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ABSTRACT BOOK

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SIMP-SGI-SOGEI 2019

Il tempo del pianeta Terra
e il tempo dell'uomo:
Le geoscienze fra passato e futuro



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From the 600 ka tholeiites to the recent trachybasaltic magmas at Mt. Etna: evolution of a lherzolitic mantle

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The paucity of primitive magmas and the absence of mantle-derived xenoliths make the discussion on the nature and evolution of the Mt. Etna mantle source/s extremely controversial, especially because of the spatial and temporal proximity of the volcano to the Hyblean Plateau and the Aeolian slab. An overview of the geochemical features of the products emitted by Mt. Etna from 600 ka ago to present days and a comparison with the Hyblean magmatic domain enabled us to infer the composition of the Etnean tholeiitic to alkaline primitive magmas as well as the nature and composition of the mantle source/s from which they segregated. According to our model, tholeiitic and alkaline primitive magmas at Mt. Etna were generated by two distinct amphibole + phlogopite-bearing spinel lherzolites at different partial melting degree. The LILE, ⁸⁷Sr/⁸⁶Sr, Rb- and H₂O-enrichment of magmas emitted after 1971 with respect to the pre-1971 ones (Tanguy et al., 1997; Métrich et al., 2004; Di Renzo et al., 2018) could be instead explained by a differential behavior of amphibole and phlogopite during melting, in a modally and compositionally homogeneous lherzolite, at comparable partial melting degrees. A variable H₂O/CO₂ activity in the mantle source could be identified as the principal driving force for the preferential melting of the hydrous phases, and in turn could be linked to the heat/fluxes supply from the upwelling asthenosphere beneath Mt. Etna. In the light of these new findings, some speculations about the geodynamic evolution of eastern Sicily were made to interpret the relationships between Mt. Etna and Hyblean Plateau magmatism.

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