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Unclassified nival sediment's grain size distribution

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Landforms related to nival accumulation are typical for periglacial and mountain environments. Diagnostic criteria between nival and glacial deposits and landforms are well known. However, even though nival processes were researched for a few decades, they are still not fully recognized. During the field studies in the Central Asia Mountains landforms that cannot be classified according to the diagnostic criteria were identified.

The studies were carried out in the Fann Mts. (Tajikistan). The highest mountain in the range (Chimtarga Peak) is 5489 m a.s.l., valley bottoms are between 1900 and 3600 m a.s.l. The section of the Sarytag Valley in which the landforms were found is about 2400 m a.s.l. The climate of this area is dry-subtropical. The average annual precipitation in the valley bottoms is approx. 250-300 mm. Average annual temperatures for neighboring stations are 6.6°C at 2204 m a.s.l., and 0.7°C at 3143 m a.s.l.

Geomorphological mapping was carried out in the section of the valley, where nival deposits were noted. Particular attention was paid to the sequence of sediments, their position, as well as their fractional structure and composition. From two outcrops samples of sediments were taken, as well as photographic documentation has been made. Grain size distribution has been analyzed with the use of a laboratory test sieve (sieves sizes: 16, 8, 4, 2, 1, 0,5, 0,25, 0,125 mm), with dry sediment samples. BaseGRAIN software was used for gravel and stones grain size determination on the photo images base.

Nival sediment is made of an unsorted sand-silt matrix with unrounded stones and boulders in it. The pebble/boulder part varies depending on the location, ranging from 10% to 50% of the material volume. There are boulders having a diameter of 1–3 m within the deposits also. No stratification was found. The absence of erratics and any foreign material confirms the local origin of the sediment. The thickness of the formation varies significantly, from 0.5 to 12 m.

Grain size distribution of matrix of both landforms, marked as A and B, do not have any significant domination of any grain size. The highest percentage on landform A, 13,6% is a medium pebble (φ 4-8 mm), and 17,8 % of silt and clay (φ <0,125 mm) on landform B. Lowest percentage of weight is of fine sand (φ 0,25-0,125 mm) and very large pebbles (φ > 16 mm), adequately. Difference between lowest and highest percentage in only 9% and 13% of the matrix, so sediments are built evenly with various grain sizes: stones, gravel, sand, silt, and clay.

Typical nivation sediments are gravel pronival ramparts. Lack of fines is regarded as one of the distinguishing features of nival sediments. In described example grain structure is different, but with nival origin without a doubt. Grain size distribution shows, that nivation processes may be different than in was classified in geomorphology till now.

