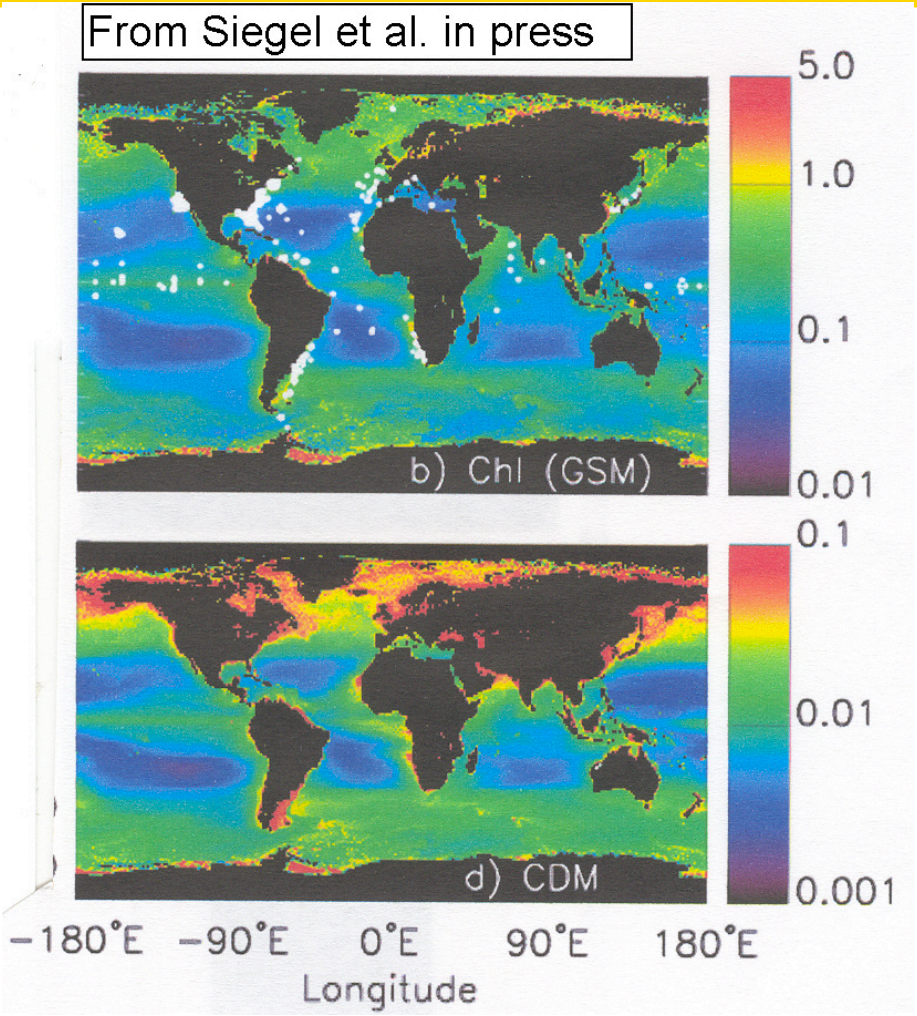
Inverting Ocean Reflectance Spectra for Chl, Colored Detrital Material (CDM) and Particulate Carbon.



