

# Island arc related Archean mafic volcanism from Bundelkhand craton, Central India -An implication from Nd Model ages

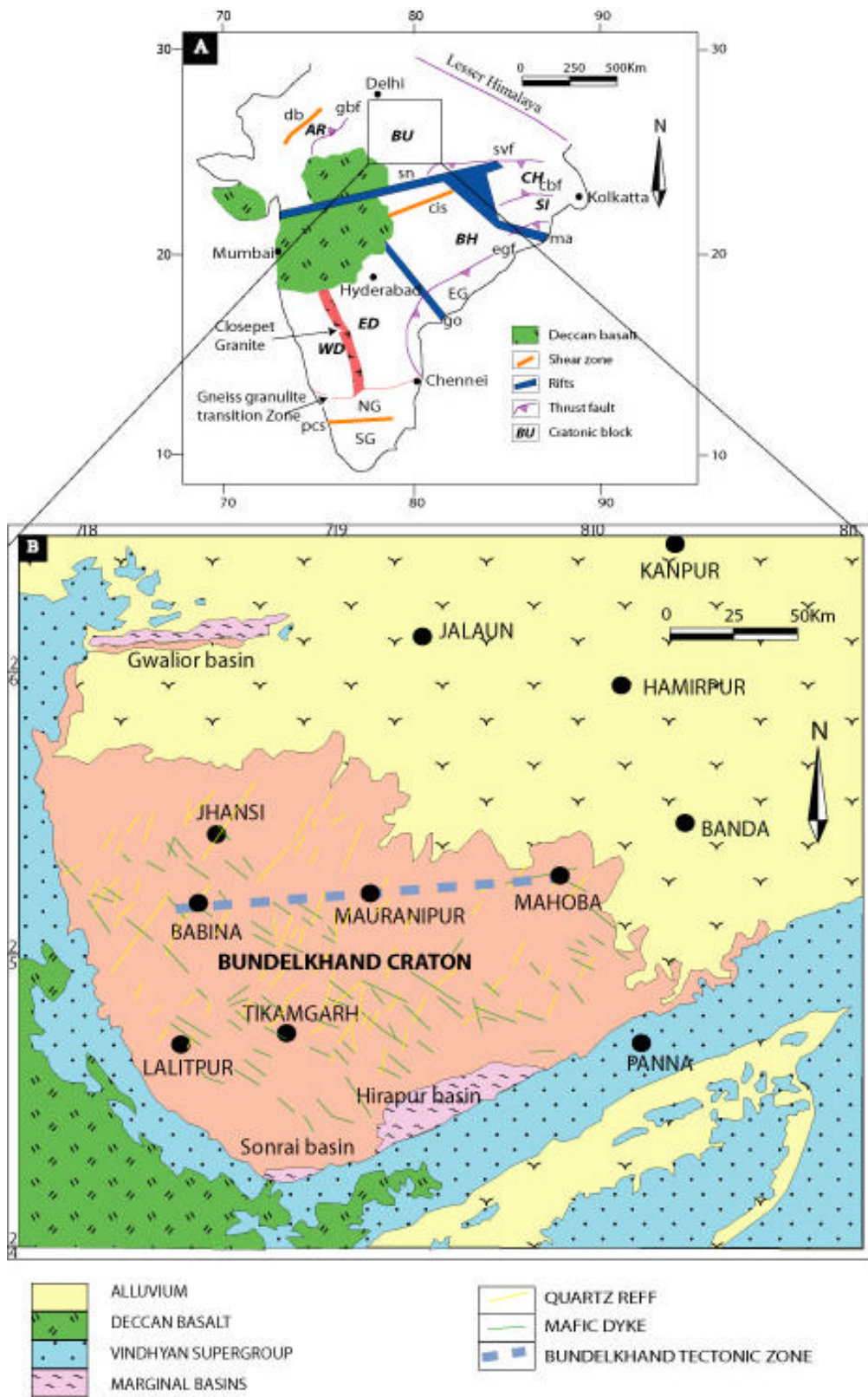
# Vivek P. Malviya[1]; Makoto Arima[2]; Jayanta K. pati[3]

