



CONTROS
Systems & Solutions GmbH



Measuring dissolved gases (CO_2 and CH_4) with the HydroC™ in flow-through applications and on other platforms – Past measurements and future advancements

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Geesthacht, 1.9.2011



SOPHISTICATED UNDERWATER GAS DETECTION

Outline

- Motivation & Fields of Application
- Connection between platforms and sensors:
Platforms & Sensor integration
- Sensor design & Measuring principle
- Calibration
- Example data
- Summary & Outlook

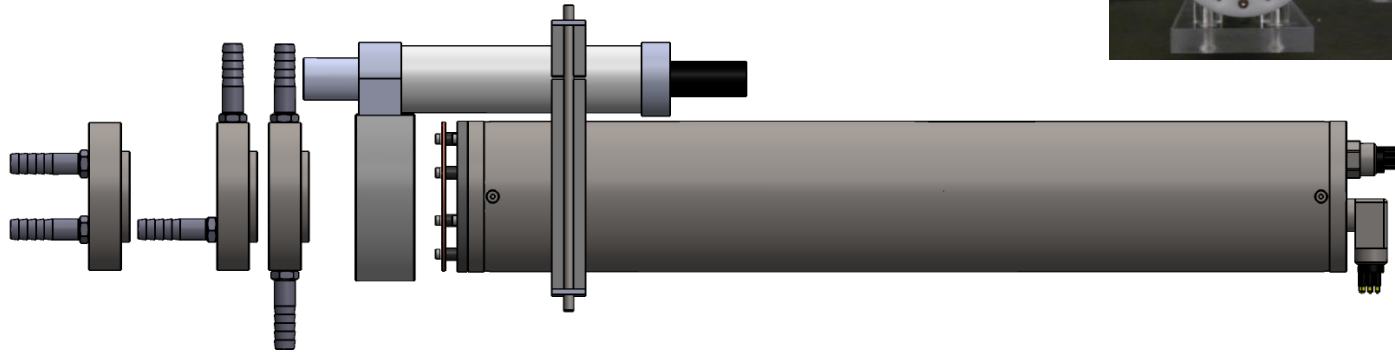
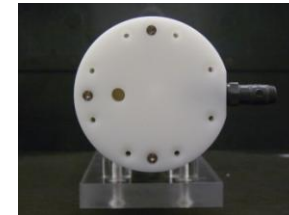


Courtesy of Björn Fiedler, IFM-GEOMAR

Versatility

Underwater

- Protection Cap
- Flow-Head
- Underwater - Flow-through



Surface

- Flow-through



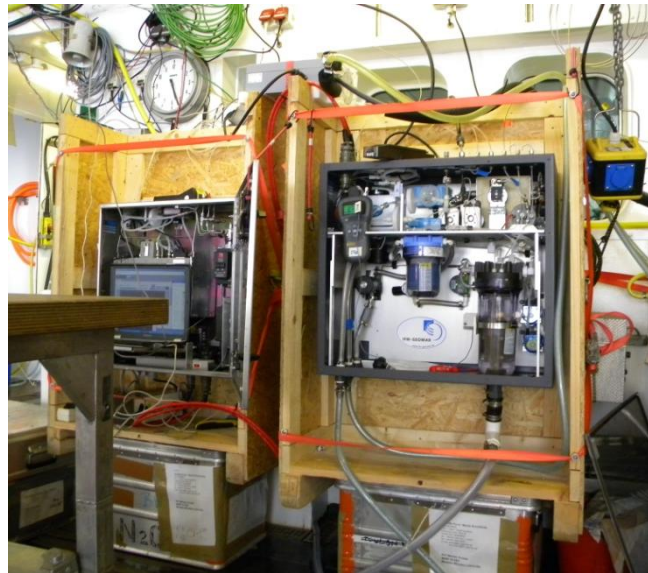
ZUKUNFTSprogramm
Wirtschaft

Investition in Ihre Zukunft

financed by the European Union,
European Regional Development Fund (ERDF)

