EGU22-13257
https://doi.org/10.5194/egusphere-egu22-13257
EGU General Assembly 2022

The red-coloured pedosediments of the Lagonaki highlands (Adygea Republic, Russia)

Anna Revunova[1] and Olga Khokhlova[2]
[1]Saint Petersburg State University, St. Petersburg, Russia.
[2]Institute of Physical, Chemical and Biological Problems of Soil Science, Russian Academy of Sciences, Pushchino, Russia.

The paper describes red-coloured pedosediments (PDs) from four sections of the Lagonaki highlands (1800m), Adygea Republic, Russia. Currently, there are no conditions for the development of such formations in this region due to climate change. But a tropical climate sufficient for the formation of red-coloured PDs dominated the area in the Lower Pleistocene or earlier. Since the signs of soil formation persist for the longest time in the lower horizons, we attempt to establish their age and develop conditions. The parent rock is carbonate deposits, but PDs erosional displacement is diagnosed by the absence of regularities typical for the genetic soil profile. Thus, when diagnosing soil formation processes, we cannot be guided by the modern topographic position of the studied objects and unstable (=modern) features.

According to micromorphological, particle size, chemical composition, and magnetic susceptibility analysis, fersiallite or ferralitic soil formation was established, but with variations. Almost all samples have high weathering indexes (CIA=1.8-2.5; Rb/Sr =1.3-2.4) and TiO2 content (0.8-1.1%). So, in the upper sample of the first section, signs of strong leaching were revealed, grains of hematite were found, a heavy particle size composition (52% - silt and colloids), high weathering indexes, relatively high content of Al2O3 and Fe2O3, and a high magnetic susceptibility (MS) index (22*10-8).

The underlying horizon is likely not to move and continues to develop with the weathering of the underlying limestone, judging by the low weathering indexes. However, strongly weathered quartz grains were found in it, which may be attributed to the result of acidic humid soil formation. The particle size composition can also be a sign of the duration of soil formation: 39% of silt and colloids.

The sample from the second section has vertic signs: iron-clay coatings and specific cracks. This is the most dolomitic and sandy (70% physical sand) layer, it contains the minimum of non-silicate forms of iron, average weathering coefficients, but quite a lot of TiO2 (0.83%). Also, due to the increased amount of diamagnetic carbonates, the MS index is minimal here.

In the third studied section signs of gleying are diagnosed. And according to the cracking of the soil mass - signs of vertic processes. Hematite grains are also present. Deep weathering processes are reflected in high weathering indexes and MS index (25.5*10-8), the content of silt and colloids

(40%).

The fourth section consists of two layers. The upper one is distinguished by the amount of K2O, which is associated with clay particles in the soil – an indication of a long and strong modification of the rock. This is consistent with the high content of Al2O3 (23.4%), high weathering coefficients, MS (15.9*10-8), particle size composition (43% - silt and colloids).

The underlying layer is similar to the upper layer with similar content of Al2O3 and TiO2, high weathering coefficients, MS, clay granulometric composition, but it has a higher content of Fe2O3 and leaching index.

The study was supported by the RFBR, project N19-29-05024mk