FerryBox systems at HZG: Experiences and applications on different platforms and integration in a coastal observing system

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FerryBox Lines currently operated by Helmholtz Zentrum Geesthacht (HZG)

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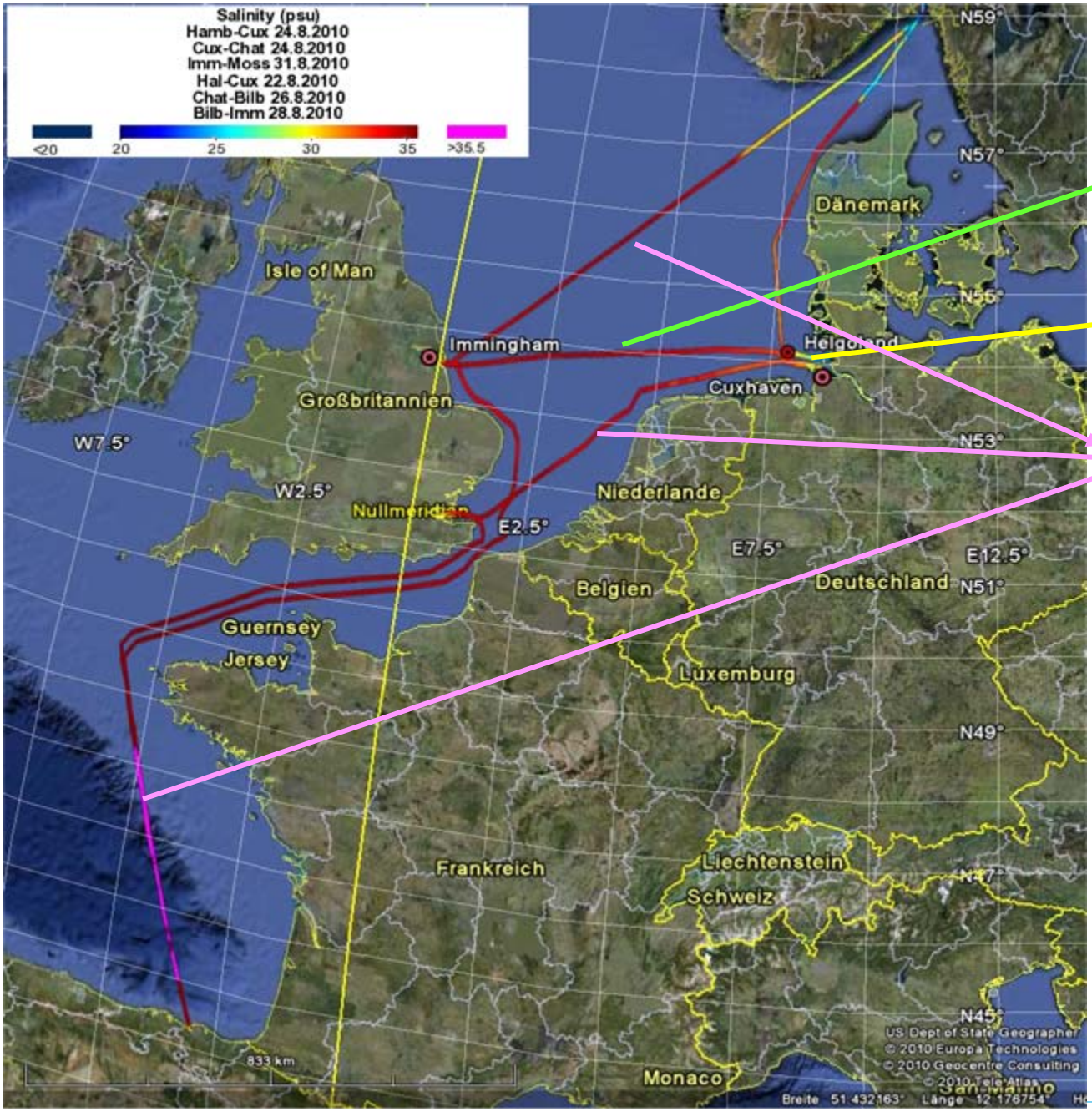

FerryBox Routes (HZG)

→ **TorDania (RoRo ship)**
Immingham (UK) <-> Cuxhaven (DE)
~ 6 transects/week

2. **FunnyGirl (passenger ferry)**
Helgoland (DE) <-> Büsum (DE)
~ 2 transects/day

3. **LysBris (cargo ship)**
Halden (NO) –> Cuxhaven (DE) -> Chatham (UK) –> Bilbao (ES) –>Immingham (UK) –> Moss (NO)
~ fortnigthly

Stationary FerryBoxes operated by HZG

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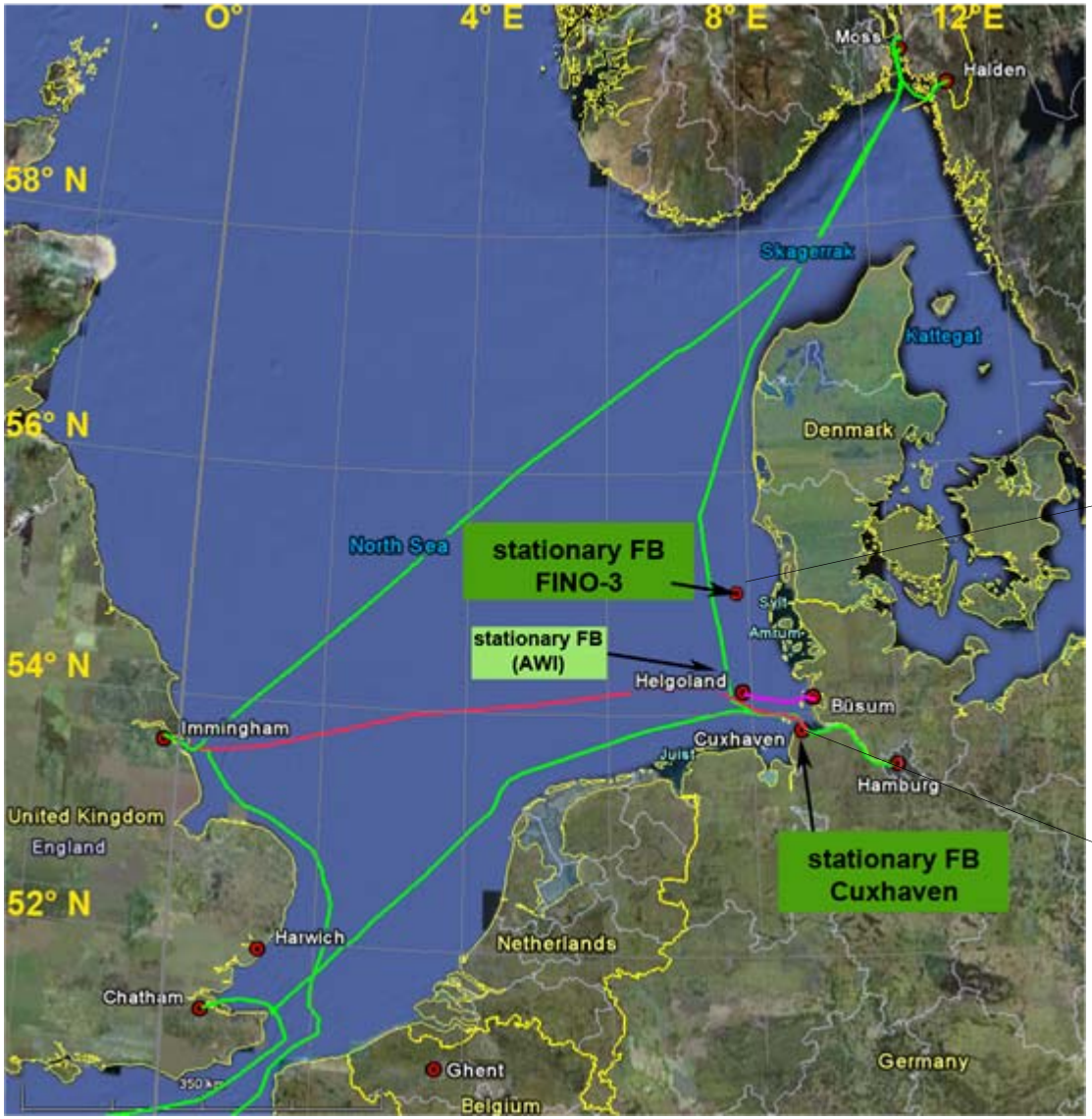

FB-Station
at FINO 3
Installation:
July 2011

FB-Station
Cuxhaven
since Okt'10:

Data Availability:
Pooled Data of Temperature and Salinity from all Transects
July 2010 to June 2011

