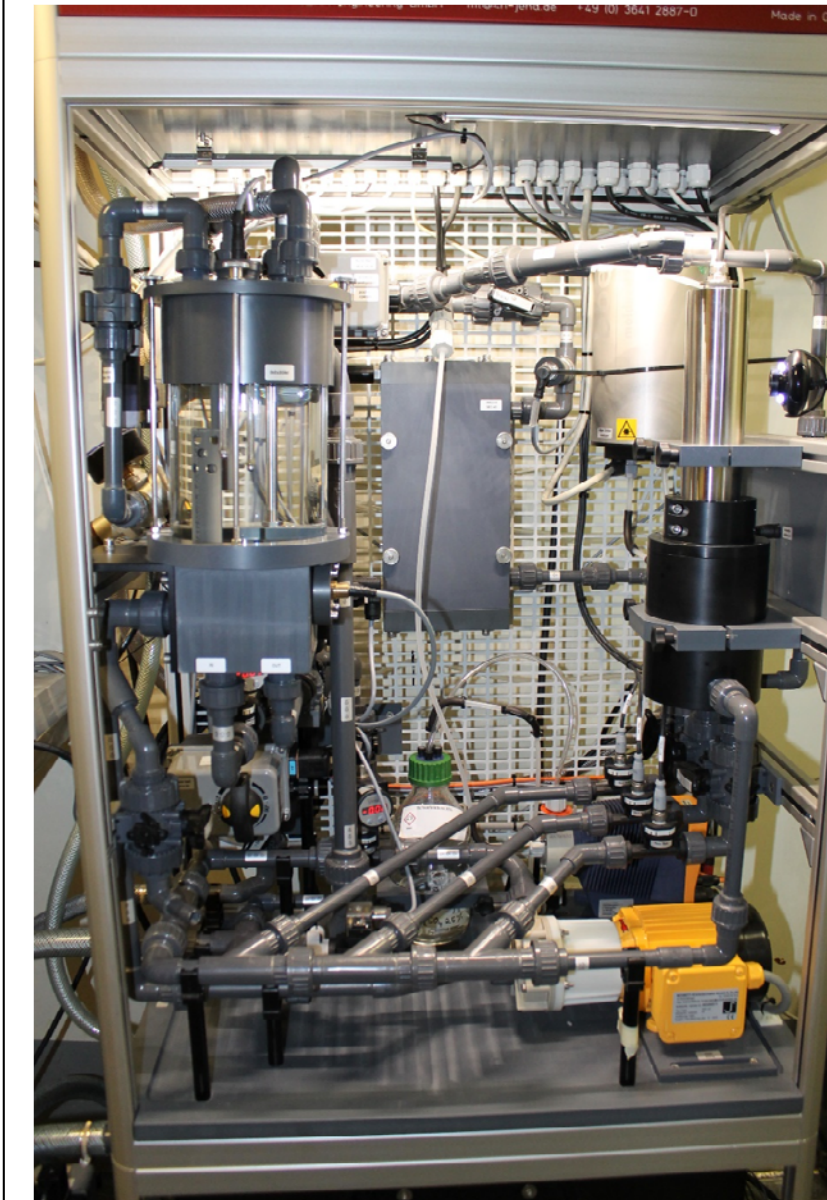


Challenges for the operation and maintenance in the shallow and turbid wadden sea areas



