



NEW SENSORS TESTED AT HZG

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COMMERCIALLY AVAILABLE NUTRIENT ANALYSER (SYSTECA)



μMAC-1000



Micromac C



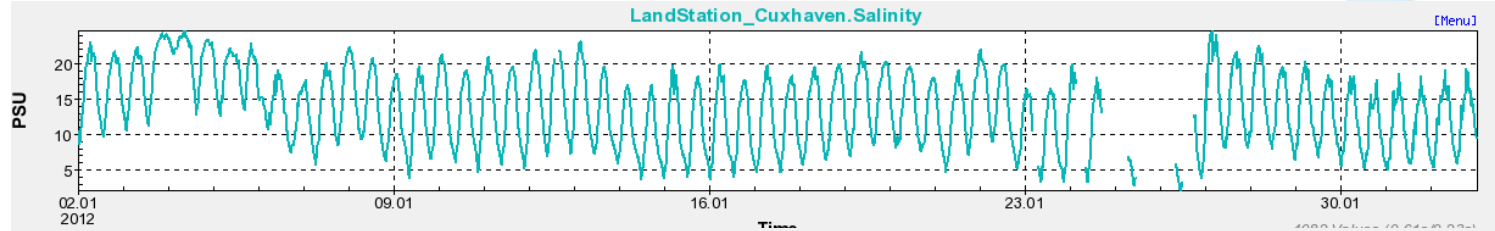
WIZ probe



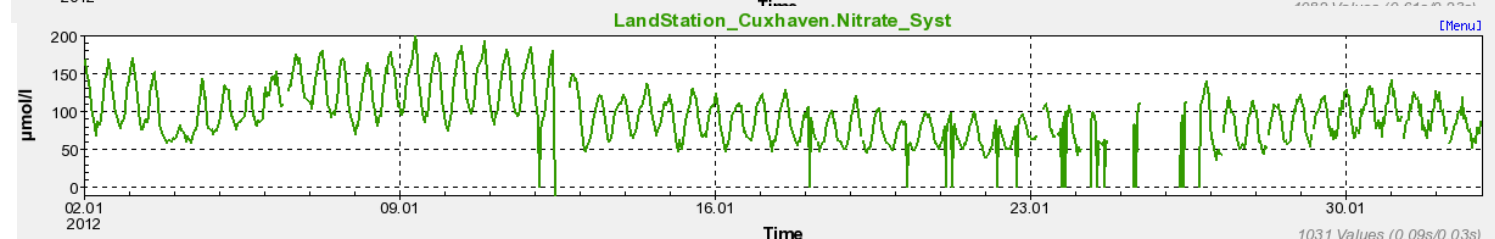
RECENT DATA STATION (STATIONARY FB) CUXHAVEN JANUARY 2012



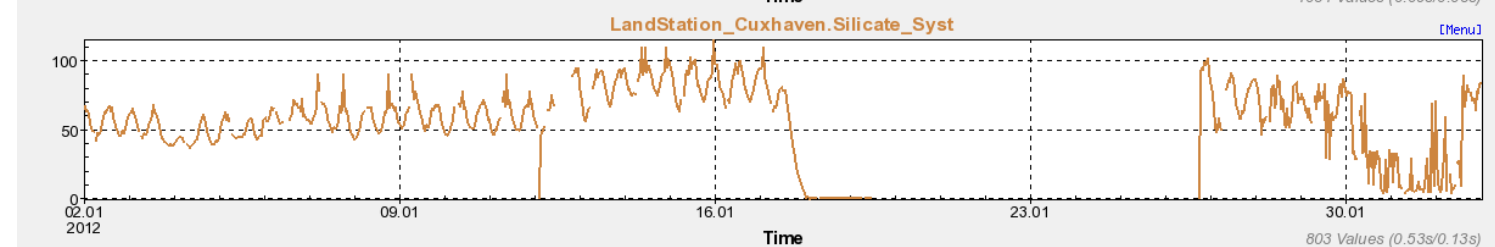
Sal



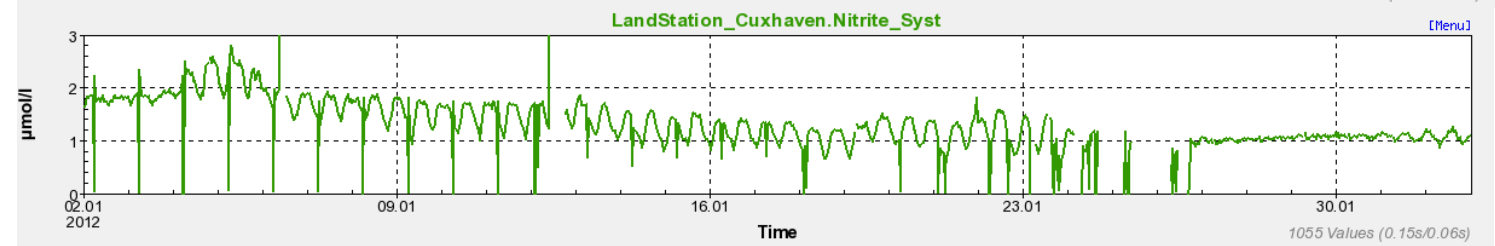
NO3



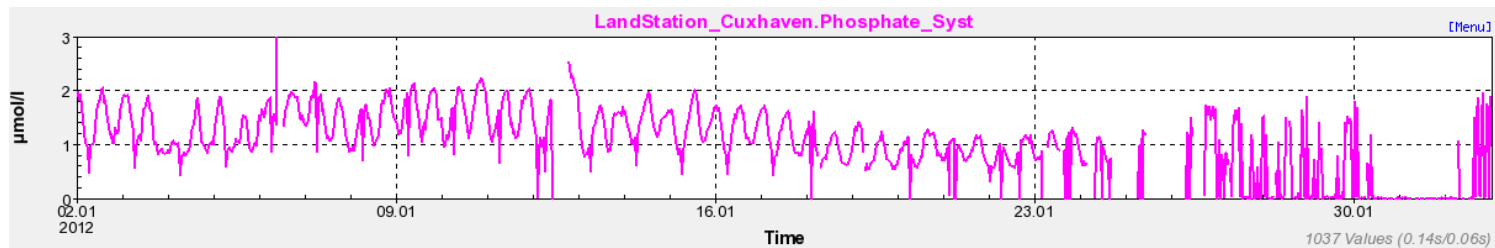
Si



NO2



PO4



NEW TECHNOLOGIES

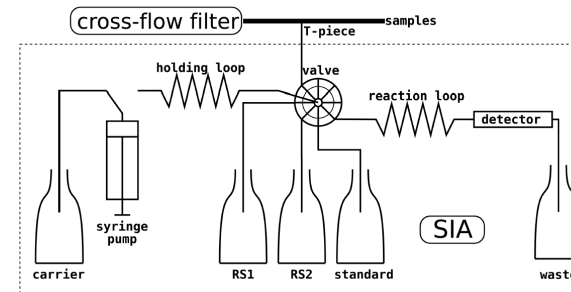


SIA Nutrient Analyser

SIA Nutrient Analyser (HZG)

new sensor (under development) for high reliable underway nutrient analysis.

