

Evidence for the oldest crust in the Eastern Dharwar Craton (EDC) from Zircon U-Pb dating of the TTG Gneiss in and around Khammam area, Telangana, India

Debapriya Adhikary^{1*}, Rajesh Kumar Sahoo², K.K. Behera² and K.V.S.S. Krishna³

¹ Eastern Region, Geological Survey of India, Kolkata-700091, India

² Southern Region, Geological Survey of India, Hyderabad-500068, India

³ Central Head Quarter, Geological Survey of India, Kolkata-700016, India

*Corresponding author. Email: debu9433291342@gmail.com

Abstract:

The TTG gneiss of the Eastern Dharwar Craton (EDC) is found in and around Khammam area, Telangana, India. This TTG gneiss is generally mesocratic, fine to medium grained and is composed essentially of plagioclase feldspar, quartz and subordinate amount of K-feldspar. Hornblende is the dominant mafic mineral with occasional presence of biotite. MMEs are absent in this unit. Strong gneissosity is developed in this rock. Petrographic study exhibits hypidiomorphic texture with intergrowth of quartz and (myrmekitic) plagioclase crystals. Anhedral quartz shows wavy extinction. Plagioclases are euhedral to subhedral. Hornblende concentration varies from 3 to 5%. Common accessories are epidote and sphene. Modal analysis shows quartz (19-25%), plagioclase (42-59%), K-feldspar (3-7%), hornblende (6-9%), biotite (6%). Zircon, sphene and apatite are common accessories, which constitute 1-2% taken together. Multiple spots from different zircons from a tonalite sample pertaining to tonalite-trondhjemite-granodiorite (TTG) suite of rock collected from study area in EDC have been analyzed for U-Pb ages. The analyses were carried out using Nu Plasma - II MC - ICPMS instrument coupled with NWR 193 nanometer Laser Ablation Unit. The zircons are igneous in origin having Th/U ratio > 0.1. The upper intercept age i.e., 3526±96 Ma obtained from magmatic zircon grains indicate an age of crystallization of an oldest component in EDC. These results also corroborate with recent isotopic studies on metavolcanics and quartzite (Maibam et al 2016 [2]) from EDC. Previously, in the EDC oldest TTG was reported from the SW part of EDC with the age 3.38-3.0 Ga. We present new age data in the NE part of the EDC which records oldest crustal dates (3526±96 Ma) in the EDC, which is comparable with the TTG dates of the Western Dharwar Craton (WDC). The obtained result indicates an evidence for probable occurrence of some Mesoarchean crustal component in Northeastern part of EDC similar to WDC (Bhaskar Rao *et al.* 2016 [1]).

References:

[1] Bhaskar Rao* YJ, Namrata Khadke and Vijaya Kumar T (2016) Research Highlights on the Evolution of Precambrian Crust of Peninsular India: Constraints from Recent Zircon U-Pb Geochronological Results Proc Indian Natn Sci Acad 82 No. 3 July Spl Issue 2016 pp. 489-503

[2] Maibam B, Gerdes A and Goswami JN (2016) U-Pb and Hf isotope records in detrital and magmatic zircon from eastern and western Dharwar craton, southern India: Evidence for coeval Archaean crustal evolution Precambrian Res 275 496-512