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# Deglaciation of the Central Caucasus Mountains, Russia / Georgia, in the 21st century observed with ASTER satellite imagery, based on a new glacier inventory.

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This paper examines changes in surface area and terminus retreat of glaciers in the Greater Caucasus Mountains between 2001 and 2010 using ASTER imagery. Previously, assessments of glacier changes using satellite imagery were conducted at larger time steps of 20-50 years during which magnitude of glacier change significantly exceeded measurement errors, which partly originate from co-registration of different types of images. Assessments at shorter intervals required data of aerial surveys which were not recently available for the Caucasus. The use of consistent high-resolution imagery such as ASTER significantly reduces uncertainties in measurements of glacier shrinkage and retreat and enables assessments at decadal intervals which are important for both scientists and regional decision-makers. Two ASTER images acquired on 15 September 2001 and 29 September 2010 covering central sector of the Greater Caucasus Ridge and the Elbrus glaciated massif were used for glacier mapping. Outlines of 178 glaciers were mapped of which 107 glaciers are located on the northern macroslope of the Greater Caucasus and on Mt Elbrus in the Baksan River catchment (Russia) and 71 are located on the southern macroslope in the Inguri River catchment (Georgia). In total, glaciers lost 5% of their area. Glacier wastage was higher in the Inguri catchment at 5.6%; in the Baksan catchment, glaciers lost 4.3% of their area. The majority of glaciers exhibited wastage in the ablation zone, however, glacier shrinkage and emergence of rock outcrops in the accumulation area were evident at a number of glaciers. The retreat of glaciers termini reaching 300 m. Glacier mass balance observations at two reference glaciers, Djankuat and Garabashi, indicate strong reduction in cumulative mass balance since 1998 providing further evidence on glacier wastage. The observed glacier wastage is consistent with a strong climatic warming observed in the Caucasus since the late 1970s. In the southern Caucasus, glacier wastage is enhanced by a negative anomaly in the accumulation season precipitation observed in the 1980s-2000s.