

**Homework Assignment #2 (Due April 23, 2009)**

- 1) Why do phytoplankton have pigments other than Chlorophyll *a*?
- 2) We can use phytoplankton pigments as “fingerprints” for who is in the water. For example, the carotenoid fucoxanthin is a diagnostic marker for diatoms. If you had a sample with a lot of peridinin, what type of algae is most likely dominant?
- 3) If the average irradiance in Monterey Bay is  $1000 \mu\text{mol photons m}^{-2} \text{ s}^{-1}$  and the 50% light penetration depth is 5 meters, calculate the compensation depth (the depth where oxygen production and respiration exactly balance).
- 4) We often use chlorophyll *a* as a general indicator of phytoplankton (or plant) biomass, even though it's not directly related to cell number, amount of carbon, etc. Why?
- 5) Many people confuse chlorophyll and primary production (for example, when someone says they have a fluorometer, and therefore can measure primary production). What's wrong with that statement?
- 6) Define the following terms:
  - Photosynthetic Unit
  - Primary Production
  - Prochlorococcus*
  - Z-scheme

## Graduate Questions:

G1. The maximum theoretical value for  $F_v/F_m$  is about 0.7. In the Boyd paper, the surface  $F_v/F_m$  values increased to about 0.4, while the deeper values approached the theoretical maximum. What explanation did the authors give for this? How would you test their hypothesis if you were asked to do so?

G2. The Dierssen et al. paper plotted remote sensing reflectance ( $R_{rs}$ , what a satellite would “see”) in Figure 2D for several algal groups. Based on the paper, and the results shown, do you think it is possible to identify “groups” of phytoplankton from a satellite using color, if you only had data from 412, 443, 490 512, 555, and 670 nm (the standard SeaWiFS wavelengths?)