20 years of FerryBox at Hereon

From Online Oceanographic Observations to Environmental Information

Dr. Wilhelm Petersen

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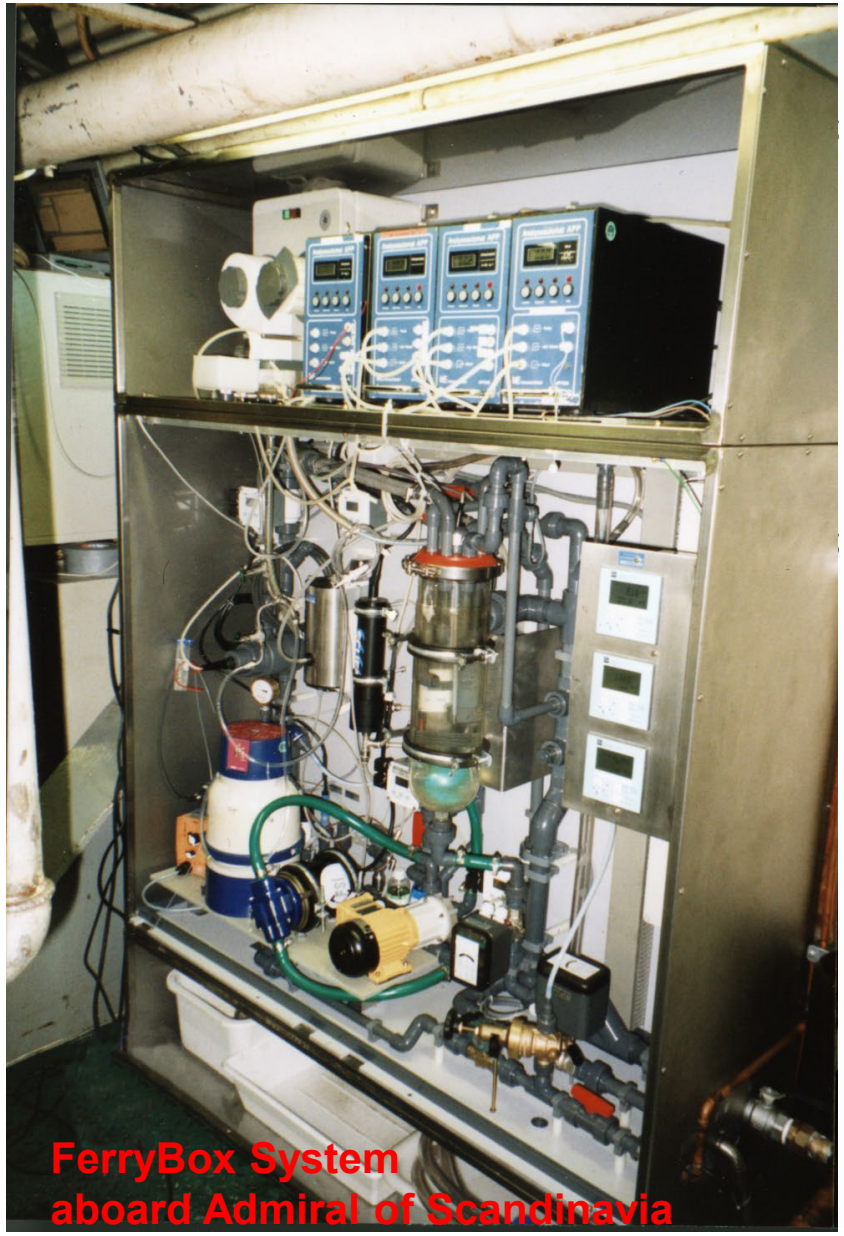
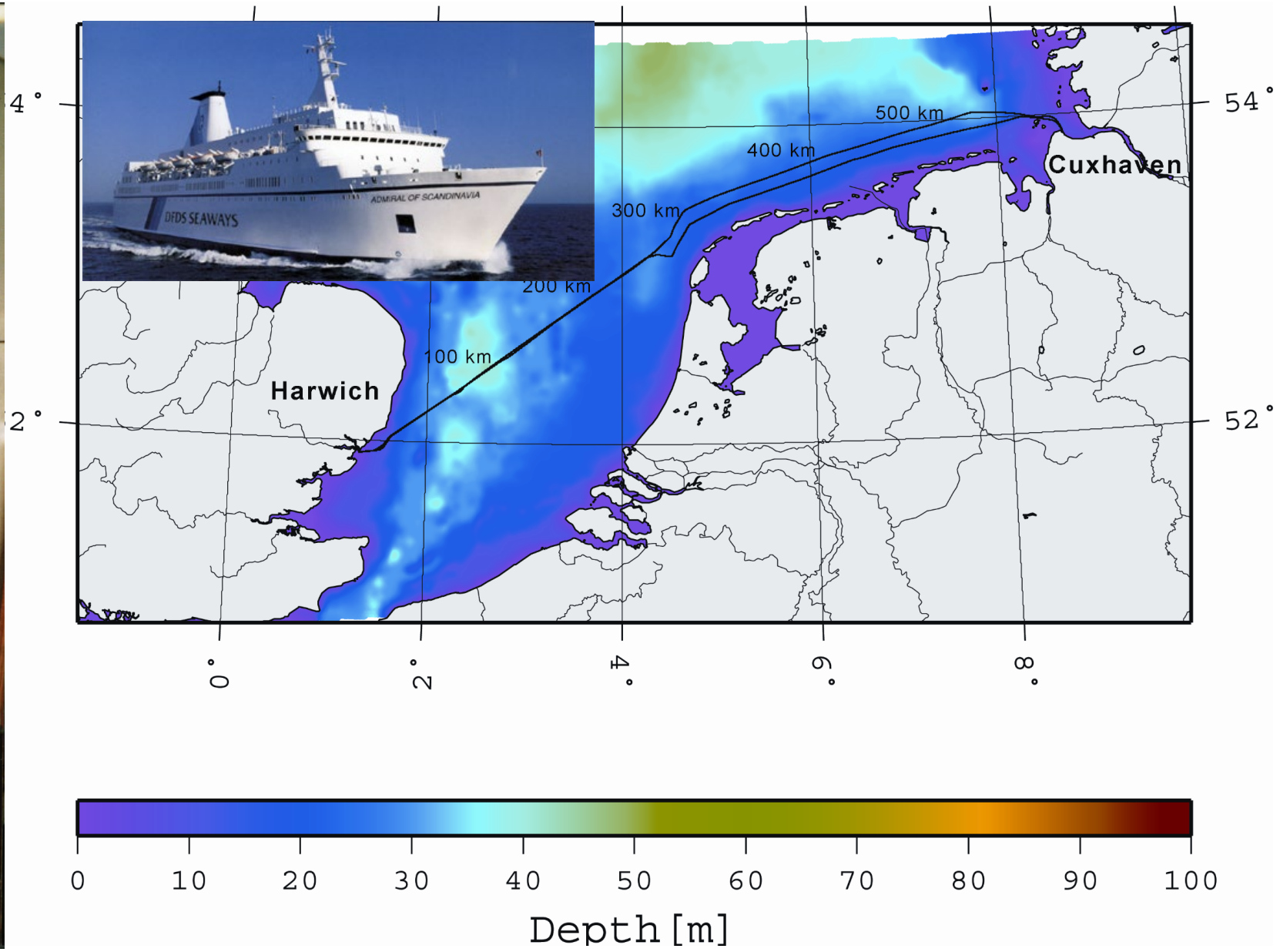
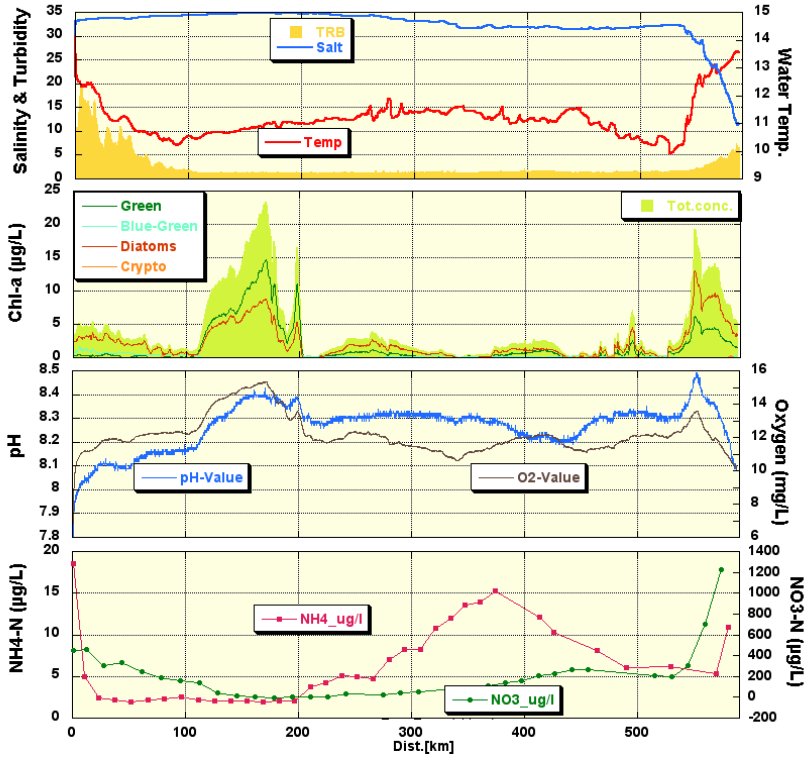
First Installation of a FerryBox onboard „Admiral of Scandinavia“
Route: Hamburg/Cuxhaven <-> Harwich (November 2001)