- Currently test for PO₄ and NH₃
- further development for NO_x

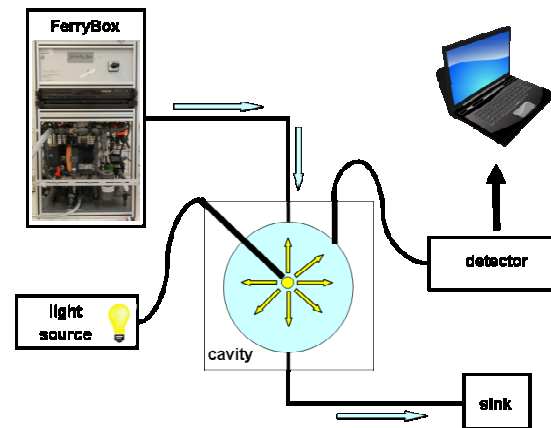


High precision pH sensor

- new sensor (under development) for automatic more precise pH + alkalinity measurements for quantifying carbon budget (presentation Aßmann at FB workshop)

PSICam

- point-source integrating-cavity absorption meter for better quantification of chlorophyll-a and detection of algal species (poster Wollschläger at FB workshop)



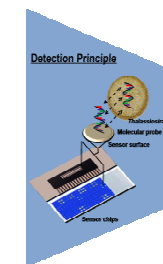
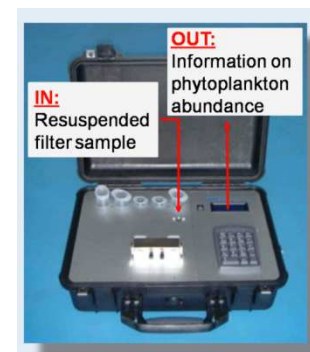
PSICam

p-CO₂ Sensors (installations in 2011)

Test of different membrane based systems (ProOceanic, Contros) with FerryBox systems

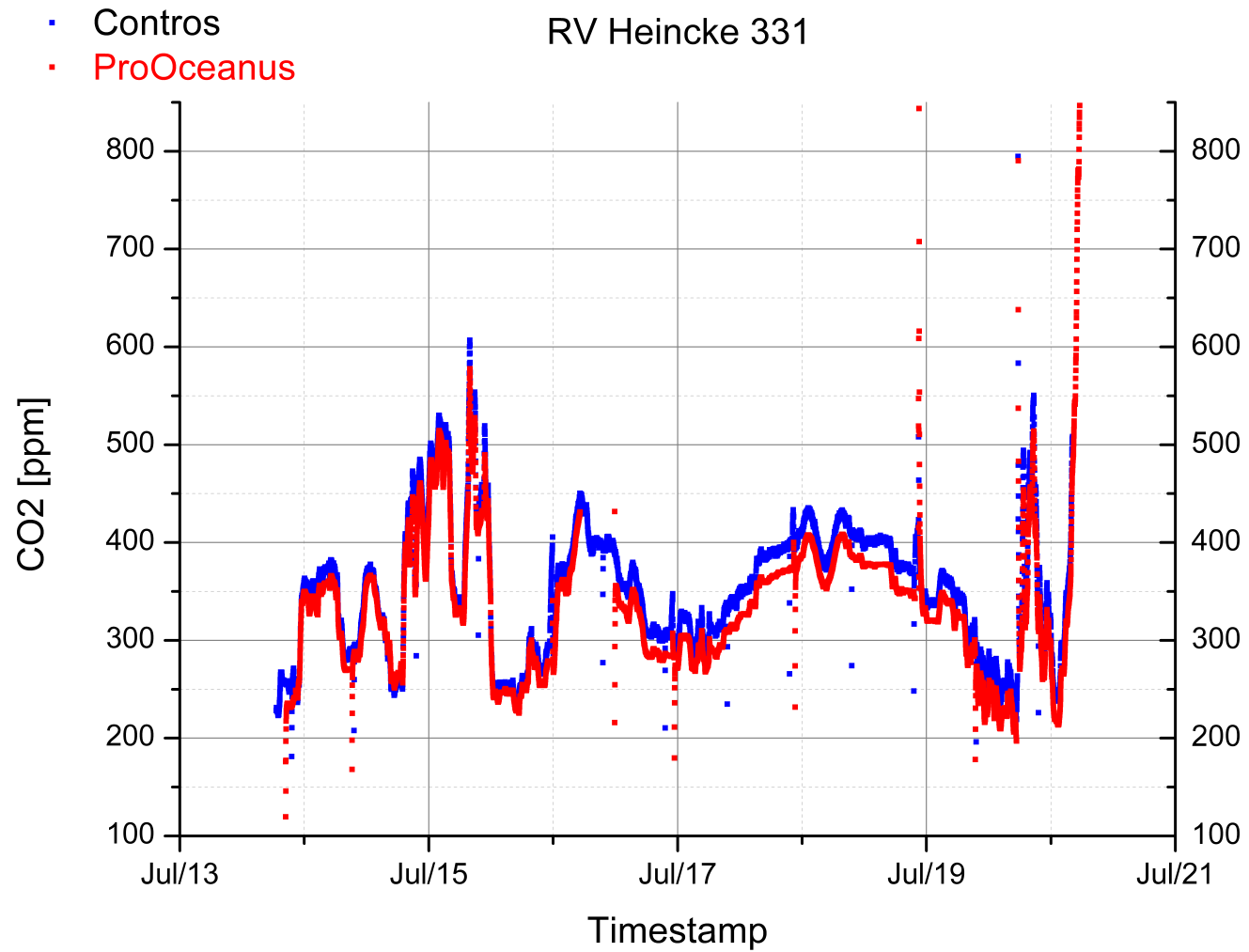
Nucleic Acid Biosensor (AWI & HZG)