Johannes Grünenbaum
Coastal Research Station – NLWKN
Norderney, Germany

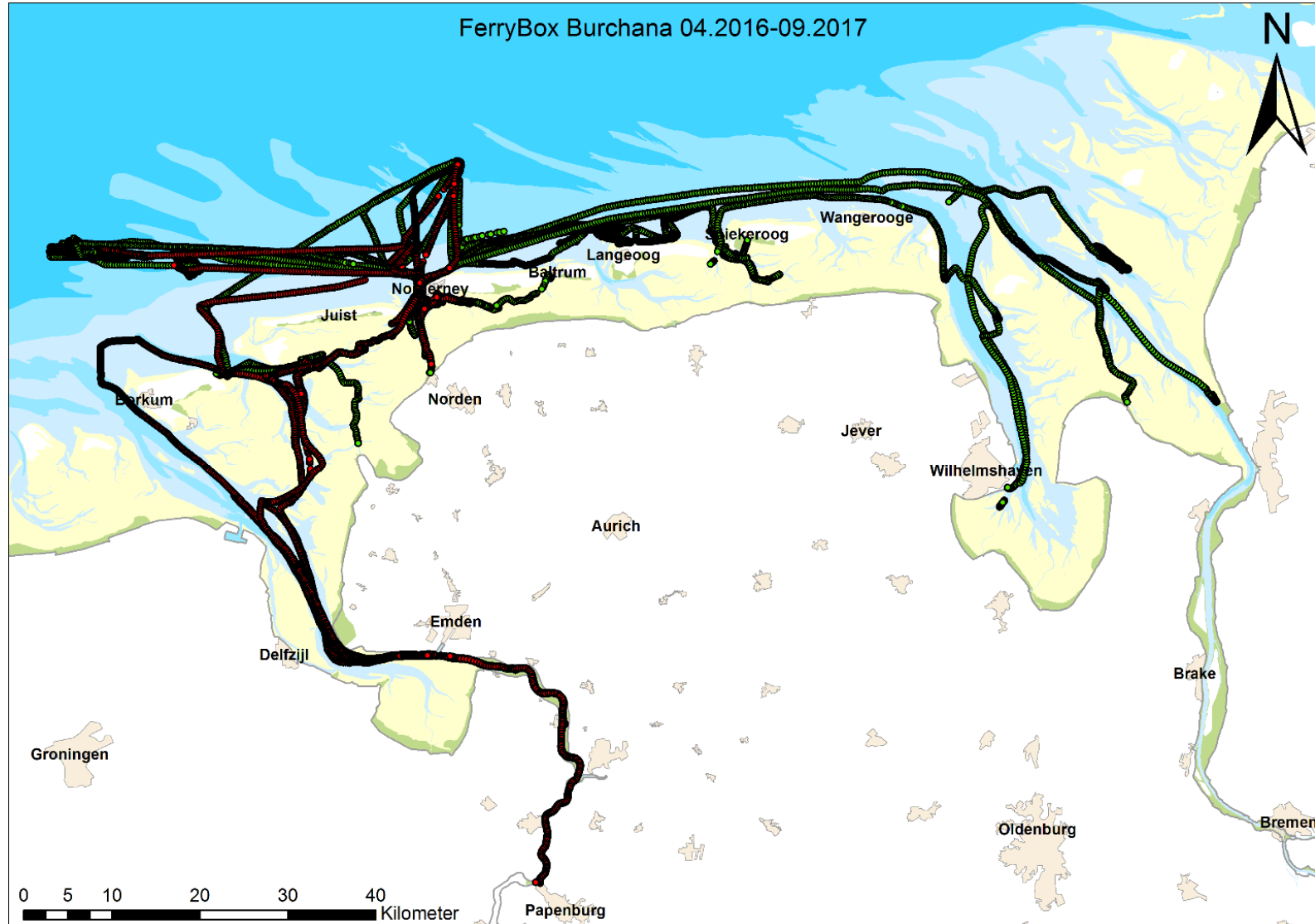
Sensors



Differences from offshore operation

- Bypass to remove harbor sediment from piping prior to operation
- Seacocks must be closed if crew is on board
- Webcam for manual quality management (Air Bubbles/Sediment)
- Webcam to check if seacocks are open for operation
- Seacock inlet is very shallow ~60cm
- Problems with sediment intake into the system
 - Damaging the internal pump
 - Damaging of optical sensors
 - Damaging of motor valves