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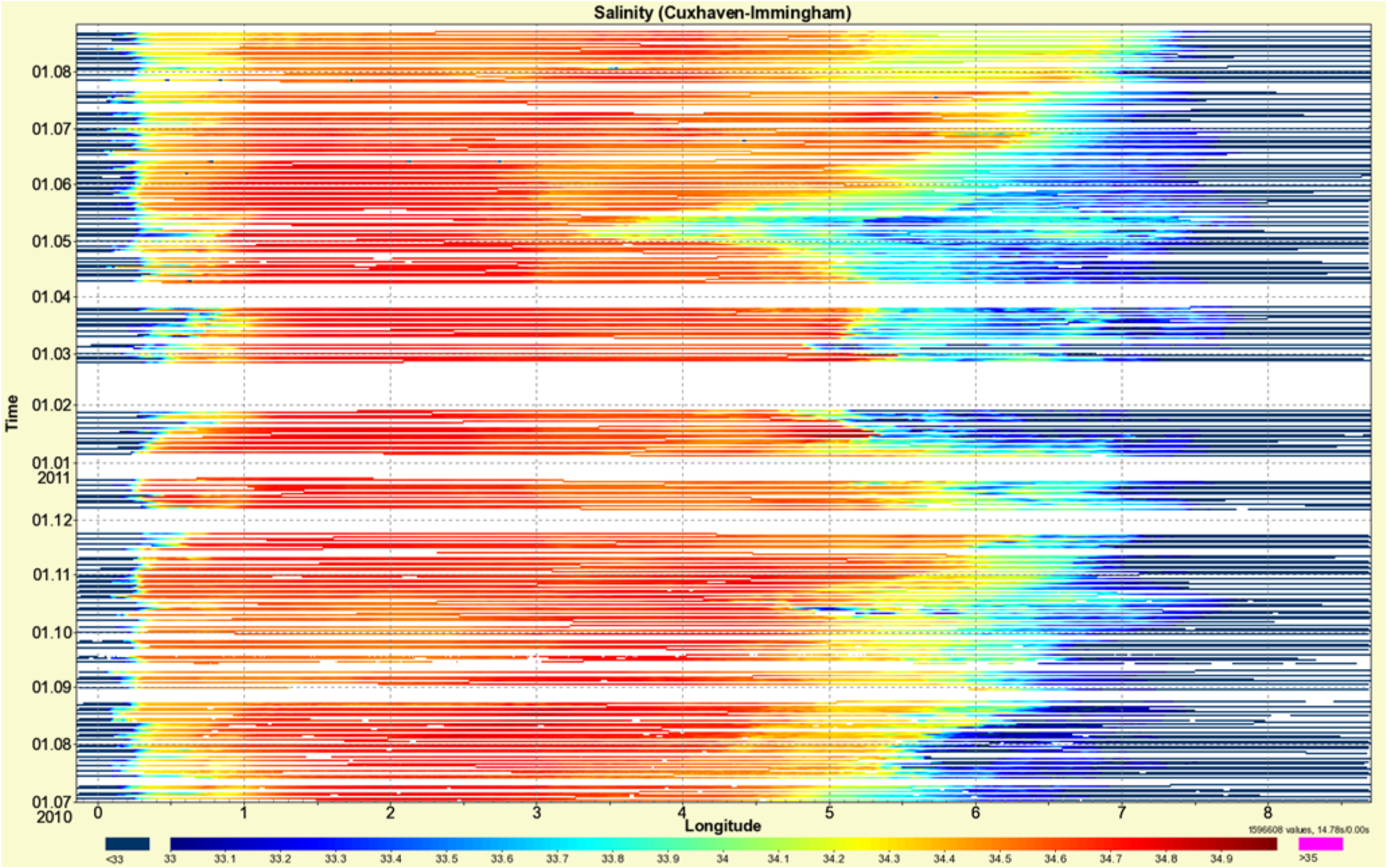

Data Availability 2002 – 2005
Ferry between German and England

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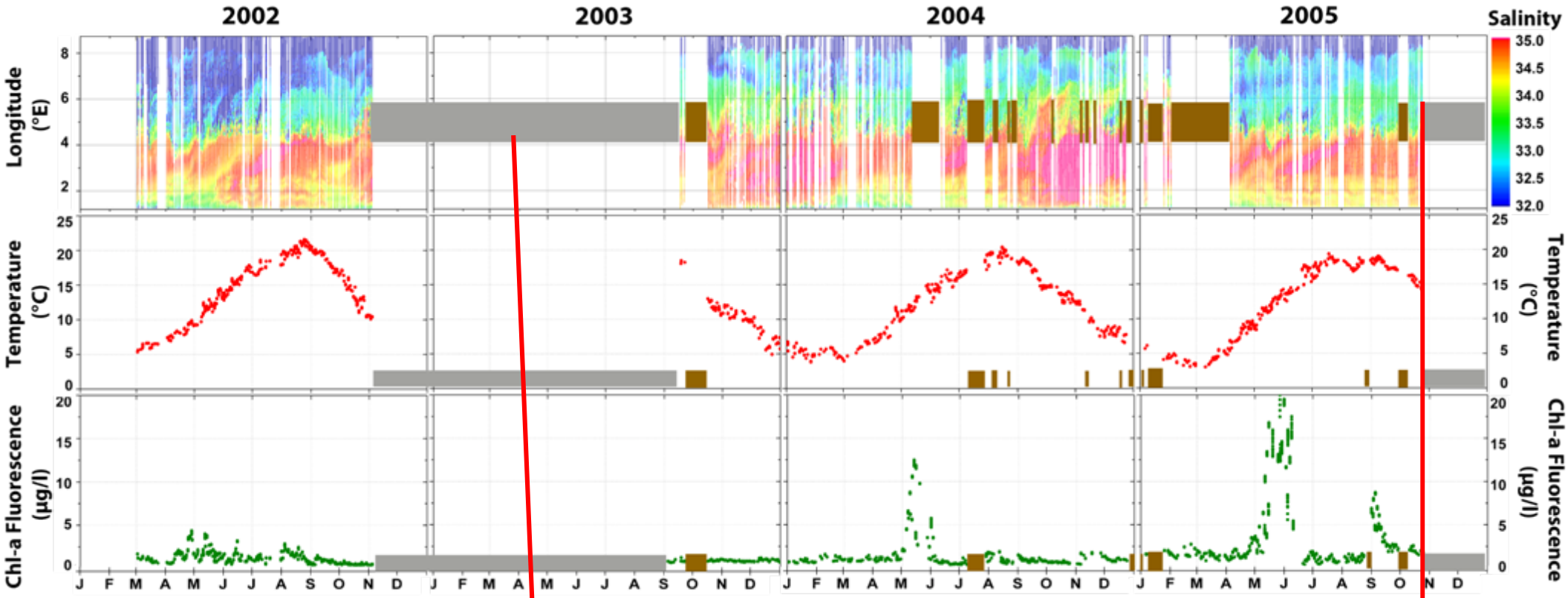

6 month stop of operation
+ change of the ship

Final stop of operation of the ferry

Data Availability 2008 – 2009
Cargo Ship between Germany and England

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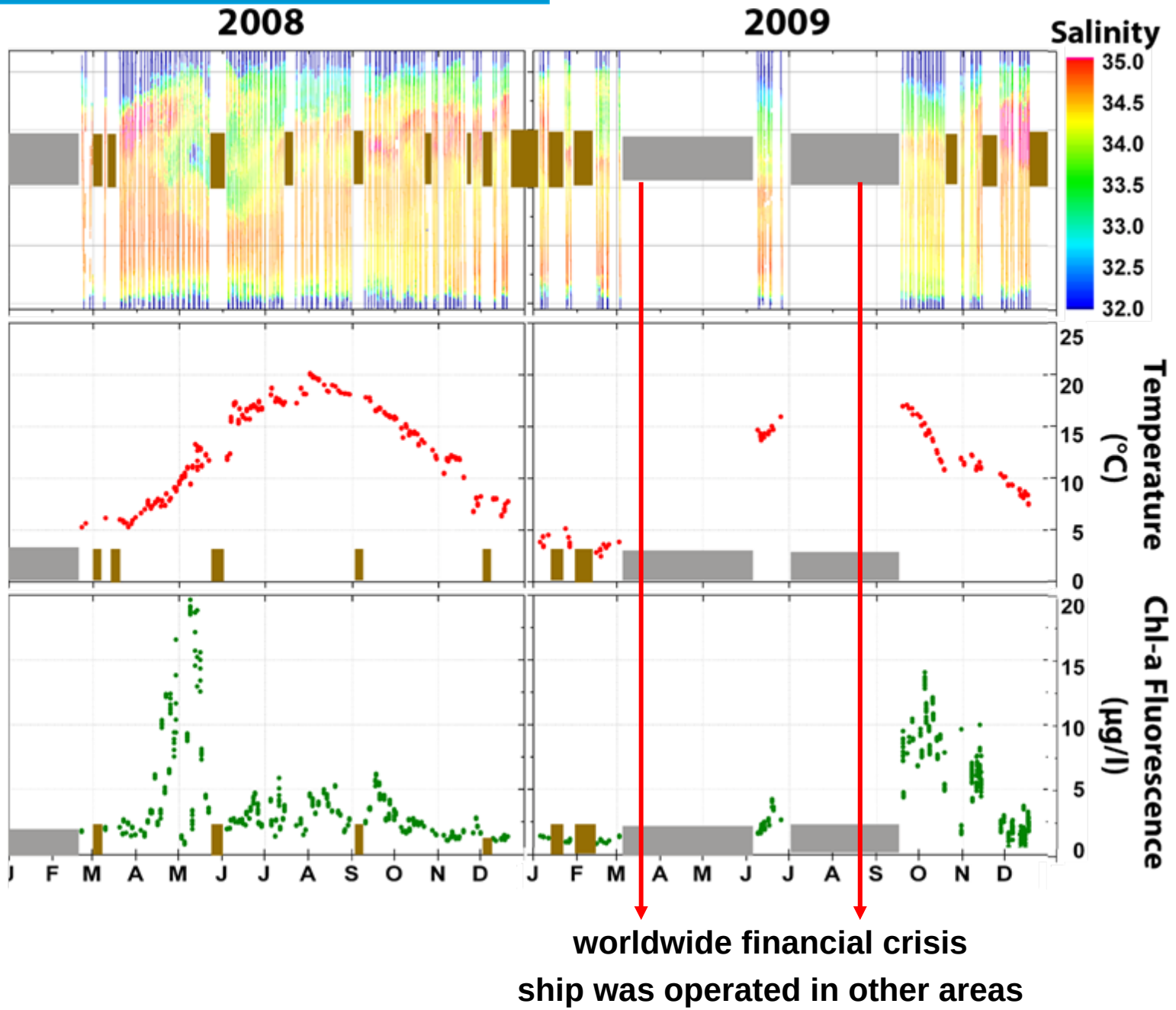

Data examples

Combination of Chlorophyll-a data from Satellite Image (MERIS) and FerryBox (May 2011)