Flow-through options

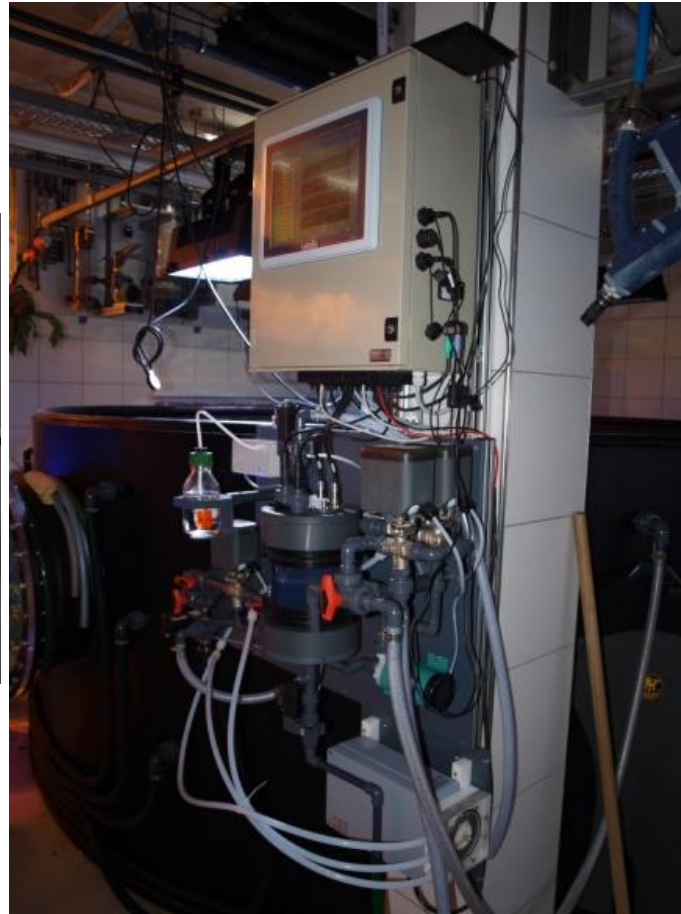
- Flow-through stand alone



Courtesy of Björn Fiedler,
IFM-GEOMAR

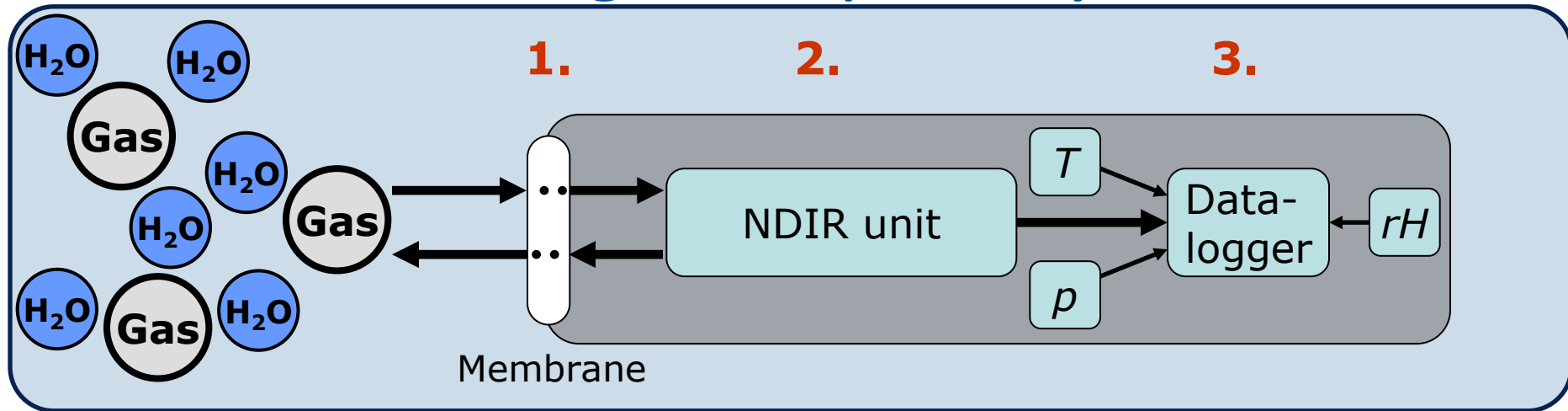
Flow-through options

- Integration into a flow-through system



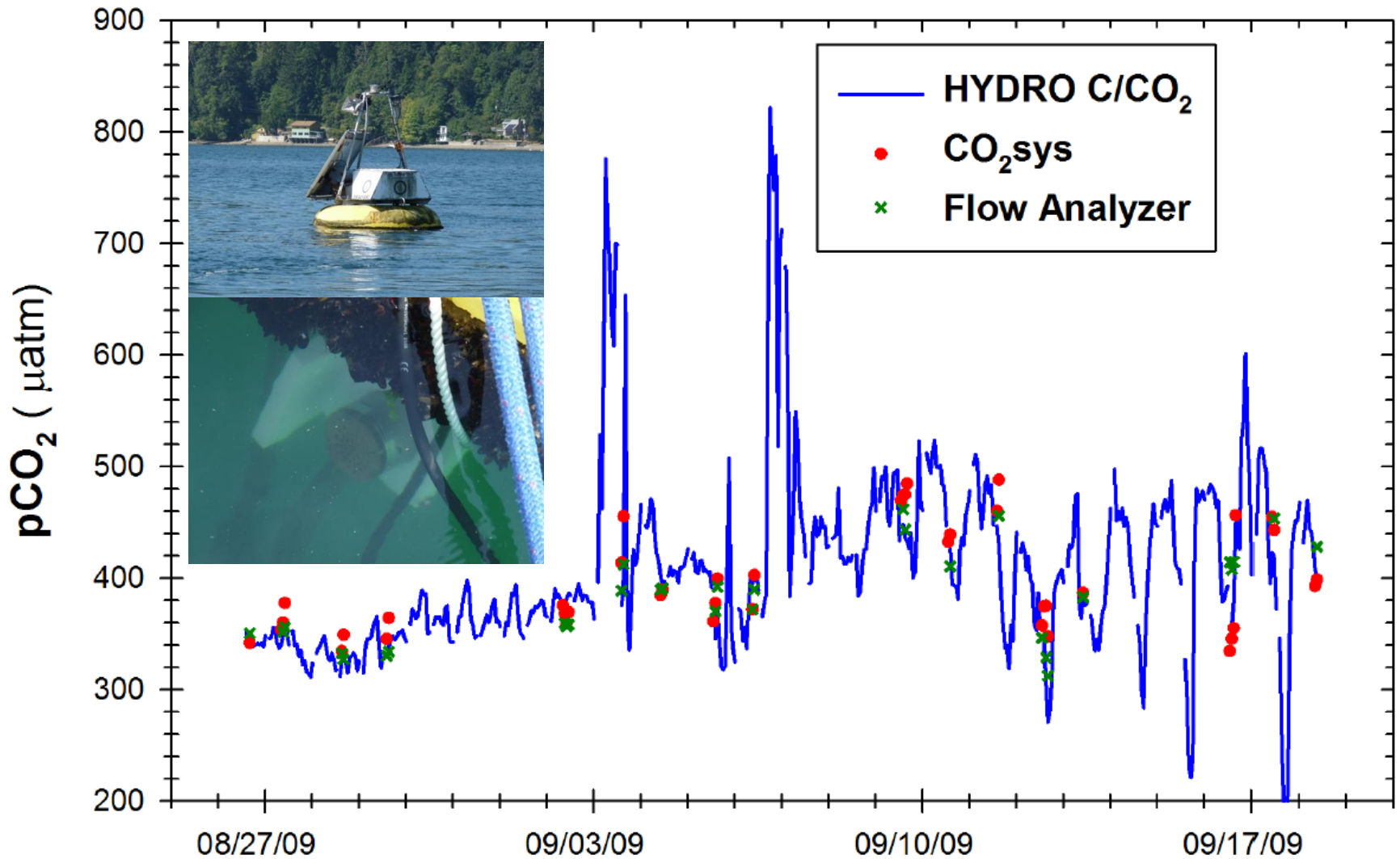
Courtesy of 4h-Jena-Engineering

Measuring Principle - HydroC™



- 1.** Dissolved gasses and water vapor pass hydrophobic membrane
→ Equilibration
- 2.** Gas concentration measured by non-dispersive infrared spectrometry (NDIR) within a gas circuit; Zeroing included (for CO_2)
- 3.** Internal datalogger saves xCO_2 along with T , p and rH (microcontroller and AD-converter); RS 232 – serial connection

