AAPG Datapages/Search and Discovery Article #90236 © 2015 Asia Pacific Region, Geoscience Technology Workshop, Tectonic Evolution and Sedimentation of South China Sea Region, Kota Kinabalu, Sabah, Malaysia, May 26-27, 2015

Unlocking the Hidden Potential of a Mio-Pliocene Delta System In Northwest Borneo through Integrated 3D Fairway Mapping and Petroleum System Modeling.

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The prospectivity of the Bruneian part of the Baram-Balabac Basin, an oil and gas industry heartland since 1929, is currently being rejuvenated by BSP with 'state of the art' geophysical data sets and technologies. Core of the effort is a Regional Framework study integrating Play Based Evaluation (PBE) with a new in-depth look at the Petroleum System. The complex geology of Northwest Borneo together with high density field calibration allows for increased basin modelling granularity to pinpoint additional prospectivity also outside of areas of existing infrastructure.
Wall-to-wall 3D broadseis based structural framework interpretation integrated with high resolution sequence stratigraphy (Figure 1) provide enhanced visualisation of the depositional environment over large distances from source to sink. Technology implemented in Shell's GeoSigns software is enhancing the quality as well as the effectiveness of the seismic interpretation process (Figure 2). As the Brunei delta systems are stepping out and reacting to the uplift of the Borneo hinterland all mid- to late Miocene plays are syn-tectonically influenced. This 'depobelt' specific progradation must be mapped in detail to achieve proper representation of the spatially variable burial history throughout the region.
Extensive fluid analysis of comprehensive field data together with new source rock concepts represents an integral part of the advanced Petroleum System Study. A significant volume of source rock material has been shed from NW Borneo throughout the Miocene (Figure 3). However, the majority of plays rely on reservoirs deposited only during the last 10Ma. This highlights the geologically relatively young late Tertiary - Quarternary nature of the Baram-Balabac Basin in terms of burial history and heatflow calibration.
The success of this integrated Earth Model study will depend on the integration quality of all geologic ingredients (e.g. play elements) in order to achieve the required granularity for credible field calibration.

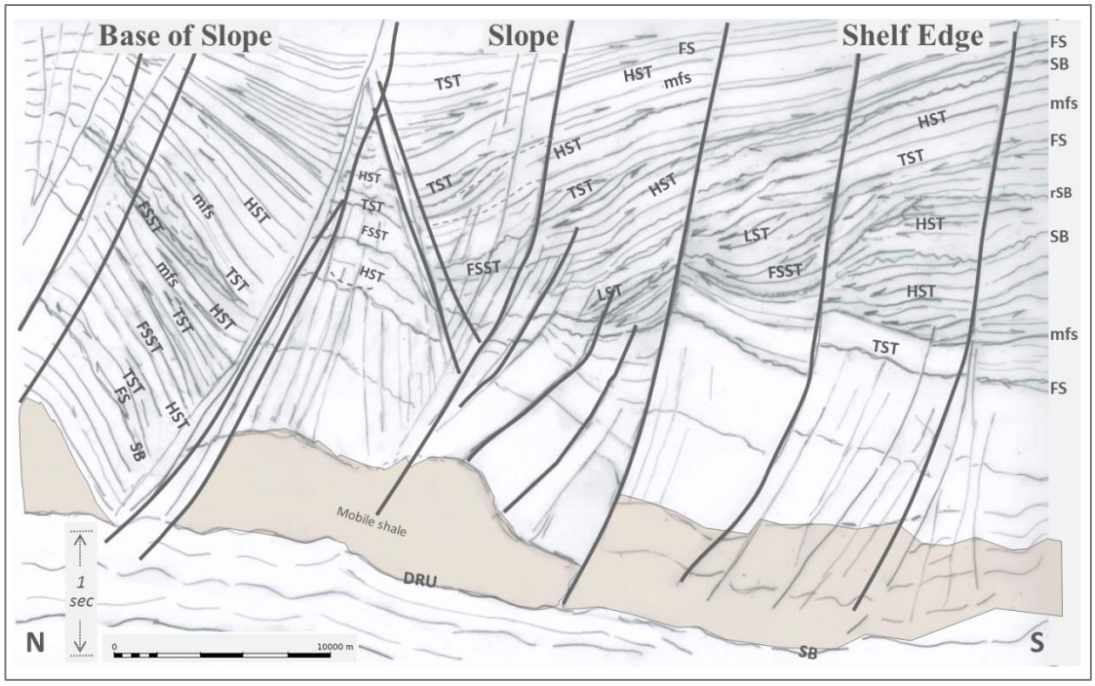

Figure 1: Parasequences level interpretation: Shallow marine sequences outstepping across older distal slopes and basin floor sequences, offshore Brunei.