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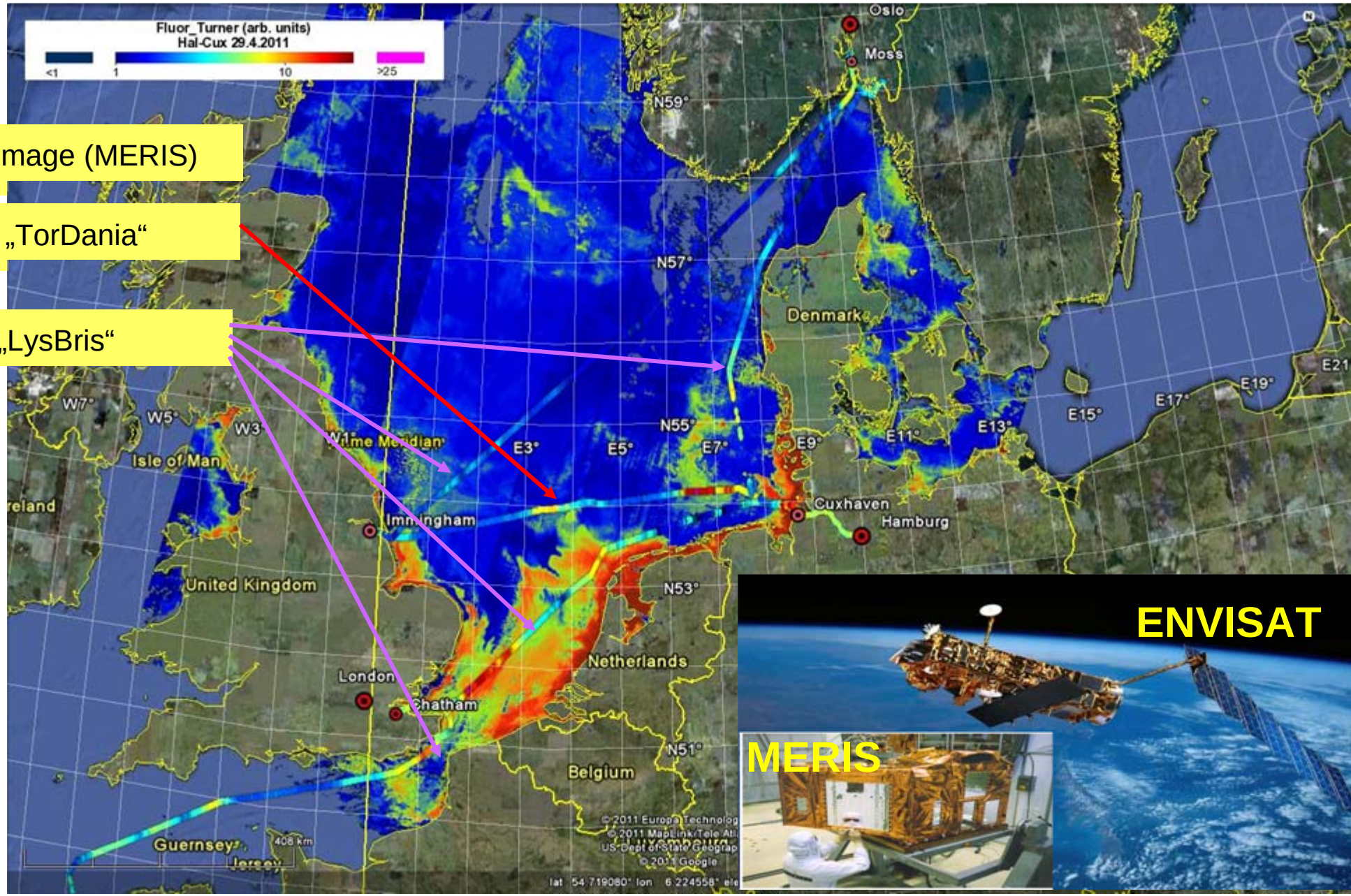

Detection of a freshwater intrusion by two independent FB Lines in 2008

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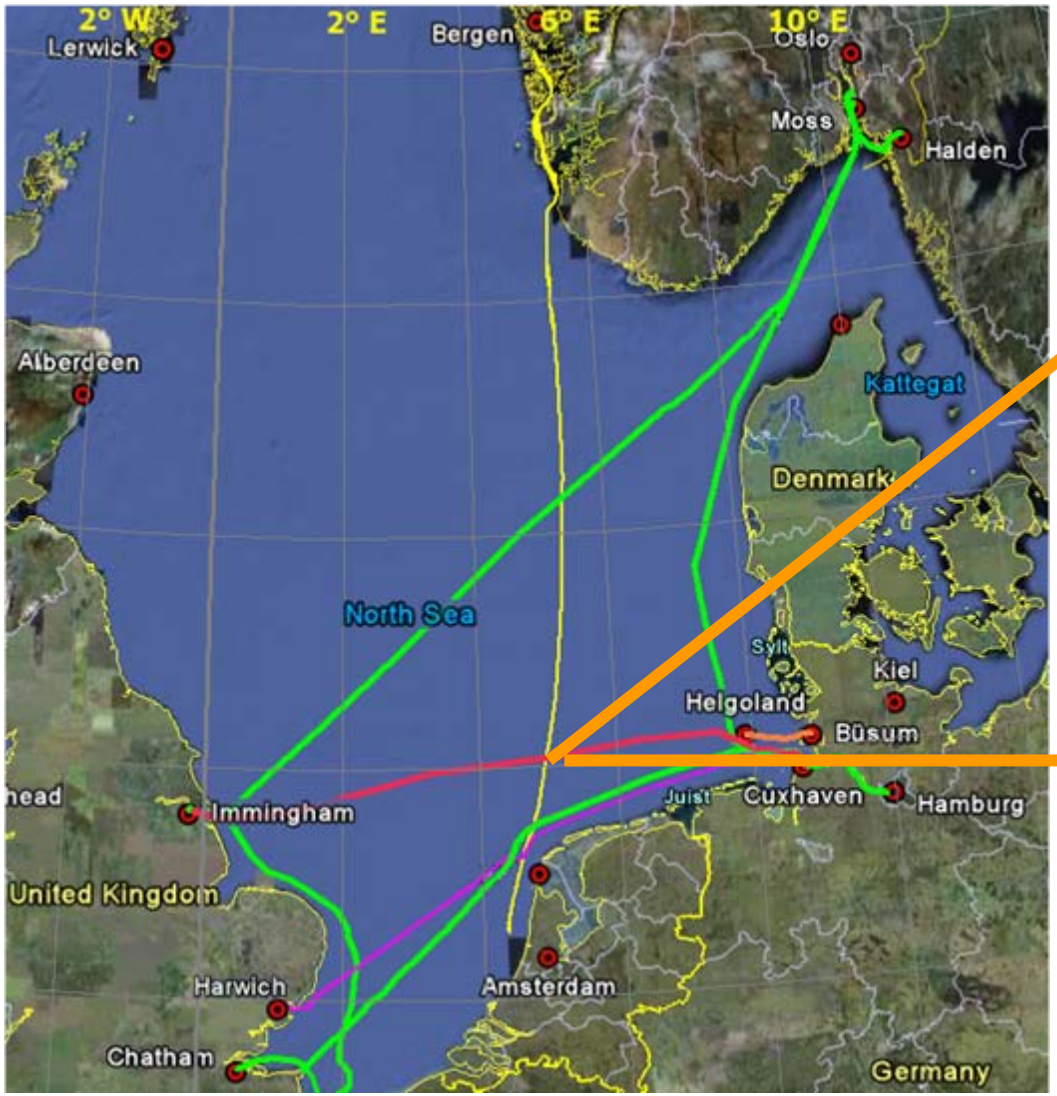

