

Crustal Setting, Structural Evolution and the Potential for Deeper Fluids Charge to the Levant Margin

Joseph Pape¹, Hossam Ali Mohamed², and Abed Hajj Chehadeh³

¹Consultant

²StratoChem Services, Cairo, Egypt

³American University of Beirut

ABSTRACT

Integration of regional seismic lines with potential field data provides a structural template for basin modeling in the Levant Basin, and reprocessing allows more confident stratigraphic correlation into the uncalibrated deepwater areas of the basin. A suite of isopach maps for the Senonian-Miocene reveals the depositional history of the basin, and records several discrete periods of inversion. The resulting structure provides focus for an intra-basinal high, and the basin margins.

Isopach maps at Senonian-Miocene levels show marked onlap to the Eratosthenes Seamount to the west, and the Levant Margin to the east. Senonian-Palaeogene is generally isopachous in the basin centre, however, with a marked thickening downthrown and proximal to the Cyprus Arc. This thickening is enhanced during the Oligocene, before inversion towards the base of the Miocene. An intra-basinal high is similarly inverted at base Miocene, with apparent aggradation and thickening of Oligocene section to the south. The Miocene section generally thins in all directions from the basin centre, and in particular correlates with the South Lebanon Thrust mapped in the nearshore area. In the final phase of basin fill the Messinian and overlying Plio-Pleistocene is more isopachous in the basin centre.

Source rock systems are regionally developed in Middle Jurassic coals, Cenomanian-Turonian and Palaeogene marine deposits, and mixed marine/terrestrial deposits of Oligocene age. The Jurassic coals are projected in to syn-rift basins underlying attenuated continental crust of the Levant Margin. However, they are overmature over large parts of the basin at depths in excess of 10 km. Cenomanian-Turonian levels are modeled as mature for wet gas generation around 20-10 MYA, and may be available to charge structures formed at Mid-Miocene. Tertiary source rocks are mature for expulsion of hydrocarbons from approximately 10 MYA to the present day.