Area of operation



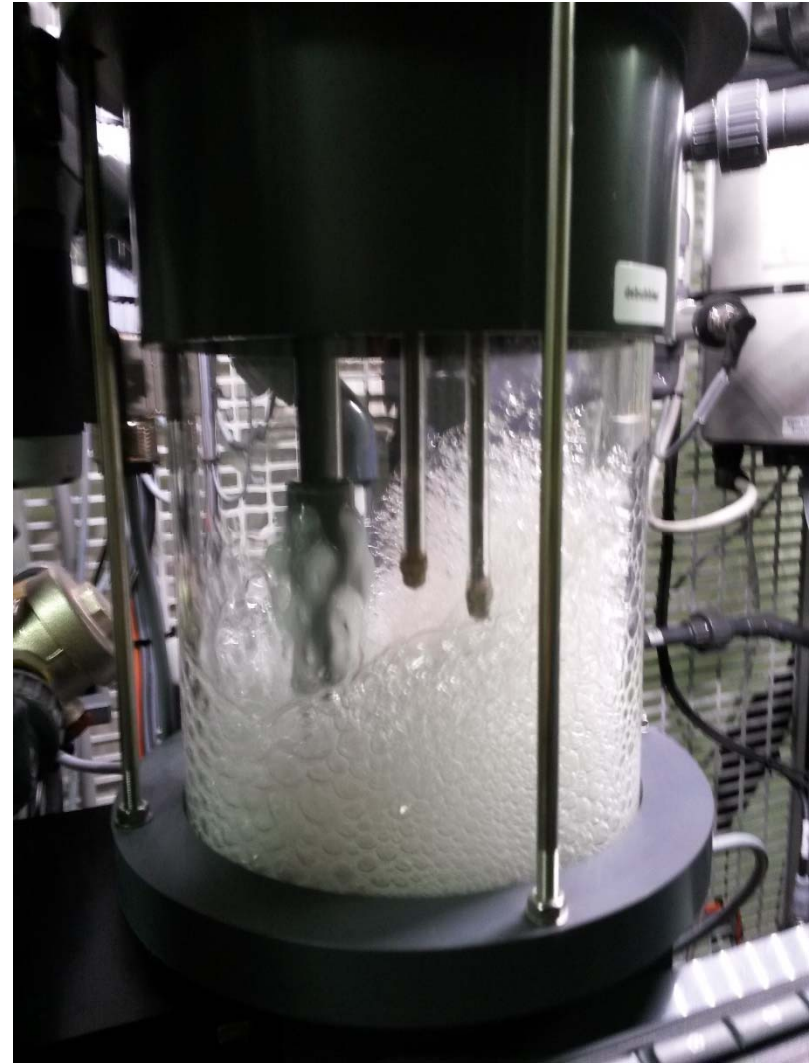


Shallow inlet



Shallow inlet

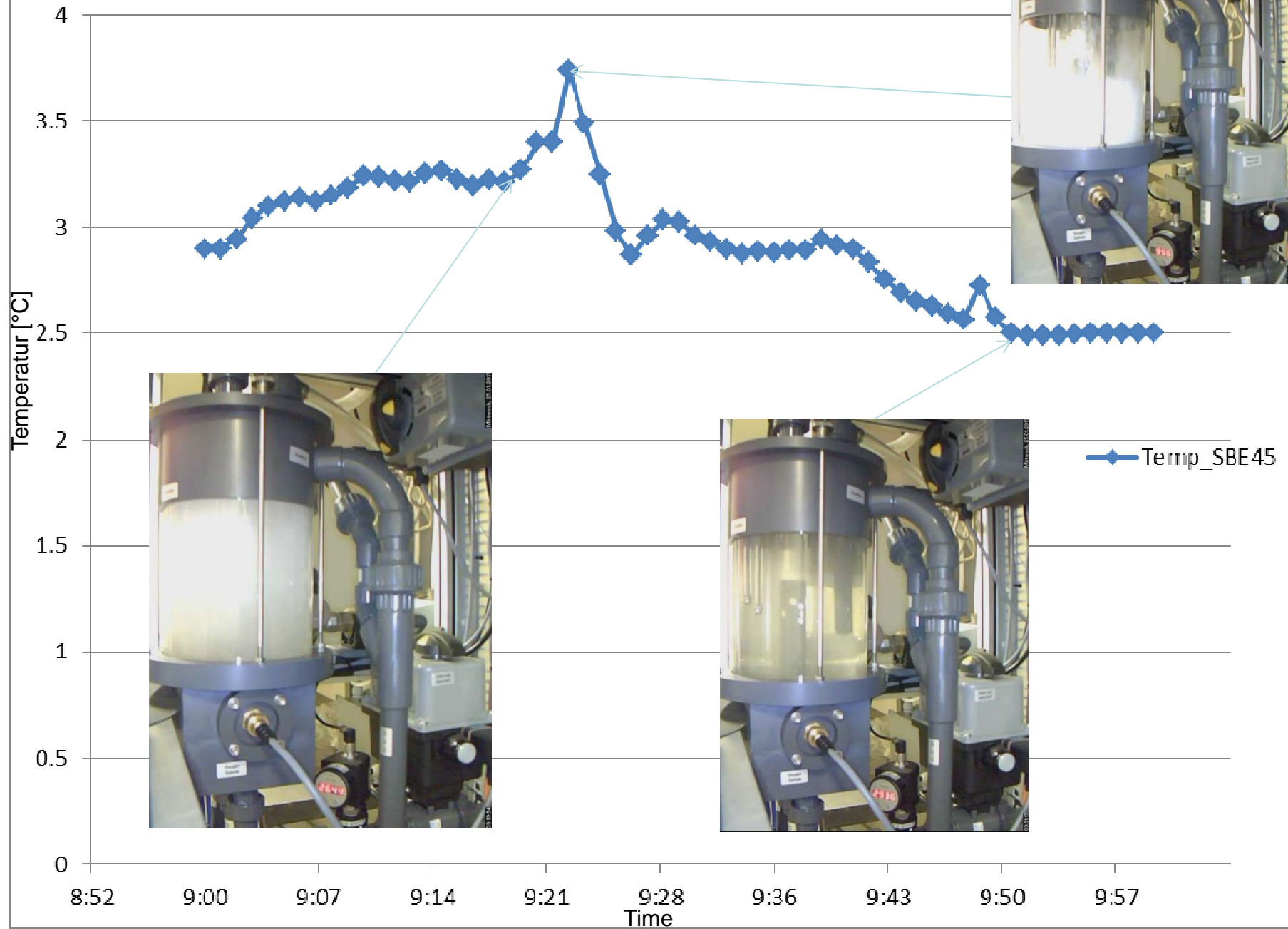




Effects of Bubblecurtain



Temp_SBE45



River Ems

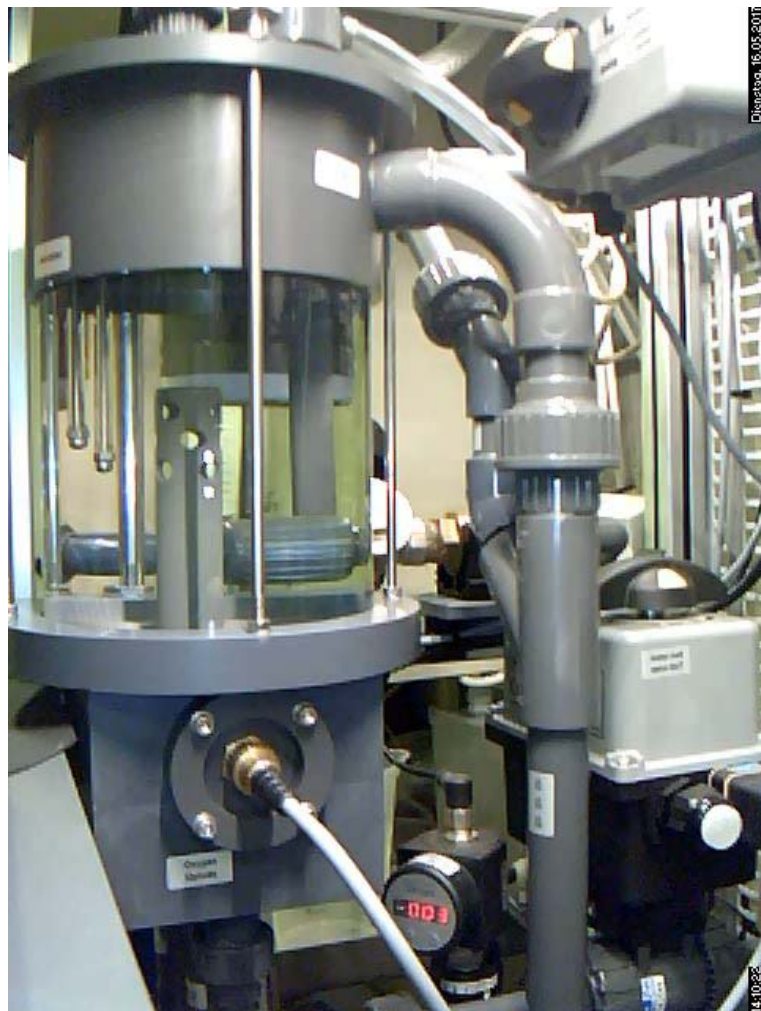


