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Soft sedimentary deformation structures from the Kaladgi Basin, Dharwar craton, India: Reflections on tectonic evolution of a Proterozoic cratonic basin

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Soft sedimentary deformation structures (SSDs) record the disruptive 'events' caused by endogenous and exogenous forces within the coeval and laterally adjacent depositional environments. They provide critical evidence for evaluating the nature of basin floor subsidence; and can be used in conjunction with the other sedimentological data to model the basin history.

Previously undocumented SSDs from the Neoproterozoic Badami Group of the northern Dharwar craton are recorded here. The SSDs in the sandstone facies of this Group include liquefaction induced soft sedimentary deformations in the form of deformed cross-bedding, clastic dykes and convolute folds. In the variegated impure limestone facies, they are represented by slumps, large and small scale syn-sedimentary faults, dewatering structures, clastic intrusions and neptunian dykes.

The Neoproterozoic Badami Group was deposited in shallow epicratonic platform settings and rests unconformably upon the folded and deformed outcrops of the older Bagalkot Group in the Kaladgi Basin, exposed on the northern edge of the Dharwar craton, south India. The older Mesoproterozoic Bagalkot Group has supracrustal sediments that rest on an eroded basement complex of the Dharwar craton. The Bagalkot sedimentation is dominated by shore-face and shallow platform deposits. The Badami sedimentation in contrast displays a strong fluvial influence, with minor shore-face facies.

The SSDs from the Badami Group differ in character and distribution from those documented earlier from the Bagalkot Group. The Bagalkot Group was deposited during active basement deformation, and contains a dominance of seismites amongst the SSDs. The intra-formational limestone breccias from this Group have been shown to display an incremental activity concurrent with sedimentation leading to the emergence of an intra-basinal disconformity. The Badami Group on the other hand contains dominantly a-seismic SSDs, and point to a relatively stable and passive depositional system.

The evidence of the SSDs is used in conjunction with sedimentological and structural evidences to demonstrate that the early deposition (of the Bagalkot Group) is one where basin floor submergence occurred concurrently (and was perhaps enhanced by) the basement tectonics. The overprinting of tectonics on the eustatic sea-level changes (during the 1800+ 100 Ma flooding event marked along the edges of the Dharwar craton) is evident in the sediment accumulation patterns of the Bagalkot Group. The sedimentary history of the successor Badami Group is a relatively passive one, and is evidenced not only by the sedimentation patterns but also the SSDs in them.