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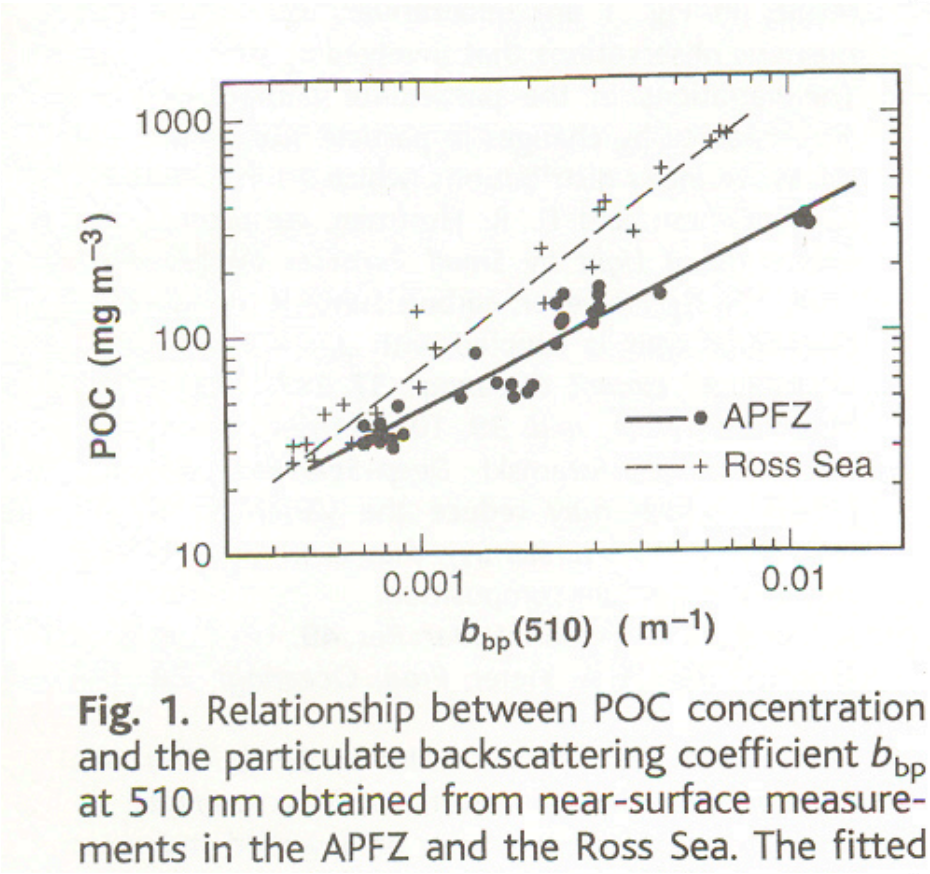
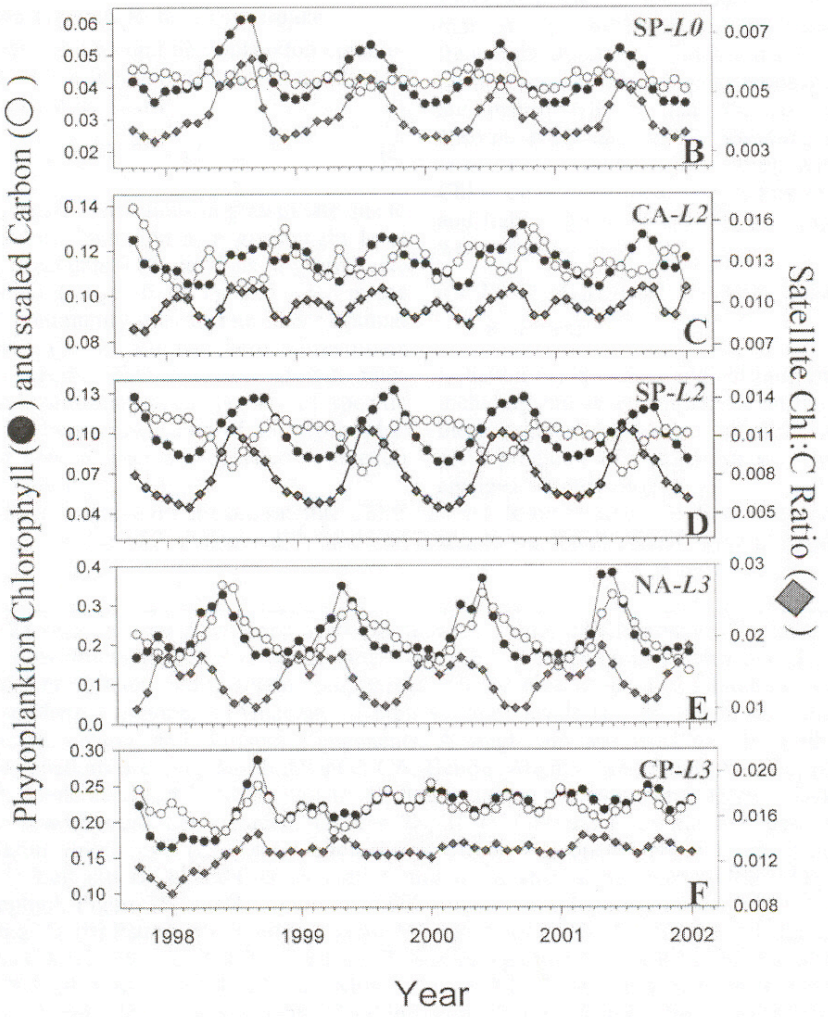


Fig. 1. Relationship between POC concentration and the particulate backscattering coefficient b_{bp} at 510 nm obtained from near-surface measurements in the APFZ and the Ross Sea. The fitted



Stramski et al. 1999 (left) and Behrenfeld et al. 2005 (right)

Inverting Ocean Reflectance Spectra for Chl, Colored Detrital Material (CDM) and Particulate Carbon.

