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FerryBox systems within the coastal observatory COSYNA

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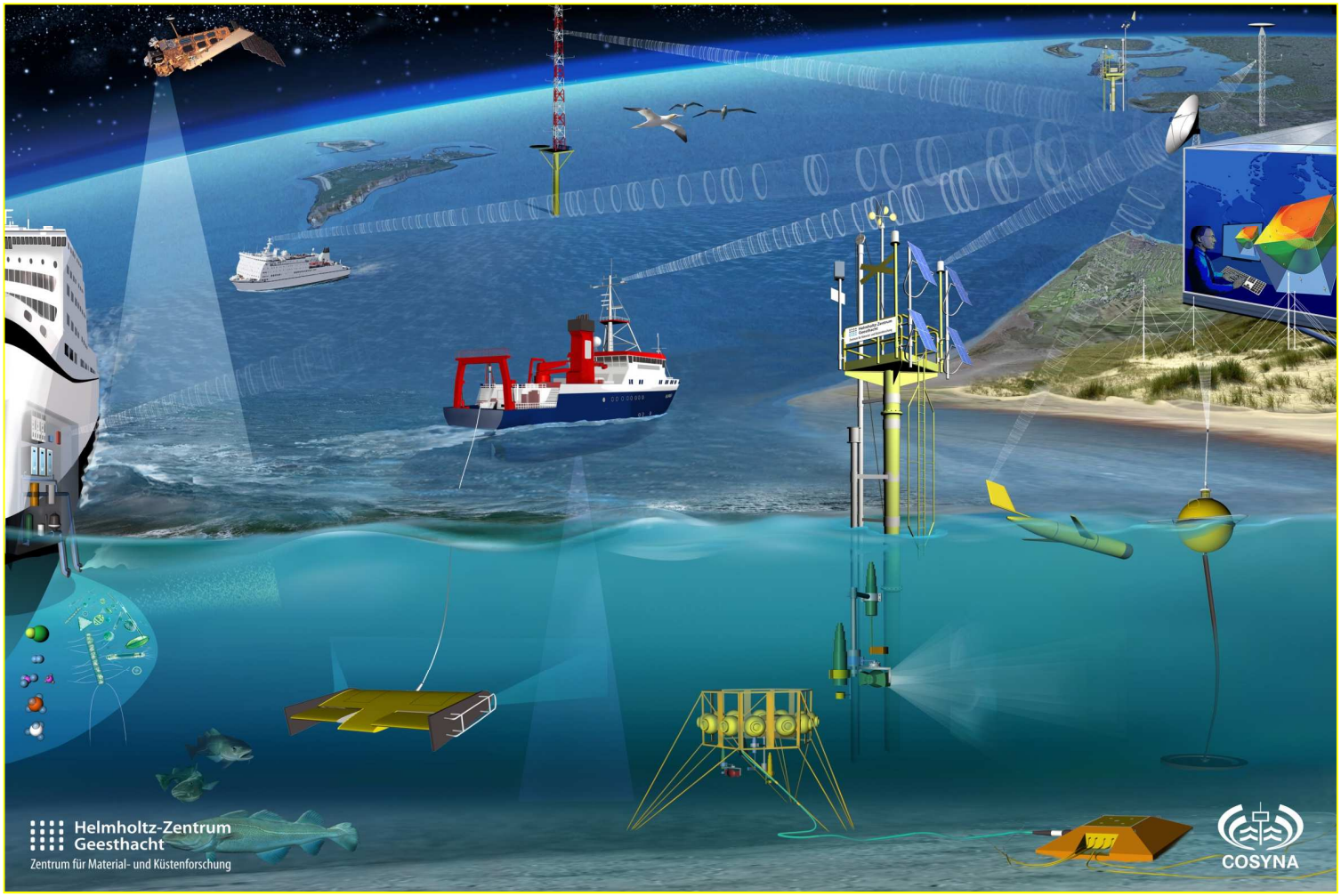
Centre for Materials and Coastal Research

What is COSYNA?

Helmholtz-Zentrum Geesthacht
Centre for Materials and Coastal Research

Coastal Observing System for Northern and Arctic Seas



AWI

ZMAW

marum

NLWKN

BSH
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

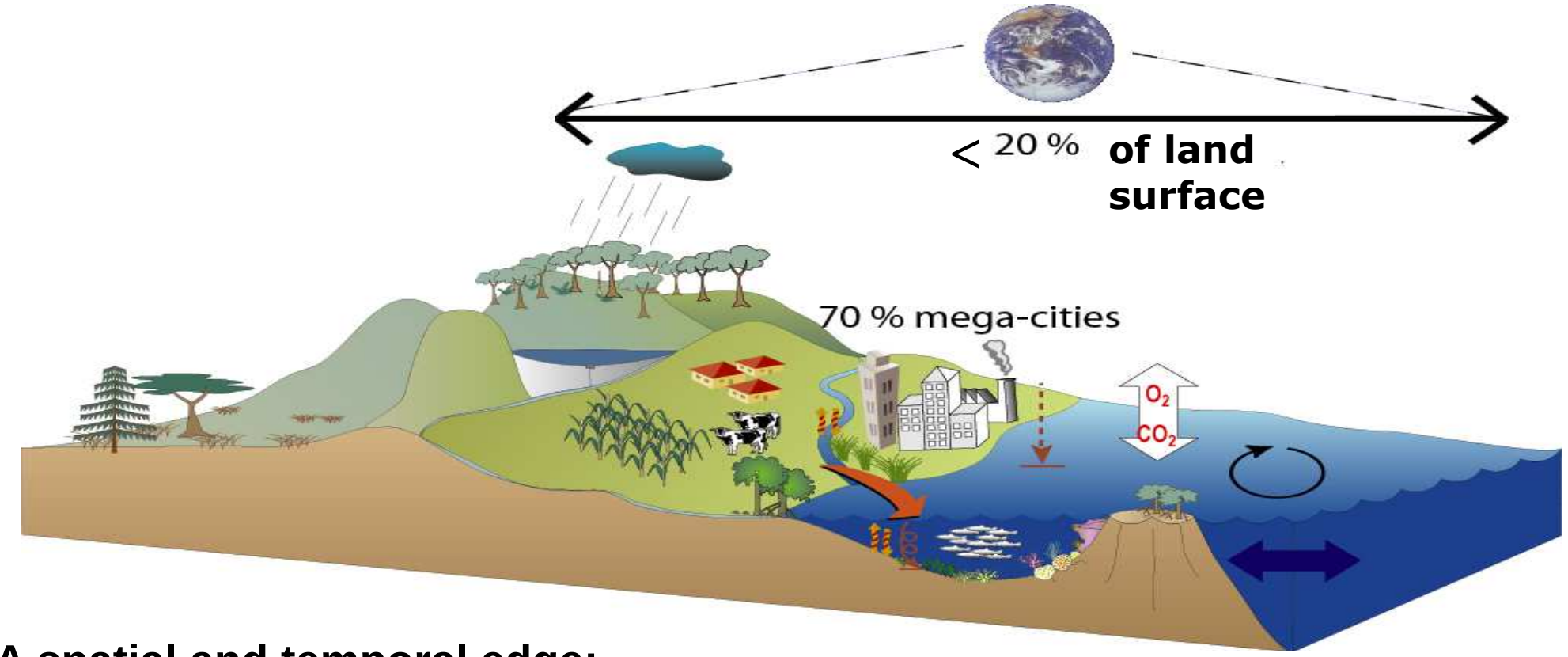
HPA Hamburg Port Authority

CARL VON OSSIETZKY universität OLDENBURG

imare
Institute for Marine Resources GmbH

Importance of coastal areas

as defined by elevation (+200 to +100 and -100 to –200 m)



