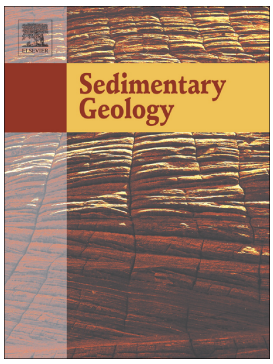

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Qun Liu, Ben Kneller, Claus Fallgatter, Victoria Valdez Buso

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Quantitative comparisons of depositional architectures of unconfined and confined turbidite sheet systems

Qun Liu, Ben Kneller, Claus Fallgatter, Victoria Valdez Buso

School of Geosciences, University of Aberdeen, AB24 3UE, UK

Abstract

Degree of confinement refers to the degree to which sediment gravity flows are influenced by the surrounding basin relief and interact with the basin margins, and is a key controlling factor in determining the depositional architectures of turbidite sheet systems. Two well exposed late Palaeozoic sandy turbidite sheet systems in the Paganzo Basin at Cerro Bola, north-west Argentina, termed stages II and IV (unconfined and highly confined respectively), provide three-dimensional constraints on facies associations, stacking patterns, depositional geometries and evolution of these turbidite sheet systems. Cluster analysis has been applied to define facies associations in these two systems at an appropriate hierarchical level depending on the overall nature of the system. The overlap index (OI), $OI=A_0/A_1$, where A_0 is the overlap area and A_1 is the area of underlying depositional element, is adopted to quantitatively characterise the stacking patterns. The two turbidite sheet systems show contrasts in that: (1) Stage II is built up by four hierarchical elements, each stacked in a shingled or compensational way with the majority of overlap index values of 0.7 and 0.8, to form higher hierarchical elements, whereas in Stage IV, individual beds stack vertically with OI=1, together forming the stage and (2) Four facies associations have been identified in Stage II by cluster analysis and they occur in a spatial sequence from axis to fringe; one facies association has been identified in Stage IV and it shows little variation spatially across the basin. In unconfined systems, depositional elements are self-organised, and autocyclic controls are dominant, whereas in highly confined systems, confinement has suppressed the autocyclic signal and systems are allocyclically controlled.

Key words: Degree of confinement; Turbidite sheet systems; Depositional architecture; Stacking patterns; Facies Associations; Autocyclic