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ABSTRACT

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Main Producing Systems in Southeast Asia

Among the many different petroleum systems in Southeast Asia, three stand out in terms of ultimate yield and widespread occurrence: (1) rift-sag basins on continental crust, (2) Miocene platform carbonates, and (3) shallow to deep water prograding deltas, largely Middle to Late Miocene in age.

(1) Tertiary rift-sag basins can be modelled using the "steer's horns" analogy. They are similar in cross section but vary in time of development.

Sumatra-West Java Sea basins originated by rifting in Late Eocene time but shifted to a sag phase in Late Oligocene. The principal source beds are middle Oligocene lacustrine shales of the late rift phase and the main reservoirs are wedge-base deltaic sandstones and grain carbonates in the early sag phase. Some are inversion structures and some are not. Mio-Pliocene wedge-top sag sandstones in inversion structures provide additional reservoirs.

Significant basin-forming normal faulting in the **Sunda Rift Basins** (especially the **Malay Basin**) took place in Oligocene time. The sag phase was Early Miocene and inversion was Middle to Upper Miocene, culminating at a regional 10.4 Ma unconformity. Source rocks are rift phase oil-prone lacustrine shales and gas-prone sag phase coaly shales and coals. The major fields are inversion structures.

(2) **Platform carbonates of Middle-Late Miocene age** produce significant amounts of oil and gas in rift/sag basins and on microcontinents (Malampaya appears to be Early Miocene). Outstanding examples are Arun, Block 6 Vietnam reefs, Luconia Shoals and Salawati.

(3) There are three outstanding delta sag systems with major hydrocarbons: Bangladesh, Kutei and Northwest Borneo.

The **eastern Bengal Basin** in Bangladesh is structured by north-trending Plio-Pleistocene wrench-fault anticlines superimposed on a thick, heterogeneous Tertiary sedimentary sequence. Underlying the thick upper Tertiary clastics derived from the uplifting Himalayan Range, the main producing section consists of clastics in an east-to-west distributary system.

A mirror image to the Bangladesh geometry is provided by the **Kutei Basin**, wherein a west-to-east distributary system has been deformed by long North-trending folds.

Traps are structural-stratigraphic, with multiple thin sandstone reservoirs draped over folds that are perpendicular to the sedimentary input direction. Basement is formed by Eocene down-to-basin normal faults into the opening Makassar Strait. Current exploration is focused on deepwater turbidite fields in a variety of structural styles.

The **Northwest Borneo Basin** has been built out over an early Tertiary accretionary complex. Shelfal fields exhibit a variety of structural styles, ranging from complexly faulted anticlines (Seria) to fairly simple open folds (SW Ampa) and seaward-advancing fault-controlled slivers of reservoirs (Champion). Source rocks are probably largely Middle Miocene shoreline-associated coals and coaly shales. In Sabah there are both simple, crestal-faulted anticlines (Samarang) and complex wrench-faulted tight anticlines (St Joseph). Tembungo is the oldest producing turbidite field, now enjoying enhanced late development activity.