

Goldschmidt2017 Abstract

Melt-rock interaction at mantle conditions: evidences from Finero gabbroic dykes.

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The Finero Phlogopite-Peridotite (FPP) is a worldwide famous mantle massif recrystallized through several events of melt migrations. These events have enriched the FPP in hydrous phases and crustal components and have been commonly interpreted as related to a subduction/post orogenic geodynamic setting. The last of these metasomatic events has produced composite sapphirine-bearing gabbroic dykes, interpreted as the result of the interaction of channelized migrating melts with the host rock in a two-steps intrusion process. In the first step, the melt reacted with the FPP rocks and evolved by fractional crystallization of amphibole cumulates. In the second step, the evolved melt reacted with the first cumulates producing magmatic sapphirine and segregating plagioclase-rich bands containing abundant apatites at the nucleus of the dike. New data suggest, however, a more complex evolution.

New O and in situ Sr isotopes on minerals suggest that the gabbroic dykes have evolved from melt(s) that progressively were contaminated by the interaction with the FPP rocks during its fractionation. The $\delta^{18}\text{O}$ increases from 5.81‰ in orthopyroxenes at the dykes border to ~6.90‰ in cumulitic amphiboles and 8.60‰ in plagioclases. The $^{87}\text{Sr}/^{86}\text{Sr}$ values for plagioclase and coexisting apatite show isotopic disequilibrium between the two phases (plagioclases at 0.70474 ± 0.00033 , $n=23$, and apatites at 0.70369 ± 0.00025 , $n=6$). These isotopic variations could be explained with an AFC-like process between mantle-derived melt(s) and a crustal-enriched host (the FPP).

In situ Sr isotope analyses were performed at the CIGS laboratory of the Università di Modena e Reggio Emilia using a Thermo Fisher Scientific Neptune™ coupled to a 213 nm Nd:YAG laser ablation system (New Wave Research™). During the analytical sessions a new in house plagioclase reference material for Rb-Sr systematic, named BC84, has been successfully tested and used.