



# Granulite belts of Central India with special reference to the Bhopalpatnam Granulite Belt: Significance in crustal evolution and implications for Columbia supercontinent

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## ABSTRACT

The Central Indian collage incorporates the following major granulite belts: (1) the Balaghat–Bhandara Granulite Belt (BBG), (2) the Ramakona–Katangi Granulite Belt (RKG), (3) the Chhatuabhavna Granulite (CBG) of Bilaspur–Raigarh Belt, (4) the Makrohar Granulite Belt (MGB) of Mahakoshal supracrustals, (5) the Kondagaon Granulite Belt (KGGB), (6) the Bhopalpatnam Granulite Belt (BGB), (7) the Kanta Granulite Belt (KTGB) and (8) the Karimnagar Granulite Belt (KNGB) of the East Dharwar Craton (EDC). We briefly synthesize the general geologic, petrologic and geochronologic features of these belts and explain the Precambrian crustal evolution in Central India. On the basis of the available data, a collisional relationship between Bastar craton and the EDC during the Paleo-Mesoproterozoic is reiterated as proposed by the earlier workers. The tectonic evolution of only few of the orogenic belts (BGB in particular) of Central India is related to Columbia.

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## 1. Introduction

The assembly, evolution and dispersal of continental fragments are addressed in a number of recent studies (e.g. Rogers and Santosh, 2003, 2004, 2009; Santosh et al., 2009a) since the dynamics of supercontinents yield significant information on the history of crustal evolution, mantle dynamics and surface processes. Among the various supercontinents that existed on the globe, the Paleo-Mesoproterozoic supercontinent Columbia is considered to have been the first coherent supercontinent, the birth of which signaled a series of important events in the Earth history (Rogers and Santosh, 2009). The Peninsular Indian Shield comprises a collage of continental blocks and records a long history of crustal evolution that can be related to the assembly of supercontinents. The entire region is divided into two distinct crustal provinces, namely the Southern Crustal Province and Northern Crustal Province, which are separated by the Central Indian Tectonic Zone (Radhakrishna and Naqvi, 1986; Yedekar et al., 1990; Santosh et al., 2009a; Rogers and Santosh, 2009; Naganjaneyulu and Santosh, in press). The Southern Crustal Province consists of the Archaean Cratonic nuclei (>3.0 Ga) such as the Dharwar, Bastar and Singhbhum Cratons whereas the Northern Crustal Province consists of the Bundelkhand Craton. The Dharwar, Bastar and Singhbhum Cratons are

juxtaposed along the NW–SE trending Pranhita–Godavari and Mahanadi rift basins (Fig. 1). The latter largely hosts late Paleozoic–Mesozoic Gondwana sediments with no evidence for any major Proterozoic activity whereas the Pranhita–Godavari basin exposes Proterozoic and Gondwana sediments (Santosh et al., 2006).

Central India is characterized by occurrence of small-sized granulite belts within the Central Indian Tectonic Zone and adjoining cratons. Based on their occurrence, the major granulite belts distributed in Central India and one of the granulite belts of East Dharwar Craton (EDC) which are necessary to evaluate the tectonic evolution of the Central Indian region are described under three major domains.