Algae taxa and algal groups

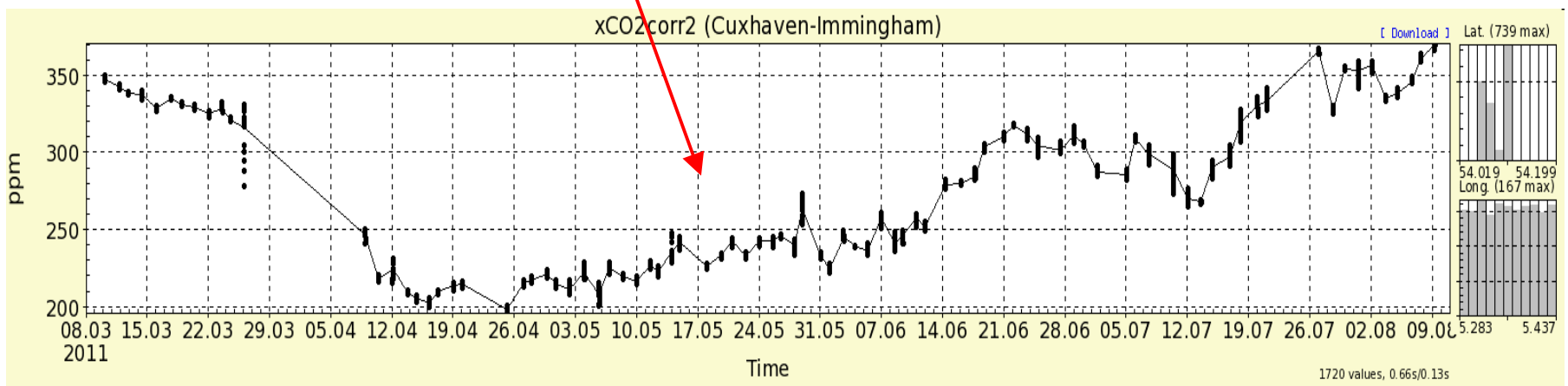
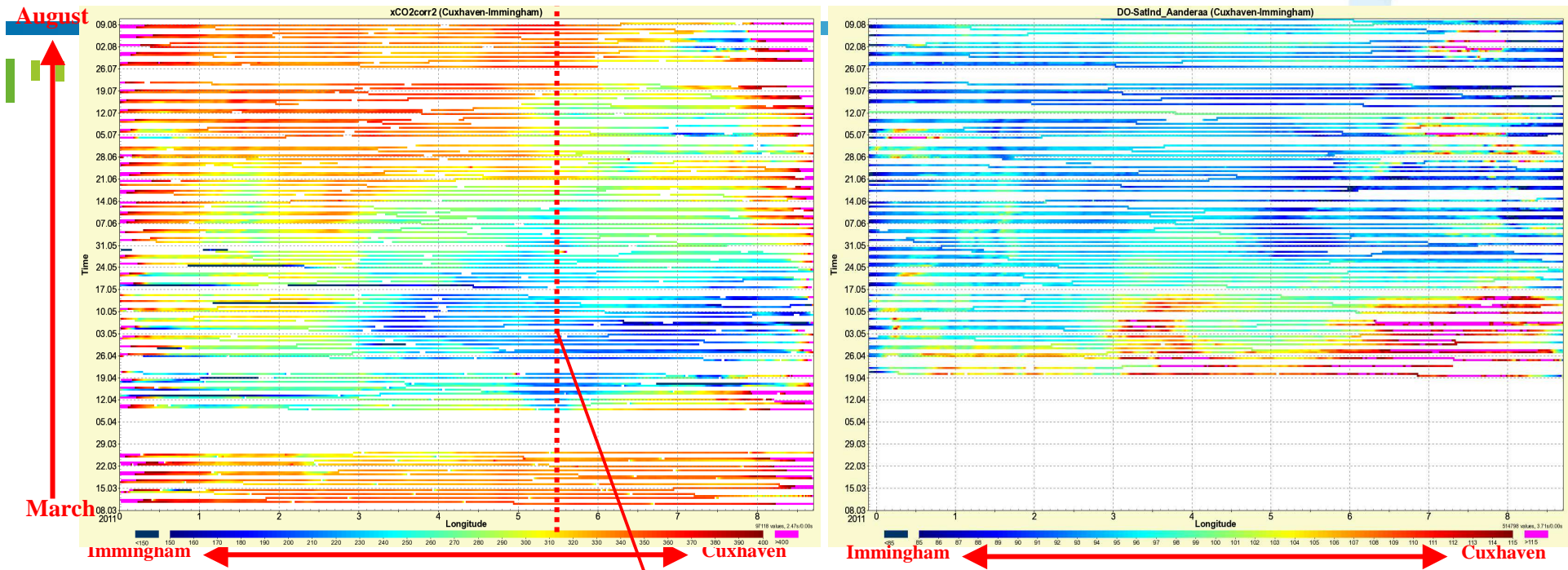


