

Geochemistry of the Vila Nova granitic pluton (Central Portugal)

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The Vila Nova pluton is a small granitic pluton which occurs close to the contact between two major tectonostratigraphic zones of the Iberian Massif, the Ossa-Morena Zone (OMZ) and the Central Iberian Zone (CIZ). The pluton intruded phyllites and metagraywackes of the Neoproterozoic-cambrian Beiras Group, which belong to the CIZ and originated a contact metamorphic aureole formed by micaschist with porphyroblasts in the outer zone and hornfels in the inner zone. The pluton is affected by several minor shear zones and faults. The granitoid rock contains several small enclaves of summicaceous composition which are enriched in andalusite. It is a medium- to fine-grained rock and shows variable composition from tonalite to granite. The granitoid rock contains quartz, perthitic microcline, plagioclase, muscovite, biotite, apatite, zircon, monazite, rutile, pyrrhotite, ilmenite, pyrite and tourmaline. The alteration minerals are chlorite and muscovite. The textures are mainly magmatic except where the granite is affected by shear and the post-crystallization deformation originates kink-bands in the micas and in the plagioclase, mica-fish textures, very fine polygonal granoblastic texture in quartz, lamellas and deformation bands in quartz and K-feldspar.

The granitoid is enriched in muscovite (up to 12%), and its ACNK ranges from 1.31 to 1.69 so it can be classified as an S-type granite. It is also classified as a magnesian, calc-alkaline to alkaline-calcic granite. The ORG normalized pattern is crust-dominated with positive Rb, Th, Ce, Sm anomalies and its normalized primordial mantle pattern shows positive anomalies for K, U, Th and negative anomalies for Ba, Ta, Nb, Sr and Ti, characteristic of granites related to subduction.

The variation diagrams show regular trends with a decrease in TiO₂, Al₂O₃, FeO, MgO, Ba, Sc, V, Cr, Ni, Nb, Zr, Hf and Σ REE with the increase in SiO₂, while K₂O, Rb show segmented trends and CaO, Sr and Cs don't show any trend, which can be due to the hydrothermal alteration.

The REE patterns show a moderate negative Eu anomaly (0.47-0.77), a moderate fractionation of REE (La/Lu_N = 7.04-9.65) and Σ REE varies from 126.84 to 179.61 ppm.