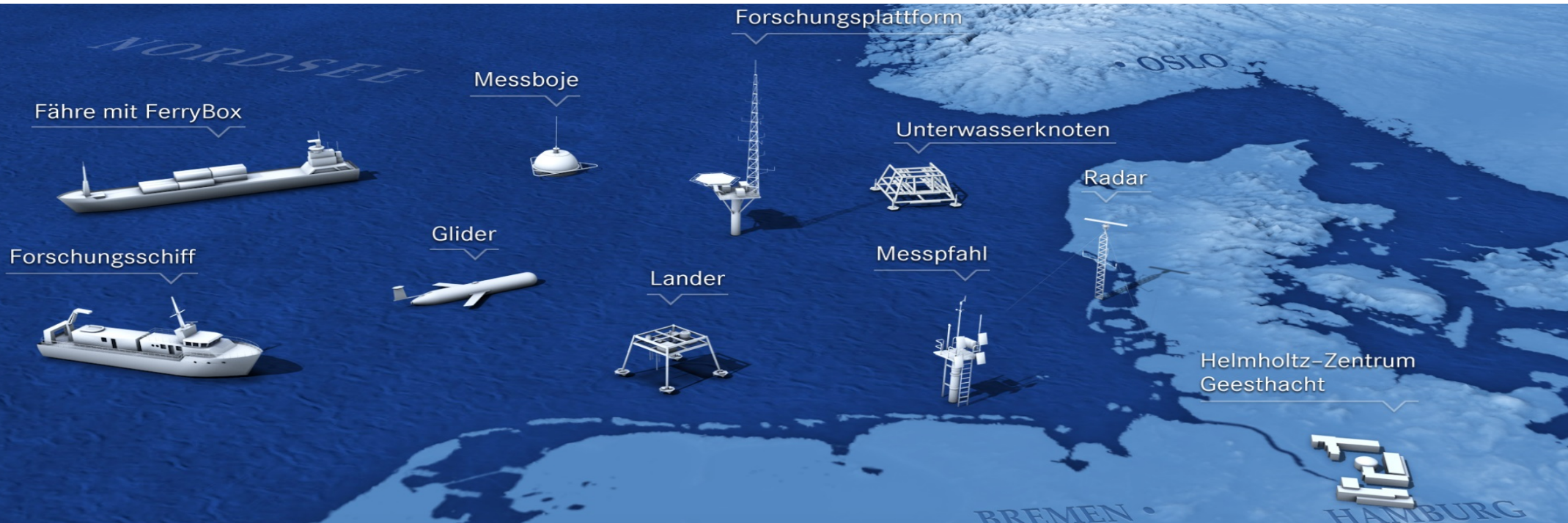
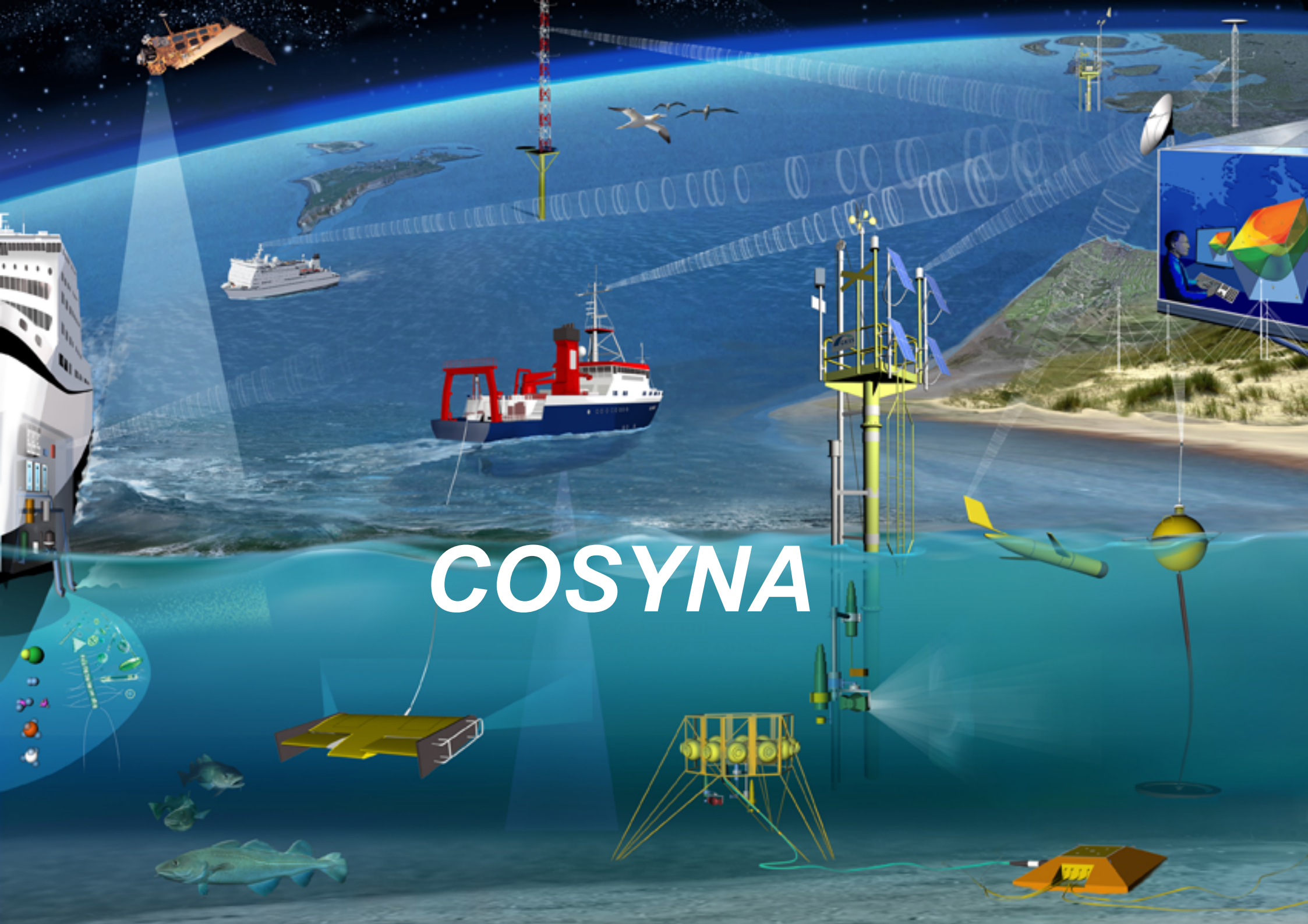


# COSYNA, the Coastal Observing System for Northern and Arctic Seas – A Regional, European Perspective and the Global Coast

Holger Brix and Burkard Baschek





# COSYNA

# COSYNA Mission Statement

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## ***COSYNA = Coastal Observing System for Northern and Arctic Seas***

One of the most comprehensive approaches to observing the coastal system worldwide in one of the most heavily used oceanic regions

### ***Mission Statement***

Development and test of analysis systems, consisting of observations and numerical modelling, for the operational synoptic description of the environmental status of the North Sea and of Arctic coastal waters.

COSYNA aims to provide knowledge tools that can help authorities and other stakeholders to manage routine tasks, emergency situations and evaluate trends.

- ***Financed by the Helmholtz-Zentrum Geesthacht (HZG)***
  - ***Building of a Community System for external partners***
  - ***Participation of external partners from universities and authorities***
  - ***Harmonization with other European observing systems, e.g. JERICO***
-

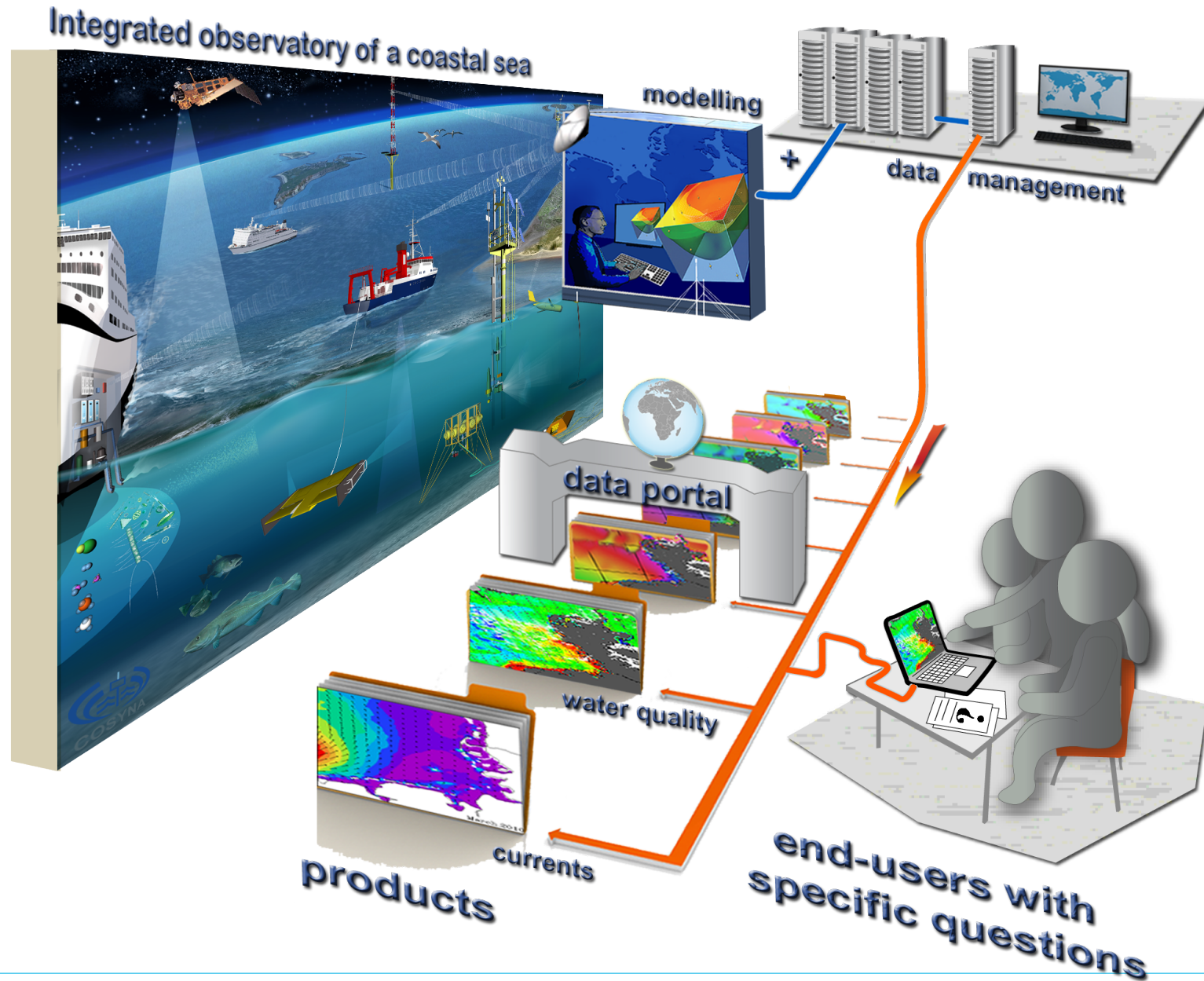
# From Measurements to Products, Information, and Science

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## **An integrated approach:**

- **Measurement data**
    - from a variety of platforms
  - **Products**
    - from a combination of measurements and numerical models (data assimilation)
  - **Data**
    - publically available through data portals
  - **Information**
    - provided in usable form for stakeholders and the public
  - **Science**
    - use of all of the above to tackle scientific questions
-

# Integrated Approach



# Types of Observations

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- **Point Measurements:**
    - Buoys & Fixed Stations (offshore & onshore)
    - Underwaternodes
  - **Surface Transects:**
    - FerryBoxes
    - Research Vessels
  - **3D Transects:**
    - SCANFISH
    - Gliders
  - **Fields:**
    - Optical Remote Sensing (satellite)
    - Radar (HF & X-Band)
-

