Petrology, Geochemistry and Origin of the Deccan Continental Flood Basalts of Southern Saurashtra, Western Deccan Volcanic Province

K. Naga Raju, D.V. Subba Rao and V. Balaram
National Geophysical Research Institute, (CSIR) Hyderabad – 500 606, India

The Deccan basaltic flows surrounding the Girnar Igneous Complex (GIC) and as well as occurring in and around Savarkundla-Rajula and Jetpur areas in southern Saurashtra are investigated in the present work. They are characterized by fine-grained green-coloured massive microporphyritic and medium-grained melanocratic porphyritic zeolite bearing basalts. The Deccan basalts under study consist of essentially augite, calcic plagioclase phenocrysts and opaques of titanomagnetite and ilmenite and show characteristic porphyritic textures. Deccan basalts of Girnar region are tholeiitic in nature and show basalt to basaltic andesite compositions in the TAS classification diagram. They represent both low to intermediate type of CFB's (TiO_2 = 0.61 % to 2.53%) and display wide compositional variations in terms of MgO (2.4% to 10.32%) and SiO_2 (47% to 52%) and trace elements. K_2O contents excepting in one sample show low to moderate contents (0.15% to 0.6%). REE patterns of these basalts show slight LREE enrichment, absence of Eu anomalies and flat HREE. The PM normalized distribution patterns show enrichments and depletions of LILE coupled with positive Nb-Ta anomalies and negative Sr and Ti anomalies suggesting the involvement of plagioclase and ilmenite fractionating phases and are similar to many high-Ti CFB sequences of the world. The overall geochemistry of these rocks in similar to the least altered Ambenali type of Deccan basalts and indicate their derivation from enriched mantle sources.