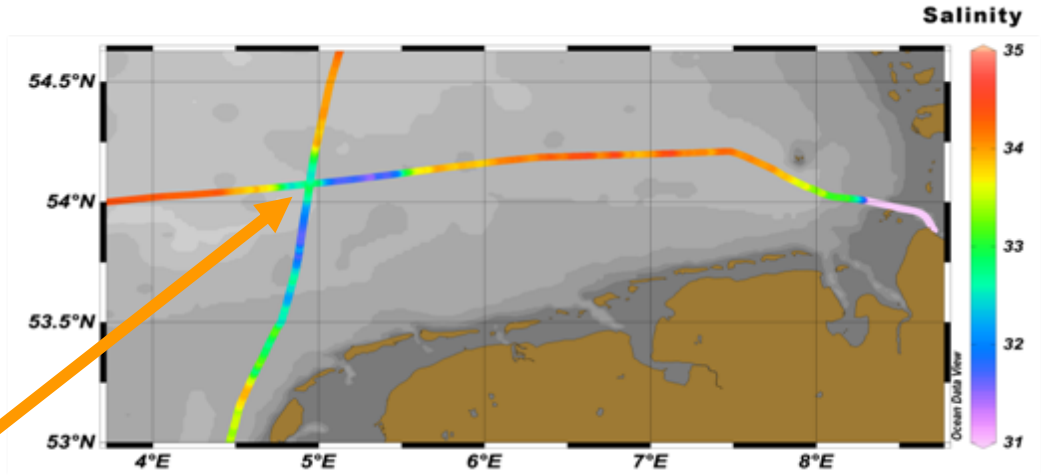

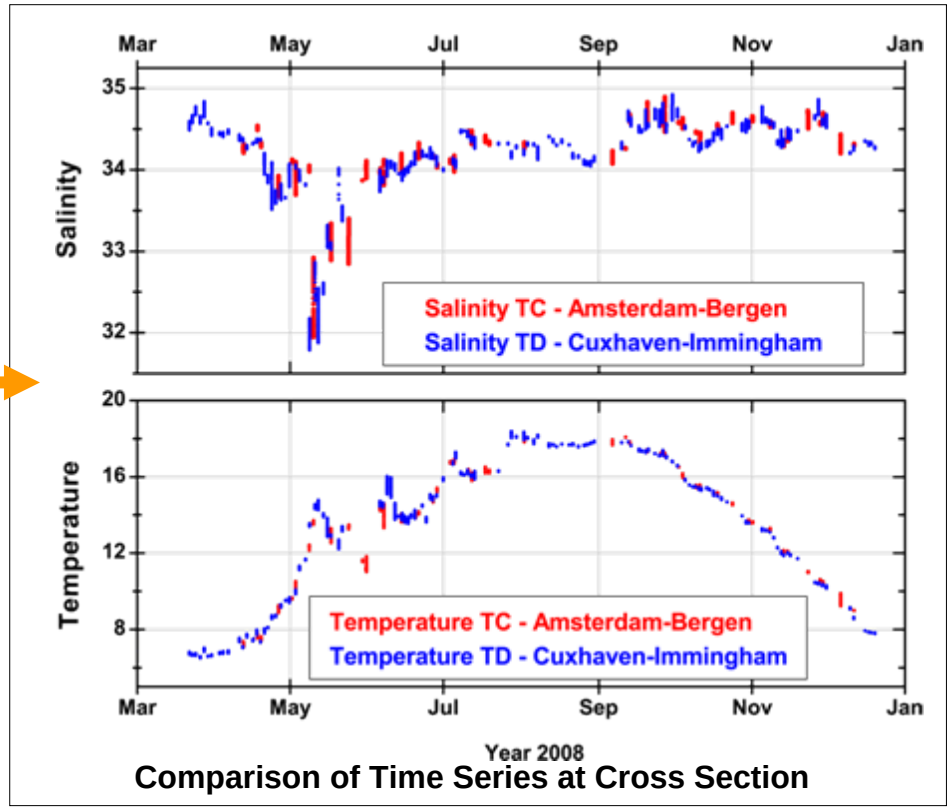

Comparison of Time Series at Cross Section

Origin of Freshwater Intrusion
Investigation by hydrodynamic models (CoastDat)

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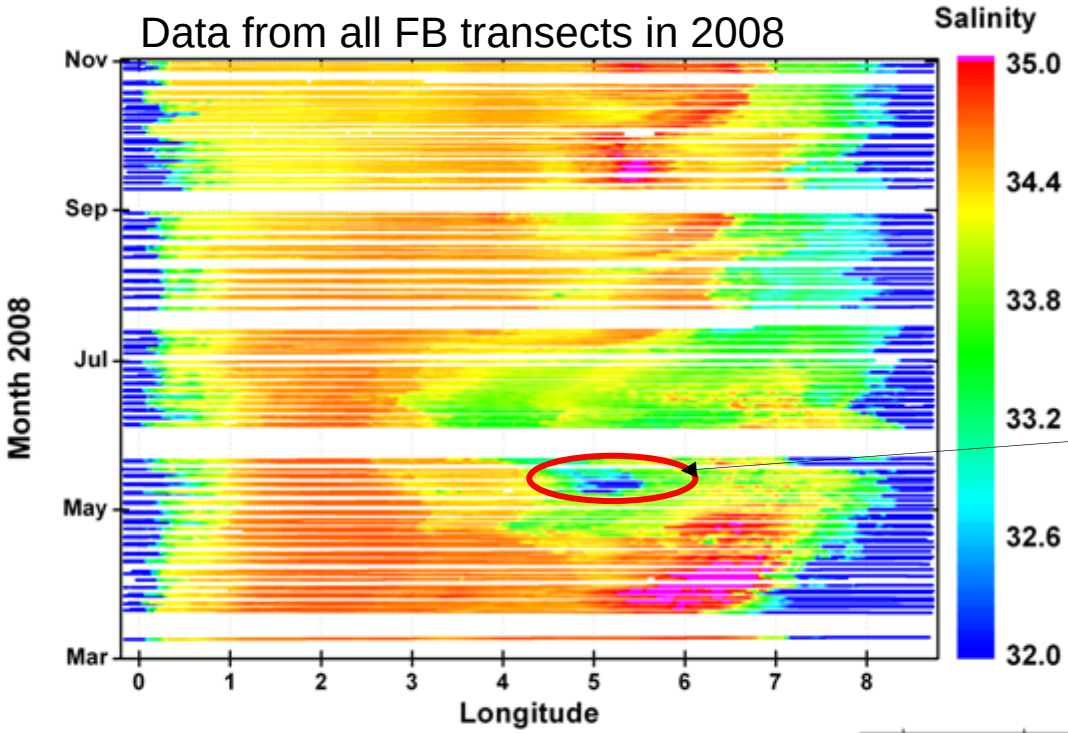
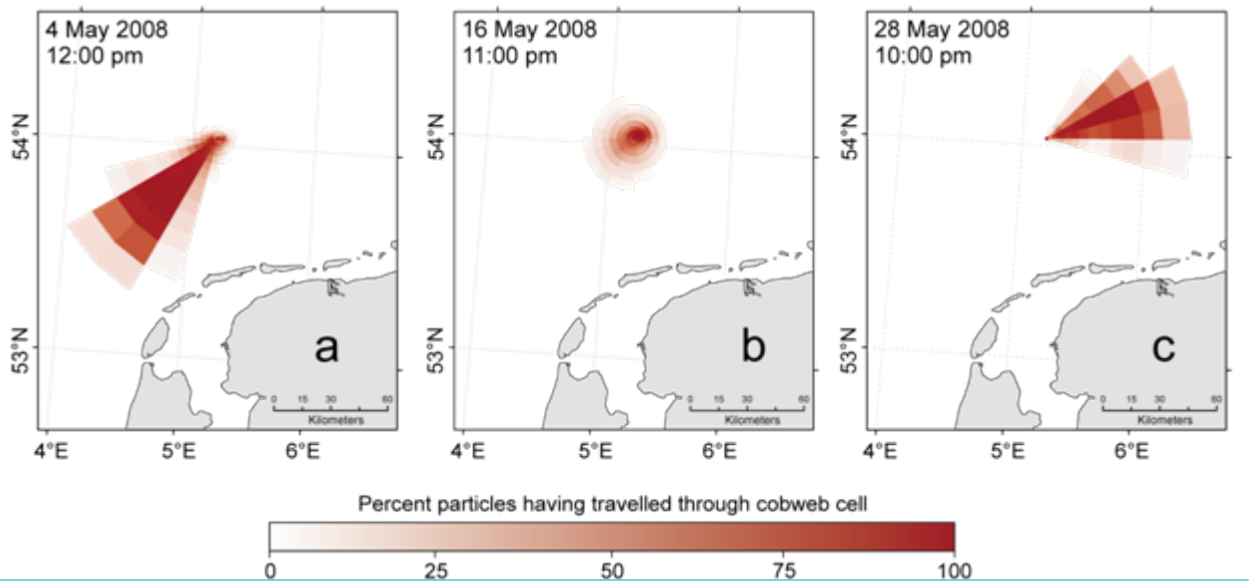
Data from all FB transects in 2008



Freshwater intrusion in May 2008

Origin of water masses
Calculated by drift model (CoastDat)



Petersen et al., Ocean Dynamics 2011 (in press)

From physical towards biological relevant data: Algae dynamics and impact on carbon budget (pH and pCO2)

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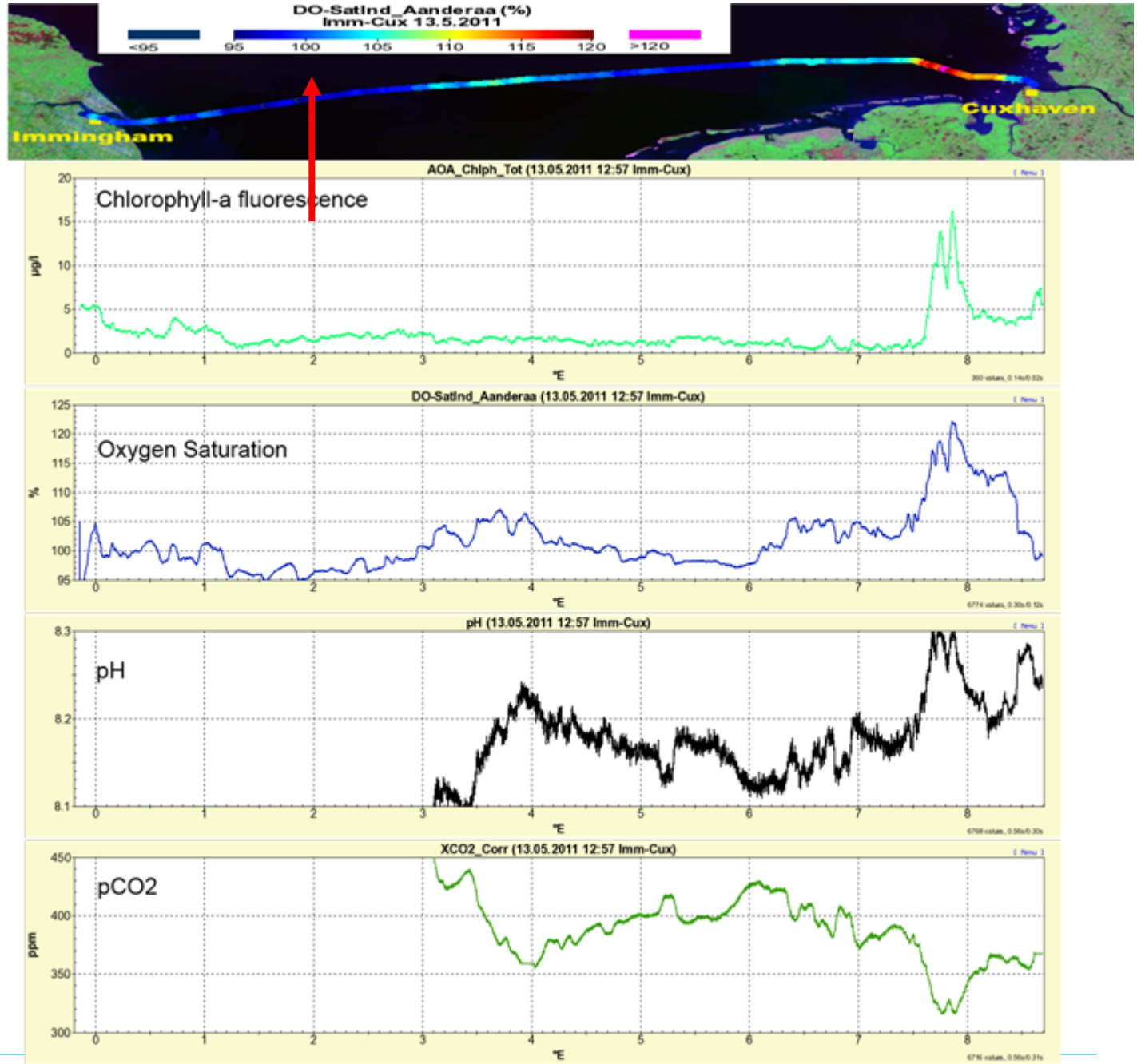
Transect 13th of May 2011



