Research
for the future
of our freshwaters

Marén Lentz / Marieke Soeter

Leibnitz-Institut for Freshwater Ecology and Inland Fisheries

Berlin – Neuglobsow

www.igb-berlin.de

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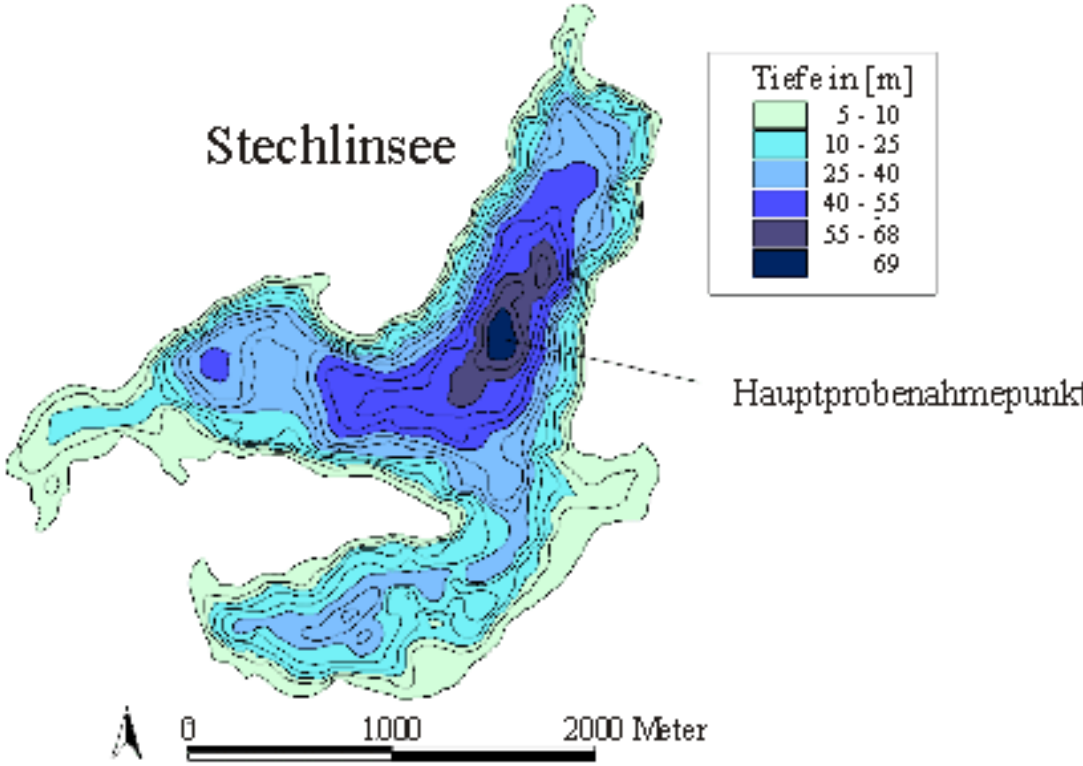
Presentation

1. IGB
2. Enclosures in Lake Stechlin
3. Marieke Soeter introduces her PhD project
4. Problems encountered with and solutions for the operation of 28 bbe FluoroProbes

Bundesministerium
für Bildung
und Forschung

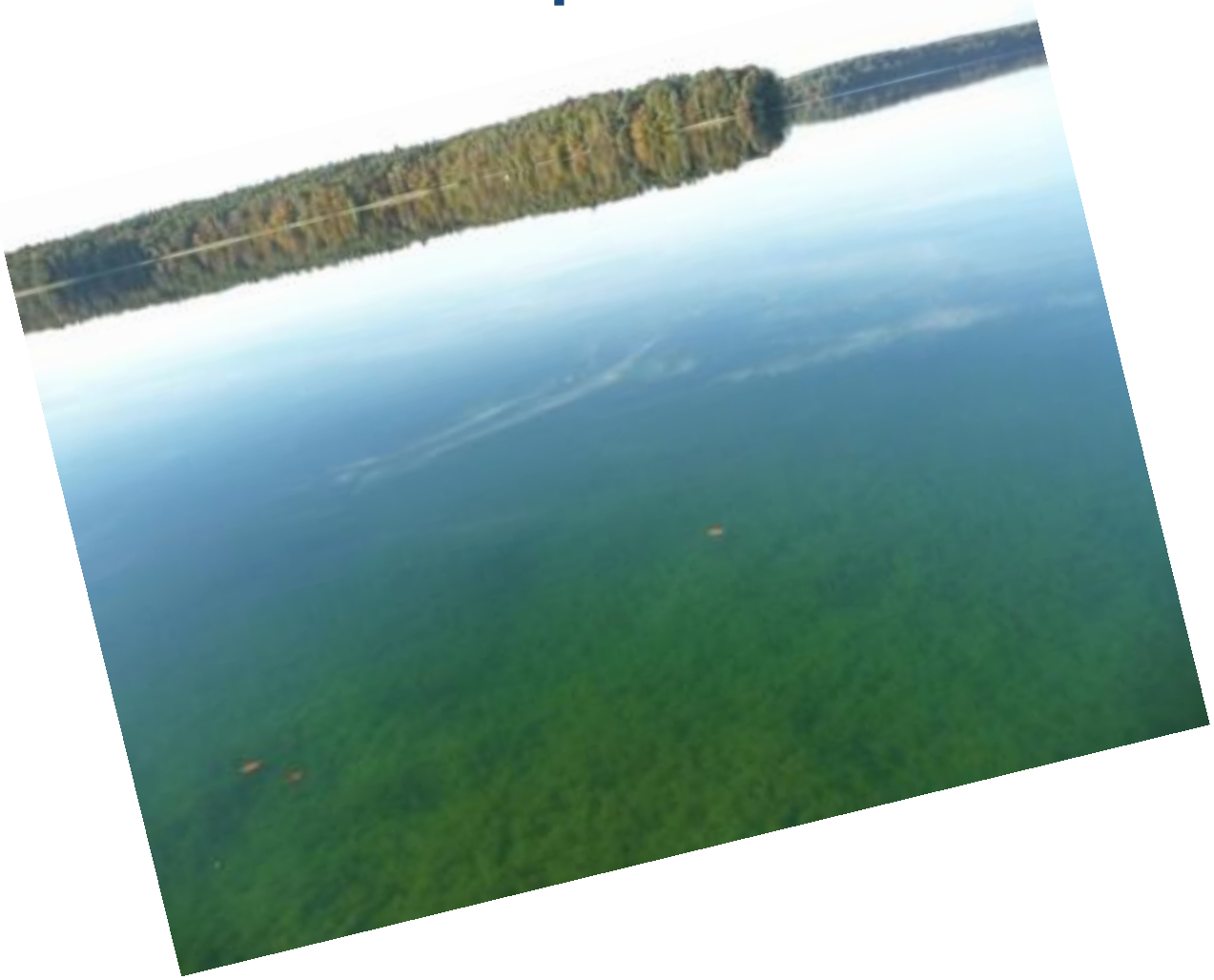
Berlin


Ostsee
Hamburg
Elbe
Berlin
Oder
Hannover
Saale


Stechlinsee
Tiefe in [m]
5 - 10
10 - 25
25 - 40
40 - 55
55 - 68
69
Hauptprobenahmepunkt
0
1000
2000 Meter

