

Collapsing Glaciers

Andreas Kääh

University of Oslo, Department of Geosciences, Oslo, Norway

Glacier collapses combine the large volumes of glacier surges and the mobility of ice avalanches. The rapid detachment of large portions of a low-angle glacier is a rare process, and has first been documented in detail for the $130 \times 10^6 \text{ m}^3$ avalanche released from the Kolka Glacier in the Russian Caucasus in 2002, an event that was until recently considered globally unique. In 2016 however, two similar giant glacier collapses, $68 \times 10^6 \text{ m}^3$ and $83 \times 10^6 \text{ m}^3$ in volume, occurred from two neighboring glaciers in the Aru range on the Tibetan Plateau, raising critical questions about the causes of these detachments, and the potential for similar events to occur elsewhere. In particular the twin Aru events have raised the awareness for the possibility for such massive glacier detachments, and led to the (re-) discovery and reporting of several potentially comparable events worldwide. The Aru events have also contributed to modulate and advance the understanding of glacier stability, and of processes involved in a range of glacier dynamic instabilities – such as the substrate and the thermal regime at the glacier base. In this contribution, we review and compare a number of glacier collapses and glacier-dynamic instability events in order to discuss potentially common causes. We also discuss the potential role of climatic changes in the occurrence of glacier collapses and the consequences for hazard monitoring and management.