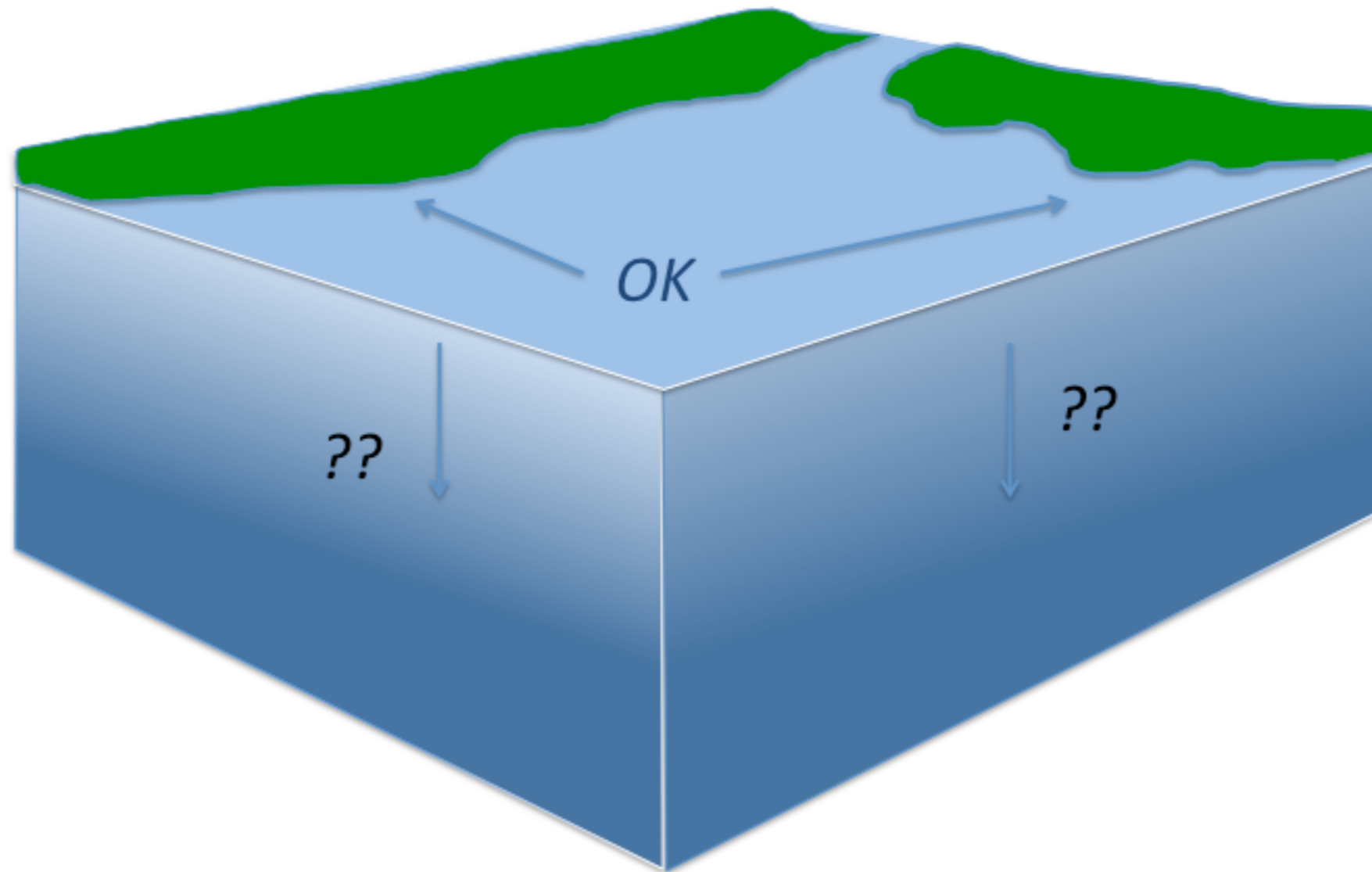




Parameters for the Depth of the Ocean's Productive Layer

J. F. Marra, W. S. Chamberlin