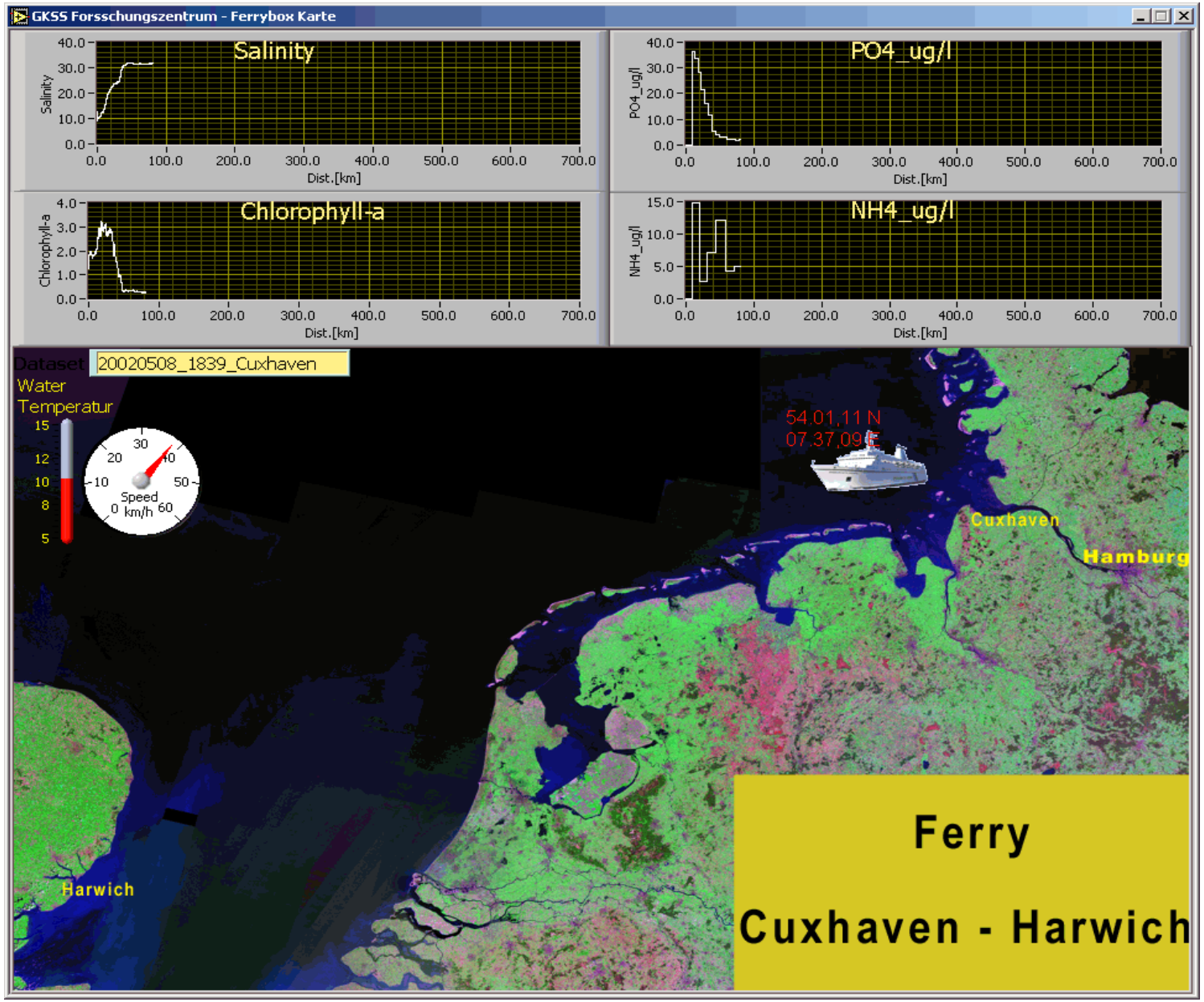


FerryBox System
aboard Admiral of Scandinavia



Exciting continous measurements along the German and Dutch Coast





First painful experiences with voluntary ships („Ships are coming and going“)

November 2001 - November 2002

November 2003 - November 2005

Dismantling the Equipement
from Admiral of Scandinavia, Nov. 2002


Dismantling the Equipement
from Duchess of Scandinavia 2005

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Cooperation with Company 4H-Jena for the Development of Commercially Available System

Large 4H-FerryBox I

Open system
many sensors
easily expandable

Small 4H-FerryBox II

Closed system
less sensors
expandable

portable FerryBox (“pocketFB”)

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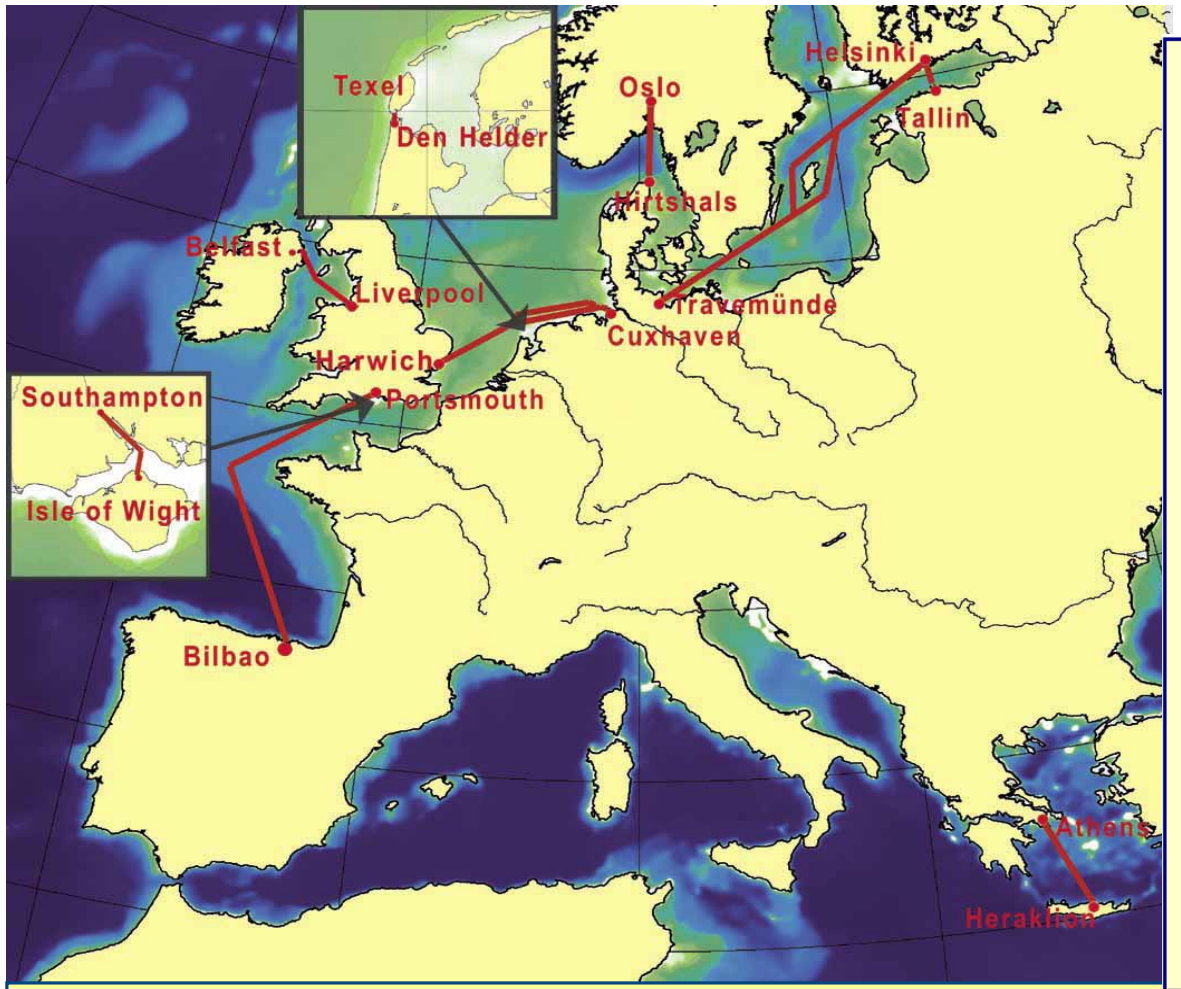
EU-Project FerryBox (led by GKSS) from 2002 - 2005



Project participants

- GKSS Research Centre, Institute for Coastal Research, Germany
- NERC – Southampton Oceanography Centre, UK
- NIOZ – Royal Netherlands Institute of Sea Research, the Netherlands
- FIMR – Finnish Institute of Marine Research, Finland
- NCMR – National Centre for Marine Research, Greece
- NERC – Proudman Oceanographic Laboratory, United Kingdom
- NIVA – Norwegian Institute for Water Research, Norway
- HYDROMOD Scientific Consulting, Germany
- CTG – Chelsea Technologies Group, United Kingdom
- IEO – Spanish Institute of Oceanography, Spain
- EMI – Estonian Marine Institute, Estonia


FerryBox Consortium at Annual Meeting in Athens 2003

Baltic Sea	Helsinki (FI) - Travemünde (D)
	Helsinki (FI) - Tallinn (EE)
Skagerrak	Oslo (N) - Hirtshals (DK)
North Sea	Cuxhaven (D) - Harwich (UK)
Wadden Sea	Den Helder – Texel (NL)
Irish Sea	Liverpool (UK) - Isle of Man (UK)
Engl. Channel	Southampton - Isle of Wight (UK)
Bay of Biscay	Portsmouth (UK) - Bilbao (ES)
Aegean Sea	Athens - Heraklion (GR)

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Soon after Finishing the EU Project:

1st FerryBox Workshop in Oslo (organized by NIVA) in 2006

The FerryBox group was growing:
4th FerryBox workshop in Geesthacht, Germany in 2011

FerryBox TaskTeam

EuroGOOS European Global Ocean Observing System

About | FerryBox Routes | Data & Dissemination | Contact & Links

Home > FerryBox Workshops

- Future Perspectives
- FerryBox Workshops
- Publications
- FerryBox Online Data
- EU Project Ferrybox 2003-2005

Data & Dissemination

FerryBox Workshops

After completion of the EU-funded project 'FerryBox' in 2005 the FerryBox community wanted to improve the combined knowledge. Therefore the FerryBox workshops were originated in order to share experience and knowledge about the use of different underway systems.

