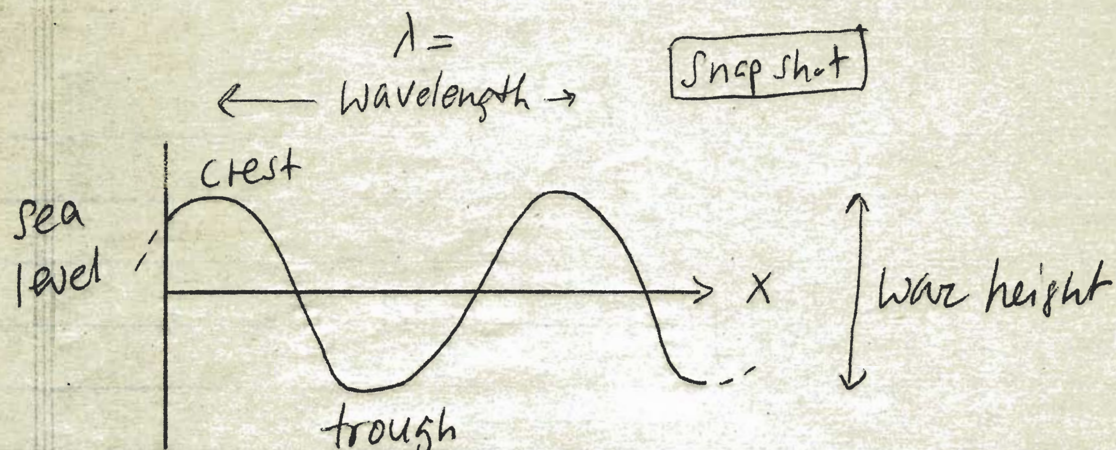
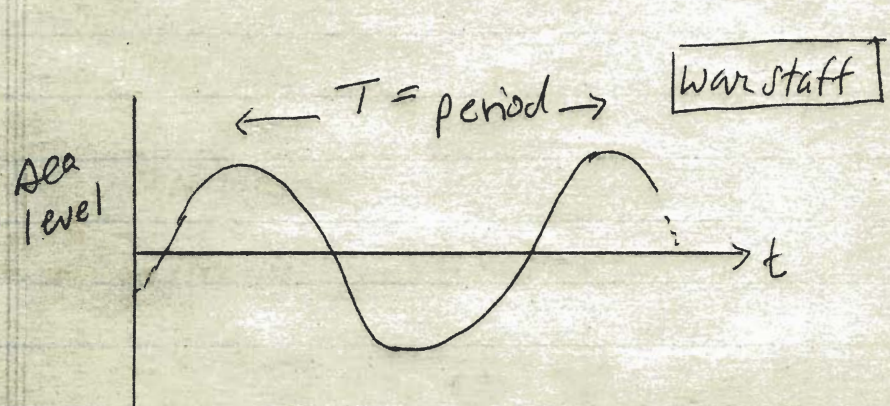




T = period (sec) $\quad f = \frac{1}{T}$ = frequency (cps)

λ = wavelength (m) $\quad k = \frac{2\pi}{\lambda}$ = wavenumber (rpm)

$\omega = \frac{2\pi}{T}$ = radian frequency (rps)

$c = \lambda / T = \omega / k$ = phase speed (speed at which crests / troughs move).

