NEW FINDING ALKALINE LAMPROPHYRE DYKES CLUSTER IN THE WESTERN MARGIN OF THE PROTEROZOIC PAKHAL BASIN IN AND AROUND KHAMMAM, TELANGANA, INDIA: EVIDENCE OF ALKALINE MAGMATISM

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Abstract:

The various parts of Cudappah Igneous Provice (CIP)/Prakasham Alkaline Province (PAP) of the Eastern Dharwar Craton (EDC), southern India is known for the occurrence of lamprophyre (Chalapati Rao,N.V 2008). Present paper reports new six lamprophyre dykes in and around Khammam area, Telangana, India (Fig.a). All the lamprophyre dykes are present in the contact zone between northeastern margin of the EDC and western margin of the proterozoic Pakhal Basin. In the south of the present study area in the contact zone between EDC and proterozoic Cuddapah basin lamprophyre and lamproits are reported earlier. First reported lamprophyre in the bayyaram area in the present lamprophyre cluster done by T.Meshram et al 2015.The lamprophyre of the study area has been intruded within granitoids of the EDC but not intruded in the Proterozoic Pakhal Basin (Fig.b). This field evidence indicate that alkaline magmatism was occur before the Proterozoic sedimentation started. These NE-SW trending lamprophyre dykes show petrographic and geochemical similarity with other lamprophyre dykes of the EDC. These dykes are ~0.5 to 1 mt wide having ~50 mt exposed in the study area. Petrographically clinopyroxene and olivine are present as a phenocryst in the rock showing the panidiomorphic texture; carbonate-rich ocelli also present in the rock. In some of the part carbonate replace the clinopyroxene and olivine (Fig.c,d and e). Mineralogy it is dominated by volatile content i.e. amphibole, carbonate, chlorite, epidote, phlogopite mica and serpentine (Fig.f). Zoining of mica is also present in the lamprophyres (Fig.g). All these petrography constitute important evidence for its identification as the lamprophyre. As this rock contains clinopyroxene and olivine as the phenocrysts and mainly plagioclase feldspar in the groundmass, this lamprophyre belongs to alkaline type. In geochemistry, all the lamprophyre are characterized by low SiO_2, generally high MgO, medium Al_2O_3 and high K_2O, also having high FeO + MgO and MgO/FeO. These lamprophyre shows low SiO_2 content varying from 42.00 to ~45.00 wt.%; $Na_2O + K_2O$ from 4.60 to ~ 4.65 wt.% and K_2O/Na_2O from 7 to 8 wt.%. The chondrite-normalized REE patterns of the studied rocks confirm crystallization from a LREE-enriched magma. The multi-element spider diagrams involving HFSE indicate their source region characteristic as subduction-zone related. Samples plot in overlapping field between subduction zone and within plate field with more affinity towards subduction- related source. Based on combined petrography and geochemistry study, this lamprophyre is considered to belong to the alkaline lamprophyre category in general. These newly finding alkali lamprophyre, indicate a phase of alkali magmatism in the margin of the EDC before the Proterozoic sedimentation.

Keyword: Alkaline lamprophyre, Eastern Dharwar Craton(EDC)

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Reference:

Chalapathi Rao, N.V. (2008). Precambrian alkaline potassicultrapotassic, mafic ultramafic magmatism in Peninsular India. Jour. Geol. Soc. India, v.72, pp.57-82.

T.Meshram, D.Shukla,K.K..Behera (2015): Alkaline lamprophyre (Camptonite) from Bayyaram area,NE margin of the Eastern Dharwad Craton,South India. Current Science,VOL,109,No 11,10 December,2015

