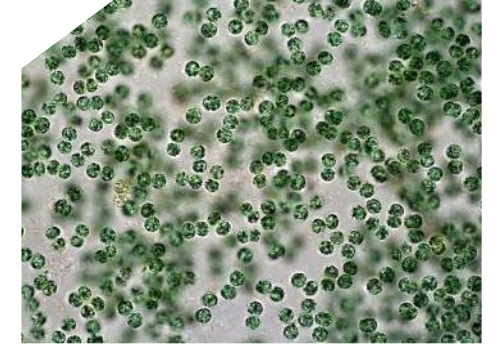
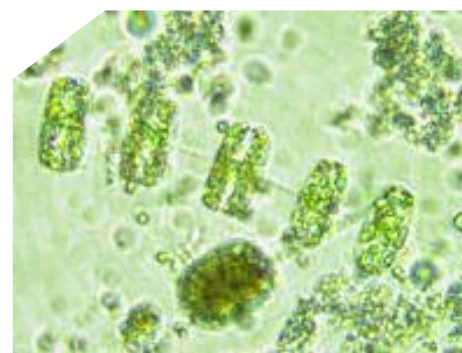
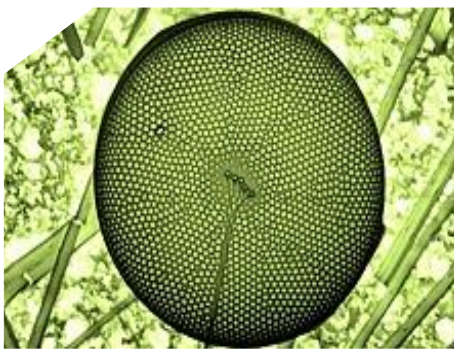
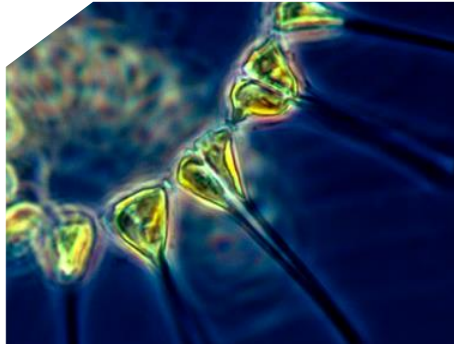
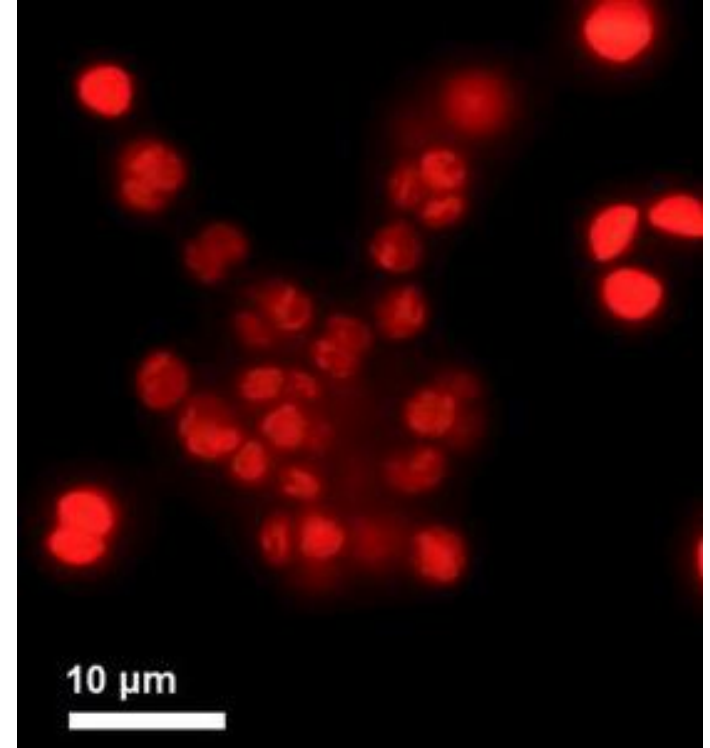