A spatial and temporal edge:

- high gradients/variability (e.g. climatic) / biodiversity
- major biogeochemical processes
- Catchment - Shelf as a unit
- > 50% of human population

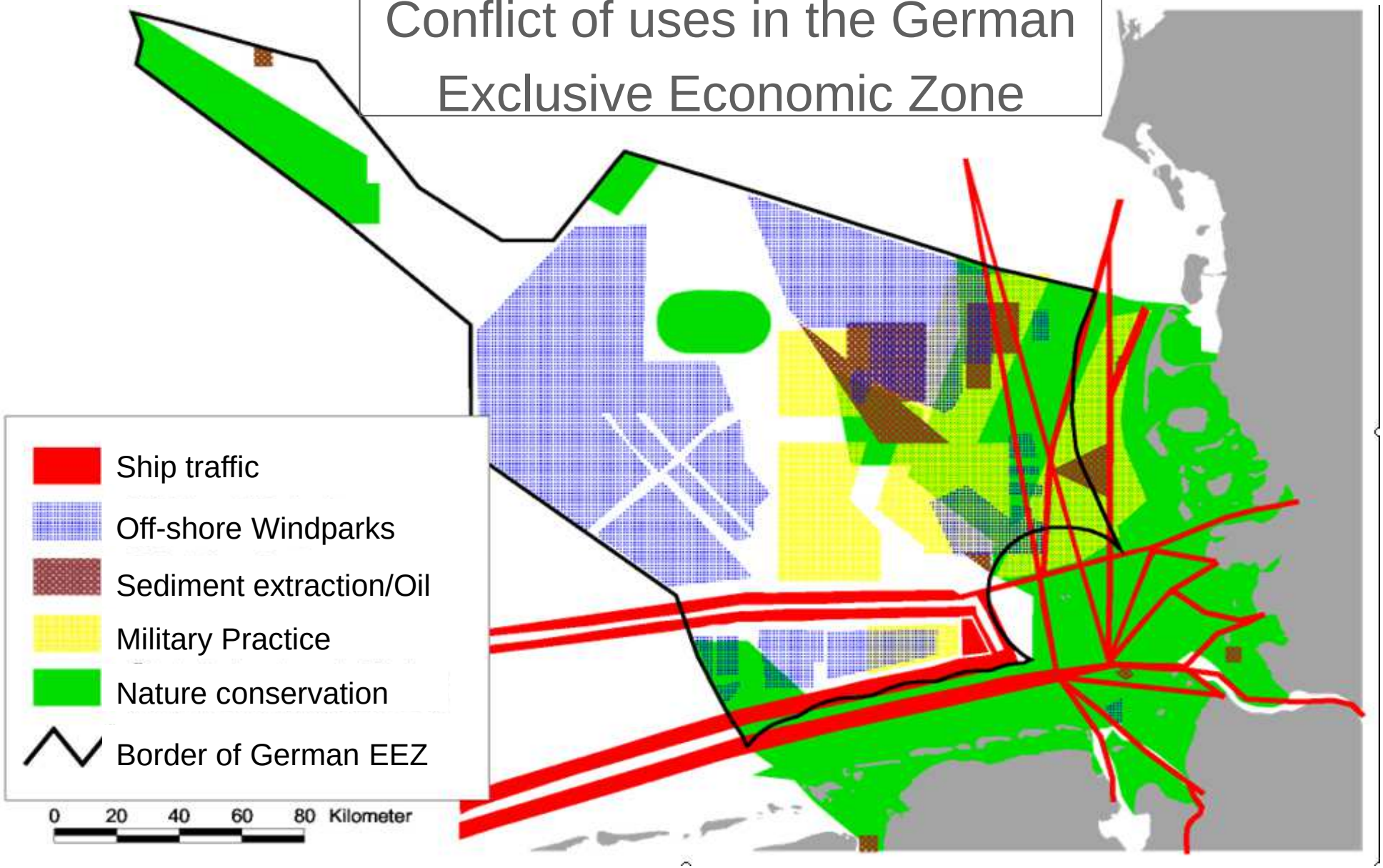
A resource sustainability edge:

- 25 % biological productivity;
- 90 % global fishery,
- Ecosyst. services: ~$17.5 trillion

Wilson et al

Challenges in the German Bight

Conflict of uses in the German Exclusive Economic Zone



Questions to be answered

→ Long-term changes of physical boundary conditions? (e.g. current pattern, waves, temperatures, salinities etc.)

→ Consequences on the SPM budget and the morphodynamics?

→ Effects on the bio-geochemical state of the Wadden Sea and the North Sea?

→ Significance of “Extreme Events” for the seasonal primary production and the bio-geochemical budgets?

→ Quantification of SPM, nutrients and organic matter exchange between Wadden Sea and the North Sea?

→ Driving factors for algal blooms (HABs)?

→ Effects of offshore wind mills on these processes?

COSYNA concept

Aims

- Development of an automated, integrated observing system under participation of external partners (universities, authorities)
- Operational observation of the state, trends and processes in the North Sea
- Operational modelling and prognoses of essential environmental parameters
- Creation of scenarios as support for coastal management tasks
- Development of observation & modelling modules, together with German institutions (universities, monitoring authorities etc.)
- Integration into European structures (EMODNET, EMECO, MyOcean2, JERICO, ...)

www.cosyna.de

COSYNA Components

1. Point Measurements:
   - Buoys & Fixed Stations (offshore & onshore)
2. Surface Transects (2D):
   - FerryBoxes
3. 3D Transects:
   - SCANFISH
   - Gliders
4. Fields:
   - Optical Remote Sensing (satellite)
   - Radar (HF & X-Band)
5. Modelling