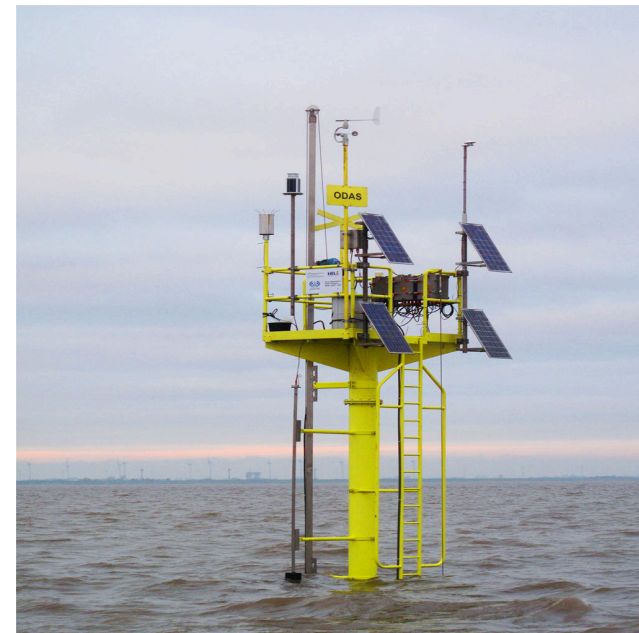
# Fixed Stations



**Hörnum**



**Cuxhaven**



**Elbe-HPA**

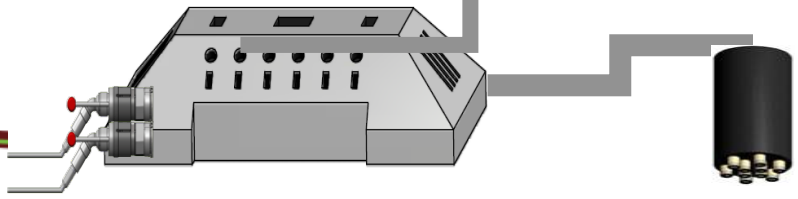
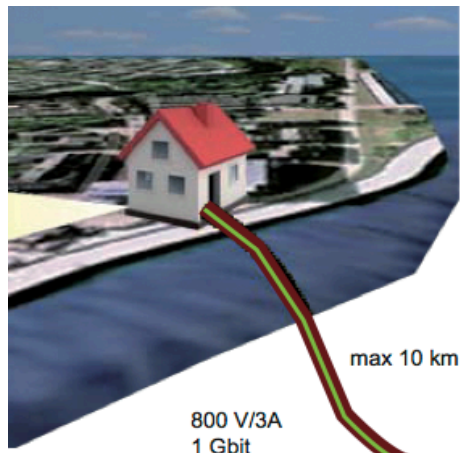


**FINO-3**

# COSYNA-Infrastructure for complex long-time observations

**Helmholtz-Zentrum Geesthacht**  
Zentrum für Material- und Küstenforschung

**WLAN (300Mbit/s) connection to land (AWI → HZG)**



**REMOS1**  
3D in-situ-image recognition → fish

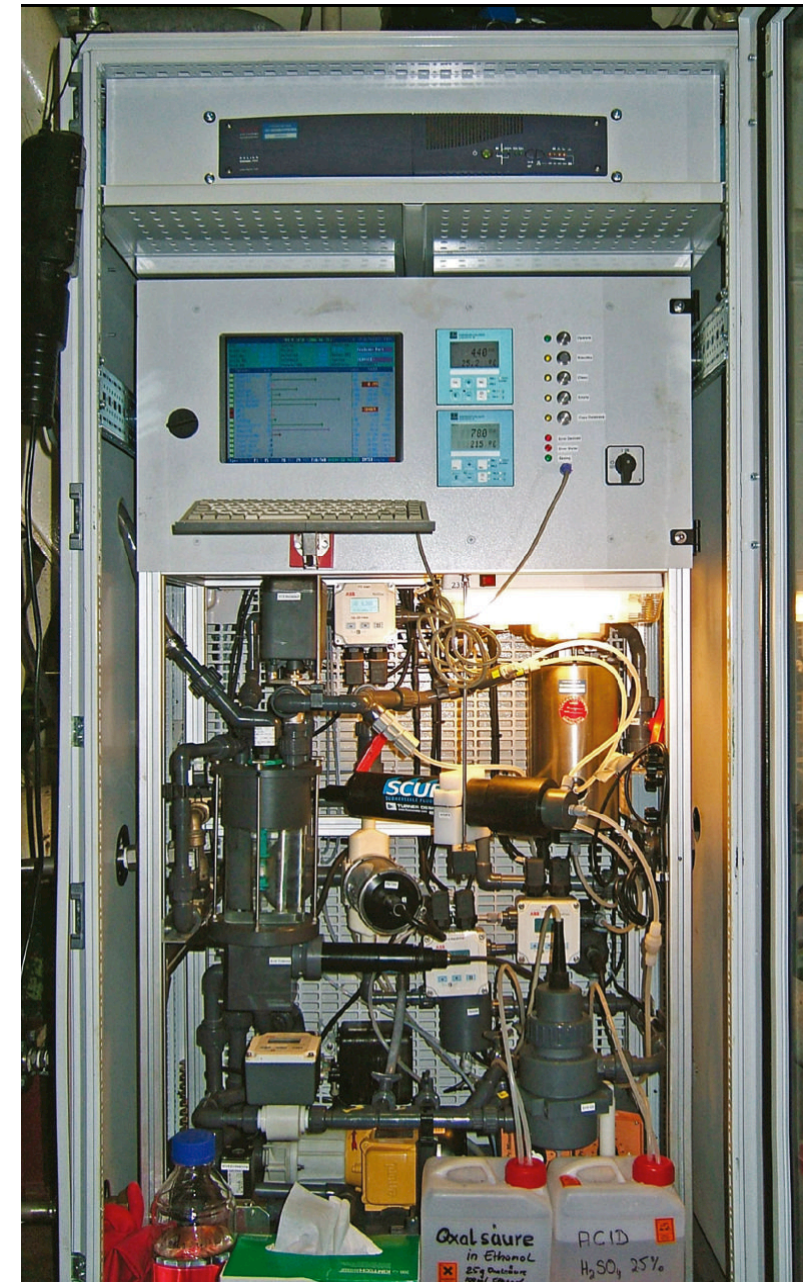
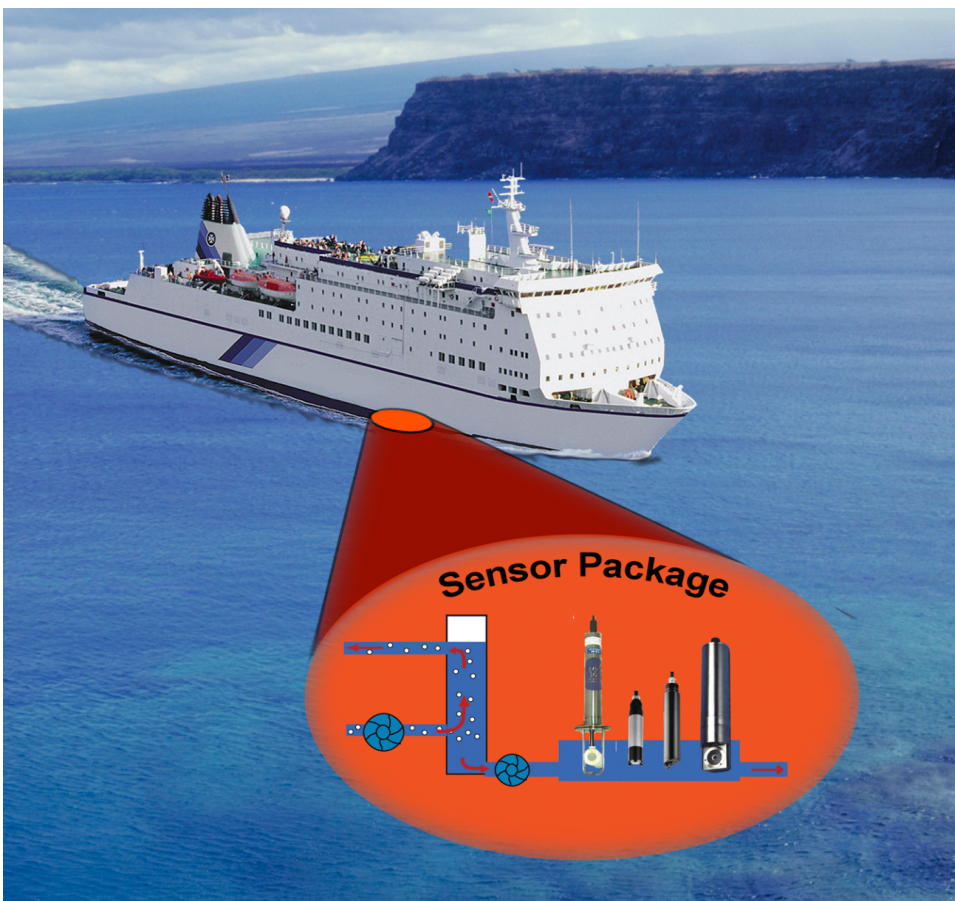


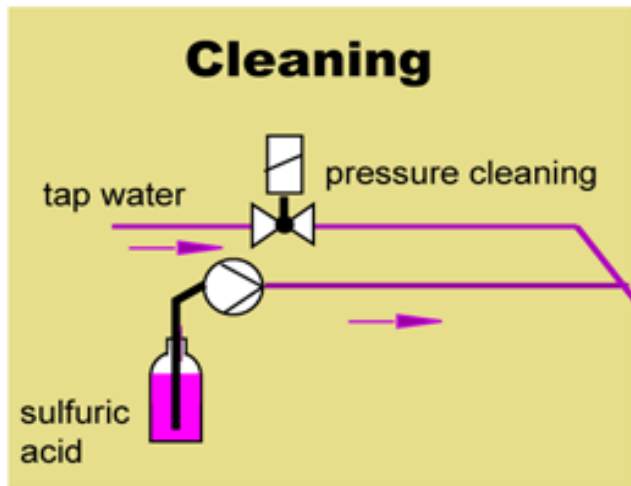


# Surface Transects: The FerryBox

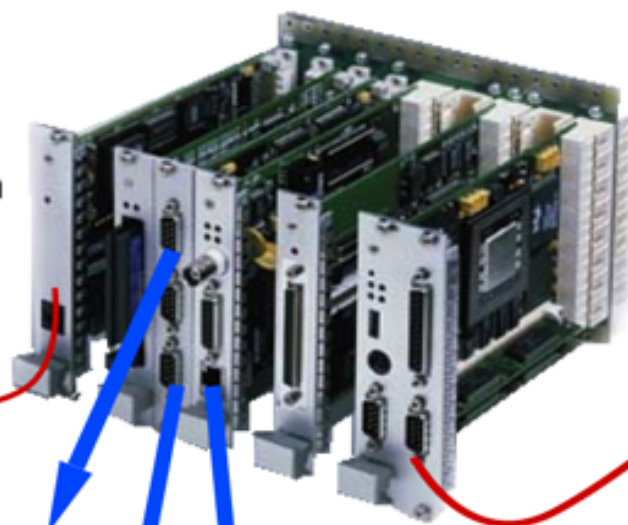
*Monitoring system designed to:*

- measure key quantities automatically on board of ferries or other ships of opportunity*
- regular routes or stationary*
- transmit data automatically to land*





