Supplement of The Cryosphere, 16, 1333–1340, 2022
https://doi.org/10.5194/tc-16-1333-2022-supplement

The Cryosphere Open Access EGU

Supplement of

Brief communication: An approximately 50 Mm^3 ice-rock avalanche on 22 March 2021 in the Sedongpu valley, southeastern Tibetan Plateau

Chuanxi Zhao et al.

Correspondence to: Wei Yang (yangww@itpcas.ac.cn)

Supplementary Figures

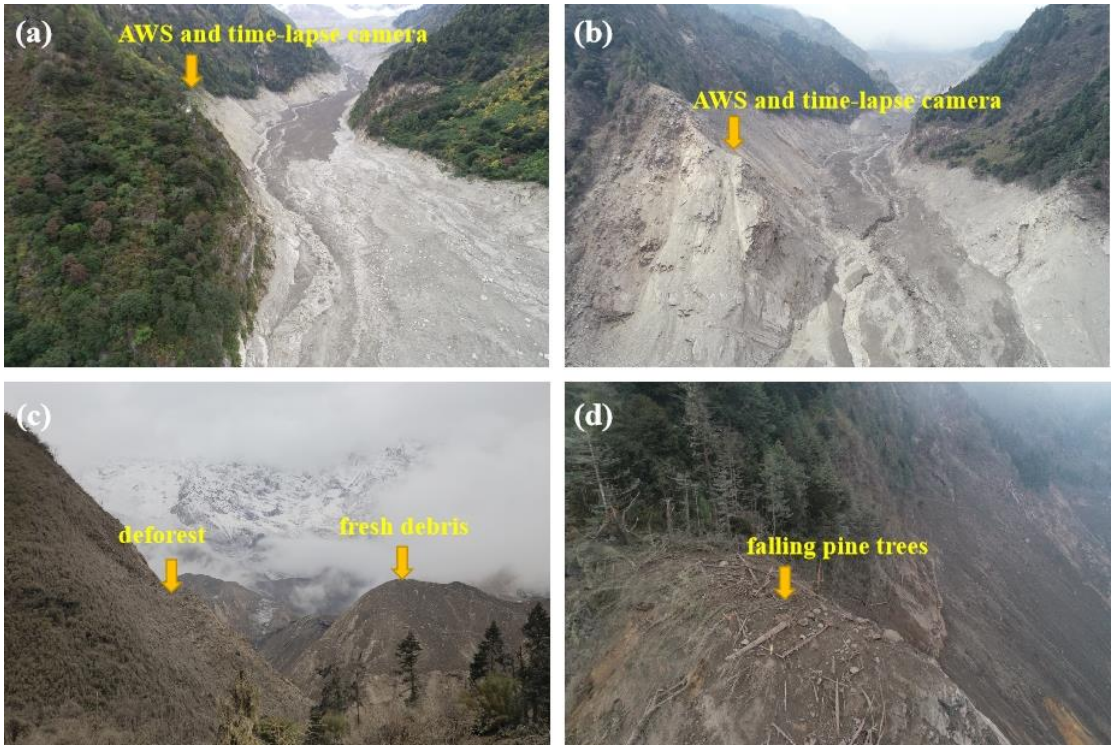

Figure S1. Photographs taken by DJI Phantom 4 unpiloted aerial vehicle showing the same view in October 2019 (pre-event) and on 25 March 2021 (post-event) looking into the Sedongpu valley （a,b) the dark fresh debris deposition and deforest region near the glacier terminus of Sedongpu Glacier (c), and the destroyed pine trees at the basin outlet (d).