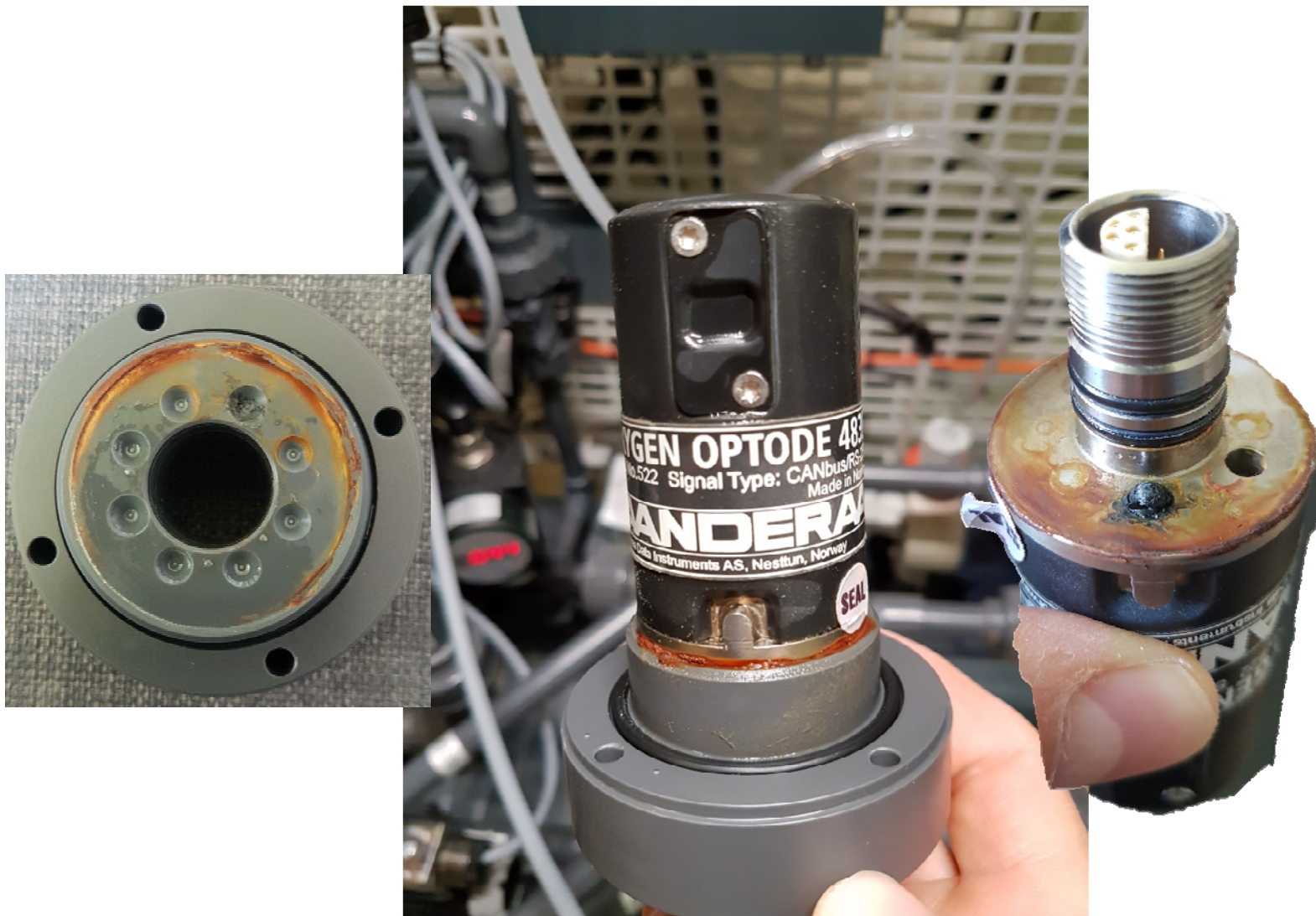
River Ems



Algae Online Analyzer







Centrifugal Pump



Centrifugal Pump



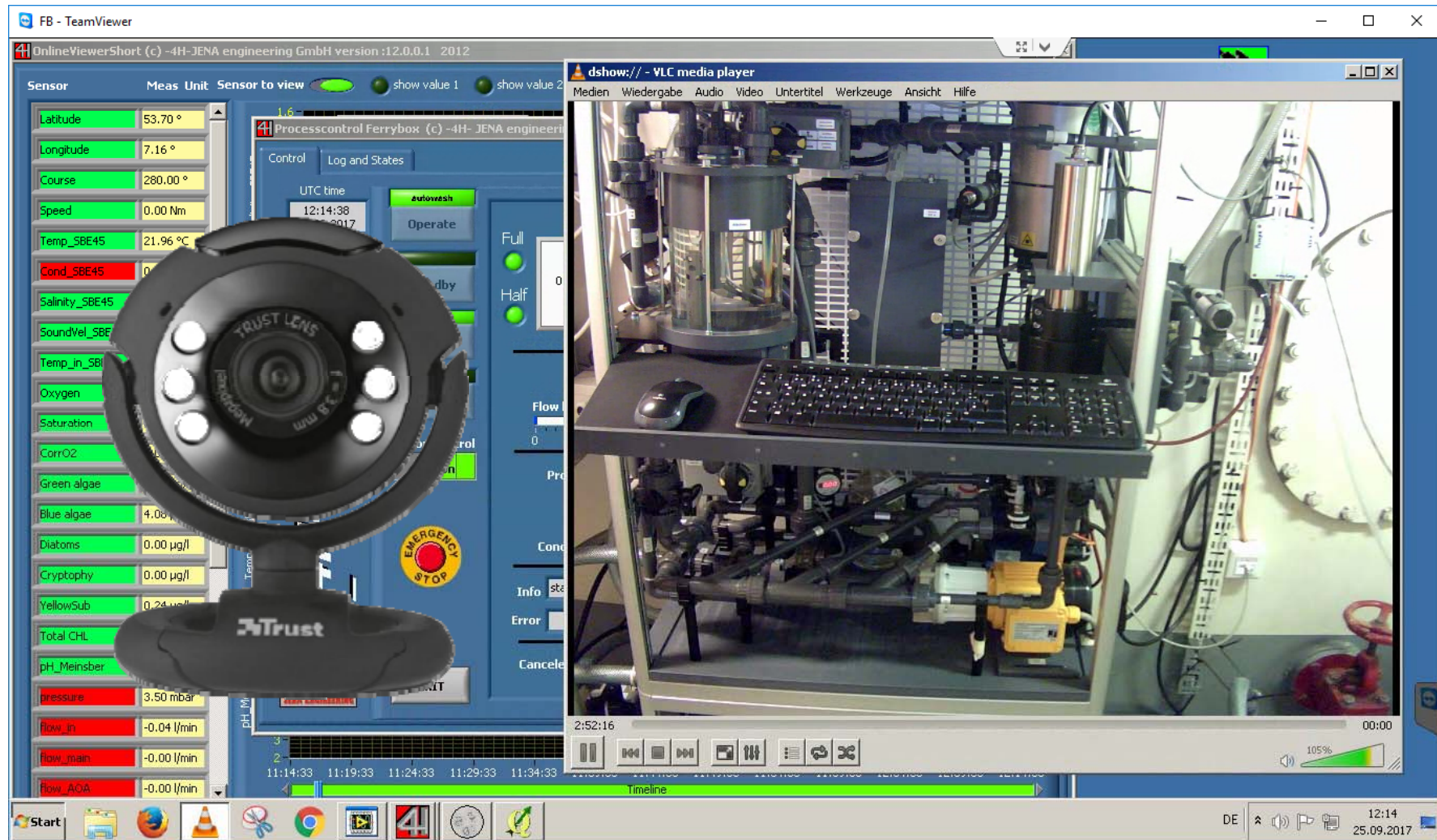
Centrifugal Pump



Webcam



Webcam



UPS