Advanced Phytoplankton Monitoring in Ocean Research

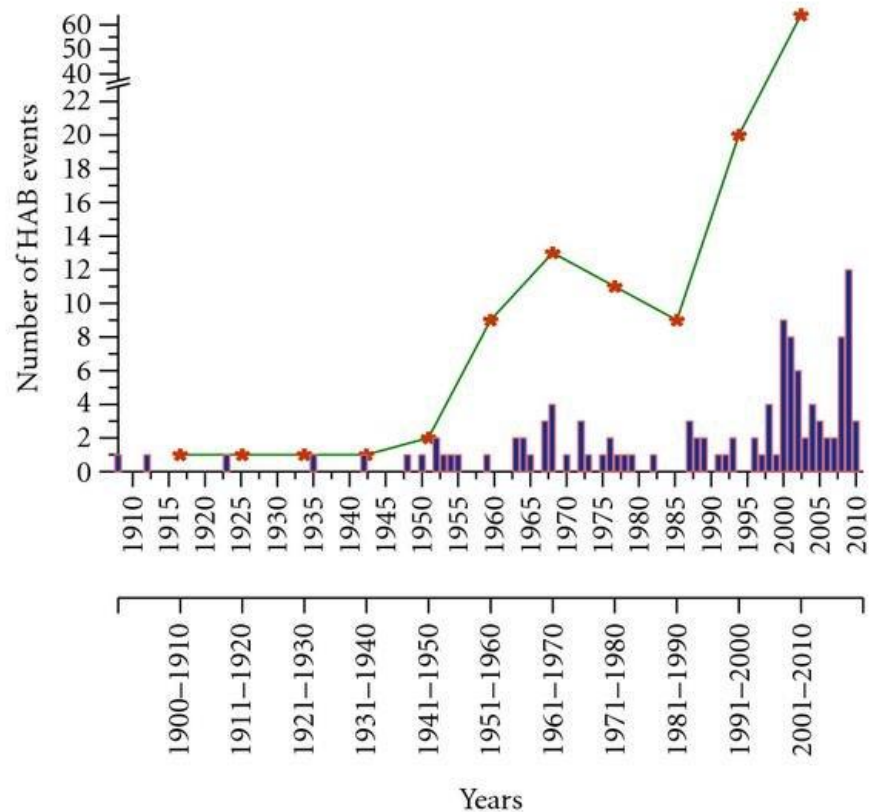
Tobias Boehme

Microalgae and Cyanobacteria

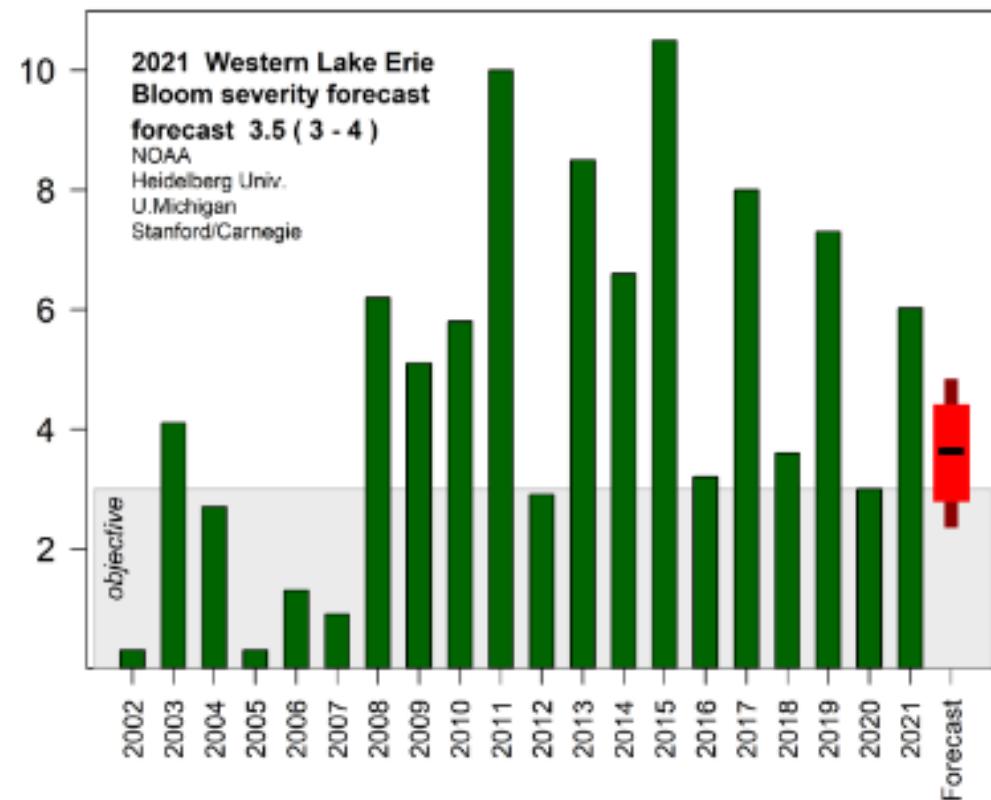




Increase of algae blooms world wide

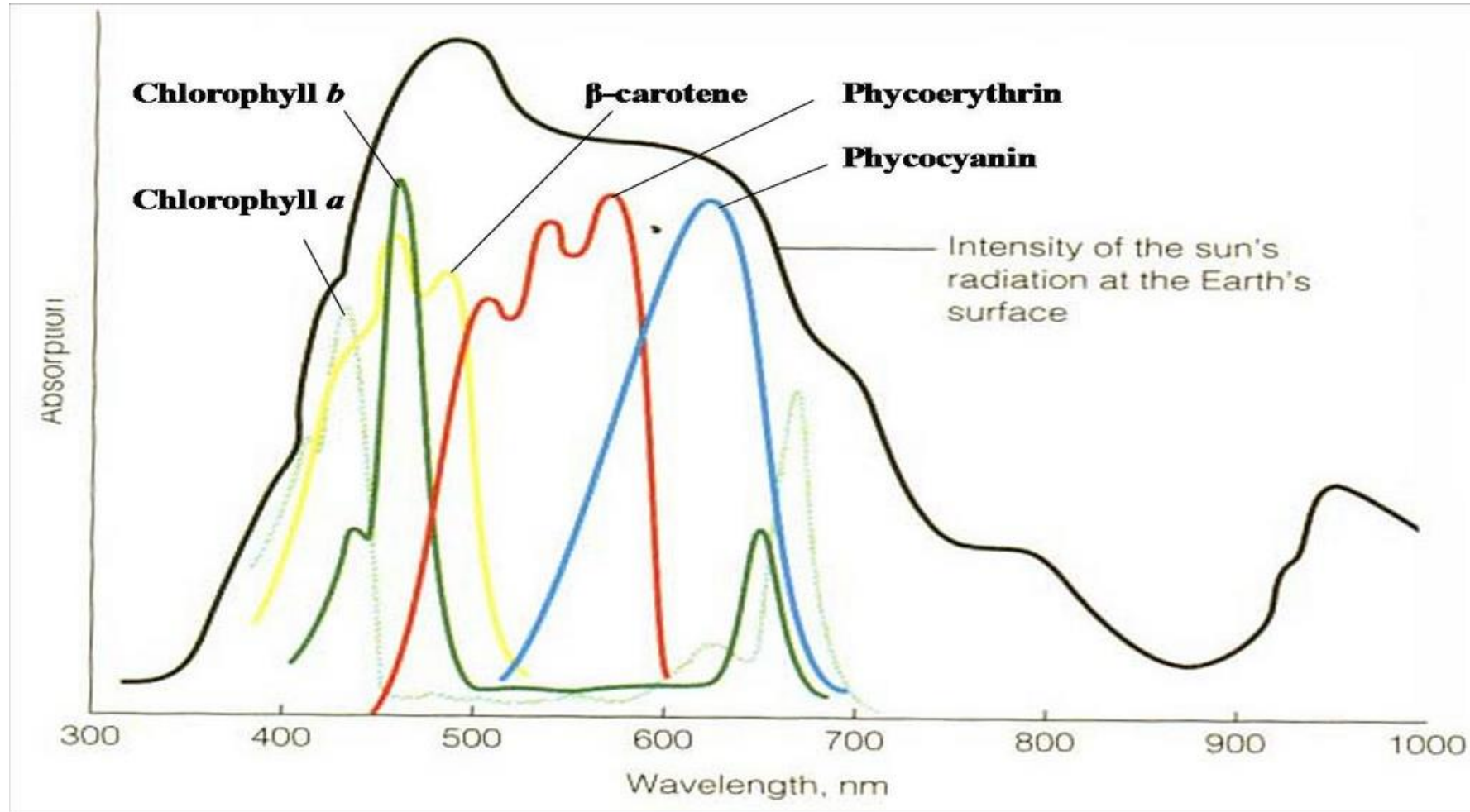


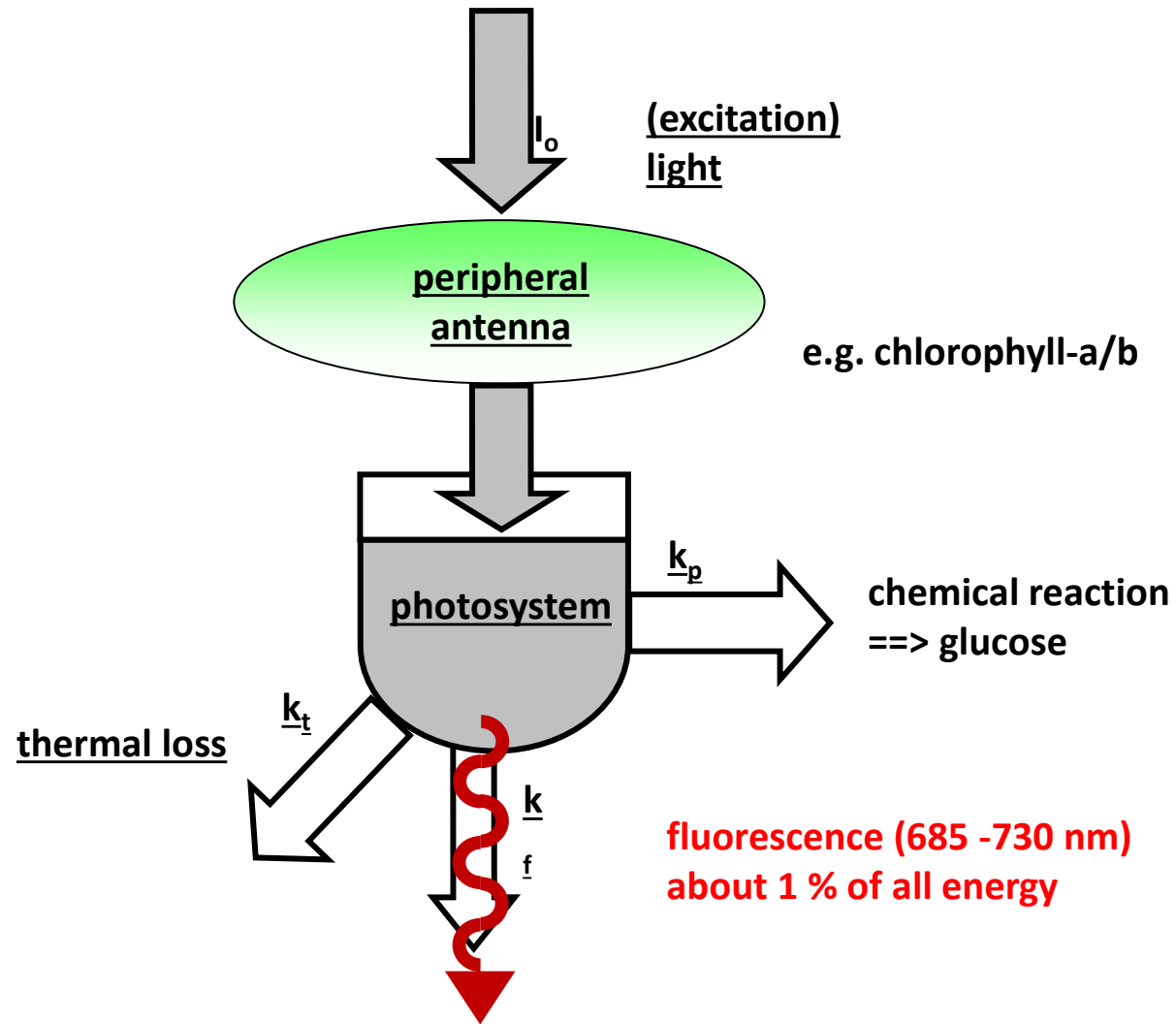
*** HAB events in 10 year interval
 ■ Yearly HAB events



