

Geochemistry, U-Pb zircon chronology and Sm-Nd characteristics of granitoids from Central Indian Tectonic Zone(CITZ)

BHUPENDRA S. YADAV^{1*}, TALAT AHMAD^{1,2},
TATIANA KAULINA³ AND TAMARA BAYANOVA³

¹Department of Geology, University of Delhi, India

(*correspondence: yadav.bhupendra07@gmail.com)

²Jamia Millia Islamia University, New Delhi, India

³Geological Institute, Kola Science Center, Russian Academy of Sciences, Apatity, 184200 Russia.

A multipulse voluminous granitic magmatism of diverse mineralogical and geochemical compositions occupies a vast expanse at the southern margin of the ENE-WSW trending Mahakoshal Supracrustal Belt (MSB), CITZ.

The granitoids from the eastern part comprises calc-alkaline granodiorite-granite suite. U-Pb TIMS zircon chronology yields the age of 1872.6 ± 8.2 Ma for gneisses and 1736 ± 16 Ma for granites. They are metaluminous to peraluminous, magnesian in nature and shows I-type to S-type affinity. Overall these rocks have 59.43-72.01 wt.% SiO₂ and high K₂O/Na₂O ratio. Their REE patterns are highly fractionated $(La/Lu)_N \sim 43.38$ with negative Eu anomalies $(Eu/Eu^* \sim 0.49)$. Multi-elemental plot suggest involvement of both crustal and mantle components in their origin. Tectonic discriminant plots suggest a combination of volcanic arc and syn-collisional type tectonic environment.

The rocks present on the central and western part are High-K granitoids, yields younger U-Pb age of 1695 ± 8.9 Ma from western part whereas ²⁰⁷Pb/²⁰⁶Pb ages from central part ranges from 1636 ± 6 to 1670 ± 11 Ma. They have high SiO₂ (~ 72.33 wt.%), Σ REE and HFSE contents. They are alkali-calcic and ferroan in nature, show signatures typical of A-type rocks and plot in the within-plate or post-collisional fields in the (Nb+Y) vs. Rb plot. REE patterns shows strong negative Eu anomalies $(Eu/Eu^* \sim 0.12)$ with $(La/Lu)_N \sim 9.02$, and shows depletion in Nb, Ta, Sr, P and Ti.

Integrating the data, it has been inferred that magmatism recorded in MSB is formed in a wide span of tectonic environment from Syn-collisional (1880-1700 Ma) to post collisional (1700-1630 Ma). However, there are no significant differences observed in ¹⁴³Nd/¹⁴⁴Nd ratios for all samples, that ranges from 0.51104-0.51139 and comparable to EM-I values. The T_{DM} model ages ranges 2804-2953 Ma, with present day ϵ_{Nd} values being negative whereas the initial $\epsilon_{Nd}(T_{DM})$ values are positive. This implies that their protoliths have been derived originally from depleted mantle source before melting again as an enriched source within the crust.