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KILIMANJARO ICE CLIFF MONITORING WITH CLOSE RANGE PHOTOGRAMMETRY

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Abstract. The glaciers on the summit plateau of Kibo, the main peak of the Kilimanjaro massif (3 ° S, 37 ° E, 5895 m a.s.l.) in Tanzania, are characterized by steep ice cliffs at their margins. These form-persistent cliffs continuously retreat and, consequently, govern the decrease in plateau glacier area. In order to quantify the ice cliff recession and study their morphology, close-range terrestrial photogrammetry combined with automatic stereo matching techniques was used to derive high resolution digital surface models of a south-facing “sample cliff” at four different dates. Results confirm, firstly, the annually bimodal nature of the recession being 15 cm/month during a 4.5 month sunlit phase and 2 cm/month during the remaining 7.5 month shaded phase, and, secondly, the tendency towards an “ideal cliff orientation”, which is either south- or north-facing and about 70 ° -75 ° steep. Moreover, the hypothesis of a predefined decay period for the plateau ice is supported by this study and it is shown that terrestrial photogrammetry is not only cheap and lightweight but also very suitable for ice surveys at the decameter scale.

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