Log 13 Wed

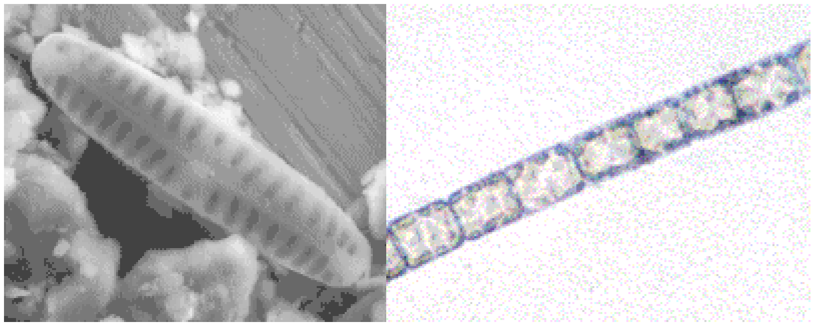
1. 142100Z September 2005
    2. Position: Lat: 0-30.0S LONG 140-00.0W
    3. Course: On station
    4. Speed: 0 kts
    5. Distance: 30.0 NM
    6. Steaming Time: 3H 54M
    7. Station Time: 20H 06M
    8. Fuel: 1661 gals
    9. Sky: Ptly Cldy; Cu, Sc
    10. Wind: 090-T, 17 kts
    11. Sea: 090-T, 3-4 ft
    12. Swell: 120-T, 4-6 ft
    13. Barometer: 1011.7 mb
    14. Temperature: Air: 26.0 C, Sea: 25.3 C
    15. Equipment Status: No change.
    16. Comments: On station #11.

MASTER, R/V ROGER REVELLE

Diatoms: Life History and Ecology

Diatoms may be extremely abundant in both freshwater and marine ecosystems; it is estimated that 20% to 25% of all organic carbon fixation on the planet (transformation of carbon dioxide and water into sugars, using light energy) is carried out by diatoms. This is possible because they contain chlorophyll. Diatoms are thus a major food resource for marine and freshwater microorganisms and animal larvae, and are a major source of atmospheric oxygen.

Diatoms are a major component of **plankton**, free-floating microorganisms of marine or freshwater environments. Not all diatoms float freely though; many cling to surfaces such as aquatic plants, molluscs, crustaceans, and even turtles. Whales may carry dense growths of diatoms on their skin. Some may even be found in soils or on moist mosses -- like the one below at left, which was found on moss growing just outside the building which houses the UC Museum of Paleontology. This particular diatom occurs as individual cells, while others, like the *Melosira* shown below at right, may grow together in long colonial chains.



Diatoms only construct new walls during cell division. After the cell divides, the epitheca and hypotheca separate, and new valves are laid down between them. Because the frustule cannot grow once it has been laid down, the mean size of a dividing population of diatoms gets smaller and smaller with time. This would be a rather bad state of affairs if diatoms could only reproduce by division! Fortunately, diatoms can also reproduce sexually, producing offspring that secrete a wholly new cell wall from scratch.

Source: http://www.ucmp.berkeley.edu/chromista/diatoms/diatomlh.html

So what else can you do with diatoms, besides study them???? Or what do scientists do in their free time?

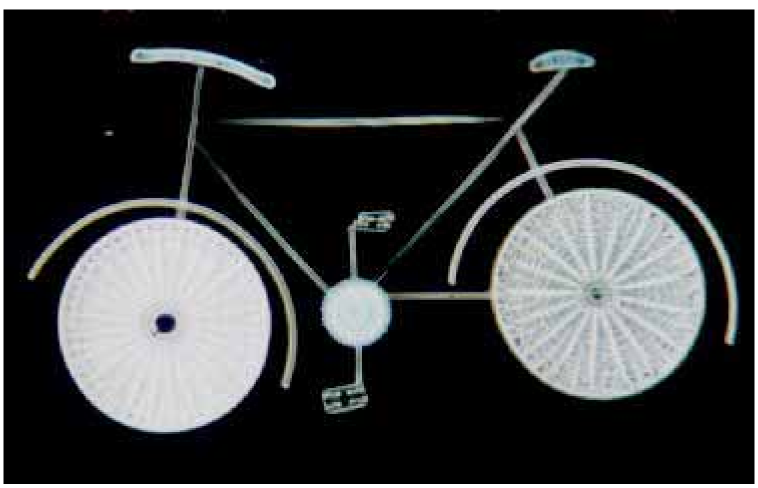


photo by Klaus D. Kemp
http://www.diatoms.co.uk/

So what are we doing with Diatoms out here?
Recently the biogeochemistry of Si has received increased attention as a possible control of Carbon export in HNLC (High Nutrient Low Chlorphyll) waters. Diatoms deposit Silica (SiO_2) (glass you guys!!) in their cell wall , with at least 2 important consequences: First SiO_2 gives diatoms and their remains mineral ballast, causing them to sink more rapidly. Sediment trap records indicate strong correlations between sinking fluxes of particulate organic carbon (POC) and diatom SiO_2, implying that diatoms are a major autotrophic source of the sinking POC. (e.g. Honjo et al. 1995, Sharek et al. 1999) Secondly, diatoms require Si for growth while other phytoplankton groups do not.

Diatoms often deplete Si in surface waters, where growth is limited by Si availability. There is evidence that Fe (Iron) limits growth in HNLC waters. The high ratio of Si uptake to N (nitrogen) uptake by diatoms which develops in response to low Fe appears to be the main mechanism leading to low Si- HNLC conditions off California, Peru and in the Southern Ocean (Franck 2000, 2002, Brzezinski 2001) This latter relationship points to an important interaction between the cycles of Fe and SI in HNLC areas: Surface layer Silica is depleted to levels that limit diatom productivity, but the reason why Silica is exhausted rather than NO3 is the preferential removal of Si , imposed on diatoms by the low Fe. Does this idea hold true in the EEP?

Summary from Nelson Proposal.