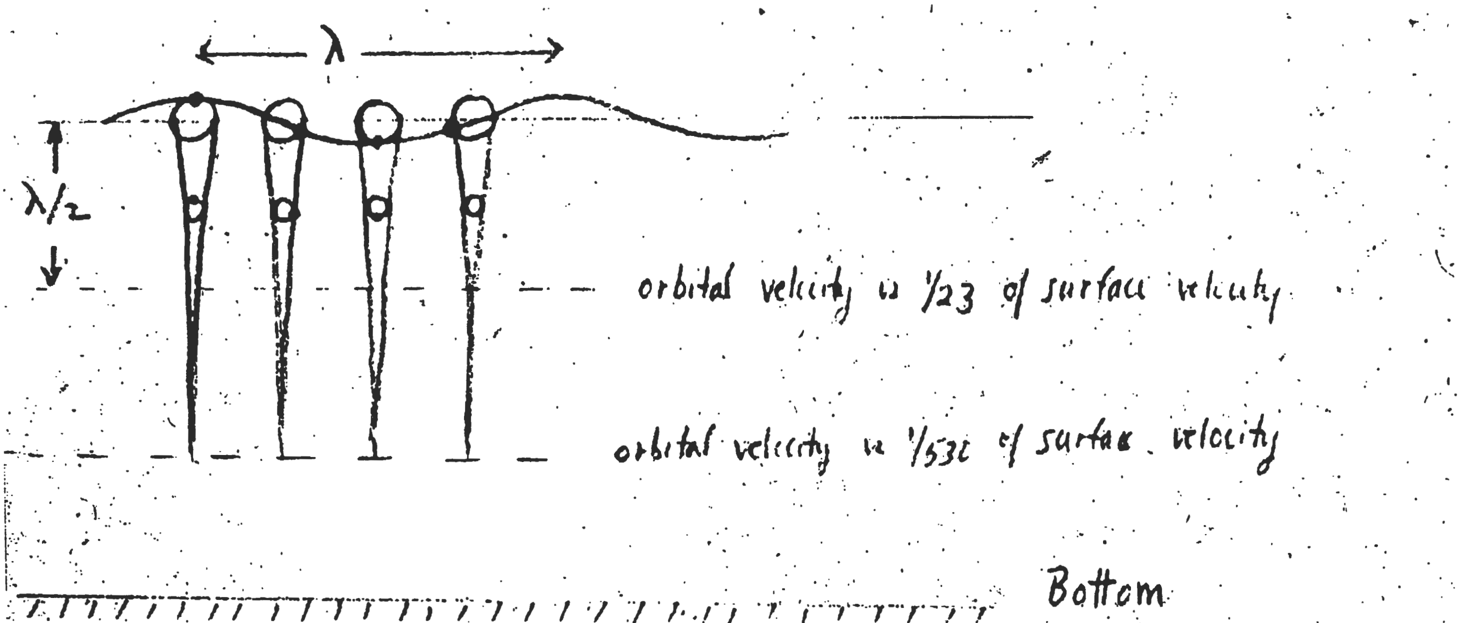
$$\text{Sea level}(x,t) = (\text{wave height}) \begin{matrix}\sin \\ \cos\end{matrix} \left(\frac{2\pi x}{\lambda} - \frac{2\pi t}{T} + \text{phase} \right)$$

$$= \quad " \quad " \left(kx - \omega t + \text{phase} \right)$$

name	medium	phase speed	what allows	what generates
Sound	air	330 m/s	compressibility	vibration of vocal chords
Sound	water	1500 m/s	(less) "	ships, fish
Seismic P	solid earth	7–8 km/s	"	fault rupture
seismic S	"	4-5 km/s	"shearability"	fault rupture
tsunami	ocean 'surface'	200 m/s	gravity + free surface	submarine earthquake
Swell	"	few 10's m/s	"	wind
Capillary	"	cm/s	surface tension	wind
EM	ether	3×10^8 m/s	?	accelerated charges

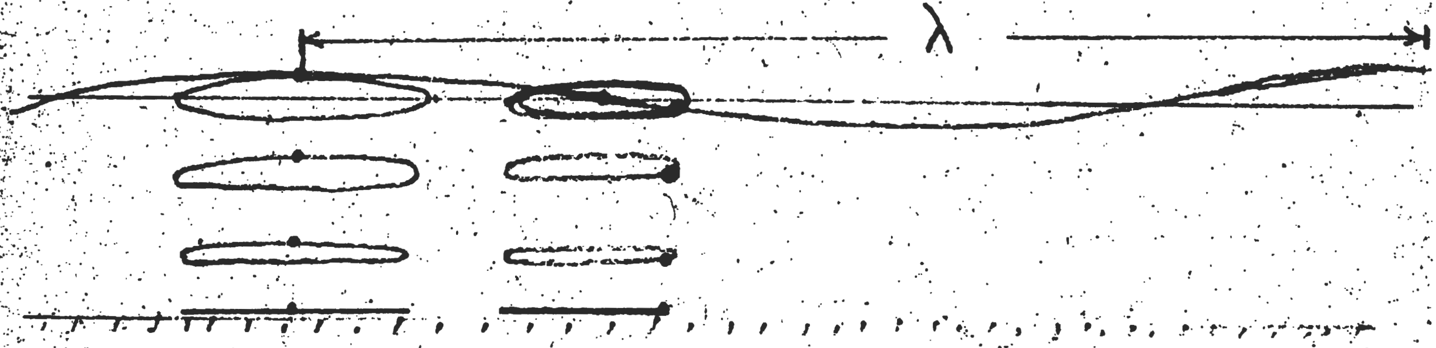
Ocean Surface Waves

Name	typical period	wavelength	phase speed	
capillary	.075 sec	1.73 cm	23.2 cm/s	(minimum)
chop	3 sec	14.1 m	4.7 m/s	$c = \sqrt{\frac{g\lambda}{2\pi}} = \frac{gT}{2\pi}$
swell	10 sec	157 m	15.7 m/s	
long swell	17 sec	454 m	26.7 m/s	
tsunami	10 min	120 km	200 m/s	$c = \sqrt{gH}$



