

A kimberlitic lamprophyre and associated alkalic basaltic rocks from Pishin District, Pakistan:

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In the western marginal portion of the Indian plate, the Spangar area in Pishin District, Pakistan, exhibits alkaline magmatism which is probably a manifestation of extensional tectonics within a continental plate. Whole-rock major and trace element variations are determined from within a recently reported kimberlitic intrusion in the lower Jurassic limestone, first reported and described by Ahmed & McCormick (1990). The rock is rich in incompatible elements like K, Ba, Rb, Sr, REE, P and Zr. Certain features of the rock deviate from those of classic kimberlites; and resemble those of the ultramafic lamprophyres. This rock is called a kimberlitic lamprophyre as it displays geochemical and petrographic features that relate it to both kimberlites and ultramafic lamprophyres. The activity is dominated by fissure-type, rather than central vent-type volcanism. This occurrence makes this region important for diamond exploration and for the lamprophyre-associated deposits of gold and other metals.

A mildly alkalic basaltic suite is identified to occur closely associated with the kimberlitic lamprophyre in space, time, mode of occurrence and probably, genesis as well. The source of basalts was trace element enriched continental lithosphere.

The kimberlitic lamprophyre and alkalic basalts are both formed from the relatively primitive magmas. The magmatism was probably caused by deep mantle or asthenospheric upwelling during the extensional tectonics and break up of the Indian plate away from the Gondwanaland where its position was in proximity to the Gulf of Aden and Somalia. Their emplacement was controlled by major fractures associated with the Jurassic rifting and continental break up. The basalts may represent "trap" volcanism of mildly alkalic character related to horizontal extension. The source of these rock seems to be trace-element enriched mantle. Like all alkaline igneous rocks, these rocks exhibit high concentrations of large-ion-lithophile elements; and their chondrite - normalized REE profiles show strong light REE enrichment.

At Kozh Kach, 25 km NE of Spangar, a conjugate third suite of sodic alkalic dolerites is present. It also intrudes the lower Jurassic sediments. It is geochemically distinct from the two rocks suites of Spangar; and within itself shows fractionation effects. It seems to belong to an episode of magmatism that differs from that of the Spangar-Garkai area alkalic rocks.

Reference cited

Ahmed Z. & McCormick G.R. A newly discovered kimberlitic rock from Pakistan. Mineralogical Magazine (U.K.), 1990, v.54, pp.537-546.