The Color of the Sea and What It Means

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Ocean color is commonly used shorthand to refer to radiometric measurements in the visible and near-infrared wavelength bands of sunlight that is backscattered out of the ocean. The spectra of the backscattered light changes depending on the constituents in the water and their concentration. For example, photosynthetic pigments such as chlorophyll *a* contained by microscope plants and bacteria (phytoplankton) that are at the base of ocean food webs generally absorb blue light, and thus shift the spectra of light leaving the ocean towards green wavelength bands. This subtle shift in spectra can be detected by satellite sensors, thus providing a capability to map the global distribution of phytoplankton biomass and other in-water constituents in near-surface ocean waters. With the launch of NASA's Coastal Zone Color Scanner in 1978 (followed in subsequent years by SeaWiFS and MODIS) biological and biogeochemical oceanographers had for the first time a powerful tool to study the time-space patterns of phytoplankton chlorophyll *a* (a good indicator of phytoplankton biomass) on global ocean scales. Furthermore, the rate of primary production (photosynthetic carbon fixation) can be calculated from phytoplankton biomass measurements and other satellite-derived parameters providing a remote sensing-based capability to study the initiating processes of the *biological pump* that leads to carbon sequestration in the ocean. The purpose of this talk is to review the significant contributions of satellite *ocean color* sensors to understanding biogeochemical variability in the ocean, including the potential impact of a changing climate on ocean ecosystems.