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A NEW TERTIARY TECTONIC COMPILED FOR WESTERN AND CENTRAL SOUTH EAST ASIA AND REVAMPED BASIN PROSPECTIVITY ANALYSIS

Petroleum exploration is often more efficient with a regional perspective in hand prior to focused seismic reflection studies. We have developed a low-cost systematic methodology that combines high-quality synoptic data coverage with localized geologic knowledge in a GIS format using common, off-the-shelf PC-based software. Hence, our results can easily be extended with commercial or exclusive data, allowing continuous validating or updating.

We begin by reprocessing and interpreting comprehensive, high-resolution satellite gravity data using techniques proven by GETECH in the Gulf of Mexico. Onshore and marine gravity data are then merged into a regional grid. This continuous coverage provides a unique means to unify previous tectonic interpretations and extend, link, and rationalize features into areas not adequately covered by seismic data or drilling. The advanced processing provides anomaly attributes that, correlated to known structural controls, inherently allow confident extrapolation.

We also derive a wealth of additional information on basement composition and its influence on the overlying Tertiary. The normally low density and non-magnetic Tertiary sediments overlie various ages of basement with generally higher density and more variable magnetisation. Potential field methods are thus ideal for identifying and mapping the Tertiary basins, basinal systems, and pre-Tertiary structural controls. Basin/sub-basin bounding features are well imaged, resolving less easily mapped elements like some of the provinces of the Sarawak Basin and the limits and nature of the East Natuna Basin.

In central and southern Sumatra, NW-SE linear basin and compressional trends form an arcuate system of anomalies that change to W-E and WSW-ENE strikes as they cross the Java Sea into Kalimantan. In Sumatra, N-S basinal faults appear to control the lateral extent of these NW-SE anomalies, which correlate with horst/anticline structures whose orientations are determined by the underlying pre-Tertiary basement fabric. In the Java Sea, a profusion of largely unpublished depocenters can be pinpointed within this arcuate system. These would otherwise be more expensively located with conventional seismic techniques. Additional potential fields based depth-to-basement and heat flow calculations can screen such features for overlooked hydrocarbon prospectivity.

North, towards Natuna Island, the basement terrain and distribution of sedimentary basins and granite bodies change with the distribution and style of the gravity field. The Penyu, West Natuna and Malay basins are associated with significant inversion due to closure of the Indochina and Thai/Malay/Sumatra blocks, the effects of which can be clearly traced northwards. Coming from the other direction, the NW--SE basin-controlling basement shear zone trends in onshore Thailand can be traced across the Gulf of Thailand into the Malay Basin.

As basement fabric influences Tertiary depositional environments, it also influences reservoir and source facies: we provide a number of example correlations. Combined with the literature, these techniques, per illustrations from Brazil & West Africa of basement and salt-



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controlled reservoir systems, can flag frontier potential and rank exploration and farm-out blocks quickly and cheaply.