Examples of observations

COSYNA

SCANFISH

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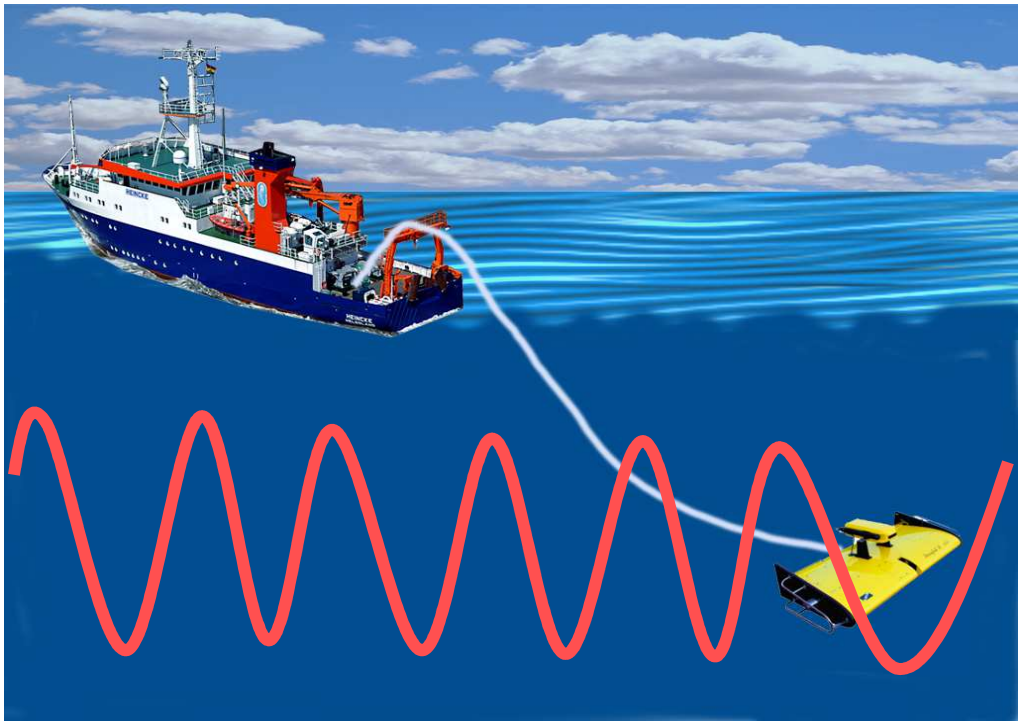
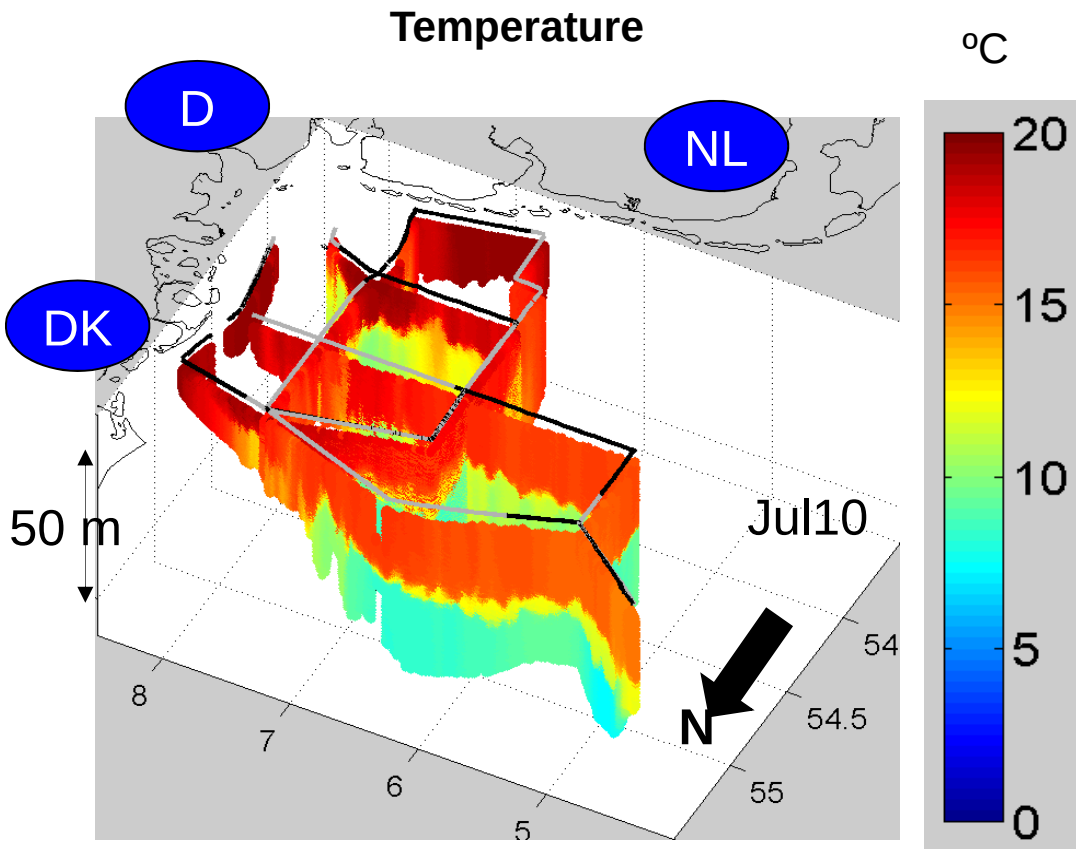
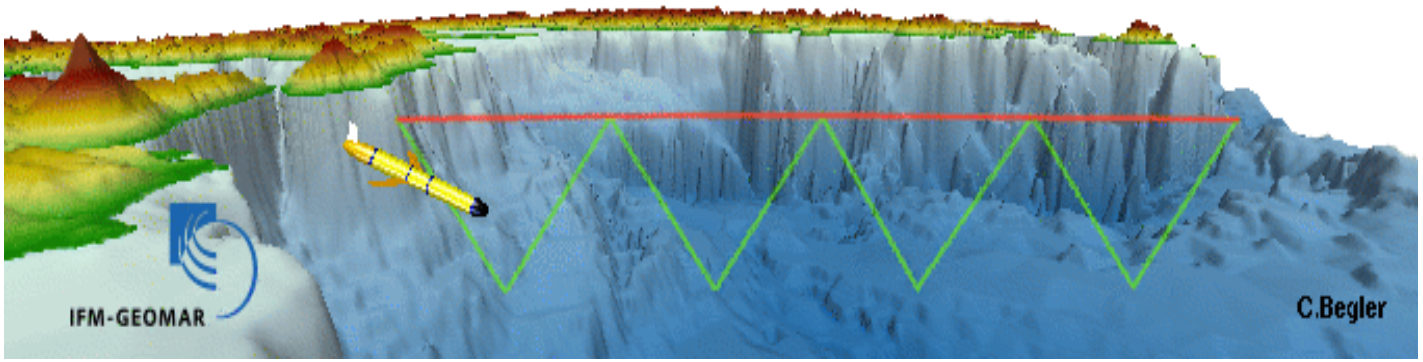
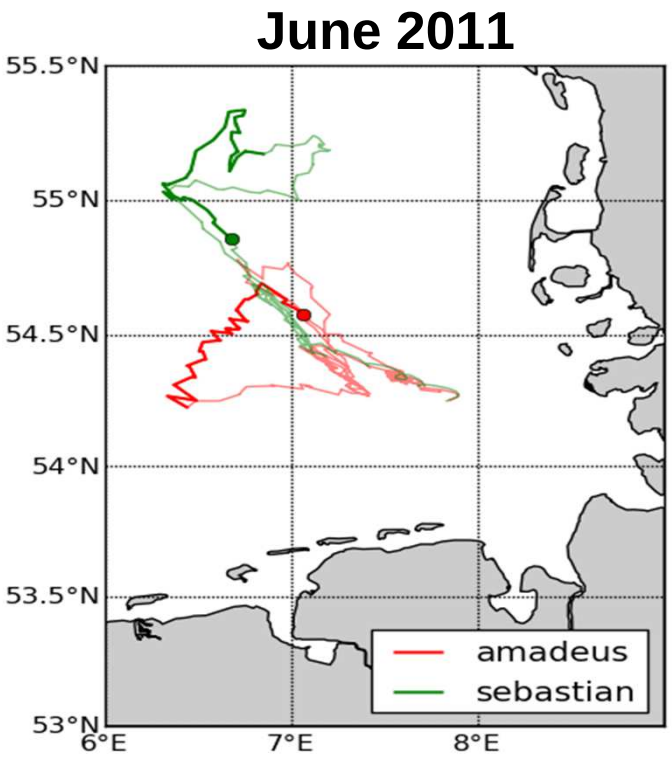
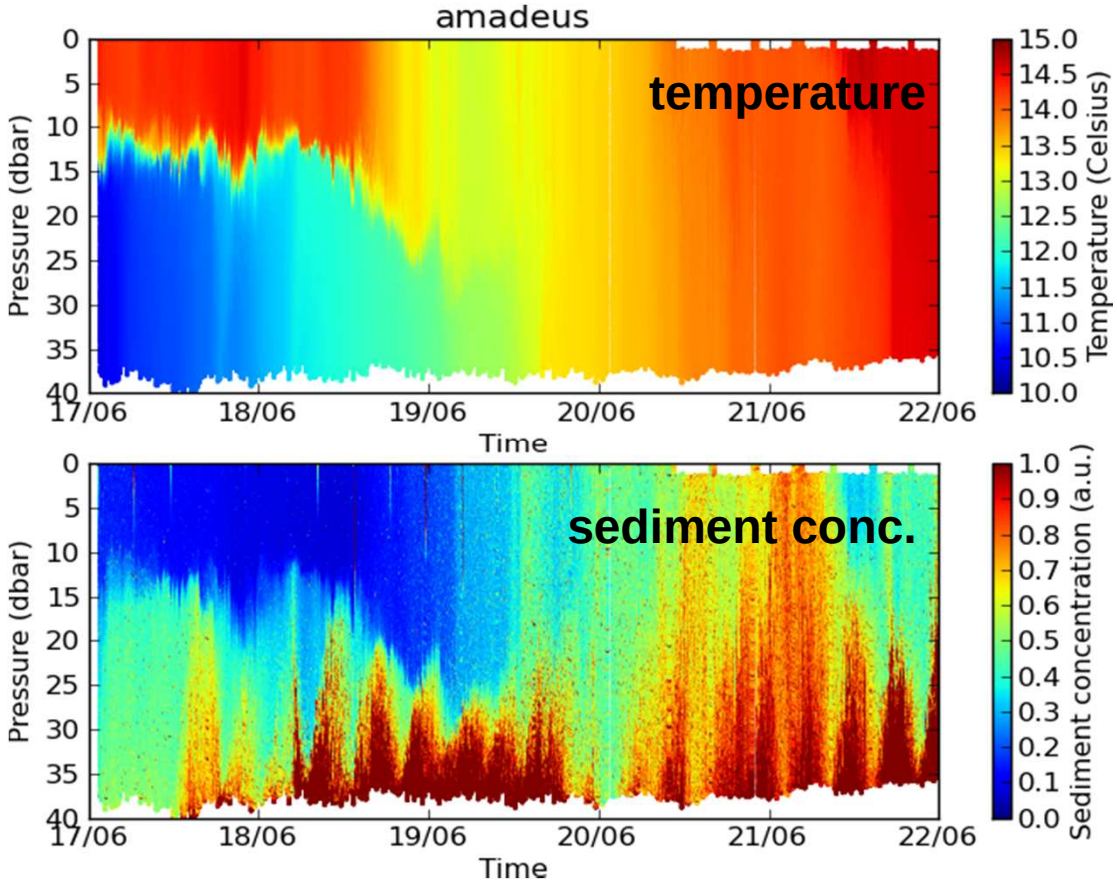




