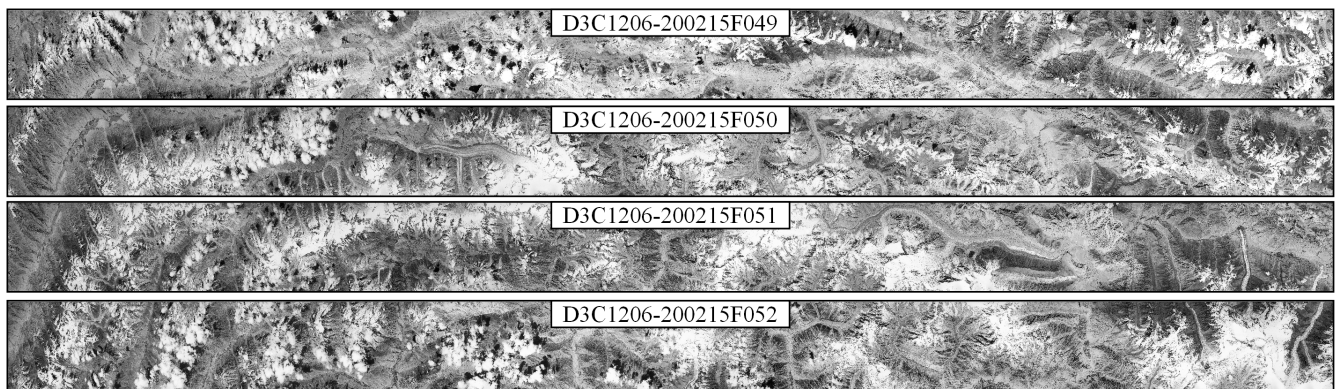**Figure S2.** Footprints of the images from KH-9PC (D3C1206-100180A062,A063, F062), KH-9MC (DZB1206-500069L010001, L011001) and KH-4PC (DS1014-2134DA089, DS1014-2134DF085) of region around AkShirak. For clarity, only one pair of KH-4 image footprints is shown here. The red rectangle shows the glacierized Ak-Shirak area used in the analysis. Basemap: ESRI World Imagery (© ESRI)
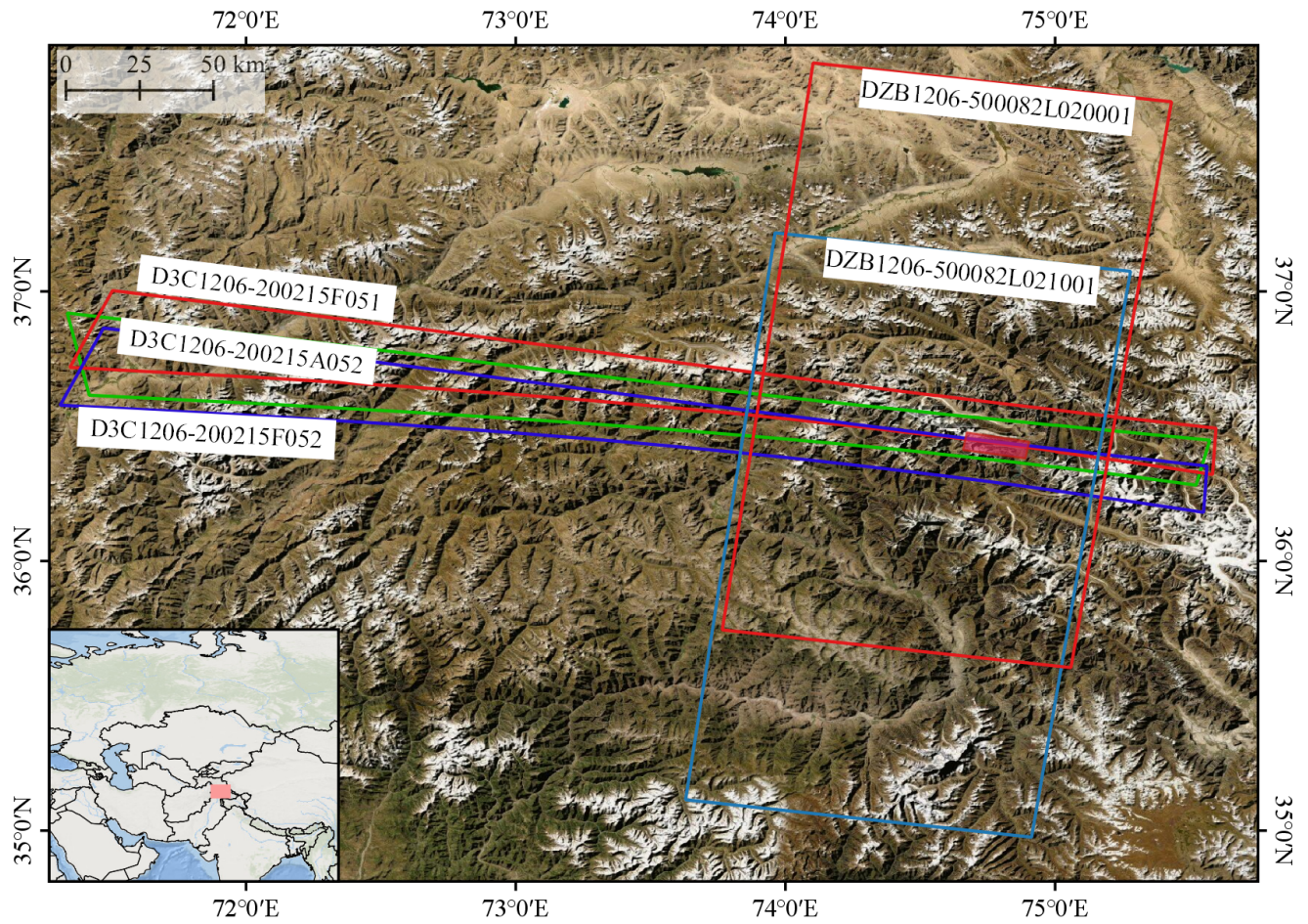
Figure S3. Footprints of the images from KH-9PC (D3C1206-200215A052, F051, F052) and KH-9MC (DZB1206-500082L021001, L021001) covering Passu Glacier and the surrounding region. Basemap: ESRI World Imagery (© ESRI)