, C. A. Knudson, W. J. Rhea, C. Ho

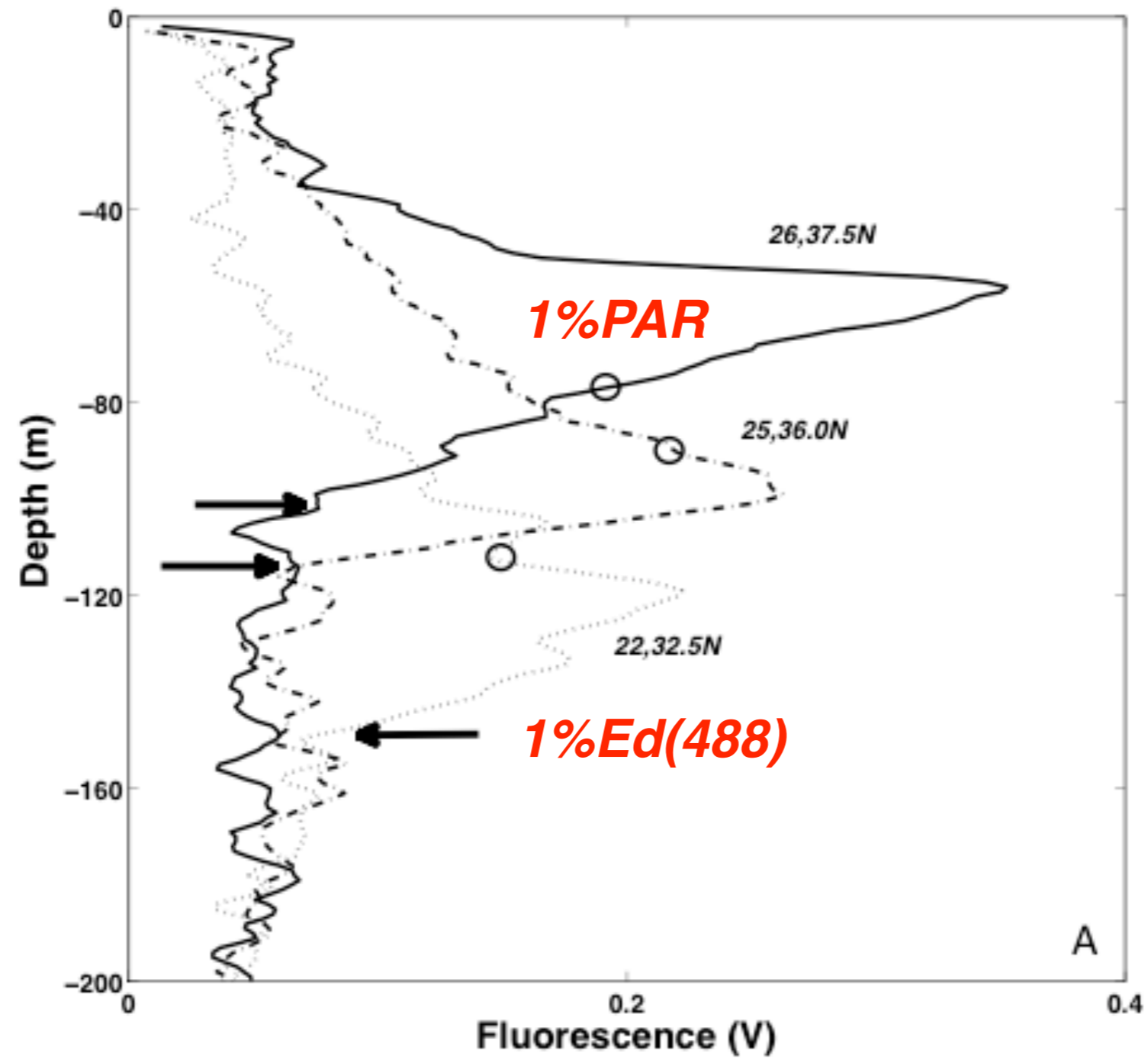
The depth dimension to ocean productivity is unknown