Development of pCO2 in Summer 2011 on the Route Immingham - Cuxhaven

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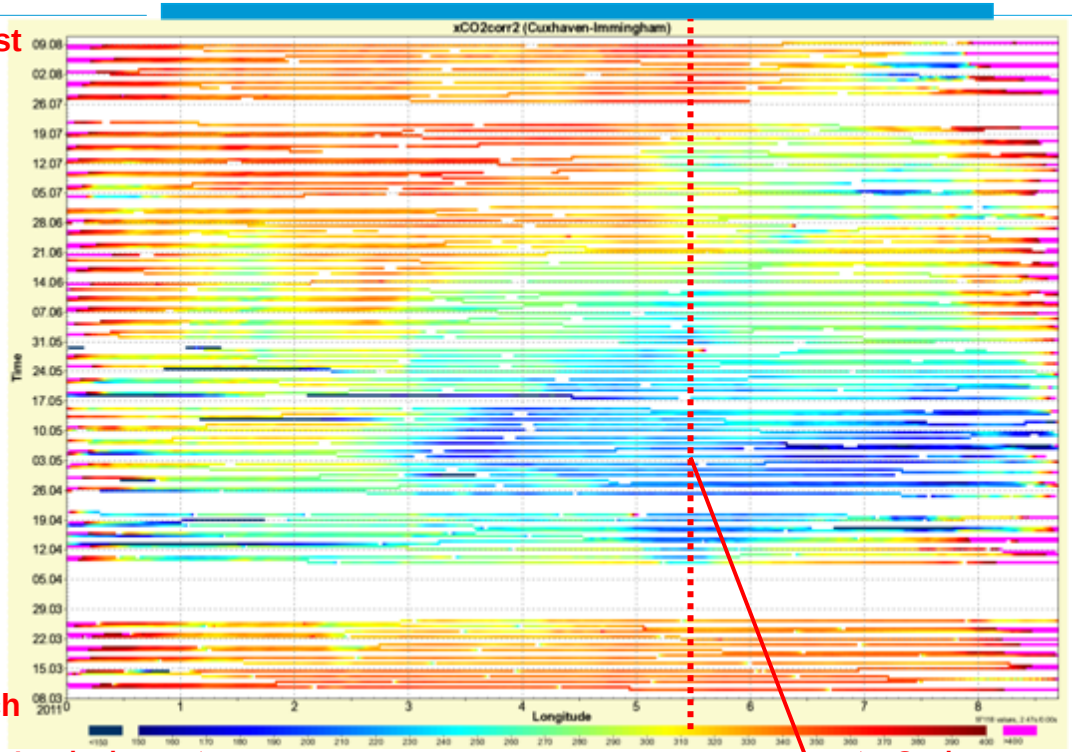
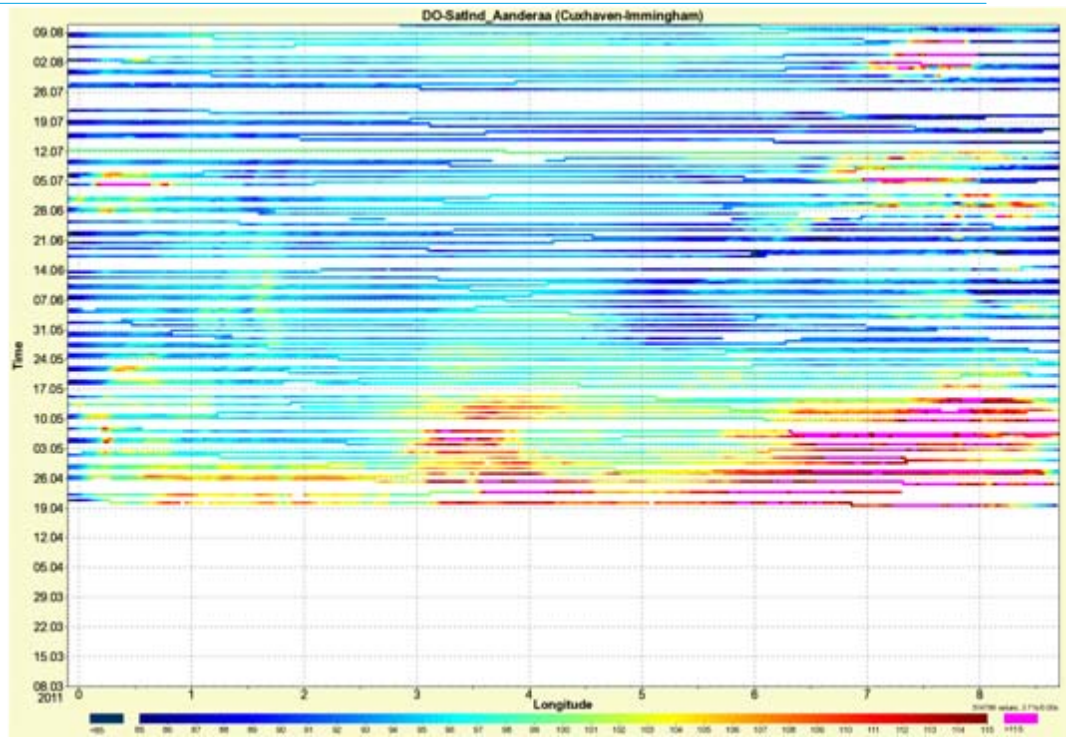
August

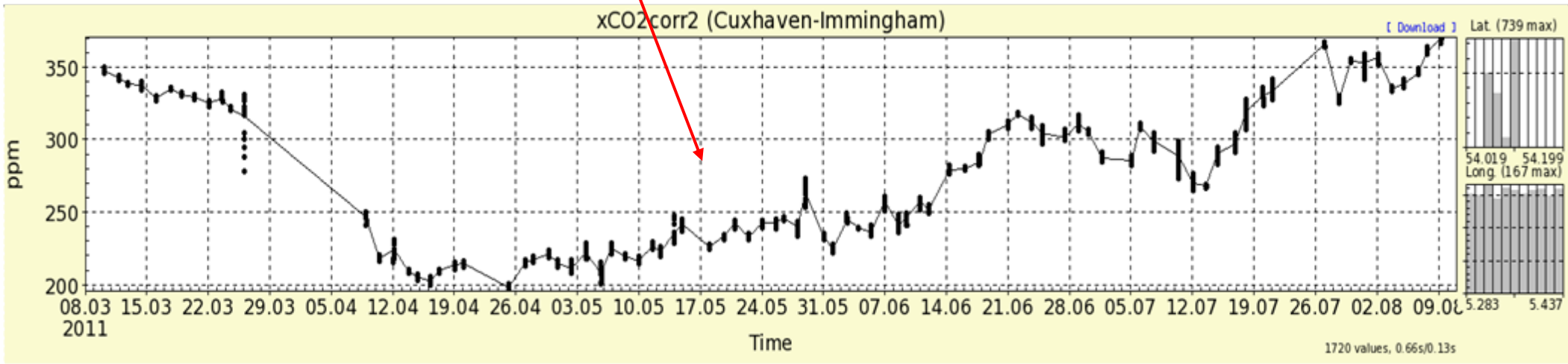


March

Immingham ⟷ Cuxhaven



Immingham ⟷ Cuxhaven



FerryBox Systems aboard Research Vessels

North Sea Monitoring Cruise (BSH)
FB aboard RV Pelagia (August 2010)

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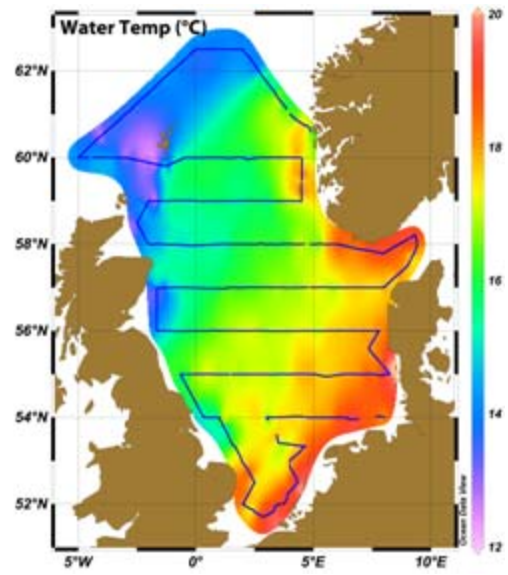

