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Signs of glacial activity in the mid-height mountains of Ukrainian Carpathians

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The prevailing opinion is that in Ukrainian Carpathians, glaciers existed only in the massifs of Chornohora, Svydovets and Chyvchyn, where distinct erosional forms of glacial excavation (glacial cars, cirques, troughs) and moraines have been preserved. Most researchers accept the snow line's lowest altitude for the Ukrainian Carpathians in Pleistocene at 1400-1500 m, and sometimes 1200 m (Lushchyk, 2017). Our observations on the Chorny Dil Range, situated in the upper reaches of the White Cheremosh River (the highest mark is 1483 m), indicate the possible existence of glacial processes here in the past. The well-rounded boulders of the quartzite (metamorphized quartz conglomerate), up to 1.5 m in diameter, can be observed on the flatted top of the range, on the upper part of adjacent slopes, and in the channel of the Sarata River, at the eastern foot of the range. The source of these rocks is the Permian basal stratum of the conglomerate-breccia, up to 30-50 m thick.

Partly, the long-distance displacement of the rock material and deep carving of the gorges in hard metamorphic rocks of the range could be provided by avalanche transportation. The hard rocks' composition of the Chorny Dil Range caused its slopes' steepness, like the Rodna Mts. Due to the steep slopes, snow accumulation caused by avalanches could occur not only at the top of the range but also in the valleys of Sarata and Perkalab. Nowadays, avalanches occur even in low mountains if the slopes are enough steep and deforested (Ridush et al., 2020). The observation of modern snow accumulations caused by avalanches can be used for the modelling of similar processes in the Pleistocene.

Keywords: glacial processes, Ukrainian Carpathians, Late Pleistocene, glacial boulders, avalanches

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