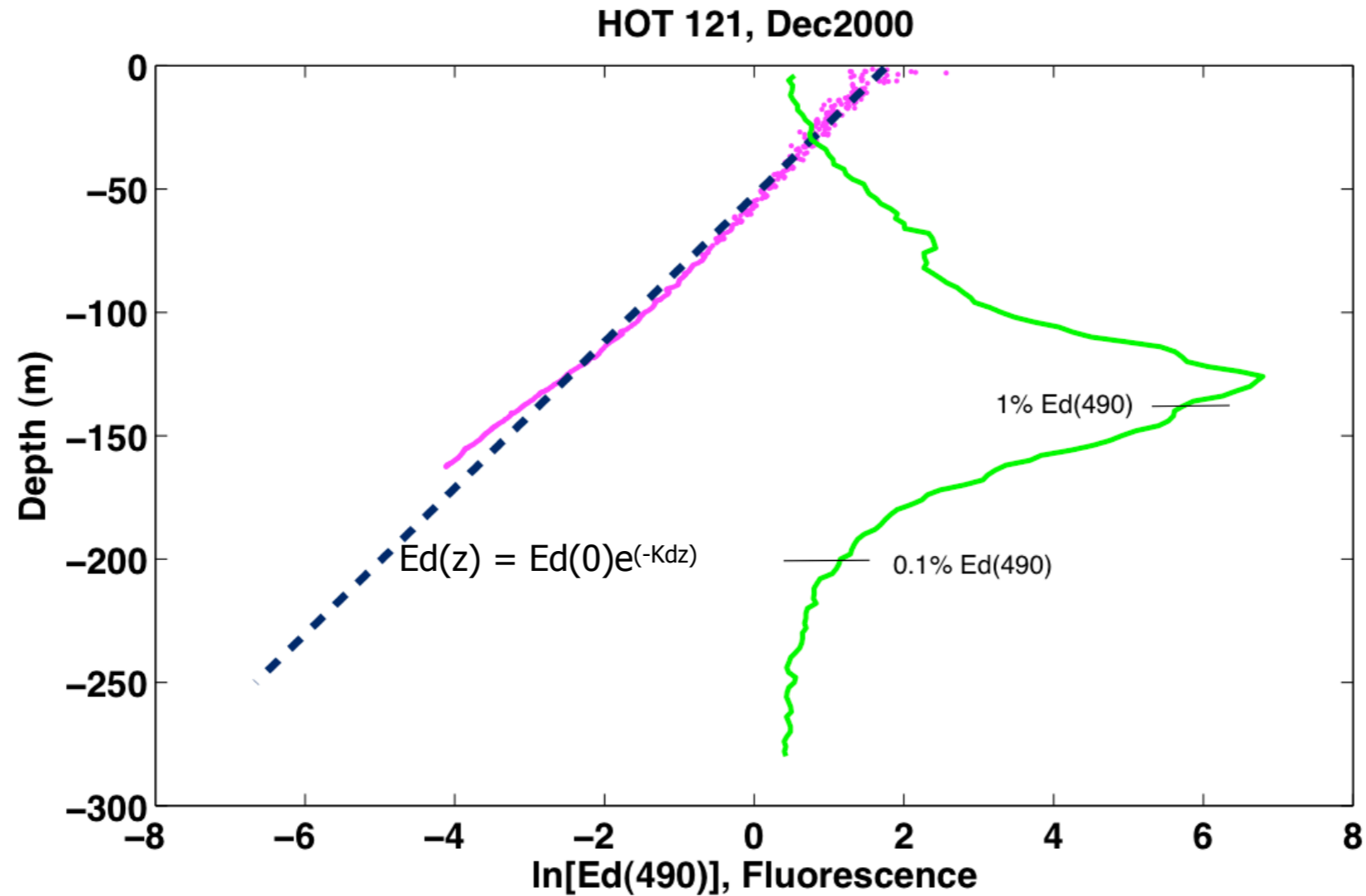
**The Optical (and Operational) Definition of the Euphotic Zone:
'The 1% Light Depth'**

**The Biological Euphotic Zone, or Productive Layer is defined by the
Compensation Irradiance, or Compensation Depth,
where $GPP = R$.
It is (almost) never measured.**

Tropical NW Atlantic



...but in the North Pacific...

