

Supplementary material for

Progressive advance and runout hazard assessment of a low-angle valley glacier in East Kunlun Mountains from multi-sensor satellite imagery analysis

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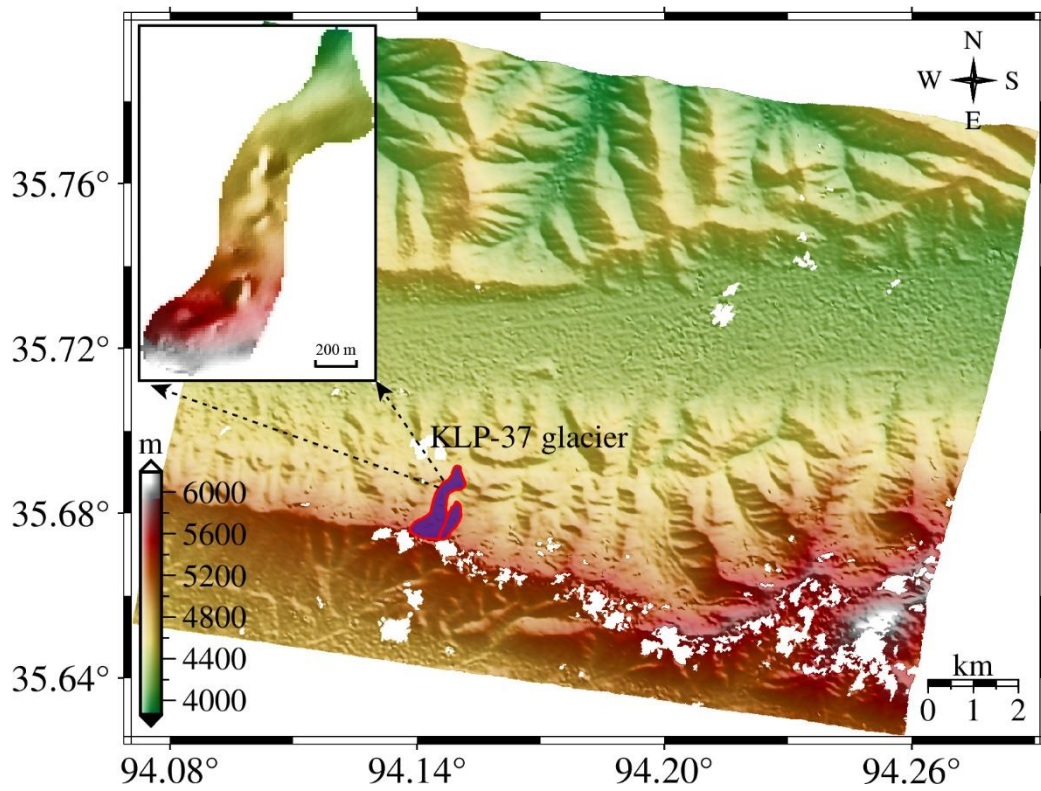


Figure S1: The KH-9 DEM generated from the Hexagon KH-9 stereo images. The inset shows the topography of the KLP-37 glacier.