Short impression of Lake Stechlin

Short impression of Lake Stechlin



Short impression of Lake Stechlin

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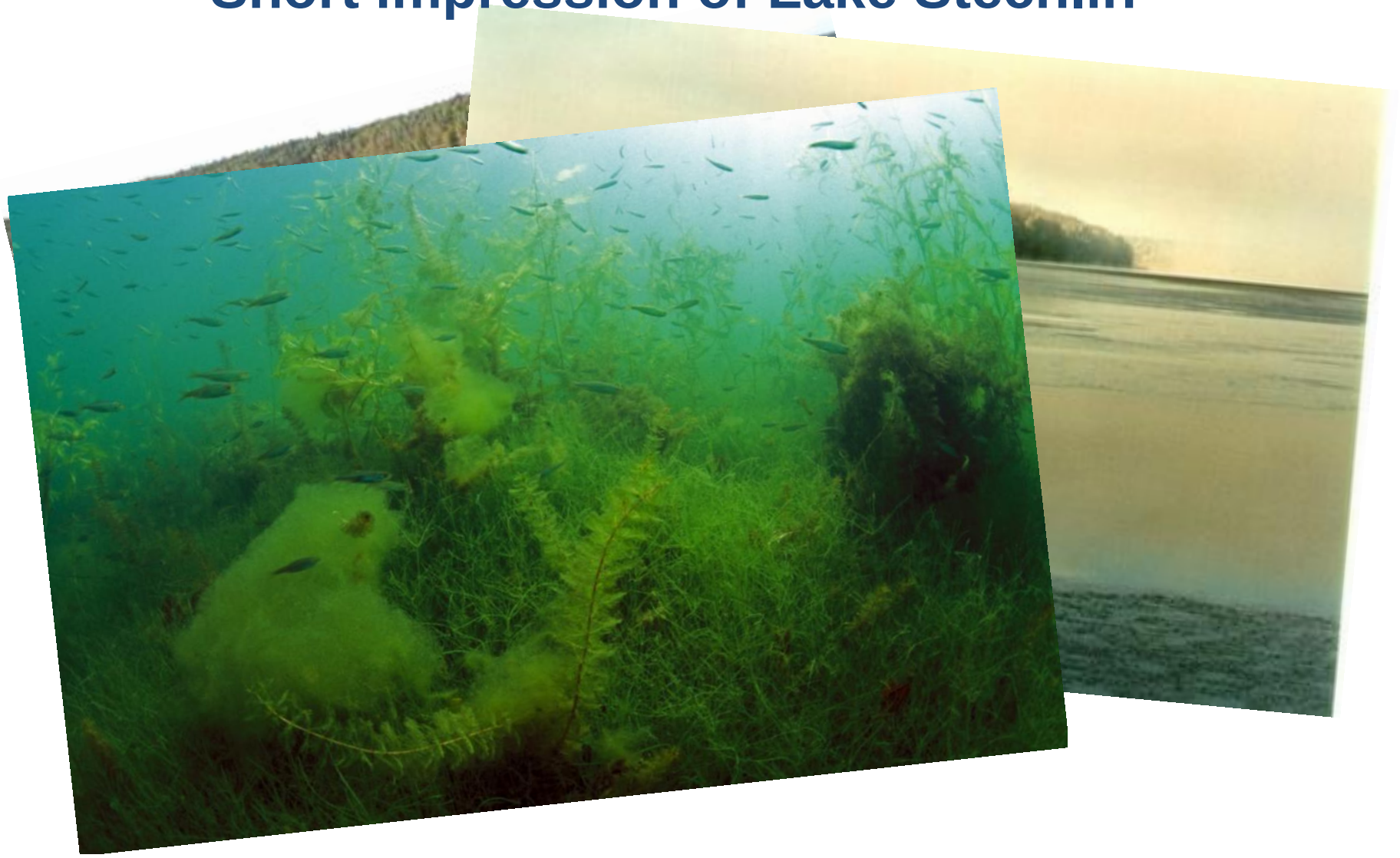

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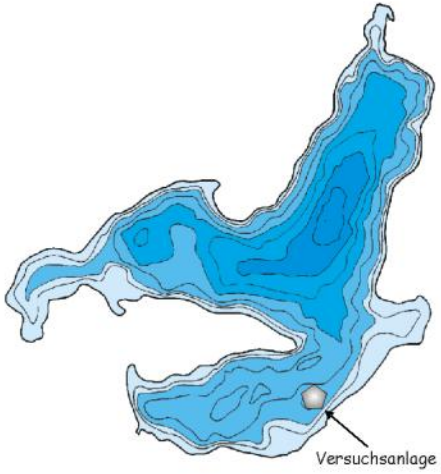
Short impression of Lake Stechlin