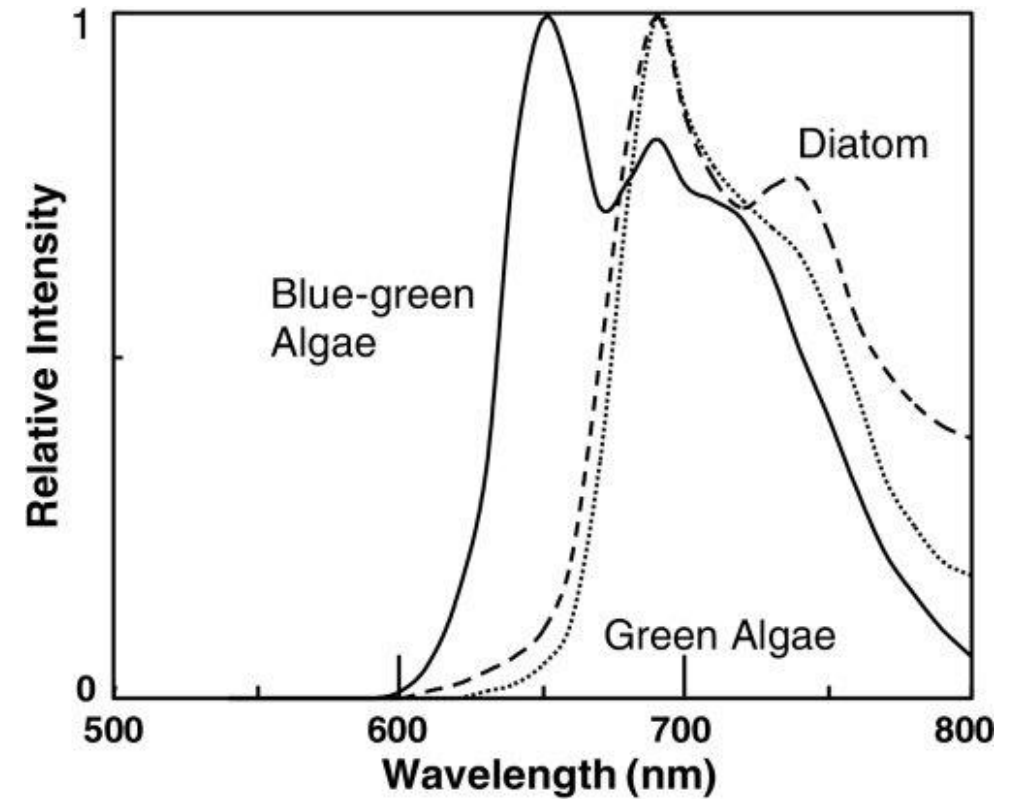
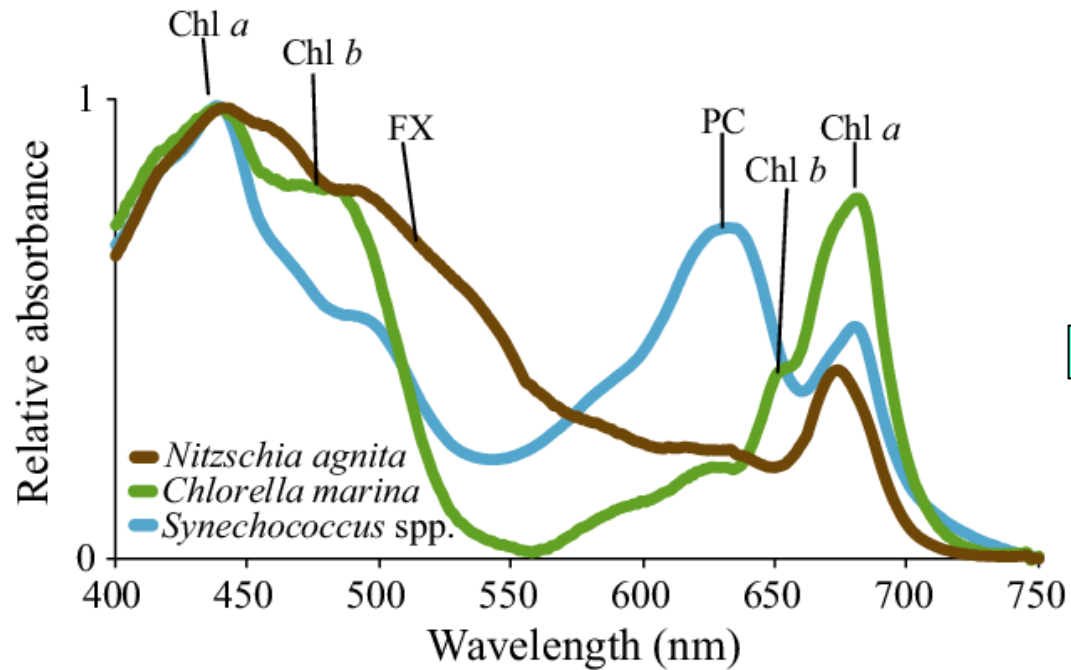
Hindawi Publishing Corporation
 International Journal of Oceanography
 Volume 2012, Article ID 263946, 7 pages
 doi:10.1155/2012/263946

Sun spectra and absorption spectra of the different pigments





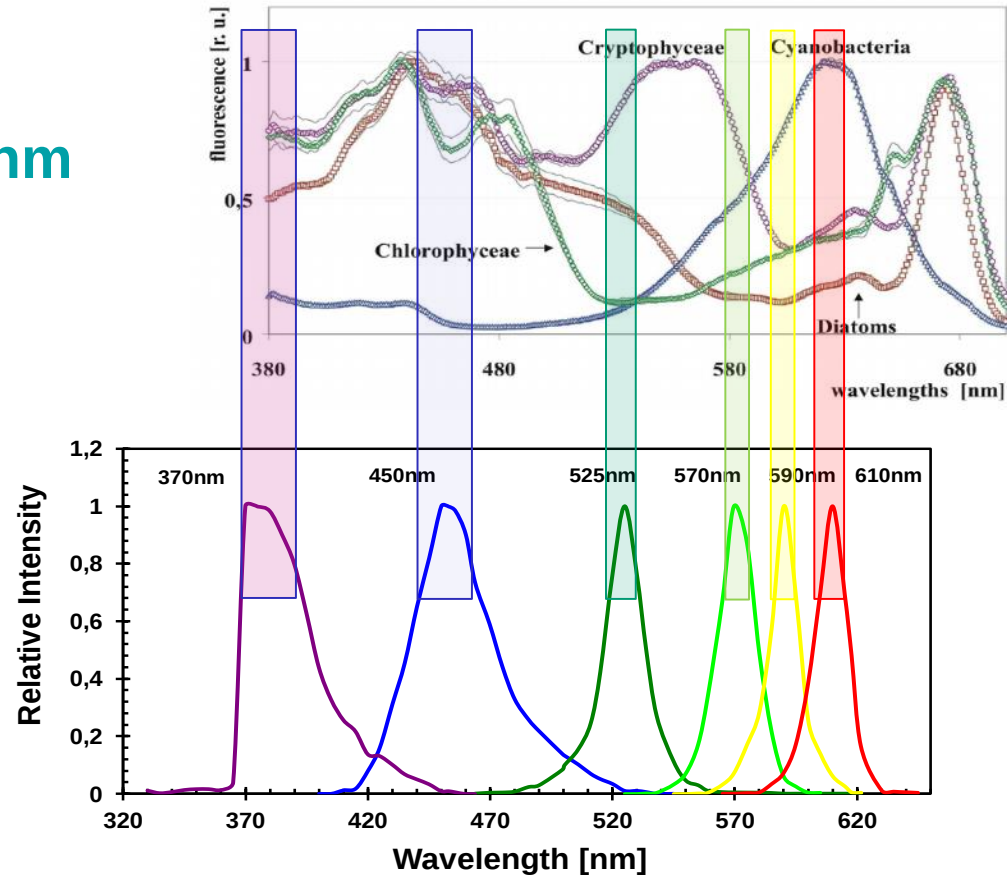
Absorption and Fluorescence of living algae



<https://www.researchgate.net>

Excitation wave length and
fluorescence response at 700 nm

Spectra of the LEDs, used in
the bbe instruments

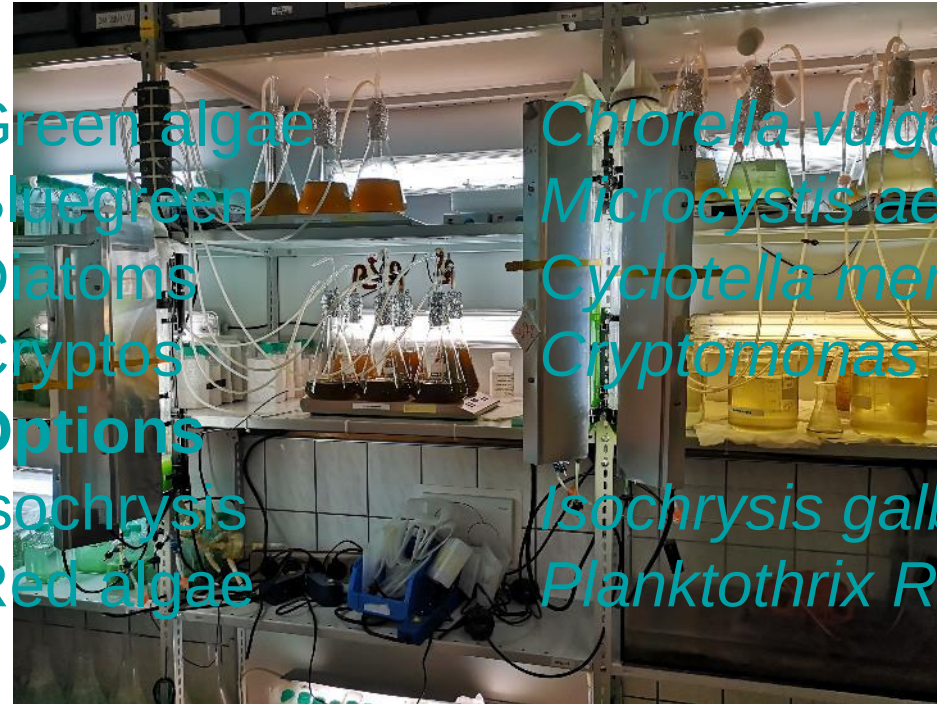


Yellow substances (CDOM) and turbidity measurement and correction

Calibration with real algae

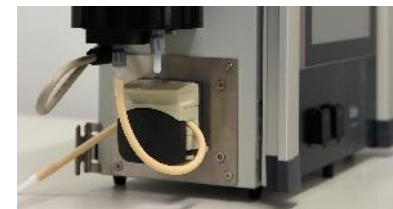
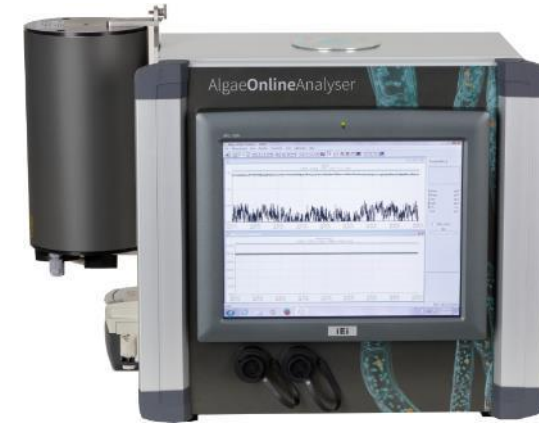


