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Petroleum Systems in the East-Mediterranean Basin Onshore and Offshore Israel

The East Mediterranean Basin (EMB) is an emerging exploration province. The recent significant biogenic gas discoveries offshore Israel (~ 3.5TCF) have drawn international attention to this area. The biogenic gas system is an extension of the Nile delta province offshore Egypt. The gas was formed in the Neogene, Saqiye shale, and accumulated in Pliocene, deepwater turbidite sands.

Other thermogenic hydrocarbon systems (oil and gas) in the basin and on its margin are, however, under-explored. Geochemical fingerprints of the hydrocarbons encountered indicate at least four thermogenic systems: 1) Heletz system– the most significant oil field in Israel (18 MMbbl), reservoir in Lower Cretaceous siliciclastics and Jurassic carbonates on the basin margin. The source is the Middle Jurassic Barnea limestone; 2) Meged system - oil in Triassic carbonates tested in Meged-2 well, east of the basin. The suggested source is unknown Silurian shale; 3) Yam system – non-commercial accumulations of condensates tested in Jurassic carbonates at the offshore, Yam-1 and Yam Yafo-1 wells. The suggested source is an unknown Upper Triassic-Lower Jurassic rock; 4) Mango system - sub-commercial oil quantities in Mango-1 well offshore Sinai. The suggested source is an unknown Lower Cretaceous rock.

A wide disagreement exists among investigators as to the actual number of thermogenic systems and the general model of hydrocarbon generation and accumulation in them. The present study indicates that Heletz is the only 'known' system. For the other three systems, source rocks have not yet been identified, and they are considered as 'hypothetical'. Preliminary modeling indicates that the hydrocarbon generation potential exceeds by far the volumes lost through migration or other processes.