Area:
2,233 m²

Volume:
44,660 m³

Profiler and Instruments

Profiler

Li-Cor
Light-Sonde

YSI-
Multiparameter-
Sonde

Moldaenke
Fluorescence
Instrument

Sediment
trap

Some impressions of the enclosure and their build-up


13.2.2012 12:40

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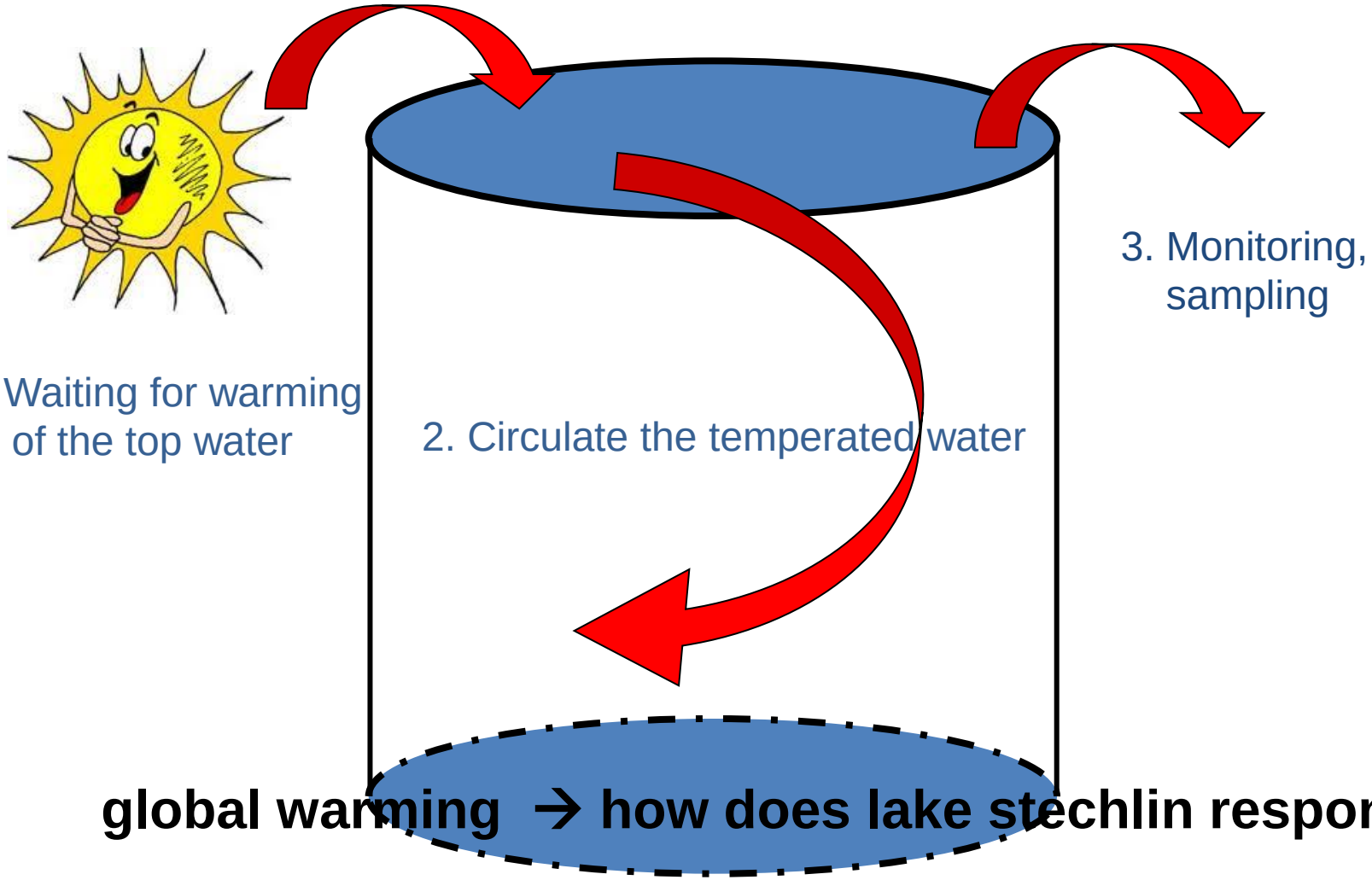
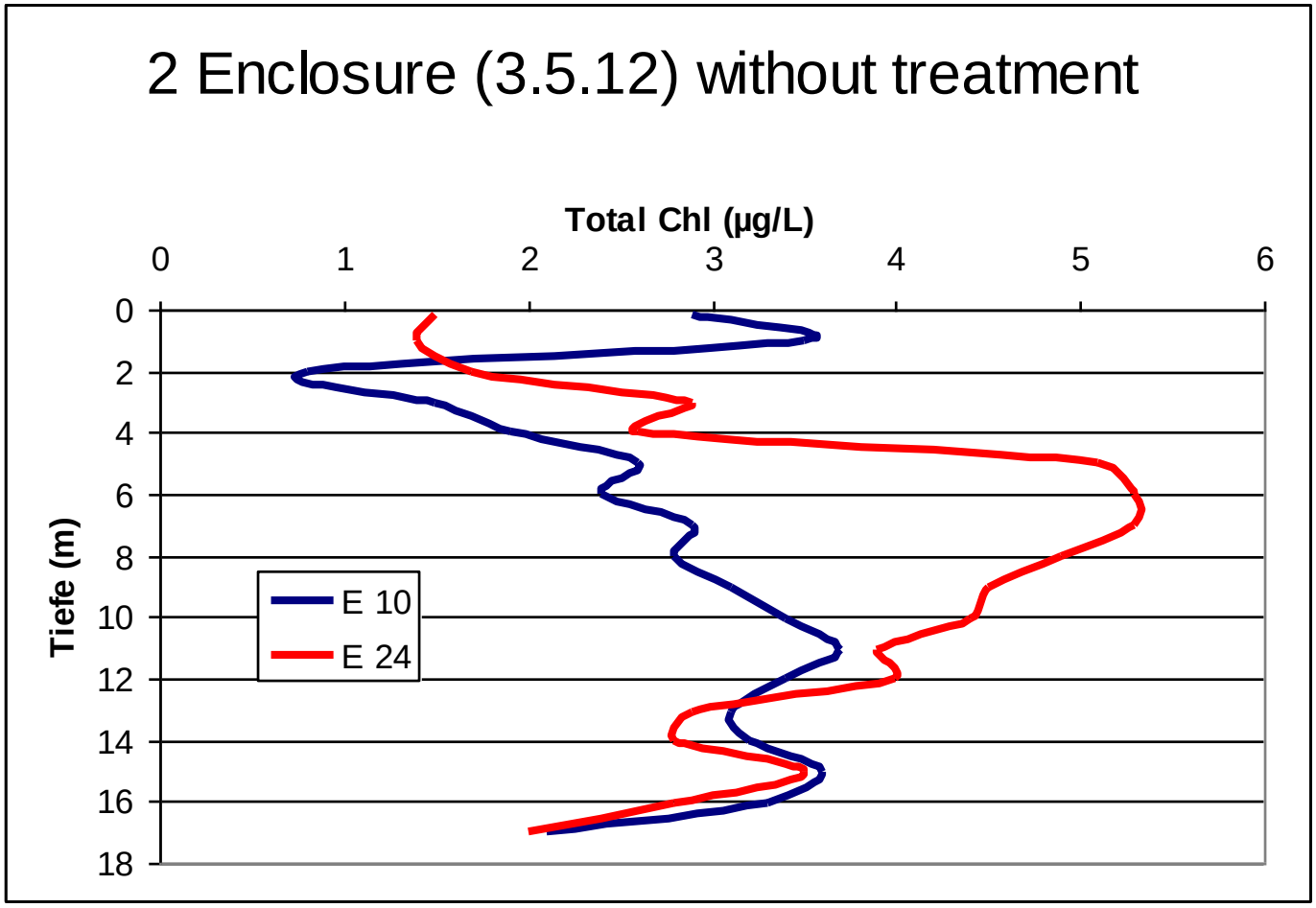
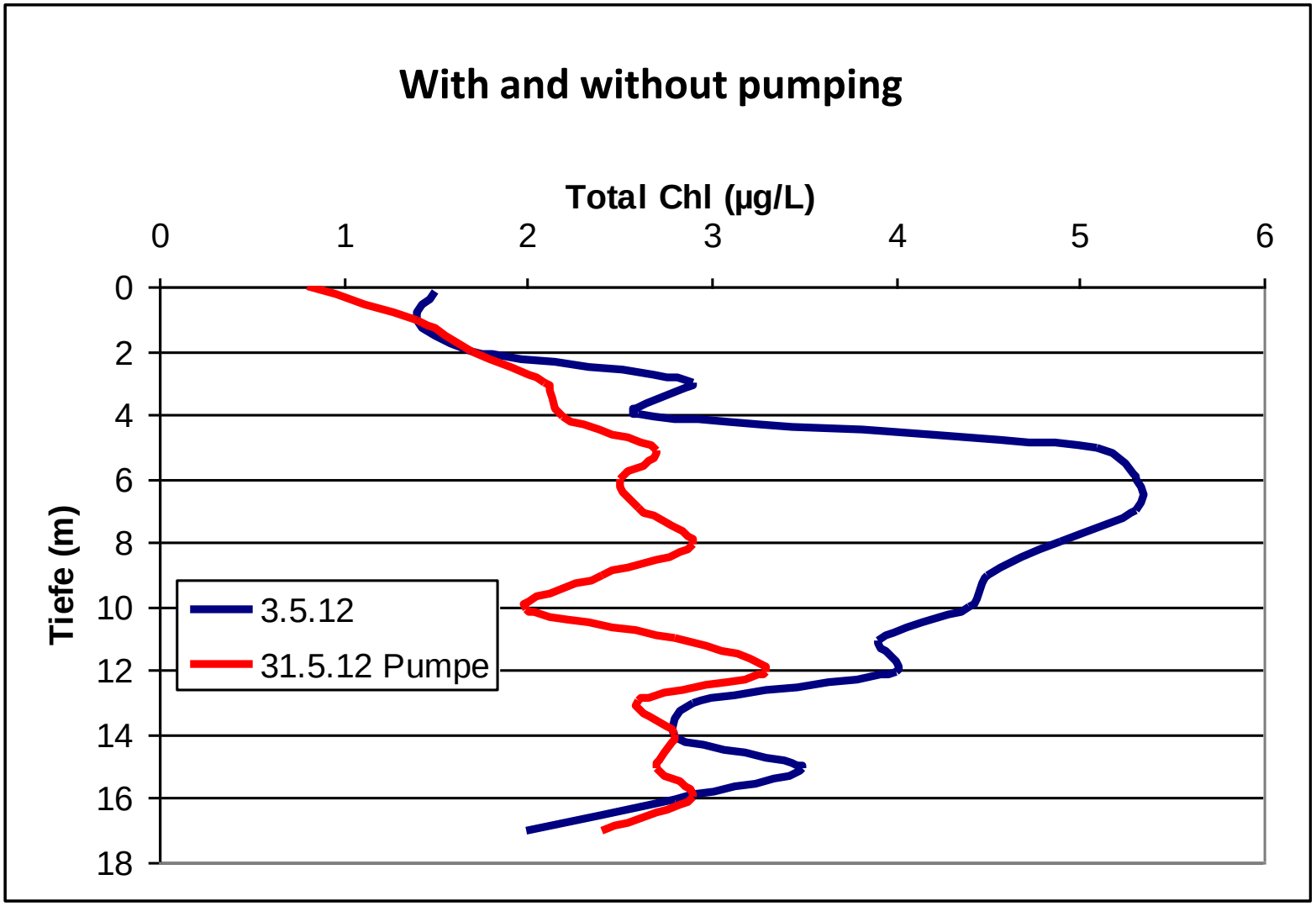
What we like to do ?



global warming → how does lake stechlin respond?


