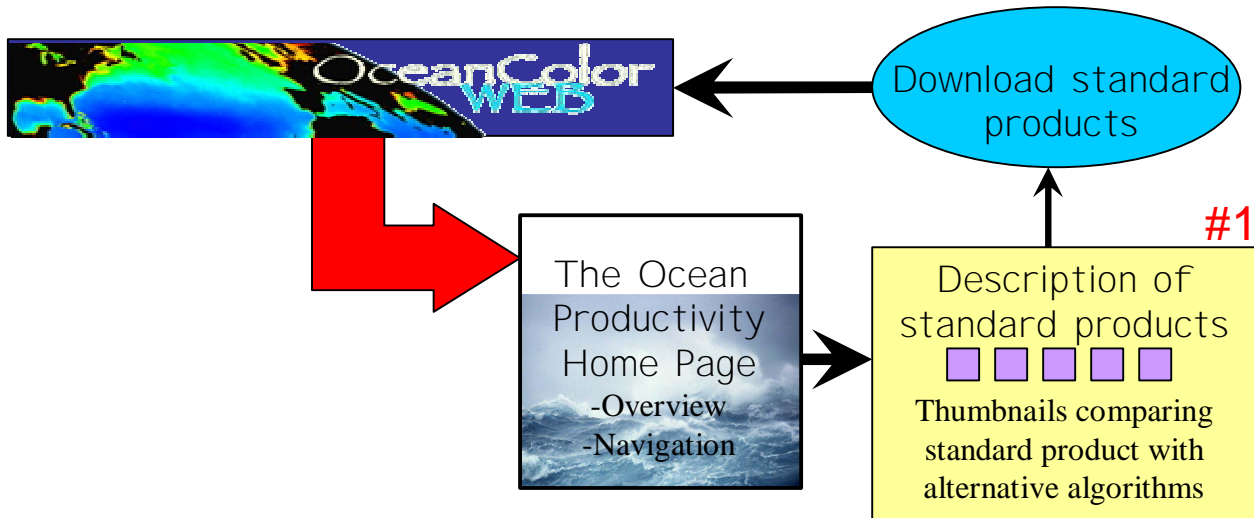


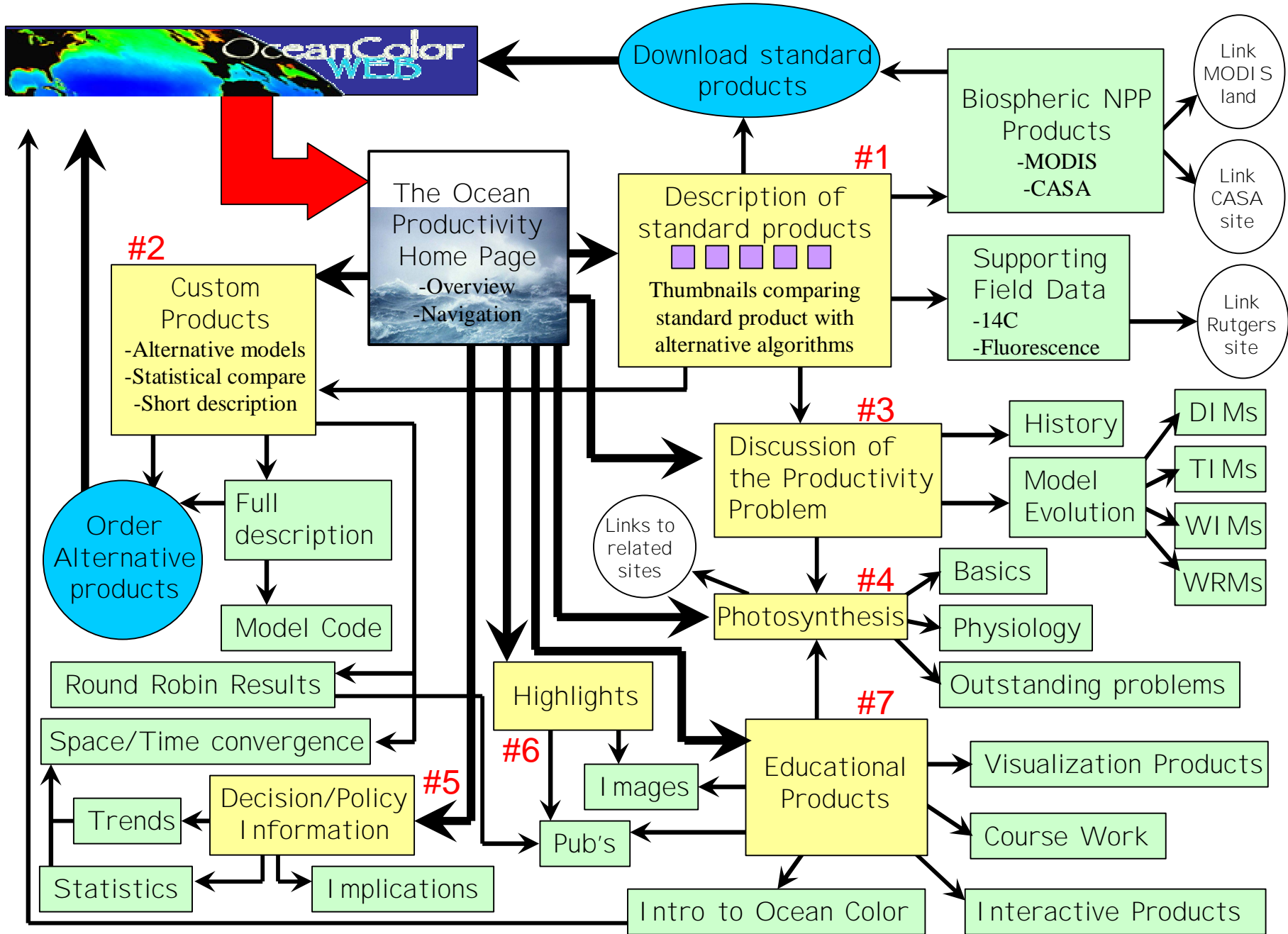
PRIMARY PRODUCTION

- Project Start Date: January 1, 2005
 - provide ocean productivity data products based on chlorophyll- and carbon-based algorithms (3 standard products, multiple optional algorithms)
- Kick-off letter to OPPWG: January 7, 2005
- Project Presented at MODIS Ocean Color Meeting, February 2005
 - recommendation to have a single standard product
- Programmer/start: Robert O'Malley, April 2005



Standard Products

- DIM w/ polynomial rate
- DIM w/ exponential rate
- Carbon-based production



Backup Slides

Ocean Model Classifications

I. Wavelength-resolved models

$$\text{GNPP} = \int_{\lambda=400}^{700} \int_{t=\text{sunrise}}^{\text{sunset}} \int_{z=0}^{Z_{\text{eu}}} M(\lambda, t, z) \cdot \text{PAR}(\lambda, t, z) \cdot a^*(\lambda, z) \cdot \text{Chl}(z) \, d\lambda \, dt \, dz$$

II. Wavelength-integrated models

$$\text{GNPP} = \int_{t=\text{sunrise}}^{\text{sunset}} \int_{z=0}^{Z_{\text{eu}}} (t, z) \cdot \text{PAR}(t, z) \cdot \text{Chl}(z) \, dt \, dz$$

III. Time-integrated models

$$\text{GNPP} = \int_{z=0}^{Z_{\text{eu}}} P^b(z) \cdot \text{PAR}(z) \cdot \text{Chl}(z) \, dz$$

IV. Depth-integrated models

$$\text{GNPP} = P^b_{\text{opt}} \cdot \text{PAR}_0 \cdot \text{Chl}_0 \cdot Z_{\text{eu}} \cdot d.l.$$