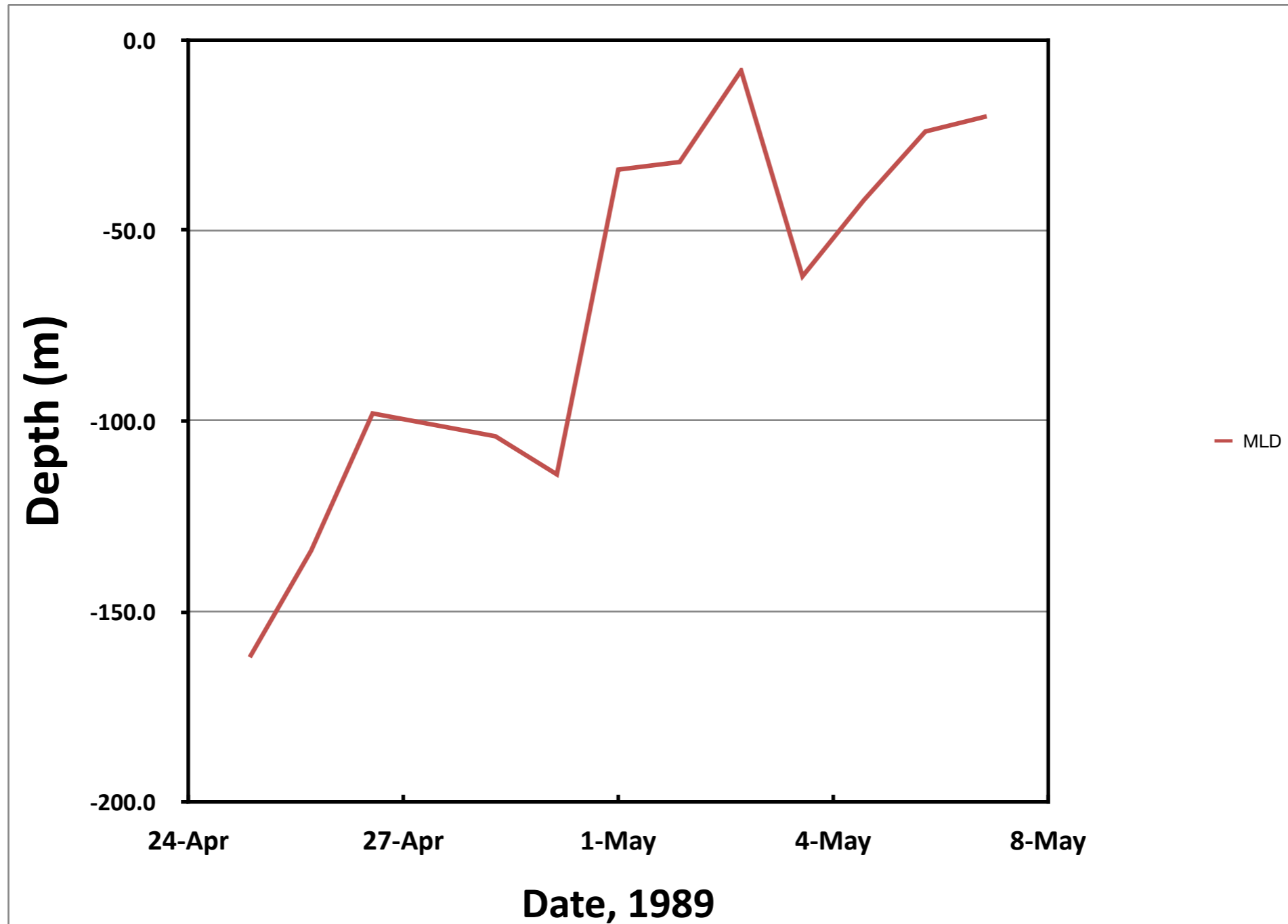


The compensation depth is probably determined by biology, **not** light depth

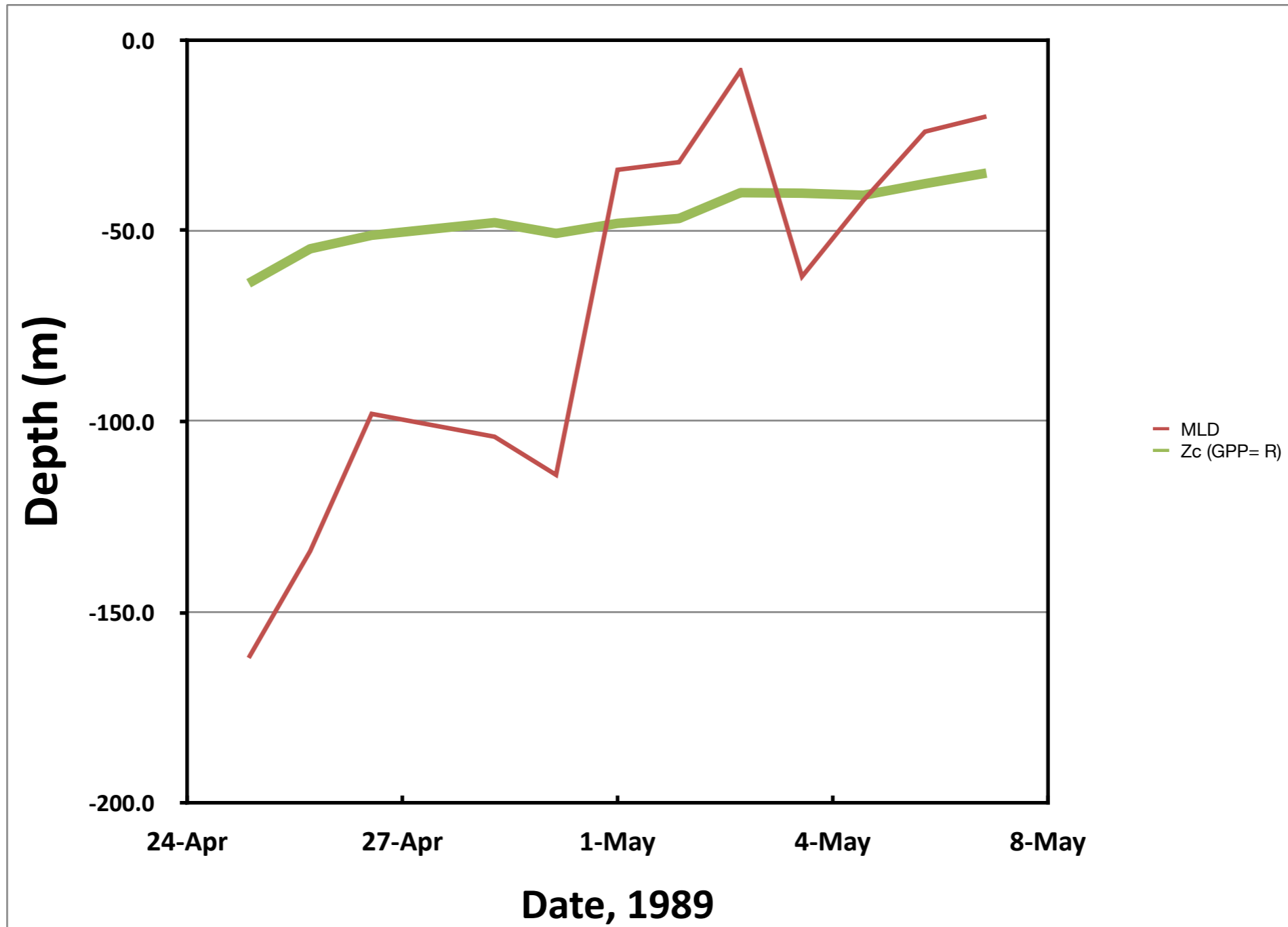
We Realized that the JGOFS North Atlantic Bloom Experiment in 1989 had the Parameters for Another Test

- Compensation Depth (autotrophic)
- Depth of 1% E(0-,PAR)
- Depth of 1% E(488)
- Bottom of the Fluorescence
Maximum
- (Depth where Integral PP = Integral
R)

