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COMPLEX ZONED CLINOPYROXENES IN THE PARIQUERA-AÇU ALKALINECOMPLEX: EVIDENCE OF OPEN-SYSTEM EVOLUTION PROCESSES

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Investigating igneous rocks within the conceptual framework of open systems provides valuable insights about their formation and evolution. These open systems included combination of magma ascent, fractional crystallization, magma mixing and recharge, and crustal assimilation processes. They are developed in vertically-extended mush column, favoring the transport of previously crystallized material, including antecrysts. In the Cretaceous Pariquera- Açu alkaline complex (SP), we identified petrographic and chemical evidences suggesting magma mixing and recharge and we observed the presence of clinopyroxene antecrysts. Major element clinopyroxene analyses were performed using JEOL JXA-FE08530 electron microprobe analyzer at the GeoAnalítica-USP facility. The clinopyroxene crystals were categorized into two groups, unzoned and step zoned crystals. The unzoned clinopyroxenes exhibit two distinct chemical compositions: a predominant composition of diopside (En38-44Fs8-16Wo45-48), with Mg# [Mg/(Mg+FeT)] from 81 to 72, and subordinate aegirine-augite (Wo4-60En27-69Ae1-31) composition, with Mg# between 67-36. The normal step zoned crystals exhibit rounded beige cores of augite-diopside composition, with high Mg# (92-81) and Cr_2O_3 (1.2-0.1 mass %), overlaid by a mantle/rim region of diopside composition, showing resorption interfaces. This region exhibits intermediate Mg# (82-70), and relative low Cr_2O_3 (0.4-0 mass %), with outermost rims showing partial corrosion and reaction rims. The reaction rims are conformed by greenish clinopyroxene that shows a decreasing in the Mg# (74-65) and Cr_2O_3 (0.03-0 mass%) contents. This rim evolves into strong green rims of aegirine-augite composition (Wo43-53En29-43Ae5-27), exhibiting low Mg# (66-40) and Cr_2O_3 (0.09-0.001 mass%). Some crystals exhibit green cores of aegirine-augite that are overlaid by slightly-green rim, which show the lowest Mg# (11-7) and are classified as aegirine. Additionally, we observed reverse step zoned crystals characterized by beige bands into mantle region, exhibiting high to intermediate Mg# (86-73) and Cr_2O_3 (up the 1 mass %). The beige cores are interpreted as antecrysts that likely formed in a deeper chamber, supported by their rounded form, resorption interfaces, and higher Mg# and Cr_2O_3. Mantle/rim regions, characterized by intermediate Mg# and low Cr_2O_3, are considered the principal clinopyroxene phase. They record recharge mafic, as indicated by the presence of beige bands. The clinopyroxenes possible are affected by input of felsic magma, resulting in the formation of reaction rims that transition from aegirine-augite to aegirine composition. We propose that the Pariquera-Açu complex undergo magma mixing and recharge, with the previous emplacement of a crystal cargo magma (melt + antecrysts) within the plumbing system context.

KEYWORDS: MAGMA MIXING AND RECHARGE, ANTECRYSTS, PARIQUERA-AÇU ALKALINE COMPLEX

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