**GPS-  
Position**



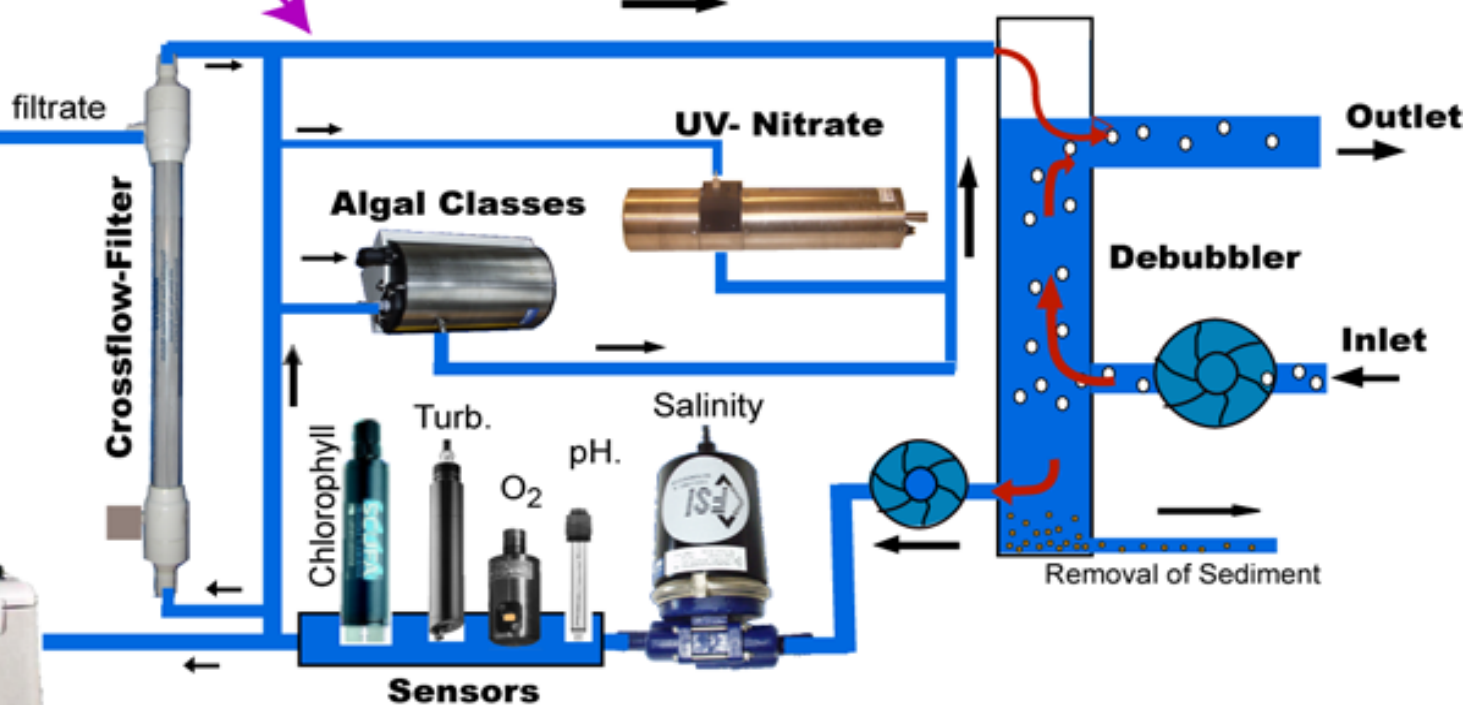
**GSM  
Mobile  
Phone**

**Remote Control, Data-Storage,  
Data-Transfer**

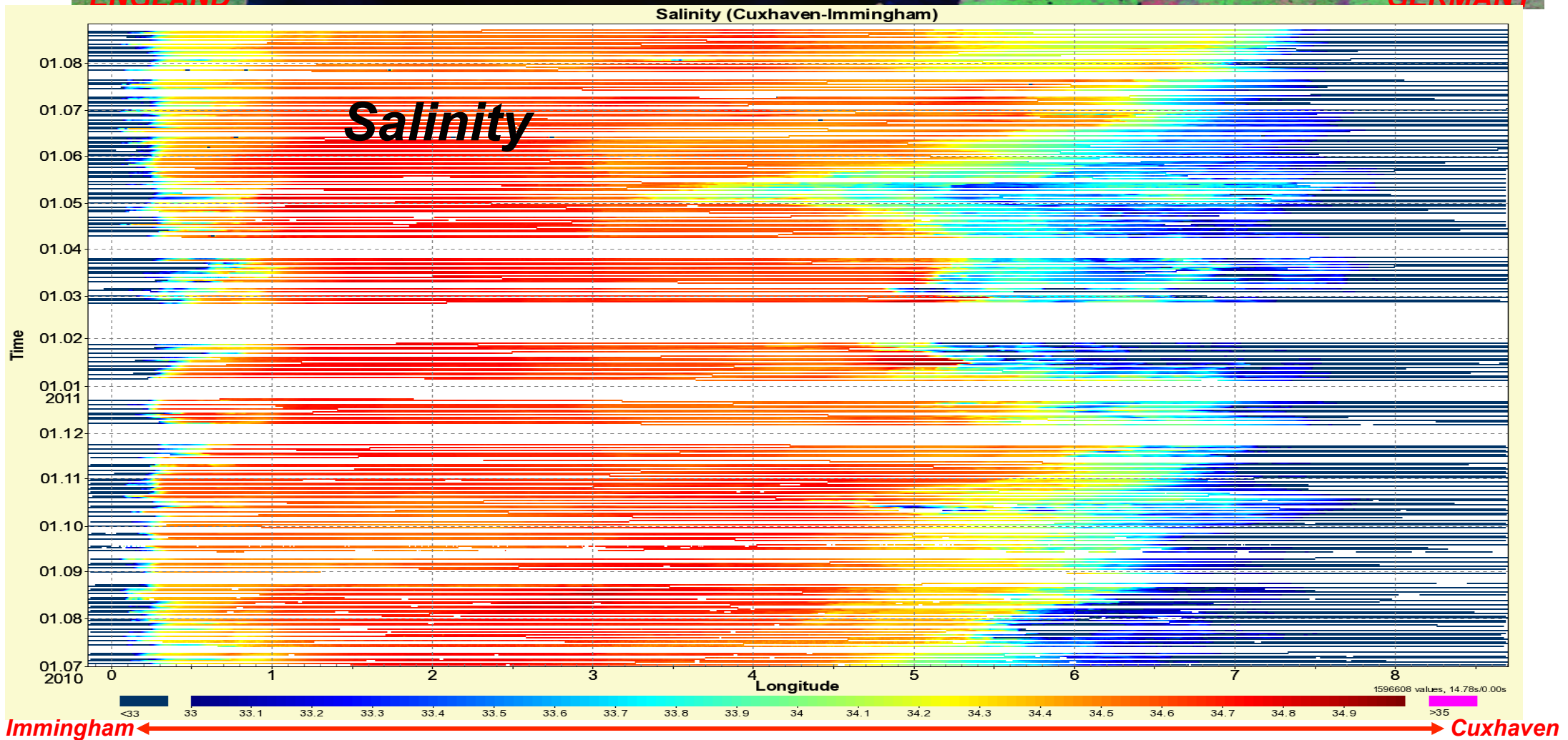
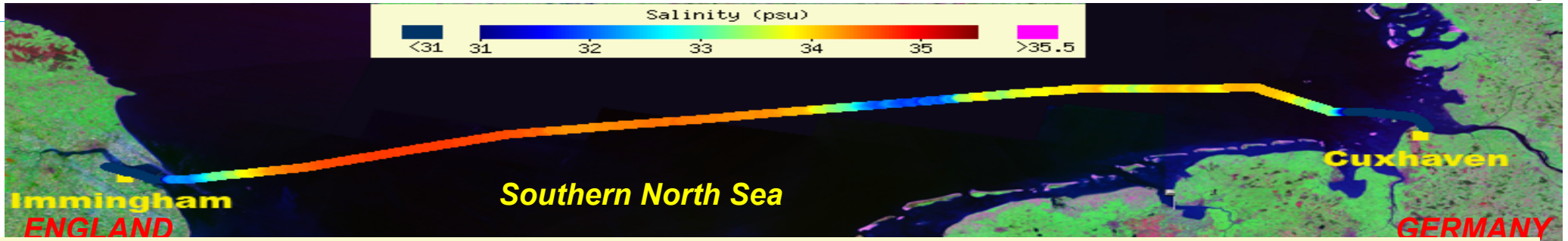


**Chemical Analyzers**  
(NO<sub>3</sub>, NH<sub>4</sub>, o-PO<sub>4</sub>, SiO<sub>2</sub>)

**Automated  
Sampler**

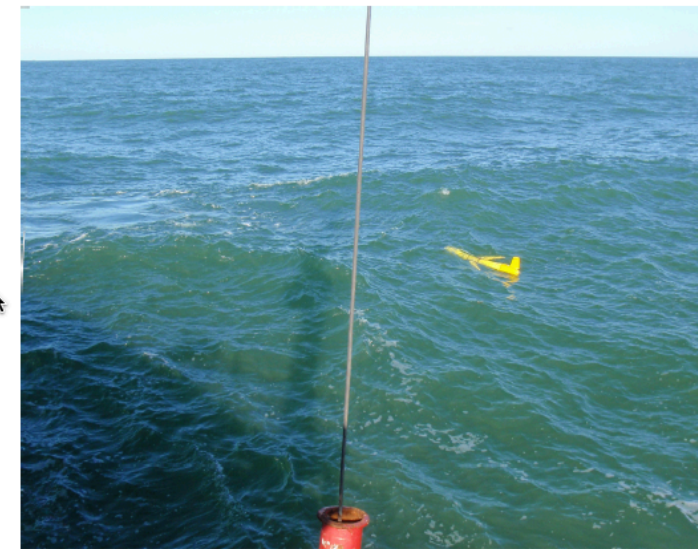
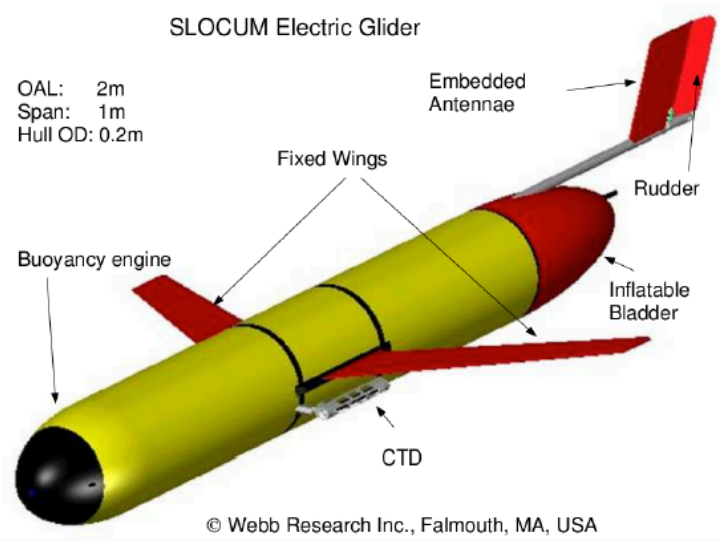