Figure S4. Four KH-9PC images covering the Karakoram and the Hindukush area. Together with the corresponding stereo images from the *aft* camera, these images were used for large-scale mapping example. The footprints of D3C1206-200215F051 and D3C1206-200215F052 are shown in Fig. S3

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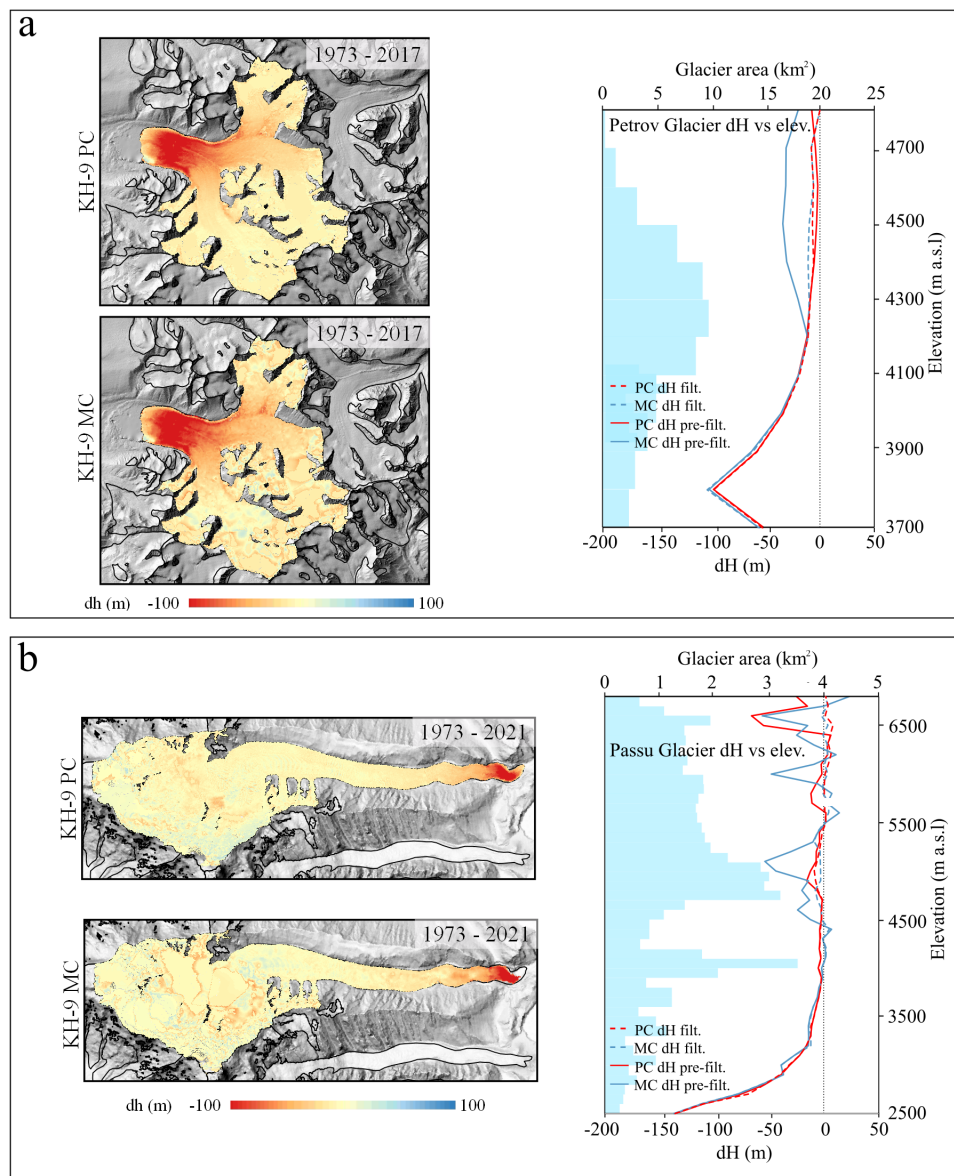
Figure S5. a) dH of KH-9PC (1973) and KH-9MC (1973) DEMs with the SPOT-6 (2017) DEM over Ak-Shirak. b) dH of the KH-9PC (1973) and