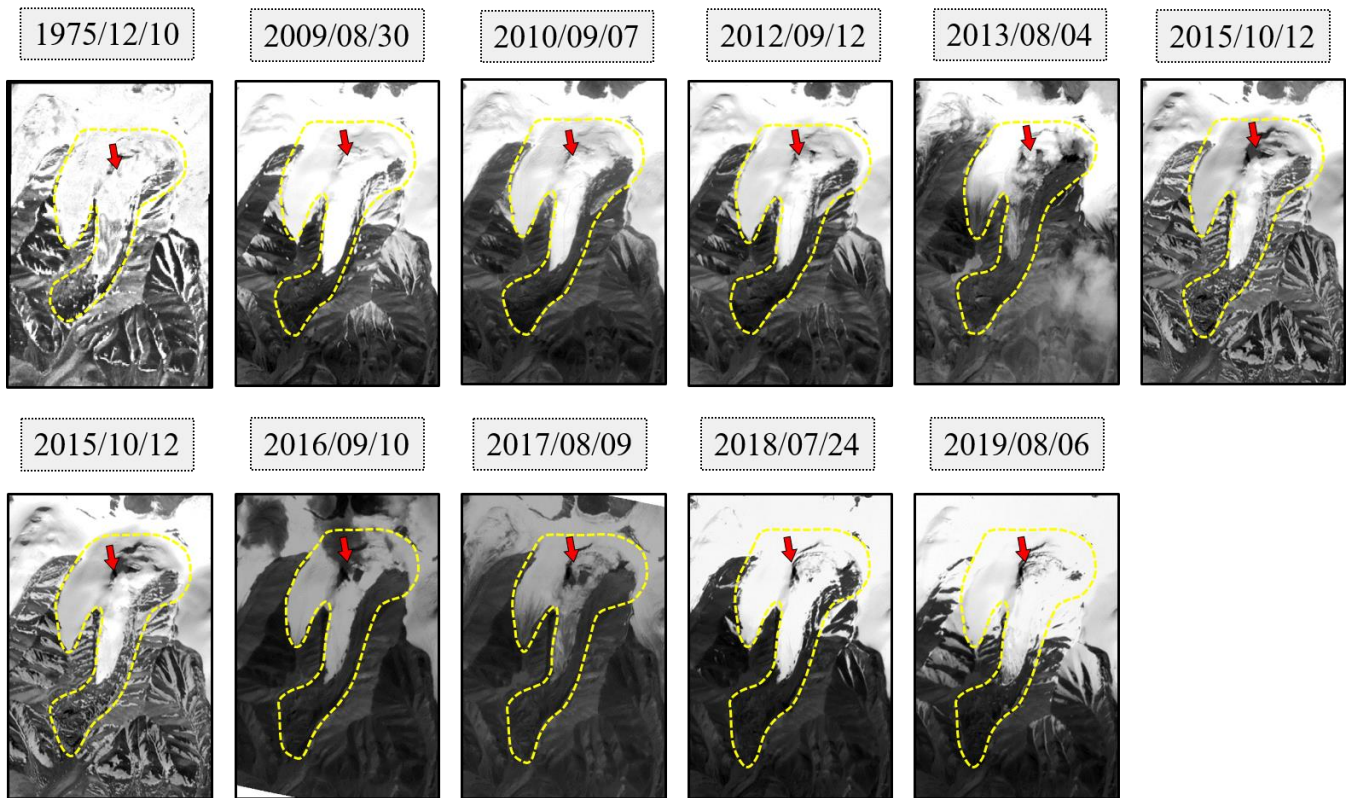
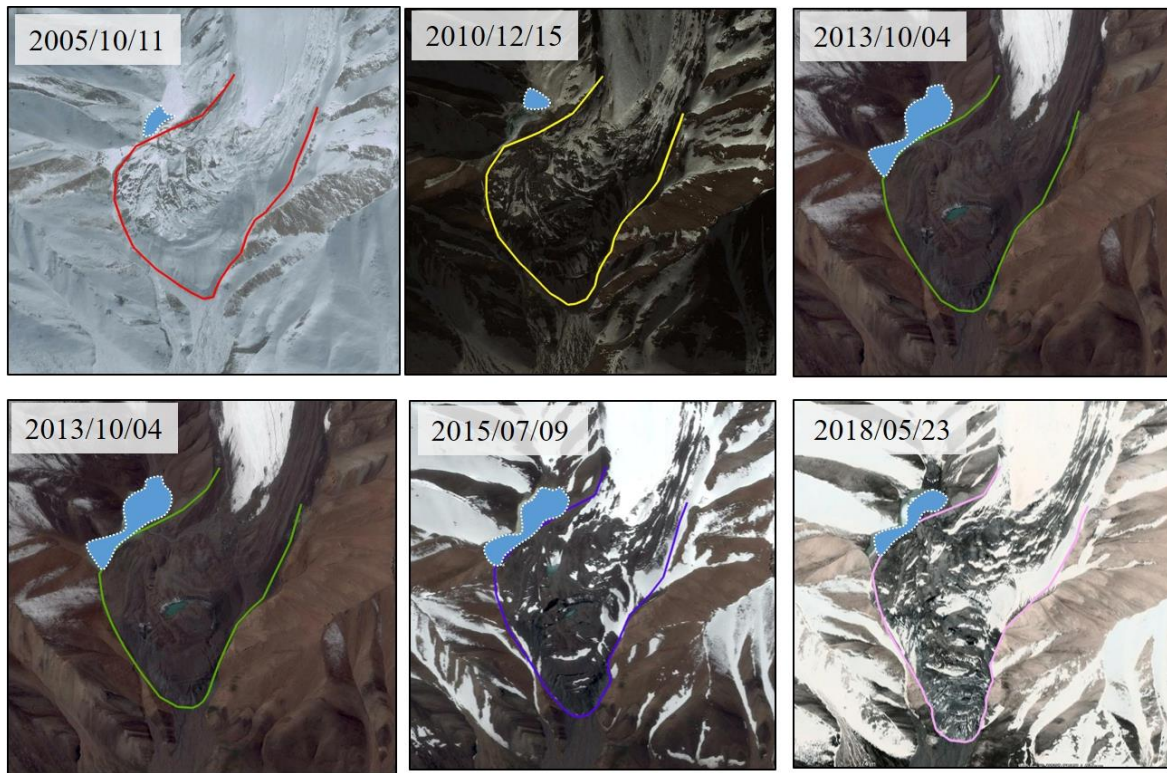


