The Sub-Alkaline/alkaline magmatism around Settupalle Complex, Cuddapah alkaline Province, Andhra Pradesh, South India

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The alkaline magmatism in the "Cuddapah Alkaline Province"Andhra Pradesh, Southern Peninsular India is characterised by isolated pockets of sub-alkaline and alkaline lithounits and exhibit two differentiated magmatic series: the early emplaced Sub-alkaline (gabbro—fayalite clinopyroxene syenite—fayalite quartz syenite) and Late alkaline (mafic alkaline roc k—hornblende syenite—quartz syenite—nepheline syenite) series. The Settupalle complex forms the saturated to oversaturated component of the said "Cuddapah alkaline province" and located along the eastern margin of the intracrtonic Proterozoic Cuddapah basin of South Indian Craton. It is conspicously confined to an extremely narrow linear belt which is close to known basement fracture zone, with which the major bouguer gravity axis is parallel in a NNE-SSW direction. This particular belt lies at the junction zone between two fold belts i.e the Dharwar (granite greenstone belt towards the west and the Eastern ghat (gneiss-granulite) mobile belt towards east. The Settupalle complex is characterised by syenitic variants in association with gabbros and ocellar lamprophyres. The complex was post-kinematic, tectonically controlled and passive emplacement in to Precambrian amphibolite and granite gneiss basement. The mineralogical and geochemical analysis suggest that the parental magma for sub-alkaline series is considered to be tholeiitic basalt while that for alkaline series is mildly alkaline basalt magma. The tholeiitic magma was dry and differentiated under very low Oxygen fugacity conditions in a closed system fractionation process whereas the mildly alkaline basalt magma was hydrous and differentiated under very very low water pressure conditions. The quartz and nepheline syenites of alkaline series are thought to have been derived simultaneously from the hornblende syenites by branching differentiation mechanism similar to that of Gardar alkaline Province of Southwestern Greenland. It is also suggested that a cumulative control of fractionation of hydrous ferromagnesiam silicates, high Water pressure and Oxygen fugacity conditions over fractionating liquids at Settupalle allowed the formation of quartz syenites from hornblende syenites and permitted their migration by crossing thethermal barrier in Petrogeny's Residua system.