Genesis of Monazite in the Floresta Azul Alkaline Complex, NE Brazil

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The Floresta Azull Alkaline Complex (FAAC, ≈ 690 Ma) is a batholith belonging to the Alkaline Provinceof South Bahia state, NE Brazil. This province consists of Neoproterozoic alkaline massifs aligned in a NE-SW direction for 200 km. These intrusions include batholiths, stocks and dykes of foid syenites, litchfieldites, monzonites and granites plus hypabyssal rocks (*e.g.*, phonolite, trachyte, tinguaite, basalt and rhyolite), with predominance of SiO_2 undersaturated syenite. In the FAAC occurr three different rock types: nepheline syenite, granite and fenite.

Monazite crystals from the FAAC rocks are characterized by REE abundances ranging from 71.6 to 72.7 wt% with predominant monazite-(Ce), whereas monazite-(La) has been found only in nepheline syenite. In the studied monazite crystals, La/Nd ratios are higher (2.4 to 10.6) than those in the monazite crystals of carbonatites. Monazite is rare in fenite, and its REE content is lower than that of granite and syenite, ranging between 68 and 69.2 wt%.

The genesis of monazite crystals in the FAAC syenites and granites is closely related to fluids in two different processes. In the nepheline syenite, late magmatic fluids containing CO_2 and Cl account for the formation of cancrinite and sodalite from nepheline. These fluids also transported REE and crystallized monazite and ancylite. Crystallization of monazite in these rocks was a late magmatic process simultaneous to formation of apatite and ancylite. Monazite was formed in the granite by the interaction between a CO_2-rich fluid and apatite crystals. In this process, REE was leached out from apatite with correspondent formation of anhedral crystals of monazite in the regions poor in REE + Si, which therefore are of metasomatic origin. The substitutions identified in this study for this process are “REE + Si = Ca + P” and “REE +O = Ca + F”. In the fenites, monazite is included in crystals of chemically homogeneous apatite in which REE content is lower than that of FAAC nepheline syenite and granite. Monazite is elongated and always oriented along the c-axis of apatite crystals. In the literature, these features are reported as common to monazite crystals formed by apatite exsolution during metamorphism or metasomatism. [*Acknowledgments:* CNPq, FAPITEC, CAPES].