Figure S2: Time-lapse of the Planet optical images covering the full KLP-37 glacier (© Planet Labs). In each image, the yellow polygon outlines the glacier boundary, and the red arrow marks the place where crevasses develop in the glacier cirque.



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Figure S3: Time-lapse of the high-resolution Google Earth images covering the KLP-37 glacier tongue (© Google Earth™). The light blue polygon in each image delineates the ice-dammed lake, and the colored line indicates the glacier snout boundary.

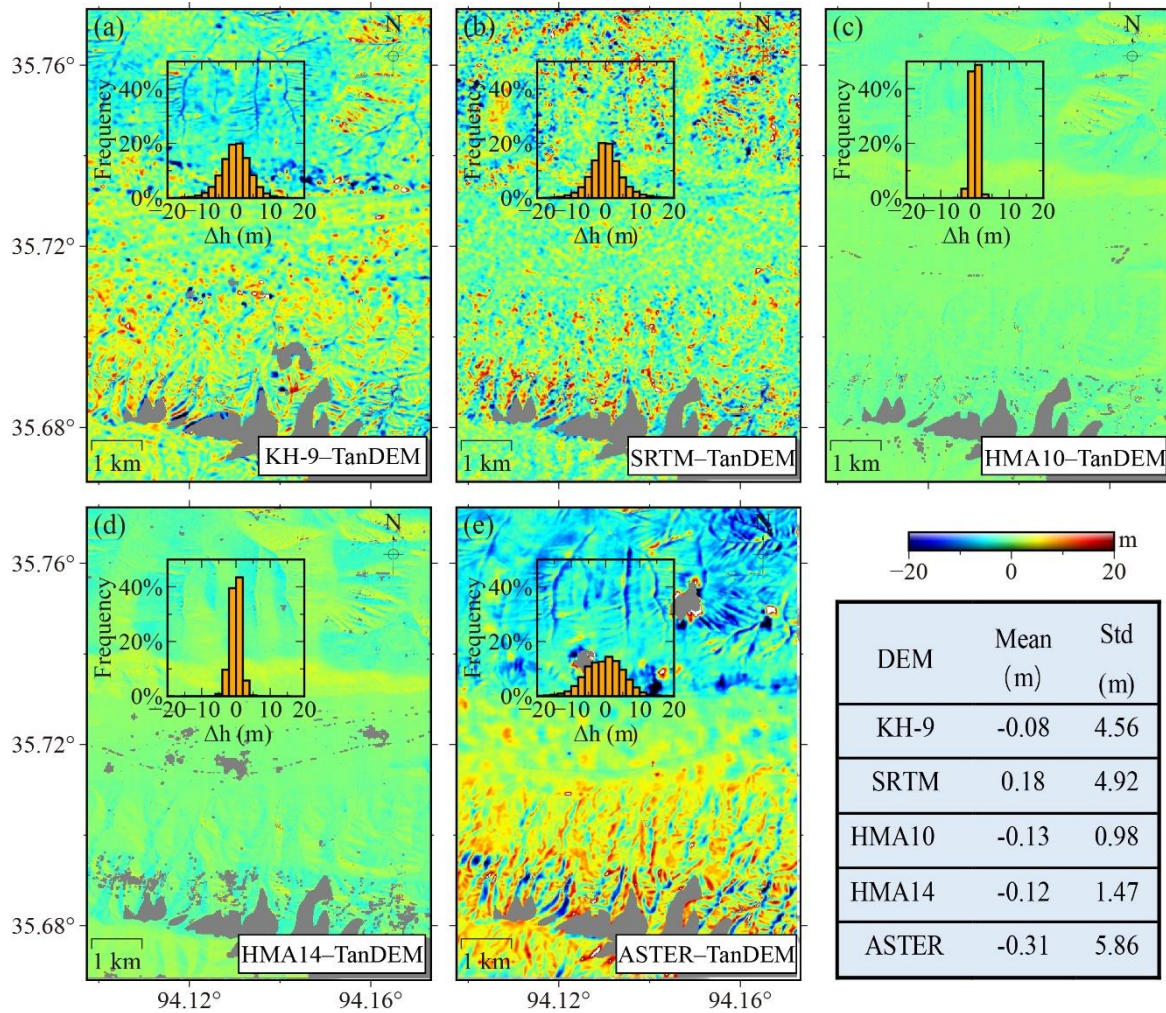


Figure S4: DEM differences over the off-glacier region between the (a) KH-9, (b) SRTM, (c) HMA2010, (d) HMA2014, (d) ASTER and the TanDEM. The inset histograms show the distribution of elevation differences. The table lists the mean values and standard deviations (std.) of the elevation differences.

Table S1. The area of the ice-dammed lake (see Fig. 4 & Fig. S3 for its location) estimated from optical satellite images.

Image date	Lake area (m²)	Image source
2005/10/11	6742±505	Google Earth
2006/07/11	15769±1545	Google Earth
2009/08/30	15826±1061	Planet Lab
