GeoMinE 2025

· XIII SIMPÓSIO SUL-BRASILEIRO DE GEOLOGIA
· IX SIMPÓSIO DE VULCANISMO E AMBIENTES ASSOCIADOS
· I CONFERÊNCIA DE GEOLOGIA E MINERAÇÃO DO MERCOSUL
· II WORKSHOP ARMAZENAMENTO DE CO_2 POR MINERALIZAÇÃO EM BASALTOS
· I EXPOGEOMINE

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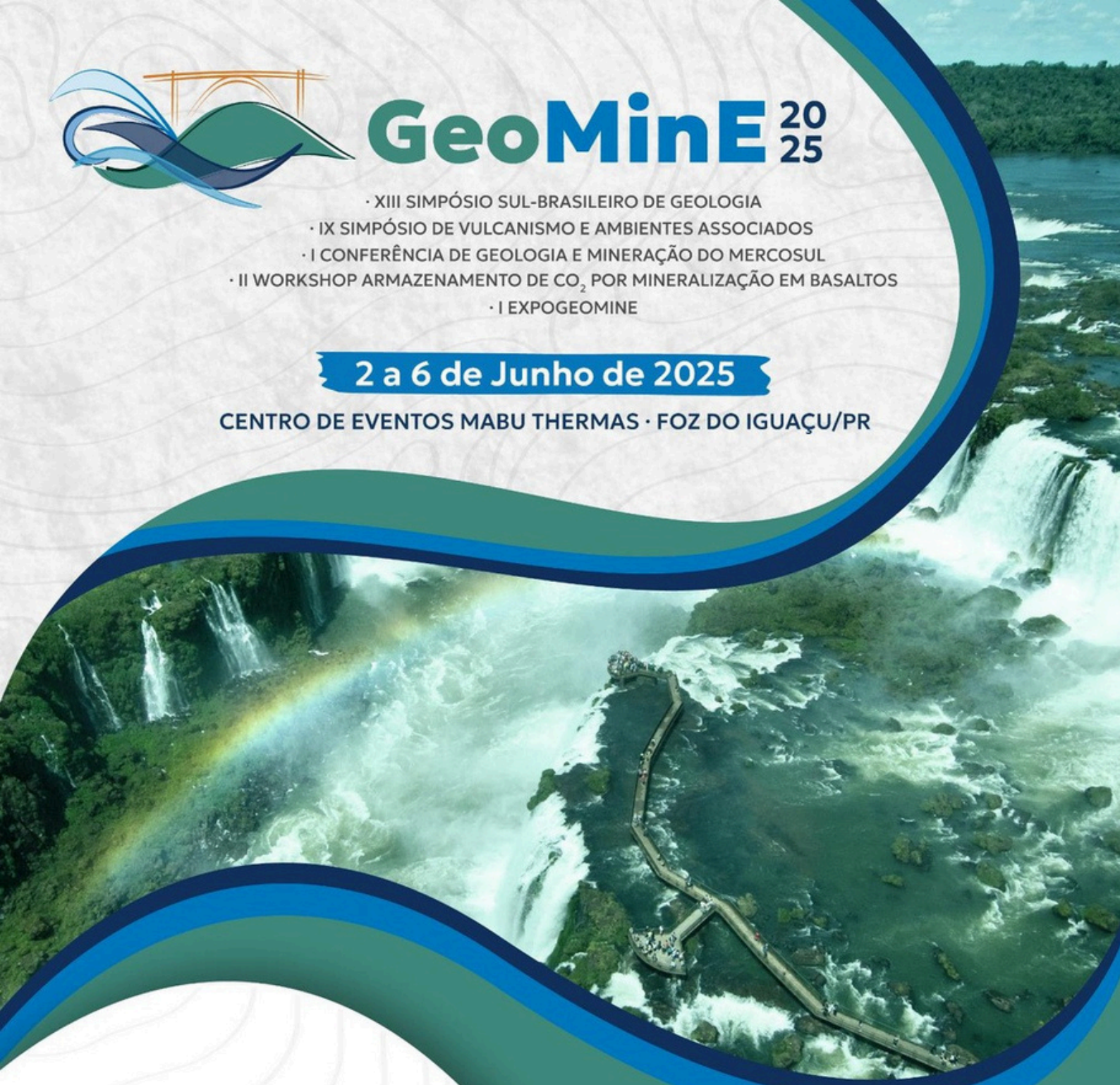

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Preliminary insights of the Paraná Province Magmatic System based on petrography, clinopyroxene and plagioclase textural and chemistry characterization, and thermobarometry

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The Paraná-Etendeka LIP is one of the biggest magmatic episodes recorded on the Earth, with a volume of at least 1.7 x 10^6 km^3 that spreads throughout areas of Brazil, Argentina, Uruguay, and Paraguay in South America (Paraná Magmatic Province – PMP), and Namibia and Angola in Africa (Etendeka Province). It is linked with the Gondwana breakup and comprises Lower Cretaceous rocks. The PMP has been divided into two suites, low-TiO_2 (LT; < 2 wt.%) and high-TiO_2 (HT; > 2 wt.%), which are subdivided into magma types according to their geochemical characteristics and spatial distribution. Gramado, Esmeralda, and Ribeira magma types constitute the low-Ti suite, while Pitanga, Paranapanema, and Urubici compose the high-Ti one. They comprise predominantly basic rocks, with subordinates' acidic ones. This study presents preliminary data from petrography description, scanning electron microscopy (SEM - BSE) imaging, and electron microprobe analysis (EMPA) of plagioclase and clinopyroxene crystals from PMP basaltic rocks. The textural control of mineral zoning patterns and rock petrography guided the quantitative spot EPMA analyses, and the whole-rock geochemical contents were considered as the magma composition. Only samples with a total sum of major elements varying from 98% to 102% in EMPA were selected for thermobarometry and H_2O content calculation. Thus, based on the characterization of the mineralogical textures, mineral chemistry, and thermobarometry data, this work aims to discuss the magmatic system of the Paraná Province tholeiitic magmatism. Analyzed plagioclase and clinopyroxene phenocrysts show diverse zoning patterns besides local sieve texture. Pitanga clinopyroxenes phenocrysts crystallized between 1185 and 1122°C at 0.5 to 0.01 GPa (cores), 1171 and 1120°C at 0.49 to 0.01 GPa (intermediaries), and 1159 and 1115°C at 0.37 to 0.01 GPa (rims). At the same time, Paranapanema ones crystallized between 1148 and 1110°C at 0.23 to 0.01 GPa (cores), 1146 and 1116°C at 0.31 to 0.04 GPa (intermediaries), and 1143 and 1120°C at 0.28 to 0.02 GPa (rims). On the other hand, Gramado clinopyroxene phenocrysts show crystallization pressures and temperatures of 0.45-0.24 GPa and 1113-973°C, respectively. Plagioclase compositions suggest an H_2O content varying from 1.4 to 2.2% in the crystal cores, while rims and intermediary zones point to lower contents, around 0.6 and 0.1%. Finally, the plagioclase and clinopyroxene crystals display a complexity of zoning patterns (normal, inverse, and oscillatory zoning), with textures that indicate multiple phases of resorption and probably recharge events in a polybaric evolution that reflect a dynamic open system into the magma(s) chamber(s).

Keywords: Paraná Magmatic Province, Mineral Chemistry, Thermobarometry

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