Biosensor

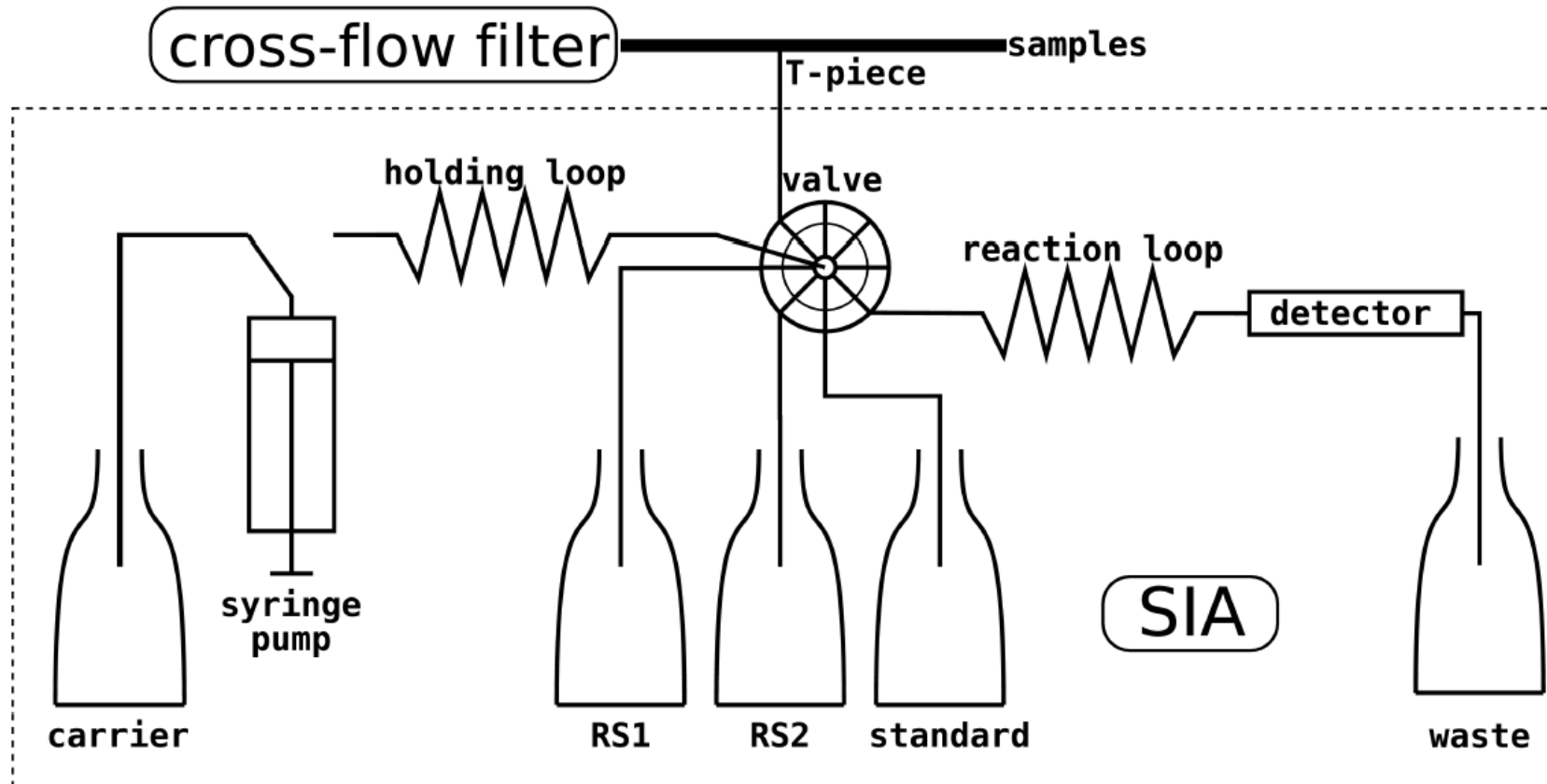
COMPARISON PRO-OCEANUS VS. CONTROS PCO2 SENSOR



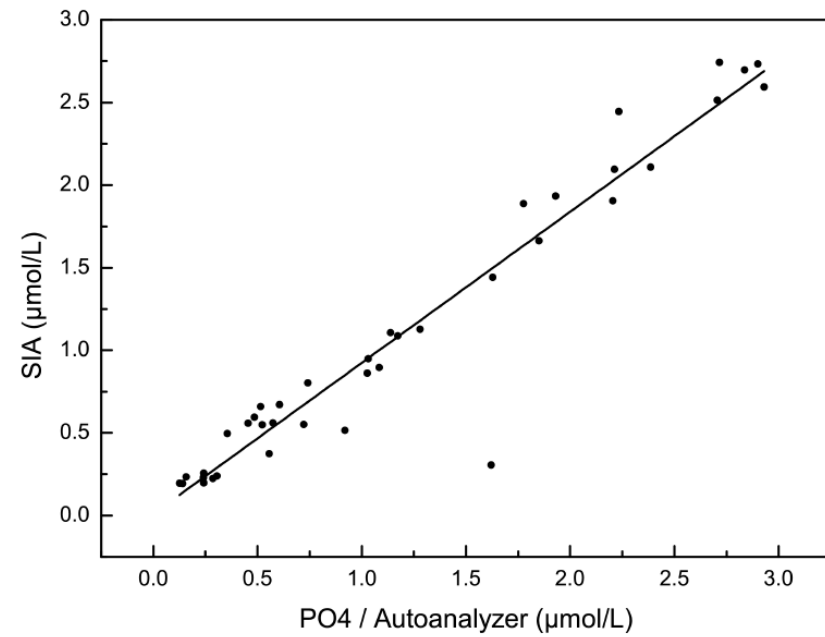
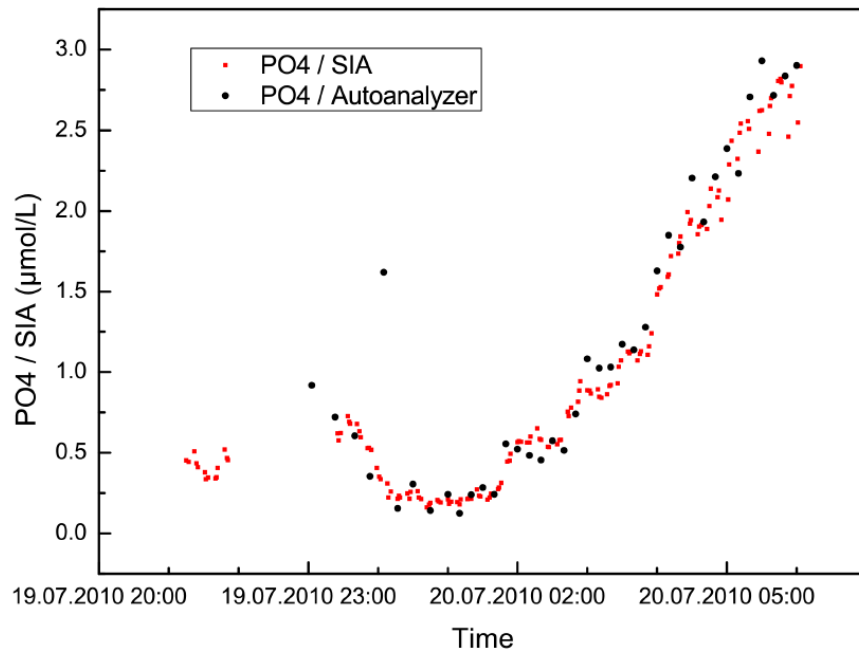
DEVELOPMENT OF PCO2 IN SUMMER 2011 ON THE ROUTE IMMINGHAM - CUXHAVEN



NEW NUTRIENT ANALYSER BY SEQUENTIAL INJECTION ANALYSIS (SIA) DEVELOPMENT AT HZG



TEST SIA ANALYSER FOR PO4 IN GERMAN BIGHT (RV HEINCKE)