2 Enclosure (3.5.12) without treatment
Total Chl (µg/L)
0
1
2
3
4
5
6
Tiefe (m)
0
2
4
6
8
10
12
14
16
18
E 10
E 24


With and without pumping
Total Chl (µg/L)
0
1
2
3
4
5
6
Tiefe (m)
0
2
4
6
8
10
12
14
16
18
3.5.12
31.5.12 Pumpe

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A PhD project
based on experiments in large lake enclosures

The effect of climate change on carbon and nitrogen fixation in temperature-stratified lakes

Marieke Soeter
soeter@igb-berlin.de

Lakes in particular are sensitive to climate change and are expected to show significant changes in the future

turbulence

pH

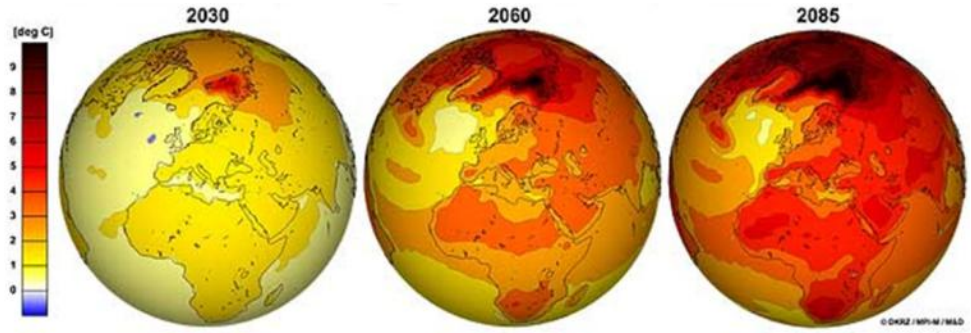
precipitation

nutrients

Lakes in particular are sensitive to climate change and are expected to show significant changes in the future

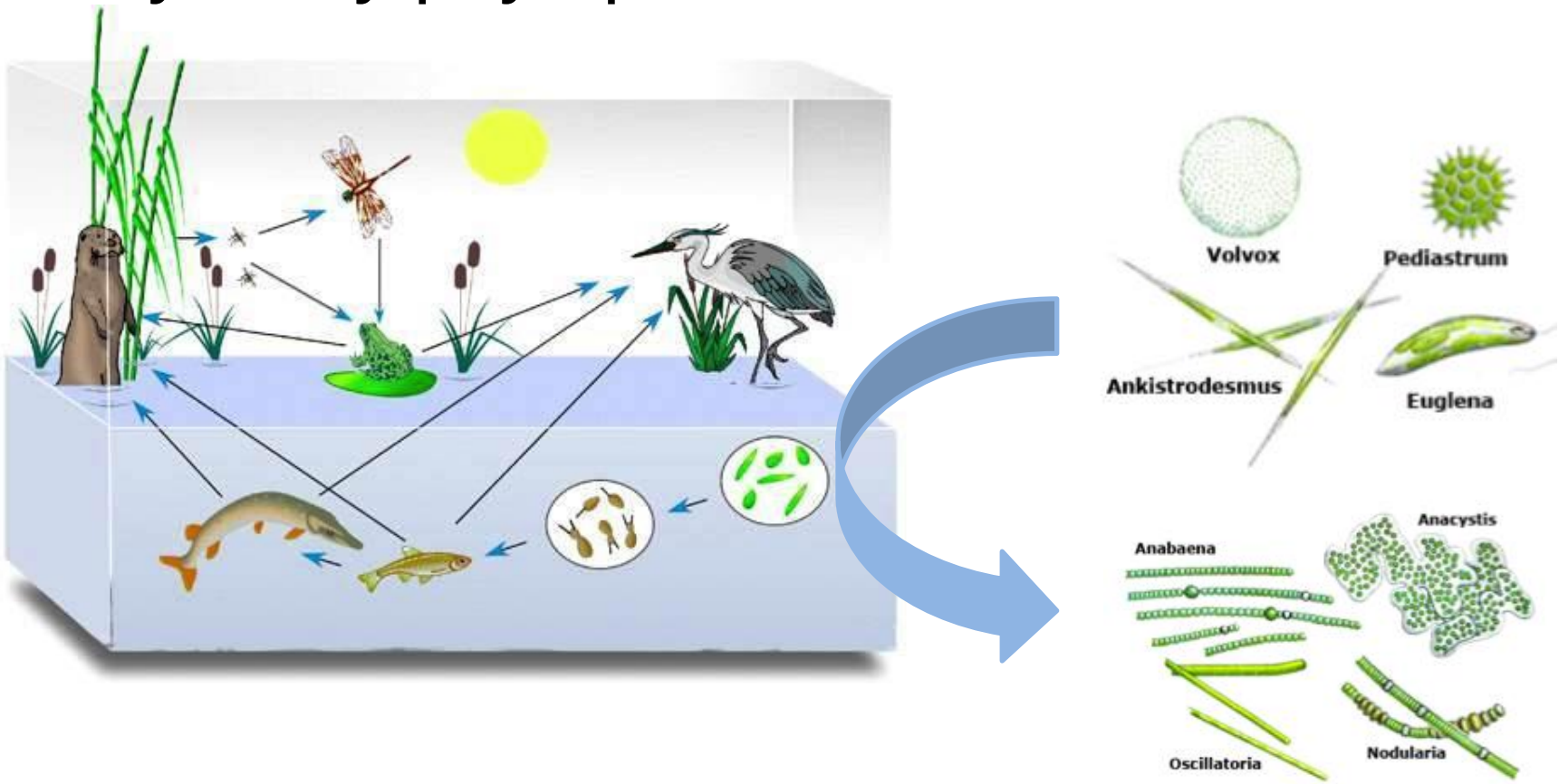
oxygen concentration

DOC



IPCC Scenario A1B

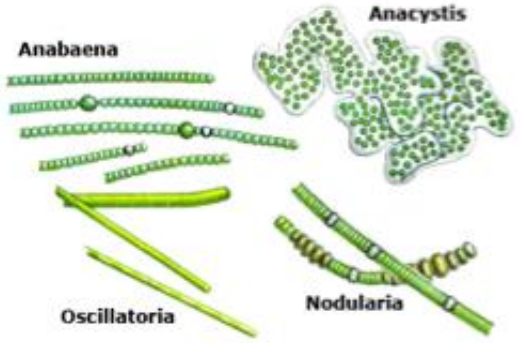
Why study phytoplankton & carbon fixation?



Why study nitrogen fixation?

Growth possible under nitrogen limited conditions (Low N:P ratio)

- Cyanobacteria
- Green sulphur bacteria
- Azotobacteraceae
- Rhizobia
- Frankia
- Methanotrophs



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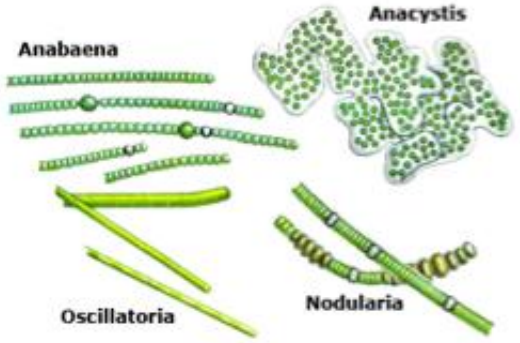

Eutrophication?
Water quality?

Why study nitrogen fixation?

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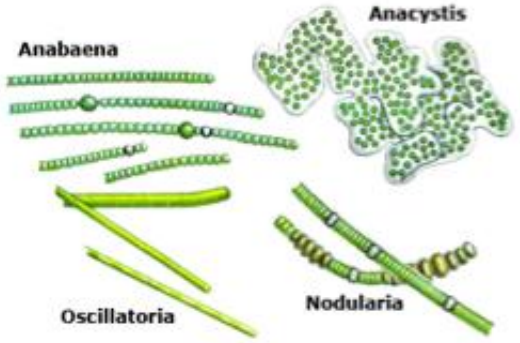


Eutrophication?
Water quality?