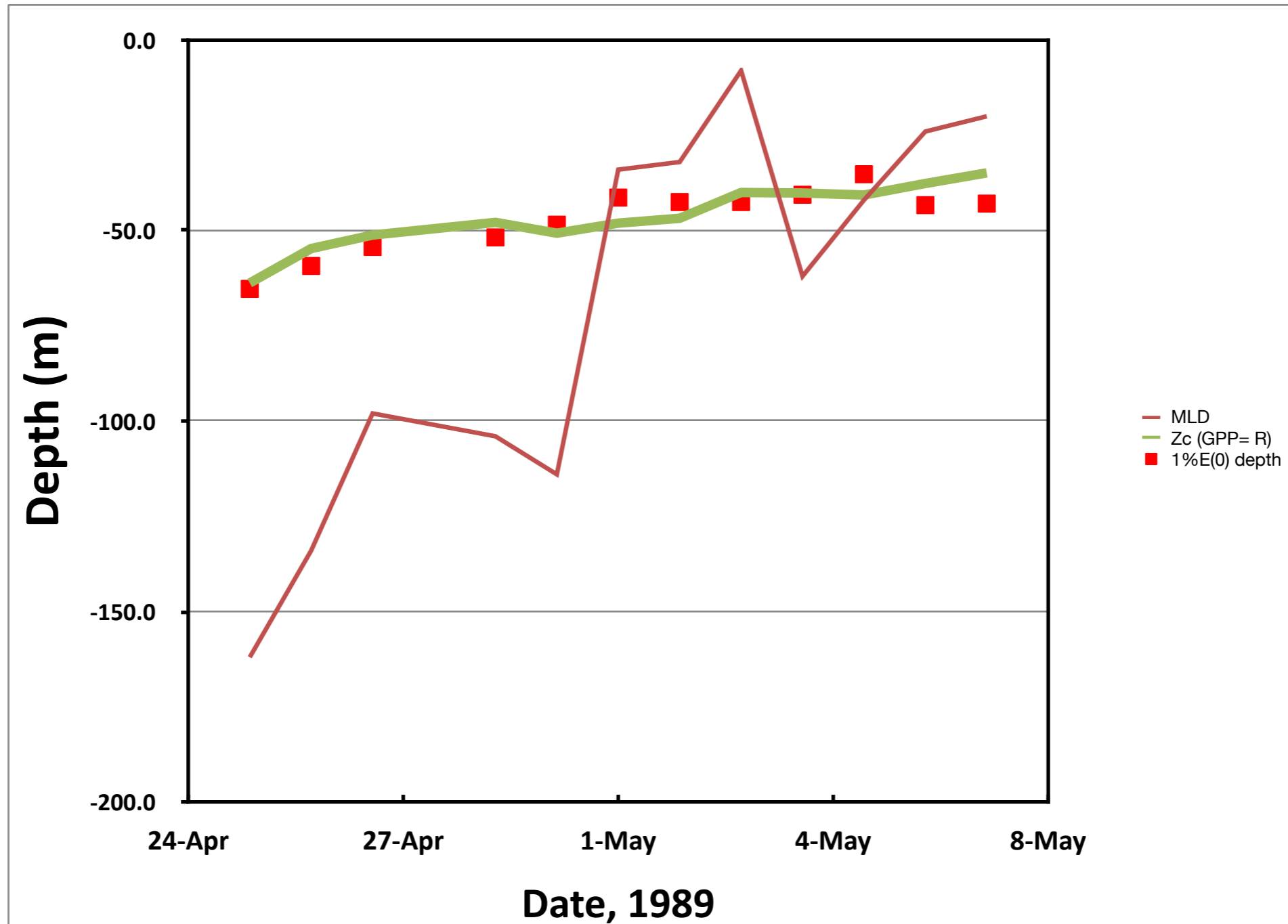
Mixed Layer Depths



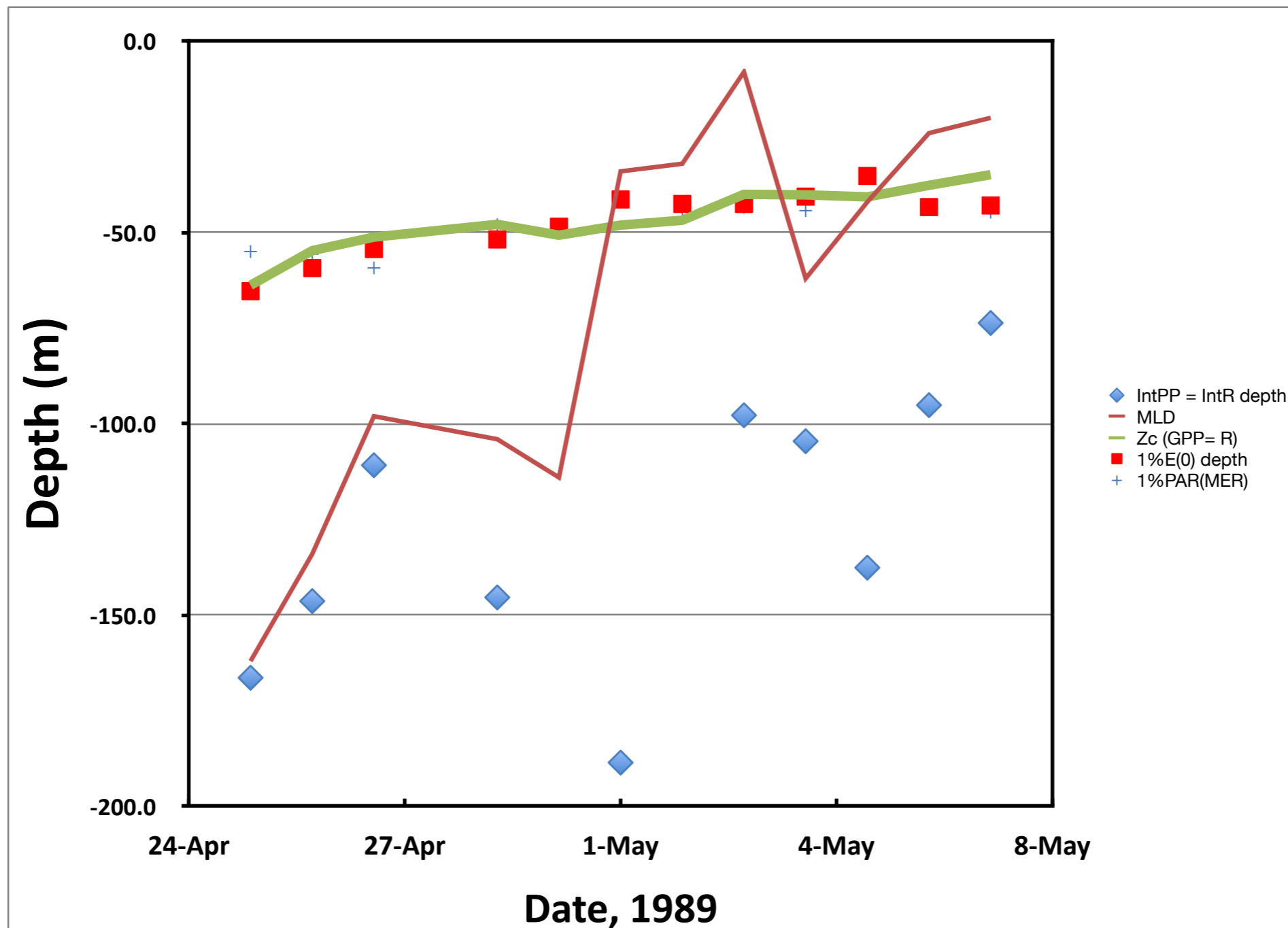
Compensation Depths



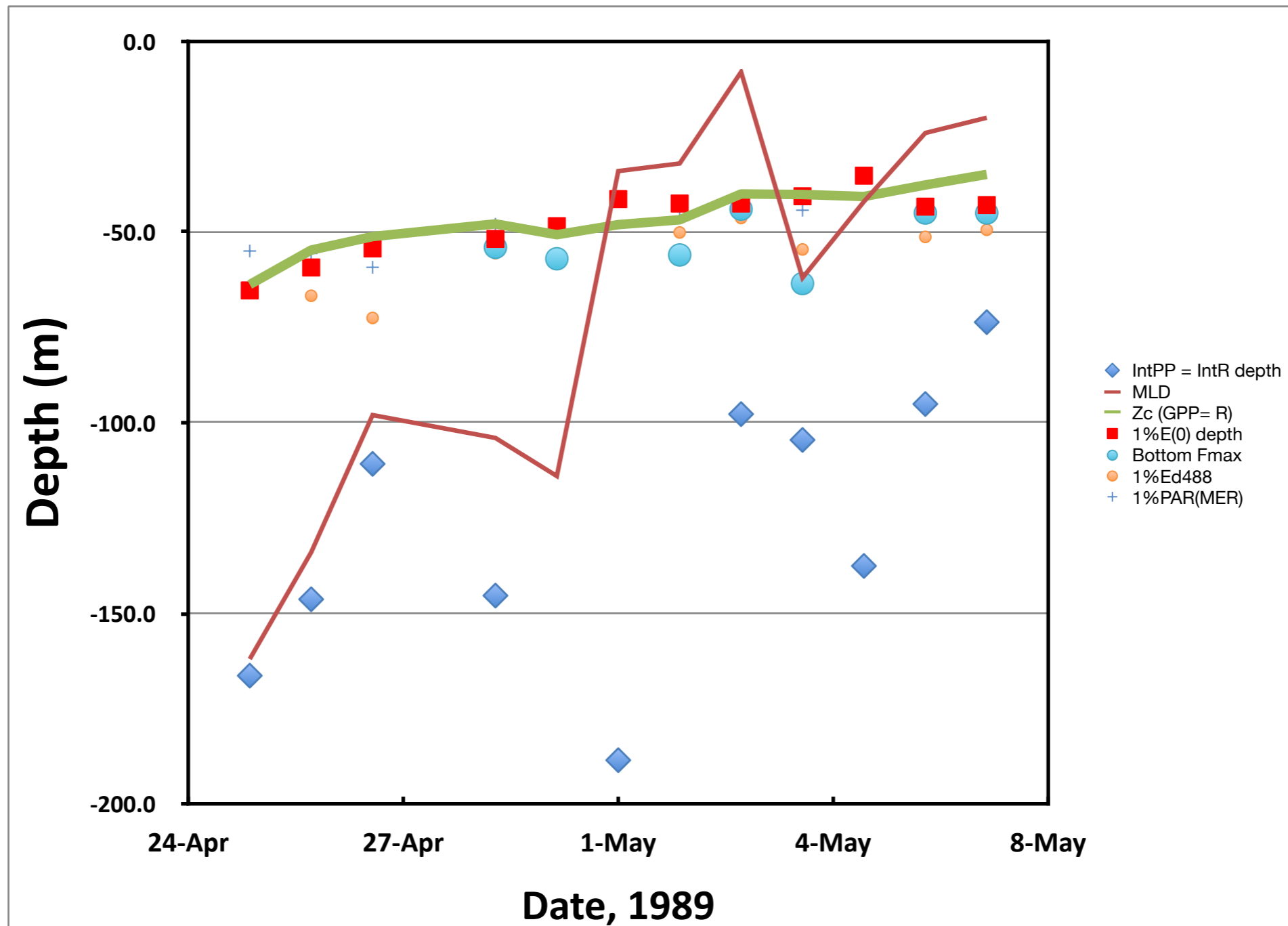
1% E(PAR,0-) depths



1% PAR (MER), Critical Depth Proxy



Bottom of Fmax, 1%Ed(488)



Conclusions

- There is not much difference between the optical parameters and the compensation depth.
- However, these results are at odds with those elsewhere.
- Therefore we suggest that a biological definition of the productive layer is best.
- The base of the Fluorescence maximum:
 - encompasses all autotrophic biomass
 - is easy to measure (except maybe for well-mixed surface layers)
 - has a large database of existing data

Thanks!