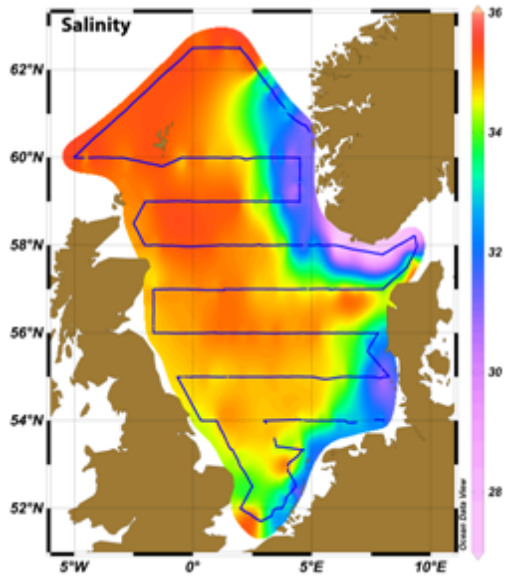

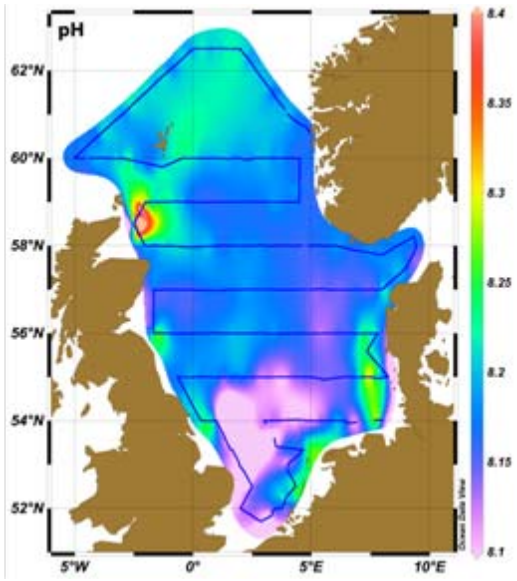

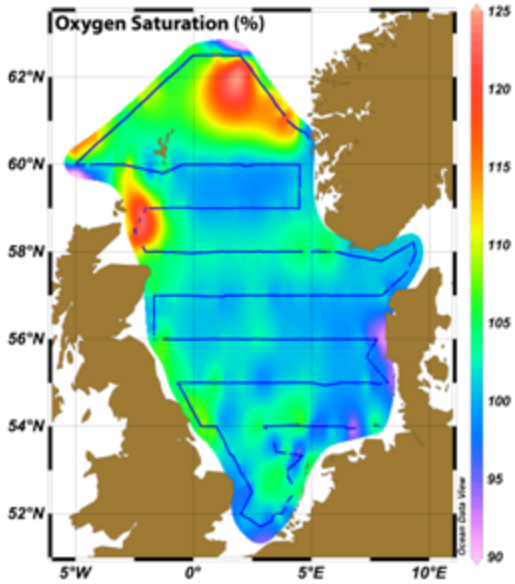

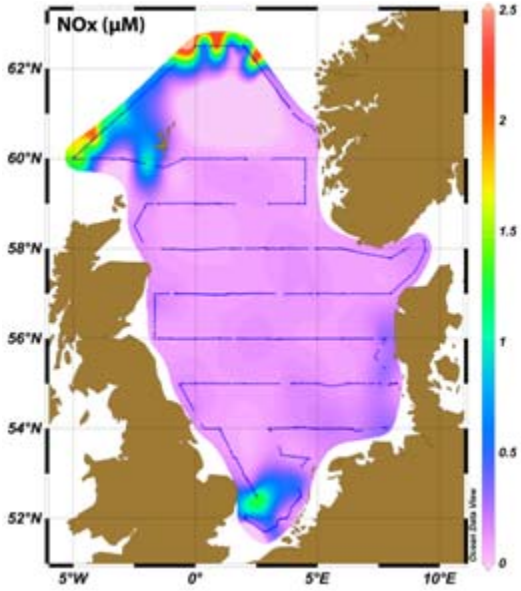

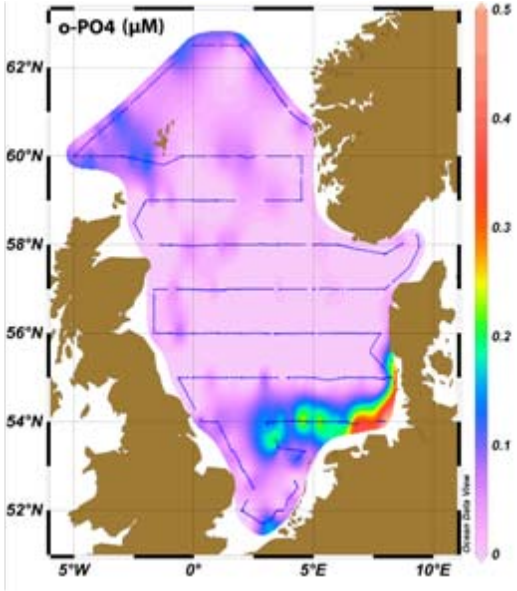

Permanent FerryBox aboard RV Polarstern
Data from cruise in Antarctic Jan – Apr 2010

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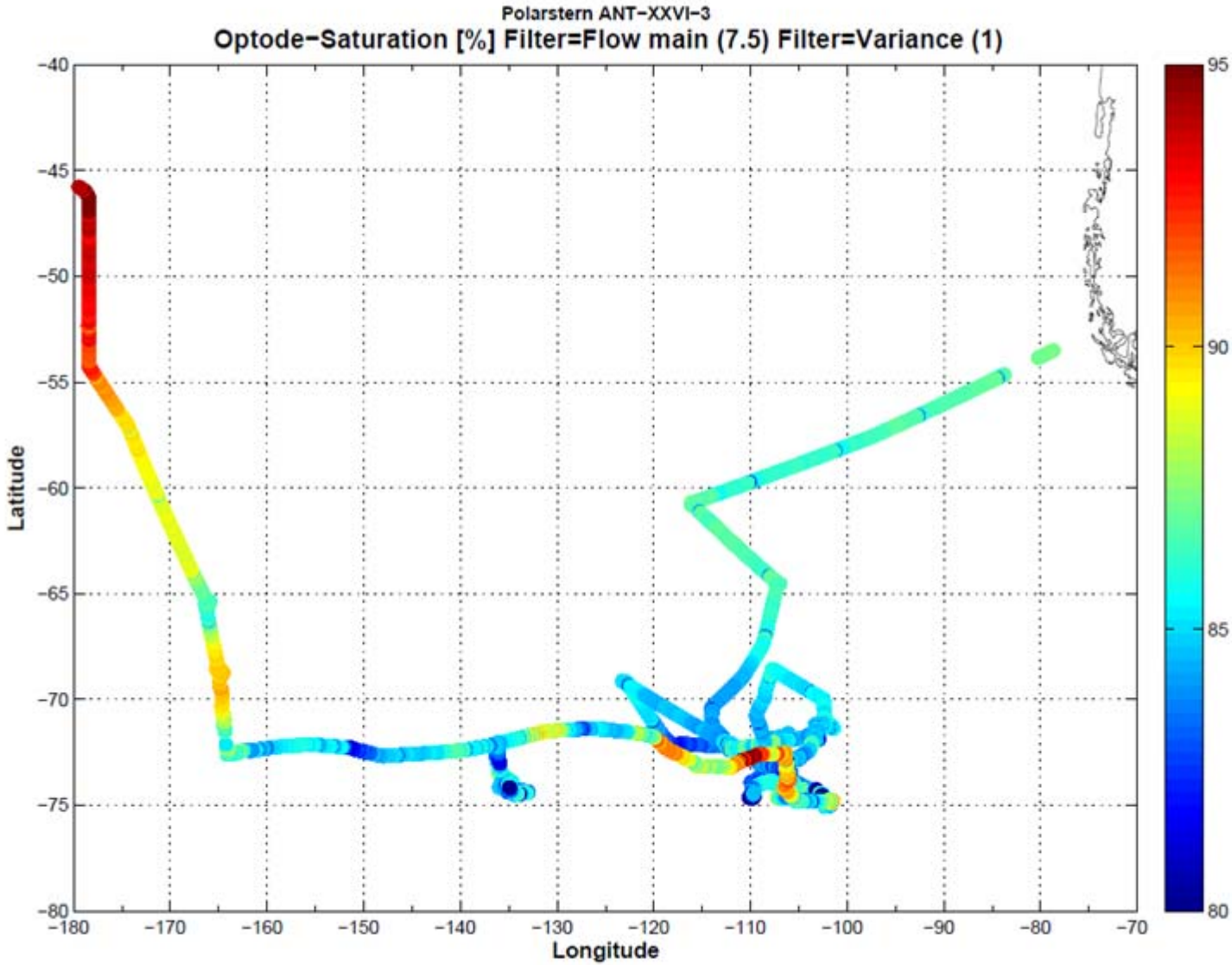

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23-Aug-2011 11:18:14

„pocket“ FerryBox

Application of the pFB in Paranaguá Bay (Brazil)

pFB aboard MS Evangelistas (Puerto Montt, Chile)

s. talk Chris Aiken

New technologies

Zooplankton Recorder (MOKI) (development AWI)

- image objects of sizes below 100µm with high resolution
- towed from research vessels,
- or as a component of the FerryBox or other platforms

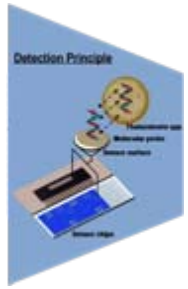
Zooplankton Recorder

Nucleic Acid Biosensor (AWI & GKSS)

• Algae taxa and algal groups

High precision pH sensor

• new sensor (under development) for automatic more precise pH + alkalinity measurements for quantifying carbon budget (s. presentation Aßmann)



Biosensor

p-CO2 Sensors (installations in 2011)

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

PSICam

• point-source integrating-cavity absorption meter for better quantification of chlorophyll-a and detection of algal species (s. poster Wollschläger)

Summary FerryBox Experiences:

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- **Data availability:**
  - high availability of qualified data
  - However: "Ships are coming and going".
    Be aware that your platform can suddenly disappear!
- **Ferries vs. cargo ships:**
  - operation aboard of ferries much easier
    problems of cargo ships: irregular schedule, rolling problems …
- **Ferryboxes aboard RVs can be a useful supplement**.
  Prerequisite: qualified maintenance
- **High resolution in space and time of FB data:**
  allows the detection and analysis of short term events
- **High quality data on temperature and salinity (and more): will be used for data assimilation**
  → Product #2 of COSYNA (end of 2011)