KH-9MC (1973) DEMs with Pléiades (2021) DEM over Passu Glacier. Outlier filtering and gap filling have been applied to glacier pixels while computing these dH grids. Plot of dH against elevation bands of the glacier pixels, colored dotted lines show the dH values after filtering and gap filling.
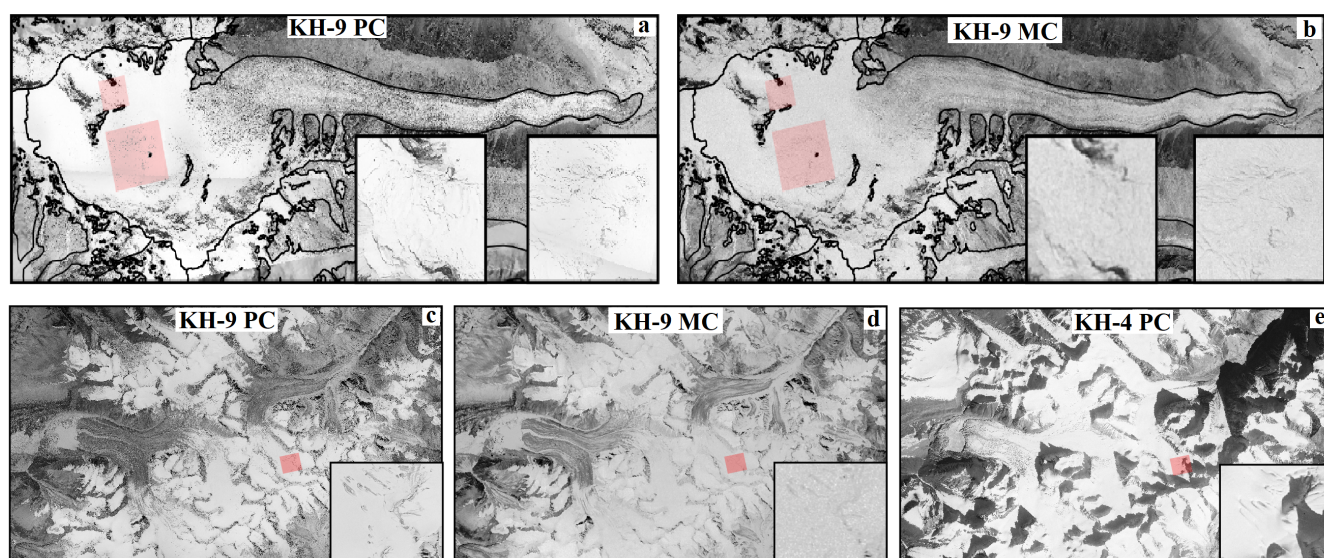
Figure S6. (a,b) Orthoimages of KH-9PC and KH-9MC of Passu Glacier, Karakoram. (c,d,e) KH-9PC, KH-9MC and KH-4PC images of the Petrov Glacier, Ak-Shirak. Insets show zoomed areas (marked as red rectangles) in the accumulation zones of the glaciers.
