Supplementary Material

Unreported mass movements and future hazard in the Warwan basin, Jammu and Kashmir, Western Himalaya

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Table S1: Remotely sensed data used in the present study

	Product	Spatial resolution	Temporal coverage	Purpose
Satellite Data	Landsat 7 ETM+	15 m (Band 8 PAN) 30 m (Bands 1 to 5, and 7) 60 m (Band 6)	1999-2012	Glacier and lake mapping
	Landsat 8 OLI	15 m (Band 8 PAN) 30 m (Bands 1 to 7, and 9) 100 m (Band 10 and 11)	2013-2015	Glacier and lake mapping
	PlanetScope image	3 m	2016-2024	Mapping crevasses, ice calving, avalanche release areas, and runouts
	Google Earth collection	< 0.5 m	2018-2024	Glacier and lake mapping
	ALOS PALSAR DEM	12.5 m	Acquisition date: 2011	Terrain
Auxiliary data	Land Use and Land Cover (ESRI)	10m	2023	Manning's N
	Open Building	NA	2023	GLOF exposure.

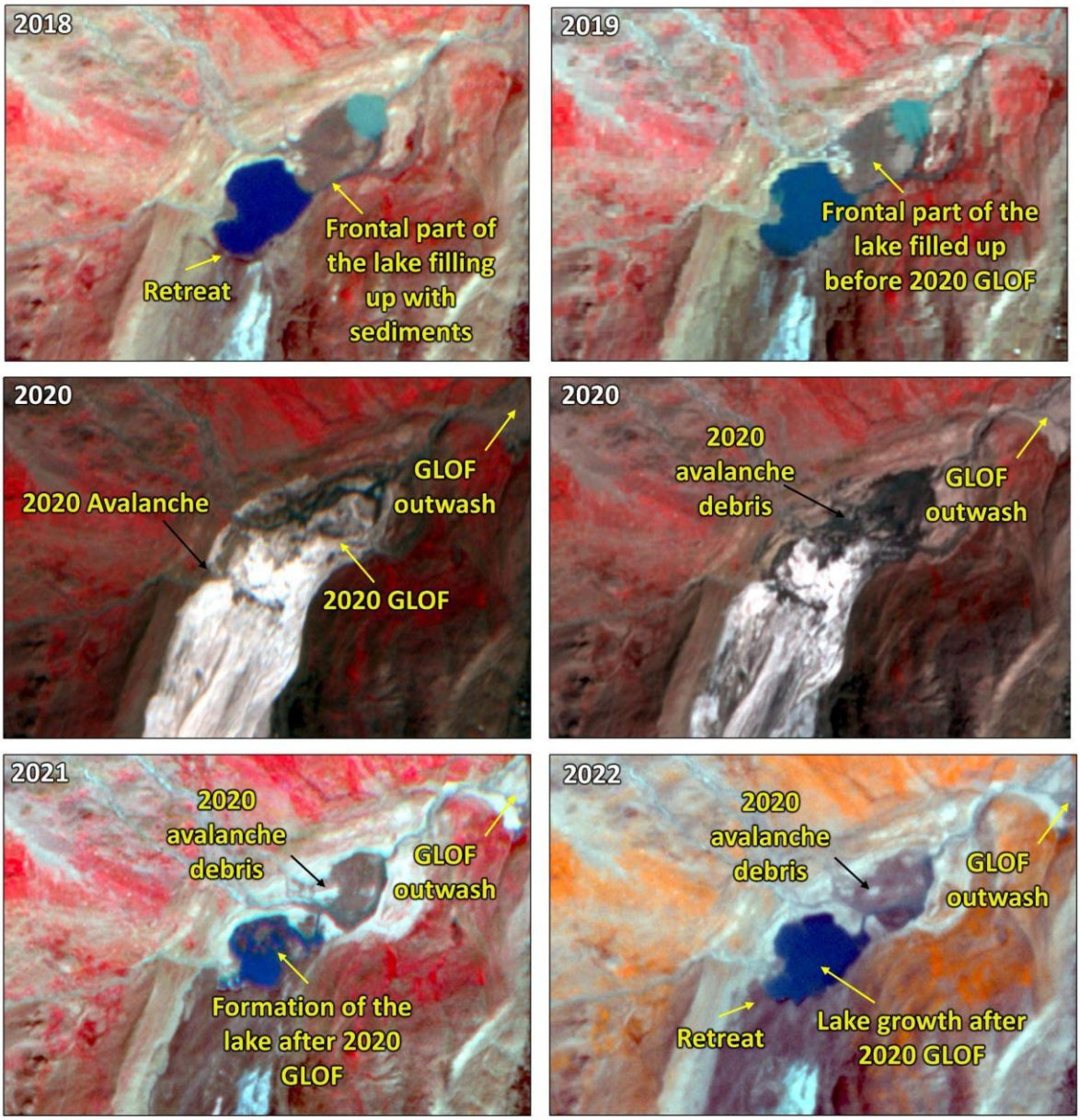

Fig. S1. Time-series images from 2019 to 2024 showing the avalanche-triggered GLOF event and post-GLOF changes in GL-A glacial lake. (Background images: ©PlanetScope).

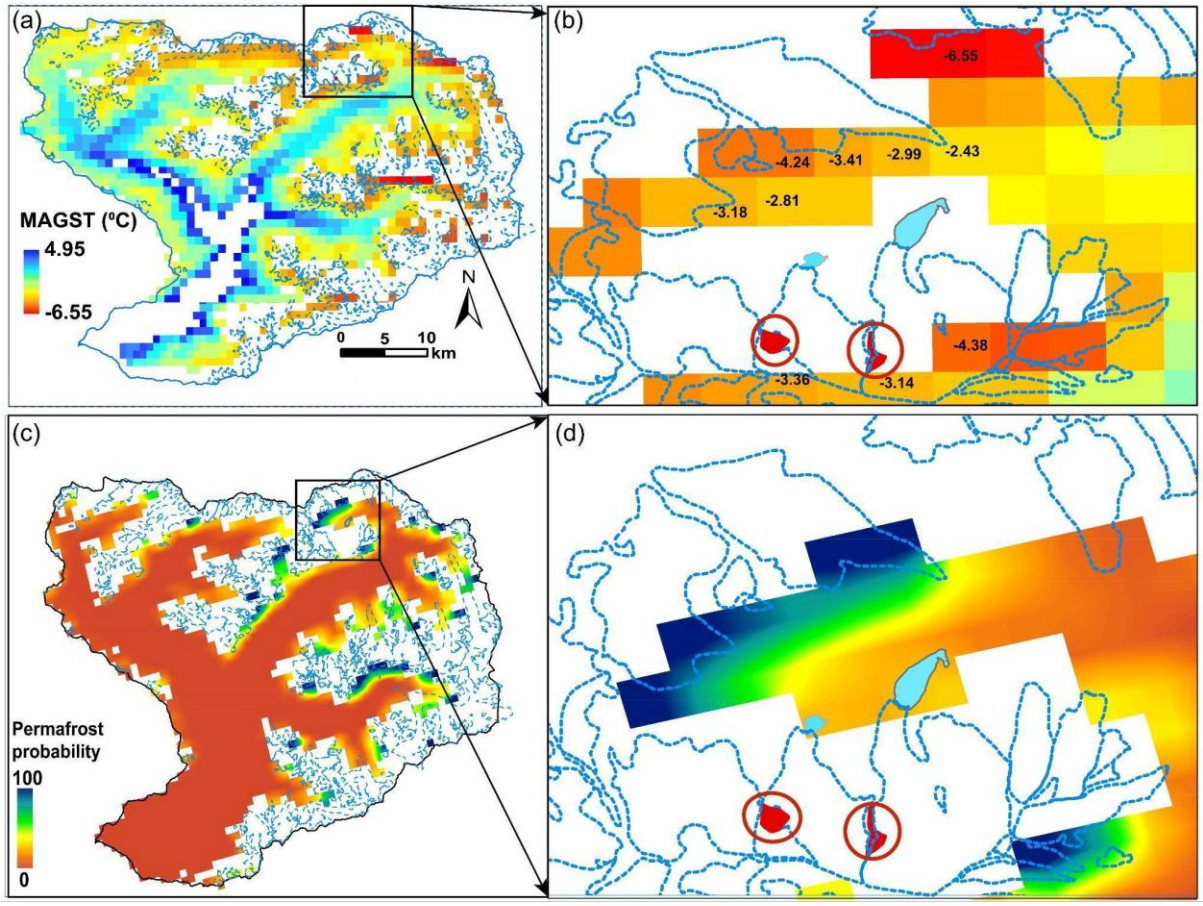

Fig. S2. Permafrost occurrence in the catchment and around the glacier complex (Ran et al., 2022). The red circle shows the failure zone of September 2005 and 2020 on GL-B and GL-A, respectively.