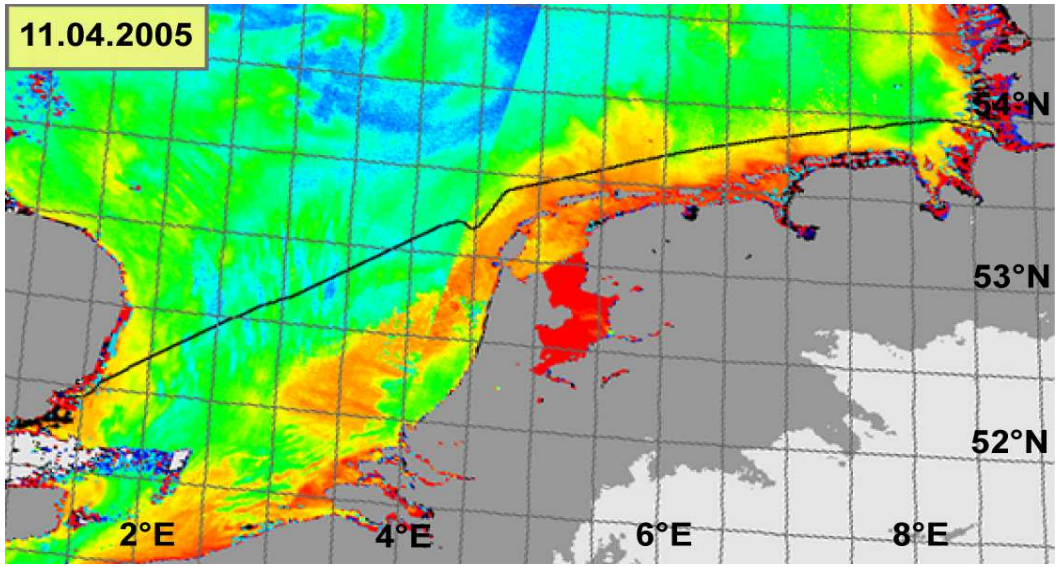
Gliders


IFM-GEOMAR
C.Begler

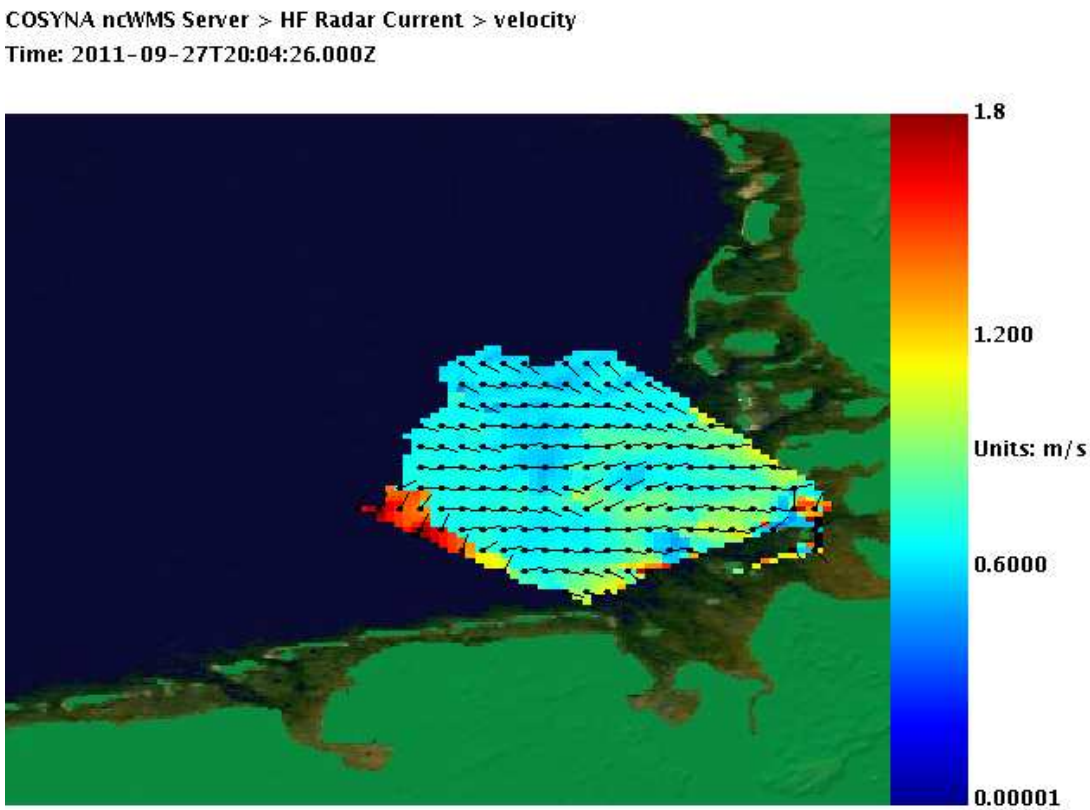

June 2011
55.5°N
55°N
54.5°N
54°N
53.5°N
53°N
6°E
7°E
8°E
amadeus
sebastian


amadeus
temperature
Pressure (dbar)
Time
Temperature (Celsius)
sediment conc.
Sediment concentration (a.u.)
17/06
18/06
19/06
20/06
21/06
22/06