# Example: Transects July 2010 to June 2011

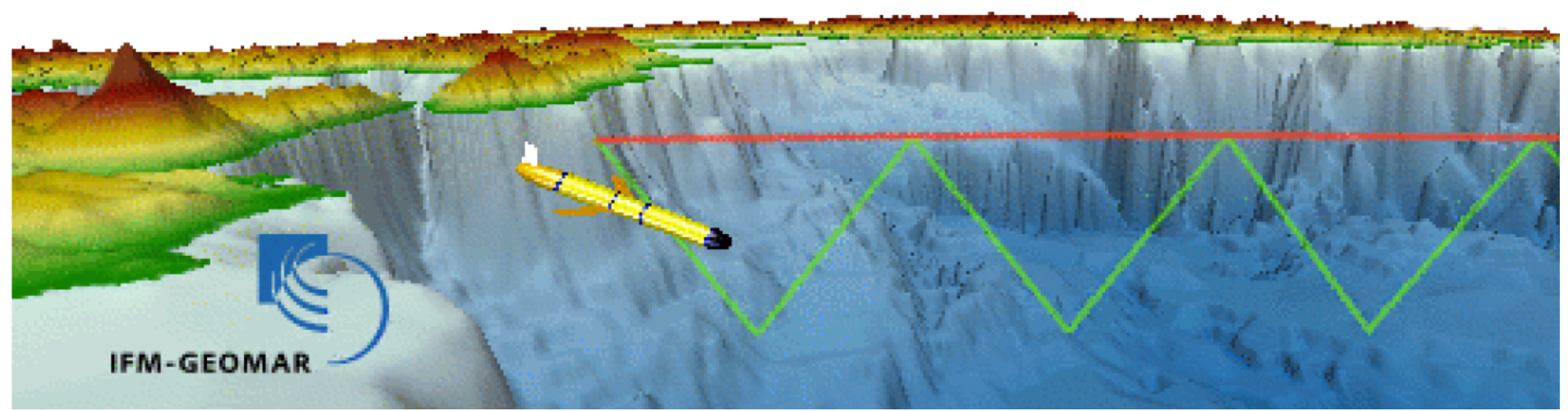


# Gliders

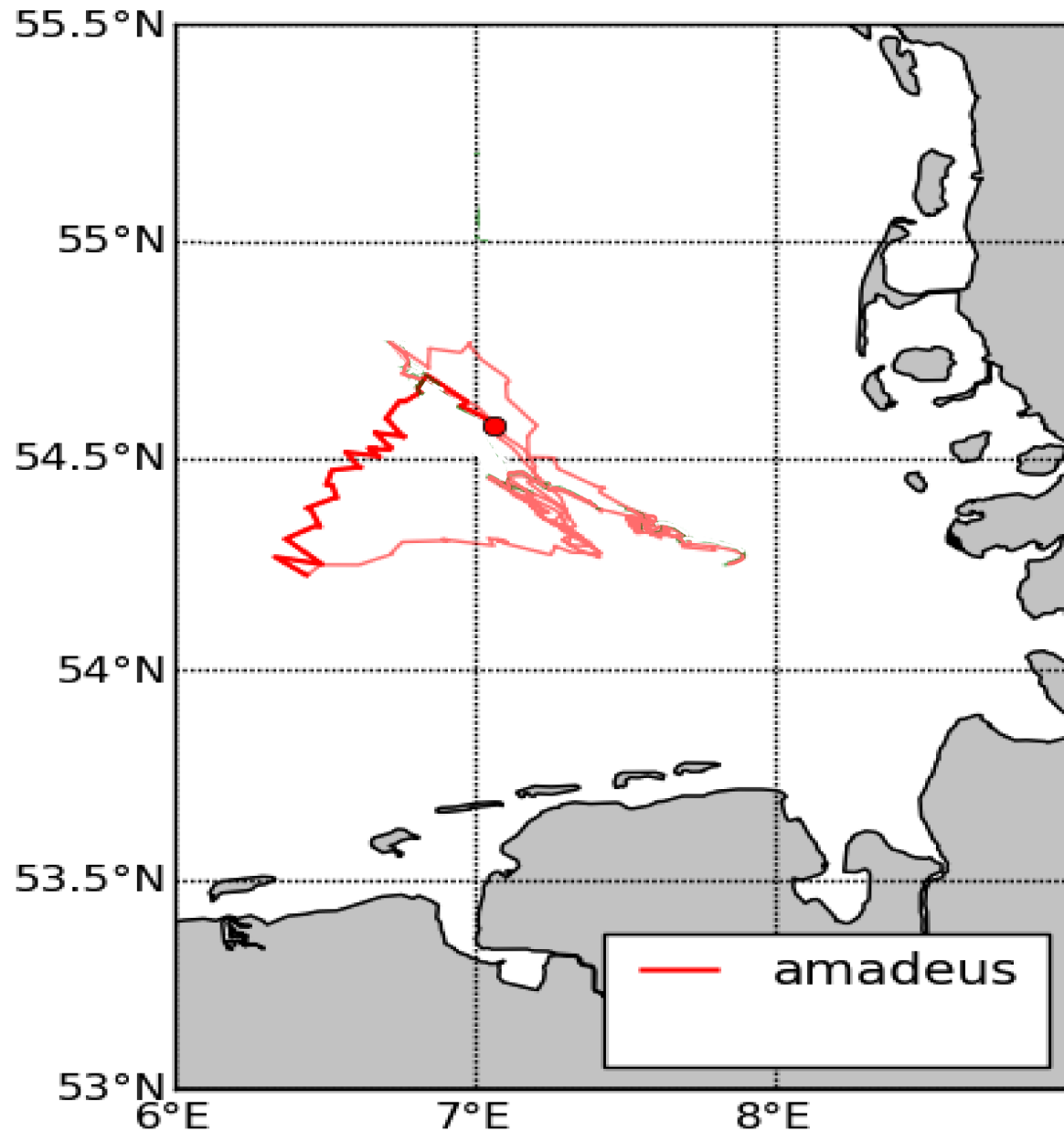
## The underwater glider



Amadeus

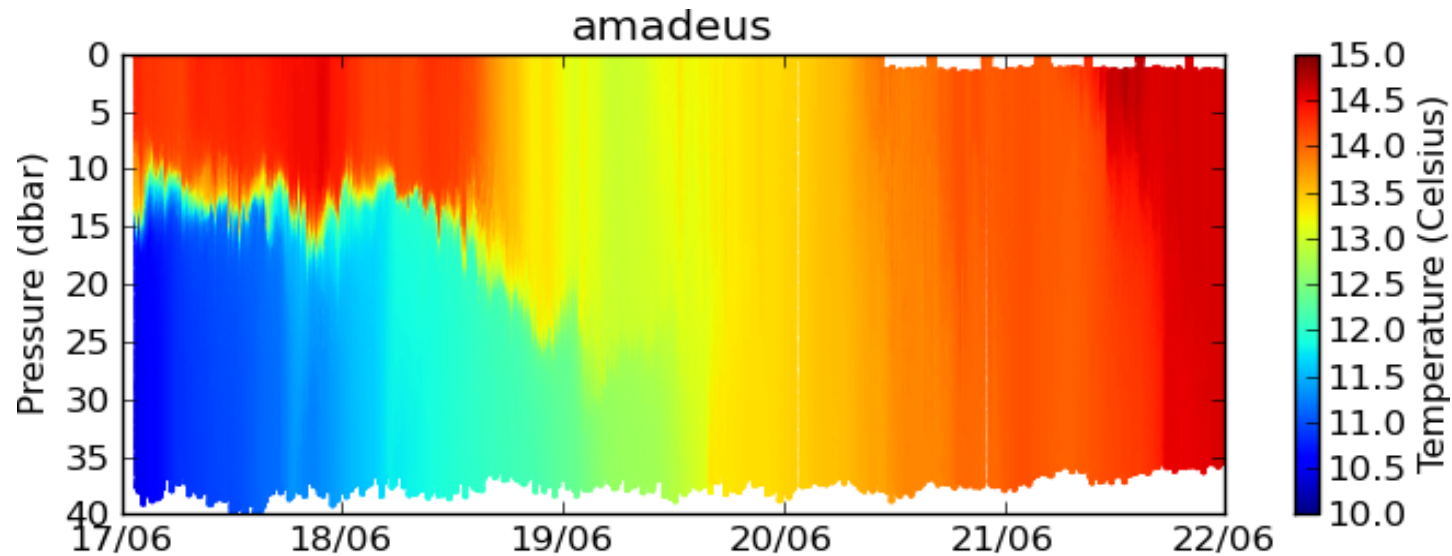


# Glider: Tracks June 2011 Mission

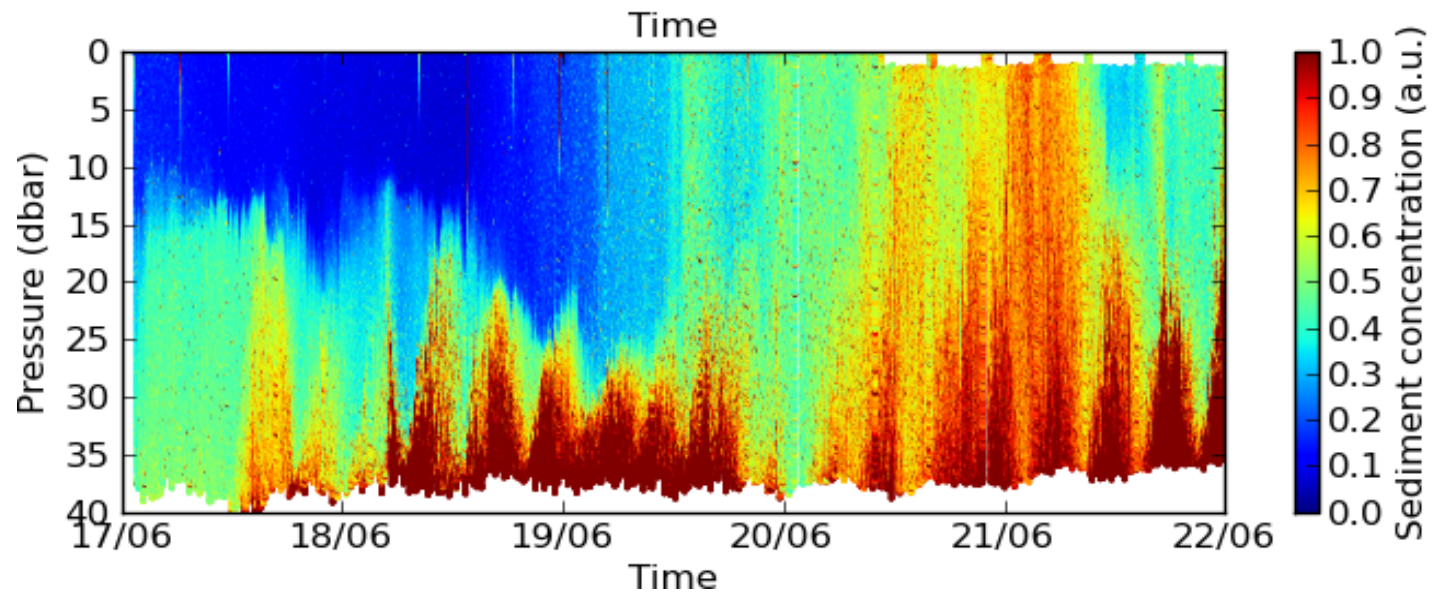


Detail of glider tracks  
17.-22. Juni 2011 (thick line)