Anzahl von Ereignissen: 302

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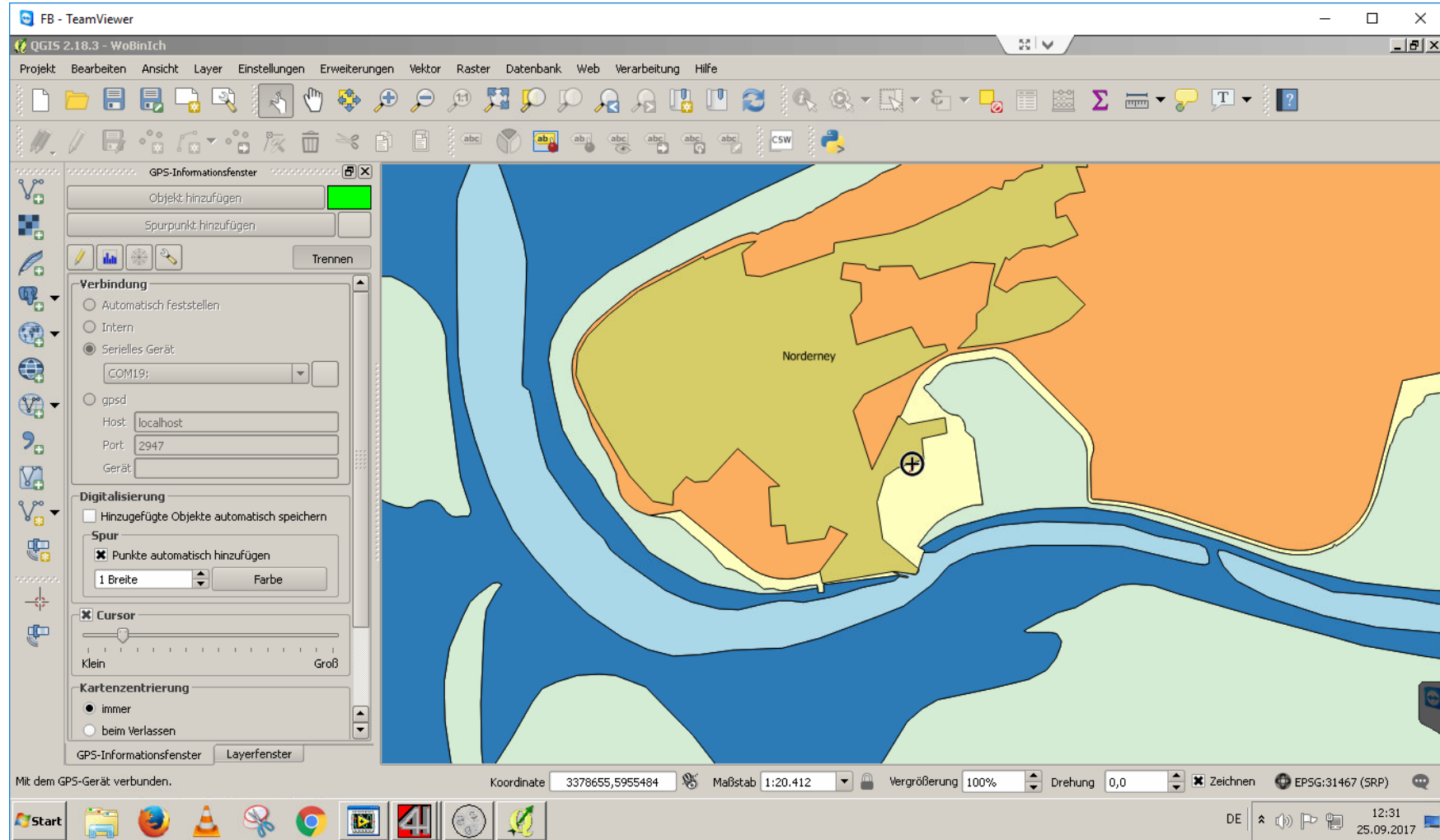


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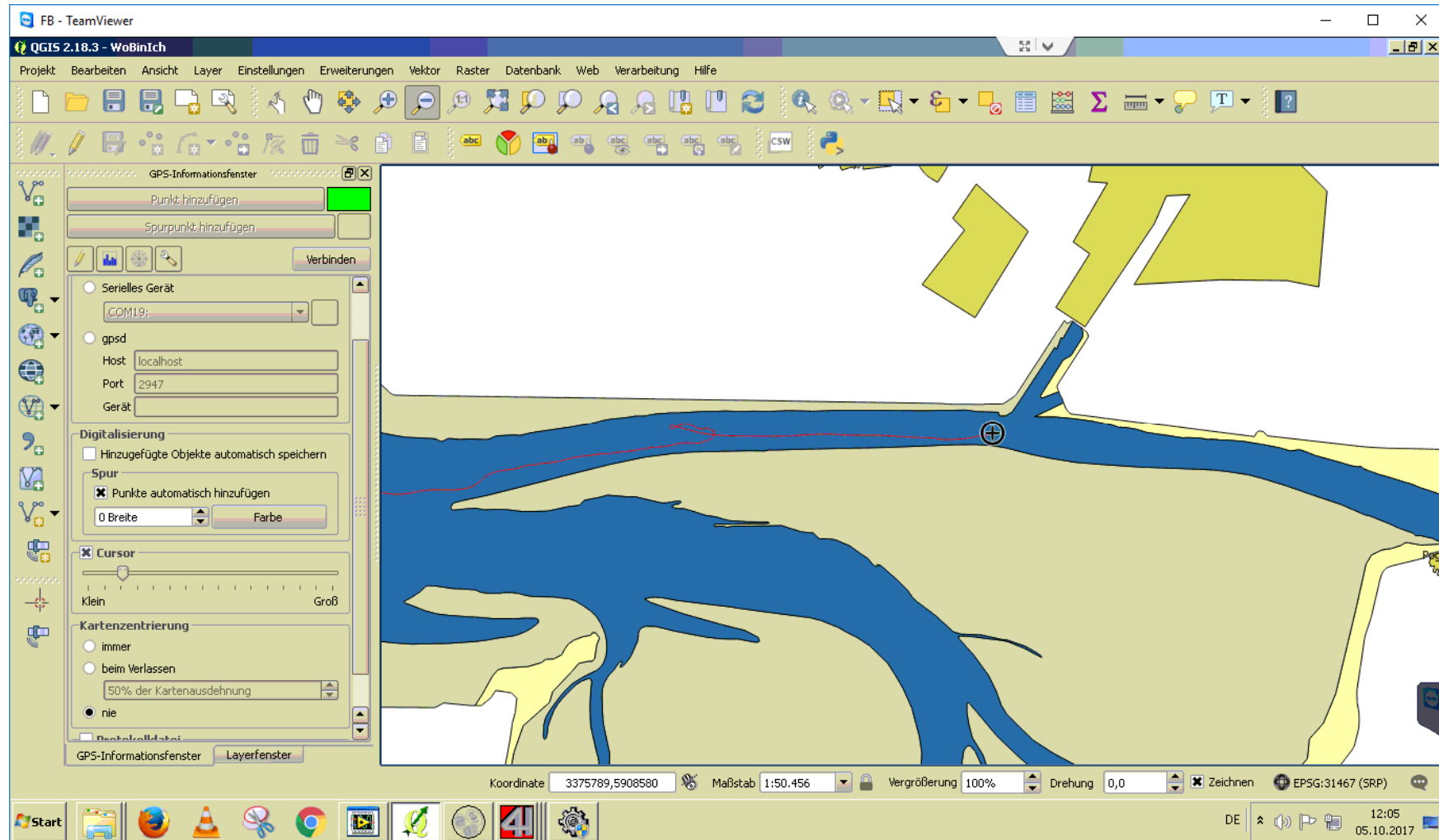