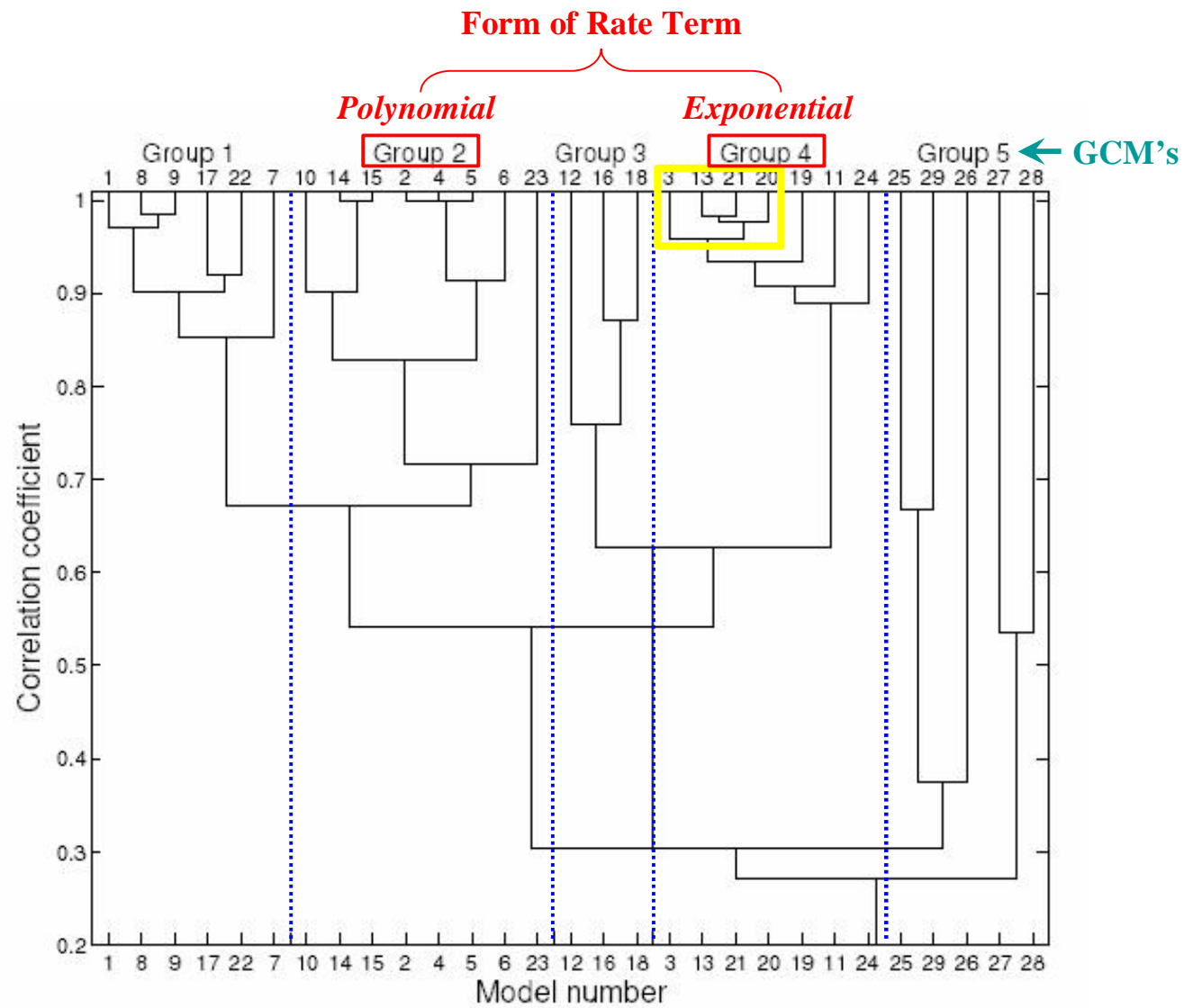
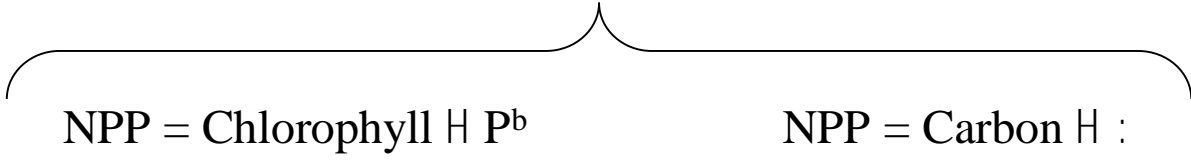


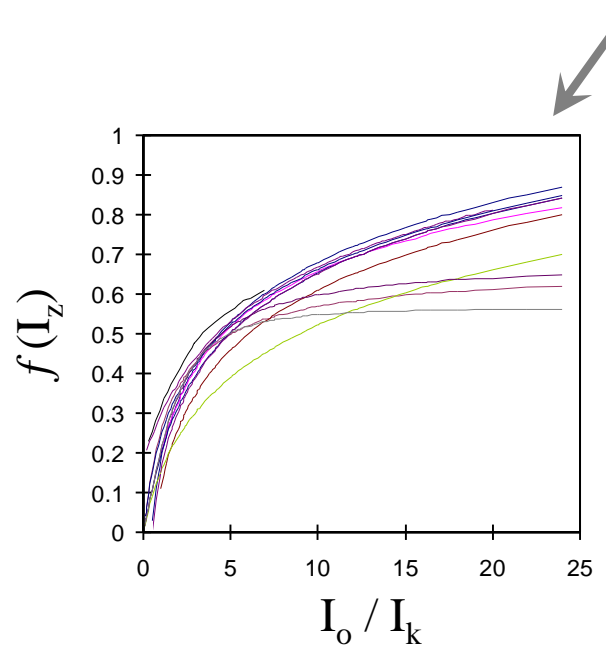
FIG. 4. Hierarchical clustering of the models based on the matrix of pair-wise correlations for January and July.