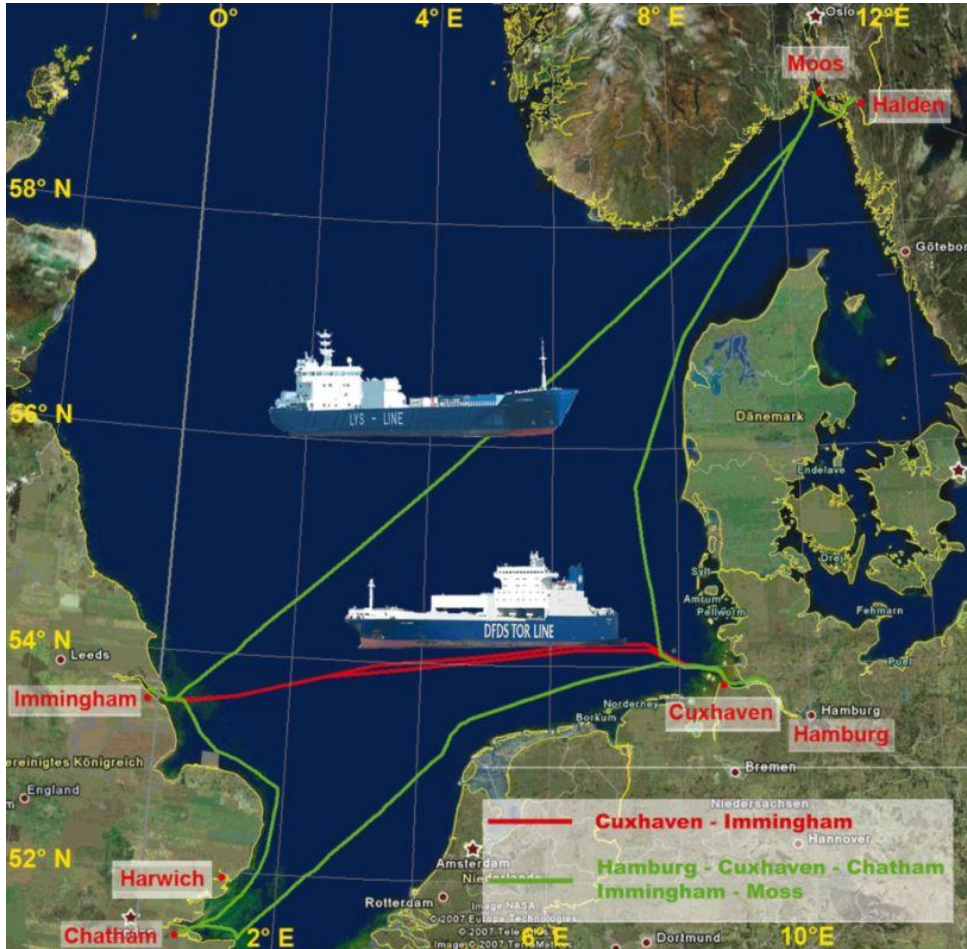
Example data – ACT-Test Seattle



Source: Alliance for Coastal Technology, Performance Demonstration Statement
– CONTROS HydroC™/CO₂, www.act-us.info

