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Supraglacial rock avalanches and their effect on glacial deposition

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Although rock avalanches occur commonly in glaciated valleys, it is only recently that their effects on the regime and final deposits of debris-covered glaciers have been recognized. The supraglacially-emplaced rock avalanche deposits are distinct features on glacial surfaces due to their different sedimentology and greater depth than other debris covers. The metre-scale thickness and large areal extent of these deposits significantly impact the glacier mass balance by preventing ice-surface ablation (Reznichenko et al., 2011). These effects are often neglected in estimating the total change of glacial mass balance and its response to the catastrophic event.

A supraglacial rock avalanche deposit can cause a glacier to form a moraine that will not reflect any current climate forcing. It is likely that only larger rock avalanche events (with respect to the size of the glacier) will result in a significant glacial response (e.g. advance or cessation of retreat). However, all supraglacially transported rock avalanche sediment will be recycled into moraines. The climatic signals extracted from the moraine chronologies of such glaciers may consequently have significant errors. The specific sedimentary characteristics of rock avalanche sediment such as agglomerates produced under high stress conditions (Reznichenko et al., in press) can be used to identify moraines that may have been formed from rock avalanche effect.

Reznichenko, N.V., Davies, T.R.H. and Alexander, D.J., 2011. Effects of rock avalanches on glacier behaviour and moraine formation. Geomorphology, v. 132, is.3-4, p. 327-338

Reznichenko, N.V., Davies, T.R.H., Shulmeister, J. and Larsen S.H. Accepted. A new technique for identifying rock-avalanche-sourced sediment in moraines and some paleoclimatic implications. Geology.