



Rapid decline of the ice volume of tropical Lewis Glacier, Mount Kenya, during the last half-century

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Lewis Glacier on Mt Kenya has a unique history of detailed study, making it the best documented tropical glacier. Here we present ice thickness measurements of Lewis Glacier in 2010, made by ground penetrating radar, and ice volume estimates based on previous surface topography maps for the years 1963, 1974, 1983, 1993, 2004, and our own survey for 2010. Total ice volume in 2010 is $2.00 \times 10^6 \text{ m}^3$ with a mean (maximum) ice depth of 19 m (46 m), which is one order of magnitude larger than previously published values. Since 1963, $10.96 \times 10^6 \text{ m}^3$ (85%) of the ice volume has been lost, with a corresponding maximum surface lowering of 70 m close to the current glacier terminus. Glacier area decreased from $0.39 \times 10^6 \text{ m}^2$ (1963) to $0.11 \times 10^6 \text{ m}^2$ (2010). The rates of mean annual mass balance, as derived from decadal volume changes, were smallest from 1963-1974 (-0.28 m water equivalent (w.e.)/a) and from 2004-2010 (-0.26 m w.e./a) and greatest between 1993 and 2004 (-2.29 m w.e./a), indicating the most rapid ice loss around the turn of the century.