Mountain glaciers

Presently, only three mountains in Africa are covered by glaciers – the Mount Kenya massif (Kenya), the Rwenzori Mountains (Uganda) and Mount Kilimanjaro (United Republic of Tanzania). Although these glaciers are too small to act as significant water reservoirs, they are of eminent touristic and scientific importance. Like glaciers in other mountain ranges, the African glaciers reached a late Holocene maximum extent around 1880. Since then, they have been shrinking and are now at less than 20% of their early twentieth century extent (Figure 6). Retreat rates are higher than the global mean.[10] If current retreat rates prevail, the African mountains will be deglaciated by the 2040s. Mount Kenya is likely to be deglaciated a decade sooner, which will make it one of the first entire mountain ranges to lose glaciers due to anthropogenic climate change.[11,12]

Reduced snowfall amounts and frequency on the East African summits are related to the altered sea-surface temperature (SST) patterns across the Indian Ocean, that is, a change of the IOD. The impinging air masses increase thermodynamic stability, which impedes the formation of deep clouds and precipitation at the summit levels.[13,14] Establishing such teleconnections requires long-term in situ observations at the summits, which scientists – from the University of Innsbruck (Austria), University of Otago (New Zealand), University of Erlangen-Nuremberg (Germany) and University of Massachusetts Amherst (United States of America) – have maintained during the last two decades through considerable physical and financial efforts. The work is currently at risk of being abandoned as a result of increasing administrative barriers. The African glaciers' imminent loss demands more vigorous endeavours to keep in situ monitoring programmes alive; the large-scale atmosphere-ocean dynamics of the African glaciers are also relevant for global climate change monitoring.

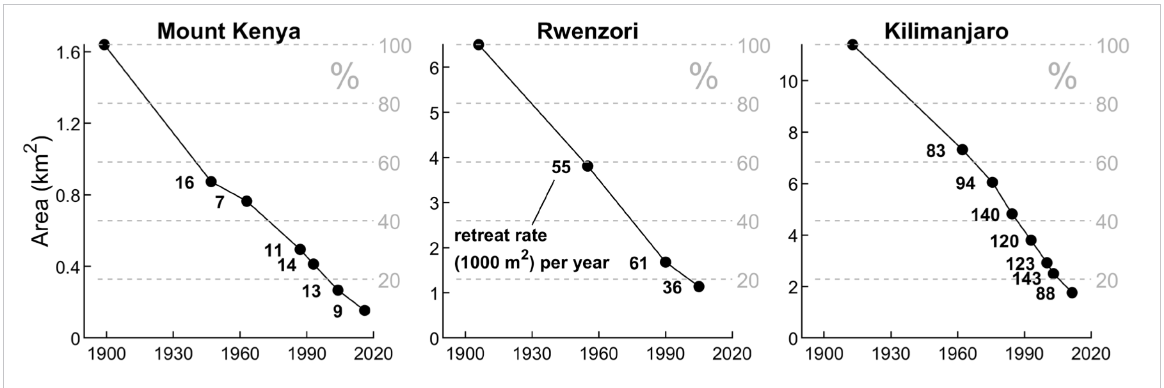

Figure 6. Changes of the glacier area on Mount Kenya, Rwenzori and Kilimanjaro. The total glacier area is indicated on the y-axes (note the different scales) and the timeline on the x-axes. Bold numbers depict the mean annual area change during the marked and the previous survey year. *Sources*: Mölg et al, 2013; Collier, E. et al., 2018: Recent atmospheric variability at Kibo summit, Kilimanjaro, and its relation to climate mode activity. *Journal of Climate*, 31: 3875–3891; Mölg, T. et al., 2020: Mesoscale atmospheric circulation controls of local meteorological elevation gradients on Kersten Glacier near Kilimanjaro summit. *Earth System Dynamics*, 11: 653–672.

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