

## DIFFERENTIATION PROCESSES AND ORIGIN OF GABBROIC MELT SEGREGATIONS IN THE JAGUARIÚNA SILL, PARANÁ MAGMATIC PROVINCE

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**ABSTRACT:** Melt segregations, in the form of medium to coarse-grained gabbroic lenses or pockets, have been long recognized as internal structures of some basalts. Occurrences of melt segregations in the Paraná Magmatic Province are described in thick lava flows at western Paraná State, and in some large sills of eastern São Paulo State. The Jaguariúna Sill is a thick (<100 m) intrusion emplaced between lower sedimentary layers of the Paraná Basin (Itararé Group), and its Precambrian crystalline basement, in the region Campinas-SP. Our study investigates the petrographic and geochemical contrasts of Jaguariúna Sill melt segregations and host diabase. The segregations are distinguished from ordinary diabase due to their lighter shades of gray and coarser grain size; they occur as 2-200 cm subhorizontal gabbroic sheets located near the intrusion roof, with abrupt to gradational contacts with the diabase. Both lithologies have a main mineralogy constituted of plagioclase, clinopyroxene (augite and pigeonite), and opaque minerals (mostly Fe-Ti oxides). Scarce xenomorphic olivine are preserved only in most primitive rocks, and the groundmass, abundant in the gabbro, has quartz-alkali feldspar intergrowths ("granophyre"), acicular apatite and traces of brownish amphibole. Olivine is relatively iron-rich (Fo30-50). Augite has average composition of Wo36En40Fs24 in the diabase, and Wo32En36Fs32 in the gabbroic segregation, whereas pigeonite has, respectively, Wo11En52Fs37 and Wo19En32Fs49. Plagioclase average composition ranges from An52 in the diabase to An41 in the gabbro. The inferred original composition classifies the Jaguariúna Sill as Paranapanema type, unlike neighbor occurrences, which are dominantly of Pitanga type. The diabase samples plots in the field of basalts, and the gabbro tend to basaltic andesite compositions, showing tholeiitic fractionation trends. The segregated material is markedly more evolved in comparison to the diabase, with lower Mg# (20-30 vs. 30-40), higher alkalis (~4.4 vs. ~3.4 wt.%) and higher P2O5 (~0.60 vs. ~0.35 wt.%). It is enriched in strongly incompatible trace-elements elements (D@0) by 1.9 on average, which allows us to estimate the amount of melt remaining to reach these values. The Jaguariúna Sill gabbroic segregations are originated by segregation from a mush after 45-50% crystallization of clinopyroxene and plagioclase in similar proportions, plus some Fe-Ti oxides, migrating due to buoyancy instability related to the lower density and fluid phases concentration in the intercrystalline residual melt.

**KEYWORDS:** MAGMA SEGREGATION; SILL; PARANÁ MAGMATIC PROVINCE