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Imaging Basement-Influenced Sedimentation with Potential Fields Data: Examples from Tertiary Petroleum Systems Around the World

This story was born in the South Atlantic margin basins and progressed around SE Asia. We show examples in Tertiary sequences in five basins (Congo Fan, Angola; Baram Delta, NW Borneo; Campos Basin, Brazil; Pearl River Mouth Basin, China; Niger Delta, Nigeria) where striking correlations were observed between geologic features that control sedimentation and signatures of multiple potential field attributes.

The GIS environment enabled faster, more precise interpretations and digital presentation of results including stacking hundreds of geo-referenced images from published experts with our own multi-featured potential fields data. Long-recognized features were reinterpreted, realigned and extrapolated based on these improved data coverages. The data signatures in map view drew unexpected geologic inferences using simple tools and basic concepts.

The study began with reinterpreted extents of continental, oceanic and proto-oceanic crust to help investigate hydrocarbon maturation. This regional work revealed surprising correlations between the gravity imagery and published reservoir and source distributions including:

- inter-raft sediment pathways, post-salt depocentres and unconfined basin floor fans, Congo Fan
- basement control on Oligocene fans, bypass zones and source pod locations, Campos Basin
- correlations between discovery trends, toe thrust belts and basement structure, Niger Delta
- projections of base of slope/basin floor fans, offshore NW Borneo
- basement control of sediment pathways, fan locales, and extended source kitchens, Pearl River Mouth Basin

Our paper includes illustrations of each situation and attempts to relate cause-and-effect, largely attributed to continuing basement influence on deposition.