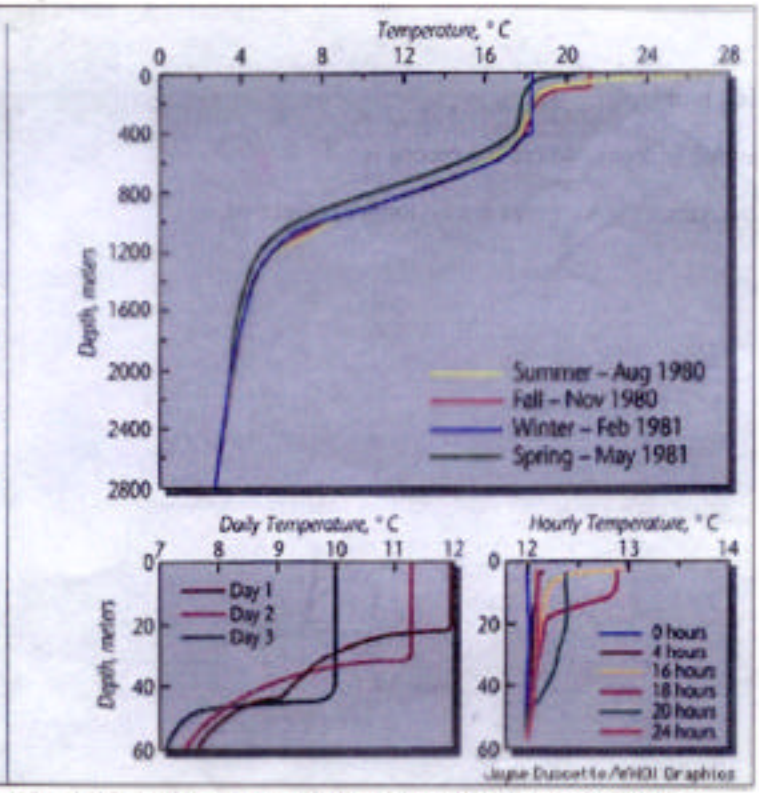
Temperature profiles taken hourly (lower right), daily (lower left), and seasonally (top) reveal the movement of the mixed layer under different conditions. The hourly profile was taken from research platform FLIP during a series of many warm days, ultimately creating a "summer" seasonal profile similar to the yellow tracing above. The daily profile was also taken from FLIP, but during a stormy period, when the cooling and deepening of the mixed layer produces a "winter" seasonal profile much like the blue line above.



Source: Weller, Robert A. and David M. Farmer. **Dynamics of the Ocean Mixed Layer.** *Oceanus*, Summer 1992, Vol. 35, No. 2, p.47.

$\overline{\Delta T}$ = mean seasonal difference in temperature (°C) from the sea surface to depth, **h** (cm)

C = heat capacity of seawater (0.94 cgs)

ρ = density of seawater (1.023 cgs)

Q = seasonal heat storage in ocean surface (mixed) layer, calories

$$Q = \rho C \overline{\Delta T} h$$

for $h = 100\ m = 10^4\ cm$

$\overline{\Delta T} = 3°C$

$Q = 28849$ calories

a layer of atmosphere of the same thickness, **h**, experiencing the same $\overline{\Delta T}$ would be much less:

$C_{air} = 0.25$

$\rho_{air} = 10^{-3}$

$Q_{air} = 8$ calories

ALG/LP