Geesthacht / Germany 2022	SMHI (online) 2021	Genoa / Italy 2019	Color Fantasy 2017	Heraklion 2016	Tallinn 2014
Helsinki 2013	Geesthacht 2011	Göteburg 2010	Southampton 2008	Oslo 2006	

11th FerryBox Workshop in Geesthacht, Germany

JERICO-S3 North Sea & English Channel PSS and Norwegian Sea & KASKENS IRS Meeting & 11th FerryBox Workshop

26-29 September 2022

Hosted by the Helmholtz-Zentrum Hereon, Geesthacht, Germany, as well as online

✓ Register your attendance and intention to present by the 1st of July 2022 here: https://ms.hereon.de/ferrybox_workshop/

www.ferrybox.org

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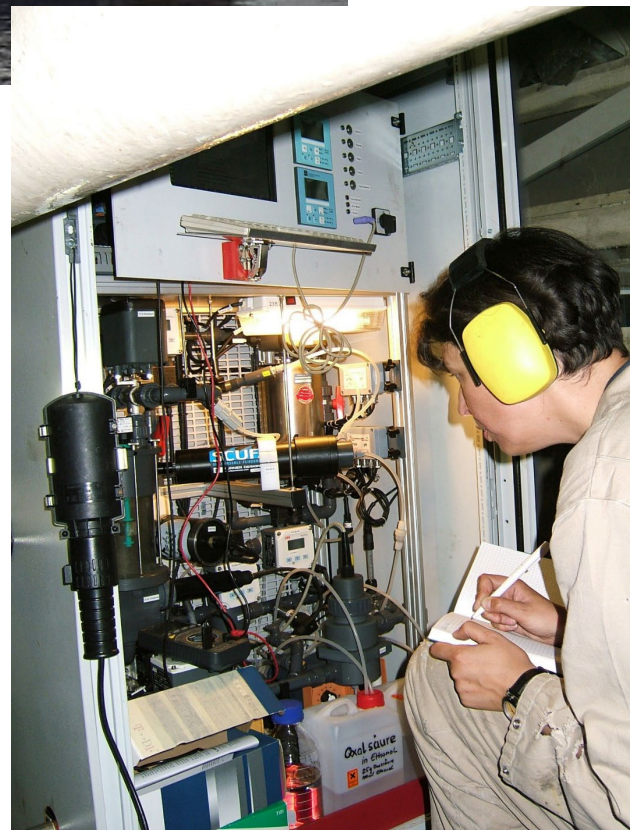
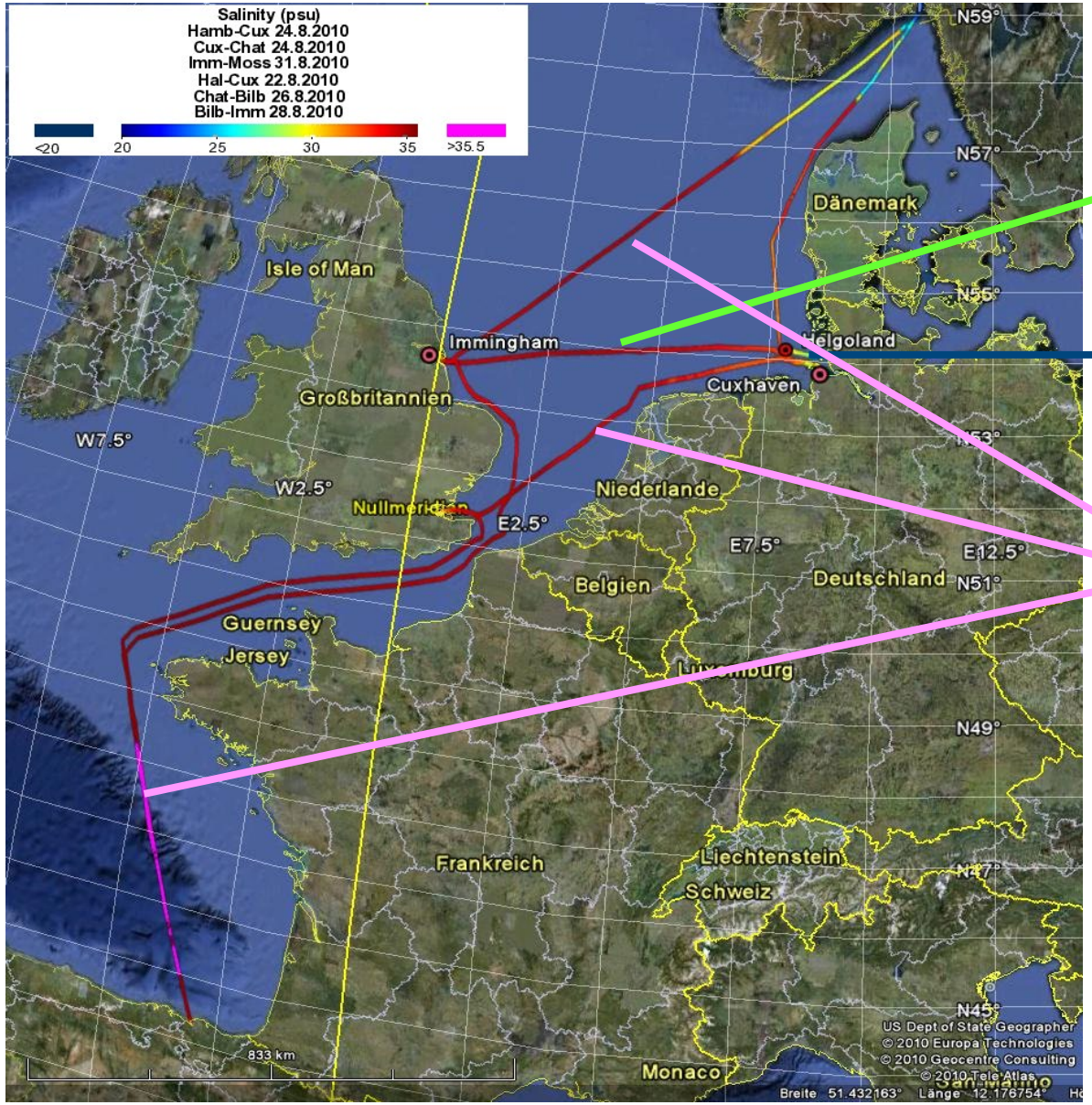
Transition from Ferries to Cargo Vessels

Tor Dania (2006 – 2012)



Lysbris (2007 -)

FerryBox Lines Operated by Helmholtz-Centre Geesthacht (HZG) in 2010



FerryBox Routes (HZG)

1. **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

Measured Variables

- **temperature**
- **salinity**
- **turbidity**
- **chlorophyll**

- **oxygen,**
- **pH**
- **algal groups**
- **nutrients**
- **pCO2**

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Current FerryBox Installations at Hereon

Fixed Routes

Magnolia Seaways

Lysbris Seaways

Funny Girl

Research Vessels:

RV Ludwig Prandtl

Speedboat Eddy

RV Polarstern
(operated by AWI)

RV Heincke (temporarily)

Fixed Platforms:


FB Container Cuxhaven

Station Tesperhude

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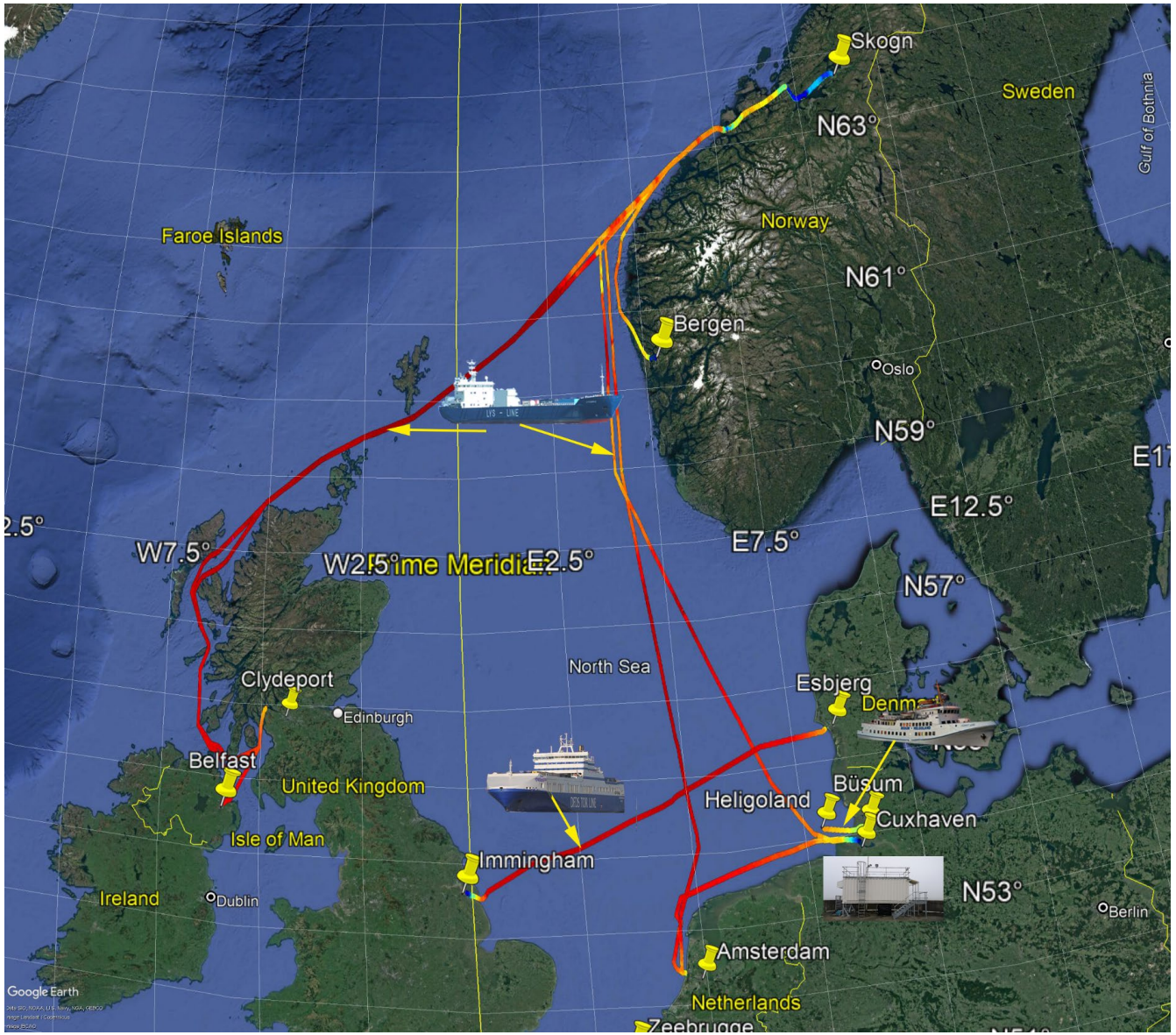
FerryBoxes operated by Hereon in the North Sea in 2022



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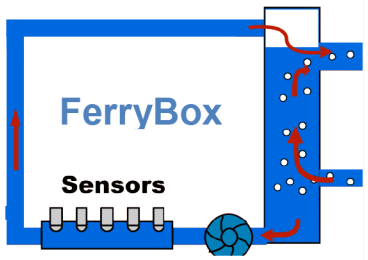
FerryBox Data Flow & Real-time Data Quality Control

All data stored on board on the FerryBox computer



Real-Time Post Processing:

All Parameters Filtered/Flagged by Housekeeping Parameters

- status of the FB
- flowrate
- speed of the vessel

Single parameters flagged by:

- range (reasonable regional & seasonal limits)
- frozen values
- variance (noise)
- spikes

automatic processing

Hereon FerryBox Database

Automated Transfer and Import into the Hereon FerryBox Database

Stored information in the database for each record:

→ date/time
→ longitude/latitude
→ physical value
→ quality flag
→ minimum
→ maximum
→ variance
→ counts

Web-based visualization tools at
http://ferrydata.hereon.de

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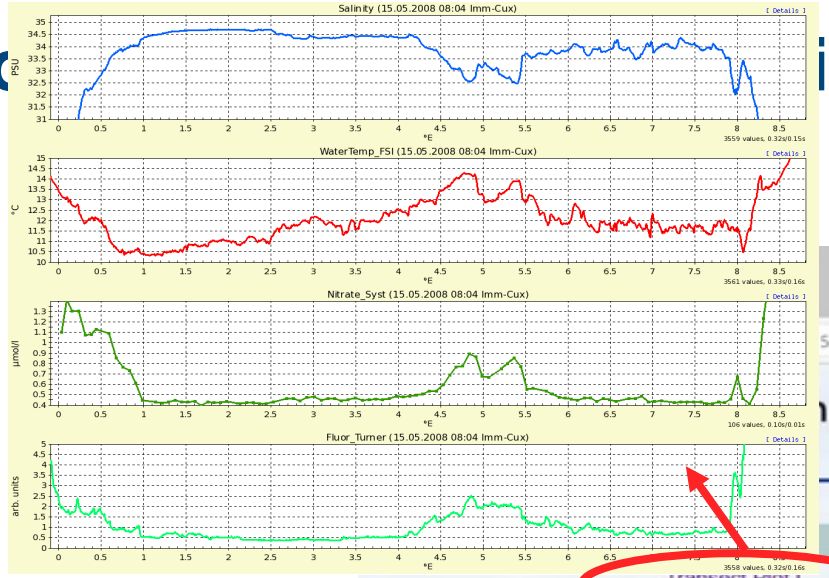
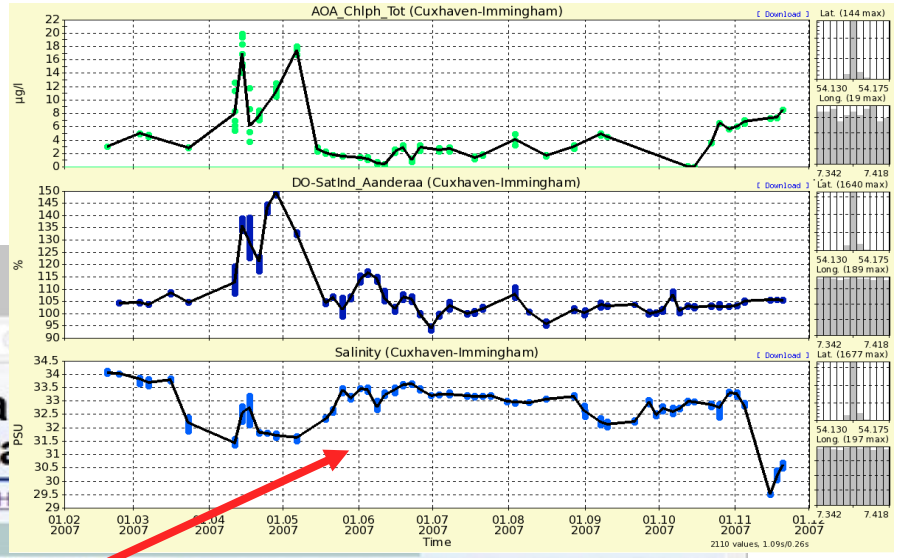
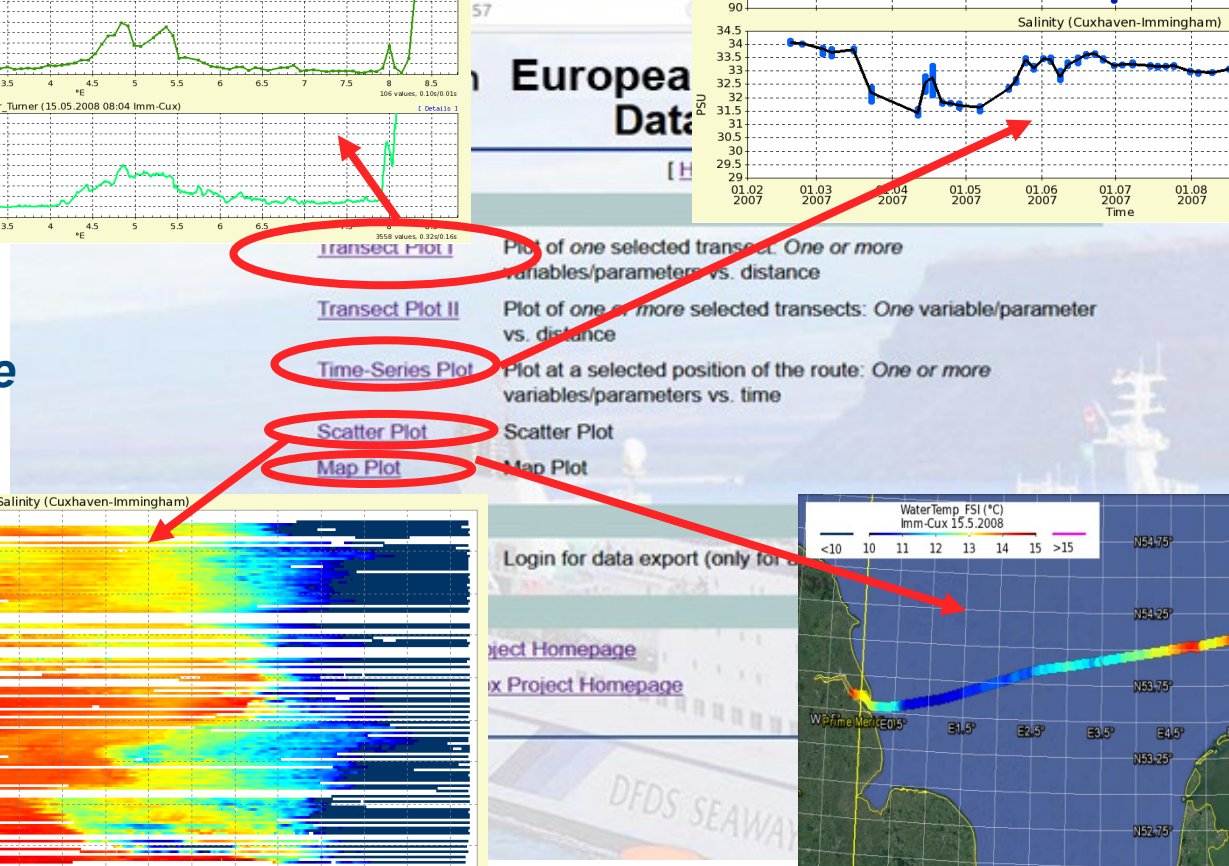
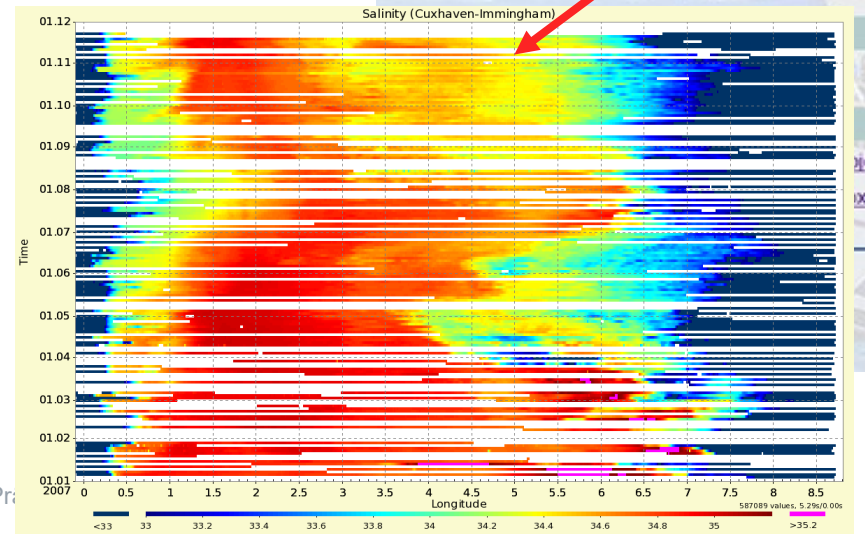
Web To ion