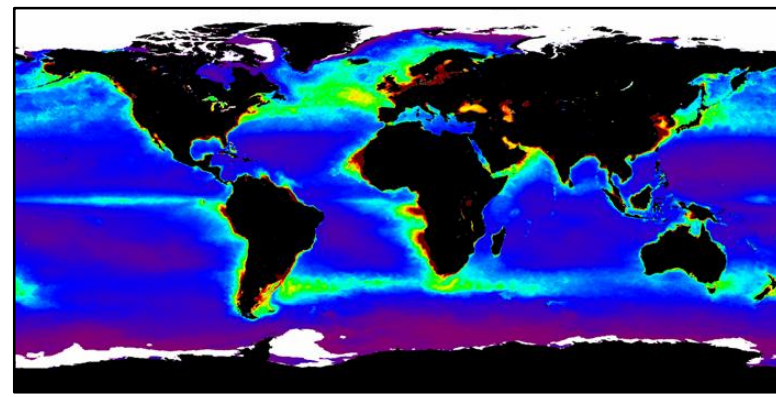
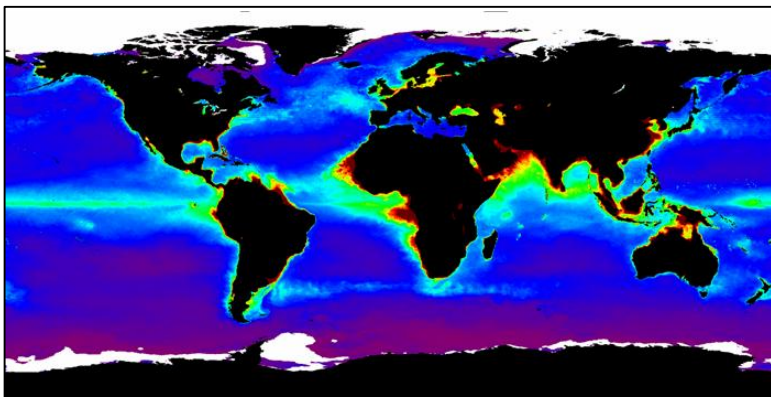
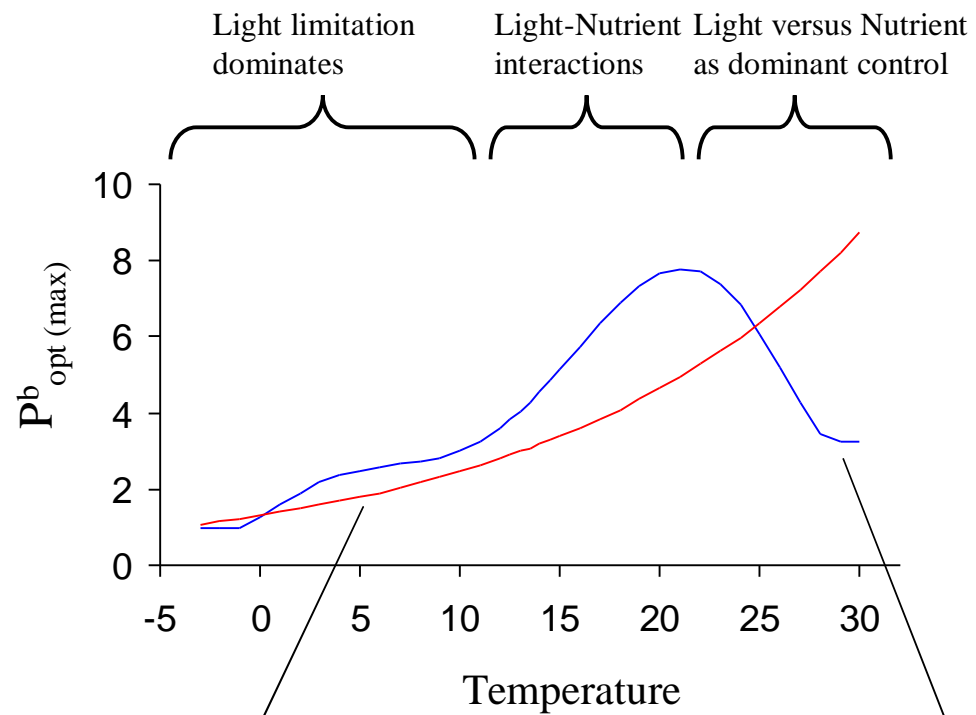
Net Primary Production = Gross Carbon Fixation – Phytoplankton Respiration

