



## **Structural control and development of the ice buttressed Mueller Rockslide, New Zealand**

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Alpine slopes experiencing glacier recession and thinning, warmer temperatures, earthquake shaking and extreme environmental conditions, are likely to become unstable when the geological preconditions allow. Herein we describe the preconditions and likely preparatory factors that have led to the development of the 200 M m<sup>3</sup> Mueller Rockslide in Aoraki/Mt Cook National Park, New Zealand.

The Mueller Rockslide is an actively deforming landslide currently undergoing debuttrressing from the adjacent Mueller Glacier which has undergone over 100m of retreat and downwasting since the Little Ice Age. Limited knowledge on the processes and effect debuttrressing has on rockslopes is currently expressed in the literature and initial site investigations are necessary not only for further understanding of the role debuttrressing plays in causing rock slope instability but for understanding all drivers of movement. A combination of geomorphological and geotechnical mapping from geophysical, field, and remote sensing methods was used to characterise the rock mass, landslide characteristics, and morphological evolution of the slope instability. Our results suggest that Mueller Rockslide is a translational rockslide on the dip slope of an overturned anticline, moving slowly downslope into the Mueller Glacier, which has experienced significant transformation to its cross-sectional geometry from the encroaching rockslide. The landslide crown is defined by a large but discontinuous head-scarp which is a zone of intense toppling that is delivering rock debris to the main landslide body. Morphology of the southern extent of the landslide and movement data indicates rotational sliding is occurring sub-parallel to the main landslide body to the north. Surface and subsurface fracture mapping identifies deep, open fractures parallel to the head-scarp that may facilitate continued retrogressive enlargement of the rockslide towards a popular tramping hut. The Mueller Rockslide, is an example of a paraglacial rock slope failure, whose development and morphology is strongly influenced by the geological preconditions and effect of ongoing glacier retreat and downwasting. Continued development of the landslide poses not only a hazard to an alpine hut, but to downstream infrastructure should a blockage of the glacial valley occur.