

## The Tertiary megasequence stratigraphy of the South China Sea petroleum basins

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The South China Sea and its associated petroleum bearing basins developed in response to Tertiary rifting and sea floor spreading. The South China Sea represents one tectonostratigraphic region in which four Tertiary megasequences can be correlated between and within each individual basin fill. These megasequences are tectonically controlled.

The earliest megasequence sedimentary fill (MT1) is Mid-Eocene to Early Oligocene in age and is controlled by syn-rift continental extension. The second megasequence (MT2) represents the basin fill to the sea floor spreading episode and is Late Oligocene to Early Miocene in age. The third megasequence (MT3) is Mid to Late Miocene in age and is dominated by progradation depositional systems. This megasequence is terminated by a regional unconformity associated with the collision of the Australian and Philippine plates with Indochina. The latest megasequence (MT4) is a resumption of the progradational systems, modified by intermittent compression.

Although each megasequence can be identified across the region the stratigraphic response and implications to petroleum exploration vary from basin to basin. The basins to the northwest of the sea floor spreading centre (typified by the Pearl River mouth Basin) display "classic" divergent margin configurations. The restricted continental environments associated with the syn-rift MT1 half graben development were ideally suited to petroleum source rock preservation. The marine transgression

associated with the MT2 boundary established the widespread development of reservoir bearing (retrogradational) depositional systems. MT3 and MT4 are predominantly progradational systems; their megasequence boundaries provided the opportunity to flood the systems and develop regionally extensive seals.

The conjugate margin, as typified by the NW Sabah depocentre, is convergent. MT1 and MT2 are fore-arc megasequences. The cessation of sea floor spreading created the "Deep Regional Unconformity" at the base of MT3. Major deltas with their inherent petroleum potential prograded into the South China Sea. The base of MT4 or "Shallow Regional Unconformity" is marked by uplift and folding. The MT4 stratigraphy is again delta dominated.

The depocentres on the western margin of the South China Sea (e.g. South Con Son, E. Natuna and Offshore Sarawak) were controlled by active and reactivated transfer zones. MT1 and MT2 display the characteristics of the Pearl River mouth Basin whilst MT3 and MT4 have affiliations with NW Sabah. Consequently, they potentially offer twice the petroleum potential of the other margins.

The identification and correlation of four megasequences across the South China region permits prediction of the petroleum potential from one basin to another.