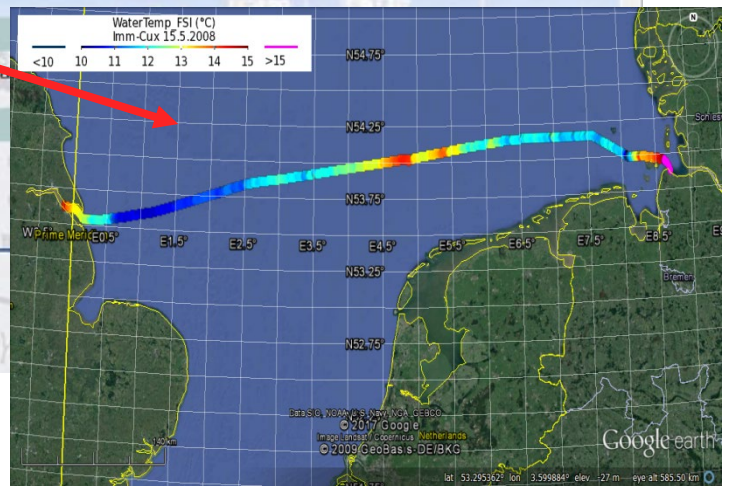




https://ferrydata.hereon.de







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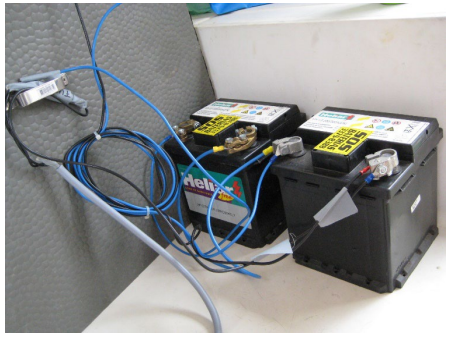
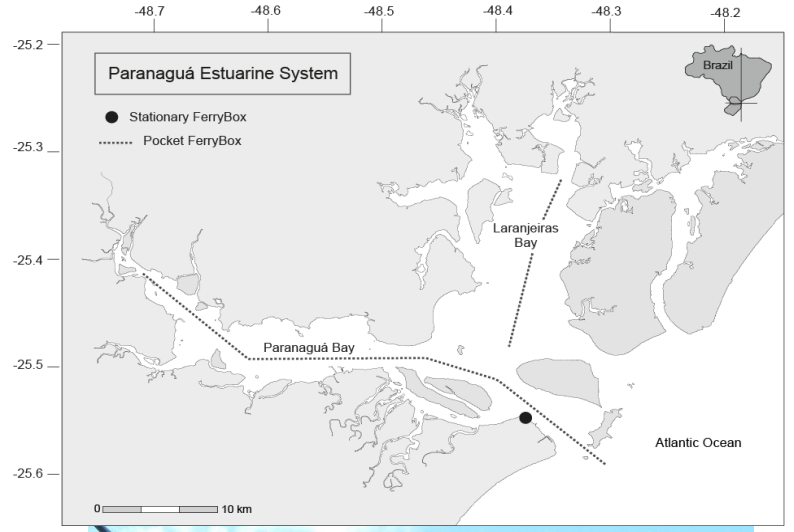
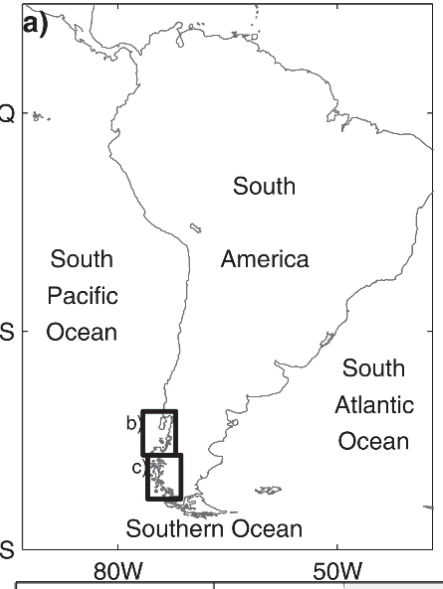
Involvement in International Projects with FB Applications

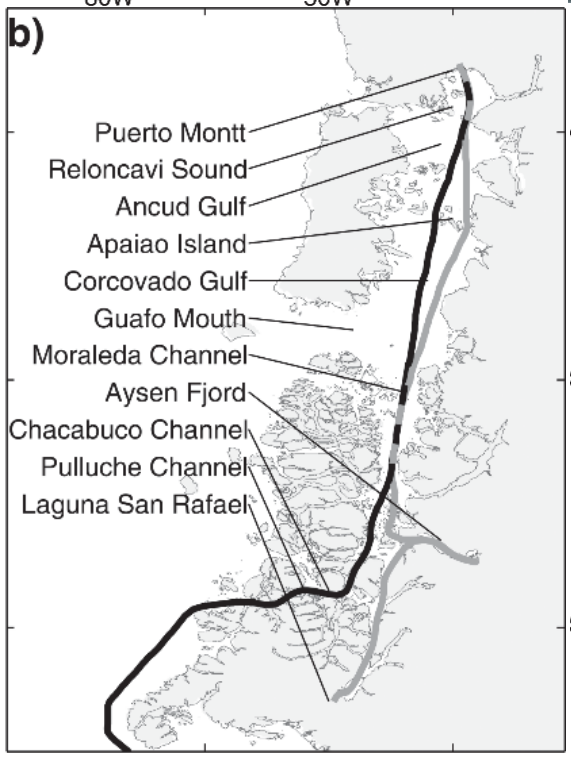
Application of a pFB and Stationary FB in Paranaguá Bay (Brazil)

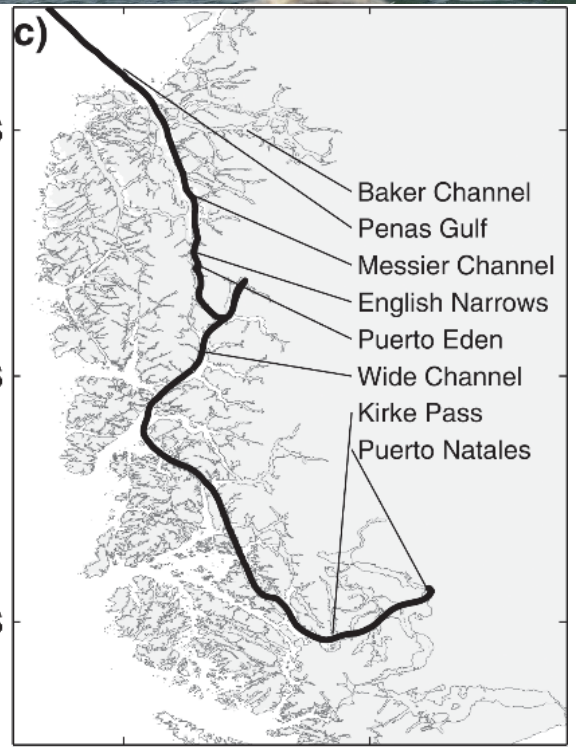




Operation of a FerryBox System in Chile (Patagonia)





