REE budget in Syenites around Eastern Dharwar Craton, India

PROF. RAJU PVS, PHD

CSIR-NGRI

Presenting Author: perumala.raju@gmail.com

Peralkaline plutons are located to the west and southwest of the Paleoproterozoic Cuddapah basin in the Ananthapur district, Eastern Dharwar Craton (EDC), India. Several alkaline plutons $(AP) \pm$ nepheline syenites were previously reported by the Geological Survey of India (GSI). The reported APs was examined for rare earth elements (REE) bearing minerals and their REE budget. The investigated AP areas in EDC are Dancherla, Peddavadaguru, Danduvaripalle, Reddypallae, and Chintalachervu. Overall, the lithounits consist of medium- to fine-grained mesocratic syenites, leucocratic syenites, porphyritic syenites, and quartz syenites in cross-cut relations within host rock (diabase hornblendite) dyke swarms of 2.2. Ga. The samples were subjected to multi-analytical techniques (e.g., SEM, EPMA, XRD, EDXRF, ICPMS, and LA-ICPMS). The microscopic studies revealed that REE is concentrated in minerals such as eudialyte, zircon, sphene, allanite, and apatite, and that REE concentration is enriched in opaque and Fe oxide phases. The total REE in one of the alkaline plutons with nepheline-bearing syenites is upto1%. The major element distributions show simple trends of a decrease in MgO, FeO, P₂O₅, and TiO₂ contents with an increase in SiO₂. Bulk-rock chemical analyses gave > 8 wt. % Na₂O, > 5 wt. % K₂O, low CaO and MgO contents (< 5 wt. %), and ~16 wt. % Al₂O₃. In a binary plot of Na₂O+K₂O vs. SiO₂, the sample clustered in the field of nepheline syenites. Our geochemical data and detailed REE budget investigation in the EDC area show enrichment in light REE in Danduvaripalle, Reddypallae, and Chintalchervu areas. An overview of the mineralogy, petrography, and geochemistry will be presented, The maximum La and Ce concentrations recorded thus far are 200 and 800 ppm, respectively. The proposed model suggests that the partial melting of mafic crust might have fractionated in a riftogenic tectonic setting.