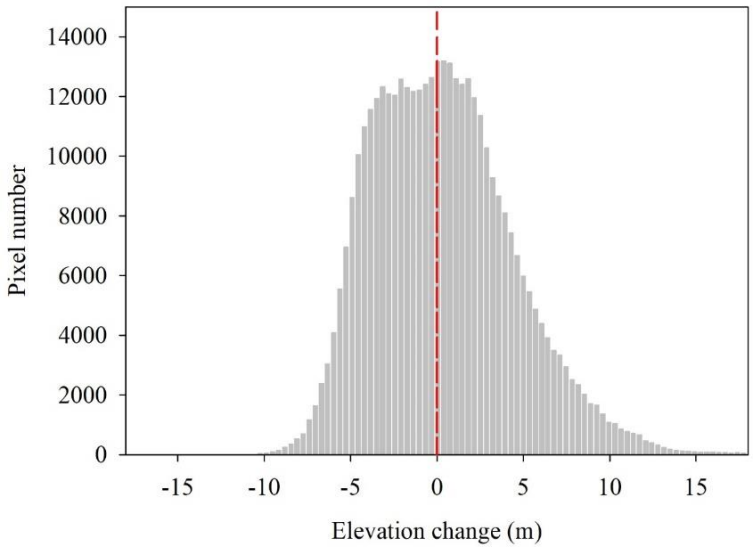

Figure S2. Histogram of elevation differences between 30 December 2018 and 30 April 2021 in the flat off-glacier terrain for the uncertainty estimation. The relative stable region in the left bank of Sedongpu valley were selected for checking the DEM differencing accuracy

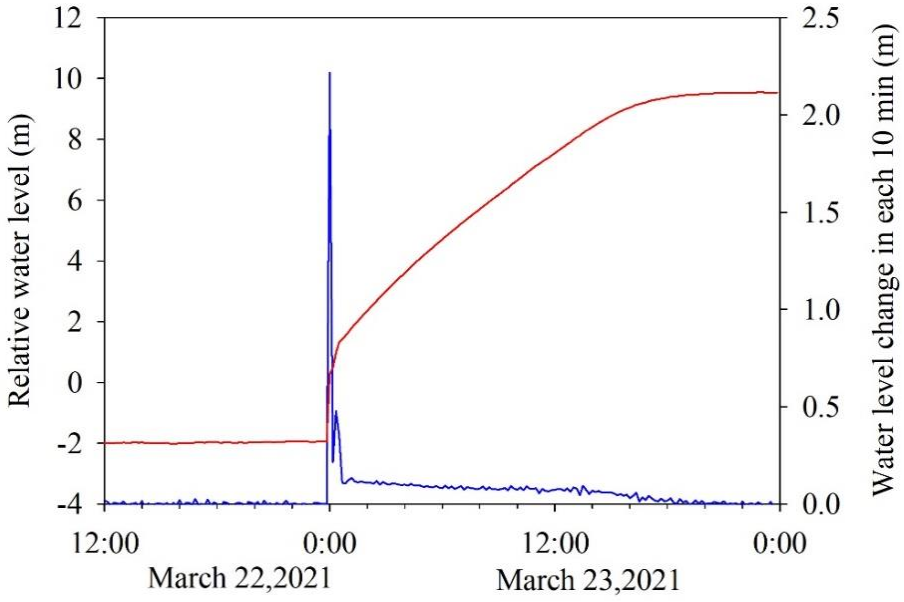

Figure S3. The relative water level (red line) and its changing rate at 10 min interval (blue line) when the Brahmaputra River was blocked by the ice-rock avalanche on 22 March 2021.

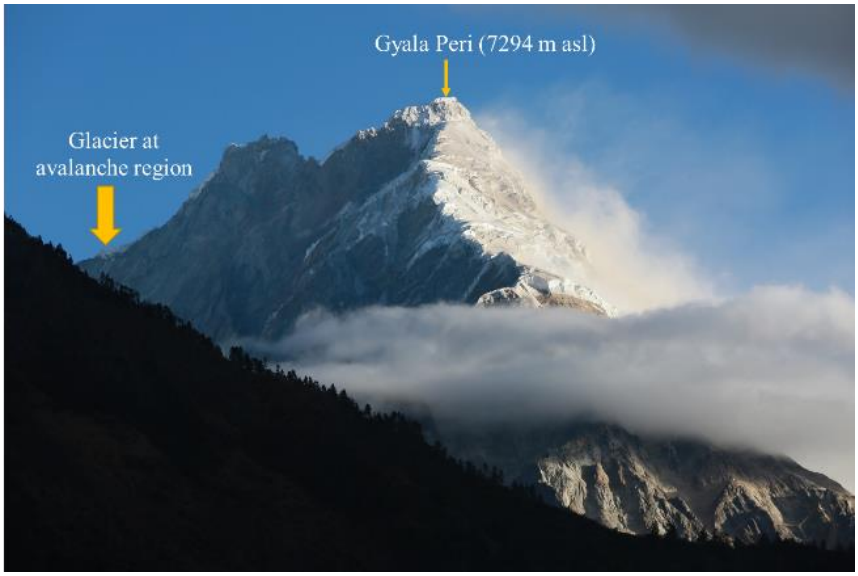

Figure S4. Photo taken on October 2019 showing perched ice mass on the mountain ridgeline before the 2021 ice-rock avalanche.