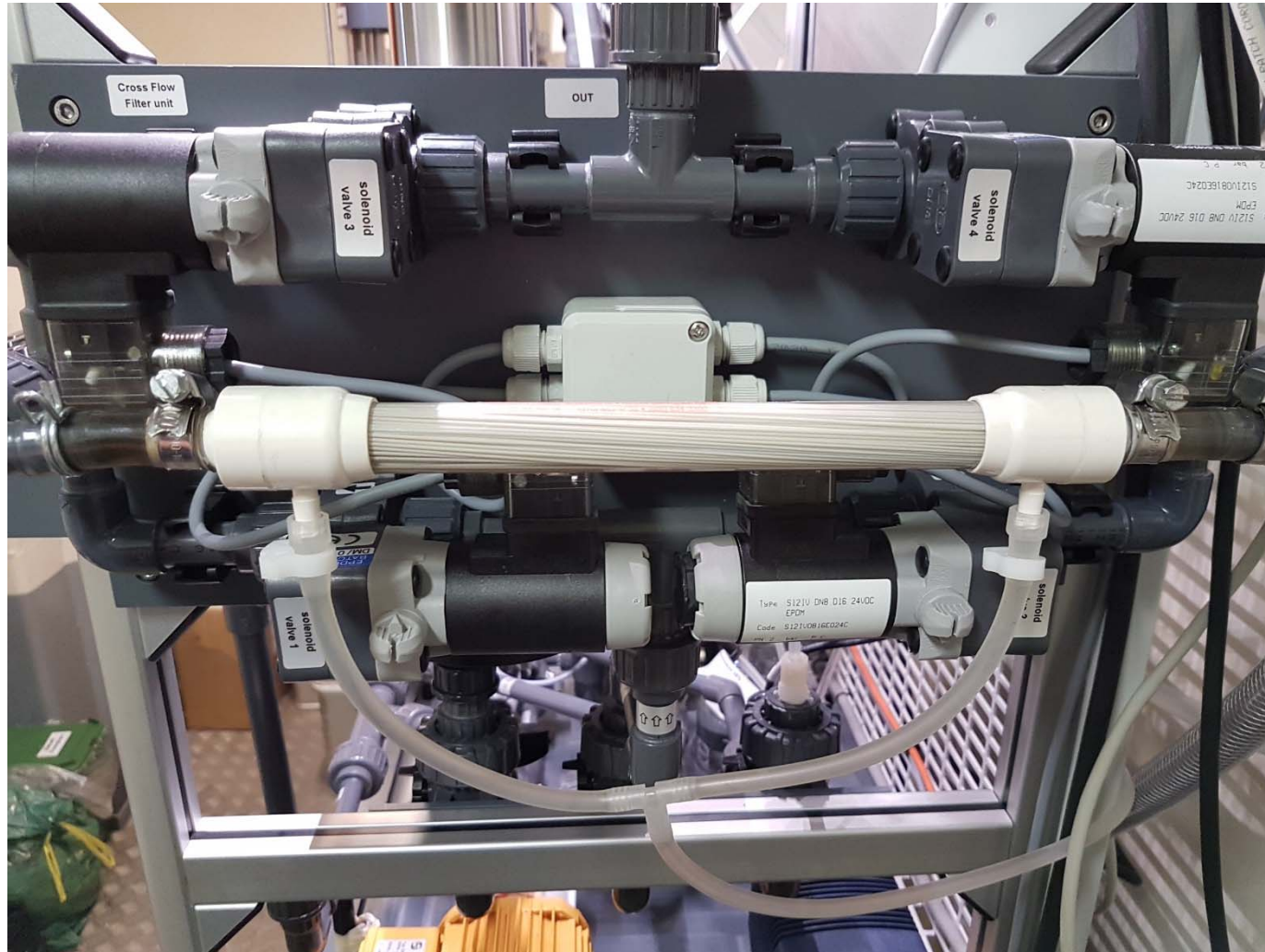
COM-Port Splitter for on site position control



