FLUID ORIGIN AND EVOLUTION DURING THE FORMATION OF RARE-ELEMENT PEGMATITES IN THE BORBOREMA PROVINCE, NORTHEAST BRAZIL

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Microthermometric fluid inclusion studies in the Borborema Pegmatitic Province, Northeast Brazil, allowed to recognize the following fluid types: A) primary aqueous carbonic (17-21 mol% CO2) inclusions in early pegmatite minerals, like garnets and tourmaline (wall zone I) and beryl, graphic quartz, tourmaline and manganotantalite (zone II and limit zone II/III); B) primary inclusions hosted in zoned quartz crystals, apatite and euclase from zone III, core and replacement bodies of the pegmatites, bearing aqueous fluids with low CO2 contents (£ 7 mol%); C) later aqueous inclusions barren in CO2 in the same minerals than type B; D) secondary inclusions in all minerals throughout the whole pegmatite, being either aqueous carbonic, showing wide ranges of CO2/H2O ratios (type D1) or aqueous, barren in CO2 (D2). The salinity of these fluids range from low (A and B) to moderate (C) to very low (D). Trapping temperatures decrease from type A to type D inclusions. Raman microspectrometric analyses of the carbonic phase of the type A inclusions confirmed the inexistence of detectable methane contents, but detected unsuspected significant N2 contents. The observed N2/CO2 ratios, ranging between 1/5 and 1/70 are higher than those reported in magmatic fluids associated with pegmatites or granitic magmas (£ 1/140). The high N2/CO2 ratios could be the result of wall rock fluid contamination. High N2 contents in metamorphic fluids are frequently explained by N2 liberation during the mica break down.