



Contrasting deglacial sedimentary architecture along paleofjord systems due to distance to open-sea, and its importance for hydrocarbon generation; Late Carboniferous units of W-Gondwana, Argentina

J.P. Milana (1), B. Kneller (3), and M. Dykstra (4)

(1) Universidad Nacional de San Juan, Instituto de Geología & CONICET, Rivadavia, Argentina (jpmilana@gmail.com), (3) Department of Geology & Petroleum Geology, University of Aberdeen, King's College, Aberdeen, AB24 3UE, Scotland, UK., (4) Colorado School of Mines, Colorado School of Mines, Department of Geology and Geological Engineering, 1516 Illinois Street, Golden, Colorado 80401, U.S.A.

The sedimentary fill of several exhumed paleovalleys cropping out at the Precordillera of San Juan Province Argentina, is compared. All these paleovalley fills show the fairly fast passage from proglacial conditions, well defined by dropstones or by redeposited units contained striated clasts, and eventually by the presence of striated pavements, to non-glacial deep water conditions defined by the lack of proglacial indicators, but instead a much finer-grained sedimentary unit, indicating a quite rapid transgression due to the eustatic rise after deglaciation. On spite of a similar climate-eustatic evolution, the paleofjord fills are quite contrasting in their detailed sedimentary architecture and in their capacity to produce source rock lithologies. We have basically differentiated three main type-cases, and we studied a few examples of each. Each type-case correspond to a realm (internal, intermediate, and marginal) that seems to be related to the distance to the open sea, and hence the capacity to produce restricted conditions in that local segment of the flooded paleovalley.

The internal realm is characterized by its closest position to the ice-cap and hence records a maximum degree of glacioisostatic load and minimum connection to open sea processes. As a result, during deglaciation, these basins become deeper and more isolated and thus, better suited for source rock production. The degree of reworking of the deposits is minimum, and preservation is maximum and it is often to record high-slope systems prograding directly onto a fjord deep basin floor. Two paleofjords were studied in detail to characterize this sedimentation mode: the Quebrada Grande and Quebrada de las Lajas paleofjords.

The intermediate realm is characterized by a medial position from the ice cap and the continent margin, and it is likely to only have recorded outlet glaciers presence. The glaciostatic load was not so strong and the resulting deglacial sequences are not as thick not so muddy as well. There is not accumulation of source rocks, although some coal beds can be produced during the last stage of paleofjord filling. Accumulation at this realm is quite varied, from typical estuarine conditions to slope-complexes generated at the front of braid- and fan-deltas, but there is a high degree of reworking of the deposits due to limited accommodation space and high sediment yield, and as a result sequences are in general much sandier, although their granulometric evolution is similar to that of the internal realm. Two paleofjords were studied in this realm: the Talacasto and Rí San Juan paleofjords.

The external realm is characterized by its furthest position with respect to the ice load and as a result the deglacial interval is the thinnest, although due to its distal position, this place has the advantage of recording more previous glacial advances, that were overridden at intermediate and internal positions in the last major glacial advance. At this realm, the postglacial transgression is again quite muddy, as in the internal realm, but in this case, there are no signs of restriction and muds tend to be green, and depleted of organic matter in spite of the rich marine invertebrate fauna, that was not observed at the other sectors. The quantity of wave structures suggest that wave action was much more intense than in the other cases, and in general, there are much less sediments product of gravity flows. We inspected in detail the El Paso and Hoyada Verde paleofjords.

This study shows thus, that there is a very important paleogeographic control of depositional processes that have some economic importance. Potential hydrocarbon source rocks would be favored at the inner belt of these paleofjords, some doubtful conditions would exist at intermediate positions and basically no source rock would be generated at the outer belt, bear the exits of these paleofjords into the open sea.

