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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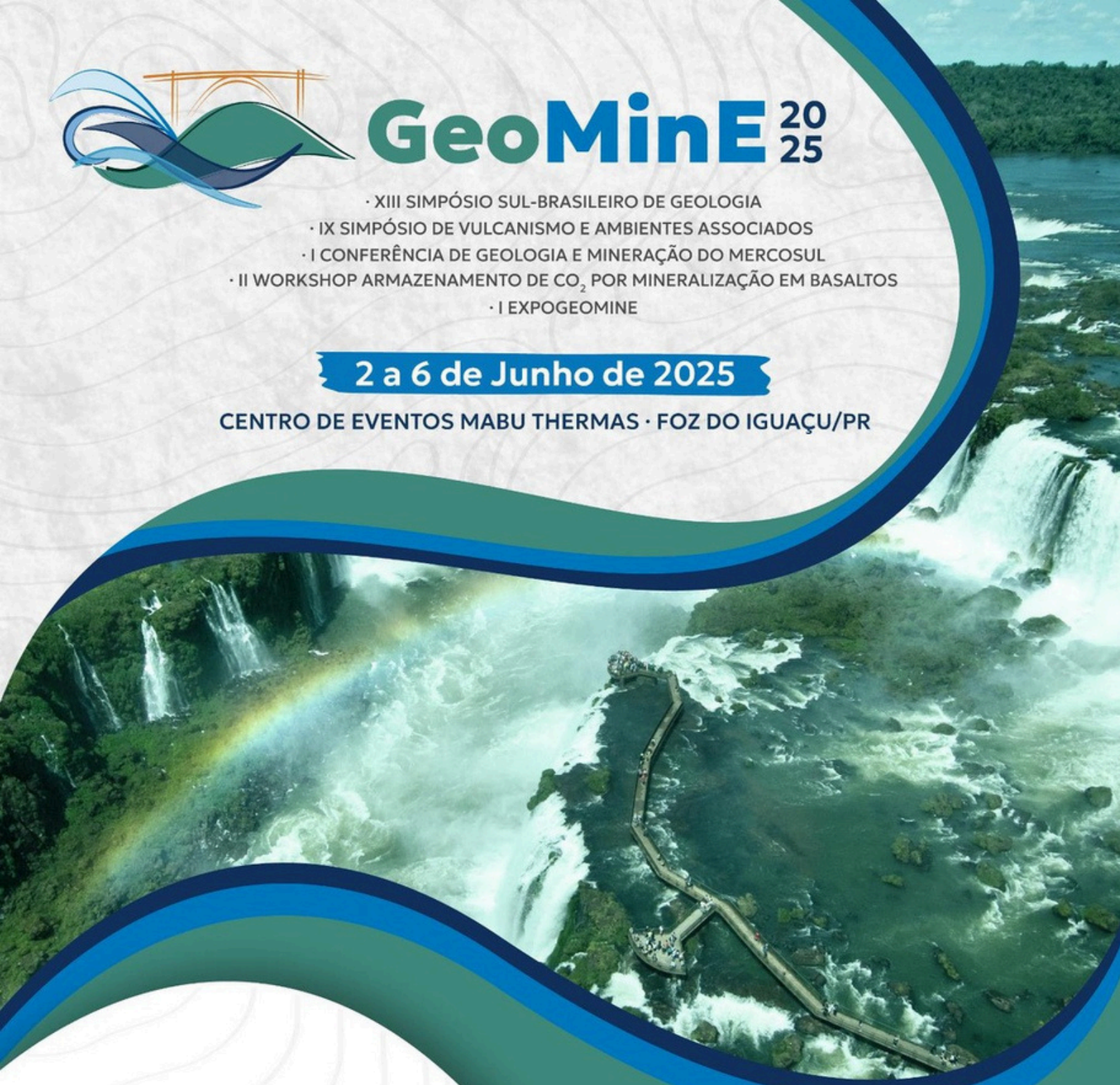

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From source to surface: tracking the magma pathways of the High-Ti Urubici plumbing system, Paraná Magmatic Province

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Large Igneous Provinces (LIPs) are characterized by vast volumes of mafic lava flows and a complex network of intrusive rocks, including dike swarms and sill complexes, that together compose the magmatic plumbing system. These magmatic events typically occur over short durations (1–5 Myr) and provide critical insights into magmatic evolution processes and their interactions with surrounding rocks. Recent geological mapping in the South Brazilian coast reveals a connected network of sills and dikes that represent the exhumed plumbing system of the Paraná Magmatic Province (PMP) emplaced on Neoproterozoic granitic country rocks. The ID-TIMS baddeleyite and zircon ages established for the high-Ti basaltic intrusive rocks from Florianópolis Dike Swarm (FDS, 132.5 - 134.7 Ma) are very close to the ^{40}Ar-^{39}Ar ages found in the lava pile (High-Ti Urubici, 133.9 -134.7 Ma) and sills of same magma type (135.0 -135.1 Ma). To better constrain the link among these intrusive bodies and its genetic link to the lava flows, we integrated field, petrographic, aeromagnetic survey, and whole-rock geochemical data. Magnetic field products corroborate with the field-observed interconnected intrusive bodies and highlight the concentration of shallow large magma chambers within the area, so as the connectivity between these reservoirs and vertical conduits. Geochemical data indicate that sills, dikes, and lava flows share a common source linked to the high-Ti Urubici magma type. Sill samples displayed less geochemical variation when compared to dikes, and a geochemical behavior similar to the uncontaminated Urubici-type base flows, whereas dike samples have larger dispersion, similar to the contaminated units from the top flows. Such variations can be attributed to magma contamination during transport, ascent, and storage along the plumbing system. The observed and mapped interconnected network of sill and dikes, together with the aeromagnetic features, support the idea that continuous and independent magma batches is a feasible scenario for the plumbing system construction. The high concentration of shallow-level magma chambers resulted in significant melting of the country rocks in some locals, a unique feature not commonly observed in other parts of the FDS or in other dike swarms from the Paraná Magmatic Province. Airborne magnetic data support such an interpretation, suggesting that magma originated from a deeper magma source, ascended thought dikes, and was stored in small, interconnected shallow-level chamber that heated the region. Such heating caused the melting of the country rocks that were partially assimilated by the last magma batches that ascended through sub-vertical to vertical foliation of the basement as dikes, leading to contamination over time. This interpretation is supported by a larger contamination in the upper parts of the lava pile compared to the lower parts. The results of our integrated aeromagnetic and geological approach demonstrated that contamination and melting processes are intricately linked to the dynamics of the High-Ti Urubici plumbing system.

Keywords: Sill and dikes network, transcrustal magmatism, magnetic field data,shallow-level magma chamber, Paraná Magmatic Province.

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