HZG-FB – Tor Dania – Cuxhaven-Immingham

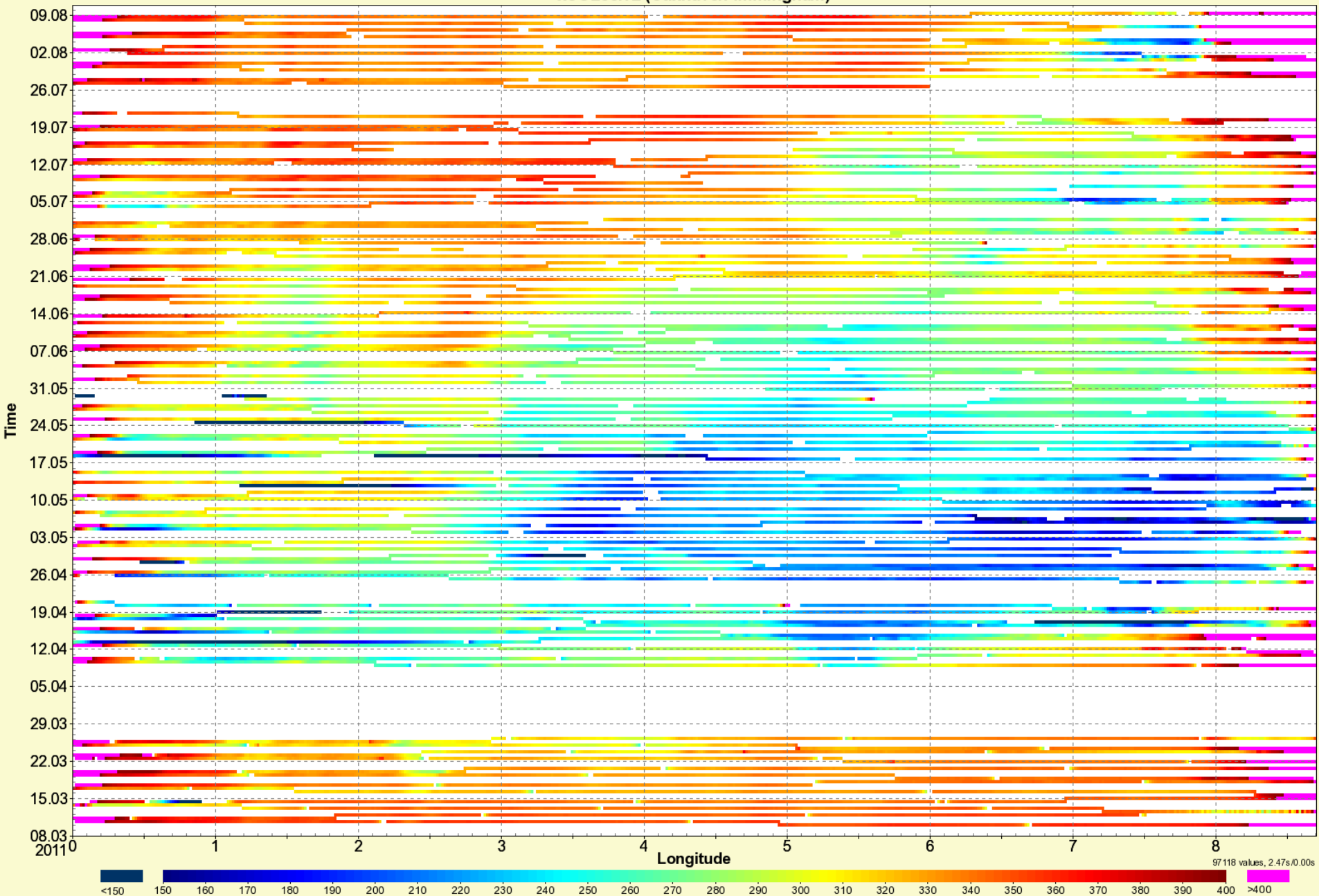
- HydroC™-FT intergated into the FB's on the roll-on/roll-off ship *TorDania* and on the cargo ship *LysBris*



Source: http://www.coastalwiki.org/coastalwiki/FerryBox_-_Continuous_and_automatic_water_quality_observations_along_transects

