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ABSTRACT

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Syntectonic Sedimentation and Global Controls: The Neogene Sediments of Maharaja Lela Field and the Onset of the SRU (Shallow Regional Unconformity), Offshore Brunei

Maharaja Lela field is located some 50 km off the coast of Brunei Darussalam, on the northern side of the Champion-Padas Trend. Part of this field sits on a major growth fault that has been active at least since Middle Miocene and it affects, up to the surface, Upper Miocene, Pliocene and Pleistocene sediments. The peculiar fact of this fault is that even though it is a major structural feature, it dies out within the available data set. It is therefore possible for us to “close the loop” and to characterize with some detail its activity and the way it affected the sediment distribution.

Although the Miocene to Pliocene section is very sandy and overall monotonous in terms of depositional environments, transgressive-regressive cycles have been interpreted on log stacking pattern and seismic. Facies patterns within these cycles indicate a curious mix of wave (oscillation), tidal and fluvial activity; this facies mix is observed throughout the Miocene of Brunei and is also present on biostratigraphically coeval rocks on outcrops (Back & Alii, 2001). The correlation of these stratigraphic cycles across the ML fault was carried out in the first place using seismic, and in a second phase, fine-tuned with log curves correlations. Seismic correlation indicate offset in the order of several hundreds of meters along the fault surface. In the sediments deposited during the sedimentation, the stratigraphic expansion in the downthrown compartment may be up to 10 times the thickness of the sedimentary units in the footwall.

The stratigraphic expansion, once analysed with the log curves, occurs in a sand-to-sand/shale-to-shale mode, meaning that the net to gross ratio of a stratigraphic interval on one side of the fault is roughly the same of that in the other side. More over, as far as log facies are concerned, in the intervals where the expansion rate remains in the range of 4-5 times, also the stacking pattern of the stratigraphic unit is preserved across the fault.

A conclusion we may draw from these observations is that the processes ruling the deposition of a specific grain size are active on both side of the fault, as are the authocyclic and allocyclic controls that rule the geometry of the stacking patterns. If we go to the next step of abstraction, these observations may lead to the conclusion that this major structural event, continuous for tens of km is actually not playing a leading role in controlling the sedimentation processes and the grain sizes.

The major structural event is, on the other side, ruling the preservation potential of the sediments, making available lots of space for the sediments to fill, an this in a rather short time.

The Maharaja Lela fault activity occurs, in part, contemporary to the development of the SRU unconformity. This presentation will conclude on the signature of this stratigraphic event in the area under the influence of the maharaja Lela Fault.