Summary: New Sensors

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- promising field test with new pCO2 sensor

- Further developing of new autonomous sensors with focus on biological relevant data will be helpful:

- can give new insights in biological processes which may be important for optimization and parameterization of ecosystem models
- gives the possibility for future application for data assimilation procedures in ecosystem models

FerryBox Flow-Through System

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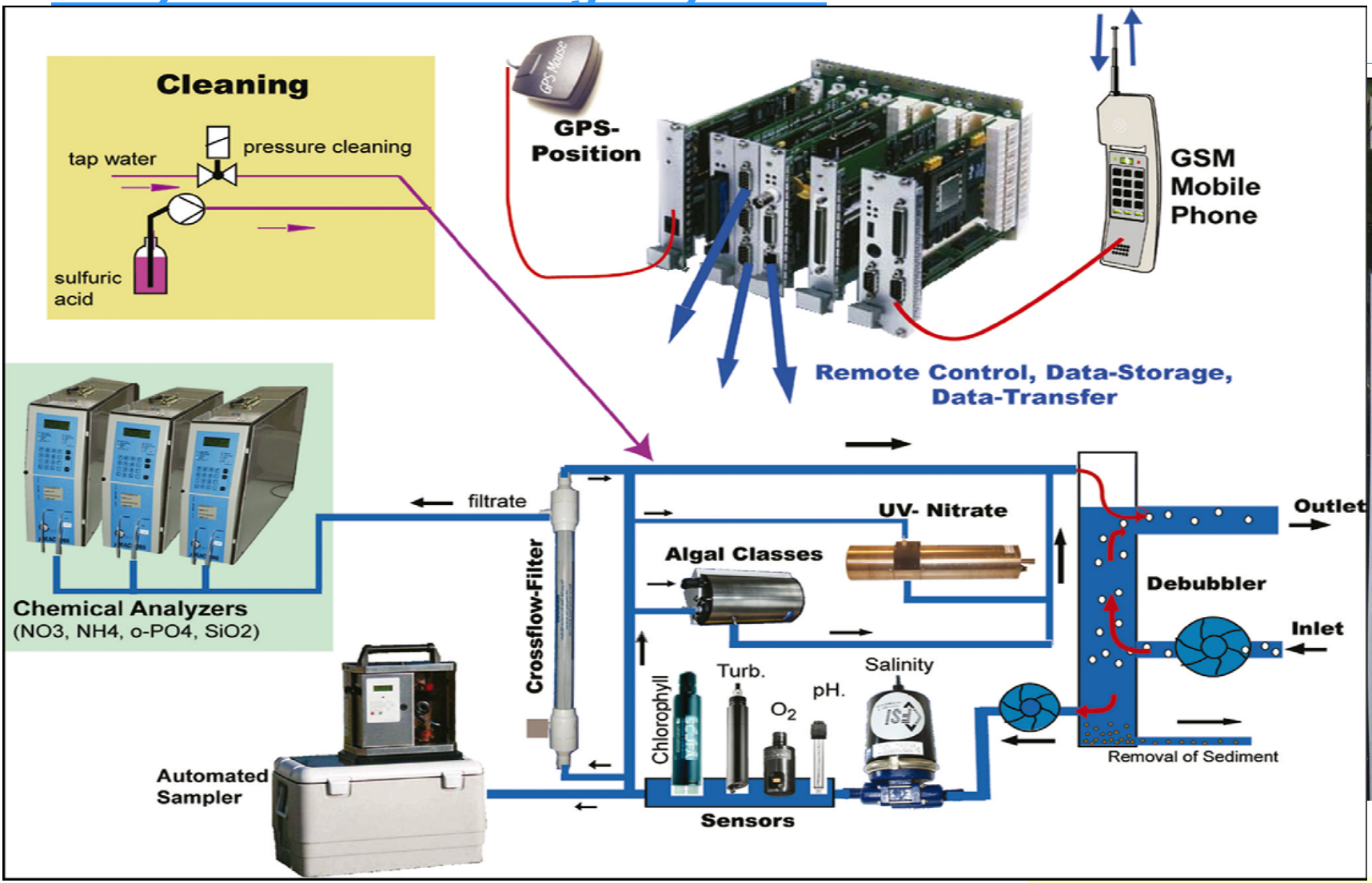

Measured Variables

- temperature
- salinity
- turbidity
- chlorophyll
- oxygen,
- pH
- algal groups
- nutrients

Main Features:

- running autonomously
- controlled by GPS position
- self cleaning (after each cruise)

+ automatic water sampler for further lab analysis

Data Quality Assurance of Salinity Data

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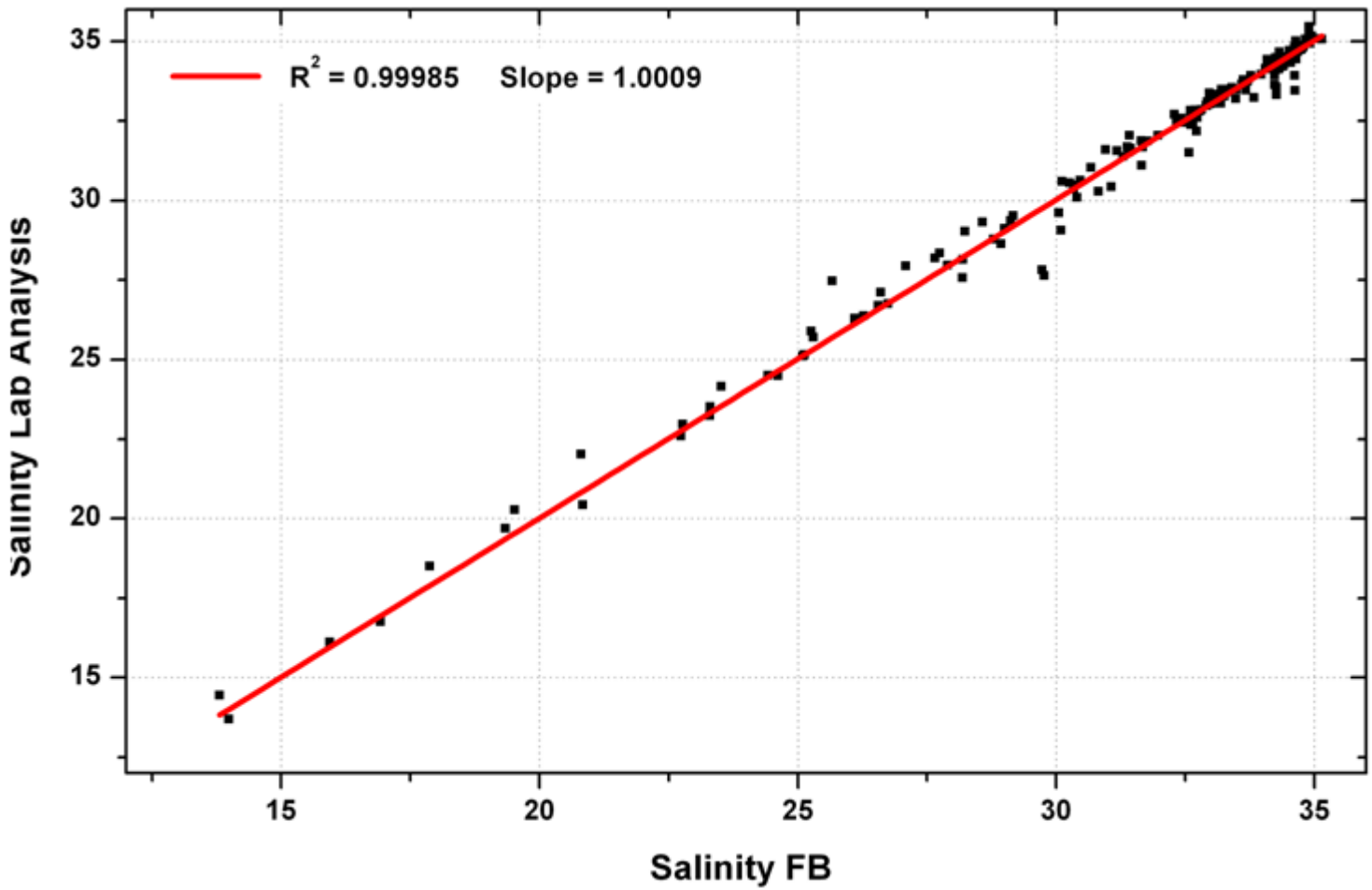
Check of Salinity Sensor:
Comparison with bottle samples:

