



Parma 16-19 settembre 2019

ABSTRACT BOOK

a cura della Società Geologica Italiana



Congresso
SIMP-SGI-SOGEI 2019

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



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Multiple subduction-related metasomatic pulses in mantle xenoliths from the Karioi volcano, North Island, New Zealand

Faccini B.*¹, Coltorti M.¹, Brenna M.², Casetta F.¹ & Briggs R.³

¹ Dipartimento di Fisica e Scienze della Terra, Università di Ferrara, Italy.

² Department of Geology, University of Otago, New Zealand.

³ Department of Earth Sciences, University of Waikato, New Zealand.

Corresponding email: fccbbr@unife.it

Keywords: calc-alkaline metasomatism, mantle xenoliths, New Zealand.

Calc-alkaline and alkaline magmatism generally occur separate in space and time at convergent margins. Alkaline magmatism usually post-dates the calc-alkaline event and is generally related to slab retreatment inducing asthenospheric upwelling and/or to the onset of post-orogenic trans-tensional regimes. Alternatively, the formation of a slab window may favor the rise of deep, fertile mantle material. Irrespective of the mechanism, how this succession is reflected in the mantle sources is still largely unknown. Some clues may come from ultramafic xenoliths found in pyroclastic deposits of the Alexandra Volcanics in the North Island (New Zealand), where calc-alkaline and alkaline eruptive products are randomly intercalated in the volcanic sequence of the Pliocene-Quaternary Karioi and Pirongia stratovolcanoes (Briggs and McDonough, 1990).

The xenoliths include typical mantle lithotypes (Iherzolites and harzburgites, characterized by medium to coarse-grained protogranular, porphyroclastic and equigranular textures) but is mainly composed by olivine-clinopyroxenites, dunites and wehrlites. For these latter, the textures vary from cumulitic to a mixed type that, however, have predominant protogranular features. Amphibole is present as traces in few peridotitic samples but is more abundant in some olivine-clinopyroxenites and dunites. Reaction textures with formation of secondary, newly-generated phases and glass are widespread in all nodules but especially in the cumulates, where distinct metasomatic episodes have been recognized even within a single sample.

The lithospheric section represented by Karioi peridotites underwent partial melting (F%) between 5 and 15%, as confirmed by spinel, olivine compositions and clinopyroxene HREE contents. Samples showing the highest F% degree are characterized by orthopyroxenes and clinopyroxenes with the highest LILE, LREE and MREE enrichment. Indeed, a metasomatic event occurred after depletion, due to the interaction with a calc-alkaline melt similar in composition to arc lavas found in the Alexandra Volcanic Group. On the other hand, mineral compositions in the olivine-clinopyroxenites and dunites speak in favor of their origin as deep fractional crystallization products of those calc-alkaline magmas, which most probably also repeatedly infiltrated all lithologies giving rise to multiple metasomatic pulses.

The Karioi ultramafic xenoliths are embedded in tuffs, preventing the identification of the magmatic affinity of the host basalt but, so far, no traces of alkaline metasomatism was found. Thus, the contemporaneous emission of both calc-alkaline and alkaline magmas suggests the presence of different mantle domains with peculiar petrological features below the Alexandra Volcanics area, but only one is represented in the xenolith collection.

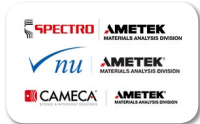
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