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Discussion on geochemical characteristics and genesis of magma in Shizishan Orefield, Tongling area, Anhui province, eastern China

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The widespread magmatic activities in 140-135Ma ago due to the collision between Huabei Block and Yangtze Block and the following extending in the northern Yangtze Block, triggered an important mineralization event in Tongling area, Anhui province, eastern China [1]. Baimangshan, Qingshanjiao, Nanhongchong intrusives in the Shizishan orefield, are respectively composed of gabbro-diorite, quartz diorite and granodiorite. All the intrusives are predominantly alkaline-rich, high Ba-Sr calc-alkine. And they have the similar characteristics to the high Ba-Sr granitoids, ie. high Ba, Sr and LREE and low Y and HREE abundances, distinct Nb, Ta and Ti depletion, as well as absence of negative Sr and Eu anomalies. In addition, it is suggested that crystallization differentiation played a domainate role in the evolution of magma because they have similar covariant of major elements in Harker Diagram. The decrease in P and Ti abundances is attributed to the fractionation of P- and Ti-bearing accessory minerals, such as apatite, ilmenite and titanite. And the relative depletion in Y and HREE resulted from the retention of hornblende and/or garnet in the source, which was not influenced by the intermediation of plagioclase. The values of initial $^{87}Sr/^{86}Sr$ (0.7062~0.7101) and $^{143}Nd/^{144}Nd$ (0.5116~0.5121) present EM I-type signature, and are negatively correlated between them. In early Cretaceous, the regional tectonic switch from compression to extension in the post-collisional stage, readily triggered rapid rise of hot Ba- and Sr-riched upper asthenosphere material and caused widespread melting of lower crust [2], which generated voluminous magmas in the deep-seated magma chamber in Tongling Area.

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Magma generation at Nisyros and Yali volcanoes (Greece): A multi-isotope approach

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Geochemical and petrographical studies from the literature [1] of volcanic products from the Quaternary Nisyros-Yali volcanic system (Hellenic Arc, Greece) have noted the presence of a compositional SiO_2 gap and addressed magma-generating processes.

Our data situate this gap between 61 and 68 wt%. The resulting division in two suites can be stratigraphically correlated with the caldera collapse: pre-caldera rocks have <61 wt% SiO_2, post-caldera rocks >68. This dichotomy is mirrored by trace element data, which show clearly distinguishable patterns.

Isotopic data of Nd, Hf, Sr, and Pb have been collected to unravel magmagenetic processes responsible for the bimodality (even though the SiO_2 gap cannot be clearly resolved in the isotopic data itself). $^{143}Nd/^{144}Nd$ cluster between 0.512570 and 0.512675; $^{176}Hf/^{177}Hf$ between 0.282795 and 0.282940, exhibiting a crustal signature and model DM ages consistently around 0.7 Ga.

Abundant hydrous phases (e.g. amphibole) indicate an increase in fluid addition for the post-caldera units with respect to the pre-caldera ones. This can explain the compositional gap as follows: assimilation of old European basement by a primitive magma of mantle origin is well modelled by Nd-Hf isotope systematics; it was ended by an interruption in replenishment, which led to an increase of crystallisation and of viscosity, suppressing eruption. During this time gap, differentiation by fractional crystallisation led to enrichment of incompatible species, especially aqueous fluids, and thus to a decrease in viscosity, enabling eruption again in the last stage

The Pb isotope signature ($^{206}Pb/^{204}Pb$ = 18.647-18.779, $^{207}Pb/^{204}Pb$ = 15.624-15.658, $^{208}Pb/^{204}Pb$ = 38.502 - 38.720) also shows mixing of mantle and old upper crust, following [2], supporting assimilation of European basement.

Surprisingly, Sr ratios are mantle-like (0.7036 - 0.7051) with no indication of major crustal assimilation. This suggests decoupling from Hf, Nd and Pb, and may require additional infiltration of slab-derived fluids.

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