[1] Geological Institute, Yokohama Natl. Univ; [2] Geolo. Instit. Yokohama Natl. Univ.; [3] Earth and Planetary Sci., Allahabad Univ

Bundelkhand Craton is one of the Archean cratons in the Indian shield. It is exposed over 26,000 sq. km and is bound by the Son Narmada lineament in the south, the Great Boundary Fault in the west, and probably the Lesser Himalaya in the north (Fig. 1A). The eastern, western, and southern margins of the Bundelkhand craton are covered by the Proterozoic Vindhyan Supergroup and the northern part is overlain by the Indo-Gangetic alluvium. Three marginal rift basins were developed at the southern (Hirapur and Sonrai, Bijawar Group) and the northwestern (Gwalior basin, Gwalior Group) fringes of the craton, respectively. These basins preserve volcano-sedimentary units (Fig-1B) of late Archean to early Proterozoic age.

The Bundelkhand craton is composed of high-Al TTG gneisses (3.5-3.3 Ga), meta-supracrustals (BIF, quartzite, calc silicates, ultramafic rock, and amphibolite), granite intrusions (2.5-2.1 Ga), giant quartz veins (2.0-1.8Ga), and tholeiitic mafic dykes (2.0-0.9 Ga). During 2003 and 2004 field seasons, we mapped occurrences of metamorphosed supracrustal sequences (Bundelkhand green stone belt) exposed along the highly sheared east-west striking Bundelkhand tectonic zone (25deg.15min.) in detail (Fig. 1B). The supracrustal sequences include amphibolite, basaltic pillow lava, ultramafics, calc silicates, quartzite, BIF, and chert. Field relationships suggest that these supracrustal units predate the granite emplacements of 2.5-2.2 Ga. In the present work, we describe mode of field occurrences, petrological and geochemical characteristics, and Sm-Nd isotopic compositions of metamorphosed basaltic pillow lava (amphibolite facies) in the Mahoba, Mauranipur, and Babina areas. The metamorphosed mafic volcanics occur within supracrustal sequences comprising BIF, quartzite, ultramafics, chert and tuff. About 80 represented rock samples were analysed for whole rock major and trace elements. The mafic rocks are characterized by higher LIL elements (Ba, Sr) and lower HSF elements (Nb, Zr, Hf, Ta, and Ti). They exhibit nearly flat to LREE enriched chondrite normalized REE patterns. In the MORB normalized plots they are showing marked Nb and Ta trough. The mode of field occurrences and geochemical characteristics collectively suggest that these amphibolites are metamorphosed basaltic volcanics. The geochemical characteristics are comparable to the modern-day basaltic rocks formed at the convergent plate margins.

Nd isotope data of the amphibolites in the Mahoba area show a wide range of variation ( $^{143}\text{Nd}/^{144}\text{Nd}$ , 0.511581-0.511966) and give depleted mantle model ages from 4.2 to 3.4 Ga. The data from the Mauranipur area ( $^{143}\text{Nd}/^{144}\text{Nd}$ , 0.512582-0.512626) yield depleted mantle model ages from 4.5 to 3.4 Ga and in the Babina area ( $^{143}\text{Nd}/^{144}\text{Nd}$ , 0.511509-0.512570) give depleted mantle model ages from 4.9 to 3.3 Ga. The Nd evolution diagram indicates that the mantle beneath the Bundelkhand craton was depleted in Archean time. Since the rocks have relatively high  $^{147}\text{Sm}/^{144}\text{Nd}$  ratios, we are not able to obtain reasonable depleted mantle model age constraint for the mafic rocks. Nevertheless, the present data collectively imply that basaltic rocks were formed during Archean from the depleted mantle source in the subduction related setting.



**FIGURE -1**