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Garnet and muscovite chemistry of Paleoproterozoic basement in Brasília Belt: preserved magmatic compositions

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In central Brazil, a wide area of Paleoproterozoic granitic rocks is exposed in northern Brasília Belt. These rocks were formed in a Rhyacian orogeny and underwent at least two deformational events: the first, coeval with emplacement of granitic rocks, reached low amphibolite facies. The second deformational event is the Brasiliano Orogeny, responsible for reequilibration in greenschist facies during Neoproterozoic. Neoformation of white mica and epidote, plagioclase decalcification, quartz recrystallization and biotite chloritization seen in samples record the effects of Neoproterozoic greenschist metamorphism.
Despite the geological history of rocks from this terrane, muscovite and garnet grains still preserve magmatic composition. Electron microprobe analysis was used to investigate muscovite and garnet.
For the muscovite, as the purpose of this investigation is to certify their magmatic composition, chosen grains were the relatively coarse, subhedral to euhedral and not enclosed by minerals from which muscovite might have formed from alteration.
In terms of Ti, Mg and Na, most grains have primary composition with relatively high contents of Ti, as expected for magmatic muscovite, once at higher temperatures, Ti solubility is lower. Muscovite grains with $TiO_2 > 0.9\%$ have undoubtedly primary composition, but other grains have a more discrete enrichment in TiO_2 (0.4 to 0.6%) and are interpreted as reequilibrated grains.
Analyzed garnet grains are all plotted within the field of magmatic garnet composition after Miller and Stoddard (1981), and are typical almandine-spessartine solid solutions, with minor grossular and pyrope component, according to calculation based on 12 oxygens. Spessartine-rich garnet is probably formed in relatively evolved magmas with high Al and low Ti contents, otherwise, Mn would be incorporated in ilmenite, especially in high fO_2 conditions.
In a hasty interpretation, it is possible to suppose both garnet and muscovite are secondary phases that had their formation related to metamorphic events. Especially considering Brasiliano and Paleoproterozoic orogenies affected these rocks. However, mineral chemistry indicates muscovite and garnet are magmatic phases.