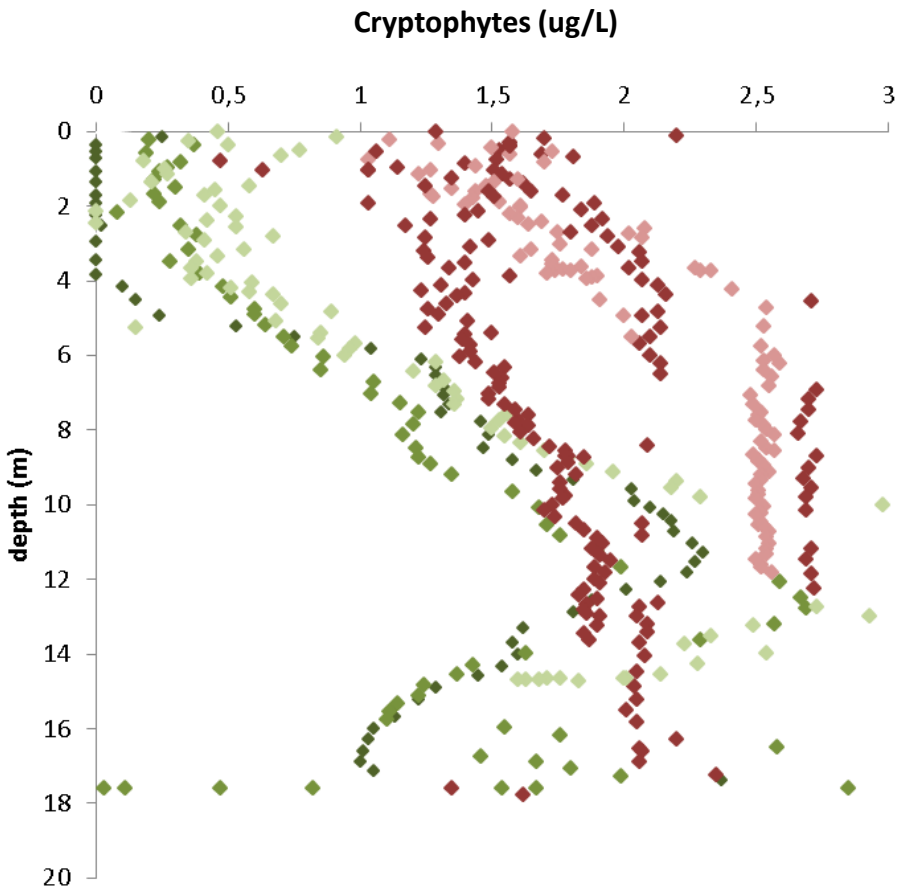
Method: different climate scenarios in the mesocosms (this year summer storm and ice cover). Finally 24 mesocosms, 4 lake sampling sites.

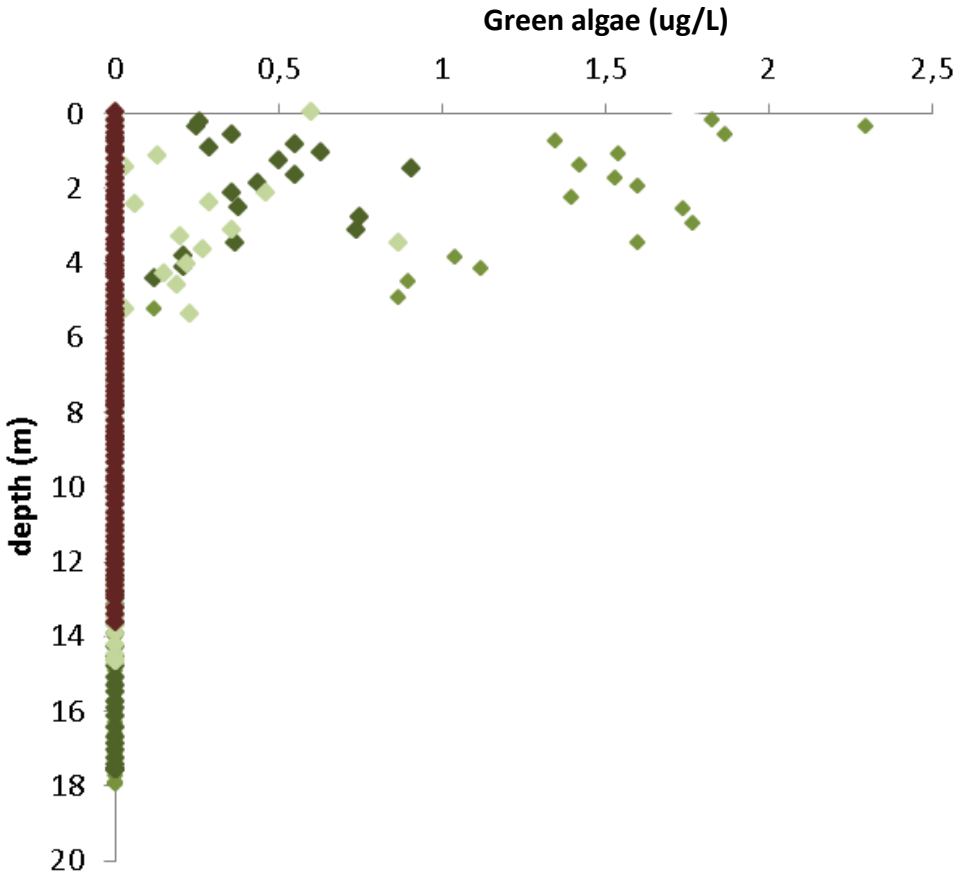
Method:

- 14C of CO_2 incorporation (biomass)
- *14C of CO_2 incorporation (specific pigments)*
- Distribution (FluoroProbe)
- Oxygen evolution and budgets (O2 conc 1.5h)

- 15N2 incorporation (biomass)
- nifH-expression patterns and diversity

Priliminary results: mixing affects chryptophytes distribution & decreases green algal biomass





