Welcome to the

First bbe Webinar 2013

on BenthoTorch

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TOPICS

1. Presentation
2. Practical application
3. Considerations of measurement and questions from the auditorium

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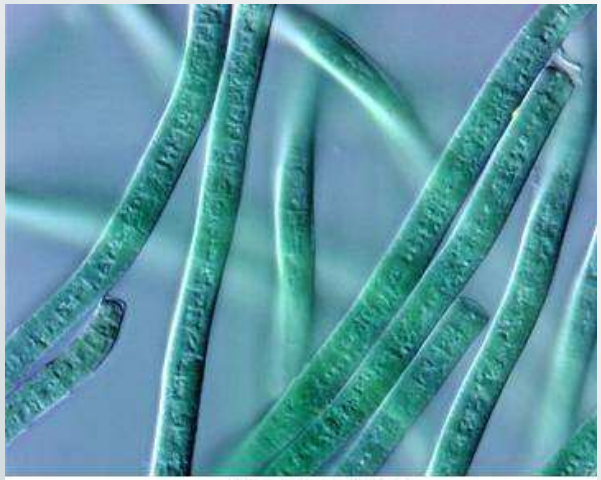
The Measurement of MicroPhytoBenthos

BenthoTorch, a Tool designed for the Analysis of Benthic Algae

Benthic algae are algae that grow on the bottom sediments of fresh and sea water bodies.



Phormidium

Benthic algae are most commonly filamentous or colonial forms, but also may be microscopic single-celled organisms

Benthic algae perform various beneficial functions. Benthic algae provide food and habitat for many aquatic organisms. They contribute to the biological productivity of aquatic systems.

***Ayu* fed pre- dominantly on benthic algae**

The algae that form the phytobenthos are plant-like organisms, very diverse and very different in size, shape and colour.

macroscopic sized benthic algae are typically designated as seaweeds

microscopic sized benthic algae are typically designated as microphythobenthos

Microphytobenthos, the micro-algae forming biofilms on sediment surfaces of intertidal mudflats, stones or artificial surfaces

Why now to deal with Benthic Microalgae?

- **Ecological status and dynamics, predictions**
- **Primary production**
- Effect of effluent on benthic community
- **Taste and odour caused by benthic algae**
- **Toxin production by cyanobacteria**
- **Fouling and biofilms**
- **Fish growth (Japan)**
- **Effects of climate changes**

Advantages of Benthic Algae Monitoring

- rapid reproduction rates and very short life cycles, valuable indicators of short-term impacts.
- primary producers, directly affected by physical and chemical factors
- standard methods exist for evaluation of functional and non-taxonomic structural (biomass, chlorophyll measurements)
- Benthic algae sensitive to high number of pollutants (i.e., herbicides).

(from US EPA)

European Union WFD - Ecological Status Requirements

The EU Water Framework Directive (WFD: European Union, 2000) has created a statutory obligation for Member States to monitor the ecological status of water bodies with the aim of achieving 'good ecological status'

Annex V of the WFD provides definitions of ecological status in rivers and lakes that are based on four biological quality elements: '**phytoplankton**', 'macrophytes and **phytobenthos**', 'benthic invertebrate fauna' and 'fish fauna'.

The collection of algae vs. the BenthoTorch

Phycologist Frank Acker scraping algae from the rocks in Horse Creek.

Biologist Corina Carpentier applies the BenthoTorch on riparian pebbles in Denmark.