All data from 2007 until 2010



Freshwater intrusion May 2008
Impact on nutrient concentration

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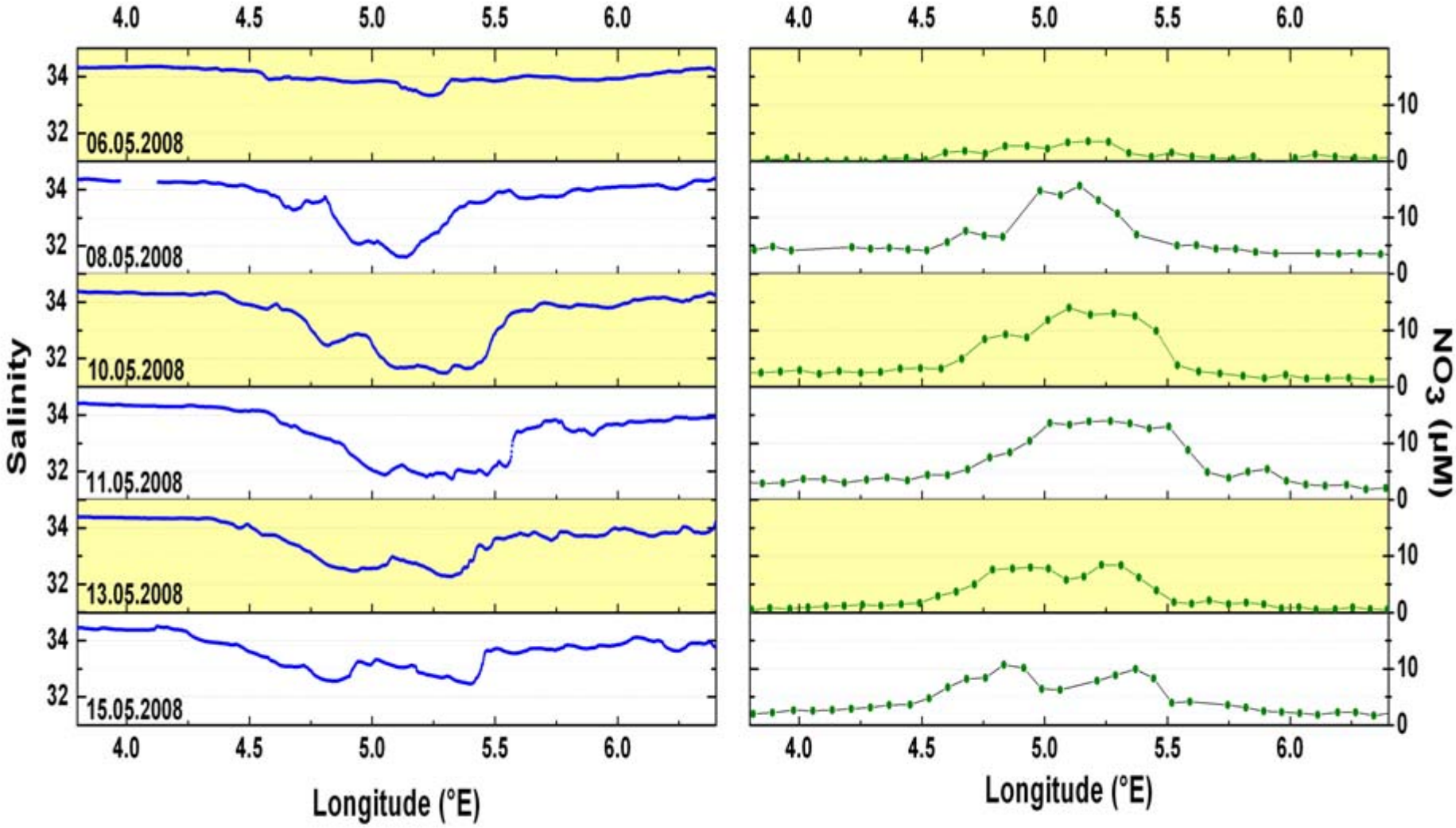
Salinity

Nitrate



pFB Application in Southern Chile (Patagonia)

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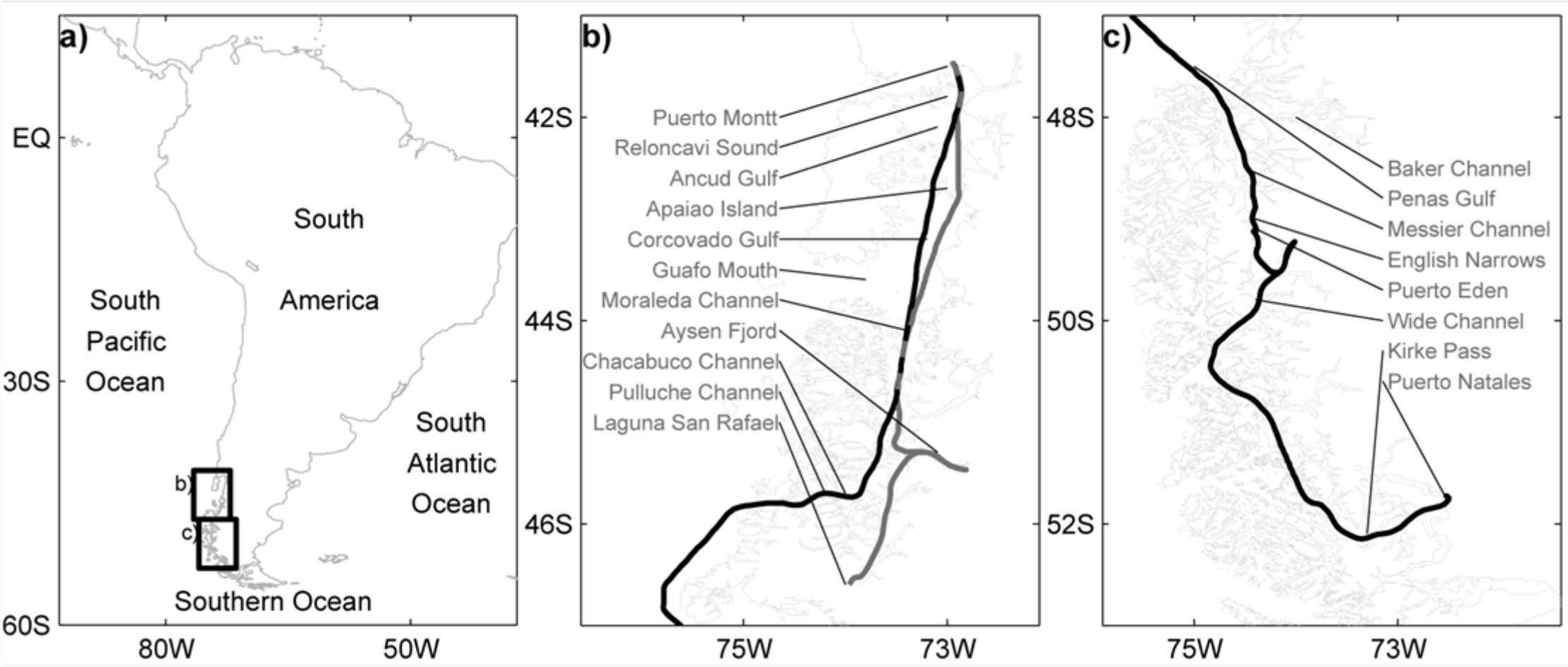

Repetitive (unattended) measurements along the transect

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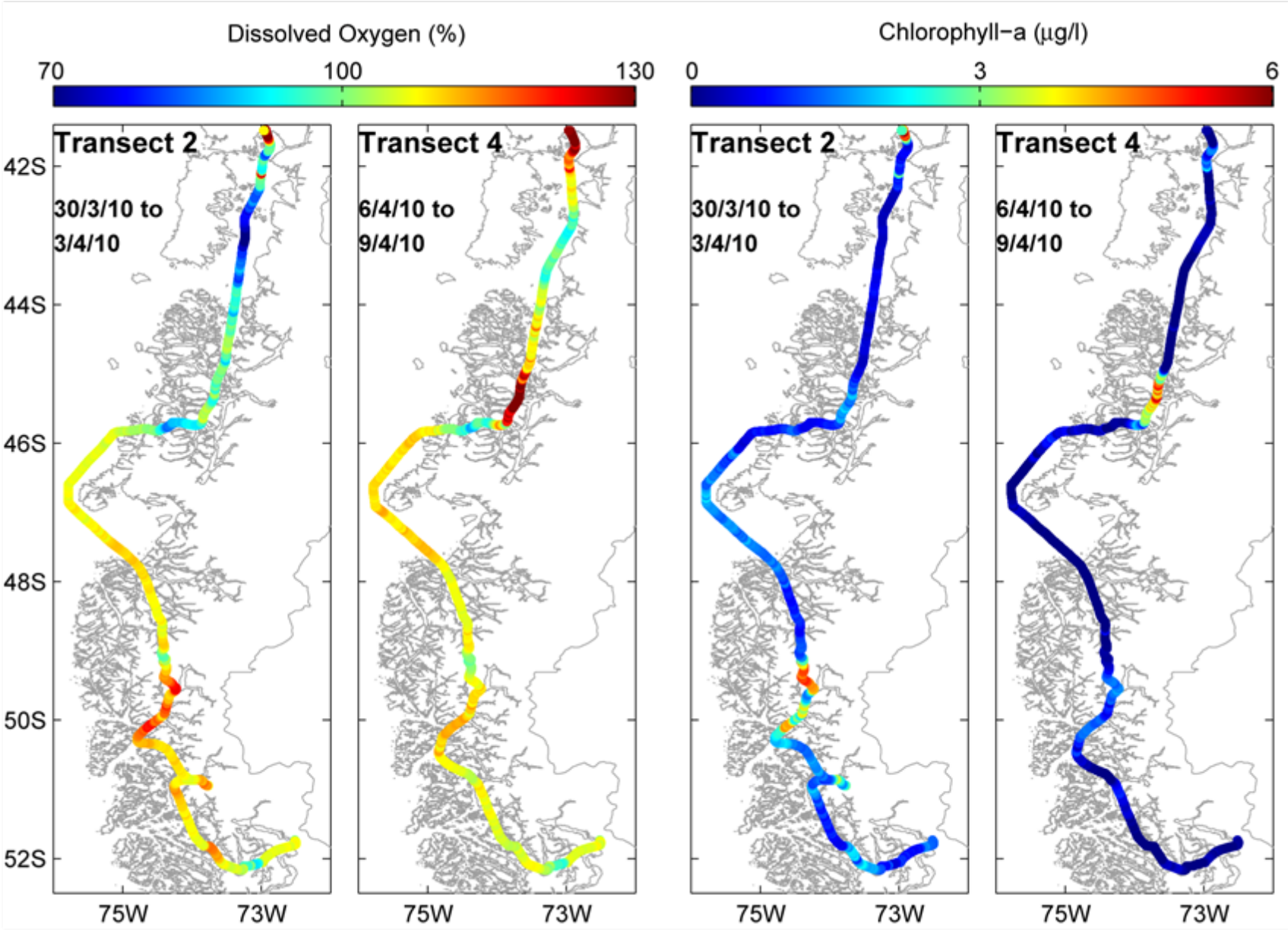

Transect from Pto Montt to Natales (March 2010) together with nutrient samples

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