Geology of Indian carbonatites and evolution of alkali carbonatite magma

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The geology, structural features and the location of a number of carbonatites and their associated alkaline rocks in India reveal existence of the Narmada-Son and the Eastern Ghats rift systems dissecting the Peninsular India over 3000 km distance from the Eastern Himalayan Syntaxis to the Gulf of Cambay and to the Gulf of Mannar respectively with a number of cross-cutting grabens and triple junctions. These major continental rift systems were periodically reactivated from Precambrian to Recent times, which caused emplacement of magmatic rocks. Recently several new carbonatite-alkalic complexes were reported from Tamil-Nadu, Karnataka, Kerala, Andhra Pradesh and Assam-Meghalaya Plateau along the Eastern Ghats rift systems.

The carbonatitic complexes of India are classified on the basis of their agpaitic, miaskitic, eruptive, effusive and exhalative types on the basis of chemical, mineralogical and compositional variations in these rocks. Trend of an agpaitic magmatic differentiation has been traced for zoned alkali syenite-carbonatite complex of Tiruppattur, Tamil - Nadu that illustrates enrichment of alkalies and volatiles at late stages of magmatic evolution. Magmatic trend of miaskitic rocks of Sivamalai alkalic complex shows enrichment of alumina and silica deficiency. In Ambadungar eruptive carbonatite complex a differentiation trend with enrichment of alumina and silica is traced with depletion of volatiles, alkalies and REE constituents at late magmatic stages. The evolution of the parent magma (probably kimberlitic in composition) is controlled by the degree of opening of vents.