Seagrasses are prevalent in coastal waters throughout the world. The role that seagrass meadows play in global biogeochemical cycles is largely unquantified. Our objective is to develop, test, and validate new algorithms for using remotely sensed ocean color to quantify seagrass productivity. We have conducted extensive field investigations in a variety of different seagrass beds:

1. Bahamas Banks, March 2004
2. Florida Bay, June 2005, 2006
3. Port St. Joe, FL, June, October 2006

Our field efforts include quantification of seagrass biomass and productivity and coincident measurements of the optical properties of the seagrass, sediment, water column, and sea surface reflectance. We have collected an extensive spectral library of sediment and seagrass reflectance. The bottom reflectance and water column optical properties are being incorporated into algorithms for remotely quantifying seagrass biomass and productivity from remote sensing reflectance.

Seagrass Reflectance

The reflectance spectra from seagrass canopies in Florida Bay show variable spectral signatures which are dependent on the mixture of seagrass species present. Differences are related to the pigments and morphology of the seagrass blade. Canopy reflectance from a dense Syringodium meadow is greater in the red compared to a Thalassia dominated area. This "red edge" may be exploited for remote sensing purposes.

Sediment Reflectance

We have compiled an extensive database of sediment reflectance spectra from coastal waters. Sediment reflectance \( R_s \) is highly variable with changing amounts of organic matter. From the Bahamas Banks, the dip in \( R_s \) at 676 nm due to pigment absorption is less pronounced in sandy regions (blue spectra) than in seagrass beds (red spectra). Graptoleid sediments (magenta) have the most pigment and appear similar to a green vegetated seafloor.

Water Column Optics

Measurements of seafloor reflectance and water column optical properties are incorporated into radiative transfer models to estimate remote sensing reflectance spectra \( R_s \) over regions with different bathymetry and bottom types.

Quantifying Seagrass

Most approaches for remote sensing of seagrasses are qualitative in nature and cannot be incorporated into global biogeochemical models. Our quantitative measurements of seagrass biomass and productivity indicate that net primary production (NPP) can be estimated from seagrass LAI or Standing crop.

Remote Sensing Reflectance

Canopy reflectance measurements taken with the DOBBS instrument.