Geophysical Research Abstracts
Vol. 16, EGU2014-4935, 2014
EGU General Assembly 2014

Extensive glaciations in Anatolian Mountains during the global Last Glacial Maximum

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As a response to the changes in the atmospheric circulation at the beginning of the Last Glacial Maximum (LGM), equilibrium line altitude commenced to decrease and, thus, also Anatolian glaciers started to expand. Depending on the altitude of the mountains and size of the accumulation area, the advance began earlier in the eastern Black Sea Mountains prior to 27 ka. In the Kavron, Verçenik, Başyayla and Çoruh valleys, glaciers terminated at an altitude of 1600 m with a length of > 10 km. In eastern Anatolia, 15 km-long glaciers descended to 1400 m from the extensive ice-fields of the Munzır Mountains. In central and western Anatolia, glaciers were smaller (ca. 6 km-long) except for Dedegöl Mountains. There, a glacier length of around 9 km and an advance down to 1450 m were mapped. At Mount Erciyes glaciers began to advance down to 2150 m prior to 25 ka. In southwestern Anatolia, beginning of the LGM advance was documented at ca. 22 ka at Mount Sandıras, where a 1.5 km-long cirque glacier terminated at an altitude of 1900 m. Meanwhile, valley glaciers descended to 2050 m at Mount Akdağ, 6 km down from the peak. In northwestern Anatolia, one paleoglacier commenced to grow prior to ca. 25 ka at Uludağ and it reached a length of 5 km and an altitude 1600 m. In brief, Anatolian glaciers reached their maximum extent between 27 and 21 ka during the global LGM.

The LGM deglaciation resulted in the collapse of Anatolian glaciers. The deglaciation was almost synchronous in all mountains. Climatic fluctuations at the end of LGM have produced only small glaciers, which are much more sensitive to temperature and/or precipitation changes than larger glaciers. Our recent study at Uludağ revealed that the glaciers re-advanced at least three times until 19 ka after their maximum extent at around 21 ka. We explain this dynamic behaviour as a response mechanism to different phases of the winter indices of the North Atlantic Oscillation, which resulted in an enhanced oscillatory pattern of atmospheric circulation at the end of LGM.