Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.8511

# Pan-African metamorphism from Lesser Himachal Himalaya and its implication in Gondwanaland assembly

**DR. HIFZURRAHMAN, PH.D.**

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH

Presenting Author: hifzurrahman17@iiserb.ac.in

Pangaea is the supercontinent geologists reconstructed using paleontological and geochronological data [1]. Immediately older than Pangea is the Gondwanaland supercontinent, amalgamated during the Precambrian–Cambrian transition and comprising the cratonic blocks of India, Africa, South America, Australia, and Antarctica [2]. In the same time frame, the East European Cratonic block, located at the northern margin of Gondwanaland, experienced granite magmatism and high-grade metamorphism. However, the correlation between crustal blocks in Gondwanaland and the East European cratons is disputed due to the lack of paleontological and paleomagnetic data. In this contribution, we present results of age-integrated thermodynamic modeling to suggest a possible correlation between Indian and East-European cratonic blocks.

An ensemble of metasediments and gneissic rocks, commonly known as the Jutogh Group and Wangtu Gneissic Complex (WGC), occurs as a tectonic window in the Lesser Himachal Himalaya, India. In the Jutogh Group, chlorite-mica schist, garnet-staurolite schist, and sillimanite-schist develop sequentially, from near Jhakri thrust in the west to Wangtu in the east. Geochemical modelling suggests that the Jutogh Group's precursor sediments were deposited in an active tectonic setting at the Indian plate's northern boundary. Phase equilibria modeling implies chemically zoned garnet developed at 550°C-600°C and 0.8 GPa- 0.9 GPa by destabilizing low-temperature assemblages. The retrograde segment consists of exhumation and cooling, resulting in a tight clock-wise *P-T* path.

The $\varepsilon_{Nd}$[1.8Ga] of the Jutogh group varies between 0.97 and 8.14, with depleted-mantle-model ages between 3.07 Ga and 2.28 Ga. A combination of the isotopic composition of the garnet core and its leachates yield an Sm-Nd isochron of 471.5±26.2 Ma. The combination of the isotopic composition of the biotite, garnet rim, and garnet leachates fraction provides an isochron of 452.97±6.26 Ma. When combined, the results of geochemical interpretation, *phase equilibria* modeling, and Sm-Nd geochronology imply that the Jutogh Group was deposited on an active continental margin and metamorphosed during Pan-African crustal assembly processes between India and East Asian Cratons.

[1] Dalziel IWD (1997). Bull. Geol. Soc. Am. 16–42. [2] Torsvik TH, Cocks LRM (2013) Gondwanan Res. 999–1030