



Evolution of Tormented Eastern Half of Cuddapah Basin Linked to Crustal Development in Southeastern Indian Shield

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The Proterozoic Cuddapah Basin evolution has been linked to multiple pulses of igneous activity and crustal development in southeastern part of the Indian shield. The Papaghni sub-basin in west and the Nallamalai sub-basin in east constitute two halves of the Cuddapah Basin. Western margins of these two sub-basins are well discernible, whereas the eastern margins are poorly defined. Field sedimentological research by Geological Survey of India between 1997-2007 has elucidated lithological attributes of two kilometer thick conglomerate/quartzite-argillite-carbonate successions accumulated in alluvial-shallow marine depositional environments during early to middle Proterozoic in the Cuddapah Basin. The late Proterozoic Kurnool and Palnad sub-basins were developed as 'superposed' basins over the Papaghni and Nallamalai sub-basins respectively. Temporal and spatial variations of Proterozoic depositional environments and their implication on stratigraphic and tectonic framework of the Cuddapah Basin are presented.

The Papaghni sub-basin was filled with fining upward mega cyclic successions of the Papaghni and Chitravati Groups deposited during transgressive sedimentary episodes of the Cuddapah 'bay' that protruded onto land from east. Provenance for the sediments was the Archaean to early Proterozoic basement gneissic complex located in west. The interlude between Papaghni and Chitravati Groups was marked by sub aerial explosive volcanism. It is now suggested that the sediments of the Papaghni and Chitravati Groups were deposited in 'successor' basins. Gradational contact relationship between the fining up Chitravati Group and the coarsening up Nallamai Group as well as outcrop extent of the latter indicate temporal transformation of Cuddapah 'bay' into a wider 'epeiric sea', wherein the sedimentation was culminated in a regressive event. Palaeogeographic reconstructions based on sedimentological attributes have revealed that the Nallamalai and Nellore meta sediments were part and parcel of one litho stratigraphic unit formed in a middle Proterozoic 'epeiric sea'.

Recent field expeditions by Midwest exploration wing have brought out several post-Cuddapah remobilized/emplaced igneous provinces around the peripheral parts of the Cuddapah Basin, now named as GPN (Guntur-Prakasam-Nellore) in east; CA (Chittoor-Ananatapur) in south; AK (Adoni-Kurnool) in west and MNK (Mahboobnagar-Nalgonda-Krishna) in north. Emplacement and remobilizations of these igneous provinces constitute post-Cuddapah additions to continental crust that controlled the Cuddapah Basin upliftment. It is now suggested that the emplacement of multiple pulses of basic and alkaline magmatic complexes of GPN province had tormented an otherwise continuous stretch of sedimentary successions of Nallamalai Group that extended eastward right up to coastal tracts. Present meta sedimentary outcrop disposition, progressively eastward increasing deformation intensity, metamorphic grades and basin inversion have been attributed to NE- SW and NW- SE deformational

phases along with plutonic emplacements of GPN province during ~1.0 Ga reworking event in southeastern part of the Indian shield.

About the Author:

The author is a former Director (Sel. Gr.), Geological Survey of India, currently working as Head of Exploration, Midwest Group, and India. He is a Chartered Professional of Australasian institute of mining and metallurgy and a Competent Person for mineral resource reporting vide JORC code (Australia); NI43-101(Canada) and UNFC (India). Material for this presentation is derived from the published and unpublished works of the author.