

Rapid Hazard Assessment Report

Location: Hassanabad, Hunza, Gilgit Baltistan

Country: Pakistan

Lat: 36.344394°N - Lon: 74.575001°E - Elevation: 2500 m a.s.l.

Date: between July and August 2025

Local time: NA

Hazard type: Collapse of glacier tongue, melt water flood

Imagery: (Source: Planet SuperDove, Sentinel-1, multiple dates)



Figure 1: Collapse of the subglacial tunnel that has formed to drain water from the original Shisper Lake. Collapse commenced in July and is ongoing in August.

Preliminary process understanding:

The Shisper Glacier has been surging since 2017 and as a consequence deposited large amounts of ice at its lower reach, upstream of the Hassanabad settlement (Bhambri et al., 2020; Muhammad et al., 2021; Rashid et al., 2020). The subsequent damming of a lake, resulted in multiple GLOF events since then (Muhammad et al., 2021; Shrestha et al., 2023). Below the ice a multitude of subglacial channels formed, that play a role in the surge as well as the drainage of melt water (Narayanan et al., 2025). The presence of additional glacier meltwater enlarges these channels by eroding the ice from below, while ice ablation lowers the glacier surface. This likely leads to the narrowing of the ice ceiling on top of these subglacial channels, which makes it possible for the ice roof to collapse down into the channel. One such channel at the very terminus has started to cave in from May 2025 and finally its ceiling collapsed from July 2nd onwards (Figure 1). The collapses cause the melt water to dam repeatedly, causing repeat floods as the temporary ice dams fail.

Since June, collapses of the glacier surface have also been detected in the upper reaches of the glacier, suggesting that further blocking and sudden release of water may also happen in the upstream with potential cascading consequences (Figure 2).

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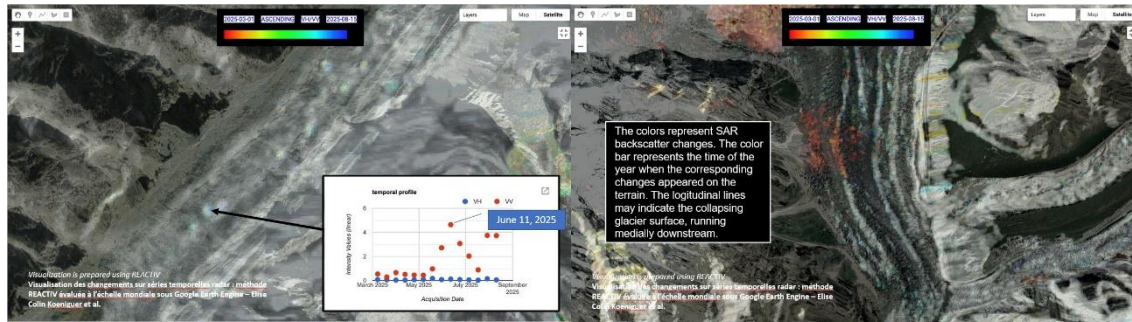


Figure 2: Changes detected at the upper part of the glacier detected by SAR, suggesting further collapse in the upper reaches of the glacier as well.



Figure 3: Highly cracked ice bridge weakened due to extensive melt and rise in temprature in the region. Collasing occures frequently damming the river temporarily.

Impact: In Hassanabad, the main road (Karakoram Highway) has been severely eroded (Figure 4), causing the road to be blocked. The local flour mill was evacuated, and multiple houses were severely damaged (as had happened during previous GLOF events). Some of the agricultural and non-agricultural land featuring fruit and non-fruit trees along the river runoff has also experienced erosion. Instances of erosion adjacent to river runoff are particularly evident in certain areas of Roshabad, Sherabad, and Sherived.



Figure 4: Erosion visible between 10th and 12th August 2025, caused by a flood event from the tunnel collapse at Shisper Glacier. The inset in the second panel, shows GLOF simulation results (shear stress) from 2021 (Muhammad et al., 2021), indicating high shear stress and rapid jumps in stress at the location where erosion is most visible.

Climate change context: Temperatures in Hunza are well above average during July and August, resulting in multiple flood events in the region. Higher summer temperatures lead to additional

melting, which enlarges subglacial water channels and lowers the ice surface, thereby weakening the ice that dams Shisper Lake.

Socioeconomic risk context: The KKH as well as the settlement is potentially threatened as erosion will continue to occur even if the tunnel has completely collapsed and no more floods occur, likely after August.

Early warning: In place at location of former lake but unclear operation¹.

Potential for recurring events: Flood events are expected to continue all of August (possibly at daily to weekly frequency) especially if temperatures stay high, until the tunnel through the terminus has completely collapsed. As the tongue will further collapse over winter, new damming and flood events (albeit possibly smaller) are also likely in 2026.

Literature context:

- Bhambri, R., Watson, C. S., Hewitt, K., Haritashya, U. K., Kargel, J. S., Pratap Shahi, A., Chand, P., Kumar, A., Verma, A., & Govil, H. (2020). The hazardous 2017–2019 surge and river damming by Shisper Glacier, Karakoram. *Scientific Reports*, 10(1), 1–14. <https://doi.org/10.1038/s41598-020-61277-8>
- Muhammad, S., Li, J., Steiner, J. F., Shrestha, F., Shah, G. M., Berthier, E., Guo, L., Wu, L., & Tian, L. (2021). A holistic view of Shisper Glacier surge and outburst floods: From physical processes to downstream impacts. *Geomatics, Natural Hazards and Risk*, 12(1), 2755–2775. <https://doi.org/10.1080/19475705.2021.1975833>
- Narayanan, N., Sommers, A. N., Chu, W., Steiner, J., Siddique, M. A., Meyer, C. R., & Minchew, B. (2025). Simulating Seasonal Evolution of Subglacial Hydrology at a Surging Glacier in the Karakoram. *Journal of Glaciology*, 1–26. <https://doi.org/10.1017/jog.2025.10078>
- Rashid, I., Majeed, U., Jan, A., & Glasser, N. F. (2020). The January 2018 to September 2019 surge of Shisper Glacier, Pakistan, detected from remote sensing observations. *Geomorphology*, 351, 106957. <https://doi.org/10.1016/j.geomorph.2019.106957>
- Shrestha, F., Steiner, J. F., Shrestha, R., Dhungel, Y., Joshi, S. P., Inglis, S., Ashraf, A., Wali, S., Walizada, K. M., & Zhang, T. (2023). A comprehensive and version-controlled database of glacial lake outburst floods in High Mountain Asia. *Earth System Science Data*, 15(9), 3941–3961. <https://doi.org/10.5194/essd-15-3941-2023>

¹ <https://www.reuters.com/investigates/special-report/climate-un-pakistan-glaciers/>