# Gliders: Temperature and Suspended Matter



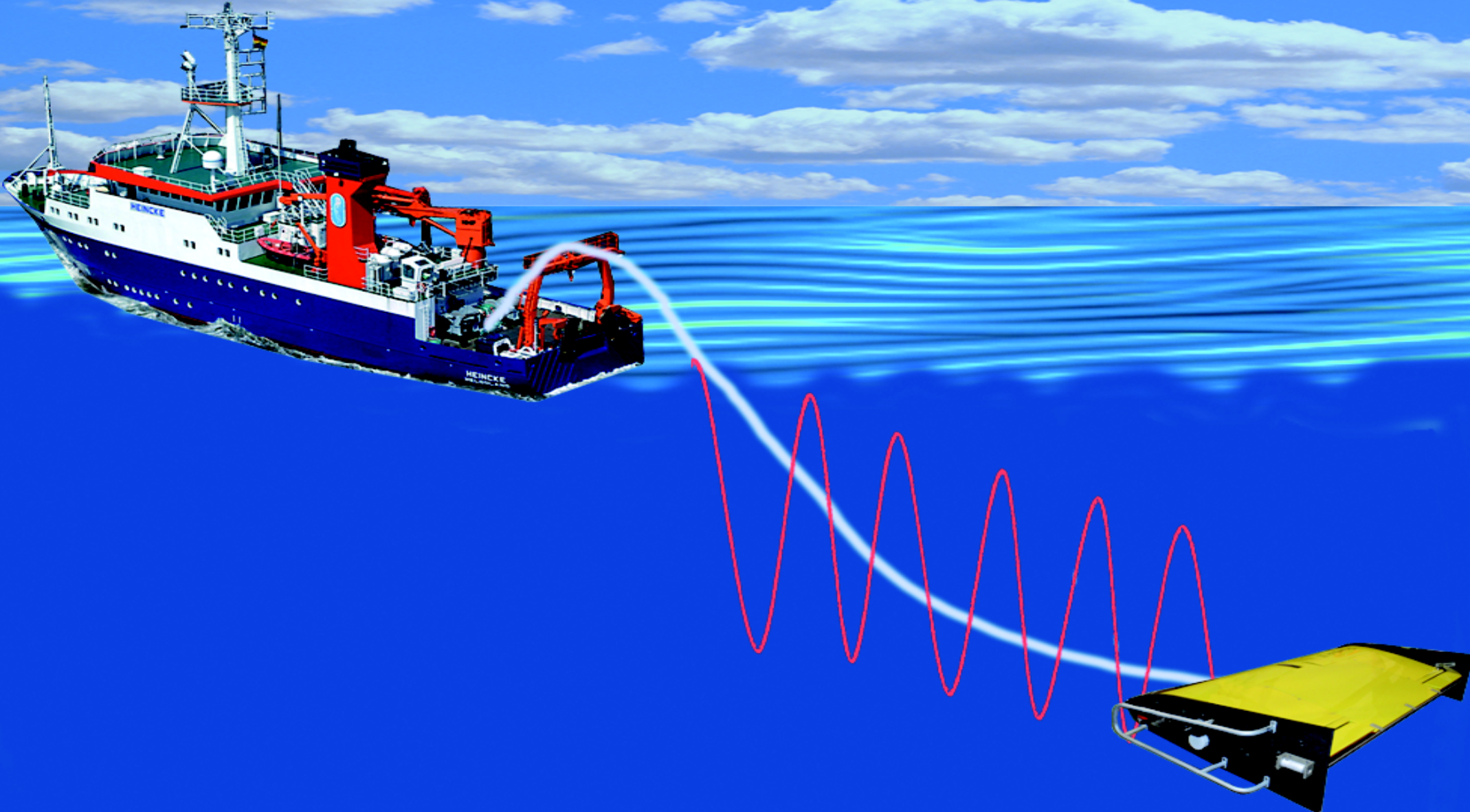
Temperature



*Suspended matter.*

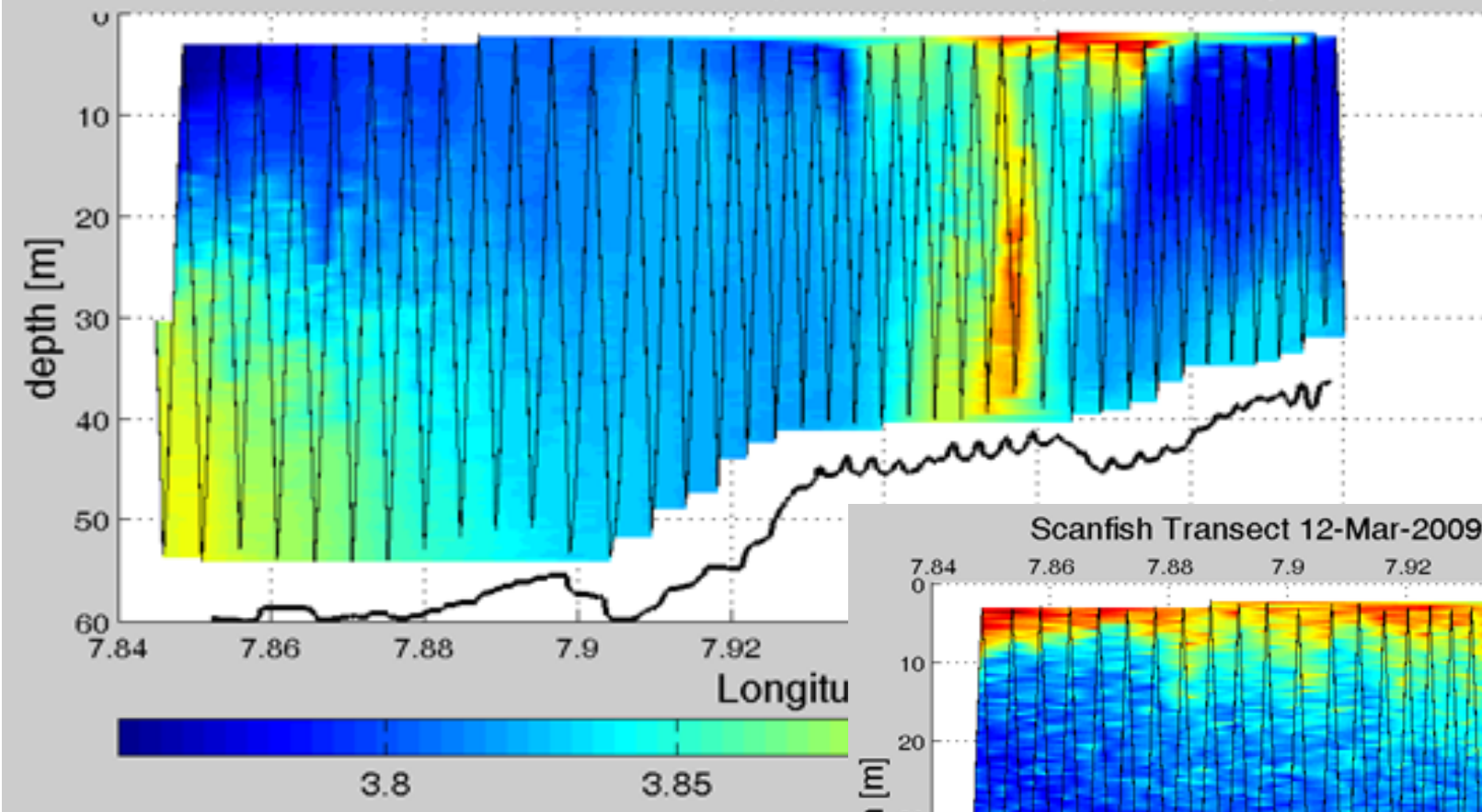
*A summer storm  
interrupts the  
stratification*