COM-Port Splitter for on site position control



X-Flow-Filter

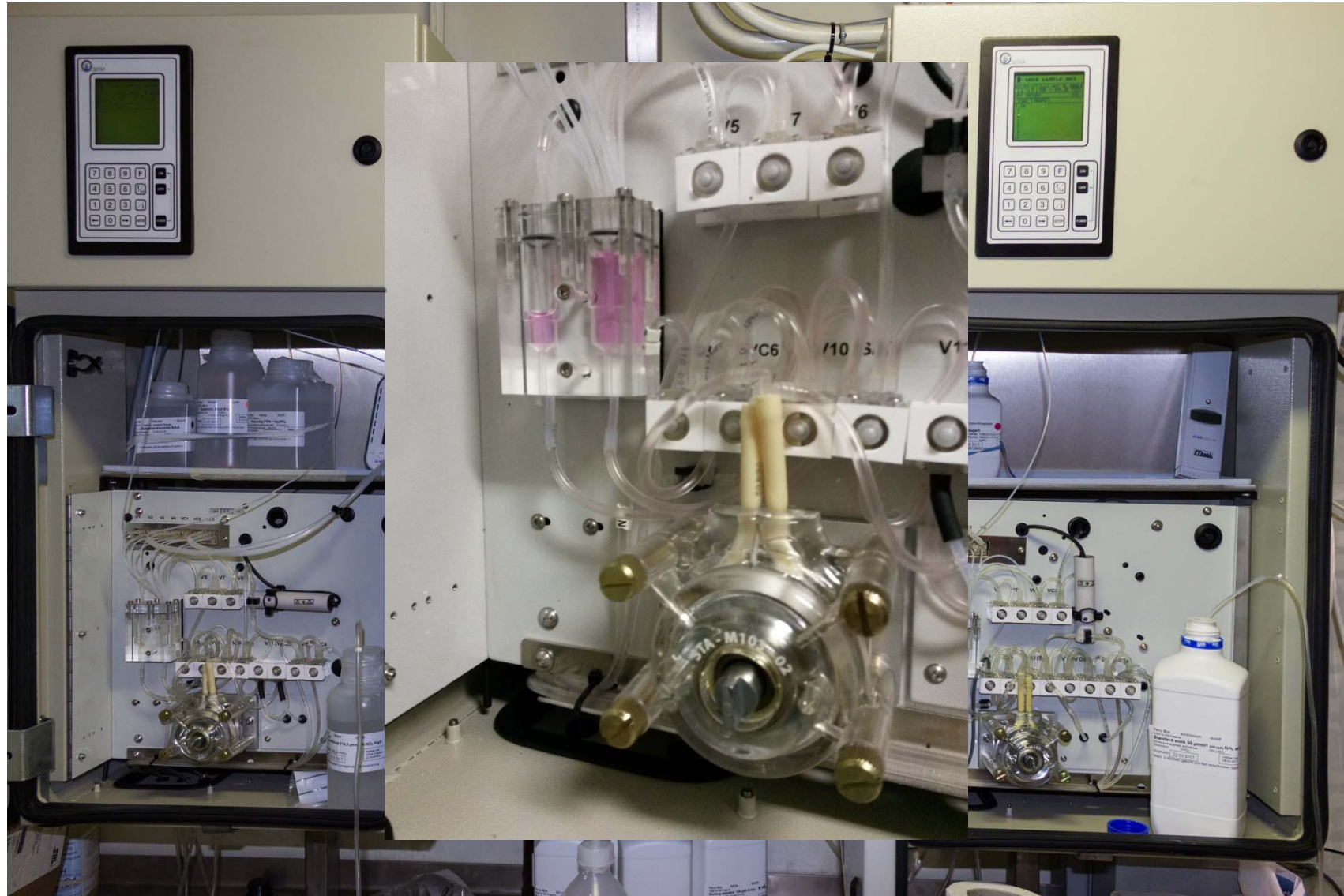


Setup: Analyzer for anorganic nutrients

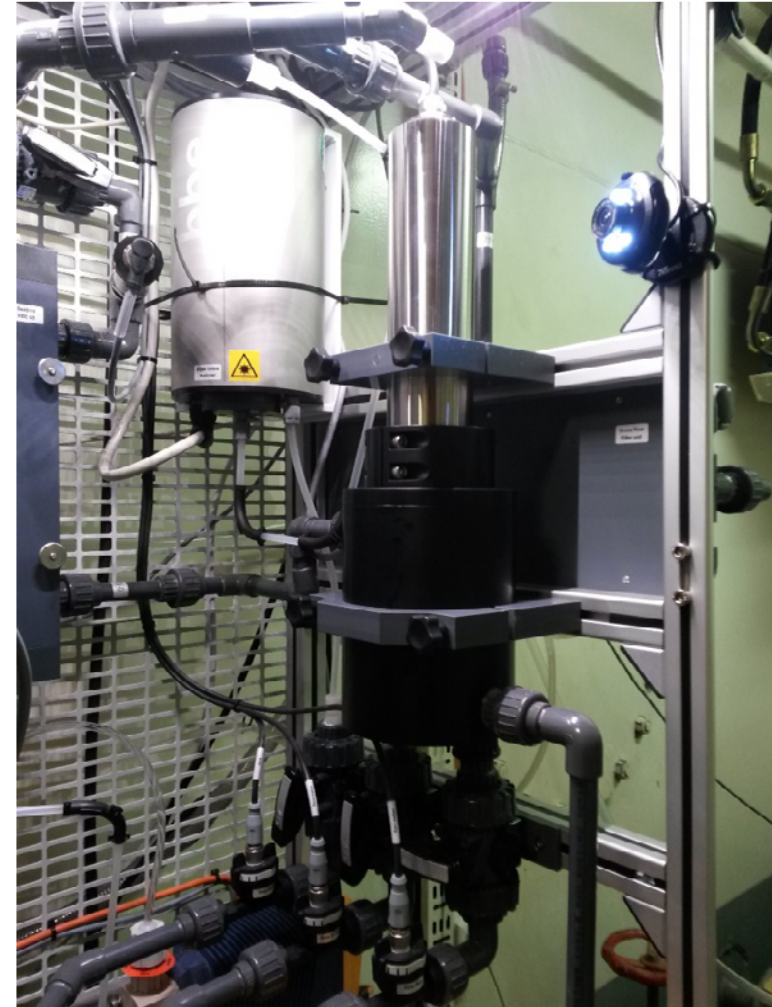
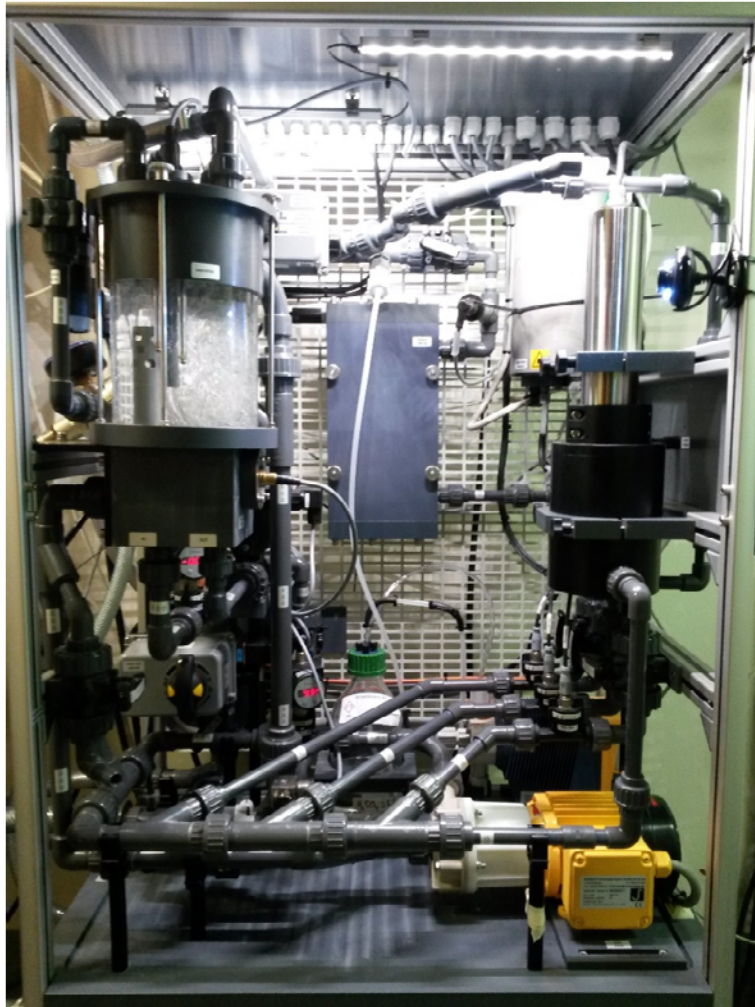




