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Are the Alkali Syenite bodies from the Nallamalai Fold Belt of Cuddapah Basin, India related to Plume or Rift Systems?

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The alkaline syenite bodies of Proterozoic age, intruding into the Nallamalai Fold Belt of Cuddapah Supergroup along deep faults and fault intersections which are postulated to have crystallized from mantle derived hydrous alkaline magma enriched in LIL and LREE [1] are studied for low temperature AMS and palaeomagnetic measurements to understand the magma intrusion mechanism and their palaeomagnetic age. Chemical and isotopic signatures points towards mantle plume. Presence of syenite bodies along the eastern margin of Cuddapah Basin suggests that it is a zone of plume-rift interaction.

A detailed AF demagnetization on Giddalur and Racherla samples yields a stable single ChRM direction of normal polarity (D=294°; I=-37°; α_{95}=6.39; k=32.17; n=17; N=5) and the corresponding VGP is located at 16°N and 322°E. A comparison of this pole with the Proterozoic APWP of South Indian Shield assigns a palaeomagnetic age of 1200 Ma for these rocks.

The AMS investigations on 16 specimens of Giddalur syenite body and 12 specimens of Racherla syenite body indicated a prominent normal magnetic fabric as the foliation planes were passing through the K_{max} and K_{int} susceptibility axes. Both the syenite bodies have shown mean magnetic susceptibility as 1.19 x 10^{-3} SI units and the degree of anisotropy as 1.02 indicating the same magnetic mineralogy. A vertical injection of magma flow was postulated for the Giddalur body as the inclination of the K_{max} axes was found > 65°. However, NNE directed sub horizontal magma flow was proposed for the Racherla syenite body as the K_{max} inclination was found around 16° with a mean declination of 20°. Thus the magnetic mineralogy, polarity and fabric suggest the time frame work of deep intrusive nature around 1200Ma in a rift related tectonic environment. This needs to be checked through gravity and magnetic study. The existence of alkali bodies in the Cuddapah Basin corroborates the occurrence of lamprophyric, gabbroic dykes with alkalic flavour [2] along the margin of the Cuddapah Basin.

References

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