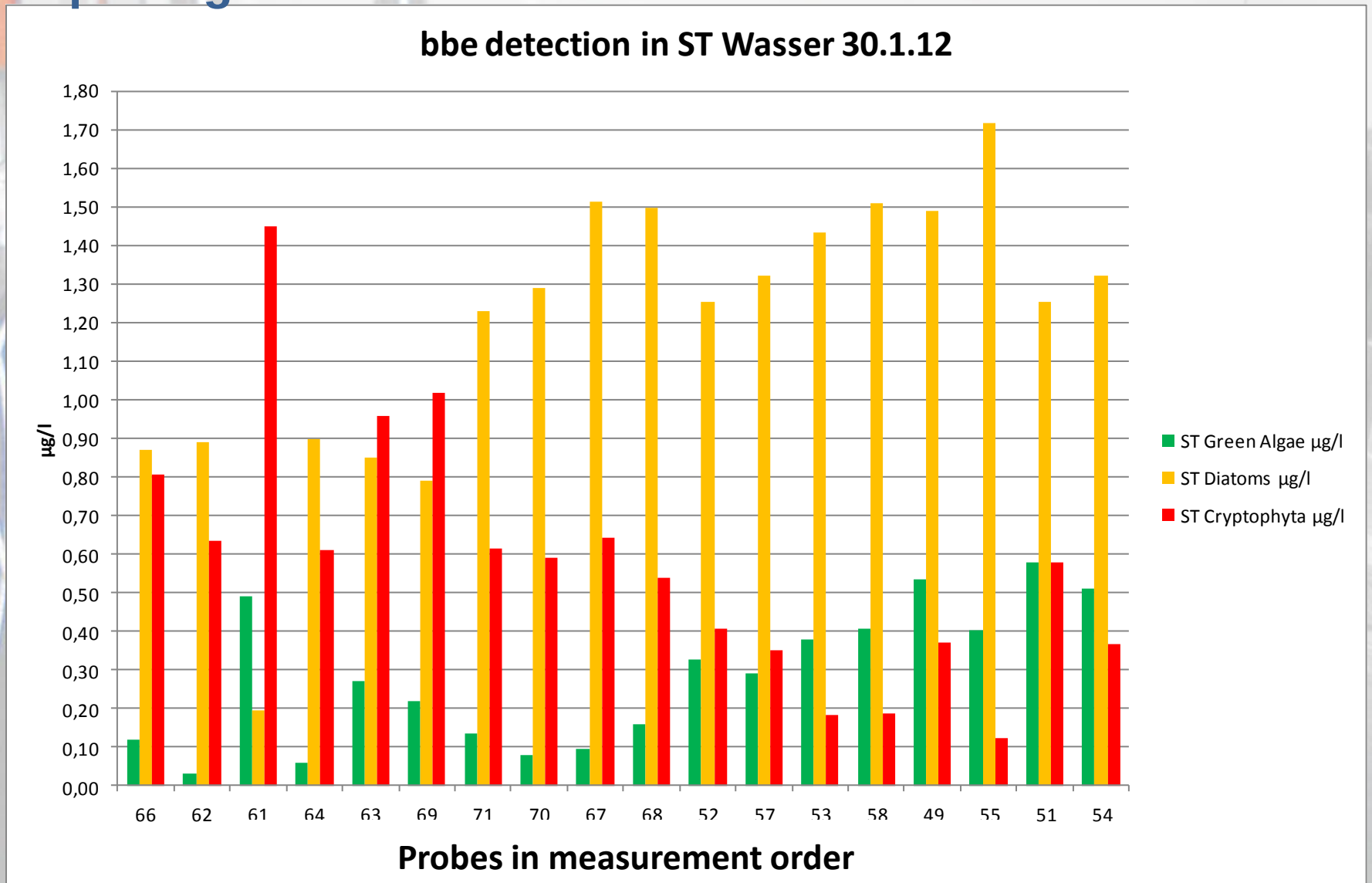
Working with 28 FluoroProbes…

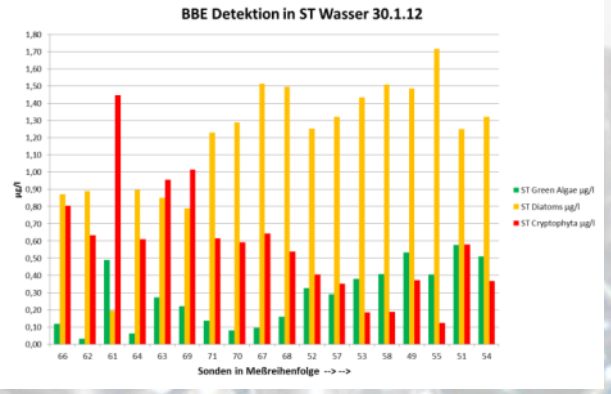
If you order 28 FluoroProbes → nothing happens

But once delivered, you need to invest a lot of time:

- to check for proper operation
- to compare the probes
- be surprised about the results
- to calibrate the Yellow Substances (YS)
- have a lot of calls to Kiel
- prepare sampling water
- carry the probes from A to B and back
- provide Christian Moldaenke with coffee

Surprising results of the first use





Try to solve the problems

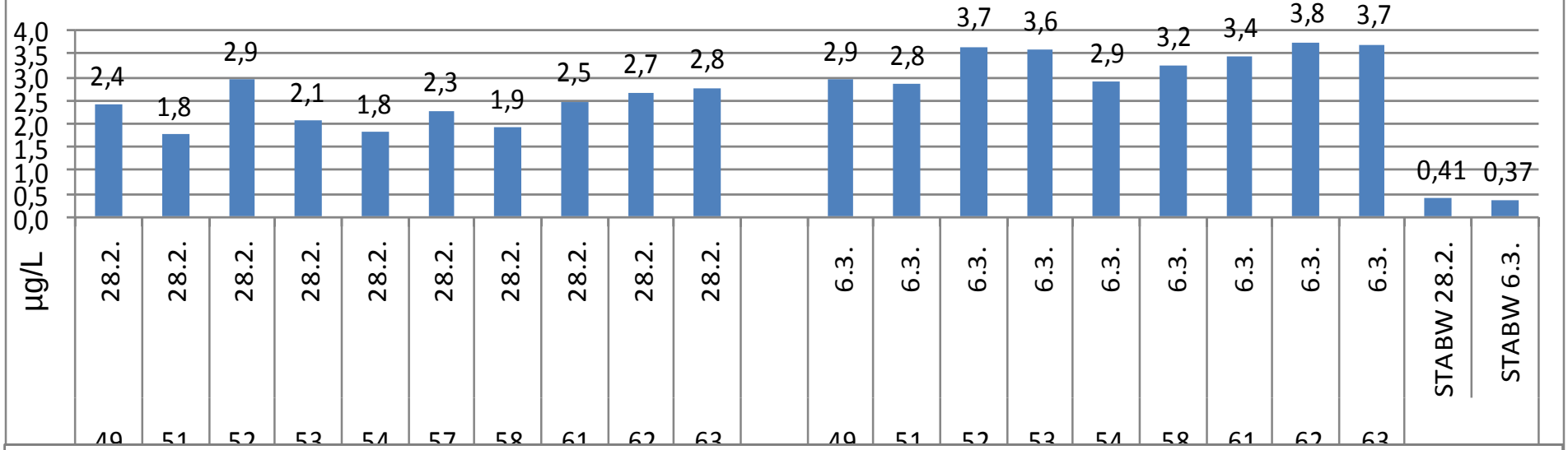
→ **Optimise probe handling**
- pay attention to ai rbubbles
- keep light constant
- move the probe

→ **recalibrate YS**

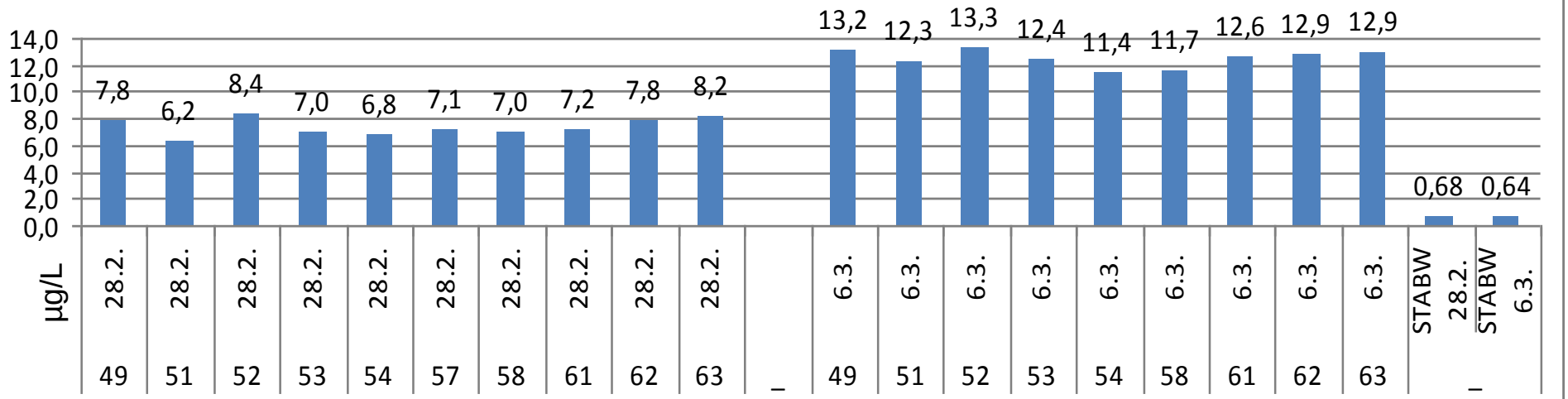
→ **change water in the cylinder after 5 measurements**
- avoid temperatur changes
- be aware of changes in algal physiology (induction kinetics)