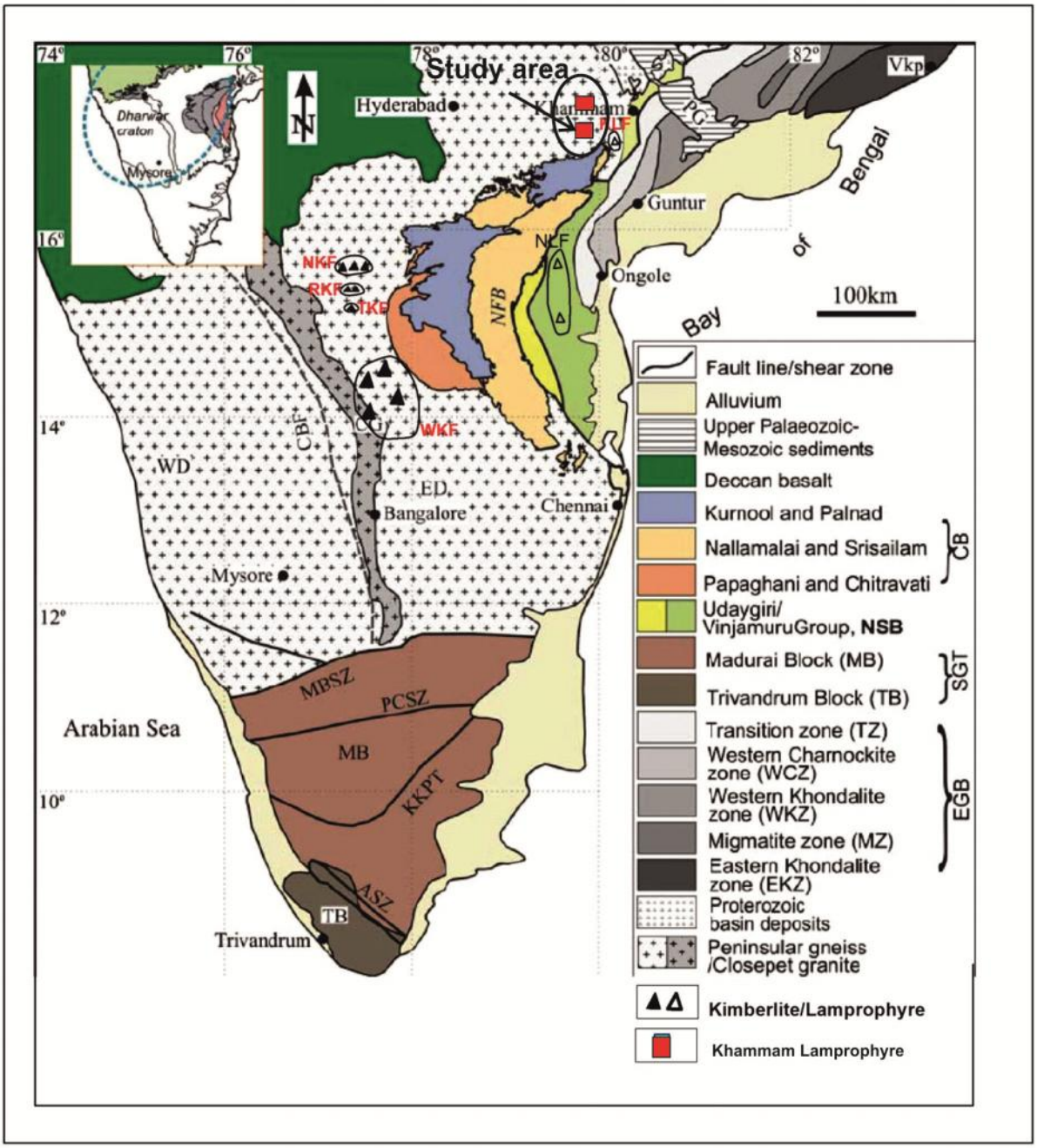

Fig.a: Generalised geological map of southern India modified from Drury et al. (1984) and Geological Survey of India (1998) showing kimberlite, lamproite and lamprophyre fields in the Dharwar craton. BC = Bastar Craton; EDC = Eastern Dharwar Craton; KLF = Krishna lamproite field; NKF = Narayanpet kimberlite field; NLF = Nallamalai lamproite field; TKF = Tungabhadra kimberlite field; WDC = Western Dharwar Craton; WKF = Wajrakarur kimberlite field, (Map source – www.researchget.net)

Fig.b: Field photograph of lamprophyre near Khammam.

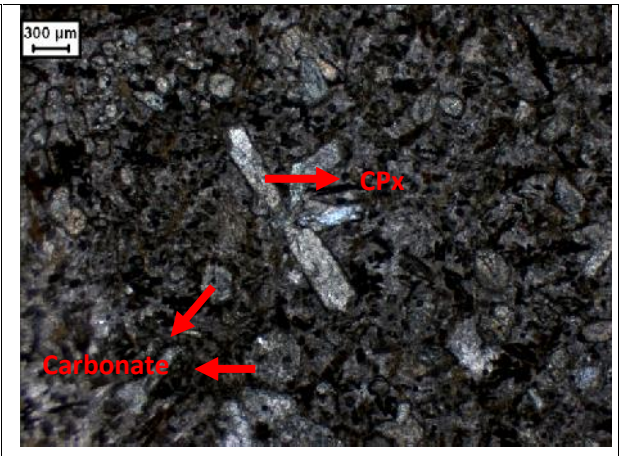

Fig c: Photomicrograph of lamprophyre showing altered carbonates and CPX phenocrysts (PPL).

