



Downslope Facies and Architectural Variations of Deepwater Slope Channels in Outcrop: Case Study from Jurassic Neuquen Basin, Argentina

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ABSTRACT

Most slope-channel outcrop studies have been conducted on continental margin systems, kilometers or even hundreds of kilometers in scale, that are clearly visible in seismic data. However, in smaller basins such as foreland and back arc settings, sub-seismic scale slope channels hold equally important information on deepwater sediment delivery in often oil-prolific provinces. One such sub-seismic slope-channel system is developed in prograding clinoforms in Bey Malec Estancia, La Jardinera area, southern Neuquén Basin, Argentina. A 5 km wide, 300 m tall, oblique- to depositional-dip section of Jurassic Los Molles Formation deepwater slope containing six clinoform timelines are highlighted by isolated slope-channel fills with thickness less than 50 m. Vertical sedimentary logs, satellite images, a digital elevation model, and drone photogrammetry were used to map variations in downslope channel geometry and infill facies. The slope channels are filled with a range of sediment density flow deposits, from poorly sorted conglomeratic debrite, to structureless, high-density sandy turbidite, and to well sorted, fine grained, graded low-density turbidite. A grain-size analysis reveals an irregular downslope fining trend of turbidite/debrite beds in slope channel fill with increasing water depth, with some notable bypass of conglomeratic facies to the lowermost slope channels and basin-floor fans. The infill architecture of slope channels changes from horizontal accretion to more aggradational downstream. The Bey Malec slope channel outcrop serves as a novel case study for sediment delivery in water-depth limited (<500 m), prograding dominant basins.