Abstract

We focus on a thick sedimentary basin formed offshore central Israel at a time when the Suez Rift was active, but prior to the formation of the Dead Sea Transform. Initially the rims of that basin were uplifted and eroded while its center accumulated sediments, but then, approximately along with the jumping of the plate motion inland to the Dead Sea Transform, the basin started decaying and the entire region including its truncated rims, tilted westward and completely buried by younger sediments. We raise the attractive, though yet not proven, hypothesis that in the early stage of breakup between Africa and Arabia, when divergence had concentrated in the Suez Rift, a strike-slip fault had extended along the Mediterranean margin from the Suez Rift to the Lebanon margin allowing the Arabian Plate to slip northward relative to the Mediterranean lithosphere by 5-10 km. In this tectonic setting the Tertiary basin offshore central Israel is a pull apart basin formed between two segments of a left lateral strike slip fault. Our research may fill an important gap in the knowledge about the early stage of breakup between Africa and Arabia and shed new light on several opened questions. Where is the continuation of the Suez Rift towards the Mediterranean lithosphere? What was the cause for the renewed subsidence of the Levant continental margins in the Tertiary? and how did the continental margin subside in the Tertiary without significant E-W extension or oceanic rifting in the Mediterranean?

Evidence for Tertiary faulting onshore Israel

1. Coastal plain faults in the top Turonian structural map do not fit any known stress regime. They are not related to the present activity around the DST, nor to the Syrian Arc fold system.
2. A curved belt of erosion (green) buried under the Saqiye Gr. perfectly fits the eastern rim of the basin.

Faulting offshore Israel

A graben preserving late Eocene to Miocene sediments (Bet Guvrin Fm.)

High resolution biostratigraphic correlation between graben’s boreholes and a 20 km distant outcrop indicate syn-depositional faulting during the Miocene (maybe also Oligocene)

All evidence in and around the basin coincide in time and space

B A fault system along the present shelf edge displacing Oligocene-Miocene sediments (with the courtesy of Y. Folkman unpublished, 2004).

Suggested model

At the early stage of breakup between Africa and Arabia, when divergence had concentrated in the Suez Rift, a strike-slip fault had extended along the Mediterranean margin from the Suez Rift to the Lebanon margin allowing the Arabian Plate to slip northward relative to the Mediterranean lithosphere by 5-10 km.

In this tectonic setting the Tertiary basin offshore central Israel is a pull apart basin formed between two segments of a left lateral strike slip fault. When this fault system failed to transform the motion, it was abandoned and buried by sediments and the motion has jumped to the DST.

Tibor et al. (1992) suggested that the renewed subsidence of the continental shelf and the Judean Hills uplift were influenced by the Nile load. However, re-examination of the stratigraphic record shows that renewed subsidence at the continental margin and uplift of the Judean Hills both begun ~20 Myr before the Nile. That is, Nile sediments filled a preexisting deep basin.

Isopach map of the Saqiye and Kurkar Groups (late Eocene-present) reveals a thick local (~30x60 km) basin offshore central Israel.

Structural maps indicate a steep eastern wall during the Oligocene-Miocene and a gently dipping eastern slope later.