Short Wave $\lambda << \text{Depth}$

$$C = \sqrt{\frac{g\lambda}{2\pi}} = \frac{gT}{2\pi} \qquad \lambda = cT$$



Long Wave $\lambda >> \text{Depth}$

$$C = \sqrt{gD}$$

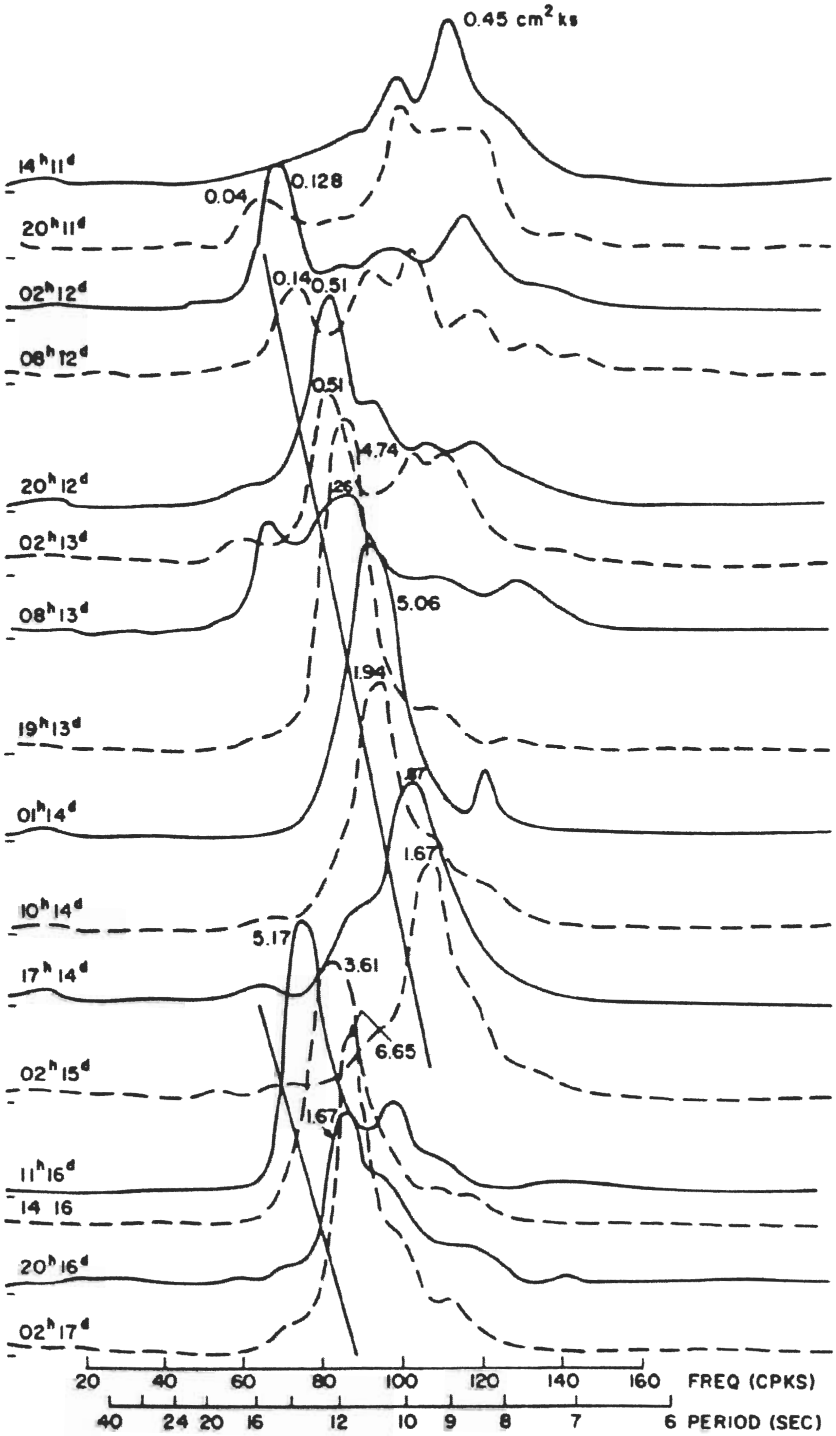


Figure 12.28 Sequence of power spectrum analyses of wave records taken from August 11 to August 17, 1958, at Barbados. Hurricane Cleo was in existence during this time. 14^h11^d represents 1400 Greenwich time on August 11. [From Dinger (1962).]