Radiocarbon and U-Th dating of Holocene reefs from the northern Gulf of Aqaba: Implications for sea-levels, tectonics and reservoir ages

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Radiocarbon and U-Th ages of 21 samples of pristine corals recovered from geotechnical cores in Elat port, in the north-west Gulf of Aqaba, provide new constraints on the early to late Holocene sea-level curve, local tectonics and radiocarbon reservoir ages in the northern gulf. The reefs drilled transgressed over a pebbly terrestrial section at present water depth of ~8.5-27 meter b.s.l. The U-Th ages of the corals lie between ~10.3 and 2 ka cal BP. Published U-Th ages from corals in the near-shore (tidal-zone) Tur–Yam terrace (5 km south of the port) span ~6.7 to 4 ka BP, indicating mid-to late Holocene sea-level elevation of ~1-2 meters above the current elevation (consistent with global sea-level curves). Comparing the elevations of the two reefs indicates that the Elat port reef continuously drowned beneath its original growth sites, possibly by the combined effect of eustasy and the adjacent Elat normal fault. Yet, the relations between the drowned Elat port reefs and the stable Tur-Yam reef allow the reconstruction of the sea-level curve back from ~7 to 10 ka cal BP. While the Elat corals show pristine aragonite mineralogy and textures and 234U/238U activity ratios of modern seawater, the radiocarbon ages (corrected to reservoir age of 400 years) display some variations, which could indicate non-uniform reservoir age in the gulf throughout the Holocene.

[1] Weil (2008), M.Sc thesis, The Hebrew University, Jerusalem, (in Hebrew, English abstract).