Regional variance in alluvial sedimentation and revised stratigraphy of the Klipheuwel Group and Franschhoek Formation

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Abstract

The siliciclastic sediments of the Klipheuwel Group mark the transition from Pan-African tectonism and amalgamation of Southwest Gondwana to the shallow marine deposits of the Cape Supergroup in the Western Cape. The rocks are preserved in a number of seemingly isolated depositories and previous studies have mainly focused on selected occurrences. The lack of any integration of regional sedimentological or structural characteristics has, to date, resulted in only tentative stratigraphic correlations and subdivisions of the Klipheuwel Group. Lithological and structural data from the Klipheuwel Group indicate at least two separate depocentres that accommodated the post Pan-African peneplanation of the Saldania Belt and clastic detritus in distinctly different palaeoenvironments. A northern depocentre can be distinguished from a southern depocentre, each characterised by distinct architectural elements and facies associations that reflect topographic and structural controls. The northern depocentre, including Klipheuwel Group occurrences at Eendekuil, Redelinghuys and Elands Bay, show laterally persistent braided fluvial facies associations that developed multi-storey superimposed 'braided sheet' deposits. Here, the rocks show gentle dips and thicknesses range from 300 to 450 m. The southern depocentre, including the Klipheuwel and Klapmutskop localities, are characterised by much larger thicknesses (up to >2 000 m), steep dips of the rocks and laterally discontinuous braided fluvial facies associations that developed staggered channelised braided deposits. The lateral continuity of fluvial facies in the northern depocentre reflect sedimentation on a peneplained basement. The larger thickness, steep dips and strongly channelised deposits in the southern facies, in contrast, indicate deposition in actively subsiding half-graben structures that reactivated basement faults. The spatially closely associated Franschhoek Formation shares numerous characteristics with the Klipheuwel Group but preserves Pan-African strains similar to that of the underlying Malmesbury Group, that may indicate its formation as compressional piggyback basins with synorogenic sedimentation.