SPECTROMETRIC pH SYSTEM & ALKALINITY

PHD STEFAN ABMANN

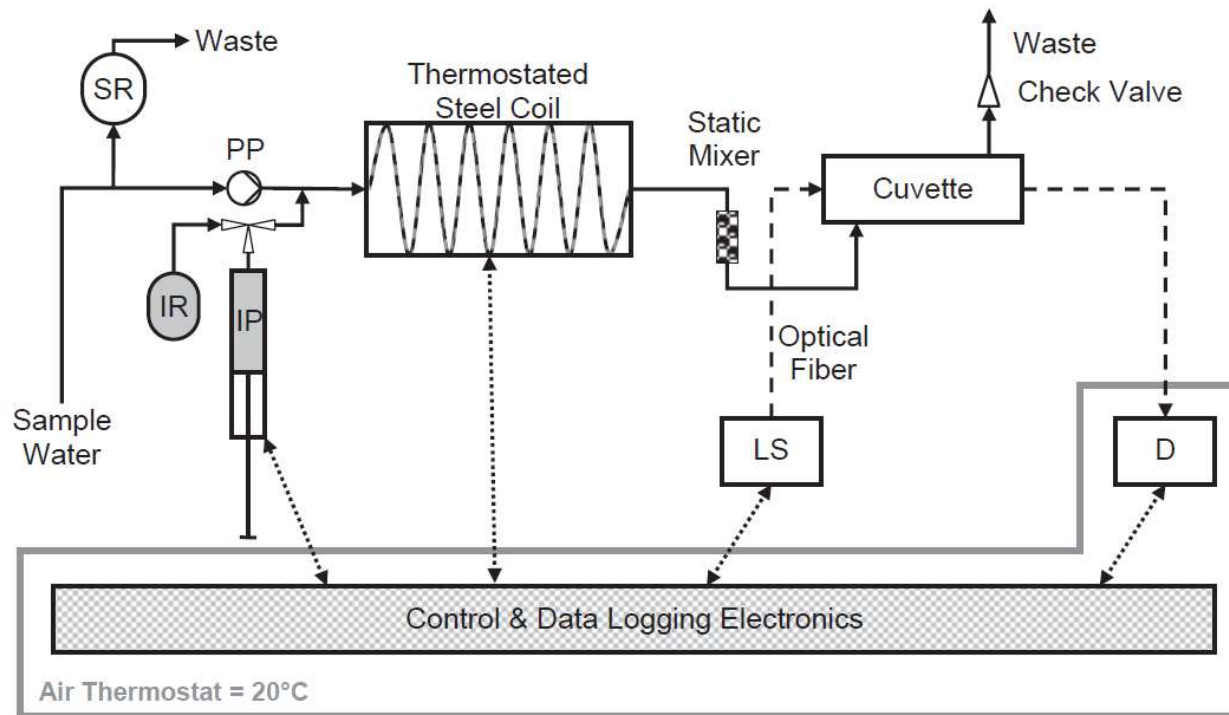


Figure 1: Overview of the spectrophotometric pH system. SR: Sample Reservoir, IR: Indicator Reservoir, PP: Peristaltic Pump, IP: Indicator Pump, LS: Light Source, D: Detector. The steel coil is embedded in an aluminum body providing a temperature regulation of the continuous flow in the cuvette to $25\text{ °C} \pm 0.006\text{ °C}$ (1σ). The cuvette is isolated with polystyrene for protection from environmental temperature fluctuations.

LABORATORY TEST

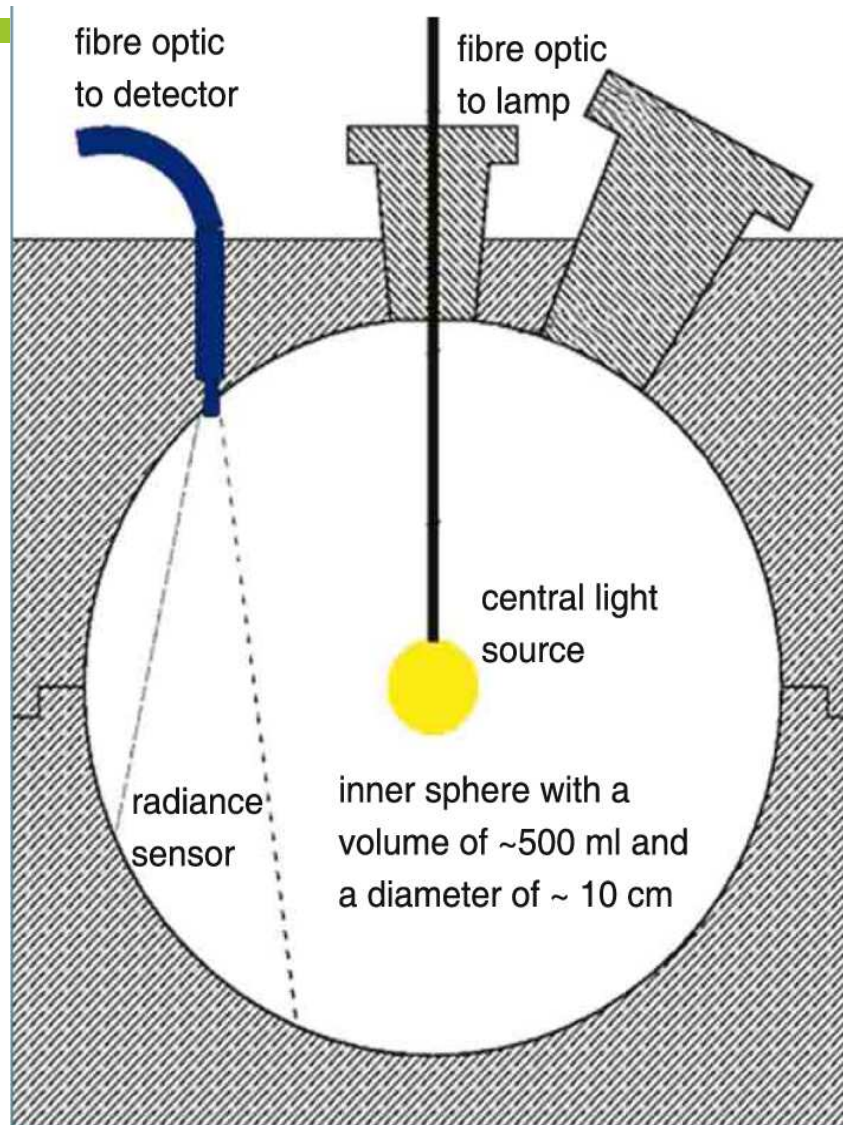
P_H AND ALKALINITY (A_T)



