

Outcrop analogues of thin-bedded turbidite reservoirs, application to gas-bearing reservoirs

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Abstract

Thin bedded turbidites are turbidite deposits with layers up to 10 centimeters of thickness. Despite thin beds are an important part of submarine deposits, they have been generally underestimated in hydrocarbon exploration. Depending on their layer thickness and the sand/shale ratios, it might be difficult to recognize the sandstone net-to-gross on conventional well logs when studying thin bed reservoirs. Under these circumstances, thin-beds have been considered as secondary targets for exploration. Nonetheless, they can have high content of well sorted sandstone in different elements of a turbidite system; Channel fill, channel overbank, channel-lobe transition and depositional lobes. Using outcrop analogs in order to define the different turbidite facies and the cyclic stacking patterns, logging total gamma ray and spectral gamma ray in order to evaluate the U, K and Th behavior and studying image logs would give insights to improve the characterization and exploration of thin bedded turbidite reservoirs. In this study, different elements of a turbidite system containing thin beds have been characterized, establishing their cyclicity patterns and studying their features, in order to provide objective criteria when exploring and producing from thin bedded reservoirs. Cyclicity observed could be traceable along tens of kilometers in a reservoir as well as the geological characteristics associated to this cyclicity. Anomalies in [Th] have been observed related to muddy stages of growth. These Th anomalies could be associated to a falling stage and they could relate with decrease of sandstone net-to-gross. All these different approaches when characterizing thin bedded reservoirs would help to recognize their potential.