Green algae
Bluegreen
Diatoms
Cryptos
Options
Isochrysis
Red algae

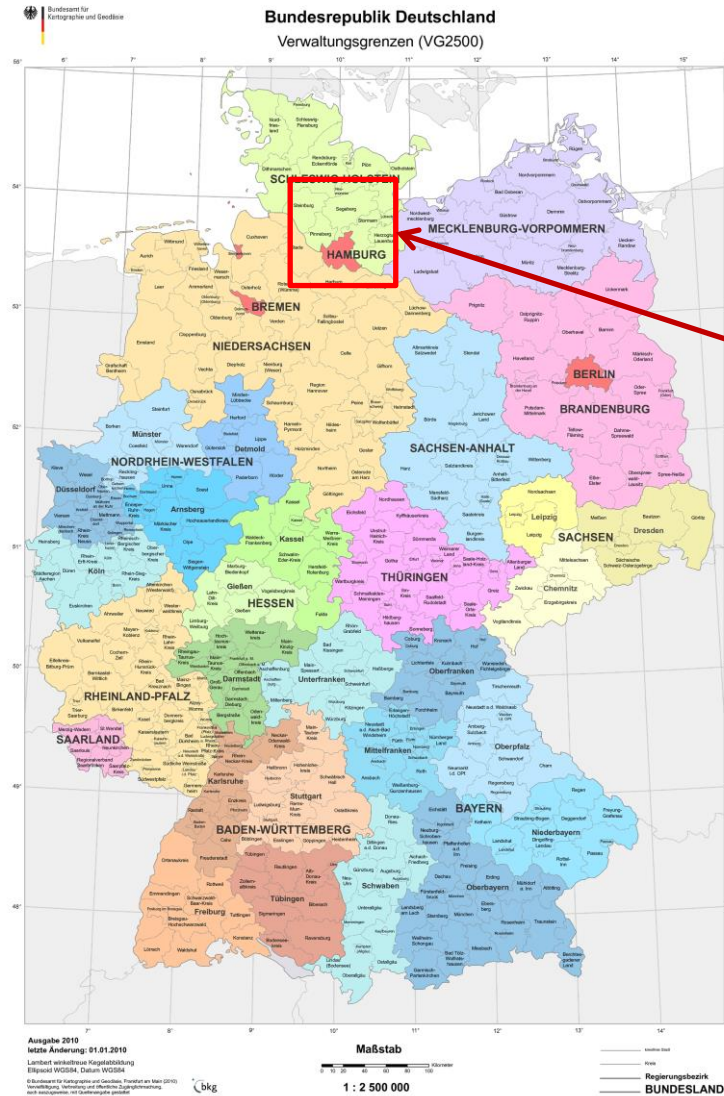


Chlorella vulgaris
Microcystis aeruginosa
Cyclotella meneghiniana
Cryptomonas sp.
Isochrysis galbana
Planktothrix Rubecense

- Chlorophyll determination
- Algae class differentiation (up to 5)
- Yellow substance measurement and correction
- Turbidity measurement and correction
- Activity of algae (Genty)
 - Health of the algae bloom
- Measuring range: 0-500 $\mu\text{g/l}$
- Resolution 0.01 $\mu\text{g/l}$
- Flow rate 1.5 l/min