### 1.1. Belts from Central Indian Tectonic Zone (CITZ)

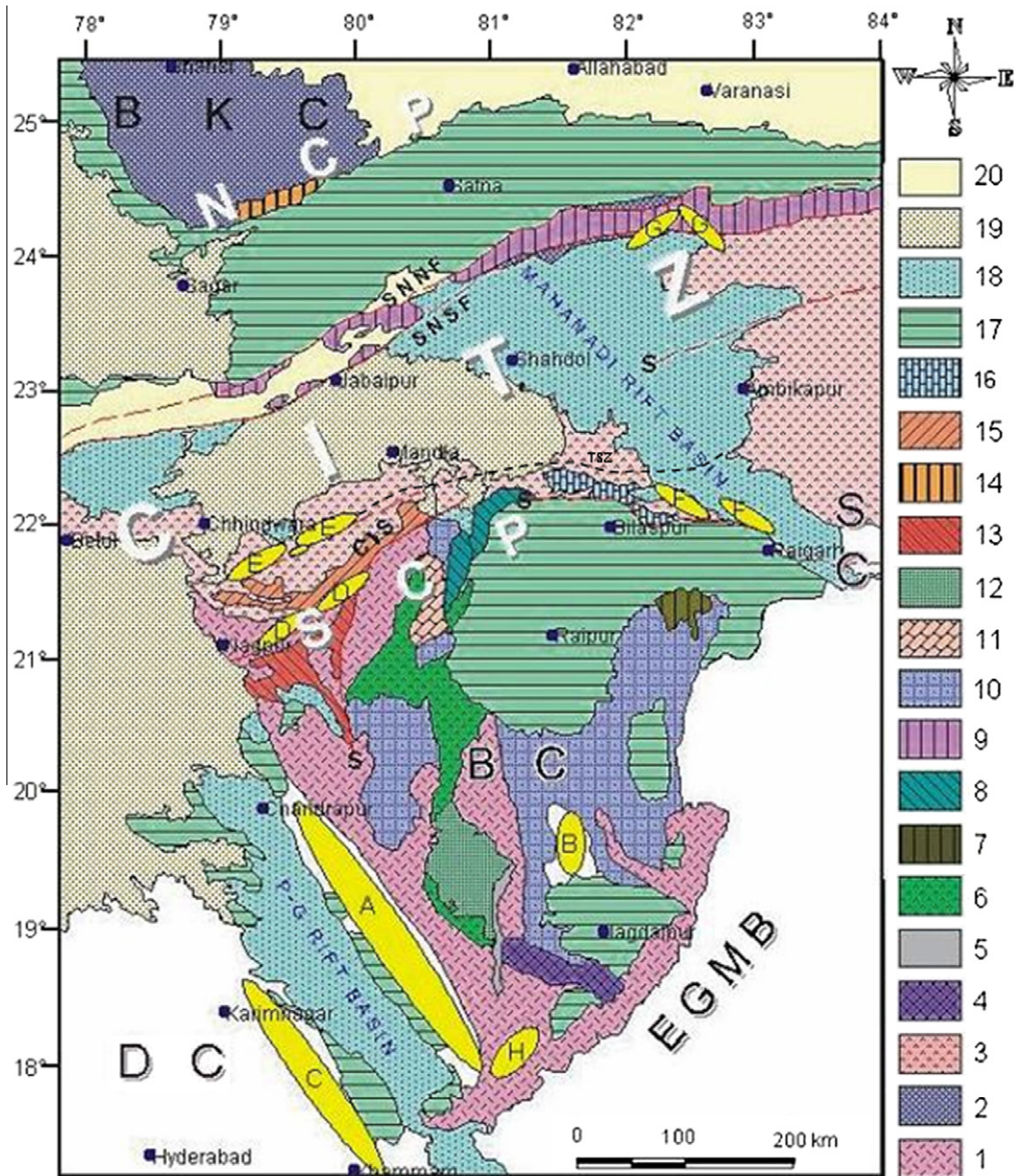
- a. Balaghat–Bhandara Granulite Belt (BBG).
- b. Ramakona–Katangi Granulite Belt (RKG).
- c. Chhatuabhavna Granulite (CBG) of Bilaspur–Raigarh Belt.
- d. Makrohar Granulite Belt (MGB) of Mahakoshal supracrustals.

### 1.2. Belts from the Bastar Craton (BC)

- a. Kondagaon Granulite Belt (KGGB).
- b. Bhopalpatnam Granulite Belt (BGB).
- c. Kanta Granulite Belt (KTGB).

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- ★ Granulite Belts:
- A. Bhopalpatanam Granulite Belt (BGB)
  - B. Kondagaon Granulite Belt (KGGB)
  - C. Karimnagar Granulite Belt (KHGB)
  - D. Balaghat-Bhandara Granulite Belt (BBG)
  - E. Ramakona-Katangi Granulite Belt (RKG)
  - F. Chhatuabhavna Granulite (CBG)
  - G. Makrohar Granulite Belt (MGB)
  - H. Konta Granulite Belt (KTGB)

★ Lensoid shape of the Granulite Belts are deliberately outlined to differentiate from rest of the terrain

DC - Dharwar Craton BC - Bastar Craton SC - Singhbhum Craton BKC - Bundelkhand Craton  
 CITZ - Central Indian Tectonic Zone NCP - Northern Crustal Province SCP - Southern Crustal Province  
 SNNF - Son-Narmada North Fault SNSF - Son-Narmada South Fault CIS - Central Indian Shear, S - Shear Zone  
 TSZ - Tan Shear Zone

1. Sukma & Amgaon Supracrustals 2. Gneiss: Younger Granitoids with Supracrustal enclaves, Bundelkhand Craton 3. Gneiss Granitoid including Tirodi Gneiss (CITZ) 4. Chandener Tulsidongar Mobile Belt 5. Bailadila Group 6. Nandgaon Group 7. Sonakhan Group 8. Chilpi Group 9. Mahakoshal Group 10. Dongargarh (including Kanker, Mainpur) & Malankhand Granitoid 11. Khairagarh Group 12. Abujmar Group 13. Sakoli Group 14. Bijawar Group 15. Sausar Group 16. Bilaspur-Raigarh Belt 17. Meso to Neo Proterozoic Cover Sediments 18. Gondwana Supergroup 19. Deccan Basalt 20. Alluvium

Fig. 1. Geological map of Central India showing Granulite belts (modified after Ramchandra et al., 2001).

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