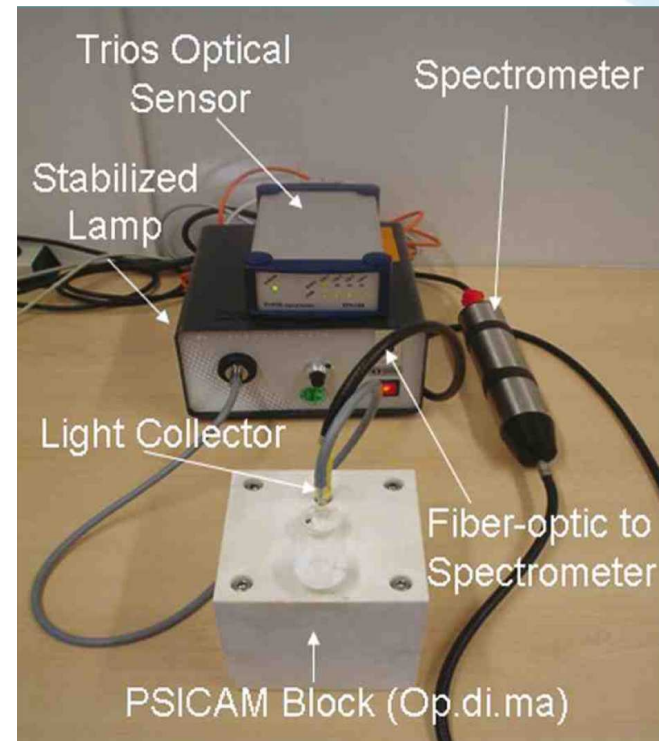
	pH	A _T
Accuracy	± 0.003 (with CRM)	± 0.5 μmol/kg
Precision	± 0.0007	± 10 μmol/kg
Meas. cycle	1 min	5 min
Annotation	No drift in the field	

POINT-SOURCE INTEGRATING-CAVITY ABSORPTION METER (PSICAM)

WORKING PRINCIPLES (LAB VERSION)



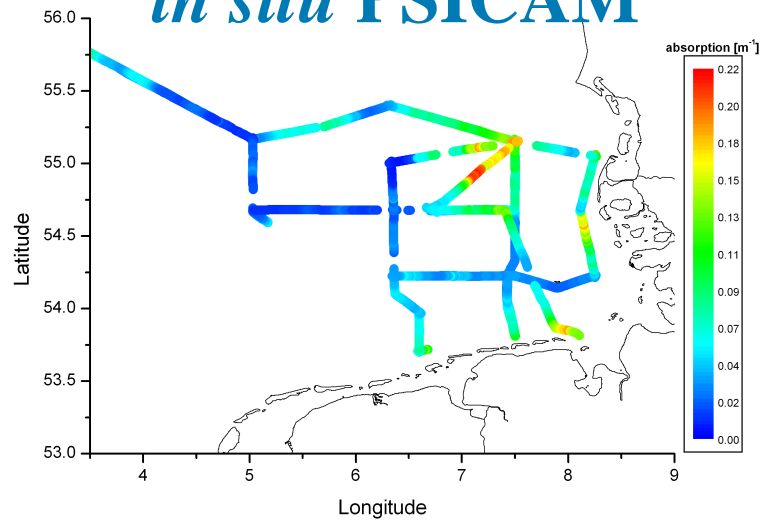
Röttgers et al., 2005



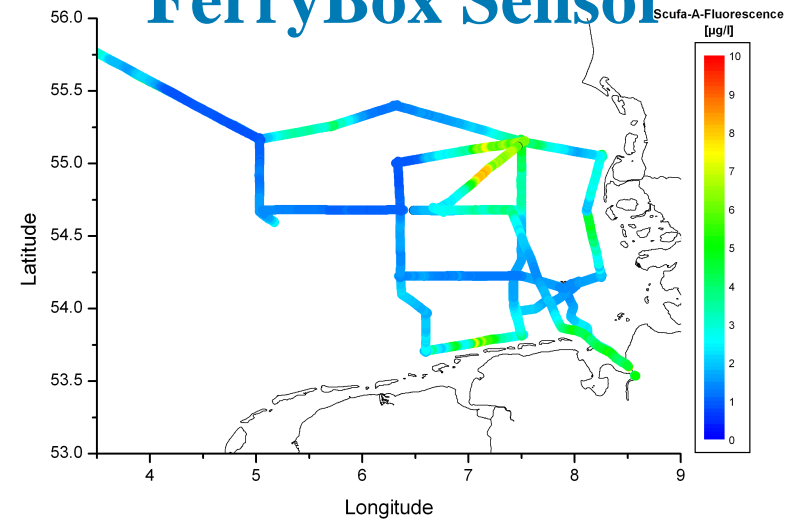
Aim:
Measuring pure absorption without errors caused by particle scattering
Inner diameter: 9.5 cm