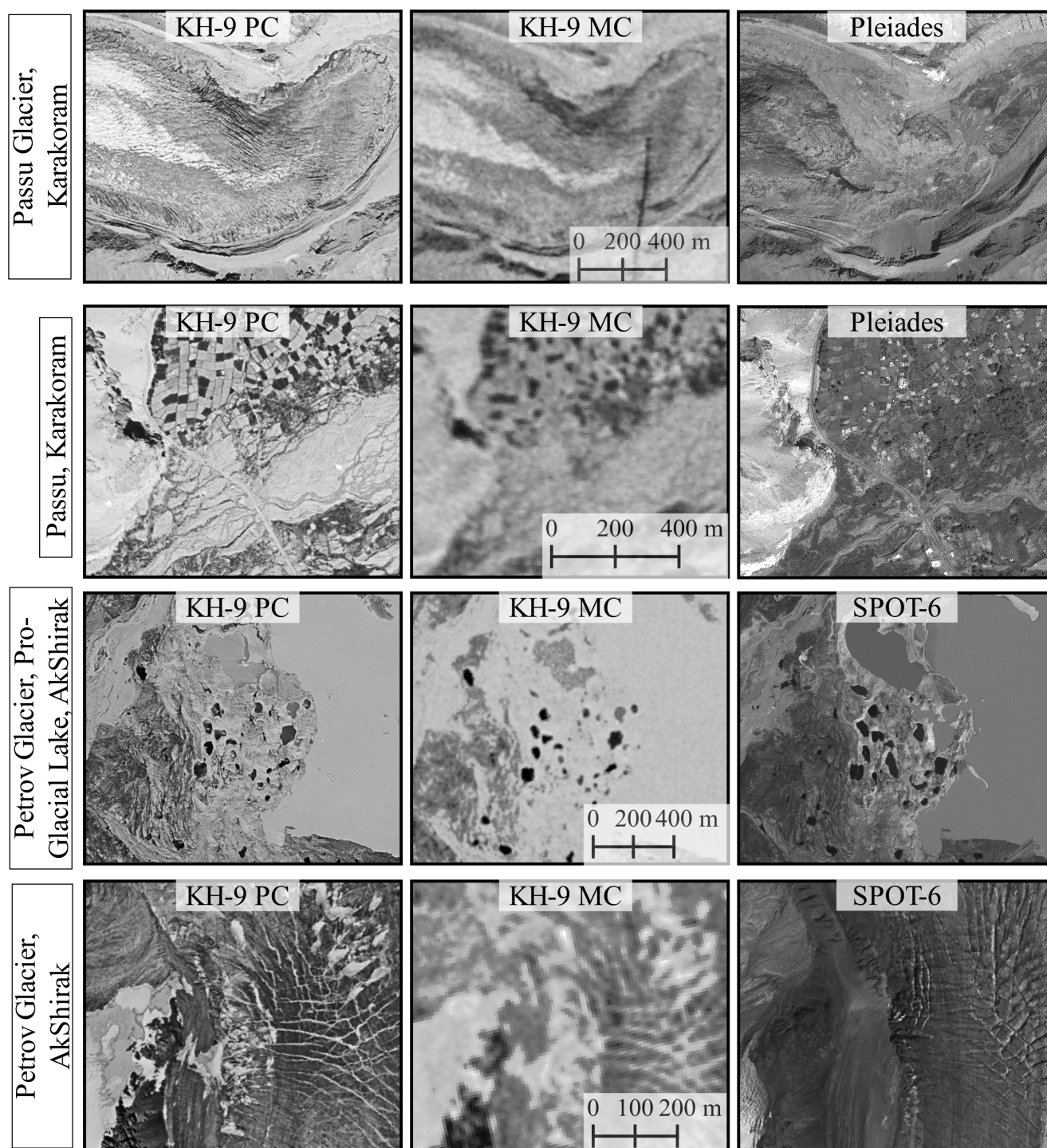
Figure S7. A visual comparison of the orthoimages of KH-9PC, KH-9MC with Pléiades and SPOT-6 images of Passu, Karakoram and Petrov Glacier, Ak-Shirak respectively.
