

Homework Assignment #4 (Due May 21, 2009)

- 1) What is the difference between the “microbial loop” and the “microbial web”? Who cares about all these little organisms anyway, since they don’t contribute to carbon fixation?
- 2) If you reread the Boyd (SOIREE) paper, you would find that they argue for zooplankton grazing making the Southern Ocean an HNLC region in the absence of iron fertilization. Why would zooplankton be able to keep a bloom from happening in the absence of iron fertilization, but not be able to keep a bloom from happening when iron is added? Is iron toxic to zooplankton?
- 3) There is very good evidence for global warming to be occurring. Based on your knowledge of Biological Oceanography, would you expect there to be more or less productivity in the California Current system as the Earth gets warmer? What changes (if any) would you expect to see in the species composition (phytoplankton, zooplankton, fish, etc) as the California Current warms?
- 4) When discussing zooplankton, we often characterize them in terms of the Reynolds number. Explain in simple terms why we care about the Reynolds number—what does this mean for a tuna versus a chaetognath?
- 5) The state of California is thinking of banning krill fishing in the Monterey Bay National Marine Sanctuary, but first, they want to know how many krill there are. If you were in charge of telling them, how would you measure the number of krill?
- 6) Define the following terms:

Protista, microzooplankton, deep scattering layer, DOM, Martin curve

Graduate-Level Questions:

G1. In Ken Johnson’s seminar, he argued that autonomous floats captured episodic new production pulses in the oligotrophic ocean based on changes in oxygen. Briefly explain how oxygen concentrations are related to new production, and explain (or guess) why there was no obvious signature of a “mini-bloom” in the data (no increase in observed biomass or productivity)

G2. Both Eppley and Huntley-Lopez have proposed that increasing temperatures result in increasing growth rates for biological organisms in the ocean, While Laws argued that increasing temperatures speed up the “microbial loop”. However, recent evidence suggests that increasing temperatures (global warming) is resulting in decreasing biomass. Why?