



Ice core isotopic studies and paleoclimatic reconstruction in the Caucasus mountains

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Here we present the results of isotopic investigations of several ice cores obtained in the Caucasus mountains in southern Russia, Mount Elbrus and Mount Kazbek. We also discuss the isotopic composition of the upper part (106 m) of the Elbrus deep ice core (182 m) obtained in 2009. According to our estimates, this core covers the last 400 years. There is a distinct seasonal cycle in the isotopic composition record of these cores that allows the dating of the cores based on the annual layers counting.

The age scale was corrected using ammonium concentration data and information on precisely dated layers of dust. The mean year and mean seasonal values of the isotopic composition and accumulation rate were calculated over a period of 89 years (1924-2012). These values were compared with available meteorological records from 13 weather stations in the region, and also with atmosphere circulation characteristics, back-trajectories calculations and GNIP data. We worked out the possible mechanisms of the formation of the isotopic composition of precipitation and of ice cores in the Caucasus region.

It was shown that in the summer season, the isotopic composition depends on the local temperature, while in winter, it depends on the atmospheric circulation. The snow accumulation rate correlates well with the precipitation rate in the region all year round. We also reconstructed the precipitation rate from 1924. These results will be used to interpret the isotopic composition data from the bottom part of the Elbrus deep ice core.

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