

Deep-Water Slope Channels in Supply-Dominant Clinoform Systems, Comparing the Jurassic Neuquén Basin and the Cretaceous Washakie Basin

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Abstract

In supply-dominant systems, such as in some back-arc, foreland, and lacustrine basins, large amount of sediments are pushed from the shelf onto the slope and the basin floor as the base level remained relatively constant or with frequent but small variations. In those systems, the slope channels are often linear-sourced, relatively small (less than 100m in thickness), and short-lived, despite bypassing large amount of sediment into deeper water. Slope channels from two such systems: Jurassic Neuquén Basin and Cretaceous Washakie Basin, are characterized and compared in terms of the facies and architecture of their fill. In La Jardinera area in south Argentina Neuquén Basin, slope channels are mapped in basin-margin clinoforms formed during the early Jurassic back-arc stage. The clinoforms are only 300 m high, reflecting the water depth at the time. Most slope channels contain only single channel element with a thickness of tens of meters, and are filled with a variety of sediment density flow deposits. A grain-size analysis reveals an irregular downslope fining trend of turbidite/debrite beds in slope channel fill, except some notable bypass of conglomeratic facies to the lower most slope channels and basin-floor fans. The infill architecture of slope channels shows an apparent increase in degrees of vertical aggradation downslope. In contrast, the Late Cretaceous Fox Hill-Lewis clinoforms in Washakie basin are finer-grained. The studied section is the type section for rising and highstand fans. The mapped slope-channel distribution strongly suggests that the basin floor fan complexes

are fed by multiple slope channels confined within well-defined high frequency (fourth and fifth-order) sequences. Channels on the deep water slope merge with basin floor fans as aprons on the lower slope to toe-of-slope. Incisions near the shelf edge, cross-cutting multiple fifth-order sequences, directly link shelf edge deltas to slope channels and fans, especially for the progradation-dominant clinoforms in the second stage of basin fill. Channel log motifs are not evenly distributed through the height of any clinoform but tend to cluster, suggesting channel elements within a larger slope channel complex. The width of channel complexes is mostly within 3-5 km. Local net to gross in the channels can be more than fifty percent.