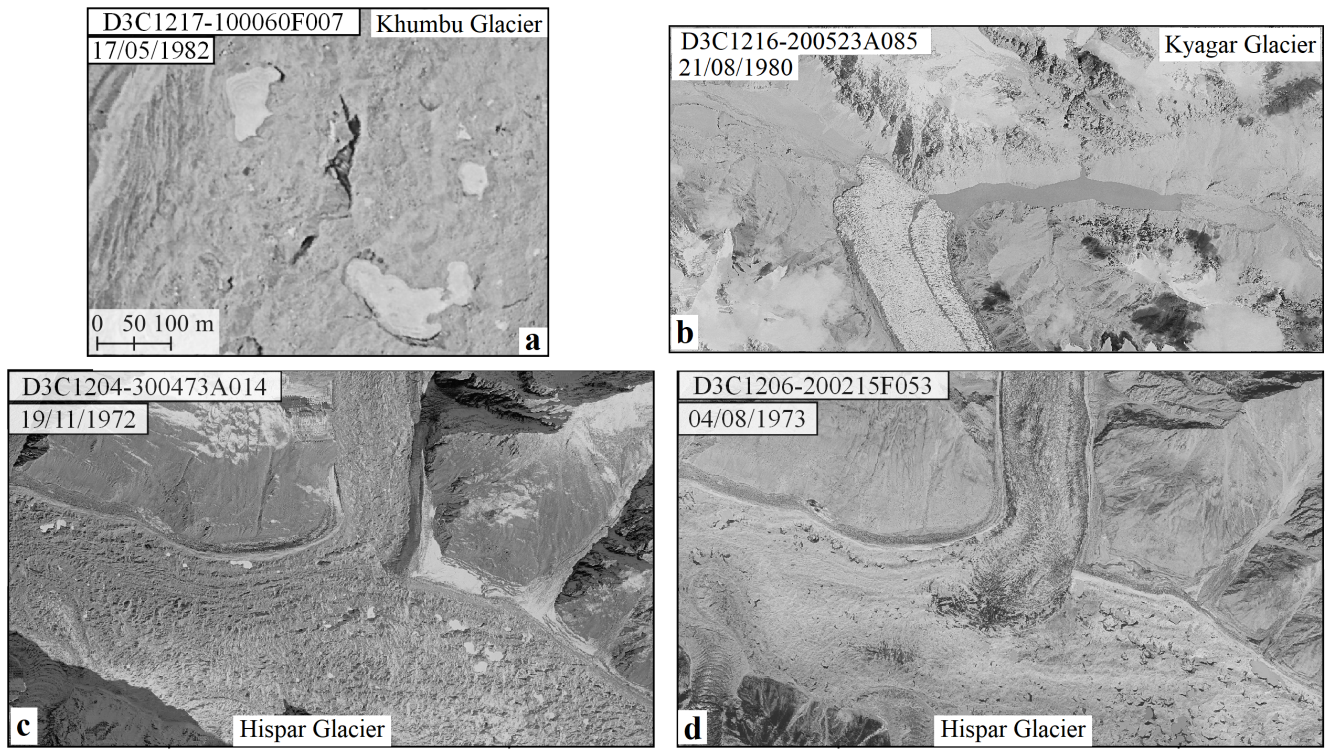
Figure S8. a) Supraglacial ponds and ice-cliffs on the Khumbu Glacier (Himalaya). b) Lake formed at the terminus of the Kaygar Glacier (Karakoram), which has caused several outburst floods. c,d) Hispar Glacier (Karakoram) tributary surge visible in multi-temporal KH-9PC scenes.