

Petrology of the Pre-Alpine Granitoids of the Khrami Crystalline Massif

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The Khrami crystalline massif is located within the Lesser Caucasus and represents the eroded part of the horst-like structures of the Artvin-Bolnisi belt. Pre-Alpine crystalline rocks are exposed in the central part of the massif and occupy an area of approximately 500 km². Most of the massif is composed of pre-Alpine autochthonous formations, whereas the allochthonous complex is much less widespread. This paper provides a detailed petrological and petrogeochemical description of the pre-Alpine granitoids belonging to the autochthonous complex of the Khrami massif, with particular emphasis on Late Variscan granitoids and Late Paleozoic quartz porphyry - granite porphyry rocks. New data are presented that distinguish biotite-hornblende-allanite, biotite-garnet, and biotite-microcline granite varieties, as well as genetically related alaskites, within the Late Variscan granitoid complex. The study includes field photographs of various granitoid types, microphotographs of thin sections, and petrochemical and geochemical diagrams. The main results can be summarized as follows: the Late Variscan granitoids belong to the high-alumina calc-alkaline series and are predominantly I-type granites, whereas alaskites and quartz porphyries correspond to A-type granites. Late Variscan granites show transitional characteristics between MPG and ACG granite types. The initial magma of the granitoid complex formed at the boundary between the upper and lower crust, while quartz porphyry - granite porphyry rocks formed within the upper crustal level.