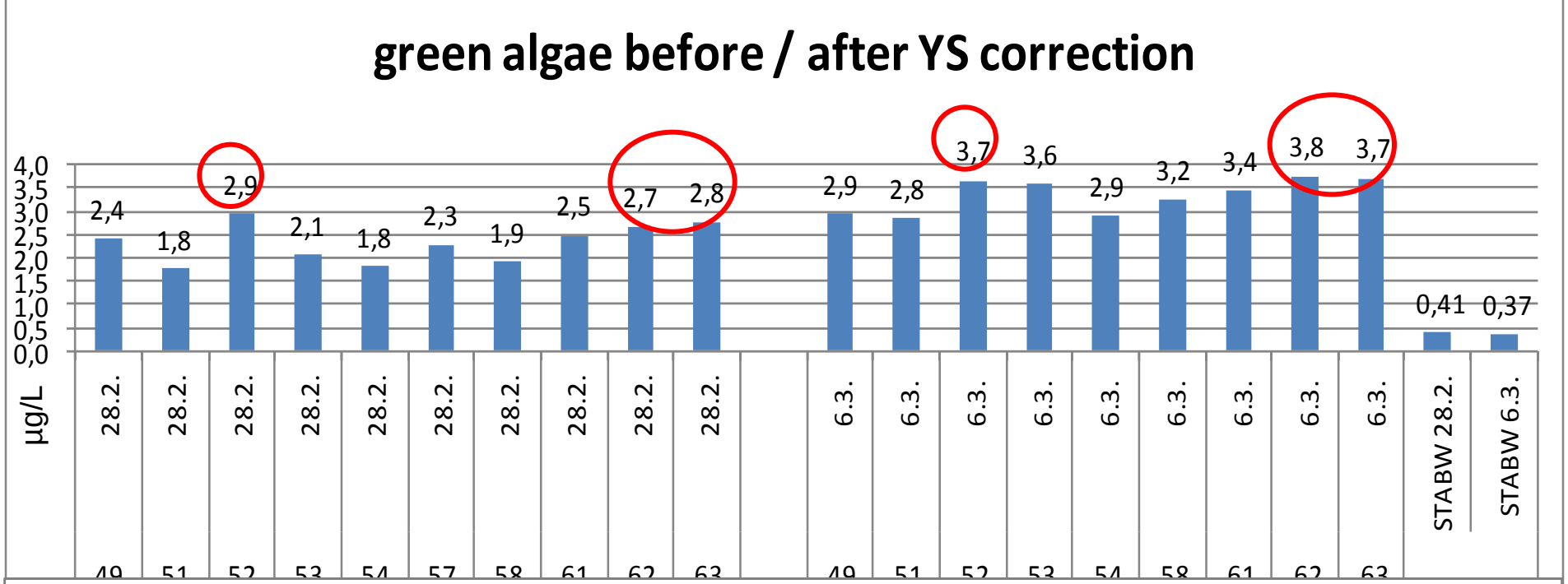
→ **It is January - detection limit**

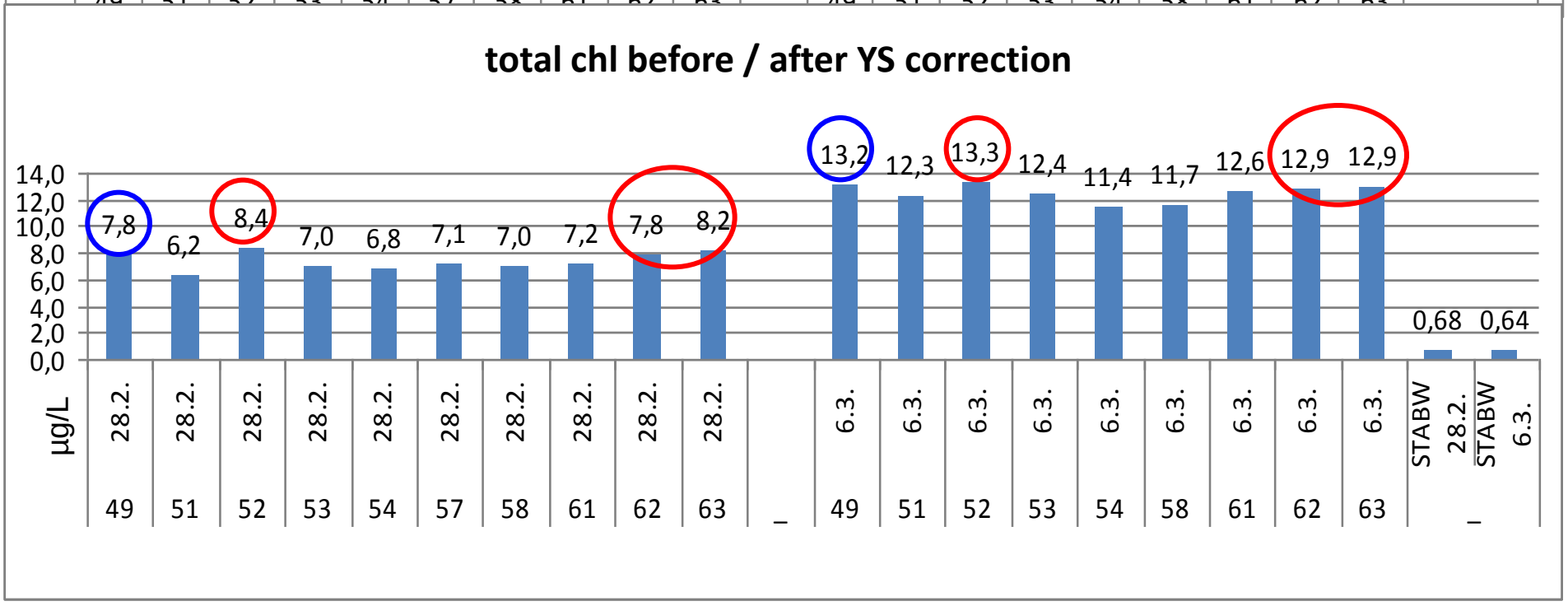
green algae before / after YS correction



total chl before / after YS correction




green algae before / after YS correction
µg/L
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
2,4
1,8
2,9
2,1
1,8
2,3
1,9
2,5
2,7
2,8
2,9
2,8
3,7
3,6
2,9
3,2
3,4
3,8
3,7
0,41
0,37
28.2. 49
28.2. 51
28.2. 52
28.2. 53
28.2. 54
28.2. 57
28.2. 58
28.2. 61
28.2. 62
28.2. 63
6.3. 49
6.3. 51
6.3. 52
6.3. 53
6.3. 54
6.3. 58
6.3. 61
6.3. 62
6.3. 63
STABW 28.2.
STABW 6.3.


