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ABSTRACT BOOK

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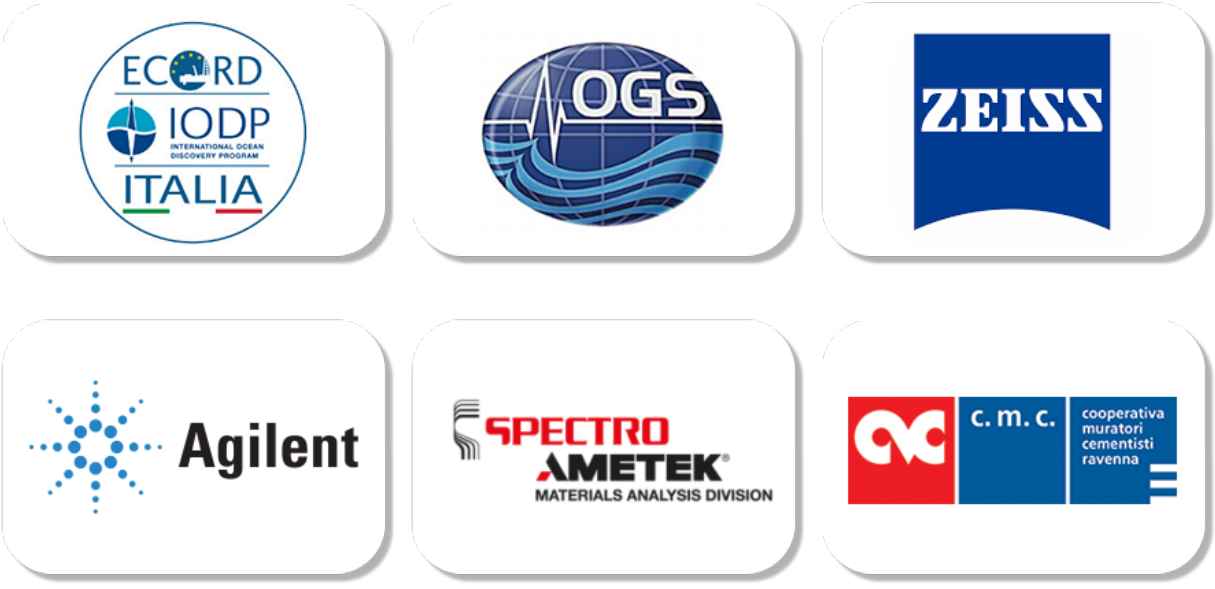

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ABSTRACT INDEX

Can a simple lherzolitic mantle source explain the geochemical variation of Etnean magmas through time?

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Keywords: Mt. Etna, Mantle sources, Hyblean.

The petrological features of the mantle beneath Mt. Etna is a controversial topic. The lack of erupted primary magmas and mantle xenoliths prevent any direct or indirect evidence of its nature and melting or metasomatic processes. The proximity of Mt. Etna to the Ionian slab and the time-related evolution of its magmatic products introduce further difficulties. On the contrary the nearby Hyblean Plateau provide large amount of mantle xenoliths and primitive products. A petrological comparison highlights several similarities similarity between the two districts, paving the way to the hypothesis that a similar mantle source could be responsible for the generation of both Etnean and Hyblean magmatisms. A detailed mass balance calculation allowed to reconstruct Mt. Etna primary magmas from the initial tholeiitic episode to the post-1971 (nowadays) stage. This simulation consisted of a backward fractionation process, in which olivine and clinopyroxene in progressive equilibrium were added to the least evolved compositions until the mantle equilibrium condition was reached (Mg# 68 of the melt, Fo_{88} in olivine). A second step was then performed to reconstruct the fertile mantle source, using mineral compositions of the Hyblean mantle xenoliths, plus amphibole from Antarctica. According to our simulation, a homogeneous lherzolitic mantle melted at various degree from 10 to19% is able to reproduce the entire range of Etnean lavas, including the post-1971 products. In our modelling, the K and LILE enrichment of post-1971 magmas can be simply related to the variation of the amphibole and phlogopite melting proportions, whose stability is in turn linked to the activity of H_2O and CO_2 of the system. A geodynamic model for the evolution of this portion of the Eastern Sicily is also taken into account to explain the fairly homogeneous composition of the Etnean magmas, indirectly reinforcing our petrological reasoning.