in situ PSICAM

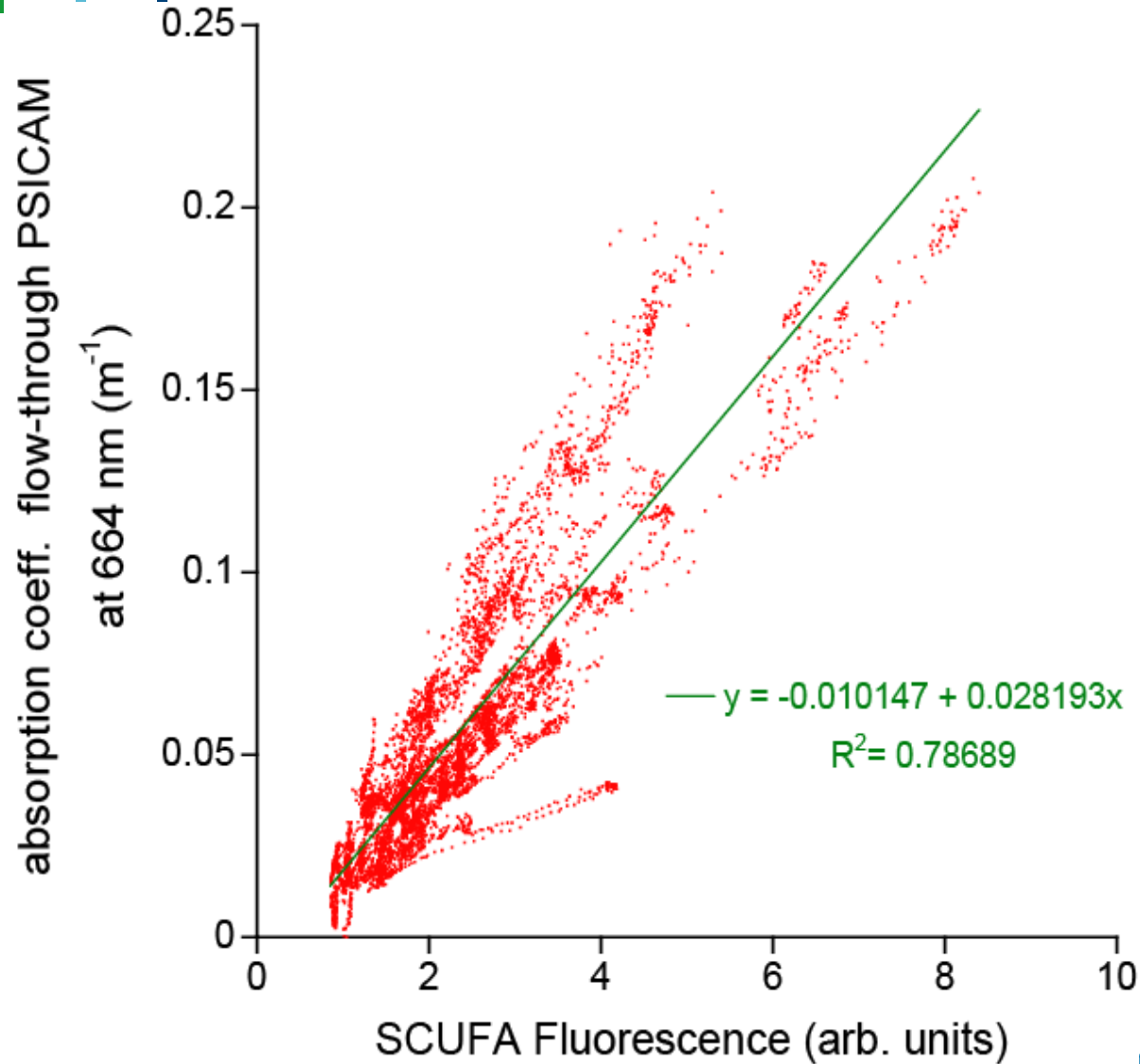


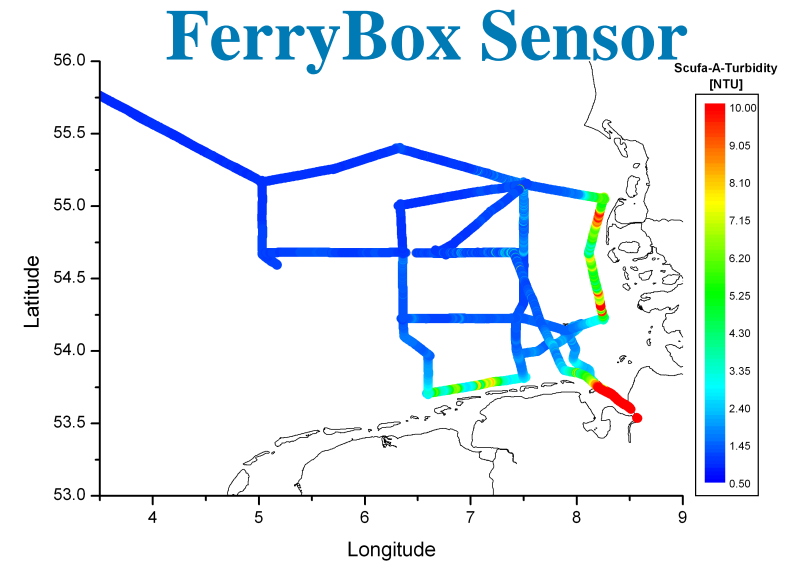
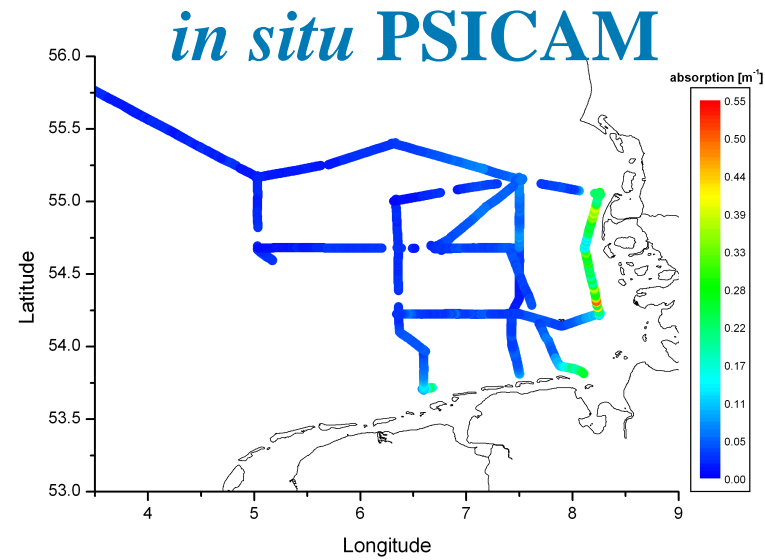
FerryBox Sensor



