



## **Observations of paraglacial processes on glacier forelands in Aoraki/Mount Cook National Park, Southern Alps, New Zealand**

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The large and extensively debris-covered valley glaciers in Aoraki/Mount Cook National Park immediate east of the Main Divide in the Southern Alps of New Zealand experienced a substantial frontal retreat and vertical downwasting during the past few decades, often connected with the development of a proglacial lake and retreat by calving. Their Holocene glacier forelands are characterised by huge lateral moraines and multi-ridged lateral moraine systems alongside smaller terminal moraines and frontal outwash heads. Placed within a very dynamic general geomorphological regime of various efficient process-systems, these Holocene glacier forelands are currently affected by substantial paraglacial modification. These paraglacial processes have already caused some consequences for the touristic infrastructure in the area and are likely to cause further problems for the accessibility of established tramping routes, tourist huts, and lookouts in the near and medium future.

One of the first steps in a project under development presented here is a detailed visual comparison of changes documented during the past 15 Years on the glacier forelands of Hooker, Mueller and Tasman Glaciers in Aoraki/Mount Cook National Park. It reveals considerable erosion especially on the proximal slopes of the lateral moraines by gully development and retreat of erosion scars at their crest in order of several metres in just a few years. Different processes contribute to high erosion rates, among others rill erosion connected to mid-slope springs that only are temporarily active following substantial rainfall events, efficient gully incision, and slumping. Although any quantification of the actual erosion rates is just preliminary and further studies are necessary in order to make reliable predictions for future development, the amount of paraglacial erosion in this environment is very high compared to other regions and highlights the current importance of the paraglacial process-system in the Southern Alps.