Geophysical Research Abstracts
Vol. 19, EGU2017-2393, 2017
EGU General Assembly 2017

Cosmogenic 36Cl glacial chronologies of the Mount Geyikdağ (Southern Turkey)

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We report the timing of advances of glaciers during the Late Pleistocene in the Mount Geyikdağ (36.53oN, 32.10oE, 2877 m), situated in the central Taurus Mountains of Turkey. Several piedmont glaciers originated from the Geyikdağ ice cap (∼40 km2), situated between 2350-2650 m above sea level (a.s.l.) and deeply carved the north-facing hill slopes before reaching the Namaras Valley (2000-2050 m a.s.l). The hummocky moraines resulted from in-situ deposition of stagnant glacier ice where debris cover was heterogeneously distributed on the glacier surface. Boulders from hummocky, disintegration, lateral and terminal moraines from the Namaras, Susam, Çimi and Güneycik valleys (1750-2200 m a.s.l.) were dated by terrestrial cosmogenic nuclide (TCN) 36Cl surface exposure dating. A total of seventy-four boulder ages indicate at least four phases of deglaciation during the Late Pleistocene.

Our results indicate that during the Last Glacial Maximum (LGM), glaciers reached their maximum positions at 20.4±4.4 ka and 19.5±2.5 ka ago (1σ; ka = 1000 calendar years). This date is in accordance with the local glacial maximum, represented by piedmont glaciers (18.0±1.1 ka) in the northern side of the mountain. Glaciers started to retreat after the LGM and shortly stabilized or re-advanced three times before they completely vanished out. The first stage ended between 17.1±3.8 ka and 14.2±1.5 ka ago during the Late-glacial. Later, glaciers re-advanced during the Younger Dryas stadial (between 12.7±2.1 ka and 11.6±1.3 ka ago). The last glaciation occurred during the Holocene 8.9±1.2 ka and 5.2±1.0 ka ago. Later, glaciers mostly vanished from the study area, but a few rock glaciers developed during the Late Holocene.

Additionally, from a well-preserved moraine loop and a rock glacier inside that loop, we also obtained contrasting TCN 36Cl inventories. We measured 4 samples from each landform and obtained the weighted average ages of 5.3±1.2 ka and 11.8±1.5 ka for the moraine and the rock glacier respectively. We attribute this unlikely situation to excessive inheritance within the rock glacier boulders as boulders from different landforms might have considerably different prior exposure histories even within a closely related glacial/periglacial environment. This work is supported by TÜBİTAK #112Y139 project.