

Reservoir Habitats in Deep-Water Depositional Settings

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ABSTRACT

In deep-water environments, reservoir-prone facies are components of a variety of depositional elements. These include 1) channels, 2) levees, 3) crevasse splays, and 4) frontal splays. Each of these elements is characterized by a unique set of reservoir attributes, which will influence exploration and development strategies. 3D seismic data are used to illustrate the seismic geomorphology and seismic stratigraphy of these deposits.

Channels containing sand can be observed from just seaward of the shelf/slope break, across the slope (whether within canyons or simply channels traversing the slope) and onto the basin floor beyond. Within canyons, channel preservation can vary from poorly preserved channel segments cannibalized by subsequent erosional events, to complete preservation along preserved canyon thalwegs. Where canyons are not present on the slope, preservation of sandstones within channels is more likely. Outboard of the slope, channels in basin floor settings exhibit a range of attributes including down-system meander loop migration, meander loop cutoffs, and avulsion events. Channel-fill amalgamation can occur in some instances, though in other instances, where amalgamation has not occurred, channels can be largely mud filled.

Channel levees can contain thin-bedded turbidites. These deposits can take the form of overbank or crevasse splays and are most prospective along outer channel bends. Sand reservoir quality diminishes with distance away from the levee crest. Levee heights decrease in a seaward direction and overbank and crevasse splays are more common in distal settings. Distally, where levee heights become too low to effectively confine the high density parts of turbidity flows, single leveed channels give way to frontal splays. These deposits are more widespread and tabular than leveed-channel deposits. Frontal splay sands are characterized by a distributary channel pattern, where individual channels are of significantly lower relief than up-system single leveed channels.