2010/09/07	19040±1509	Planet Lab
2010/12/15	3745±229	Google Earth
2012/09/12	12761±1117	Planet Lab
2013/07/18	19018±1193	Google Earth
2013/08/04	17558±1322	Planet Lab
2015/07/09	17916±1522	Google Earth
2015/10/12	10069±951	Planet Lab
2016/09/10	17466±1711	Planet Lab
2017/08/09	21276±1646	Planet Lab
2018/05/23	9356±533	Google Earth
2018/07/24	20899±1201	Planet Lab
2019/08/06	17247±1084	Planet Lab

Table S2. Changes in coordinates of the KLP-37 glacier terminus point during different periods. Note ΔX and ΔY represent the coordinate offsets in east-west and north-south directions, respectively.

Image pairs	ΔX (m)	ΔY (m)	Distance (m)	Time interval (a)	Velocity (m·a⁻¹)
1975/12/10–2009/08/30	-28	213	153±9.43	33.66	4.55±0.28
2009/08/30–2010/09/07	8	-15	17±7.07	1.02	16.64±6.93
2010/09/07–2012/09/12	-22	22	31±7.07	2.02	15.37±3.50
2012/09/12–2013/08/04	8	12	14±7.07	0.89	15.72±7.94
2013/08/04–2015/10/12	-2	33	33±5.83	2.19	15.08±2.66
2015/10/12–2016/09/10	3	30	30±4.24	0.92	32.78±4.61
2016/09/10–2017/08/09	-1	31	31±4.24	0.91	34.08±4.66
2017/08/09–2018/07/24	10	28	30±4.24	0.96	31.37±4.42
2018/07/24–2019/08/06	-5	33	33±4.24	1.04	31.87±4.08