Net Primary Production = $\text{mg C m}^{-3} \text{ d}^{-1}$
 = number of cells \times average carbon fixed per cell
 = biomass \times biomass specific rate



Areal NPP (m^{-2}) = biomass \times biomass specific rate $\times f(I_z) \times f(\text{biomass}_z) \times f(K_d)$



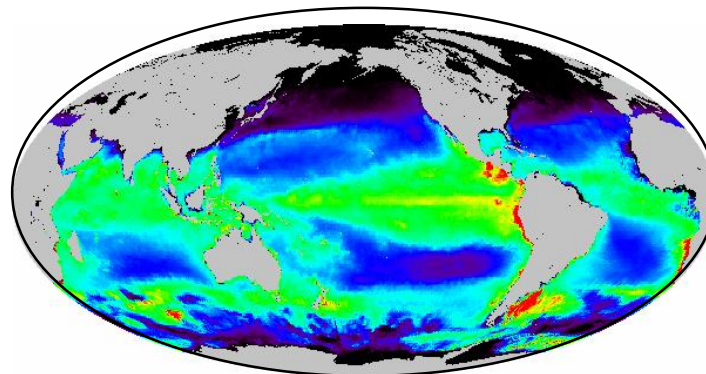
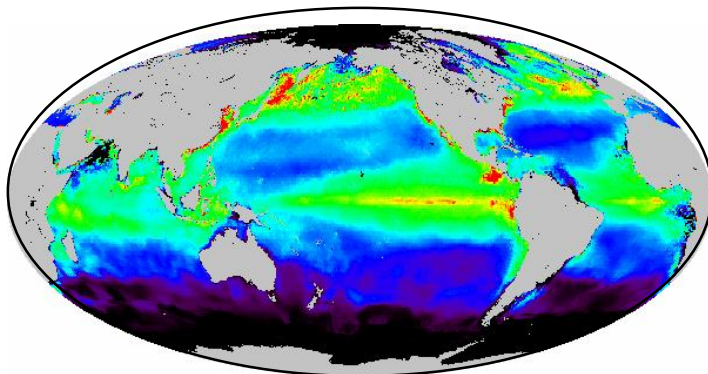


$$\text{NPP} = f [\text{Carbon}, Z_{\text{eu}}, \dots, g(I_0)]$$

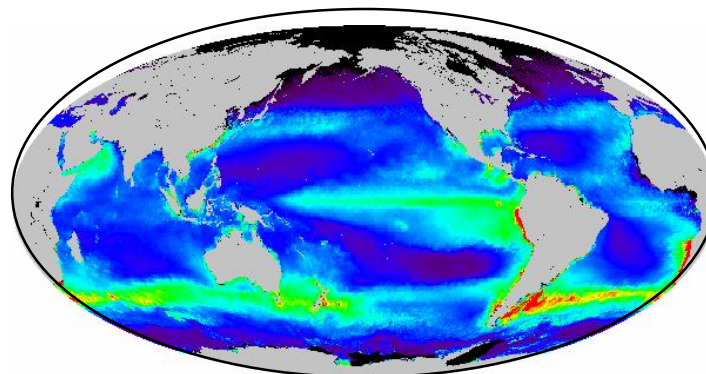
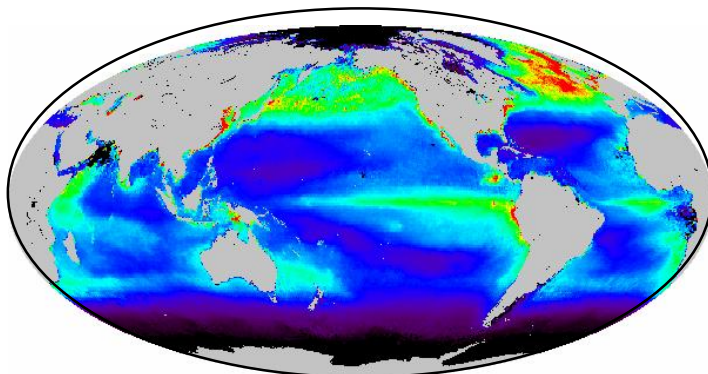
Boreal Summer

Boreal Winter

Carbon-based



Chlorophyll-based



Difference

