

The Greater India case study and its connection with the Gondwana geological map

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Abstract

Greater India was a paleocontinent formed during the breakup and separation of Gondwana when it disconnected from Antarctica and Madagascar at 125 Ma and 75 Ma, respectively. The migration of this continent took approximately 75 million years, from its position in Gondwana to the Northern Hemisphere, when it collided with the southern portion of Asia and started the formation of the Himalayas. Today, its landmass is part of the Indian subcontinent, with a basement registering the evolution of at least three supercontinents: Gondwana (0.5 to 0.15 Ga), Rodinia (1.3 to 0.75 Ga) and Columbia (2.1 to 1.8 Ga). The geological map of the India subcontinent at 1:5M scale was constructed to integrate the new geological map of Gondwana (IGCP-628). The methodology consisted of six major tasks, executed simultaneously: (1) Selection of base maps and scientific papers from diverse sources; (2) Determination of a uniform datum (WGS-84) and a common georeference for obtained data on ArcGIS software; (3) Polygons are drawn according to available metadata, adjusted and corrected over Shuttle Radar Topography Mission (SRTM) images; (4) Polygons were classified according to rock type, geochemical signature, metamorphic grade, age of last tectonic event; (5) Crustal scale structural elements were drawn and classified according to kinematics; (6) Refined geological corrections were done following most recent publications and also the revision of a group of international researchers that are acting as Gondwana map collaborators. The synthesis of Greater India geology display the main cratons in shades of pink, red and brown, representing the Archean, Paleo and Mesoproterozoic rock forming events, corresponding to the Dharwar, Bastar, Singhbhum, Bundelkhand and Aravalli blocks. The younger mobile belts appear in shades of orange and yellow, from Neoproterozoic through the Cambrian, such as the Eastern Ghats, the Southern Granulite and the Central India Tectonic Zone. The Deccan Trap, volcanic unit of 65 Ma, ends the Gondwanan evolution of India subcontinent after the development of intracontinental rift type basins, like Godavari and Mahanadi. One controversial issue is the representation of the Himalayan region within the Gondwana map. First option was to leave units deformed in the Cenozoic out of the map. Though to trace the paleomargin of Greater India, also northern Gondwana, the addition of Pre-Cenozoic geological units provide better evidence for this reconstruction. Therefore, sedimentary rocks of the Jurassic passive margin and its Precambrian basement were included in the map, even the units deformed within the Himalayan orogeny.

Keywords: *Gondwana, Greater India, Neoproterozoic orogens, Himalayan deformation*