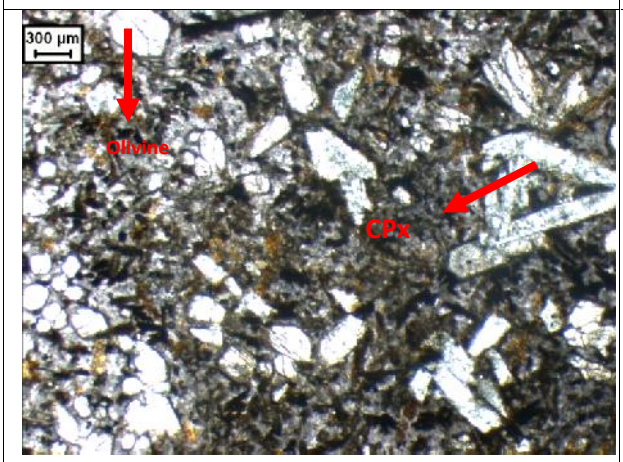

Fig.d: Photomicrograph of lamprophyre showing Olivine and CPX phenocrysts (PPL).

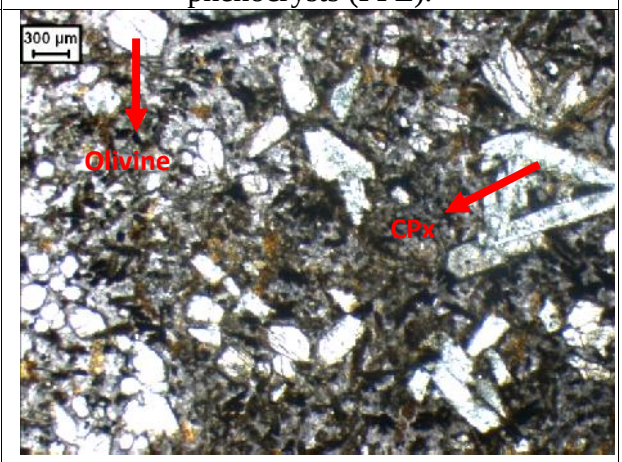

Fig.e: Photomicrograph of lamprophyre showing Olivine and CPX phenocrysts (XPL).

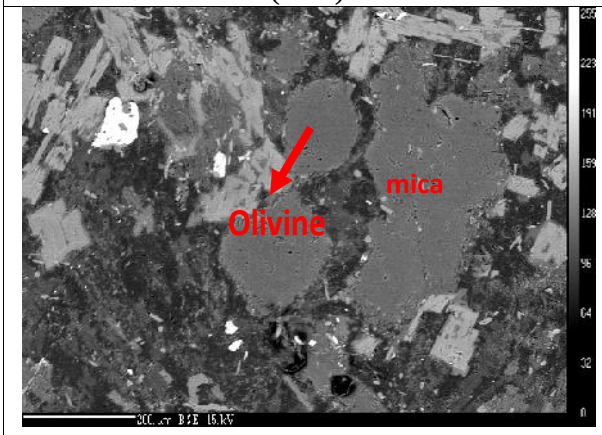

Fig.f: BSE image of Olivine and Mica in lamprophyre.

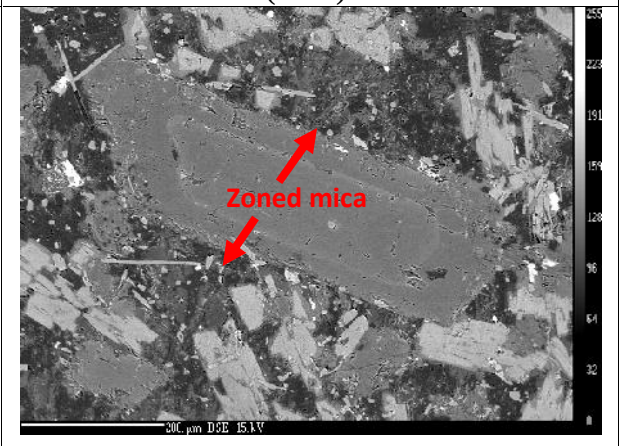

Fig.g: BSE image of zoned Mica in lamprophyre.