Typomorphic mineralogy of the Vattikod lamproites from Mesoproterozoic Ramadugu Lamproite Field, Nalgonda District, Telangana, India: A plausible manifestation of subduction-related alkaline magmatism in the Eastern Ghats Mobile Belt?

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Lamproites are mineralogically complex rocks and their bulk rock geochemistry is not for characterization of their parental magmas (Mitchell and Bergman, [1]). Characterization is best accomplished by consideration of their typomorphic mineralogy. We have investigated nine dykes from Vattikod (VL1:VL8 and VL10). The mineral assemblage and their compositions are comparable to those of lamproites in terms of the presence of phlogopite (Ti-rich, Al-poor phlogopite and tetraferriphlogopite); amphiboles (potassic-arfvedsonite, potassic richterite, potassic-ferro richterite, potassic katophorite, Ti-rich potassic katophorite, Ti-rich potassic-magnesio katophorite); Al-poor pyroxene; feldspars (K-feldspar, Ba-K feldspar and Na-feldspar), spinels (chromite magnetite and qandilite-ulvöspinel-ZnFe₂O₄). These dykes have also undergone varied degrees of deuteric alteration as shown by the development of secondary phases such as titanite, allanite, hydro-zircon, calcite, chlorite, quartz and cryptocrystalline SiO₂.

We have classified the Vattikod dyke on the basis of their typomorphic major mineralogy in conjunction with alteration affects as: Group 1 (VL1); Group 2 (VL2 and VL3); Group 3 (VL4 and VL5); Group 4 (VL6, VL7 and VL8); and Group 5 (VL10). Group 2 dykes are pseudoleucite-amphibole-lamproite; Group 3 dykes are pseudoleucite-phlogopite-lamproite; Group 4 dykes are pseudoleucite-phlogopite-amphibole-lamproite. The Group 1 dyke is completely altered and the precursor mineralogy cannot be identified. Group 5 dyke is also extensively altered but contains fresh euhedral apatite microphenocrysts together with pseudomorphs after leucite and is classified as a pseudoleucite-apatite-(phlogopite?) lamproite.

It is suggested that the Vattikod lamproites represent a spectrum of modal variants of lamproite produced by the differentiation and crystallization of a common parental peralkaline potassic magma. The near-linear disposition of Deformed Alkaline Rocks and Carbonatites commonly known as DARC’s (Burke and Khan, [2]) and lamproites in eastern India implies a relationship with subduction-related processes (Das Sharma & Ramesh, [3]; Gurmeet Kaur & Mitchell, [4]). We propose that the Vattikod and other lamproites in eastern India emplaced at 1100-1450 Ma are possible manifestations of subduction-related alkaline magmatism along the Eastern Ghats Mobile Belt, in contrast to extension-related anorogenic lamproite magmatism related to supercontinent(s) break-up as has been suggested for Ramadugu and other Dharwar Craton lamproites.

References: