Goldschmidt 2024 Abstract
https://doi.org/10.46427/gold2024.23674

# Petrology and geochemistry of olivine-bearing metanorite and gabbro from the Angul domain: Insights to the mafic magmatism at the northern Eastern Ghats Belt, India

**DR. PROLOY GANGULY**[1], MRS. APARUPA BANERJEE[2,3], SANKAR BOSE[4], NILANJANA SORCAR[5], SNEHA MUKHERJEE[5] AND DAS KAUSHIK[6]

[1]Durgapur Government College
[2]Shahid Matangini Hazra Govt. General Degree College for Women
[3]Presidency University
[4]Presidency University, Kolkata
[5]National Centre for Earth Science Studies (NCESS), Ministry of Earth Sciences, Government of India
[6]Hiroshima University

Presenting Author: pganguly06@gmail.com

The present study focuses on the petrology and geochemistry of olivine-bearing metanorite and gabbro of the Angul domain of the Proterozoic Eastern Ghats Belt (EGB), India. The study area has undergone two metamorphic events ($M_{A1}$ and $M_{A2}$) and associated magmatism and deformation[1]. The $M_{A1}$ event reached granulite facies conditions (>850°C, 7–8 kbar) at ca. 1200 Ma and traced in aluminous granulite, khondalite, mafic granulite, fine-grained charnockite, and augen gneiss. The retrograde path of this event is characterized by cooling with minor decompression (~720°C, ~5 kbar). The $M_{A2}$ granulite facies reworking (800°C, ~6 kbar) occurred at ca. 990–960 Ma along a counter-clockwise *P-T* trajectory and was associated with felsic magmatism in the form of porphyritic granite and coarse-grained charnockite[1]. The gabbro is characterized by plagioclase, clinopyroxene, and orthopyroxene with subordinate proportion of hornblende, magnetite, and biotite. Olivine-bearing metanorite is composed of olivine, plagioclase and orthopyroxene with minor proportion of clinopyroxene. Both the rocks are overall undeformed in outcrop-scale but show recrystallization only in micro-domains and characterized by relict hypidiomorphic granular texture. In the latter rock, olivine grains are surrounded by orthopyroxene ($Opx_1$), while $Opx_2$ + spinel intergrowth is present at the boundaries of $Opx_1$ having contact with plagioclase. Hornblende (Hbl) is notably present as intergrowth with spinel at the contact of plagioclase with olivine and $Opx_1$/$Opx_2$. Phase diagram modelling suggests that the aforesaid intergrowth was developed at the time of cooling of this rock, following emplacement of the protolith mafic magma at mid-crustal level. We infer that such emplacement was probably synchronous to the $M_{A2}$ granulite facies conditions. The chondrite-normalized REE plots of both the rocks show slight enrichment of LREE and flat HREE pattern. In MORB-normalized trace element plot, depletions of Nb, Ta, and Ti are prominent, suggesting that the protolith mafic magma was emplaced at the depth above the garnet stability field, possibly in a continental arc region. The present study thus provides new insights to the early Neoproterozoic tectonothermal history of the northern Eastern Ghats Belt.

[1] Banerjee, Ganguly, Das, Sorcar, & Bose (2023), Journal of Petrology, 64(9), egad065