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## **Geodynamic Evolution of the NW Borneo Wedge: New Structural Guidelines for Exploration**

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### **Abstract**

The hydrocarbon rich NW Borneo Margin is a complex structural domain where deformation style is a mix of compression and extension features associated with transverse structures. Regional work results in a new geodynamic model integrating structure interactions giving geometrical and kinematics coherency.

Review of outcrops, geomorphologic and magmatism studies show two imbricate wedges in Sabah/Brunei:

- The Rajang-Crocker Wedge, mainly onshore, is oriented N-S in Sabah, curving to E-W in Sarawak. It is characterized by short wavelength thrust folds. The age of deformation is Paleogene with sequence of thrusting propagating westward. This wedge has been lately refolded by large wavelength anticlines generating well-known geomorphologic domains such as the Crocker Ranges, the Trusmadi Ranges and the Mulu Mountains.
- The offshore NW Borneo Wedge is oriented NE-SW from North Sarawak to Palawan Island. This wedge can be divided into four structurally different domains, two compressive and two extensive basins rooted on the Mid-Miocene Unconformity (MMU). The formation of this second wedge is contemporaneous with Mid-Miocene uplifts in the Rajang-Crocker Wedge.

The timing of deformations and relationships between the different morpho-tectonic domains leads to reconsider the evolution of the entire Borneo Wedge.

The offshore NW Borneo Wedge is characterized by the coeval NW Borneo Thrust Belt (offshore Northern Sabah) and the Outer Thrust Zone (offshore Brunei and Southern Sabah) of contrasted structural styles (difference of folds wavelength, occurrence of out-of-sequence thrusting, passive-roofing...). The Outer Thrust Zone is associated both in time and space, to the large Champion-Baram deltaic province. This recent (Mid-Miocene) deltaic province results of a drastic change of sediment source during the Early/Mid-Miocene (~16Myr) from the SW (Schwanner Mountains) to the SE (Central Rajang-Crocker Wedge).

It is proposed that the emplacement of the Champion-Baram deltaic province results from the “sinking” of the Mulu Block into the NW Borneo Subduction.

The entry of a crustal asperity into a subduction zone generates both large uplifts of the accretionary wedge and greater subsidence of the subducting plate. At crustal scale, the asperity may have caused:

- Tremendous uplifts (South of Mulu Area and Central Rajang-Crocker Wedge), modifying the zone of sediment source,
- Associated deep recipient basin capturing the sediments evolving into a deltaic province (The Champion-Baram Basin).

This new geodynamic model implies new guideline for NW Borneo deformations and timings that impact petroleum system.