

## **Geodynamic and tectonic evolution of Indo-Pakistan peninsula (South Asia)**

**M. Raza Shah<sup>1</sup> and M. Sadiq Malkani<sup>2</sup>**

<sup>1</sup>*Department of Earth Sciences, COMSATS Institute of Information Technology, Abbottabad  
Campus, Abbottabad, Pakistan*

<sup>2</sup>*Geological Survey of Pakistan, Muzaffarabad, Azad Kashmir, Pakistan  
razashah@ciit.net.pk*

### **Abstract**

Indo-Pakistan subcontinent (South Asia) is a peninsula but in the past it was a part of Gondwanaland and during northward journey it was mostly an island. During Late Triassic (220 Ma) the lands united as Pangea. The breakup of Pangea started in Middle Jurassic (170 Ma) while, the breakup of Gondwana started in Late Jurassic (160 Ma). Indo-Pakistan separated from Madagascar during Early Cretaceous and started northward journey (135 Ma). Most of Cretaceous pass in journey and an island. It migrated rapidly covering more than 6000 km in about 60-70 million years. Its northwestern corner collided first time with Afghan block of Asia at Latest Cretaceous about 70-67 Ma. This corner acts as a pivot point for counterclockwise rotation. Consequently Western Indus Suture, close to Zhoob-Waziristan-Kuram and its adjoining western areas like Katawaz basin began to rise, ended the Paleo Vitakri River systems of Sulaiman fold and thrust belt flowing from east to west (Indo-Pakistan shield toward Neotethys) and started the Paleo Indus River systems flowing from north to south. It deposited the molasse Chamalang (Ghazij) and Kahan groups in the Indus basin and Shagala Group (Murgha Faqirzai, Mina and Shagala/Shagalu formations) in the Balochistan basin. This shows the start of closure of Neotethys from Pakistan and adjoining Afghanistan. Further orogeny occurred at the Late Eocene (40-35 Ma) from where the northern part collided with southern extremity of Asia. This episode of orogeny is responsible for the birth of Ganges River systems and eastward expansion of Indus River systems. On this orogeny Tethys permanently closed from northernmost, northern and central Indus part of Pakistan, while the southern Indus was undersea. In this way Tethys retreated southwards, showing the uplift in the northernmost Foreland and its adjoining part of Hinterland. This land uplift resulted in the birth of Himalaya, Hindukush, Karakoram and adjoining Tibet. The Himalaya came into existence only at this collisional boundary. The main geoevents at Pliocene-Pleistocene boundary resulted in the further retreat of the sea from southern Indus. This phase is also responsible for further folding and faulting of previous rocks. So far the last major episode occurred at the end of Pleistocene, resulted further retreat of sea, foldings and faultings. The northward movements creating major stresses on and the vicinity of Northern Indus Suture (from Mohmand-Swat-Besham-Chilas-northern Haramosh-Astore-Shontar top-Taubat/Deosai belt) and also Western Indus Suture (Uthal-Bela-Khuzdar-Quetta-Muslimbagh-Zhoob-Waziristan-Kuram belt) are continuing so far. This tectonic orogeny is responsible for creating highest peaks and present morphology and birth of Indo-Pakistan Peninsula (South Asia).