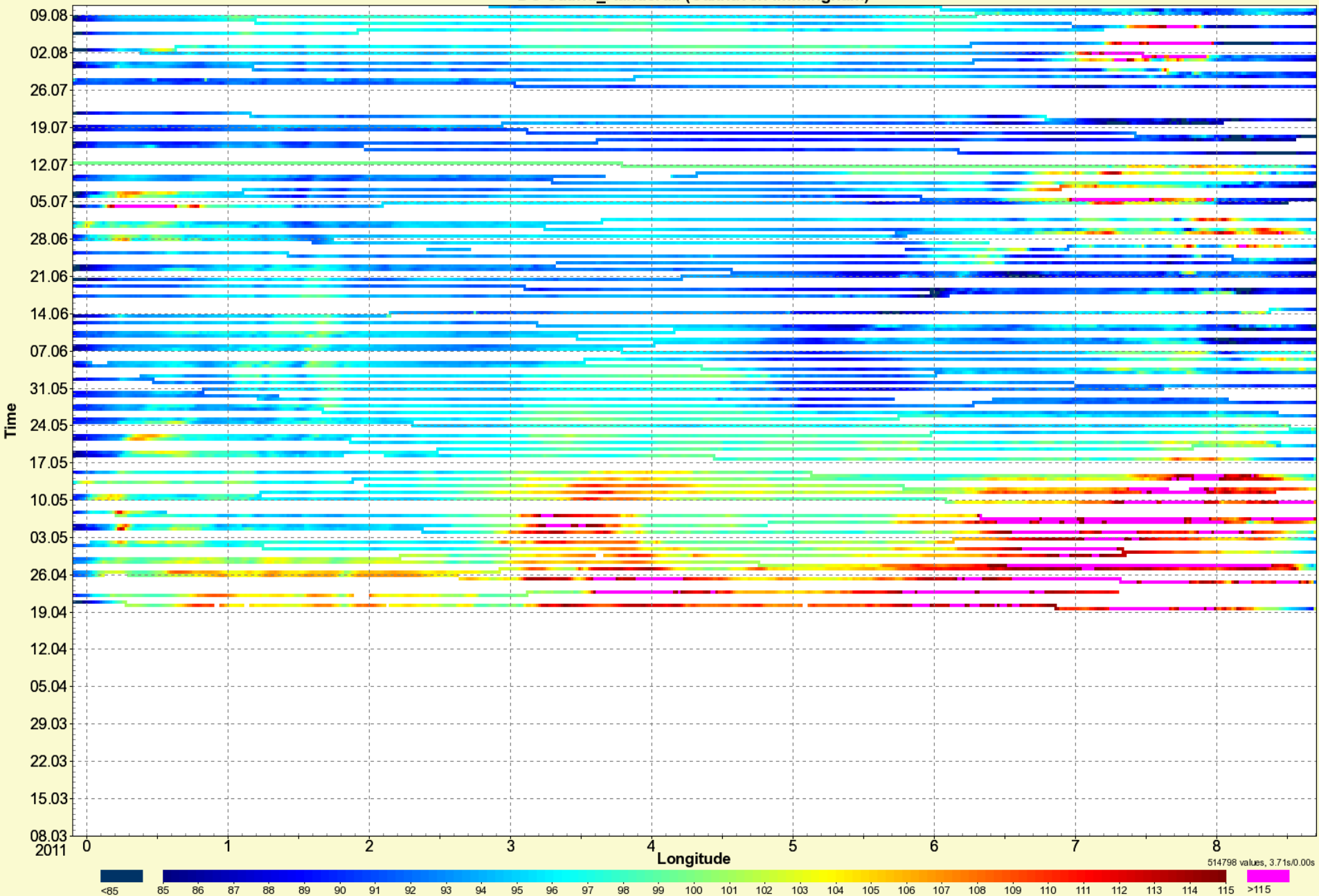
© Klaus Kehrls, 09.03.2011

xCO2corr2 (Cuxhaven-Immingham)



Courtesy of Wilhelm Petersen, Helmholtz-Zentrum Geesthacht

DO-SatInd_Aanderaa (Cuxhaven-Immingham)



Summary and outlook

- $p\text{CO}_2$ and $c\text{CH}_4$ are parameters of increasing interest that are monitored within multiple applications and on various platforms.



HydroC's:

- Reliability proven during many missions and on various platforms 376 mm
 - More than one year of continuous data of HydroC™-FTs in FB's
 - Usage of acid as an anti fouling mean proved a positive effect → pH change influence
- Individually in-situ calibrated, fast and including drift correction means
- Continue with data analysis and processing optimization
- New version of the underwater sensor released in October; FT will follow:
 - Smaller, faster, programmable sleep-mode, ...

Thank you!

Any questions?

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