Absorption bei 674 nm als Proxy für Chlorophyll

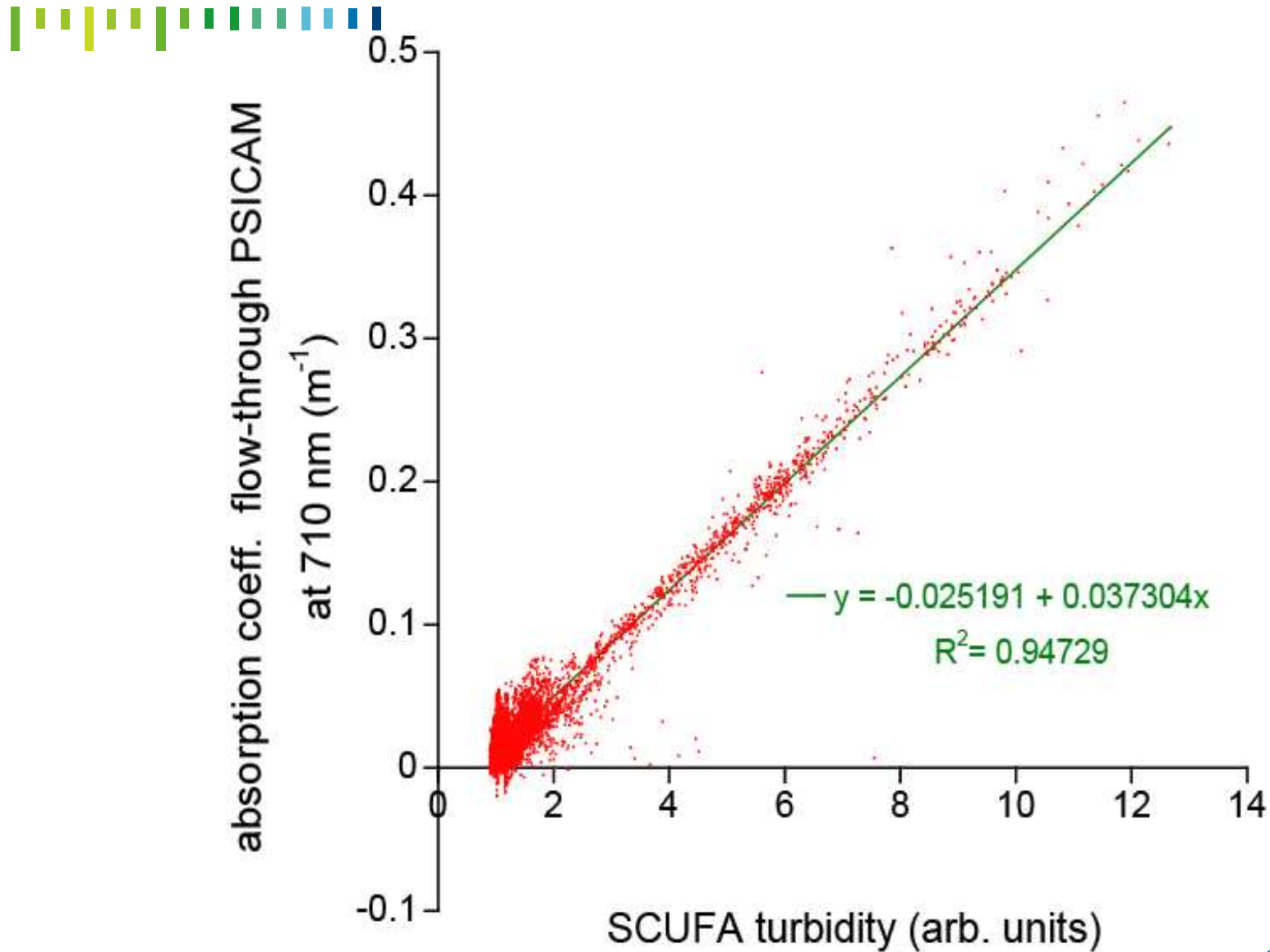
COMPARISON TO FLUORESCENCE MEASUREMENTS





Absorption bei 696 nm als Proxy
für TSM

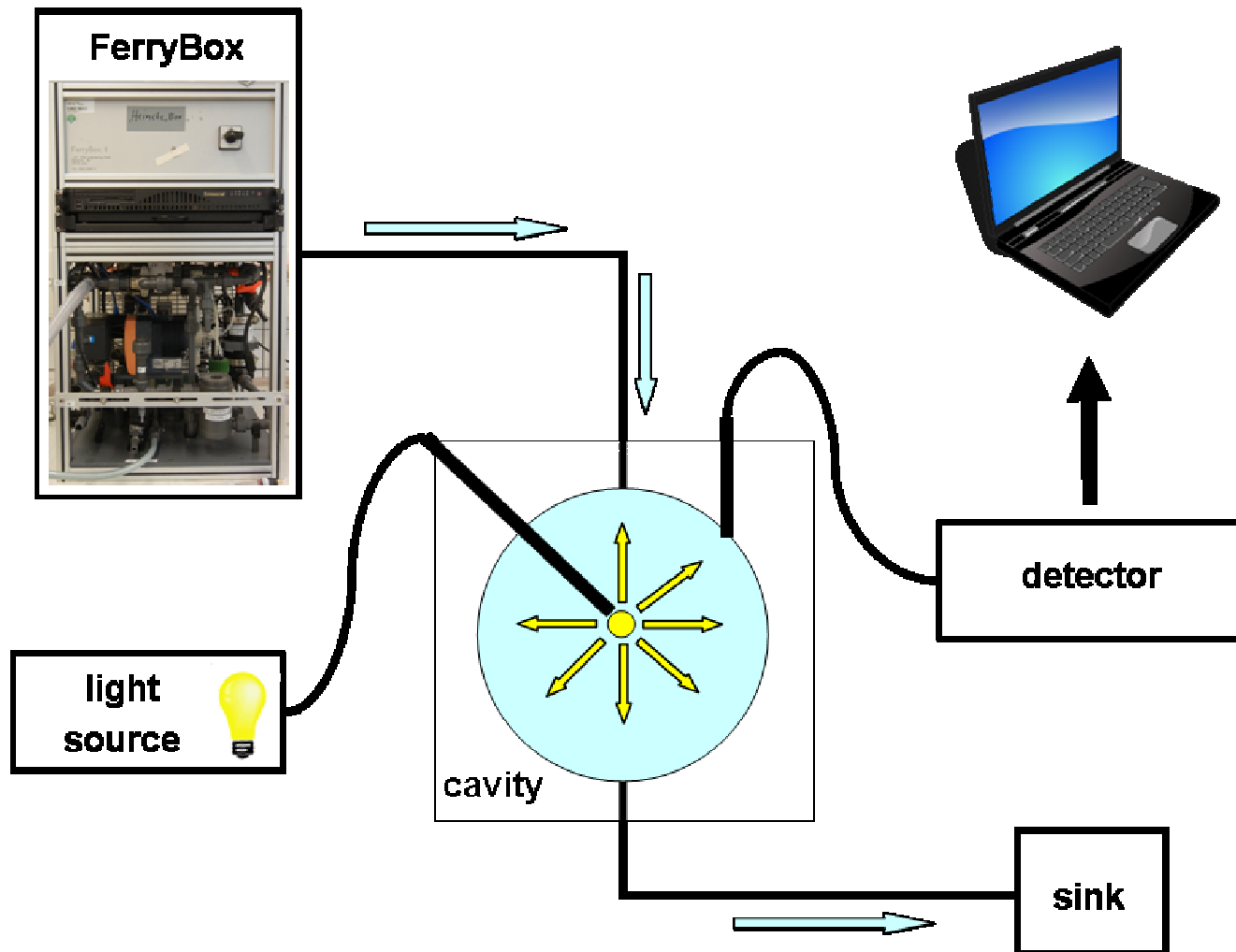
COMPARISON TO TURBIDITY MEASUREMENTS





Thanks for your attention!

PSICam: point-source integrating-cavity absorption meter



GENERAL PROBLEMS



The reflectivity of the PSICAM is strongly affected by biofilms or other contamination. But even after intense cleaning cycles including bleaching the reflectivity scatters during a cruise.