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The Structural Map of the South China Sea ; Highlighting the Main Tertiary Events

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The Structural Map of the South China Sea (SCS) at scale 1/1.5M, is one of the maps proposed by the Commission for the Geological Map of the World for 2016, and results from a collaboration of participants from all the countries surrounding the SCS. The area has been the focus of scientific interest in the past decade including ODP and IODP drilling, oil and gas exploration, and projects from several international teams onshore and offshore, which supplied a great deal of seismic and other geophysical, as well as geological data. We present a synthesis of the main characteristics of the SCS on a structural map focused on the Late Mesozoic and Cenozoic features, as a support for depicting the birth and the decay of the basin. In this mapping exercise, emphasis was put on a selection of geological criteria; basement morpho-structures such as Mesozoic granitoids which control various key processes of the evolution of a marginal sea; the opening with rifting and subsequent ocean floor spreading, the accretionary wedges where shortening took place and finally the recent development of deltas affected by gravity tectonics.

The pre-Tertiary basement similar in China, Vietnam and part of the western Philippines is undifferentiated large except for intracontinental basins developed in the Jurassic and Late Cretaceous. In addition, During Mesozoic times, the area was sitting on the upper plate of a subduction zone, resulting in an extensive coverage of Cretaceous granites sometimes separated by narrow Cretaceous molasse basins. These granitic bodies, widespread offshore in the extended crust, conditioned the location of the extension via large detachments and normal faults. The map displays the different stretching directions. The extension started before the rifting *sensu stricto* which is clearly documented since the Early Eocene only. Stretching and thinning were important and resulted in a wide "Basin and Range" like province which was sustained near sea level during the entire duration of the rifting process. This province is seen on both margins of the SCS and ultimately nearly exhumed the mantle as seen offshore Vietnam and SE of Taiwan. Because the thinned margin was sustained at shallow depth, Late Oligocene to Mid Miocene platform and reef carbonates occupy some of the bathymetric highs. The SCS basin also raises questions about the time of the breakup versus the time of cessation of the extension. The spreading of oceanic crust started by 33Ma in the northern and central part of the basin although rifting continued until at least 15.5 Ma, at a time when spreading had already finished. Furthermore extension is also observed in the midst of the oceanic crust as indicated by low angle normal faults. It is only during Late Miocene times (*circa* 12Ma) that extension ceased and regional subsidence was triggered and marked by a well known Mid Miocene unconformity (MMU) indicated on the map. The connection of the submarine wedges and the fold-and-thrust belts onland is proposed to assess the continuity of the structures during the shortening.