total chl before / after YS correction
µg/L
14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
7,8
6,2
8,4
7,0
6,8
7,1
7,0
7,2
7,8
8,2
13,2
12,3
13,3
12,4
11,4
11,7
12,6
12,9
12,9
0,68
0,64
28.2. 49
28.2. 51
28.2. 52
28.2. 53
28.2. 54
28.2. 57
28.2. 58
28.2. 61
28.2. 62
28.2. 63
6.3. 49
6.3. 51
6.3. 52
6.3. 53
6.3. 54
6.3. 58
6.3. 61
6.3. 62
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STABW 28.2.
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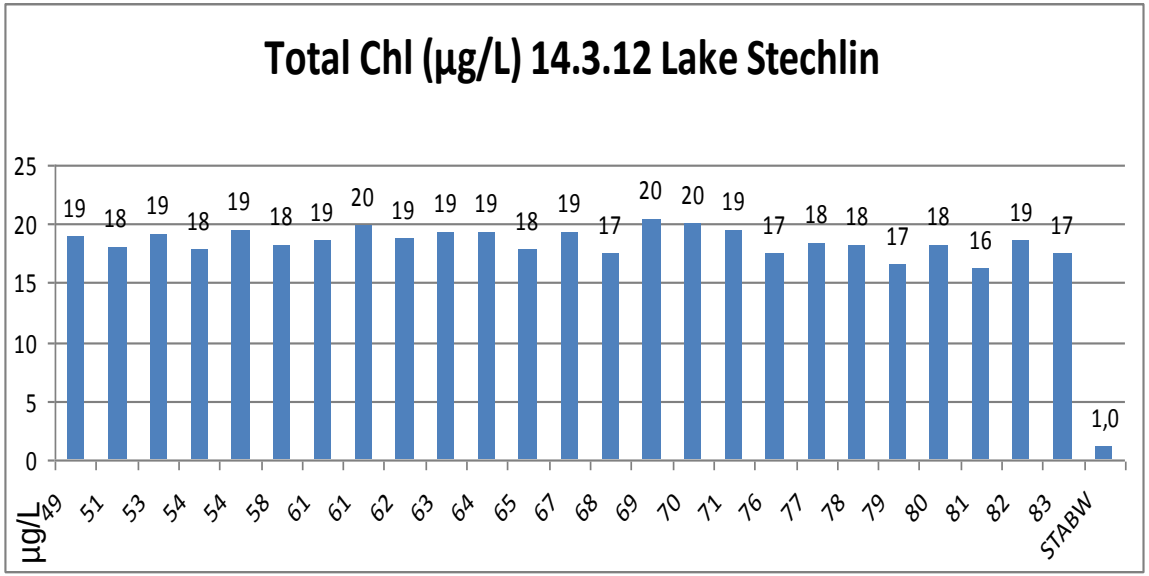
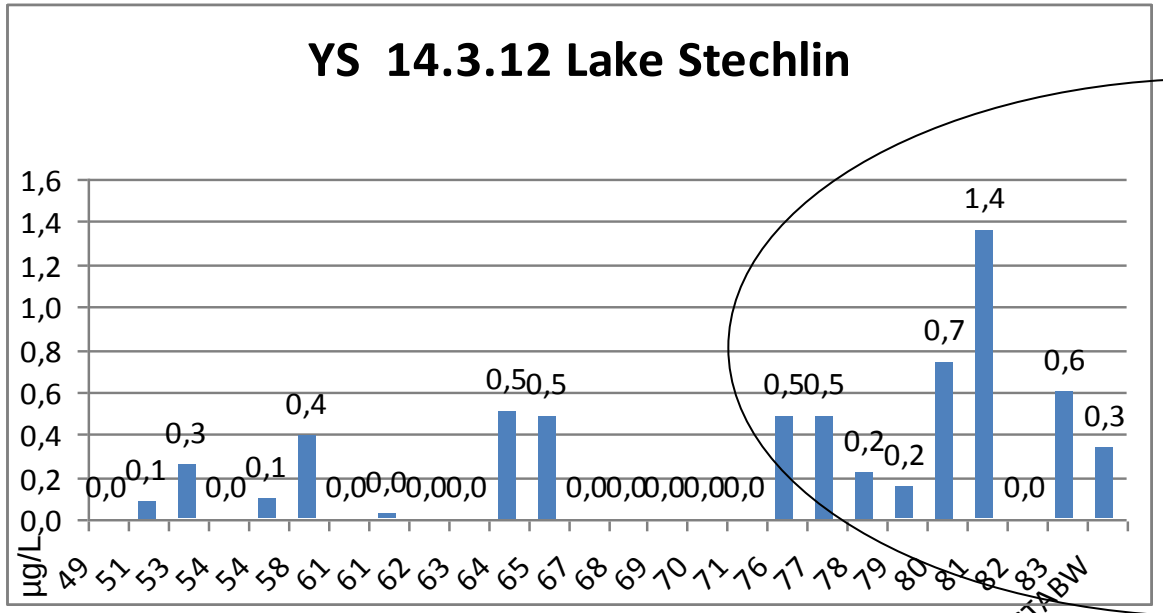


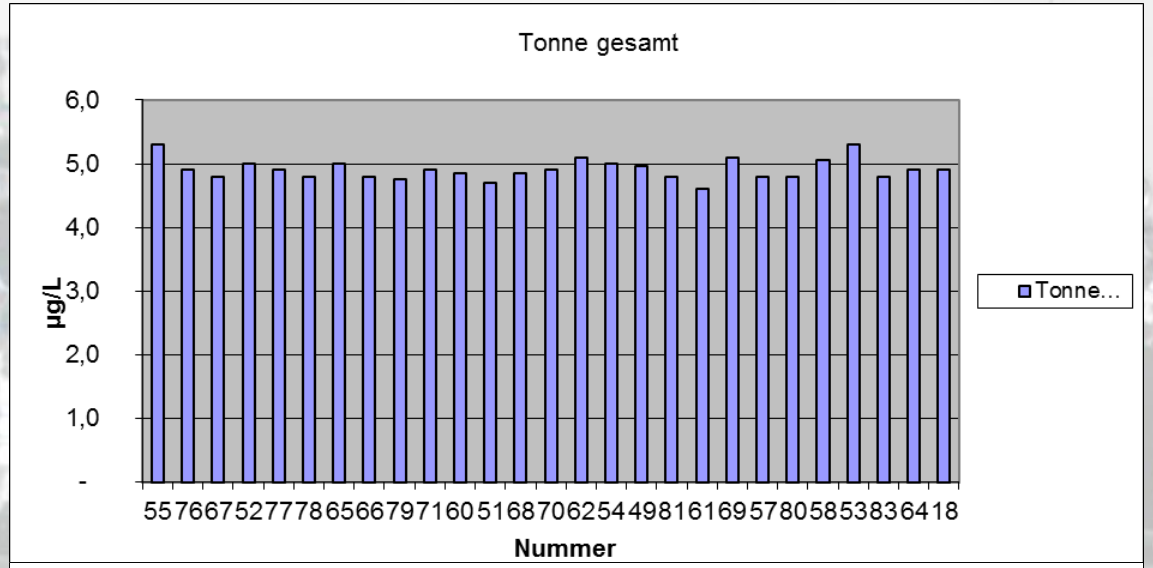


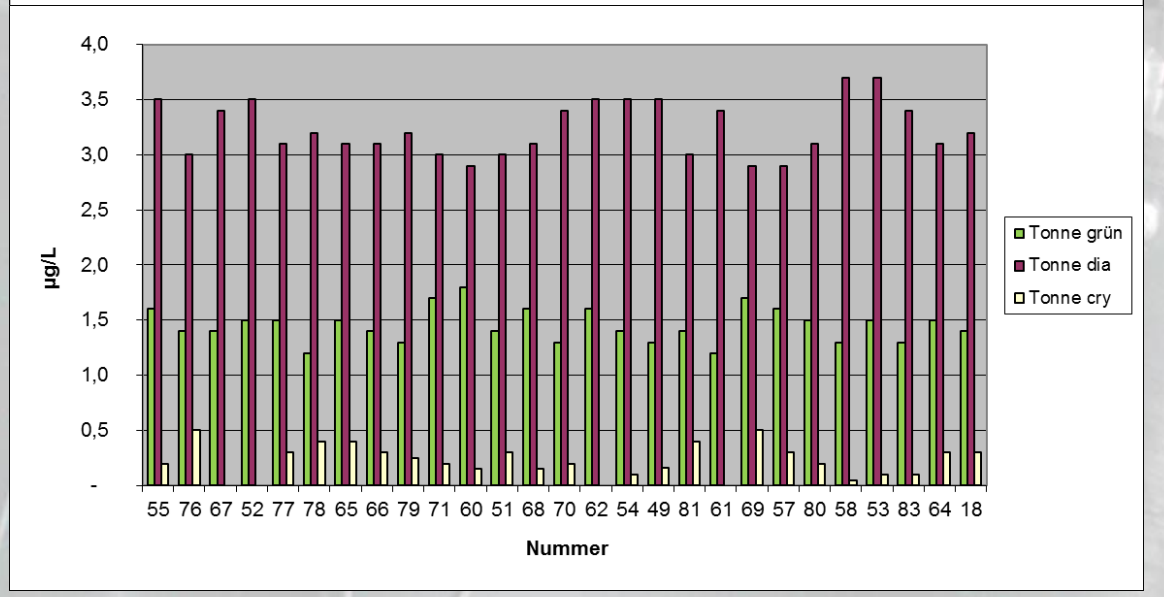
…next step
→ directly in lake

Variation between probes decreases

lake water is moving

Finally we solved the Problem!





Finally solutions to work with 28 FluoroProbes without trouble

→ avoid air bubbles and check the values after measurement

→ recalibrate the fingerprints

→ lake water at the same point is not the same some minutes later

→ know the algae in your lake

→ make sure you put some milk in Christian's coffee

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