

Measurement Capabilities of WET Labs' Sensors

Biogeochemical Property	Related Optical Properties	Importance	Sensor(s)
Chlorophyll absorption	Particulate absorption	Chlorophyll captures and provides the energy for photosynthesis. Absorption by chlorophyll is a critical IOP for estimating primary productivity and carbon production in bio-optical models.	ac-9, ac-s
Chlorophyll fluorescence	Fluorescence emission	In-vivo chlorophyll fluorescence is a sensitive indicator of chlorophyll concentration, though highly dependent on pigment packaging and quantum efficiency of fluorescence.	ECO FL, WETStar
Particulate mass concentration	Beam attenuation	Beam attenuation in the red is linearly correlated with particle mass concentration. Where phytoplankton are the dominant particulates, the beam attenuation coefficient can be correlated to the particulate organic carbon (POC) concentration and can be used to estimate net primary production and biomass-specific production rates.	ac-9, ac-s, C-Star
Particulate mass concentration	Backscattering	Backscattering is a less precise proxy of particle mass concentration but is effective over a wide range of concentrations and can be related to the common unitless measurement of turbidity.	ECO BB2F, BB, FLNTU
Phytoplankton composition	Spectral absorption	Phytoplankton have specific pigment compositions related to species and physiological parameters. Precise absorption spectra can distinguish the bulk ratios of pigments in a given population and can be used for taxonomic and niche identification.	ac-9, ac-s
Particle composition: the proportion of pigmented to non-pigmented particles	a/b (absorption to scattering ratio)	Can estimate the abundance of phytoplankton particles relative to the total particle population	ac-9, ac-s
Size distributions	Spectral attenuation	The hyperbolic slope of the attenuation spectrum in the visible is linearly linked to the slope of the hyperbolic, Junge-type particle size distribution, thus providing a simple means of determining relative proportions of small and large particles.	ac-9, ac-s
Bulk refractive indices—PIC:POC	Backscattering ratio and spectral attenuation	The relationship between the backscattering ratio (ratio of backscattering and total scattering) and bulk refractive index allows a direct estimate of the proportion of organic to inorganic particulate material (POC:PIC).	ECO BB, VSF
Colored dissolved organic matter (CDOM)	UV and blue wavelength spectral fluorescence and dissolved absorption	Identification of fluorescent amino acids, terrestrial humic and fulvic acids, aquatic humic acids and whitening agents. Composition of colored dissolved organic material based on dissolved absorption spectrum.	CDOM WETStar, filtered ac-9, ac-s