

Paper 12

Sand geometry of the deep water Crocker sediments in the Kota Kinabalu area, Sabah

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Deep-water turbidite sands are relatively new exploration targets in Southeast Asia. Recognizing and understanding the geometry of sand bodies in this tectonically active region pose a great challenge. The Paleogene deep-water sediments of the Crocker Formation, partially exposed along the coastal mountain ranges of NW Borneo provides an opportunity to understand turbidite reservoir system. Some of the good outcrops of the Crocker Formation can be found within the Kota Kinabalu area in Sabah.

The Crocker Formation in the Kota Kinabalu area can be divided into two lithological units — a lower sandy and an upper shaly unit. The sandy unit consists predominantly of grey sandstones interbedded with

various colored shales, whereas the shaly unit consists predominantly of shale with thin sandstone interbeds. Based on parameters such as bedding type, internal structures, sand to shale ratio, and grain size, the Crocker Formation can be broadly divided into four main turbidite facies — (i) very thick-bedded Sandstone Facies; (ii) thick to medium-bedded sandstone facies; (iii) thin-bedded sandstone and shale facies; and (iv) red shale facies. The four facies has been interpreted to represent, channels, channel margins and fan lobes, interchannels and basin plain deposits, and pelagic deposits, respectively.

Based on facies and vertical sequence analysis, it can be said that the Crocker sediment is dominantly a sand-rich submarine fan system. The sequence consists of about 500 m stacked channel-levee-fan lobe complex, draped over by about 100 m pelagic and basin plain deposits. The sandy bottom megasequence consists of at least 20 major channel sand sequences that range in thickness from 5–70 meters. Lateral correlation of bedding shows that most of the channel sand sequences could be followed parallel and perpendicular to a northward paleoflow direction. Although there are changes in terms of sand to shale ratio, the overall thickness of the channel sand sequences is generally maintained for several kilometers. The overall good lateral continuity of bedding in the study area suggests that the sands were probably deposited as broad channels and fan lobes over an unconfined basin, at least 50 km wide, producing lenticular and wedge-like sand geometry.