Scrape or brush removable algae from substrate

Transfer algae into container

Homogenize samples, determine volume

Enter place and time in the minutes

Concentrate algae on a filter

Extract chlorophyll with organic solvent

Measure chlorophyll a with photometer or fluorometer

Calculate amount of chlorophyll-a benthic algae / cm^2

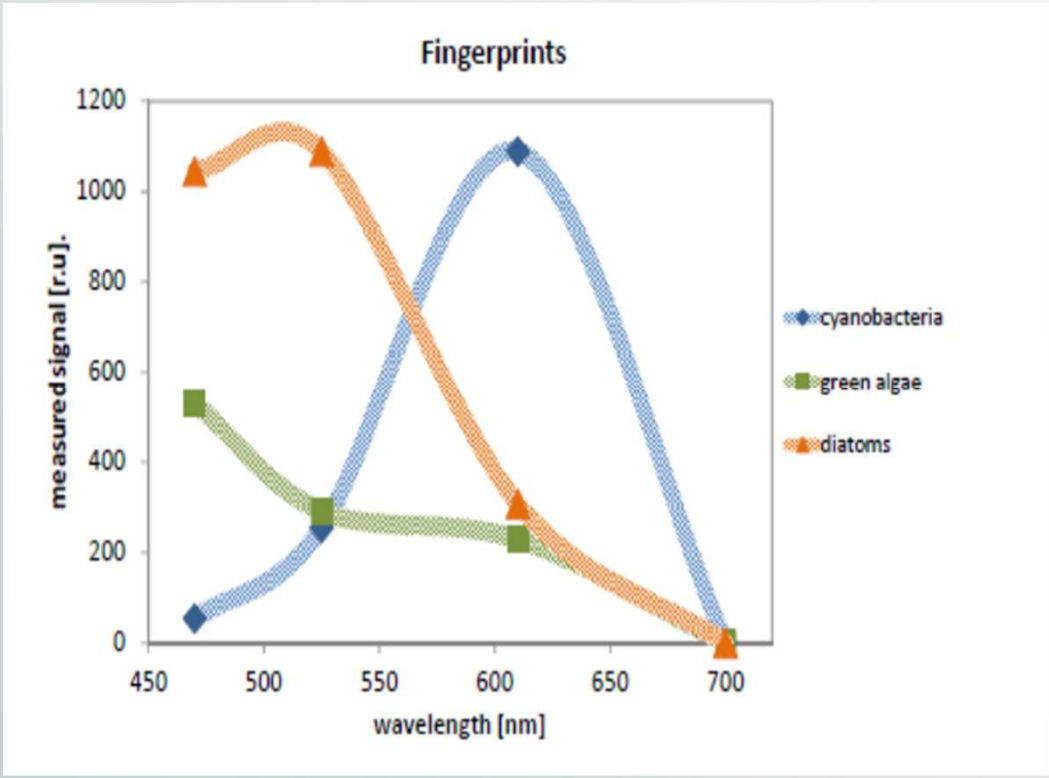
Place BenthoTorch in position

Start the BenthoTorch

Read BenthoTorch results and position

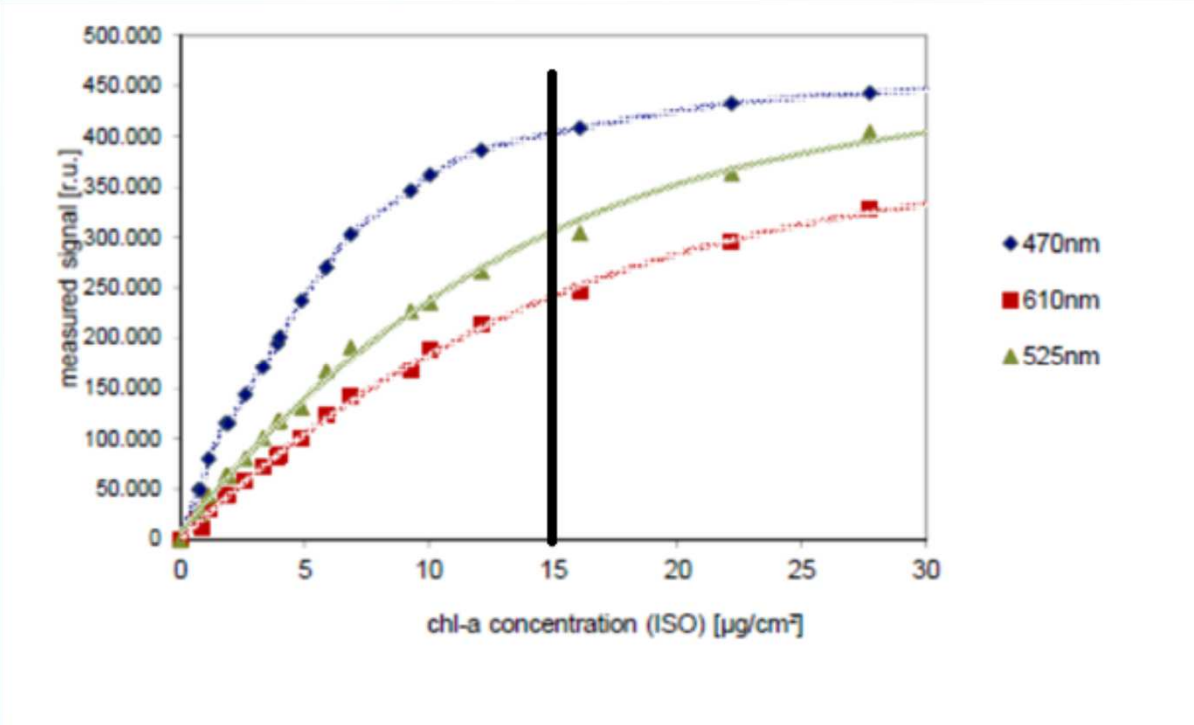
Dominating „algae“ classes of microphytobentho

