



**Geochronological and sedimentological constraints on the
evolution of the lower Cuddapah Basin, India**

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ABSTRACT

The Palaeo- to Mesoproterozoic Cuddapah Supergroup was deposited in the Cuddapah Basin, which is one of a number of Proterozoic volcano-sedimentary basins that overlie the Indian Shield. On the south-western margin of the basin, the stratigraphic succession in the basal Papaghni and Chitravati groups is initially composed of gravelly fluvial deposits with dominant sediment input coming from the western foreland. These are succeeded by shallow-water stromatolitic dolomite and shale with a significantly reduced siliciclastic component, and finally by sub-tidal laminated silt and sand. A detailed facies analysis of these rocks suggests that deposition occurred initially in an active extensional setting which subsequently developed into a passive extensional setting. Stable isotope geochemistry of dolomites in the Vempalle Formation of the Papaghni Group indicates that deposition of the formation may initially have occurred in a restricted setting where $\delta^{13}\text{C}$ varied according to fractionation via environmental processes. Whether the Vempalle Formation was deposited in a shallow marine or lacustrine milieu is equivocal; $\delta^{13}\text{C}$ values may correlate with the conclusion of the global oceanic ‘Lomagundi’ positive $\delta^{13}\text{C}$ excursion around 2100 Ma, however, this inference requires the carbonates to have been precipitated in oceanic water, and have retained their primary isotopic signature during pervasive dolomitisation. U-Pb dating of detrital zircon grains from the Gandikota Formation – previously thought to be the uppermost formation of the Chitravati Group – yields a maximum depositional age of 1207 ± 22 Ma. This is significantly younger than intrusive igneous rocks within the Cuddapah Supergroup and it is therefore likely that the Gandikota Formation is part of the overlying Meso- to Neoproterozoic Kurnool Group. The detrital zircon age spectrum of the Gandikota Formation indicates significant sediment input from the east, which is likely to be a result of the thrusting of the Eastern Ghats Belt onto the Eastern Dharwar Craton and a reversal of the prevailing extensional regime in the Cuddapah Basin. A number of authors have proposed a genetic link between the Cuddapah Basin and several other Proterozoic basins of the Indian Shield. This study provides no reason to directly correlate the temporally and spatially distinct basins.

Keywords: Cuddapah Basin, Palaeo- Mesoproterozoic, detrital zircon geochronology, hafnium isotope analysis, provenance, stable isotopes, dolomite, basin evolution.

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