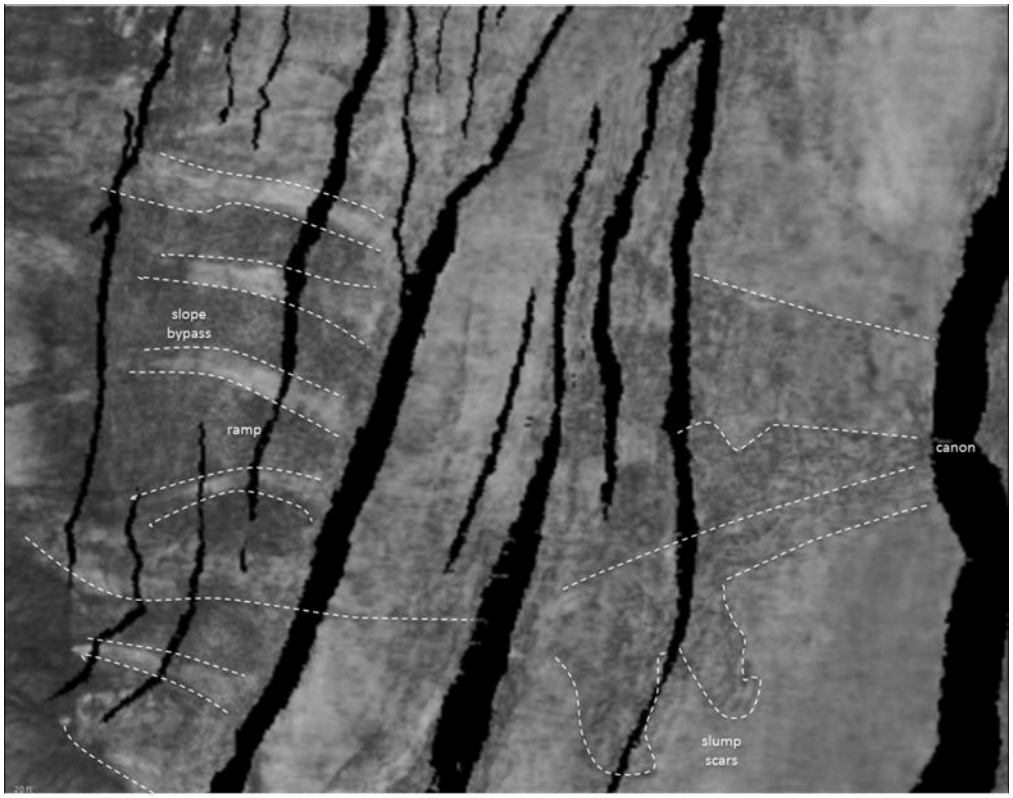

Figure 2: Visualisation of slope channels in offshore Brunei. Delivery feeder and slump scars on the right, ramp bypass across the upper slope on the left. The length of the section is ca 15km.

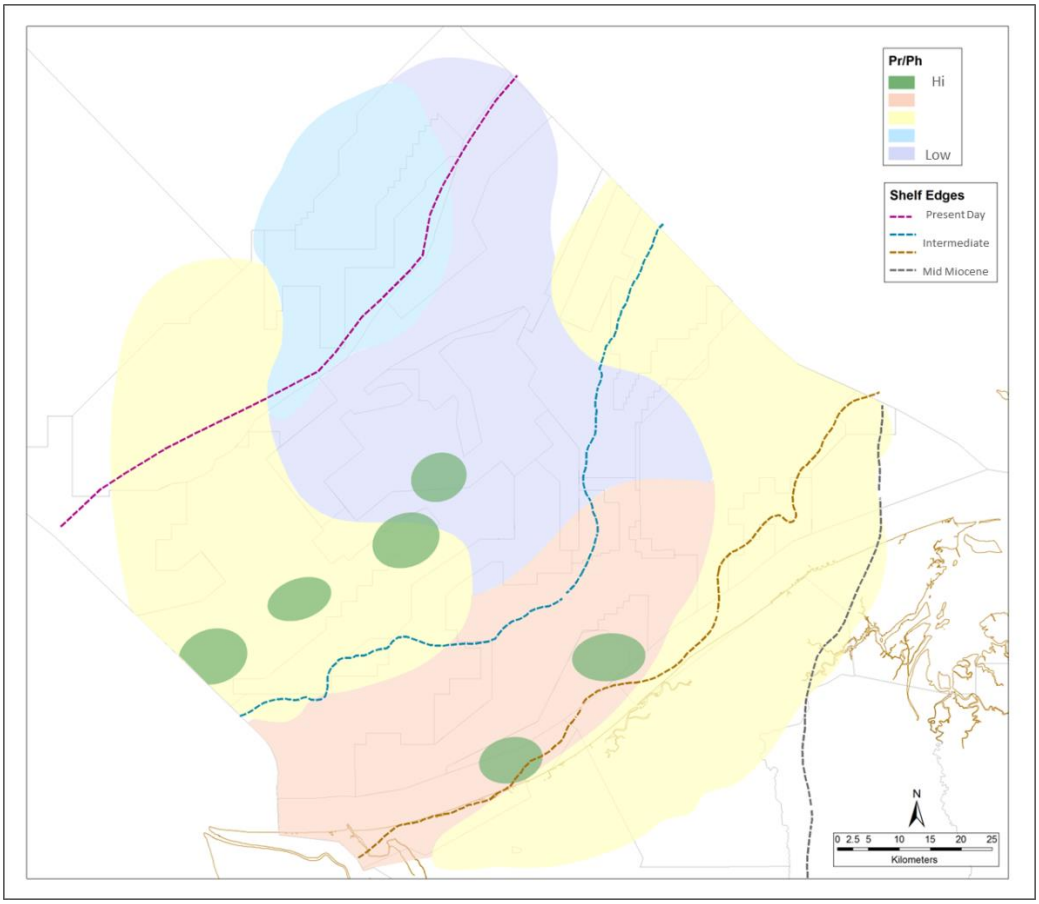

Figure 3: Map of Pristane to Phytane ratios throughout Brunei Near Offshore based on well fluid samples. Values all exceed a ratio of 3 indicating a dominance of terrestrial source material. High values support terrestrial source material input along long-lived fairways. For comparison dashed lines indicate the progress of the progradation of the delta systems through time (after H. Ganz 2013 - internal report).