# Scanfish

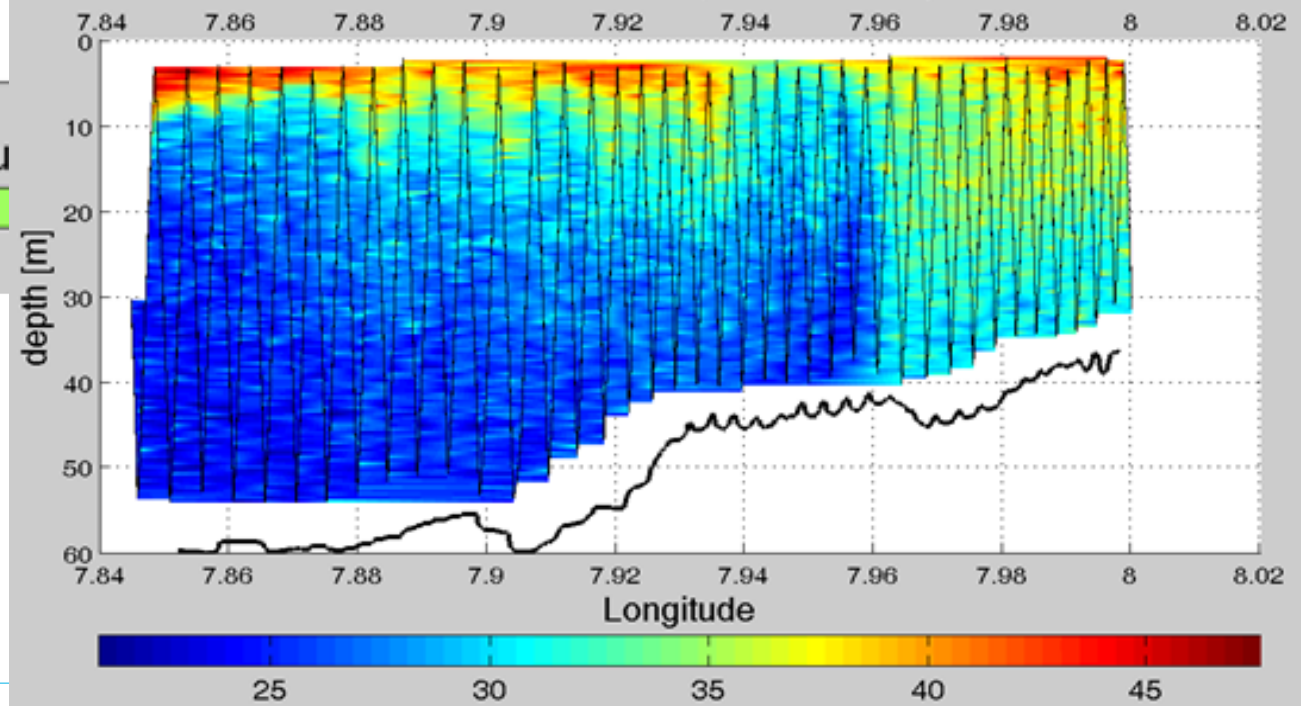


# SCANFISH Transect March 2009

Scanfish Transect 12-Mar-2009, 08:50 - 09:50; Water Temperature



Scanfish Transect 12-Mar-2009, 08:50 - 09:50; Fluorescence



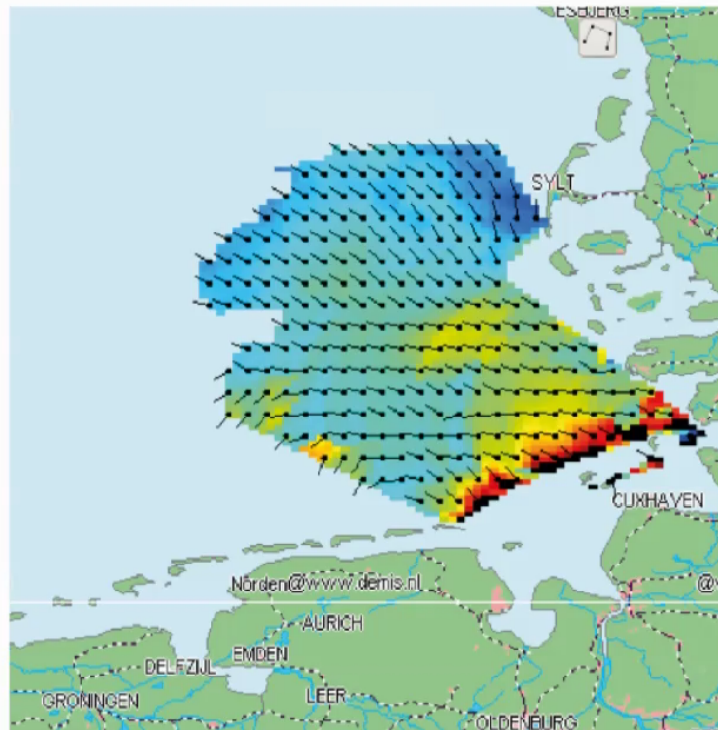


# Current Maps and Predictions

**COSYNA Product Currents**  
8 February 2013

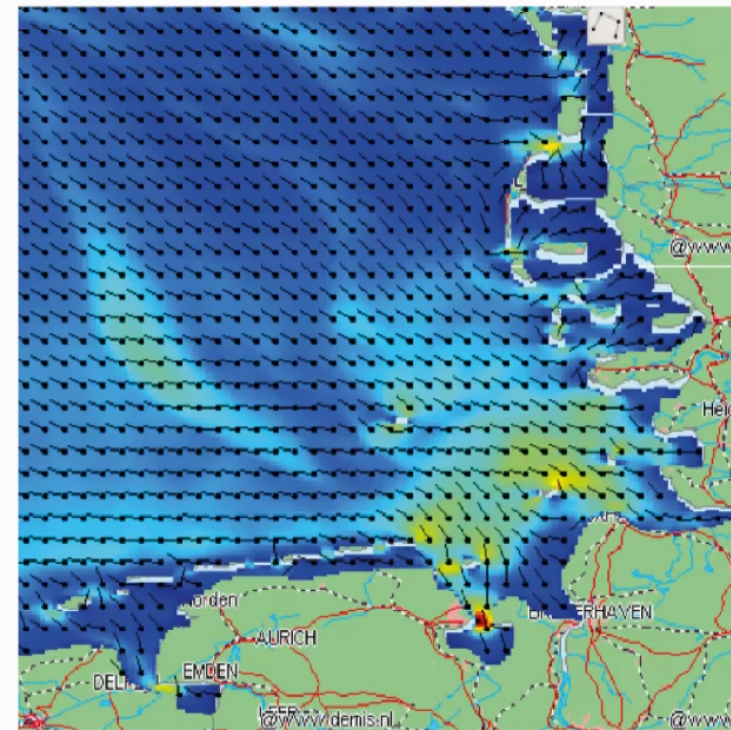


**HF Radar Measurements**



**00:04 UTC**

**Model**



**00:00 UTC**

1.5

1.0

0.5

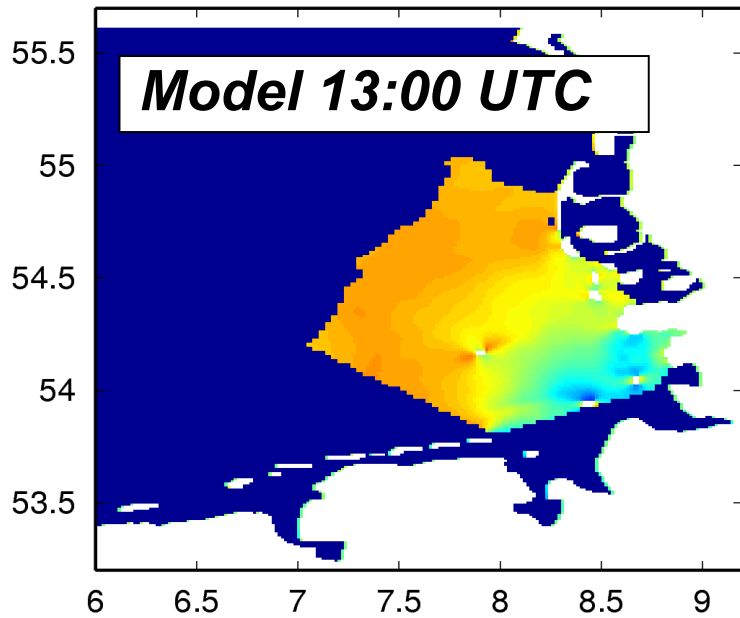
0

Current Speed [m/s]

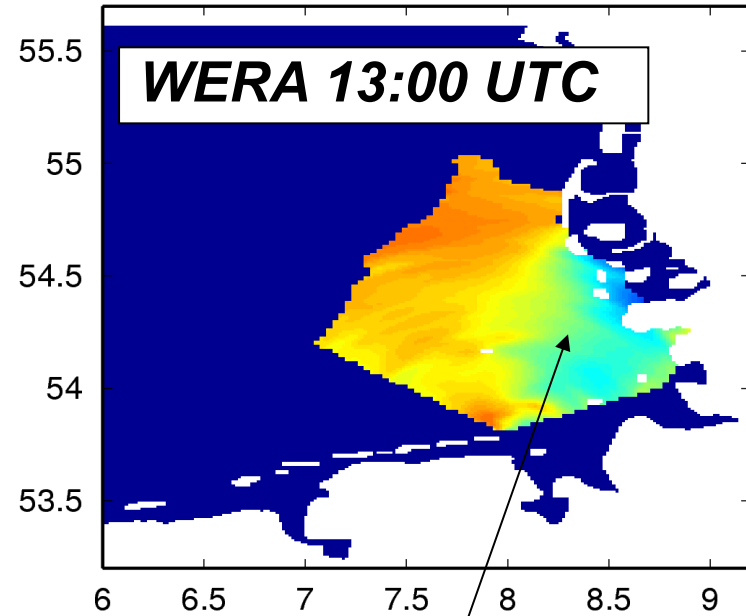
# Model vs. Observations (WERA)

(Radial component Wangerooge)

