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Forced Regressive, Lowstand and Incised Valley Reservoir Development in a Strike-Slip Setting: East Sakhalin Shelf, Russian Pacific

Sakhalin Island comprises a N-S trending strike-slip fault zone, movement on which resulted in the northward propagation of an uplift front that gradually cut off sediment supply to the east Sakhalin shelf from the paleo-Amur delta and increasingly contributed sediment to the late Miocene shelf system. The East Sakhalin shelf is characterised by NNW-SSE trending folds that have undergone punctuated development since the Miocene. Interpretation of regional 2-D seismic lines, a 3-D seismic volume and wireline log/core data reveal a common architecture consisting of downward stepping reflectors interpreted as forced regressive shoreface deposits, related to periods of reducing shelfal accommodation. Subsidiary tidal/estuarine/fluviol deposits at specific stratigraphic positions are related to interpreted sequence boundaries. Seismic onlap data indicate that present day anticlines started to develop as syn-sedimentary subtle uplifts. There is no evidence from core for subaerial exposure but these intrabasinal subtle tectonic features exerted a local control on 'differential accommodation' and thus reservoir geometries. The highest permeability reservoir unit is a lowstand, transgressively reworked deposit of shoreface and local fluvial origin, which can be related to an episode of anticline uplift. Incised valleys observed on seismic trend sub-parallel to local strike-slip faults and local block rotation/uplift may have exerted a control on their positions. Flooding surfaces and some regional sequence boundaries are interpreted as due to eustatic sea level cycles, although current biostratigraphic control is of too low a resolution to provide an absolute age fit to the Miocene oxygen isotope paleo-temperature curve.