



EXPERIMENTAL STUDIES ON TRACE ELEMENT PARTITIONING BETWEEN MAFIC MINERALS AND ALKALINE MELTS

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ABSTRACT: Trace elements are a small fraction of geochemical systems and their variations are sensitive to magmatic processes because they are influenced by the physic-chemical properties of crystal-melt systems. Therefore, the trace element distribution is a powerful tool to distinguish, to understand and to model the genesis and evolution of magma series. The present research aims to determine trace elements partition coefficients ($D_i^{crystal/melt}$), for the most important LIL and HFS elements, as well as transition metals and P, considering typical rock-forming mafic minerals (olivine, pyroxene, amphibole and perhaps phlogopite) and alkaline basic-ultrabasic melts. Melting and crystallization experiments will be performed starting from natural and synthetic samples with well-known geochemical properties, similar to those observed in mafic-ultramafic rocks of the Serra do Mar Alkaline Province, Southeastern Brazil, under conditions of pressure, temperature and volatile activity compatible with those estimated for the known occurrences. Although there are several coefficients available in the literature, they do not cover all compositional ranges and crystallization conditions as observed in the province. In order to fill this gap, experimental simulation techniques with piston-cylinder and vertical tubular furnace apparatuses will be carried out. The starting materials and/or run products will be analyzed for their textural and compositional properties with imaging and chemical analysis of high spatial resolution (e.g., SEM, EPMA, LA-ICP-MS) and the results will be compared with the available data. It is expected to obtain geochemical partition coefficients that will allow a more realistic modeling of the genesis and evolution of alkaline magmas in subvolcanic and plutonic environments and contribute to a better understanding of the magmatic processes that have built the province, as well as similar provinces on the South American platform.

KEYWORDS: Trace elements, partition coefficients, alkaline melts, mafic minerals