Inverting spectra measured by satellite ocean color sensors can yield regional- to global-scale estimates of:

(1) near-surface colored detrital material (sum of dissolved and particulate);

(2) near-surface phytoplankton chlorophyll a; and

(3) near-surface particulate carbon.

All of these are important parameters for determining the role of the biological pump in the global ocean carbon cycle.

On the Shores of a Living Ocean

Planning Document for NASA HQ's Ocean Biology and Biogeochemistry Program (Paula Bontempi's program).

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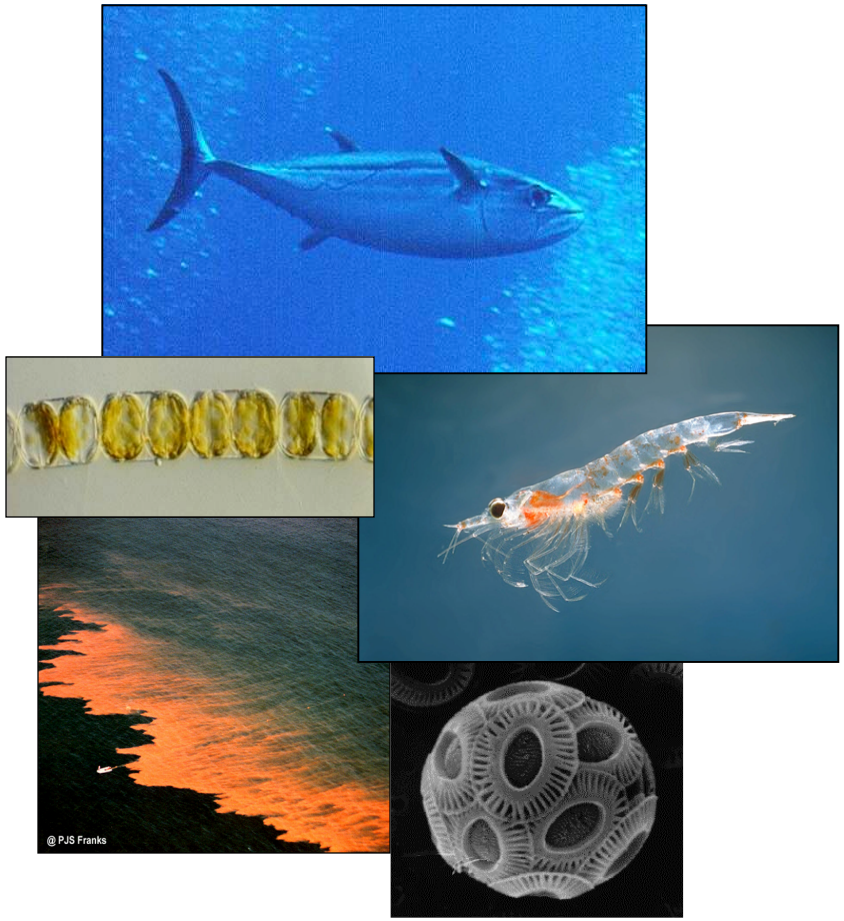
Scientific Questions for the OBB Program

- How do ocean Ecosystems and the Diverse Communities they support function and how does this change over time?
- How do Carbon and other elements transition between ocean and other global reservoirs and how do associated fluxes impact the Earth system through their interaction and change over time?
- What is the variety and geographical distribution of coastal marine Habitats? How are these changing and what implications do they have for human health?
- How do natural Hazards and pollutants impact the hydrography and biology of the coastal zone?