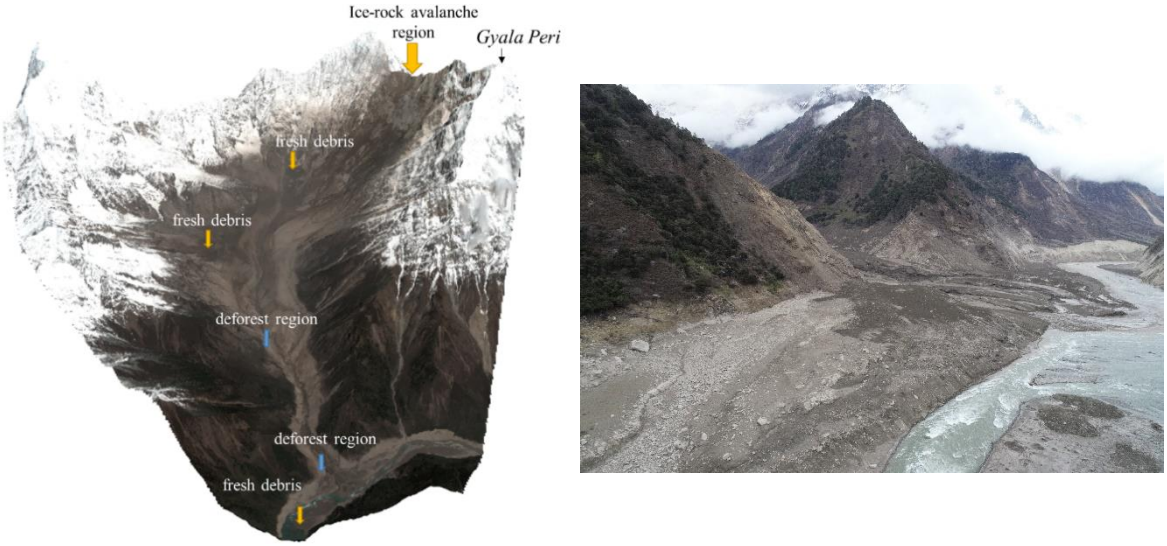

Figure S5. The 0.5m-resolution Pléaides image on 30 April 2021 showing the fresh debris deposition and a large extent of destroyed mature forest in the Sedongpu basin (left) and the photo taken on 25 March 2021 showing the less fresh avalanche debris near the outlet of Sedongpu Basin.