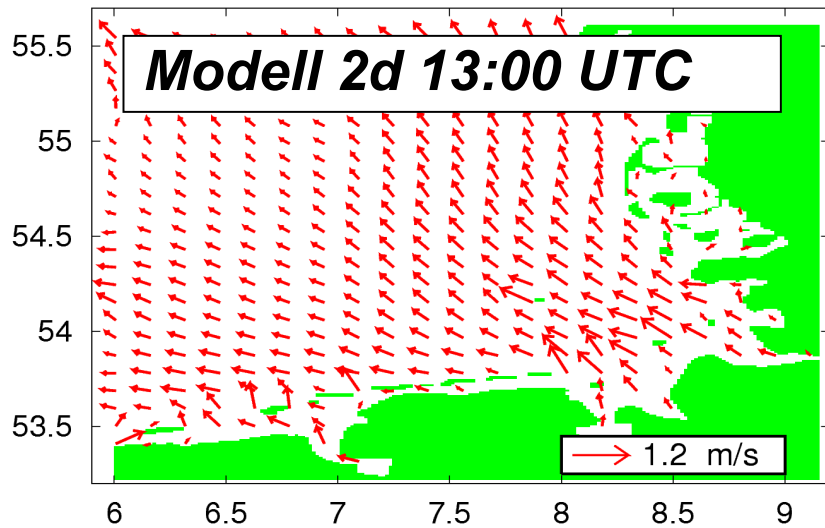
Radial GETM 20091101130000



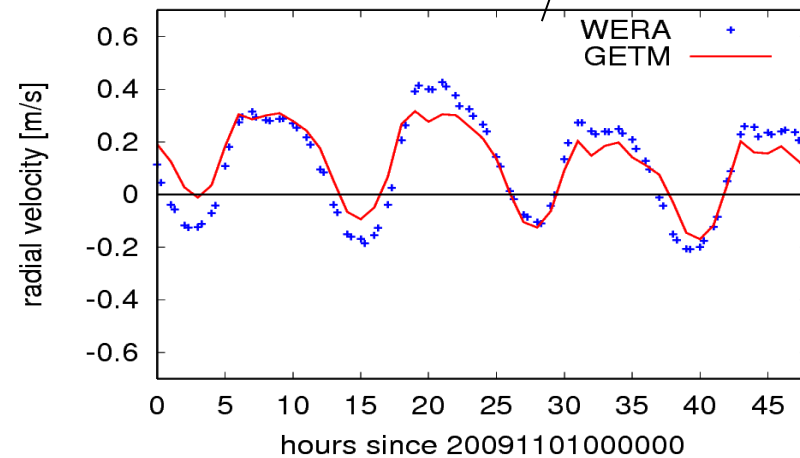
Radial WERA 20091101130000



GETM surface curren 20091101130000

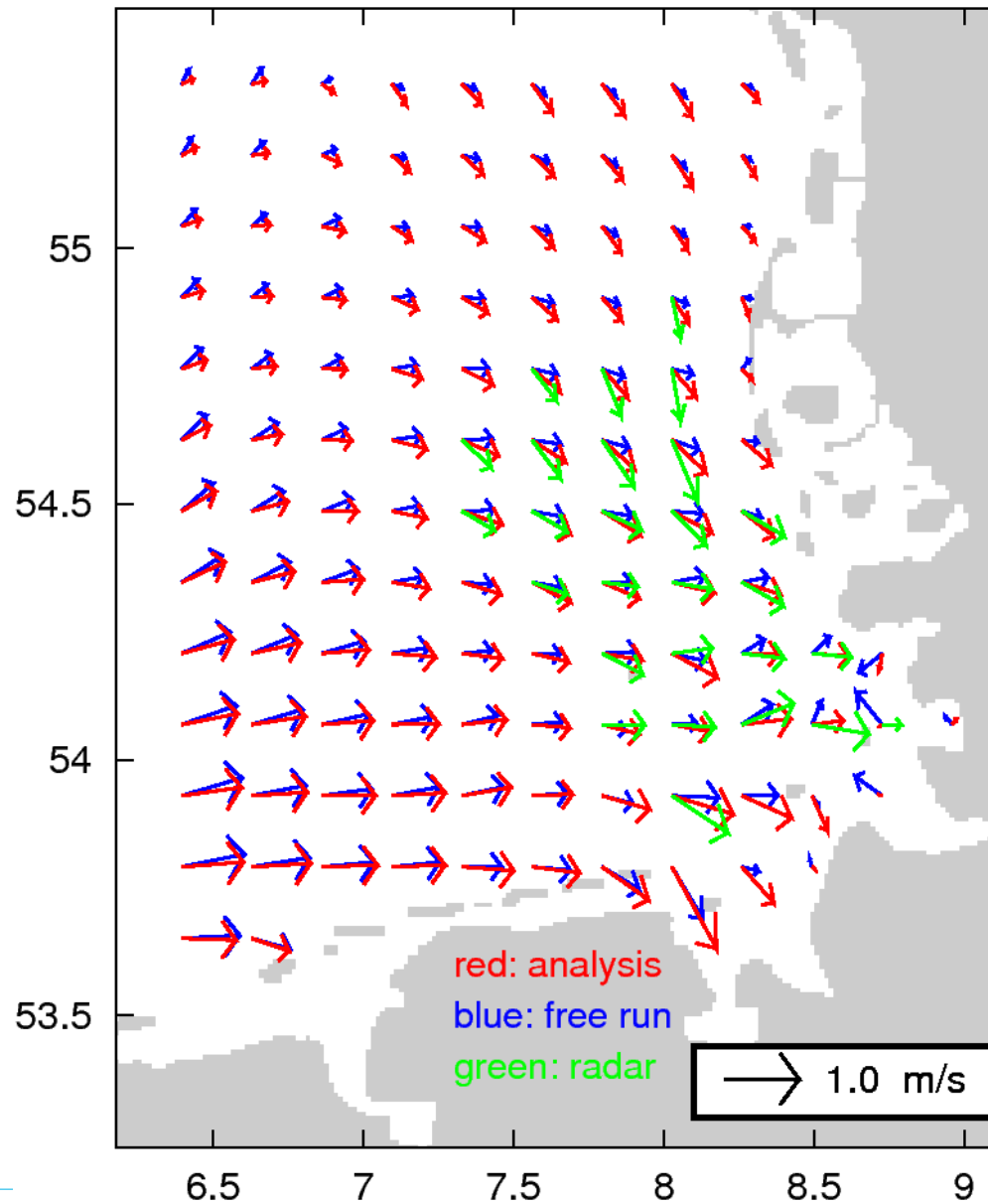


Position C

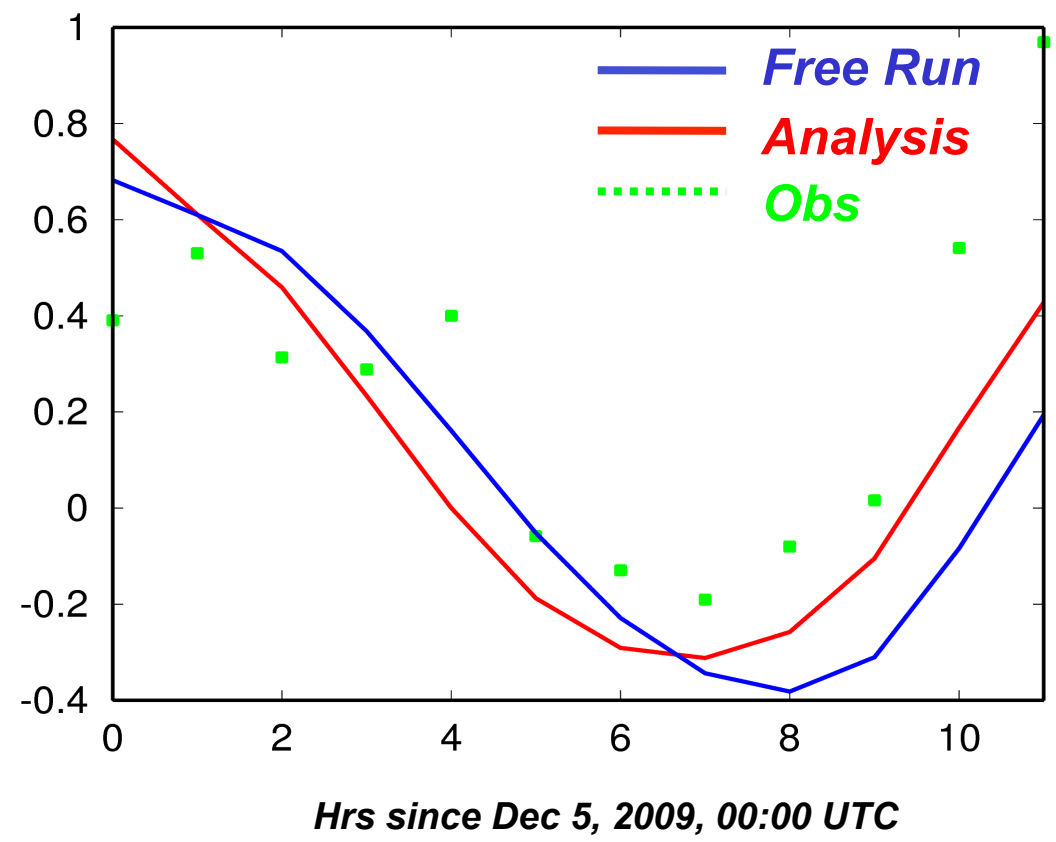
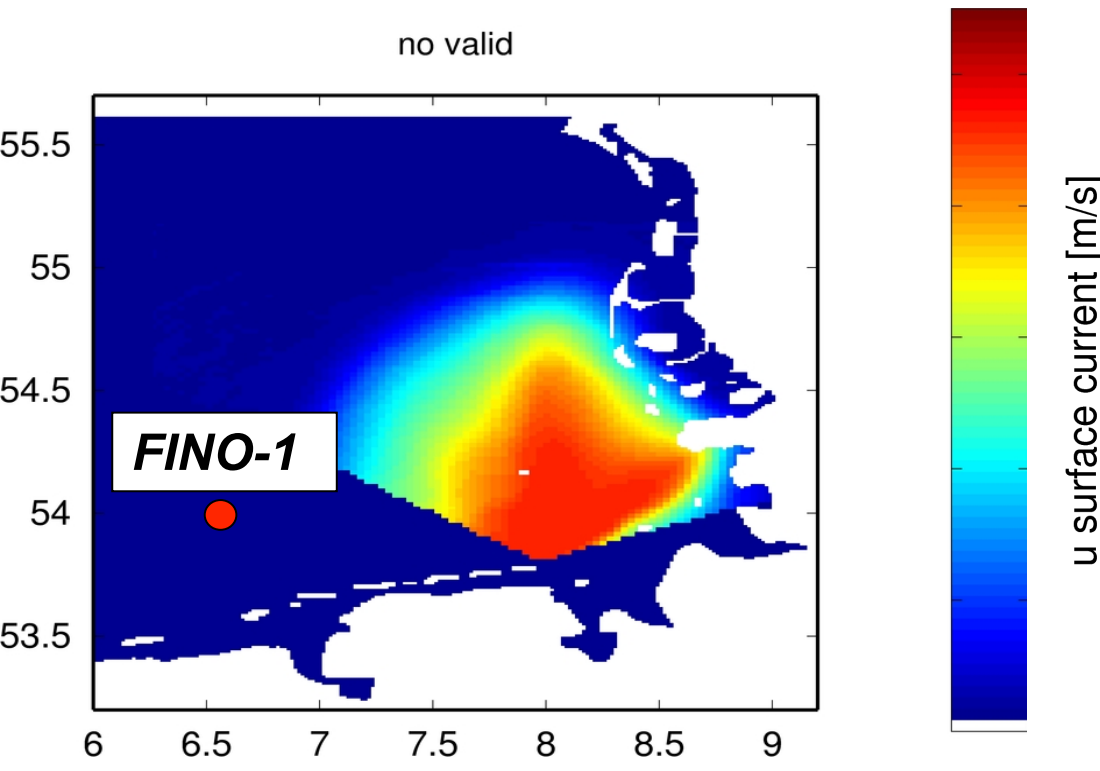


# Comparison of model and measurements

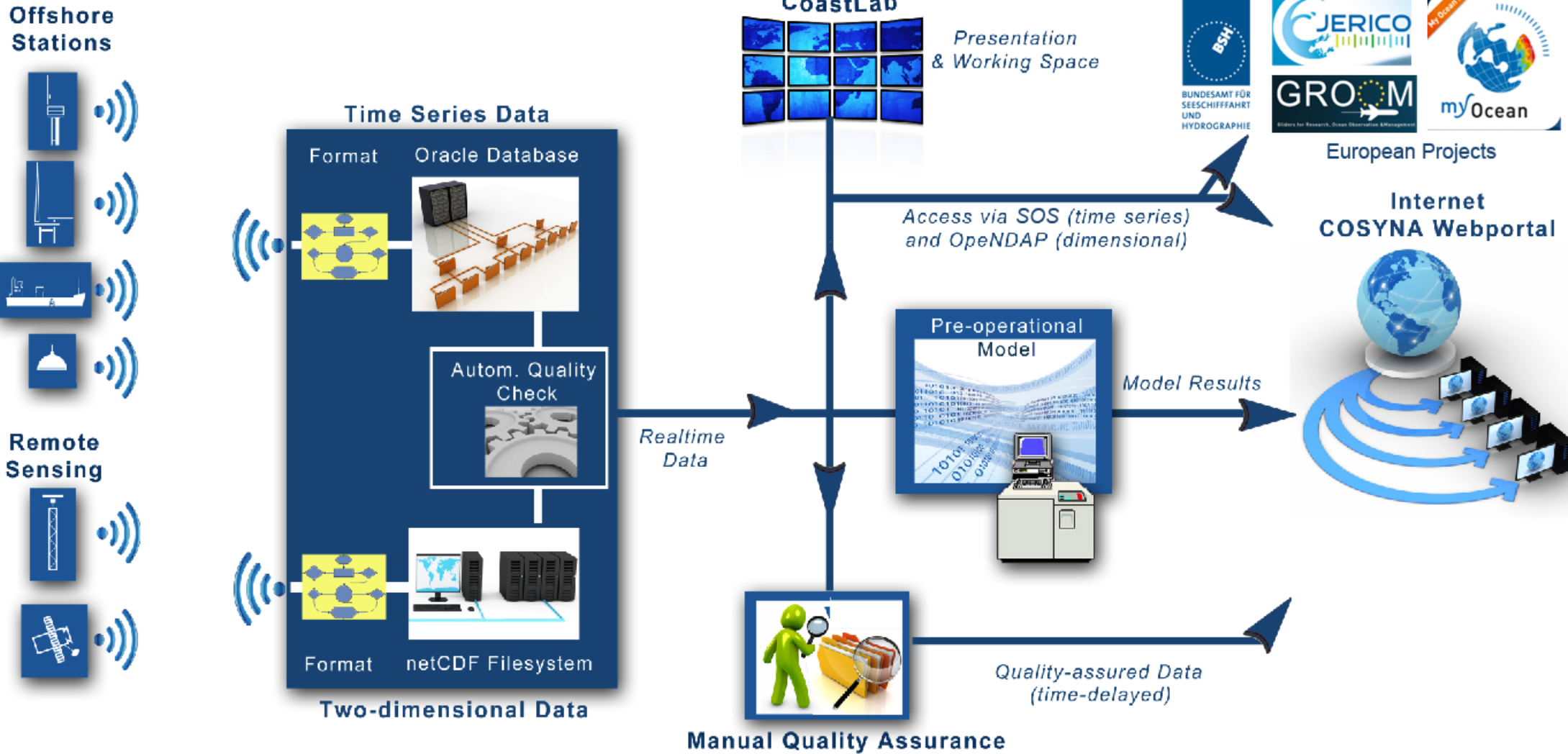
Current Speed [m/s] Sep 11, 2011 19:00 UTC