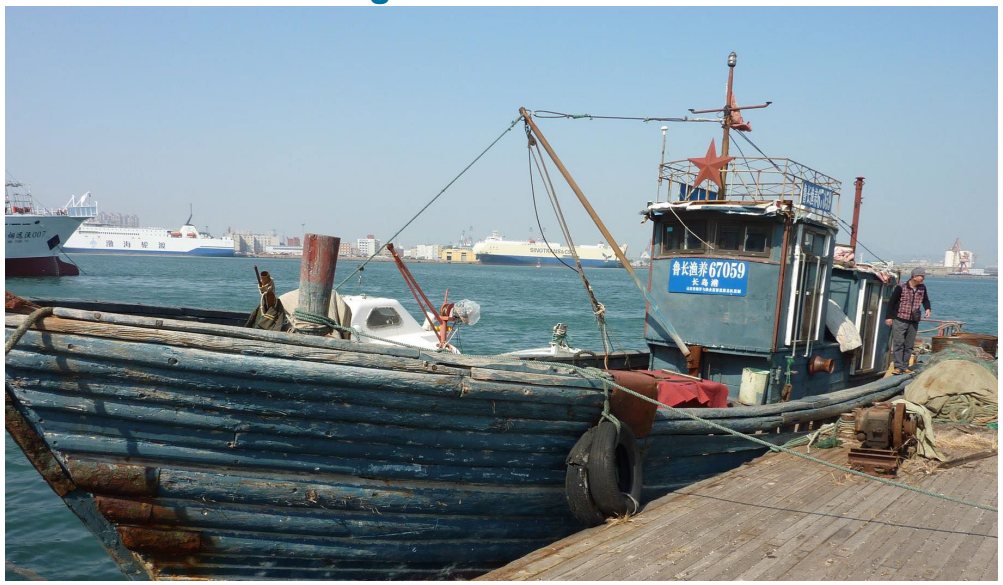


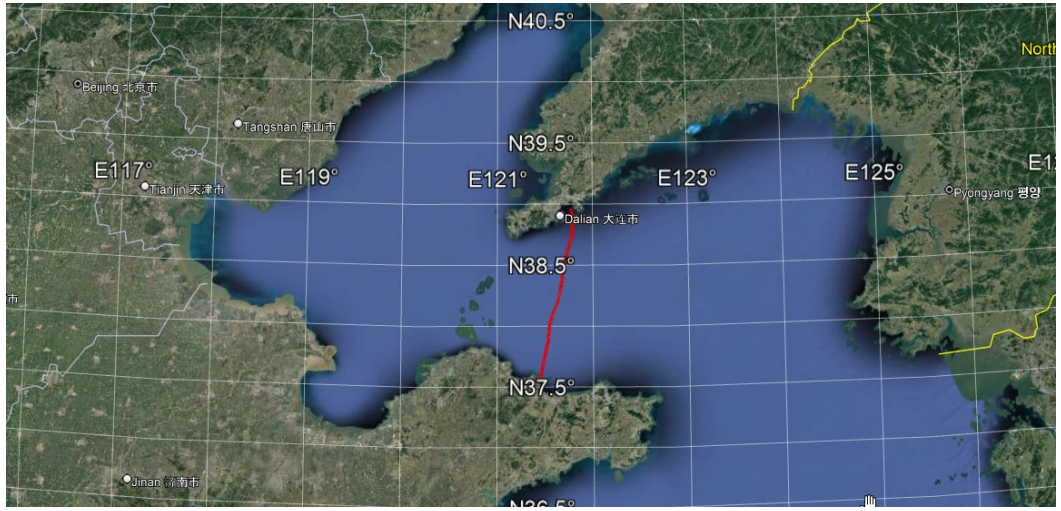
Test and Operation of a FerryBox System in China, Yellow Sea

Cooperation with Yantai Institute of Coastal Zone Research (YIC)

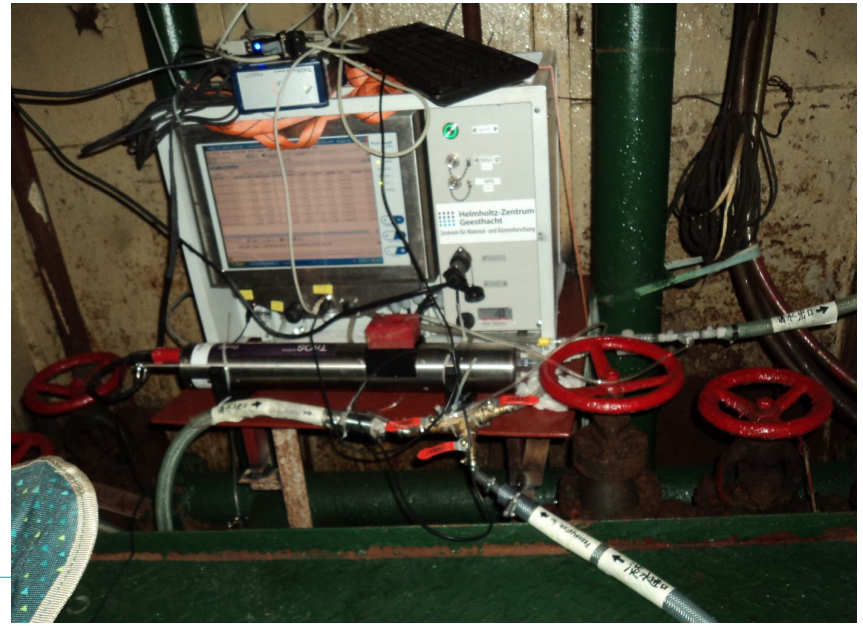
Helmholtz-Zentrum Geesthacht
Centre for Materials and Coastal Research

First Test on a fishing boat





Installation aboard cargo vessel Jin Chuan 9



Wilhelm Petersen (wilhelm.peterrsen@hzg.de)

Participation in Different EU- Projects:

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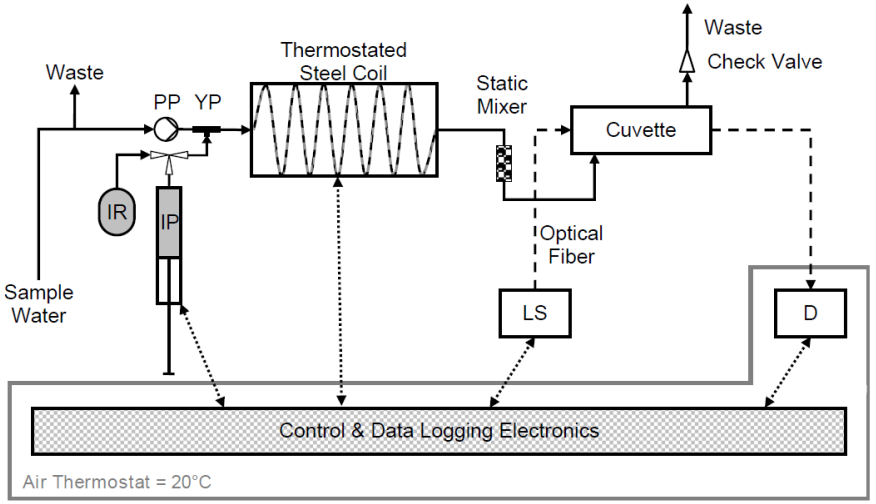
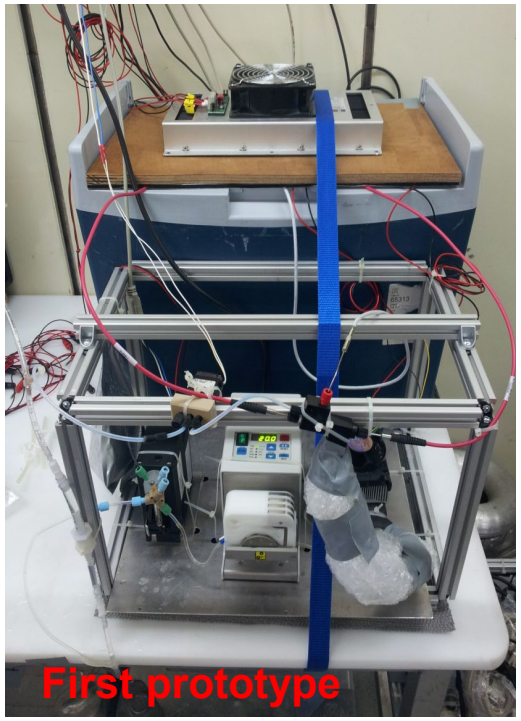
Development of new Sensors for Operation in FerryBox Systems:

High precision pH and Alkalinity Sensor:



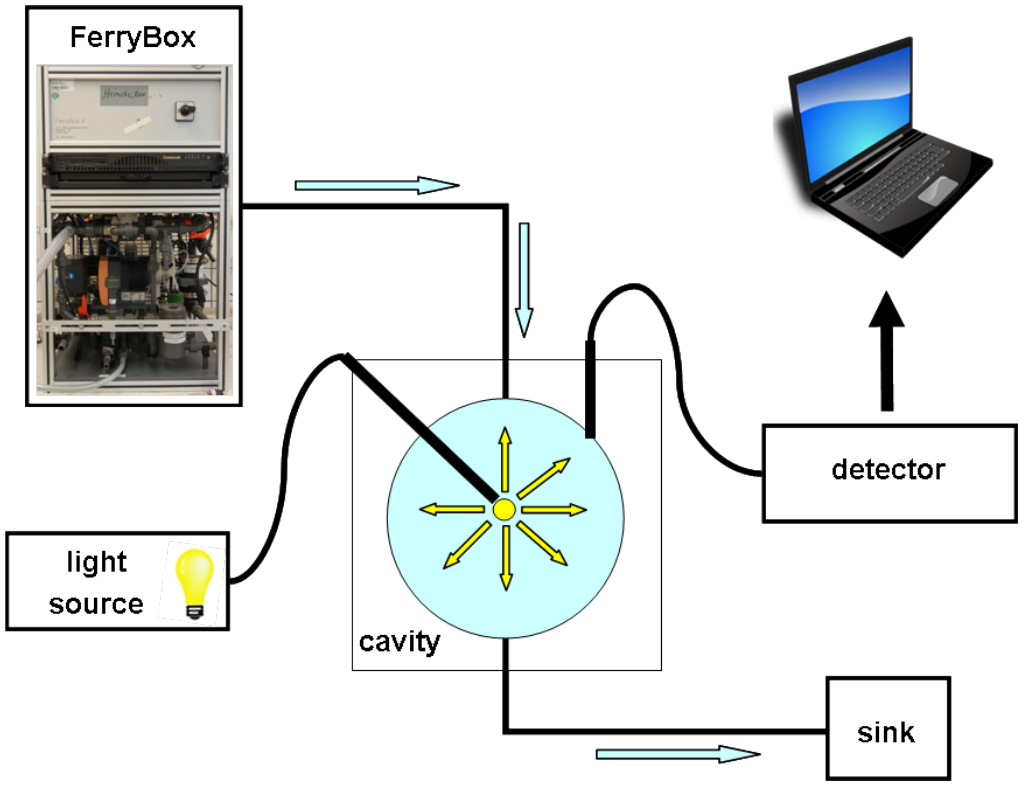


Accuracy: pH: ± 0.003 A_T: ± 6.3 µmol/l

Precision: pH: ± 0.0007 A_T: ± 4.4 µmol/l

Aßmann et al., 2011, Ocean Science
Aßmann, S., 2 012, PhD Thesis

flow-through-PSICAM:



Wollschläger et al., 2013, Ocean Dynamics

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Cruise liner “MeinSchiff3“ Recent Chlorophyll-a Data from April 2015

Date range: 28.03.2015 - 28.04.2015

Modify size: − + Click and drag for panning. <SHIFT>-click and drag for zooming.

Linear
Logarithmic

Refresh

Show stations

Platforms:

show **Ferrybox on MeinSchiff3 provided by TUI and HZG**

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Permanent Installation of a FerryBox aboard RV Polarstern

RV Polarstern
(operated by AWI)

Measured Variables:
- Salinity
- Temperature
- Chl-a-fluorescence
- CDOM fluorescence
- Turbidity
- pCO2 (from subCtech sensor)
- Dissolved oxygen
- Dissolved nutrients (only on request)

Data Transfer:
- D-Ship system
- Quality flagged data to HZG Database; realtime (5min average) via http-protocol

Future Development (Working group with AWI, IOW etc.):
Development of a standardized measuring systems for all German research vessels:
- Modular system of different boxes:
  - Oceanographic parameter
  - Carbon parameter
  - Bio-optical parameter

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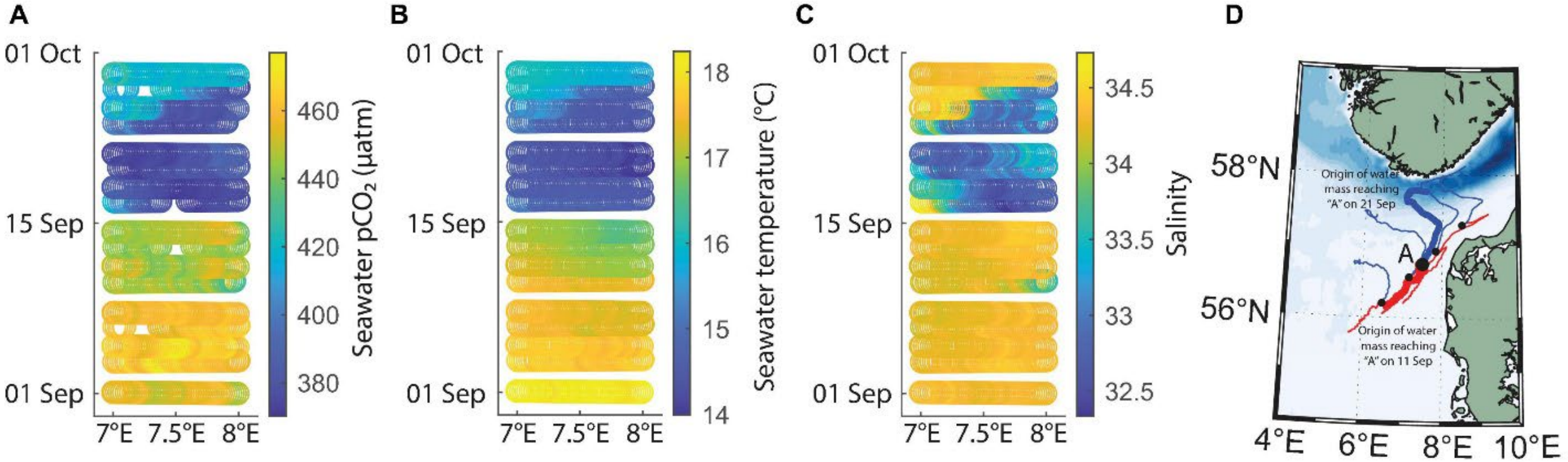
Short-term Observations:
Changes of Circulation Pattern Influences Carbon Uptake Capacity



from Macovei et al. 2022

Main results:

- Short-term changes of circulation from normally cyclonic to anti-cyclonic alter local mesoscale variabilities of carbon uptake capacity
- This has a significant effect on the carbon sink or source status at such subregions

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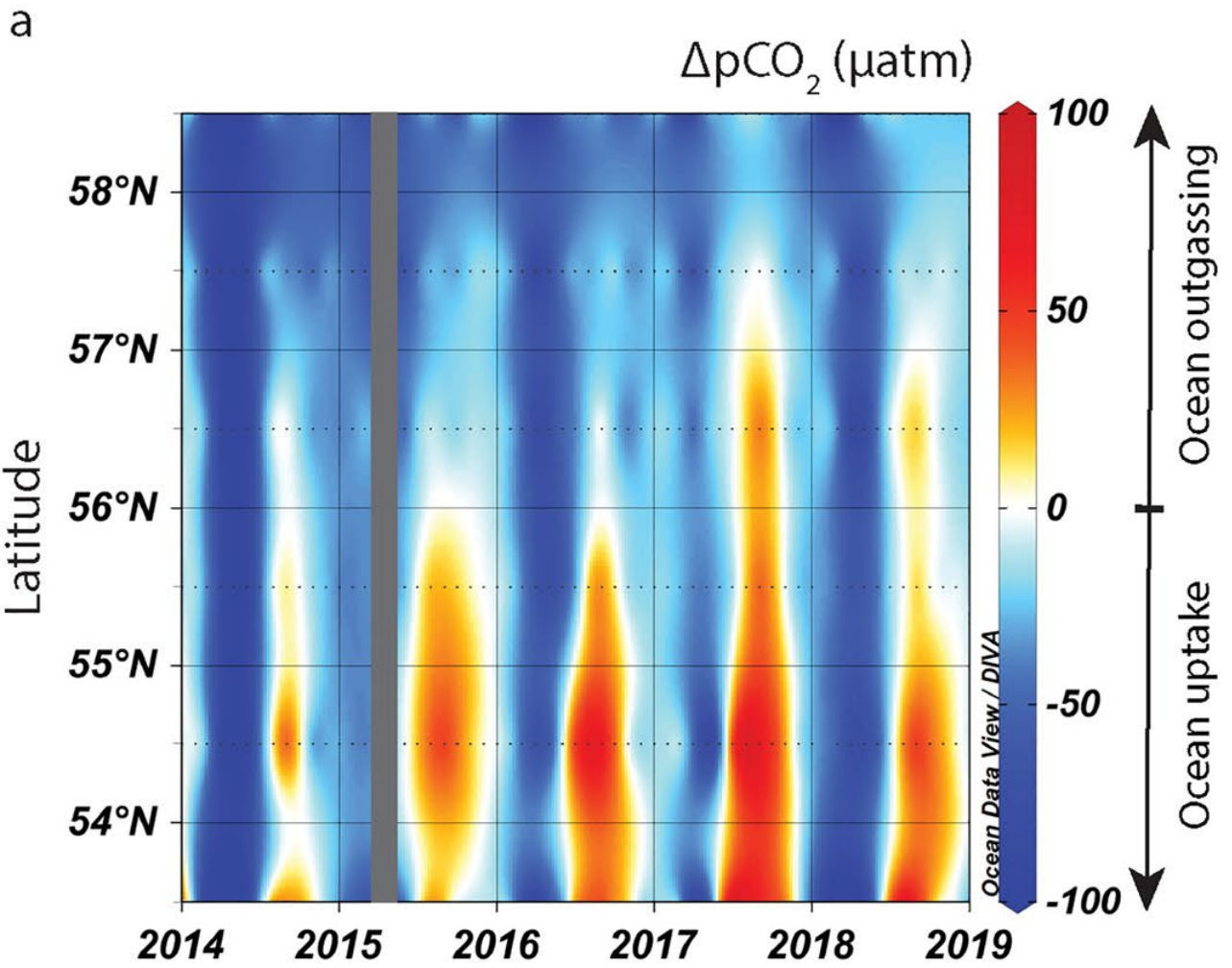
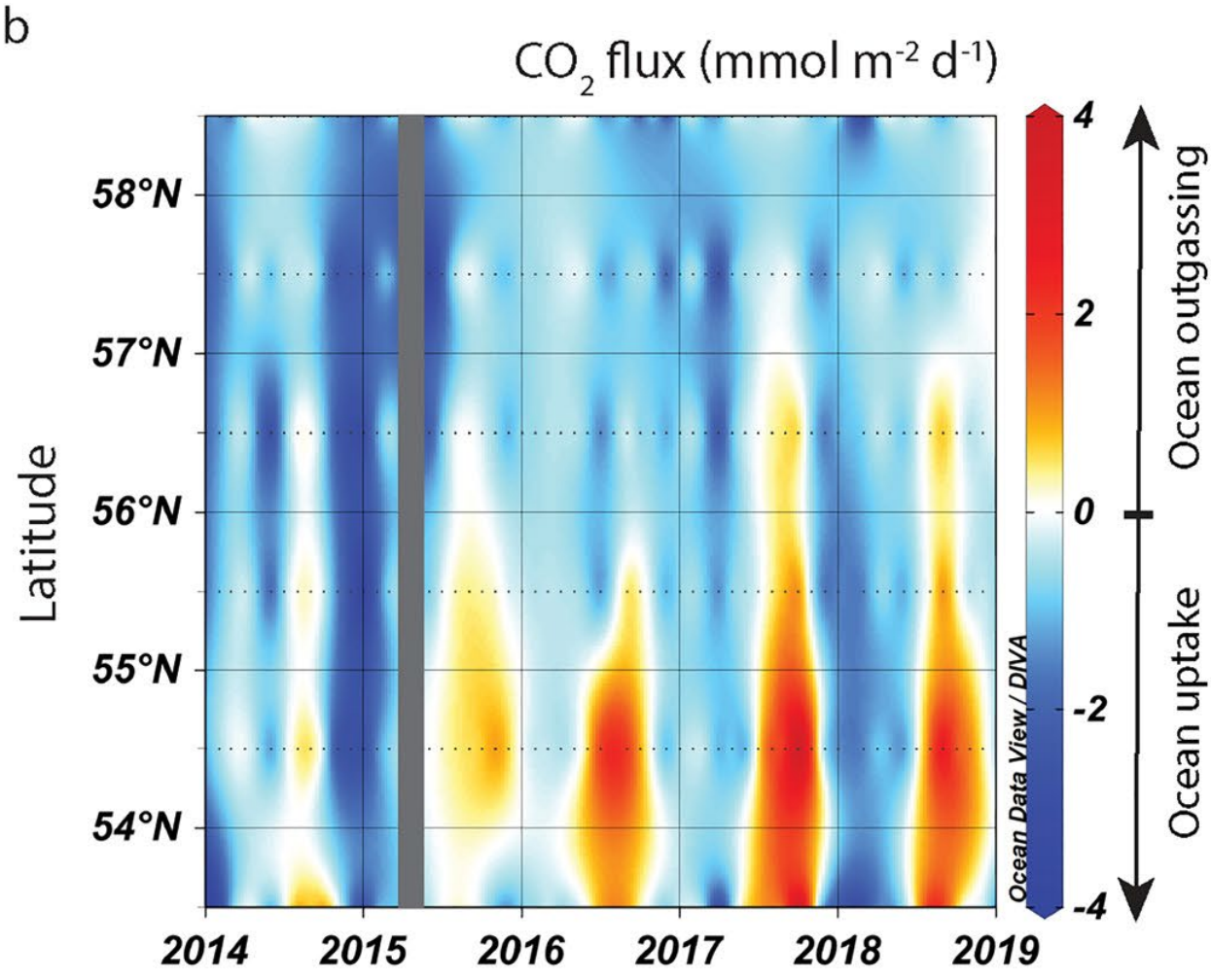
Long-Term Observations of pCO2 Anomalies in the North Sea:





from Macovei et al. 2021

Main results:

- Reduced efficiency of carbon uptake from the atmosphere
- The southern part of the North Sea became a stronger carbon source and the northern part a weaker carbon sink

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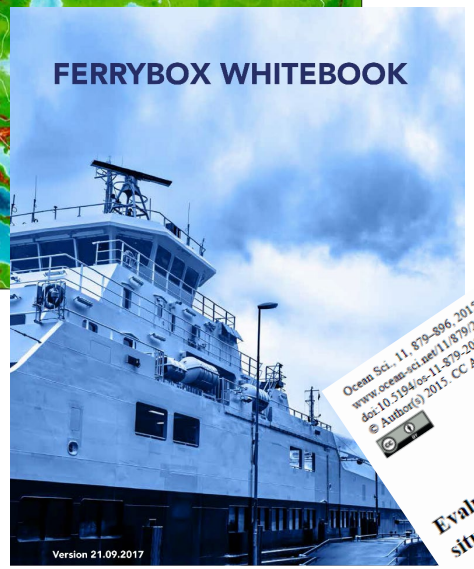
Publications (examples)

EuroGOOS Publication No. 25

March 2007

FerryBox:

From On-line Oceanographic Observations to Environmental Information



www.eurogoos.eu

EuroGOOS
European Global Ocean Observing System

Available online at www.sciencedirect.com
ScienceDirect
Estuarine, Coastal and Shelf Science 77 (2008) 296–307
ESTUARINE COASTAL AND SHELF SCIENCE
www.elsevier.com/locate/ecss
ELSEVIER

FerryBox and MERIS — Assessment of coastal and shelf sea ecosystems by combining in situ and remotely sensed data

W. Petersen*, H. Wehde, H. Krasemann, F. Colijn, F. Schroeder

GKSS Research Centre, Institute for Coastal Research, 21502 Geesthacht, Germany

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www.biogeosciences.net/14/541/2017/
doi:10.5194/bg-14-541-2017
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Extreme flood impact on estuarine and coastal biogeochemistry: the 2013 Elbe flood

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[1]Institute of Coastal Research, Helmholtz-Zentrum Geesthacht (HZG), 21502 Geesthacht, Germany
[2]Federal Maritime and Hydrographic Agency, BSH-Laboratory Süllddorf, 22589 Hamburg, Germany
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P.O. Box 180, 27483 Helgoland, Germany

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journal homepage: www.elsevier.com/locate/jmarsys

FerryBox systems: State-of-the-art in Europe

Wilhelm Petersen *
Institute of Coastal Research, Helmholtz-Zentrum Geesthacht, Germany

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LIMNOLOGY and OCEANOGRAPHY

ASLO

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doi: 10.1002/lno.11103

Intertidal regions changing coastal alkalinity: The Wadden Sea-North Sea tidally coupled bioreactor

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[2]Kongsberg Maritime Contros GmbH, Kiel, Germany
[3]Norwegian Institute for Water Research, Oslo, Norway

Ocean Sci., 11, 879–896, 2015
www.ocean-sci.net/11/879/2015/
doi:10.5194/os-11-879-2015
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Evaluation of numerical models by FerryBox and fixed platform in situ data in the southern North Sea

M. Baller[1], F. Janssen[2], J. Siddorn[3], W. Petersen[1], and S. Dick[2]

[1]Institute of Coastal Research, Helmholtz-Zentrum Geesthacht GmbH, Max-Planck-Str. 1, 21502 Geesthacht, Germany
[2]Bundesamt für Seeschiffahrt und Hydrographie, Bernhard-Nocht-Straße 78, 20359 Hamburg, Germany
[3]Met Office, Exeter, UK

Contents lists available at ScienceDirect
Journal of Marine Systems
journal homepage: www.elsevier.com/locate/jmarsys

Use of FerryBox surface temperature and salinity measurements to improve model based state estimates for the German Bight

Sebastian Grayek [a,b,*], Joanna Staneva [a], Johannes Schulz-Stellenfleth [a], Willhelm Petersen [a], Emil V. Stanev [a]

[a] Institute for Coastal Research, GKSS Research Centre, Max-Planck-Strasse 1, 21502 Geesthacht, Germany
[b] Institute for Chemistry and Biology of the Sea (ICBM), University of Oldenburg, Carl-von-Ossietzky-Strasse 9-11, D-26111 Oldenburg, Germany

Geophysical Research Letters

RESEARCH LETTER
10.1029/2021GL092645

Reduced Ocean Carbon Sink in the South and Central North Sea (2014–2018) Revealed From FerryBox Observations

V. A. Macovei[1], W. Petersen[1], H. Brix[1], and Y. G. Voynova[1]

[1]Institute of Coastal Ocean Dynamics, Helmholtz-Zentrum Hereon, Geesthacht, Germany

Key Points:
- The surface seawater partial pressure of carbondioxide (pCO_2) trend between 2014 and 2018 in the South and Central North Sea was stronger than the atmospheric one
- As a consequence, the average sea to air CO_2 flux increased

Helmholtz-Zentrum hereon

Thanks for your attention!

I would like to thank all the colleagues working together in FerryBox Team:

Michail Petschatnikow, Henning Wehde, Jan Bödewadt, Martina Gehrung, Gerd Blöcker, Uwe Mnich

Michael Haller, Susanne Reinke, Tanja Pieplow, Hendrik Rust, Henrike Thomas

The FerryBox team today:

Yoana Voynova, Vlad Macovei, Louise Rewrie, Oliver Listing, Hendrik Rust, Martina Gehrung

Helmholtz-Zentrum
hereon

Ferry Lines Operated within the EU Project

Oslo-Hirtshals

Helsinki-Tallin

Helsinki-Travemünde

Cuxhaven-Harwich


DenHelder-Texel

Liverpool -Belfast

Southampton-Cowes

Portsmouth - Bilbao

Athens-Crete

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