



Isotopic and multi-proxy continental records in the Precambrian rocks, Aldan Shield, Russian Federation

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Clay minerals and hematite from paleo-weathering profiles, observed on and within Precambrian rocks of the apatite deposits, have been investigated from the view-points of geology, mineralogy, pedology. Weathering phenomena have been recognized in the Fedorovskaya and Gorbyliakhskaya Formations of the Precambrian Aldan Shield.

Two complexes that differ in rock composition and structure are involved in the geological sections of the deposits. The lower complex (basement) is a stratum (up to 500m) of interlayered gneisses, schists and apatite-bearing carbonate and calc-silicate rocks. The upper complex (up to 200m) is a blanket-like residual deposit intensely crushed and strongly altered formations of the basement. Clay minerals (hydromica, vermiculite, chlorite, illite, and kaolinite) are predominantly developed in the upper complex of the deposits, whereas in the lower complex they occur dissipated as separate crystals and grains or concentrated in layers and nests mainly in the apatite-carbonate rocks.

The carbonate rocks are typically medium-grained, massive, mottled or banded, and red-brown in color. Their oxidized character is expressed by high Fe^{3+}/Fe^{2+} ratio. The banded structure is due to throughgoing bands a few millimeters to several decimeters in thickness. Some of the mottled rocks contain pocket-like isolation and thin beds rich in clay, hematite (after magnetite), and rounded apatite and seem to be of paleo-carstic origin.

The isotopic data for the carbonates from coexisting poor and rich in clay minerals bands are similar to those under- and overlaying massive carbonates. It is consistent with the proposed model of simultaneous chemogenic and detrital deposition and intra-formational erosion during weathering processes.