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Importance of Gravity Flow Deposits within a Pure Pelagic Carbonated Ramp (Cenomanian-Campanian, North-Western Indian Margin)

In southern Pakistan, the Upper Cretaceous margin of the Indo-Pakistani plate recorded a shallowing upward evolution from pelagic facies (Goru Fm, Cenomanian-Coniacian) to carbonate slope (Parh Fm, Santonian-Campanian). The geometry and the facies architecture of this margin can be restored from excellent exposures and subsurface data. This 3D restoration is of primary importance for the local exploration as the margin geometry controls the onlap architecture of the siliciclastic turbidite systems (Pab Fm, Maastrichtian).

Slope facies shows rapid thickness variations both due to syn-sedimentary faulting, regional depositional topographic profile and major erosional surface related to submarine canyon incision. At the scale of a tilted block, thin turbidite channels (50-120 m thick) are locally preserved over starved block crests, whereas 600 m thick of stacked slope carbonates are trapped in the hanging wall of the fault.

The facies evolution of this carbonated slope can be studied in outcrops along a 200-km long profile. It shows, from a proximal to distal setting: a) Stacked fine-grained packstone beds, which are pelagic-rich graded turbidites; b) Thin-bedded laminated wackstone and packstone beds (pure pelagic fauna), also showing debris flows and slump scars; c) Muddy turbidites (pelagic wackstone) alternating with shales and hemipelagites; d) Alternation of pelagic mudstone / wackstone beds with grey marls (hemipelagites).

The Parh slope carbonated ramp is then mostly made of gravity-flow deposits reworking pelagic material. The fact that benthic fauna is rarely found is probably due to the presence of a large transition zone between the eastern platform and the slope.