

Isotopic studies on Lamprophyre dykes of Schirmacher Oasis, East Antarctica and their significance.

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Precambrian polymetamorphic gneisses from Schirmacher Oasis (SO), Queen Maud Land, a part of East Antarctic shield (ranging in age from 779 ± 26 to 853 ± 51 Ma) are intruded by lamprophyre, dolerite/basalt, amphibolite dykes and sills of acid and basic nature. Rb-Sr and Sm-Nd isotopic studies were carried out on four lamprophyre dykes of SO for which isotopic data was not available earlier. The melanocratic lamprophyres are (minettes), medium to coarse grained in panidiomorphic texture and consists of phlogopite and pyroxene phenocrysts in a ground mass of k-feldspar. The dykes are calc-alkaline and broadly similar in their major, minor and trace element characteristics. The REE patterns of these dykes are also similar showing enriched LREE and depleted HREE ($LREE/HREE \sim 15$, $Ce_n/Yb_n \sim 41$) with no Eu anomalies. The Rb-Sr whole rock/mineral isochron ages of two dykes from western part of SO have given ages of 455 ± 12 Ma ($Sr_1 = 0.70886 \pm 5$) while other two from eastern SO give ages of 439 ± 10 Ma (2 σ). Large variation in δSr and δNd ($^{87}Sr/^{86}Sr = 0.70925$ to 0.71008) and $^{143}Nd/^{144}Nd = 0.511684$ to 0.512023) in the later indicate higher degree of crustal assimilation.

The chemistry of these dykes suggest the source magma was derived by low degrees of partial melting of a mantle with residue enriched in HREE. The enrichment of LILE and variations in Sr and Nd isotopic values suggest crustal contamination. The ages of the lamprophyre event in SO can be correlated to the end of Pan-African orogeny.