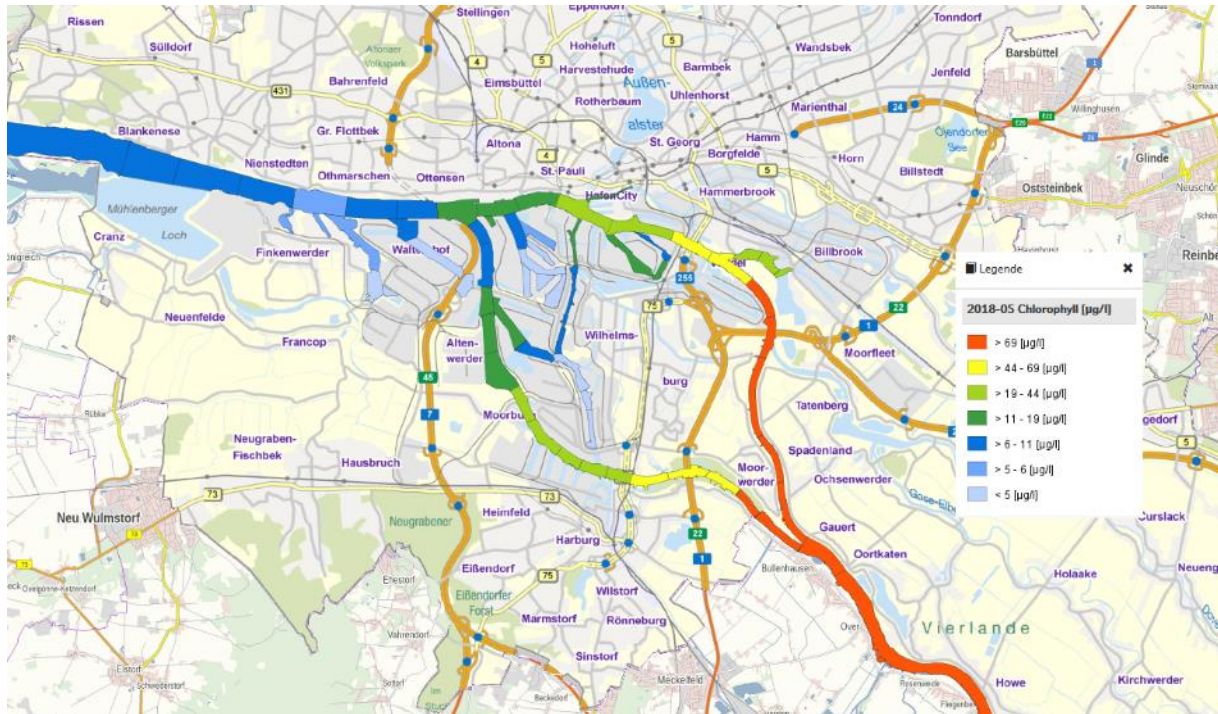


Monitoing Stations



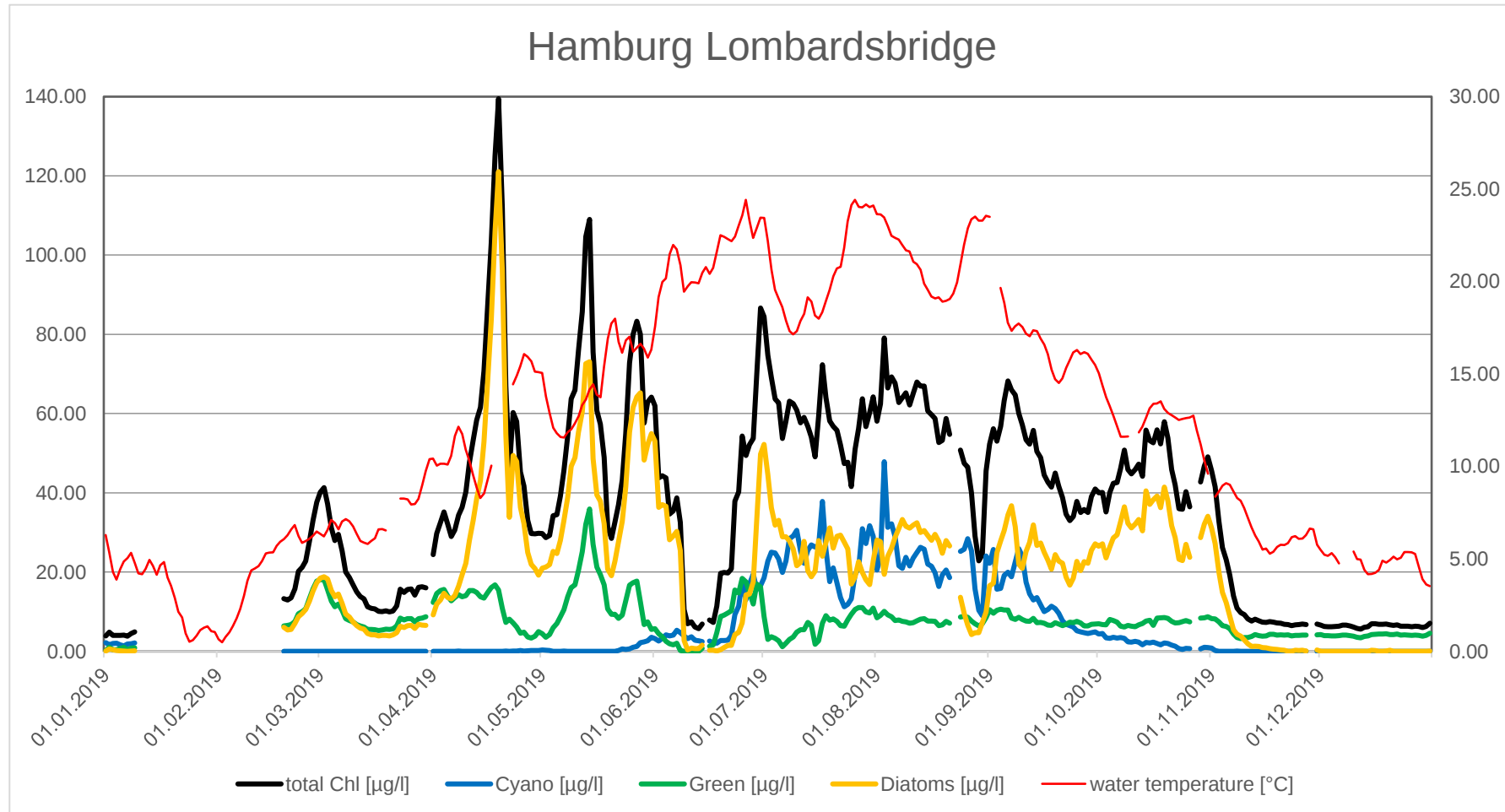
Hamburg
River Elbe

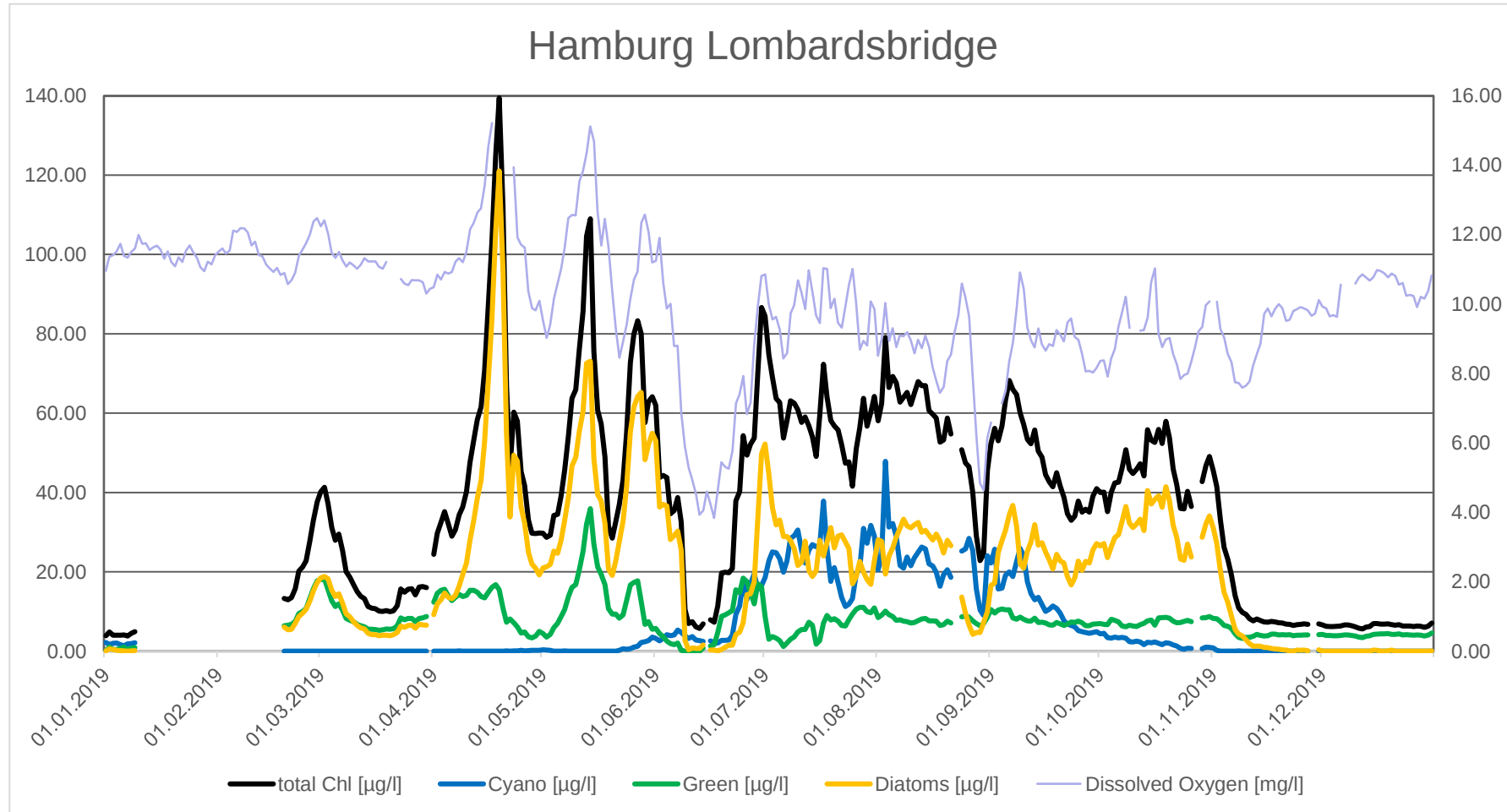
Enviromental monitoring at the Estuary of River Elbe (Hamburg)

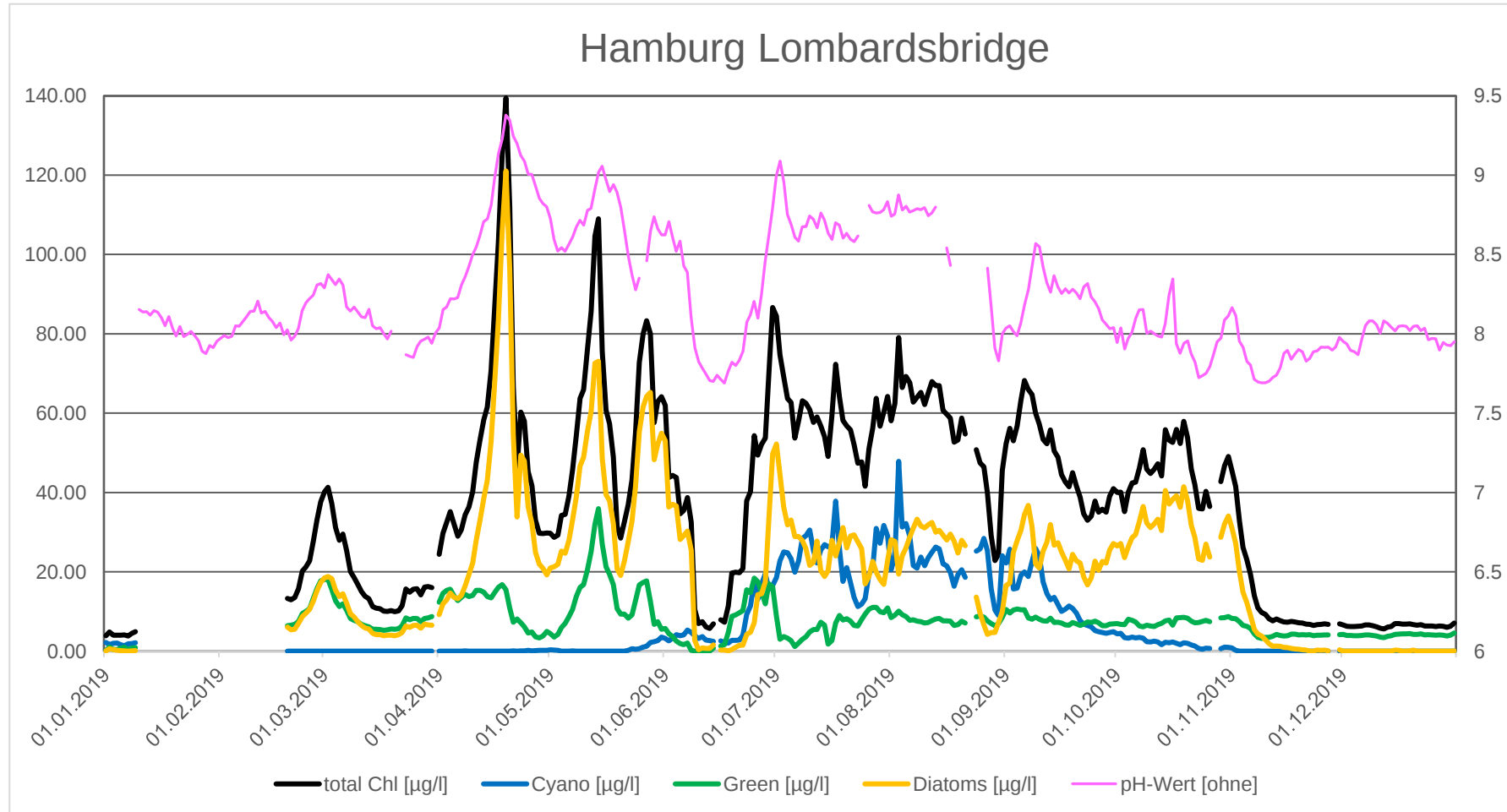


All shown data from
Institute for Hygiene and Environment. : <https://geoportal-hamburg.de/geo-online>