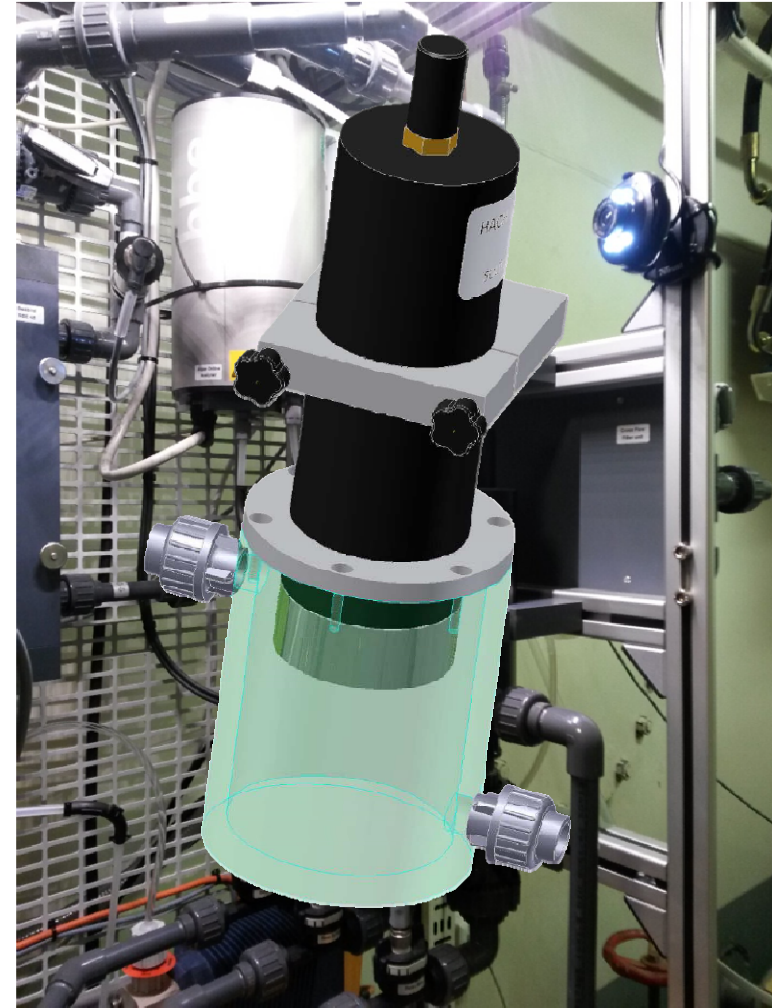
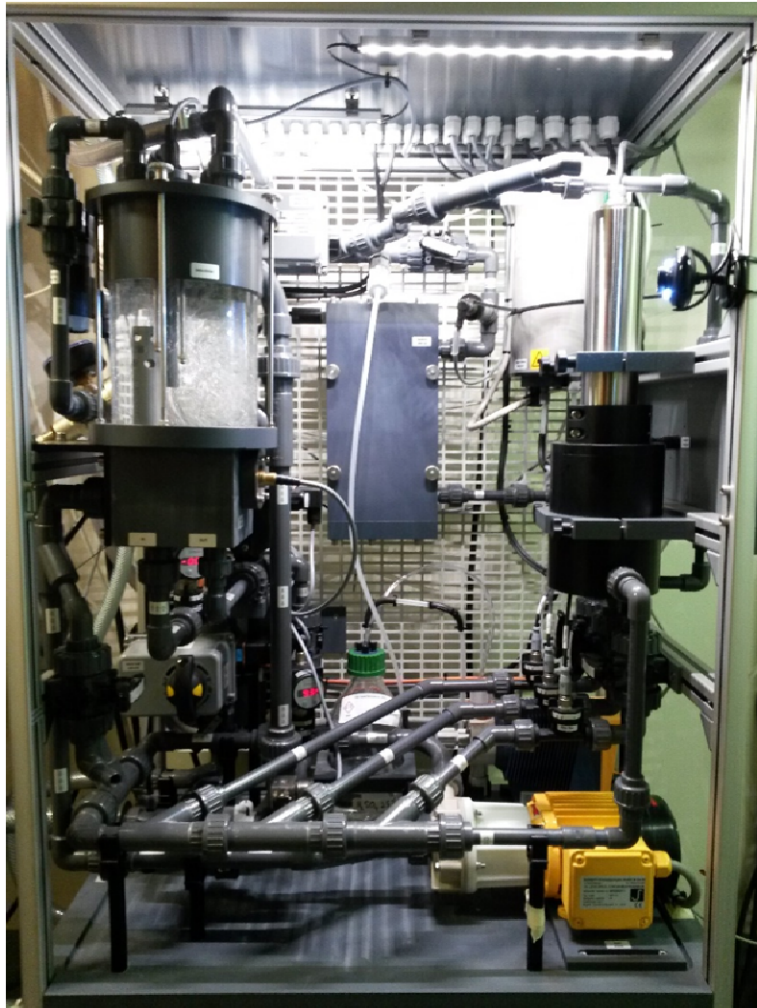




Turbidity sensor Solitax sc



Turbidity sensor Solitax sc



Summary

- With the right adaption high data density with little effort can be acquired
- Operation in very turbid areas is possible
- Higher maintenance interval for any moving parts
- High personnel expenses for operation of Nutrient Analyzers



Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency

Thank you for your attention