Satellite & Radar

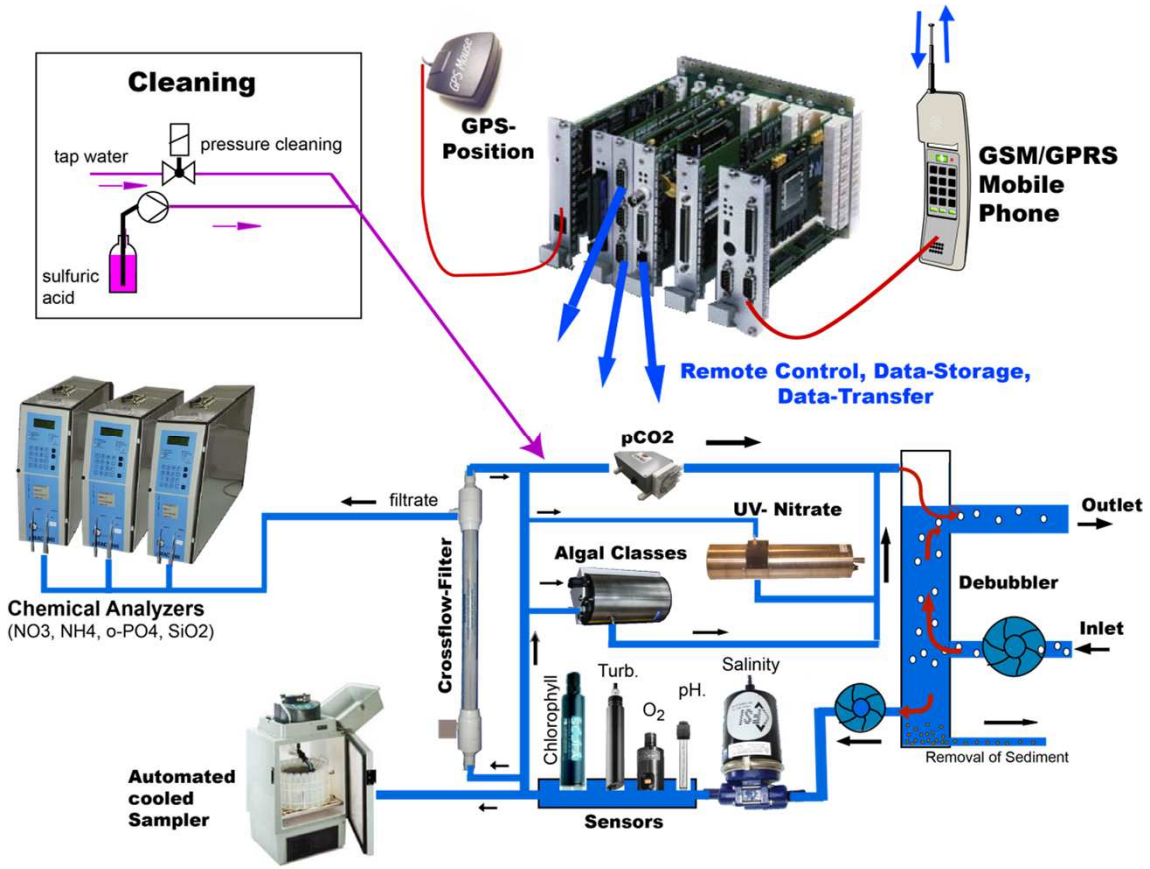


chl-a detected by ENVISAT/MERIS



currents measured by HF radar

FerryBox



Sensors for:

- temperature
- salinity
- turbidity
- chlorophyll
- oxygen
- pH
- algal groups
- nutrients
- pCO_2

Main Features:

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

+ automatic water sampler for further lab analyis

Ferries or SoO‘s as Monitoring Platform

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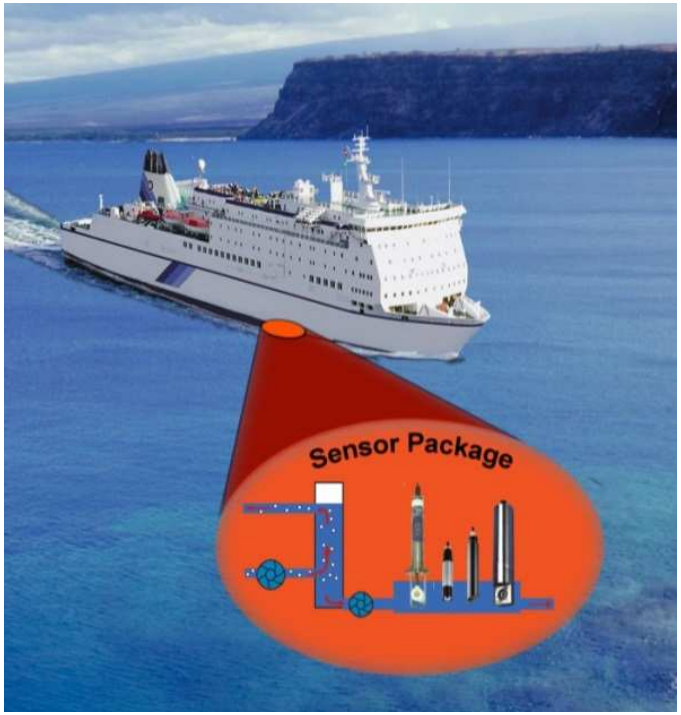
Advantages:

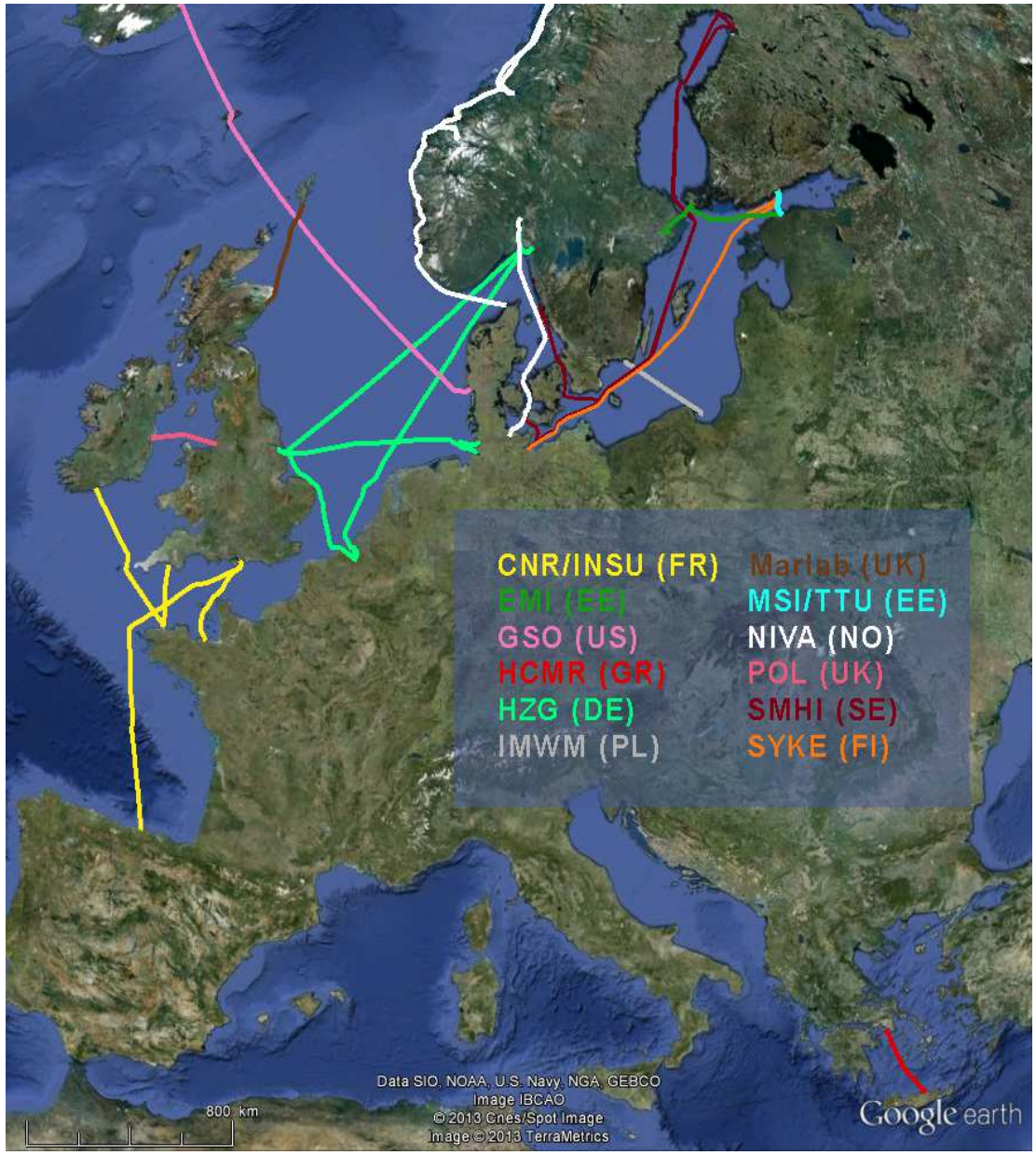
- cost effective (no costs for the platform)
- no energy limitations
- easier and cheaper maintenance
- more effective antifouling measures
  - long-term reliable data
- „friendly" environment for the system
  - inline sensors
  - possibility of operation of new developed (less robust) sensors
- high resolution of data in space and time

Limitations:

- data limited to the transect
- no depth profiles
- voluntary ships



European FerryBox routes



FerryBox operated by HZG

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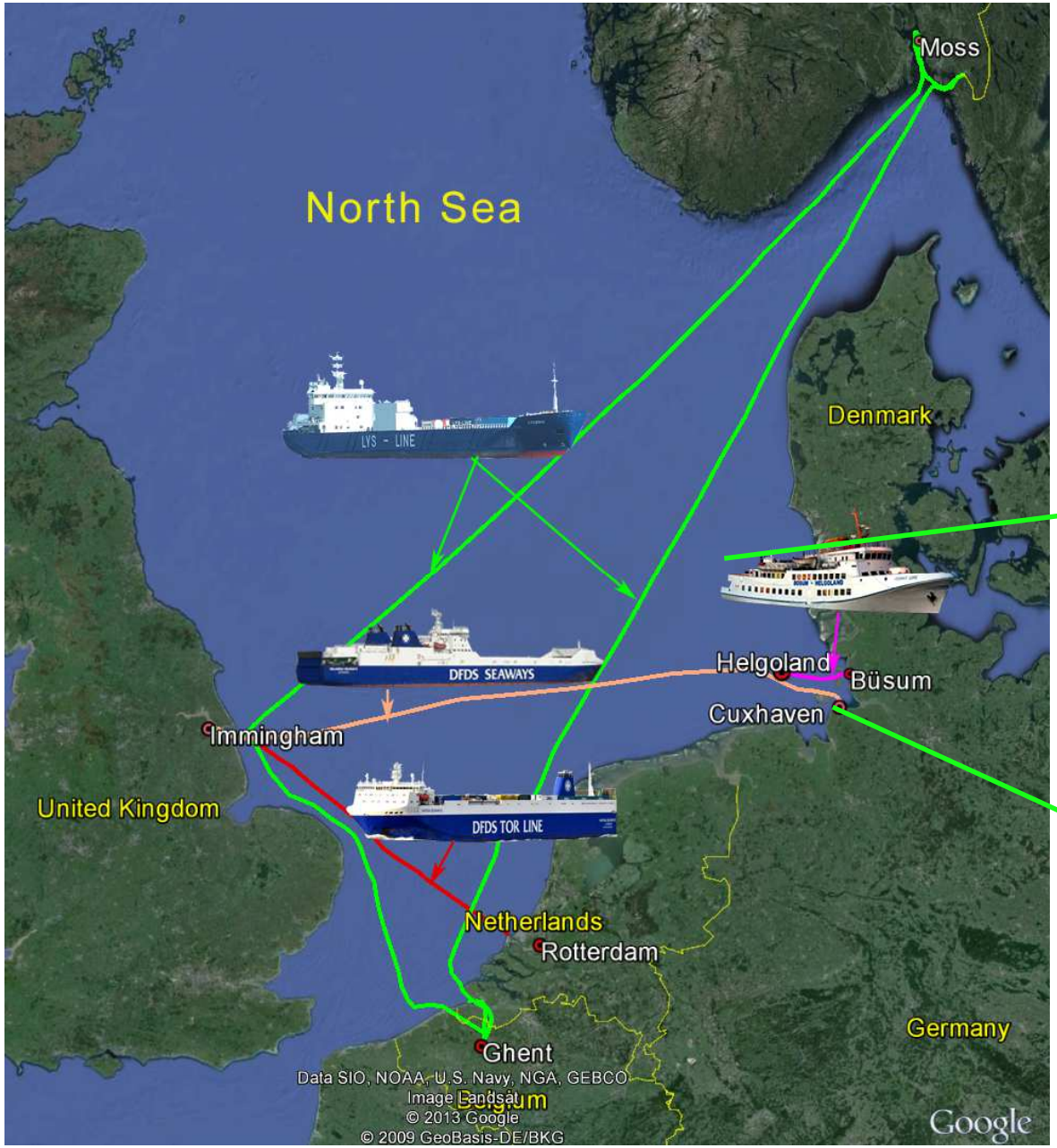
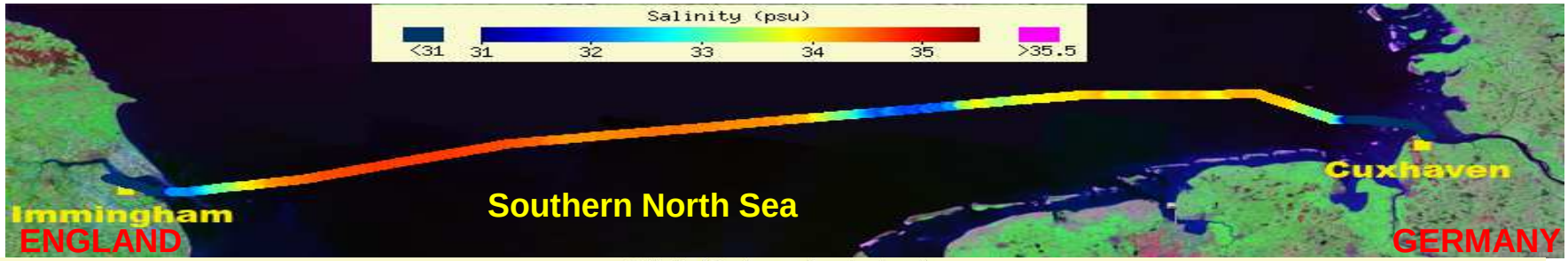
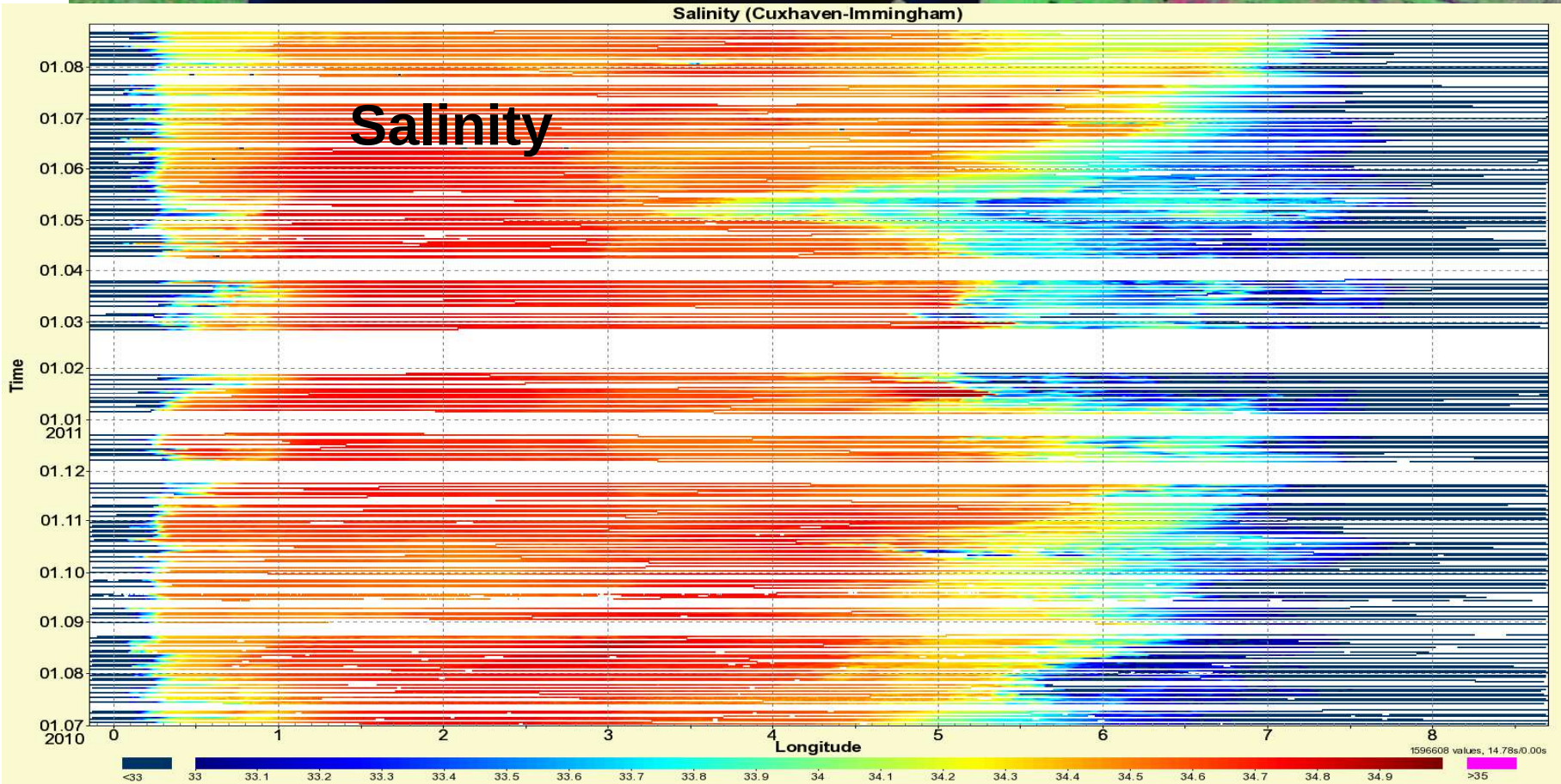


FB-Station
at FINO 3
Installation:
July 2011

FB-Station
Cuxhaven
since Okt‘10:

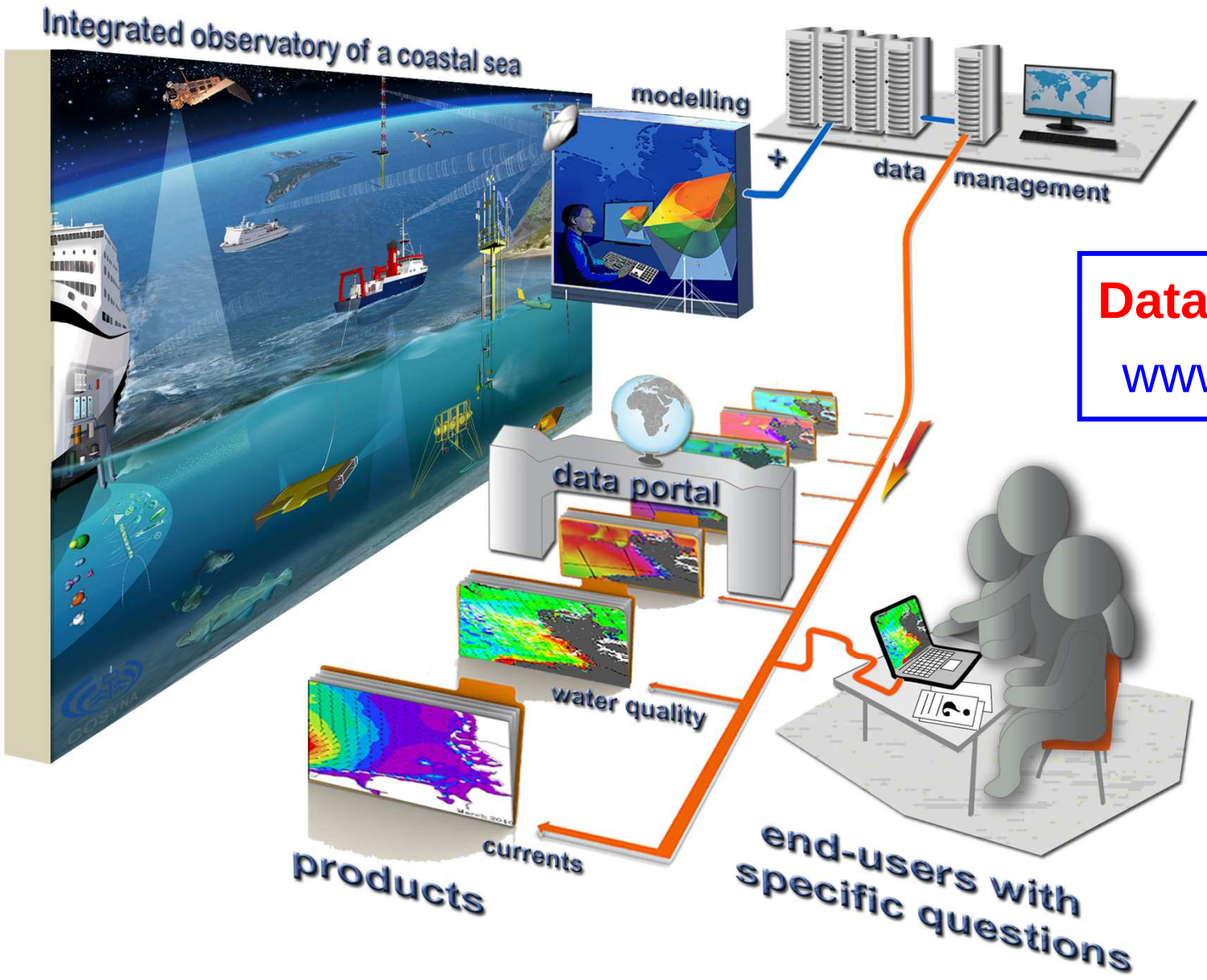
Data Availability: Transects July 2010 to August 2011





