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# Lamprophyres and K-rich Plutonic Rocks from Schirmacher Oasis, East Antarctica: Magma Source and Related Issues

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Lamprophyres and K-rich plutonic rocks from the Schirmacher oasis, Princess Astrid Coast in the Central Droning Maud Land (cDML) of East Antarctica are exposed over an area of approximately 35 $km^2$; which is chiefly composed of garnet-biotite gneiss, pyroxene granulite, calc-gneiss, khondalite along with migmatite and augen gneiss [1]. The dykes are texturally and mineralogically distinct e.g. very coarse-grained gabbros, caorse-grained gabbros; some show strong abundance of intergranular material, whereas others are completely porphyritic. Micas and amphiboles are idiomorphic occurring as phenocrysts and also present in the groundmass, clinopyroxenes are observed in few samples, but olivine is totally absent. Feldspars are both plagioclase as well as orthoclase.

The ultrapotassic rocks of cDML are high in $K_2O$, MgO, $TiO_2$, Cr, Ba, Rb, Sr, Zr, and LREE; low in $SiO_2$, Ni, Co, Y and HREE; and variable concentrations of CaO, $Na_2O$, Cu, Pb, Zn, Nb, and Th. The chondrite normalized REE spidergram shows LREE enriched – HREE depleted pattern; however, some of them (notably gabbros) display horrizontal (flat) REE patterns. The gabbros show positive Eu anomalies, whereas lamprophyres show negative Eu anomalies. Primitive Mantle normalized trace elements spidergram shows negative Ti-Nb-Ta (TNT) anomalies, which is considered to be characteristic of calc-alkaline lamprophyres, and to metasomatism induced by subduction related fluids [2]. There is a general consensus that the shoshonites are generated in a subduction zone to post-collisional setting from a previously metasomatized mantle source enriched in LILE that may contain phlogopite and pargasite. Experiments show that partial melting of such a mantle can yield shoshonitic liquids, which may be parental to major batholiths. The calc-alkaline lamprophyres occur in a variety of tectonic settings that are broadly related to the latest stages of convergence where subduction is terminated by arc–continent, continent–continent collision or by ridge–trench interaction. In the case of arc–continent or continent–continent collision, slab-break-off has been proposed as the trigger for asthenospheric upwelling, which would initiate magmatism with both SCLM and juvenile mantle components. Our samples indicate orogenic environment, co-relatable with the Pan-African Orogeny.

Localized decompression melting of metasomatized lithosphere may occur in collision zones where the mantle root of subducted lithosphere may have been removed by convection. If collision was followed by a major period of orogenic collapse and extension, substantial partial melting of the lithosphere may occur. Melting of mixed lithologies may produce a variety of granitoid magmas accompanied by shoshonitic and lamprophyre-type magmas tapping isolated K-rich domains in the lithosphere. Jacobs and co-workers [3] already demonstrated that extensional shearing and granitoid intrusion are synchronous, and that orogenic collapse and the magmatism are related in the DML. Thus the K-rich lamprophyrs and associated plutonic rocks occurring in the Schirmacher Oasis and the southern Nunakates are related to partial melting of the K-rich metasomatised mantle related to partial delamination of the orogenic root of the East Antarctic-African Orogen.

*References:*

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