

Comments by Sunwi Maskey on

Brief communication: A landslide-induced winter outburst from a frozen glacial lake in the Central Himalaya

Paper submitted to “The Cryosphere” by

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General:

This manuscript presents a case study of a winter outburst flood from a glacial lake, triggered by a rock avalanche. Two rock avalanches originating from a permafrost rock slope at the uppermost section of Pida Lake collapsed, with fragmented rock mass falling partly onto the frozen glacial lake surface and partly onto the glacier terminus. This generated a sub-ice impulse wave that triggered a flash flood. The documented event demonstrates that winter hazards in frozen lakes are likely to become more frequent as paraglacial slope failures increase, and that the occurrence window for GLOFs in high-mountain regions will widen as lake ice cover diminishes in winter. The manuscript emphasizes the importance of monitoring winter conditions and incorporating glacial lake ice phenology into GLOF hazard assessments.

The author should further describe the geological/geomorphological setting of the surrounding slopes and moraine to verify the presence of permafrost in the area and should include relevant climatic conditions of the region.

The case study offers an interesting account of the sub-ice impulse wave, which lifted the marginal lake ice near the end moraine, creating an "ice tsunami." The observed removal of river ice in the downstream valley further supports understanding of the flow mechanism. The combination of ground observations and remote sensing evidence used to reconstruct the event is well presented. Given these strengths, submitting this work to “The Cryosphere” as a Brief Communication is well suited to the journal's scope. A few minor comments and recommendations are provided below:

Minor remarks:

Line 18: broke (not broken)

Line 24: Better to rephrase as: “.... danger and to incorporate lake-ice condition into future GLOF risk-assessments/ early warning systems as one of the monitoring parameters under relevant safety protocols.”

Line 52: Better as: “...out of all 687 total GLOF events, less than five were from November to March”

Line 52/53: Slightly unclear as to the number of events from November to March. First, it is mentioned, that only 5 out of 687 were from November to March but then it is mentioned 325 date confirmed failures took place within the same month. Is the figure 5 in percentage?

Line 59: Better as: “overlaps with”

Line 70: Better write as: “It is a permafrost dominated catchment....”

Line 97: Check Figure label, must be “Fig 1 e-g”

Line 123-126: Maybe rephrase it as such: “The second rock avalanche with a volume of ~4.29Mm³ occurred from the same slope in the late afternoon of 16 December, leaving a distinct scraped edge line on the cliff wall. An estimated volume of ~2.86 Mm³ from this avalanche struck the frozen lake impacting the lake ice.”

Line 129-130: Maybe better as: “Following this collapse, another section of glacier ice (~250m×27m) across the entire glacier tongue calved away.”

Line 135: Sufficiently (not insufficiently)

Line 152/153: Better as: “...during which a noticeable drop in the air and lake water temperature were observed.”

The numbers and labels in Figure 1 are difficult to read, specially in 1 (a), a rearrangement or a separation of the graphs is recommended.