AOA Algae Distribution and Water Temperature





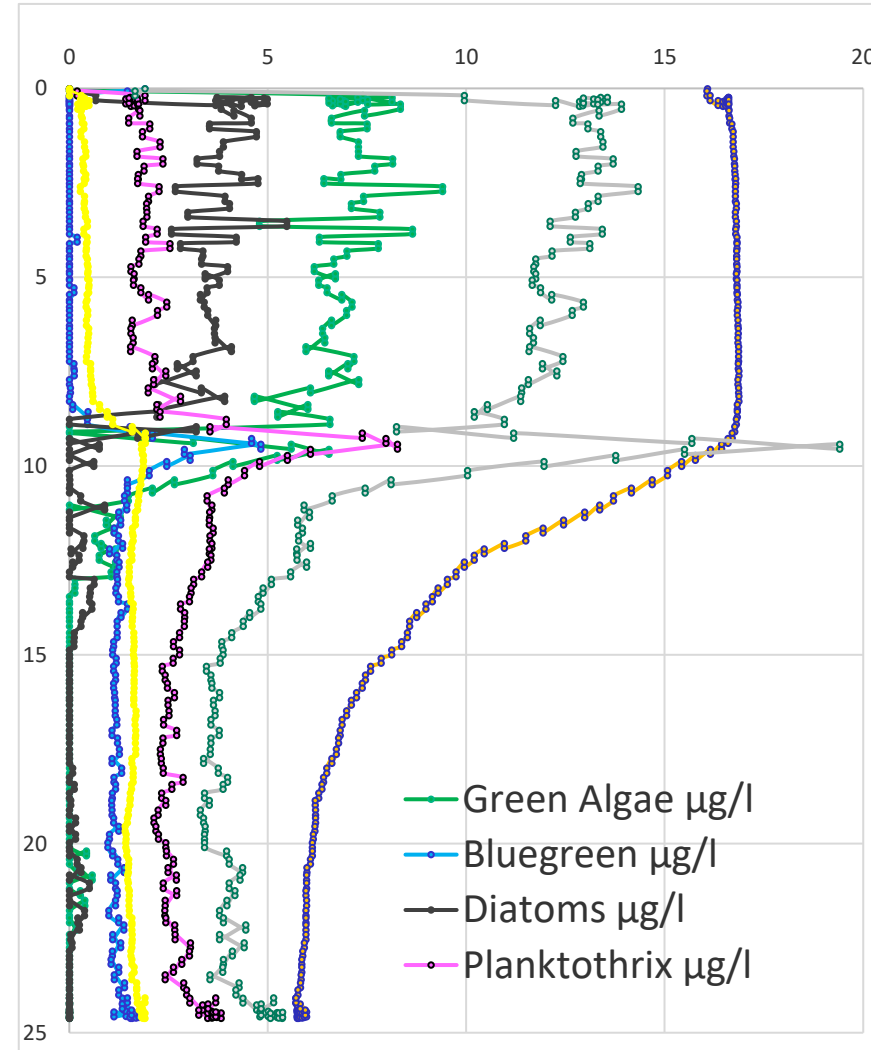
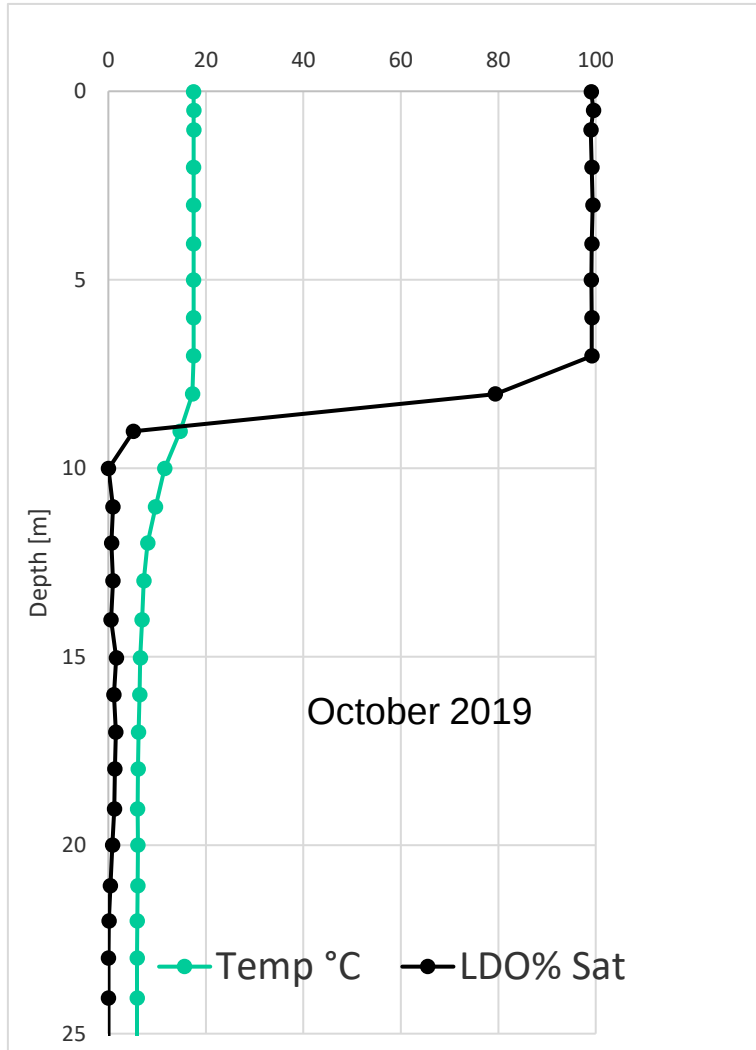


