

## Occurrence of Two Distinct Paleoproterozoic TTG Types in the Singhbhum Craton: Implication for Crust Formation Mechanism

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Tonalite-Trondjemite-Granodiorite (TTG) association is one of the major constituent of Paleoproterozoic Cratons that allow us to study crustal evolution. Gneissic to foliated sodic granitoids of TTG clan is well exposed in the Singhbhum Craton. These TTGs have been treated as a single episode of magmatism by early researchers based on field evidences and geochemical characteristics. However, our study on TTG rocks show notable difference in Heavy Rare Earth (HREE) pattern in chondrite normalized REE plot. Accordingly, TTG rocks are divided into two groups, namely, (1) High HREE TTG [low SiO<sub>2</sub>; high HREE avg. (Gd/Er)<sub>n</sub>=2.23; less fractionated REE avg. (La/Yb)<sub>n</sub>=27.9 and low Sr/Y avg. Sr/Y=53.59] and Low HREE TTG [high SiO<sub>2</sub>; depleted HREE avg. (Gd/Er)<sub>n</sub>=3.23; steeply fractionated REE avg. (La/Yb)<sub>n</sub>=46.11 and high Sr/Y avg. Sr/Y= 95.49]. There is little difference in the major element composition and mantle compatible elements of High HREE and Low HREE TTGs.

“Subduction of hot oceanic plateau Basalt” and “melting of thick oceanic crust” are the two mechanisms that have been suggested by many workers for the generation of TTG magmas. Absence of elongated batholithic bodies, associated high magnesium diorites (Sanukitoids), high Nb basalts imply, possibly subduction was not the dominant mechanism for generation of TTG magmas in Singhbhum Craton, at least in Paleoproterozoic. Overall low Mg# (<50), Ni and Cr also rule out the possible interaction with mantle wedge and subduction like mechanism. Whereas, large flat domal granitic bodies flanked by greenstone belts indicate towards an oceanic plateau setting.

The two types mainly differ in pressure sensitive signatures like Sr/Y and (La/Yb)<sub>n</sub> ratio. This indicates melting occurred at different crustal levels. Similar Sr content but variation in HREE infers, both the types are generated by melting in garnet stability field. However, HREE variation is controlled by amount of Garnet retained in the restite. Further, U-Pb dating of Zircons from the TTGs are being undertaken to understand the time gap within the generation of two kinds of TTGs.