bbe biological · biophysical · engineering
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BBE's unique Method of Spectral Classes Algae Differentiating

Background:

Phytoplankton are microscopic organisms that live in watery environments, both salty and fresh. Some phytoplankton are bacteria, some are protists, and most are single-celled plants. Among the common kinds are cyanobacteria, diatoms, dinoflagellates, green algae and cryptophytes.

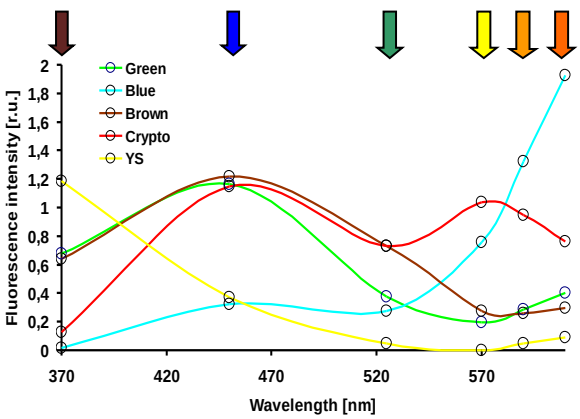
Like plants, phytoplankton perform photosynthesis using pigments to turn sunlight into chemical energy. A small part of the absorbed energy is emitted by the main photosynthetic component "chlorophyll-a" as fluorescence. Illuminating algae with artificial light from LEDs the intensity of fluorescence is related to the amount of chlorophyll-a inside of the cells. This measurement is the basis for the determination with bbe fluorometer.

The bbe method:

Five main spectral classes can be identified and related to different algae pigments. These pigments cooperate with chlorophyll-a by energy transfer of the trapped light. Each class has a characteristic pattern of fluorescence at definite wavelengths of excitation (illumination). This is termed the norm spectrum and enables to identify different algae in a sample.

Assuming a concentration of one algae class in the sample, the bbe software with its algorithms searches the best fitting fingerprint (norm spectra).

An important issue is the effect of so-called Yellow Substances (YS) or FDOM (fluorescent dissolved organic matter) which have interfering fluorescence effects and may lead to incorrect measurements. Compensation is done in the bbe devices using the fluorescence properties of the YS.



A sample taken from a water body will probably contain a mixture of different algae classes. Using the norm spectra of all classes and the compensation of YS to fit the measurement, the bbe algorithms will find the correct chlorophyll-a concentration of each class.

The method has a high sensitivity, needs no sample preparation, and is very quick. It is used in all bbe fluorometer.