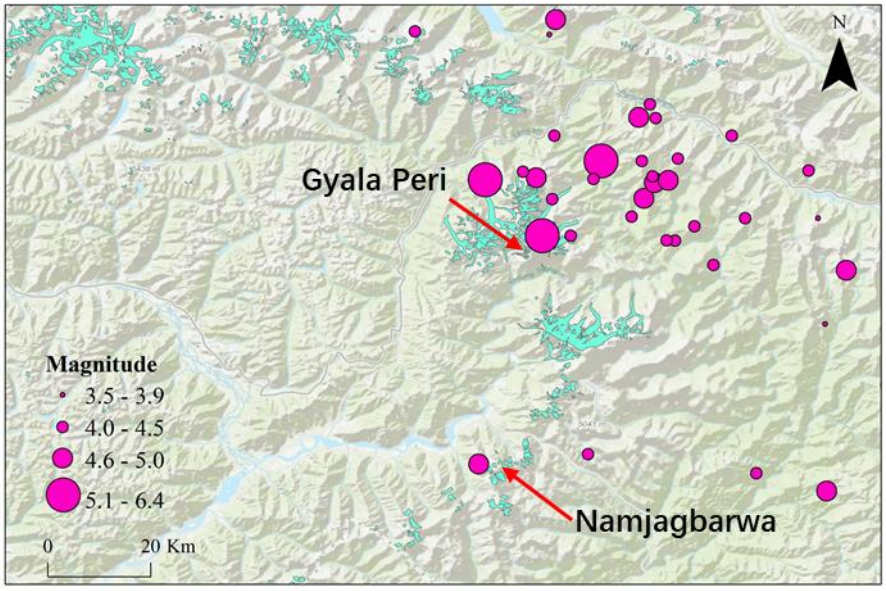

Figure S6. Spatial distribution of earthquakes with magnitude above 3.5 M during the period between 2000 and 2020 around two glacierized regions of Gyala Peri(7294 m asl) and Namjagbarwa(7782 m asl).

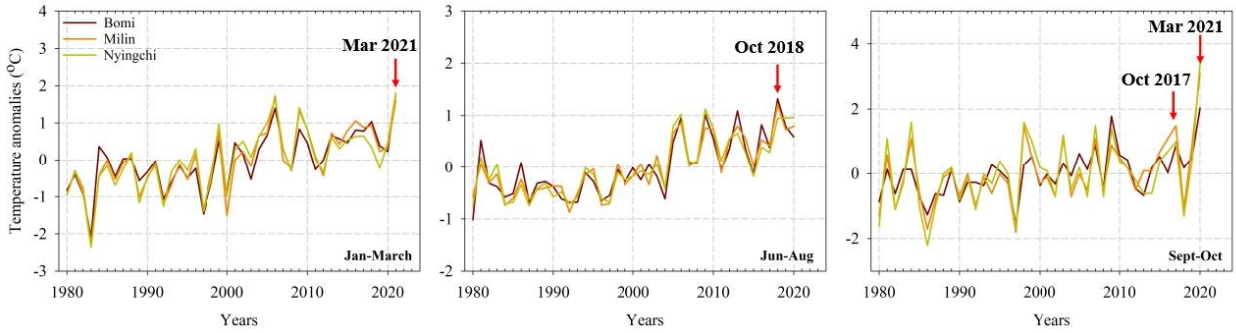

Figure S7. Anomalies of mean air temperature recorded by the three nearest meteorological stations (Bomi: 2737 m asl, Milin: 2950 m asl, Nyingchi: 2991 m asl), corresponding to the massive disasters in October 2017, October 2018 and March 2021.

Table S1. Information on previous disaster events in the Sedongpu valley

Time	Event type and source regions	Source Magnitude	References
Between 1969 and 1974	Possible ice avalanche-induced debris flow witnessed by the fresh deposits covering the Sedongpu valley and destroyed vegetation-covered residual dam	-	*Kääb et al. (2021); Li et al. (2022)*
Between 2013 and 2015	Ice-rock avalanche from northern ridge of Gyala Peri	~4 Mm^3	*Li et al. (2022)*
October 2017 and into 2018	Rock avalanche from northern ridge of Gyala Peri between 20 and 27 October 2017 Debris flow on 3 November 2017 Ice avalanche on 21 December 2017 Debris flow in January 2018 Debris flow on 26 July 2018	~50 Mm^3	*Kääb et al. (2021)* *Tong et al.(2018)*
Between 19 September and 26 October 2018	Ice-rock avalanche from the south-western flank of Gyala Peri	~9 Mm^3	*Kääb et al. (2021)*
17/18 October 2018 29 October 2018	Glacier detachments from the tongue of Sedongpu Glacier	~130 Mm^3	*An et al. (2021)* *Chen et al. (2020)* *Kääb et al. (2021)* *Tong et al.(2018)*
29 October 2019	Small scale ice-rock avalanche from northern ridge of Gyala Peri	-	*This study*
22 March 2021	Ice-rock avalanche from northern ridge of Gyala Peri	~50 Mm^3	*This study*

Supplementary reference

Li, W., Zhao, B., Xu, Q., Scaringi, G., Lu, H., and Huang, R.: More frequent glacier-rock avalanches in Sedongpu gully are blocking the Yarlung Zangbo River in eastern Tibet, Landslides, 1-13, https://doi.org/10.1007/s10346-021-01798-z, 2022.