# Validation

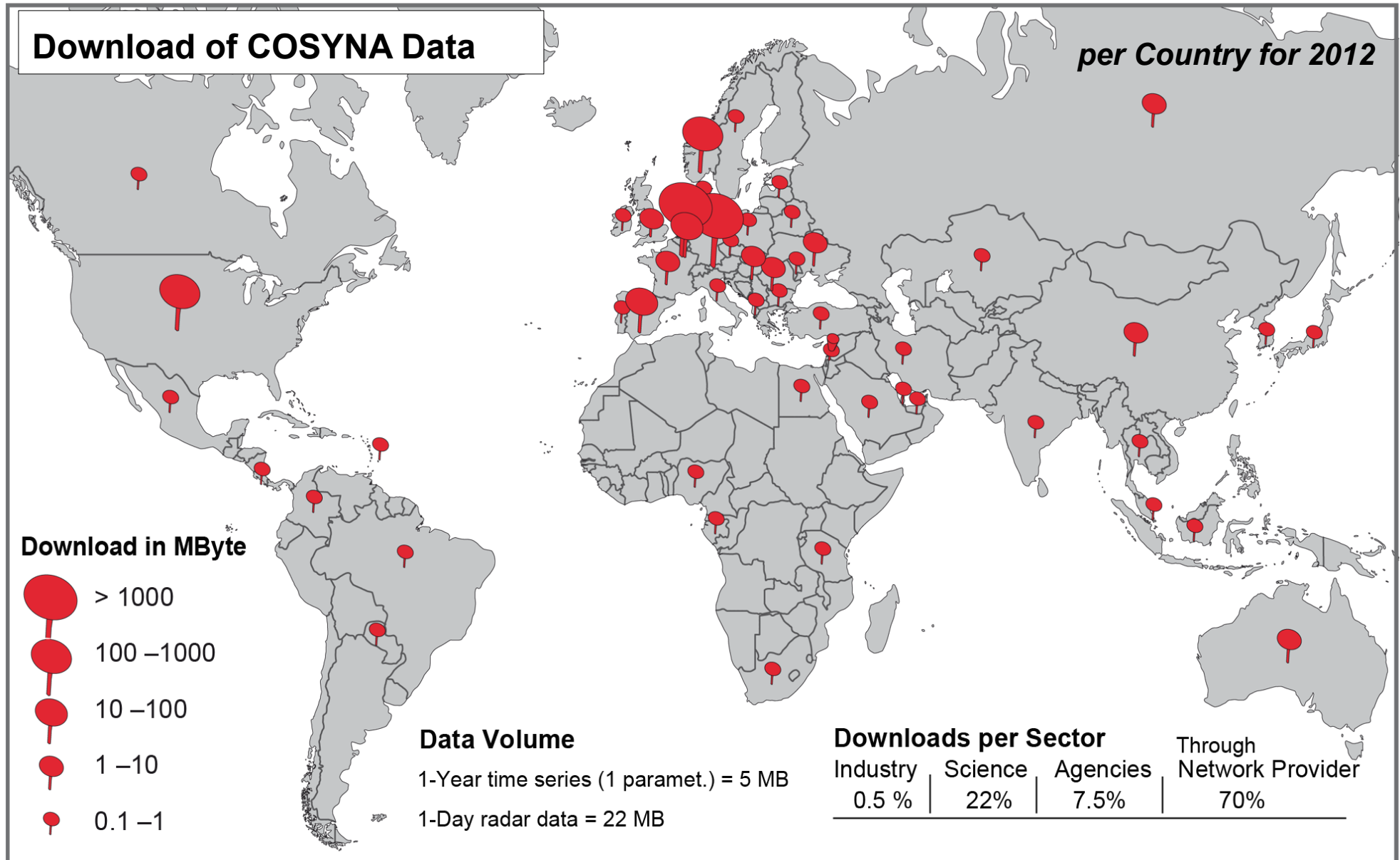


# Data System

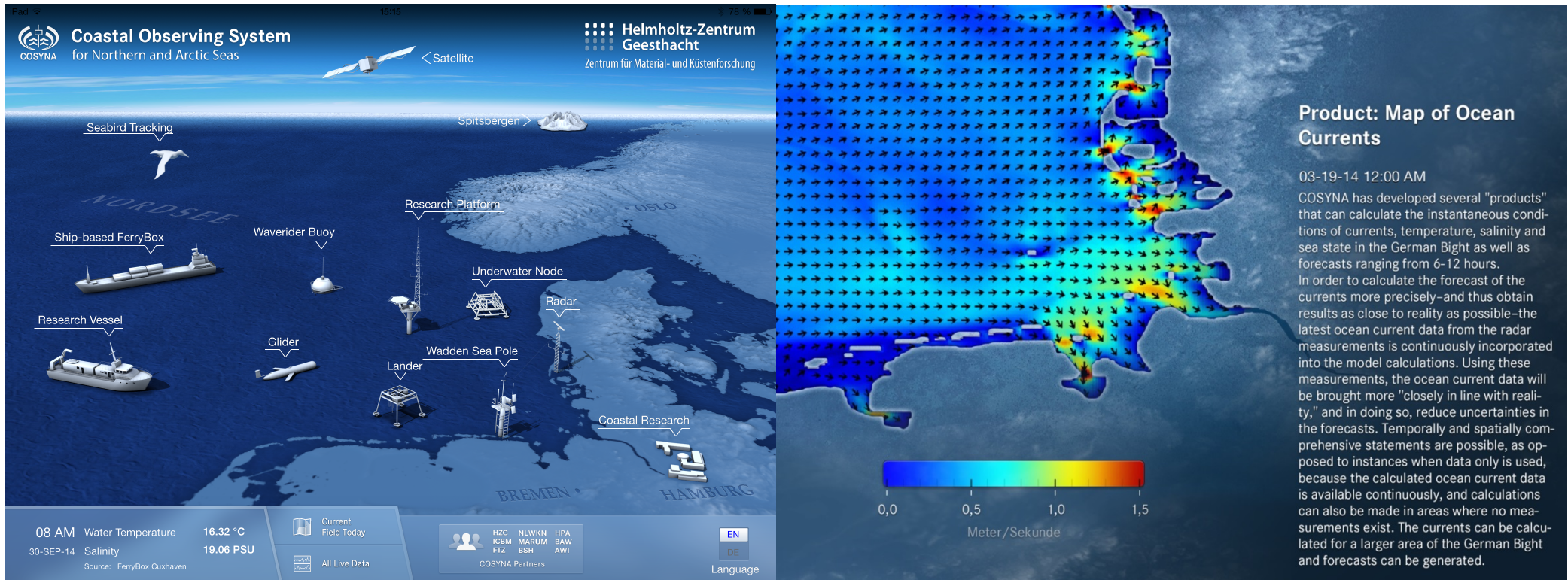




# Data Usage

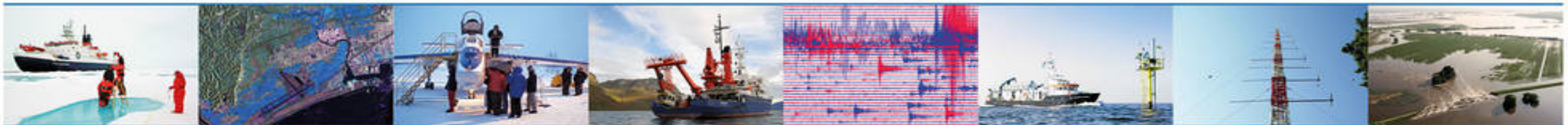


# COSYNA App



Helmholtz-Zentrum Geesthacht: [www.cosyna.de](http://www.cosyna.de)

Earth System Knowledge Platform (ESKP): [www.eskp.de](http://www.eskp.de)



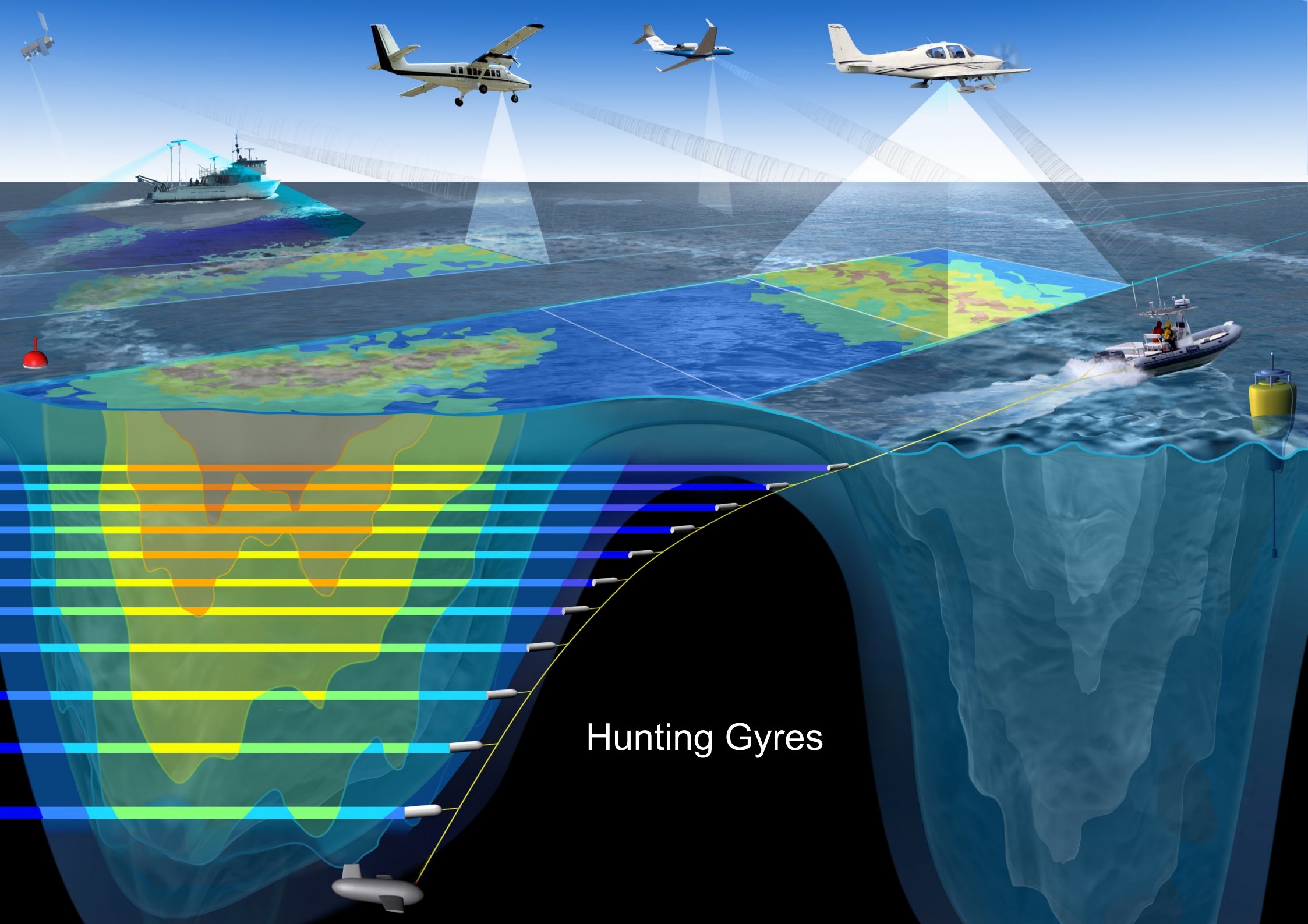


# Offshore Windparks

The screenshot displays the 'Global Offshore Wind Farms Database' interface. At the top left, the '4C Offshore' logo is visible. The main area is a map of the North Sea and Baltic Sea regions, showing various offshore wind farm locations marked with colored icons. The map includes labels for 'Outer Hebrides', 'Orkney Islands', 'North Sea', 'Skagerrak', 'Denmark', 'Kattegat', 'Baltic Sea', 'United Kingdom', 'Netherlands', 'Germany', 'Poland', 'Russia', 'Leeds', 'Manchester', 'Birmingham', 'London', 'Amsterdam', 'Hamburg', 'Berlin', 'Cologne', 'Brussels', 'Warsaw', 'Copenhagen', 'Vänern', and 'Lincs'. A 'Windfarm Data' popup is open on the right, featuring search filters for 'Search by Country' (a dropdown menu), 'Search Windfarms by Name' (a text input field with the example '[e.g. Scroby]'), and a 'Download as Excel' button with a 'Subscribe!' link. The interface also includes a 'Check for Nautical Charts (NW Europe)' button, a '974' notification, and a 'Your experienced partner' banner for 'ITW Densit' with the text '- more than 1500 Ducorit® grouted connections in foundations'. On the right side, there are several interactive buttons: 'Ports', 'Wind Speed & Water Depth', 'Vessel Activity', and 'Windfarm News'. A vertical scale on the left side of the map indicates depth or distance.



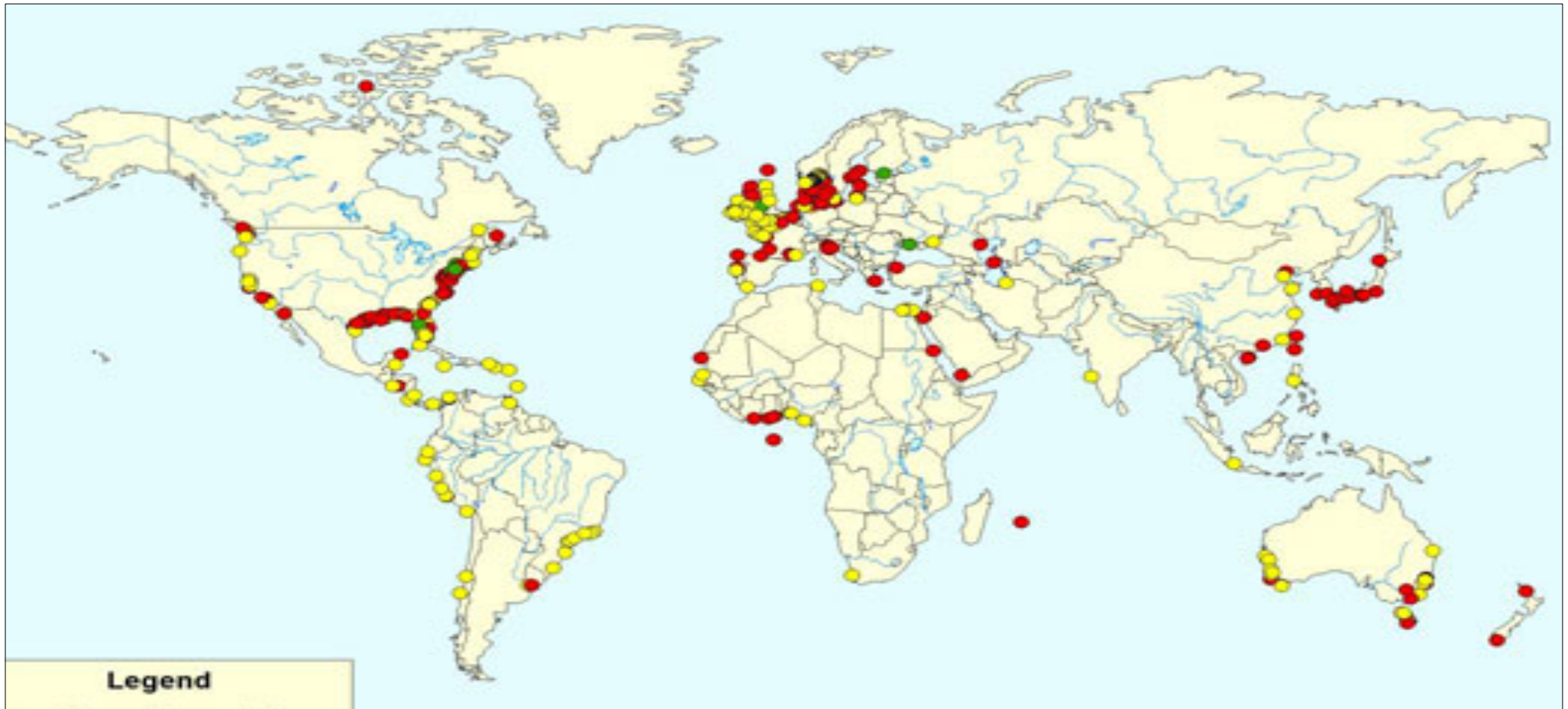
**BARD 1**



Hunting Gyres

# Focus on the „Global Coast“

Example: Oxygen-depleted Areas





**COSYNA**