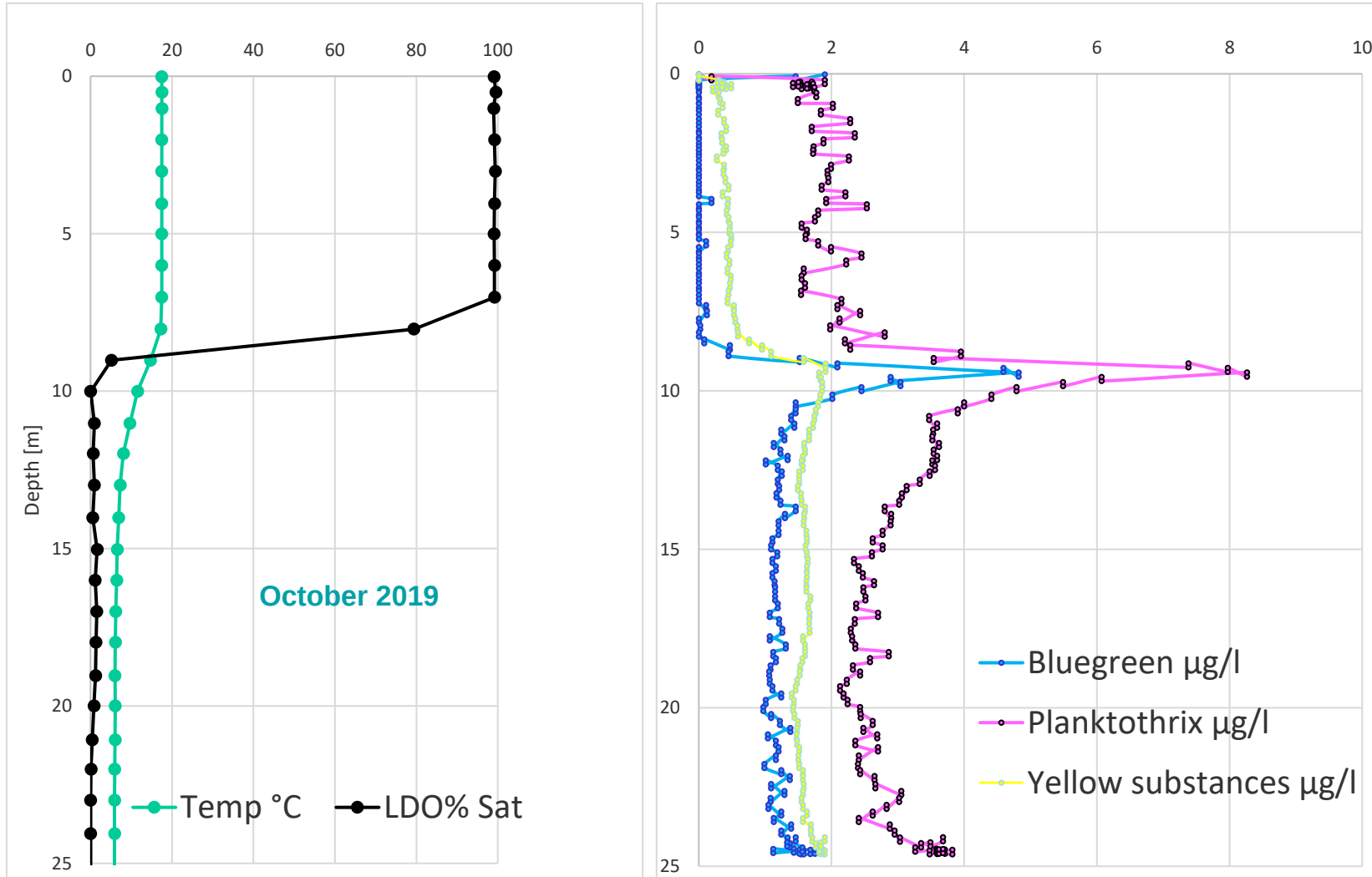
Seepark lake south of Germany



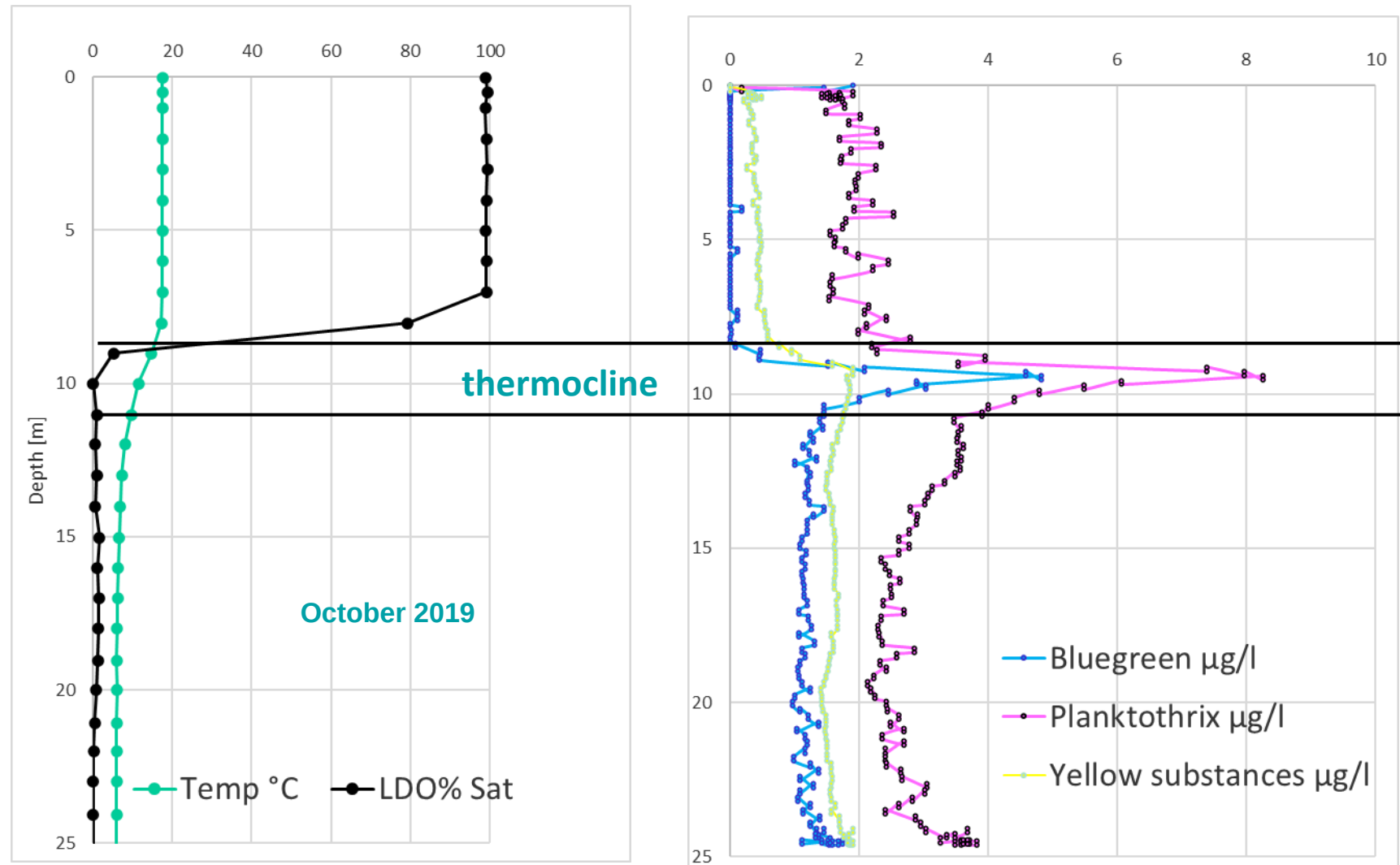
Page 16

FlouroProbe measurements at lake Seepark





High concentration at a depth of 9 m

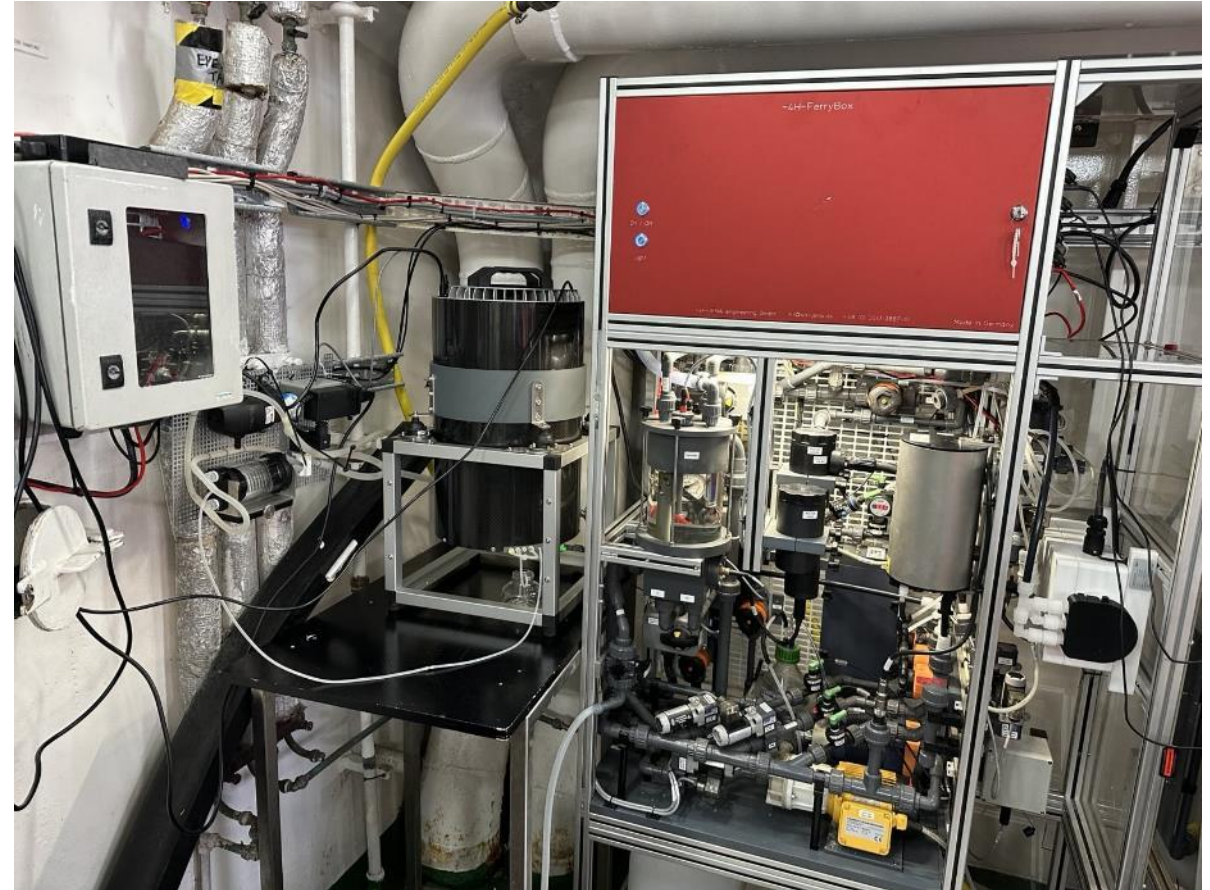




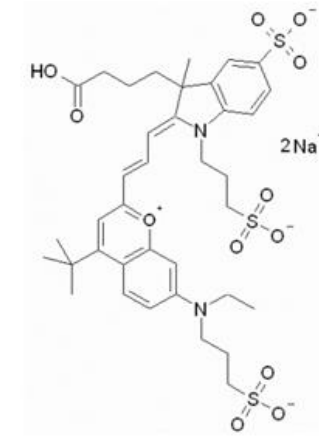
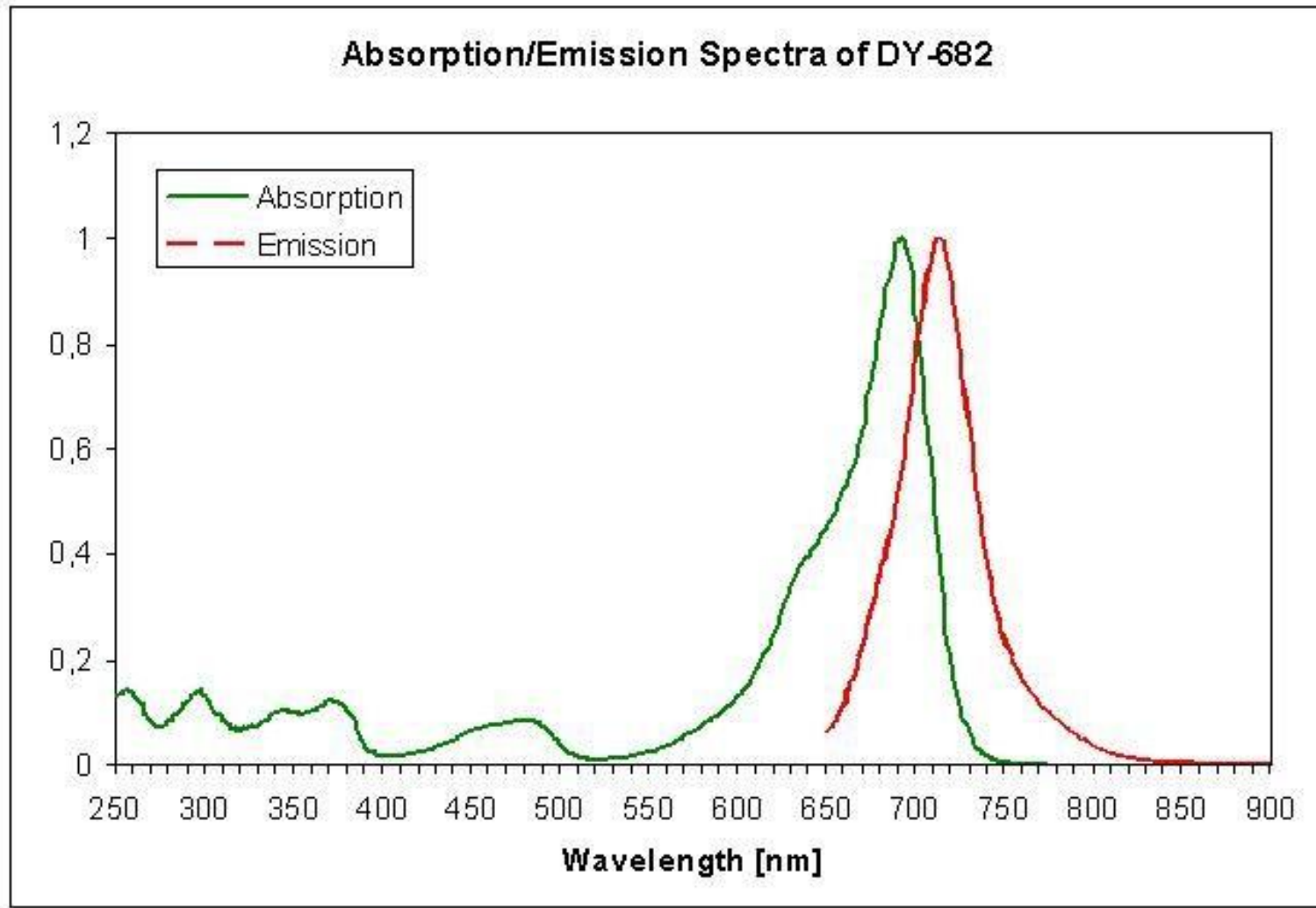
-4H- Ferrybox on the *Odon de Buen* (Spain)



-4H- Ferrybox on the RV Muskie (US)

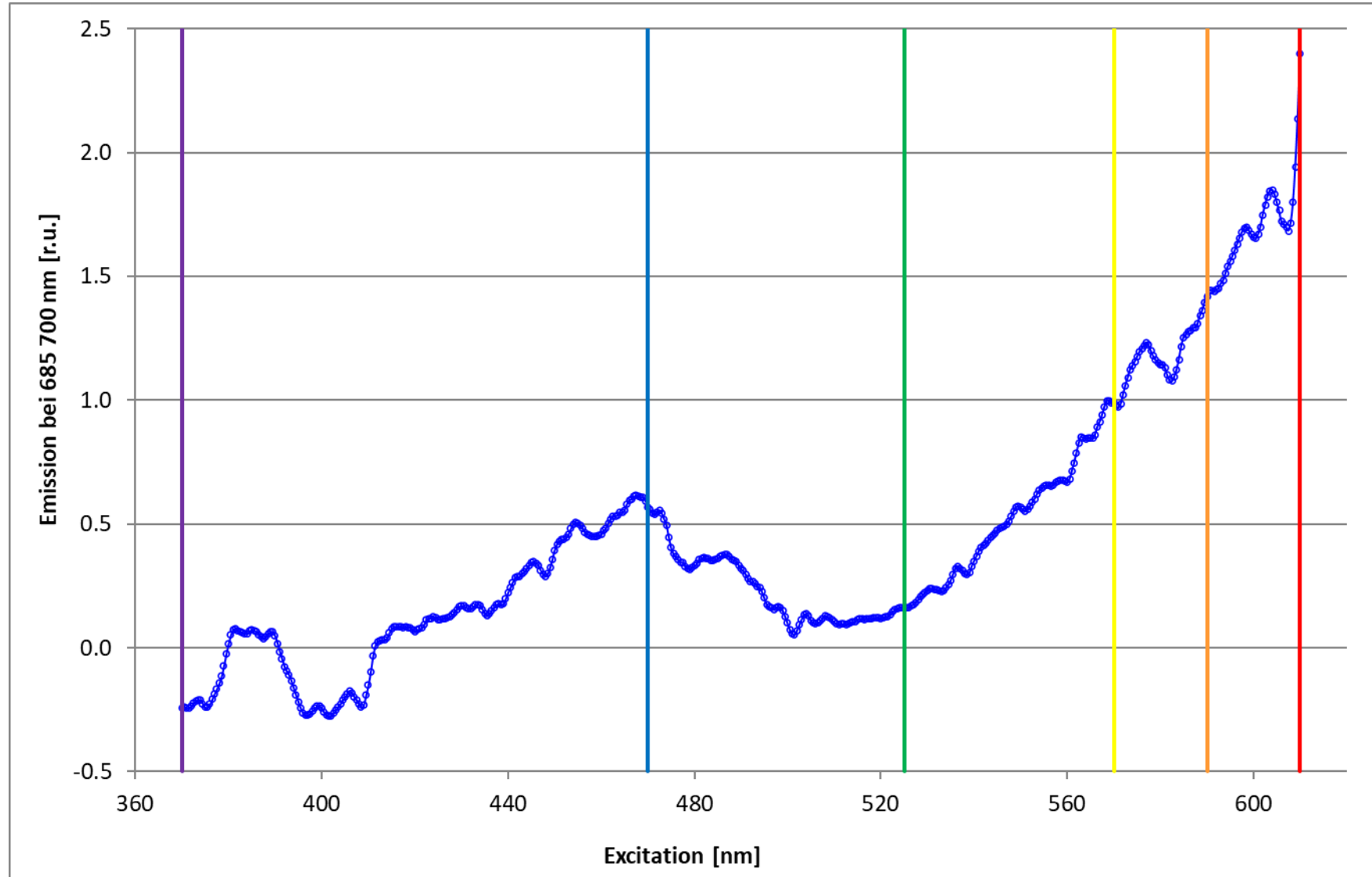


-4H- Ferrybox on the RV Endeavor (Cefas UK)



