

A tectonostratigraphic model for the southern Nam Con Son Basin, offshore Vietnam

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The Nam Con Son Basin is a Tertiary rift complex that lies on the western margin of the East Vietnam Sea. As one of the more underexplored of several petroliferous provinces in the region, it is currently the focus of substantial exploration effort. Its underexplored status does however result in an inherent lack of data about stratigraphy, structure and petroleum geology. We have attempted to create a template for exploration through identification, mapping and interpretation of the major tectonostratigraphic units or megasequences visible in the available seismic and well data.

Four major tectonostratigraphic units may be defined. The boundaries of these units represent phases of rapid tectonic reorganisation in the depositional systems in the basin. Only some portions of the depositional systems tracts have to date been penetrated by wells and these facies define currently recognised lithostratigraphic formations. However, our template allows prediction outside well control into untested areas.

A gently divergent Palaeogene rift-fill seismic package which onlaps NE-SW to N-S trending fault blocks represents sedimentation in generally coastal plain to deltaic environments during the first pulse of extension in the basin. Preservation of Oligocene on footwall crests and lack of pronounced seismic terminations indicate that regional subsidence occurred synchronously with the observed extension and that sediment supply broadly kept pace with subsidence. Lower Miocene post-rift sediments characterised by parallel seismic reflections record regional thermal subsidence. Wells so far have penetrated a generally transgressive megasequence in coastal plain, delta, estuarine and lagoonal environments.

A Middle Miocene rift-fill package is characterised by a prominent unconformity at its base with truncation of underlying reflections on footwall crests of rejuvenated and new faults, and which is immediately overlain by a pronounced surface of marine onlap recording a second pulse of extension. Failure of regional clastic sediment supply is indicated in wells by transgression of fully open marine conditions, onset of deep water environments in depocentres and commencement of carbonate deposition on drowned highs.

A major late Middle Miocene truncational unconformity records gentle compression and uplift of depocentres probably combined with uplift on a more regional scale. Thin syntectonic packages are preserved which onlap structural highs.

A third pulse of mild extension is recorded by minor faulting and is combined with major regional subsidence that very rapidly flooded the remnant highs during the Late Miocene and Plio-Pleistocene. Platform-type carbonate build-ups which developed on fault blocks during the flooding were sequentially inundated by the easterly prograding palaeo-Mekong clastic wedge.

The processes responsible for these megasequences can be related to plate tectonic processes in the East Vietnam Sea and greater region. Palaeogene extension and regional subsidence is a function of both opening and spreading of the East Vietnam Sea, and relative motion of Indochina and the Sunda Shield resulting from India/Eurasia collision. Middle and Late Miocene extensional and compressional pulses are related to complex motions, possibly in response to the major collisional and compressional processes resulting from the propagating collision of Australia with Indonesia and the continued northward drive of India into Eurasia.

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