



## Origin of Gondwana Basins of Peninsular India

Manas Roychowdhury

Geological Survey of India; Kolkatta, E-mail: manasmayukh@gmail.com

The Gondwana basins of Peninsular India occur along four major linear belts namely 1) ENE-WSW to E-W trending Trans Indian basin belt, 2) NW-SE trending Godavari-Pranhita-Wardha Valley basin belt, 3) NNW-SSE trending Mahanadi Valley basin belt and 4) N-S trending Purnea-Rajmahal-Galsi basin belt. Each of the basin belt includes a number of smaller subbasins or coalfields. These coalfields show varying litho-character and occur either as isolated troughs or are connected by the thick post-Permian strata.

The very disposition of Gondwana basins within the suture zones between different Precambrian cratonic blocks of Peninsular India and their complete absence in the cratonic interior, points towards a strong influence of such tectonically weak zones in the development of Gondwana basins. All the Gondwana basins are restricted between deep crustal level shear zones with associated granulite belts. The basins were initially developed during last phase of Carboniferous or at the dawn of Permian as sag basins within which Talchir sediments were deposited having a much larger extent than the present day basin boundaries and continued as such during Early part of Early Permian. The sag basins convert into rift basin in the latter half of Early Permian during which present day fault controlled basinal geometry came into existence. Most of the basins are characterised by boundary faults present along one margin only giving rise to 'half-graben' geometry. The movement direction as deduced from slickensides and other markers is predominantly normal along boundary faults. However, the dip of the boundary faults is generally more than  $75^\circ$  without any effect of flattening with depth. Such high angle is unlikely in case of normal faults. A distinct parallelism exists between the boundary faults and the basement grain within the mobile belts and in most cases the basement rock near the boundary fault is intensely sheared. It has been proposed that the reactivation of the shear zones within the basement under renewed stress field gave rise to the present day geometry of Gondwana basins. In order to explain the discrepancies in simultaneous development of rift basins in two near-orthogonal direction, it has been proposed that the basins which were subparallel to the northeastward bulk extension were developed as pull-apart basins while the northwesterly oriented basins were developed as rift basins.

Apart from these boundary faults, each individual basin has its own complex network of intrabasinal faults. Synsedimentary reactivation of the fault system, well established from different basins, provided the accommodation space in which the nearly five km thick pile of predominantly continental sediment was deposited. The rifting and the concomitant creation of accommodation space was not homogeneous. During Permian the major depocentre was in the eastern Indian basins while it shifted westward during Triassic onward.