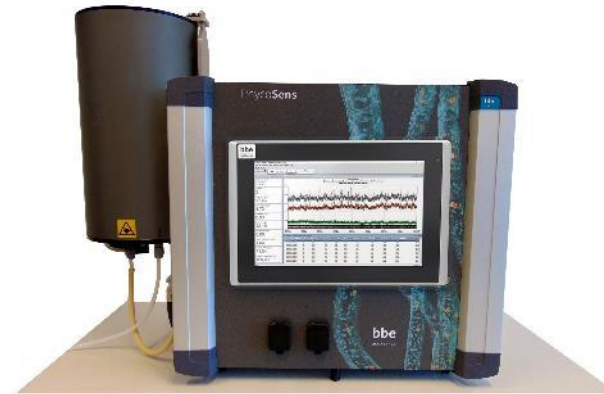
Performance testing for AOA devices

Excitation at the LEDs, Fluorescence at 685nm 730nm

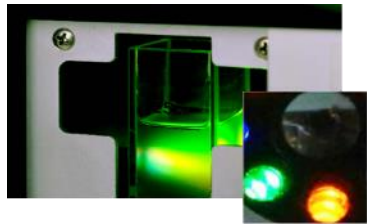


- Wavelength
- Signal height
- Temperature
- pH
- Durability in solution
- Reproducibility
- Robustness?
- Price





AlgaeOnlineAnalyser



AlgaeLabAnalyser



AlgaeTorch



BenthoTorch



FluoroProbe

NEW



Add-On DO, C, pH



Add-On DO



Algae Toximeter



Daphnia Toximeter



FishToximeter

**Thank you very much
for your attention**

