

Quantitative Subsidence Analysis of the Southeast of the Mesopotamian Basin, Southeastern Iraq: Implications for Basin Evolution Since the Middle Jurassic Period

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Abstract

Quantitative subsidence analysis of the South-east of the Mesopotamian Basin, South-eastern Iraq: Implications for basin evolution since the Middle Jurassic Period

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The Mesopotamian Basin is a wide sedimentary basin which its evolution is poorly understood. In this study, subsidence analysis has been carried out to provide insights into the tectonic events that have influenced the basin's evolution, considering the controversy in the chronostratigraphy of the basin that can help to increase the realism in the petroleum system modelling. Data constraints for the subsidence analysis have been provided from stratigraphical and wireline log data from 14 wells, that penetrate the Cenozoic and Mesozoic successions down to the Middle Jurassic strata.

Results from the subsidence analysis reveal distinct tectonic phases of extension in the early part of this basin's history. A main extensional event occurred at approximately 160 Ma with a lithospheric stretching factor of 1.38. There is a doubt whether this event extended to 130 Ma or was followed by another extension. A second extensional phase occurred about 130 Ma and lasted for approximately 20 Myr with a stretching factor from 1.08 to 1.15 across the study area. In about 100 Ma, the south-east part of the basin was subject to a flexural subsidence phase that was followed by two strike-slip related subsidence phases which initiated in about 75 Ma and 60 Ma. The second phase was restricted to the north-east part of the study area. Further to the north-east, there is evidence of another strike-slip related subsidence phase during Eocene. During the Miocene, a rapid increase in subsidence highlights the last tectonic event.

Comparing these interpreted results to the geodynamic events shows that the first extensional phase may be caused by the late phase of the Triassic-Jurassic rifting in the southern Neo-Tethys. Cretaceous extensional phase(s) should be attributed to the extensional phases during the subduction in the Neo-Tethys, while no evidence of rift. The flexural event in the Late Cretaceous is consistent with the initiation of the ophiolite obduction, in more recent geodynamic studies and it was followed by two transpressional phases of the ophiolite obduction, during the late part of the Late Cretaceous and Paleocene. Since the obduction did not span to Eocene, it should be related to the subduction in the Neo-Tethys. Eventually, the Arabia-Eurasia collision figured the rapid increasing in subsidence. These

tectonic event should be considered in the petroleum system models and can be extended to cover whole the basin in the future.