TECTONIC EVOLUTION AND PALEOCLIMATIC CONDITIONS OF THE INDIAN PLATE DURING ITS LONGEST JOURNEY

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The tectonic evolution of Indian plate, which started in Early Jurassic (~180 Ma) with the separation of Gondwana from Laurasia, presents an exceptional and intricate case history against which a variety of models of plate tectonics like continental breakup, sea-floor spreading, birth of ocean, flood basalt volcanism, hotspot trails, transform faults, subduction, obduction, continental collision, accretion, and mountain building can be investigated. For the duration of its extravagant voyage starting from southern hemisphere, to the final impact with the Asia, the Indian plate has experienced changes in climatic conditions both short and long-term. A series of plate tectonic maps are presented here illustrating the repeated rifting and morphing of the Indian plate from its Gondwana abode, its northward expedition, its collision first with the Kohistan-Ladakh arc in its NW corner, and then with Tibet at the Indus-Tsangpo Suture, its ultimate accretion to Asia, and the growth of Himalaya and Tibet by crustal shortening. We also present a series of paleoclimate maps illustrating the temperature and precipitation conditions based on estimates of Fast Ocean Atmospheric Model (FOAM), a coupled global climate model. The associations between flood basalts and the recurrent consequential disintegration of Indian plate from Gondwana are assessed and a mixed scenario of "active/passive" rifting model is presented. The break up Gondwana and the opening of the Indian Ocean is thought to have been caused by heating of the lithosphere from underneath by the large Bouvet plume, whose relicts are short-lasting swarm of plumes including Rajmahal-Kerguelen, Marion, Somnath, and Deccan-Reunion; and a 4,500 Km long hotspot trail along the Ninety East Ridge. On the other hand, plate-boundary forces mediated the collision of Kohistan-Ladakh arc with present day Indian plate in the north-west, and the closure of the Neotethys, resulting the northward motion of the Indian plate since the Late Cretaceous. The obduction at Kohistan-Ladakh arc might have triggered the acceleration of the Indian plate (18-20 cm/yr) from Late Cretaceous (~85 Ma) to Paleocene (~55 Ma) and then slowed down to (5 cm/yr) after the continental Indian plate collided with continental Asia in Early Eocene (~50 Ma). It is also important to note that through feedback mechanisms, the long-term climate change can modify plate motion and might have played a critical role in the post-obduction journey of the Indian plate.