

PETROGENESIS OF LATE CENOZOIC MAFIC ALKALINE ROCKS OF THE NOSY BE ARCHIPELAGO (NORTHERN MADAGASCAR): RELATIONSHIPS WITH THE COMOREAN MAGMATISM

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Results of a geochemical and isotopic (Sr-Nd-Pb) study of mafic volcanic rocks outcropping in the Nosy Be archipelago are reported. This volcanic area (10-7 Myr) is part of the igneous province extending throughout northern Madagascar. Lava flows and spatter cones are present in the northern and western sides of the Nosy Be island, while the central part is characterized by the presence of several tuff rings. The rocks range in composition from basanite to phonotephrite, and have phenocrysts of olivine, Cr-rich spinel and Ti-rich clinopyroxene. Kaersutite phenocrysts are present in the most differentiated rocks. Small ultramafic spinel-bearing xenoliths occur in the primitive lavas. The mafic rocks have $Zr/Nb=3.1\pm0.3$, $(La/Yb)_n=20.8$, $^{87}Sr/^{86}Sr=0.70332-0.70366$, $^{143}Nd/^{144}Nd=0.51280-0.51284$, $^{206}Pb/^{204}Pb=19.39-19.41$, $^{207}Pb/^{204}Pb=15.6$; $^{208}Pb/^{204}Pb=39.3-39.4$. The range of Zr/Hf (44-45) and Nb/U (47-49) is similar to the values of normal MORB and OIB worldwide. The geochemical and isotopic composition of the Nosy Be rocks is similar, but not identical, to that observed in the Comore Islands. The preferred genetic hypothesis for the Nosy Be basanites is low degree (4-5%) melting of enriched subcontinental lithospheric mantle, likely within the spinel peridotite field. Late Pan-African Nd model ages obtained ($\approx 550-610$ Myr) could indicate the timing of the enrichment event. The mantle source of the Nosy Be volcanism was remobilized during rifting events which have occurred throughout Madagascar in recent times. These rifting events could have also triggered the formation of the large alkaline volcanic fields of Itasy and Ankaratra in central Madagascar.