Supplement 2: Estimation of effective wave depth

Definition of effective wave depth (orbitals)

The depth of impact of a wave is dependent on the shape of the orbital it generates and the amount of energy in them. Assuming the wave behaves as a simple harmonic function (as in the Airy model) it can be described by eq. S1 (Allen 1985):

$$\text{(S1)} \qquad y = \frac{H}{2} Sin\left(\frac{2\pi x}{L} - \frac{2\pi t}{T}\right)$$

Where y is measured positive upwards from the undisturbed water surface, H is the vertical circular orbit of diameter, x is the horizontal component, L is the wavelength, t is time and T is wave period. This wave function generates orbitals (d) which decay exponentially downwards according to eq. S2:

$$d = H \times e^{\left[\frac{-2\pi(y+h)}{L}\right]}$$

Where *d* is the horizontal orbital diameter and *y* the vertical effect of wave. At *y*=-*L*/2, the value of *d* will be 4% of H, which is considered as the practical limit of wave effectiveness, also known as the wave base. This allows the determination of the wave base in open waters as half the wavelength.

Wavelength can be estimated based on wave period, for nearshore waters (Clifton and Dingler 1984) the ratio is defined by eq. S3:

$$\text{(S3)} \qquad L = \frac{gT^2}{2\pi} tanh\left(2\pi \frac{h}{L}\right)$$

Where *L* is the near shore wavelength (m), *g* is the gravitational acceleration constant (9.81 m/sec^2), *T* is wave period and *h* is water depth. The right hand component pf the equation can be considered the open water wavelength, L_0 (m). If h/L>1/4 then one can substitute L for $L_{0\ as}$ the hyperbolic tem in the left side approaches unity, resulting in eq. S4:

$$\text{(S4)} \qquad L_0 = \frac{gT^2}{2\pi}$$

Data set

No published wavelength information is available for the Israeli shelf. Therefor wavelength estimated based on wave period (see next section). Wave period data was obtained from the Texas A&M - University of Haifa Eastern Mediterranean Observatory shallow water buoy (THEMO1, 125m water depth, 33.03513°/34.945°; Figure S1-1) around 10km from the study area. All data is available online from the THEMO website (http://themo.haifa.ac.il/). Wave information was recorded using a Lord MicroStrain - 3DM-GX25 and the period analyzed spans the years 2019 and 2020 (Figure S1-2), in total 18841 individual measurements sampled every 0.5h during the deployment periods. The water depth at the study area does not diminish bellow an $h/L_0 = 0.25$ (Figure S1-3), allowing the use of eq. S4 for the estimation of the wavelength.

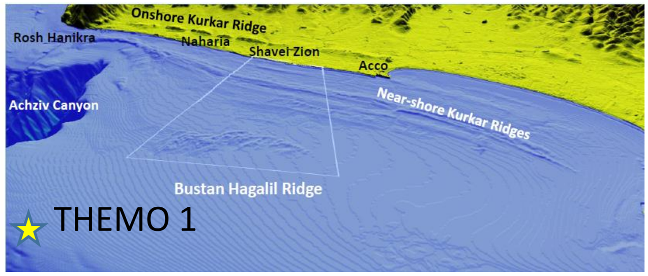

Figure S2-1: Location of the THEMO1 buoy (star) relative to the study area

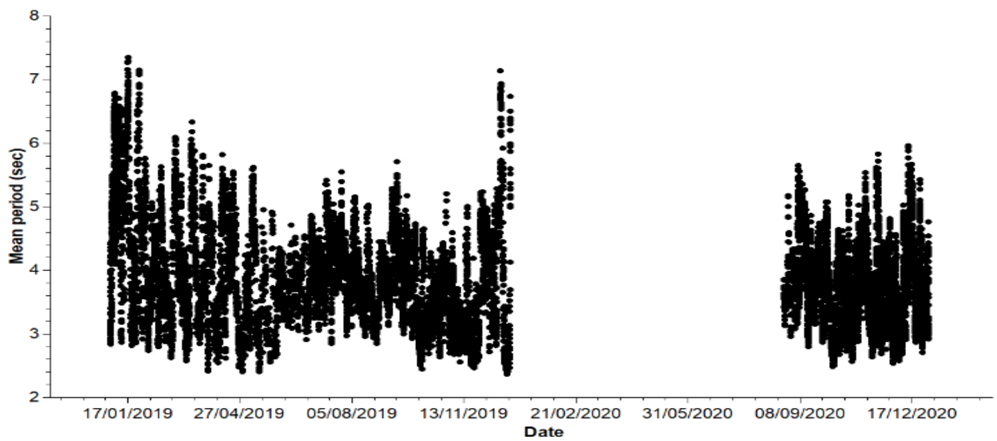

Figure S2-2: Wave period data from the THEMO1 buoy for the period of 2019-2020

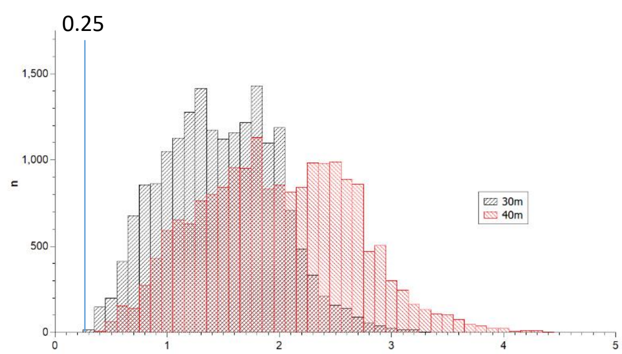

Figure S2-3: ratio of h/L0 for 30,=m and 40m water depth

References cited

Allen JRL (1985) Principles of physical sedimentology. Chapman and Hall, London

Clifton HE, Dingler JR (1984) Wave-Formed Structures and Paleoenvironmental Reconstruction. Mar Geol 60:165–198. https://doi.org/10.1016/S0070-4571(08)70146-8