Surface morphology of fans in the high-arctic periglacial environment of Svalbard

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Objectives

Here we present an overview of the morphology of fans in the high-arctic environment of Svalbard to (1) increase our fundamental knowledge on the morphology of fans in high-arctic permafrost and snow avalanches and freeze-thaw cycles can be frequent. Do these conditions lead to a unique fan morphology in high-arctic periglacial environments?

Main fan types in the Longyearbyen area on Svalbard

Fluvial fans

Debris-flow fans

Snow-avalanche fans

Conclusions

- Periglacial conditions (e.g., frequent snow avalanches, freeze-thaw cycles, active layer melting and freezing) lead to unique fan morphology on Svalbard.
- The morphology of active fans is predominantly controlled by snow avalanches, in contrast with the ubiquity of rockfall-dominated cones in most other parts of the world.
- The primary morphology of inactive surfaces is rapidly bevelled and levelled by snow avalanches, solifluction and frost weathering.