

MAFIC SUBVOLCANIC INTRUSIONS AND THEIR PETROLOGIC RELATION WITH THE VOLCANISM IN THE SOUTH HINGE TORRES SYNCLINE, PARANÁ-ETENDEKA IGNEOUS PROVINCE, SOUTHERN BRAZIL

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ABSTRACT: The hypabyssal intrusions investigated in this study are located in the east-central region of the state of Rio Grande do Sul, in the south hinge of the Torres Syncline. The intrusions comprise twenty-four dikes and ten sills, intruding in ponded pahoehoe, compound pahoehoe, rubbly and acidic lava flows of the south sub-Province of the Paraná Igneous Province and the sedimentary rocks of the Botucatu, Pirambóia, Santa Maria and Rio do Rasto Formations, on the edge of the Paraná Basin. The intrusive dikes in the flows have preferred NNW-SSE direction and the intrusive dikes in the sedimentary rocks have preferred NE-SW direction. Regarding the morphology, the dikes were separated into two different groups: symmetrical and asymmetrical. The small variation in facies is characterized by fine to aphanitic equigranular rocks. The rocks were divided into two types: Silica Supersaturated Tholeiite (SST) e dikes and sills consisting of plagioclase and clinopyroxene as essential minerals, with some olivine and felsic mesostasis, predominant intergranular texture and subordinate subophitic texture; and Silica Saturated Olivine Tholeiite (SSOT) e dikes consisting mainly of plagioclase, clinopyroxene and olivine, and predominant ophitic texture. The major and trace element geochemistry allows classifying these hypabyssal bodies as basalts (SSOT), basaltic andesites and trachyandesites (TSS) of tholeiitic affinity. The mineral chemistry data and the REE behavior, combined with the LILE and HFSE patterns, similar to the flows and low-Ti basic intrusions of southern Brazil and northwestern Namibia allow suggesting that these dikes and sills were part of a feeder system of the magmatism in the Paraná-Etendeka Igneous Province. The preferred direction of the intrusive dikes in the sedimentary rocks of the Paraná Basin coincides with tectonic-magmatic lineaments related to extensional processes and faulting systems that served as vents for dike swarms parallel to the Brazilian coast, with the same direction as the Namibia coast dike swarm. This suggests that these dikes were part of the triple junction system related to the opening of the South Atlantic Ocean. The preferred directions of the intrusive dikes in the lava flows are similar to the directions of the Ponta Grossa and Rio Grande Arcs and the Torres Syncline. They may have been a part of or been caused by one or more geotectonic cycles that originated these structures. The emplacement process of the asymmetric dikes suggests they were enclosed under the hydraulic fracture model, since they do not follow a pre-existing fracture filling pattern. The emplacement of the sills conforms to the weakness zones of the sedimentary units. Regarding the intrusive dikes in the flows, divided by lithofacies associations, also considering the geochemical and petrographic similarities, it is observed that these dikes are part of a supply system of the basic lava flows, stratigraphically positioned above the host lava flows.

KEY-WORDS: SERRA GERAL VOLCANISM, MAFIC INTRUSIONS, PETROLOGY