- Diatoms
- Cyanobacteria
- Green algae

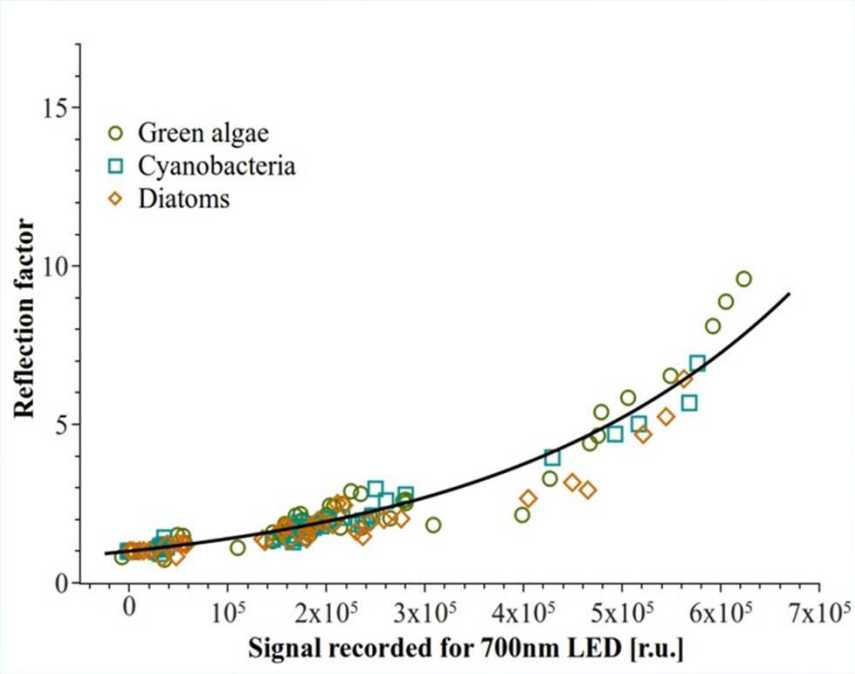


Excitation spectra of microphytonenthos

Upper Limits & Thickness

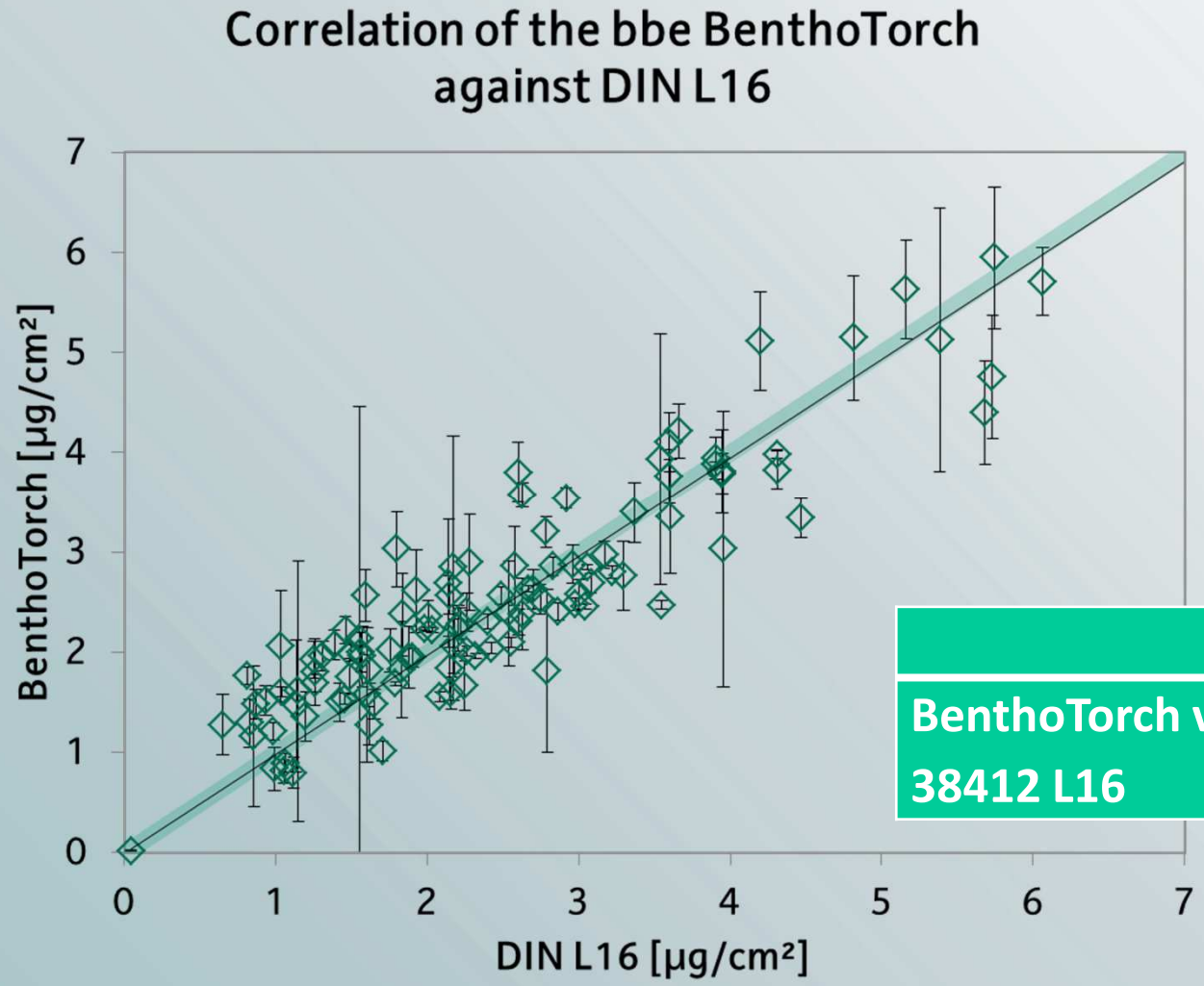


The influence of substrate – the background reflection



Different substrates

- Artificial
- Natural



	R^2	slope
BenthoTorch vs. DIN 38412 L16	0,79	0,99

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BenthoTorch

Measure benthic algae -

in less then a minute

- No sample preparation
- Automatic substrate correction
- Rapid results
- Cable-free operation
- GPS module
- Display on instrument
- Datalogger

Benefits

- real-time measurement of benthic algae concentrations
- improvement of ecological status assessment
- cost-effective tool to aid field sampling methods
- eliminate need for expensive random sample-taking and testing, and micosocpic analysis

How to apply the BenthoTorch?