Immingham ◄——————————————————————————————► Cuxhaven

COSYNA Data Management (CODM)



Data free available

www.coastlab.org

Conclusions

- **Monitoring is necessary for a sustainable use of natural resources**
- **Coastal monitoring programs have to be planned very carefully in order to be efficient and cost effective**
- **Combination of different systems (automated observation techniques + research campaigns + remote sensing + numerical modeling) are necessary for an efficient water quality management**
- **There is still demand for effective monitoring technologies for ecological variables (EU projects EnviGuard, NEXOS….)**
- **High need of better coordination and harmonization of national coastal observatories (aim of JERICO project)**
- **Sustainability of observatory systems is still an big issue**

Thanks for your attention!

Further information:

COSYNA:

www.cosyna.de

www.coastlab.org

www.coastdat.org

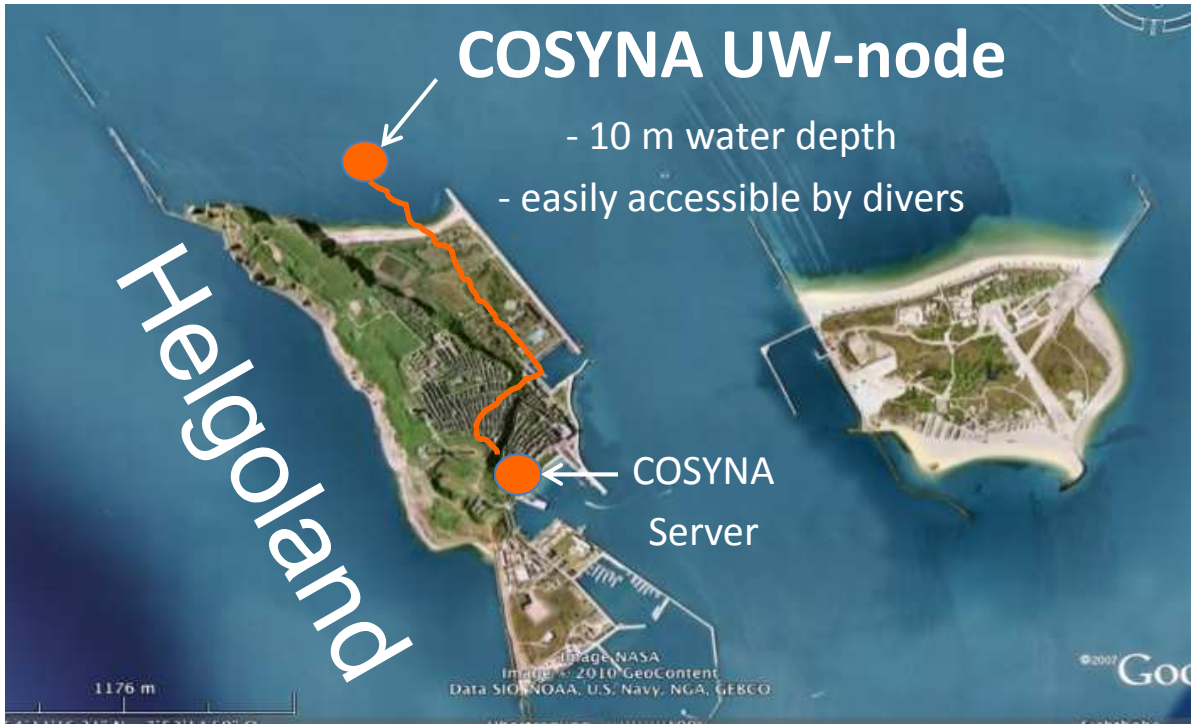
JERICO:

www.jerico-fp7.eu

Emerging Technologies:
COSYNA Underwater node

Aims

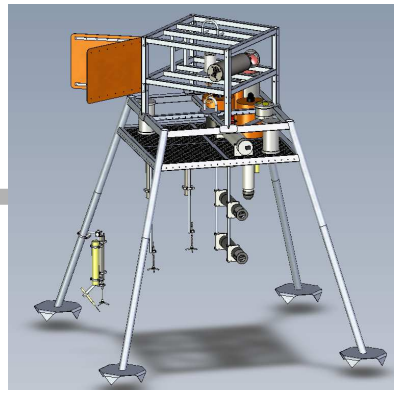
- Underwater node usable for all common sensors and probes including power supply and data transmission.
- Semi-mobile (deposition and pick-up by ship)
- Primarily connected to land via cable (potentially self-sufficient)
- Remote access for all users (just as if you are sitting with your instrument in the lab)
- Test-station at Helgoland



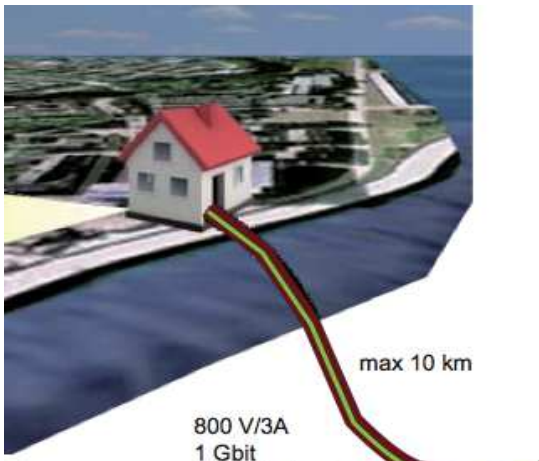
Setup

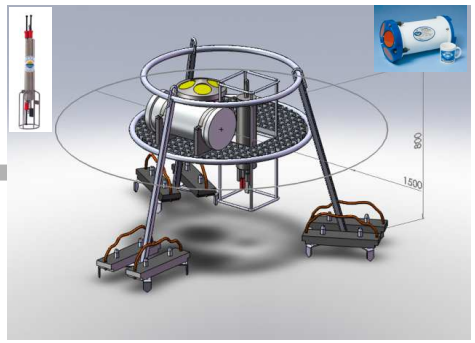
MOKI
zooplankton
recorder

REMOS1
3D in-situ imaging system
(Fish)



SedObs & NusObs
Fluxes sediment/water column





ADCP/CTD/Turb/
Fluo/O2