Ecosystems & diversity, Carbon & biogeochemistry, Habitats & Hazards

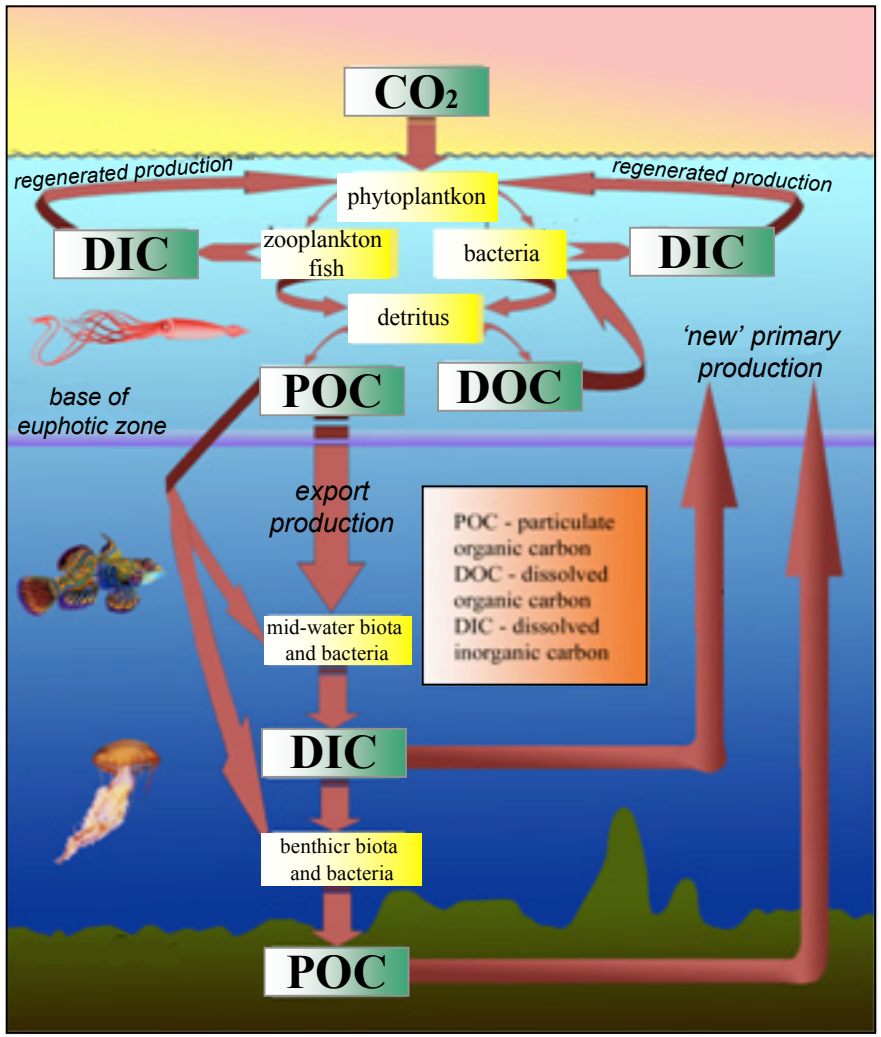
"How do ocean ecosystems and the diverse biological communities they support function and how does this change over time?"

- Biogeography
- Ocean Productivity
- Trophic energy transfer
- Functional Groups
  - Carbon Exporters (diatoms)
  - Nitrogen Fixers (trichodesmium)
  - Calcium Carbonate (coccolithophores)
  - Microbial loop (prochlorococcus)



"How do carbon and other elements transition between ocean and other global reservoirs and how do associated fluxes impact the Earth system through their interaction and change over time?"

- Phytoplankton Biomass
- Ocean Productivity
- Particulate Carbon
- Dissolved Organic Carbon
- Inorganic Carbon System
- Export Carbon Fluxes



"What is the variety and geographical distribution of coastal marine habitats? How are these changing and what implications do they have for human health?"

- Classification of Ocean Habitats
- Land to Ocean Materials Exchange
- Eutrophication
- Fisheries
- Recreation

Carbon Cycle & Ecosystems

Science Measurement	Technology Options	Challenges
Global ocean carbon / Particle abundance	Aerosol/Particle lidar[1]	Depth-resolved subsurface return
	Multi/Hyper Radiometer[2]	Data volume, NIR detector sensitivity, electronics
Physiology & Functional Groups	Variable fluorescence lidar[4]	Fluorescence saturation profile, dawn/midnight sampling, subsurface signal
	Multi/Hyper Radiometer[2]	Data volume, NIR detector sensitivity, electronics
Coastal Carbon	Aerosol heights[5]	Laser altimeter/polarimeter, absorbing aerosols to 0.5 km
	Geo Multi/Hyper Radiometer[6]	<100 m resolution, NIR detector sensitivity
	Polar Multi/Hyper Radiometer[2]	Data volume, NIR detector sensitivity, electronics
Mixed Layer Depth & Illumination	Model/data synthesis	Synthesis of operational model output & available data products
	Lidar backscatter	Pulsed lidar returns @ 532 nm
	Lidar emission/excitation	Variable excitation wavelength, low SNR