
Geodynamics of the NE Arabian Plate revisited

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Geophysical MT data across the Oman Mountains and geochronological data on As Sifah high-P rocks suggest there is a possibility that much of Neo-Tethys could have been subducted underneath Arabia with apparently little surface expression. High-P metamorphism, and therefore subduction, must have been occurring at ~110 Ma. Possible effects on the overriding plate, the Arabian margin of Neotethys, may have included subsidence related to lithospheric extension and as well as that induced by down-pulling related to mantle flow above the subducting slab. Interpretation of the Arabian Plate sedimentology and sequence stratigraphy for Oman and the interior has previously been done within the context of the current suprasubduction paradigm of northwards subduction beneath Neotethys. Subduction of oceanic lithosphere beneath the Arabian margin however, would have different interpreted consequences in a “soft” type of subduction scenario that produces no Andean-type arc. The lithosphere of the overriding plate, the Arabian margin of Neotethys, should exhibit changes in sea-level due to regional tilting of the margin on length scales of 1000 to 1500 km as a response to down-pulling by mantle flow coupled to the margin-directed subduction zone. Uplift in this scenario relates to termination of subduction, or to change in the angle of subduction. Re-examination of the first-order stratigraphic relationships suggests that 1) the sedimentation interval between the Tithonian unconformity and the Aptian-Albian unconformity may reflect subduction-related subsidence, suggestive that subduction beneath Arabia could have been occurring between 150 and 110 Ma; and 2) lithospheric extension may be responsible for the deepening of the Rub Al Khali Basin with implications for hydrocarbon generation.
