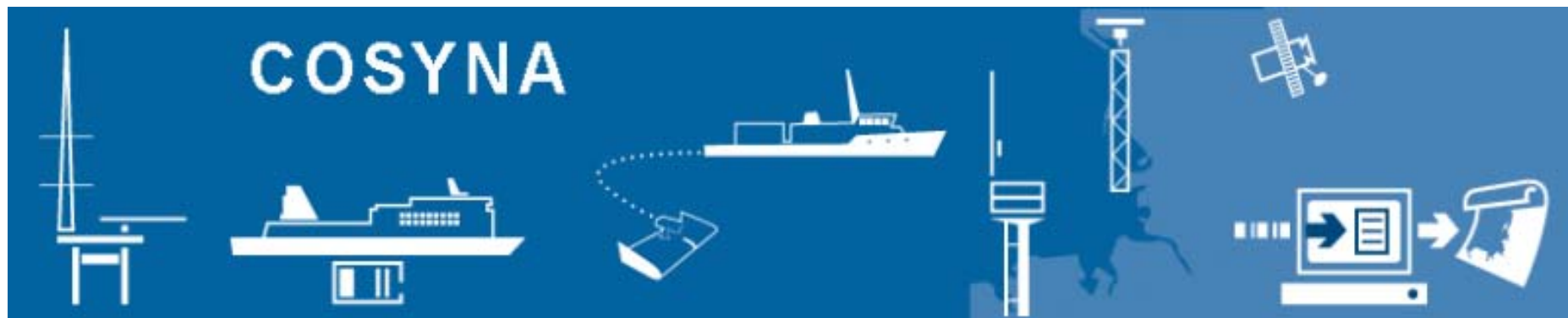


COSYNA

Coastal Observing System for Northern and Arctic Seas

- a contribution to future European, marine environmental observing initiatives



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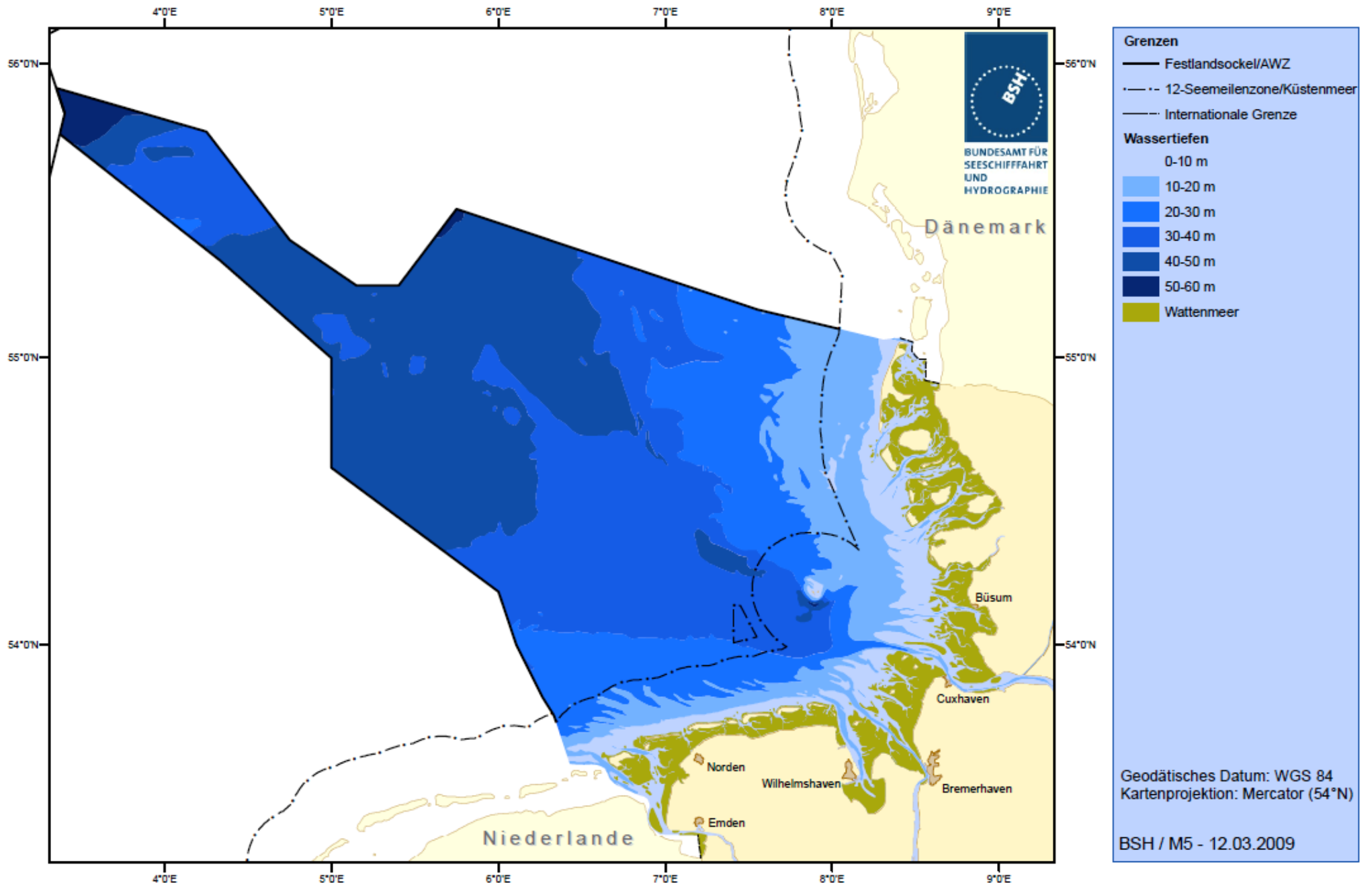
Mission statement:

To acquire a better understanding of the complex processes in coastal waters and to apply this knowledge for solving problems in coastal areas that are relevant to society by means of an observation network.

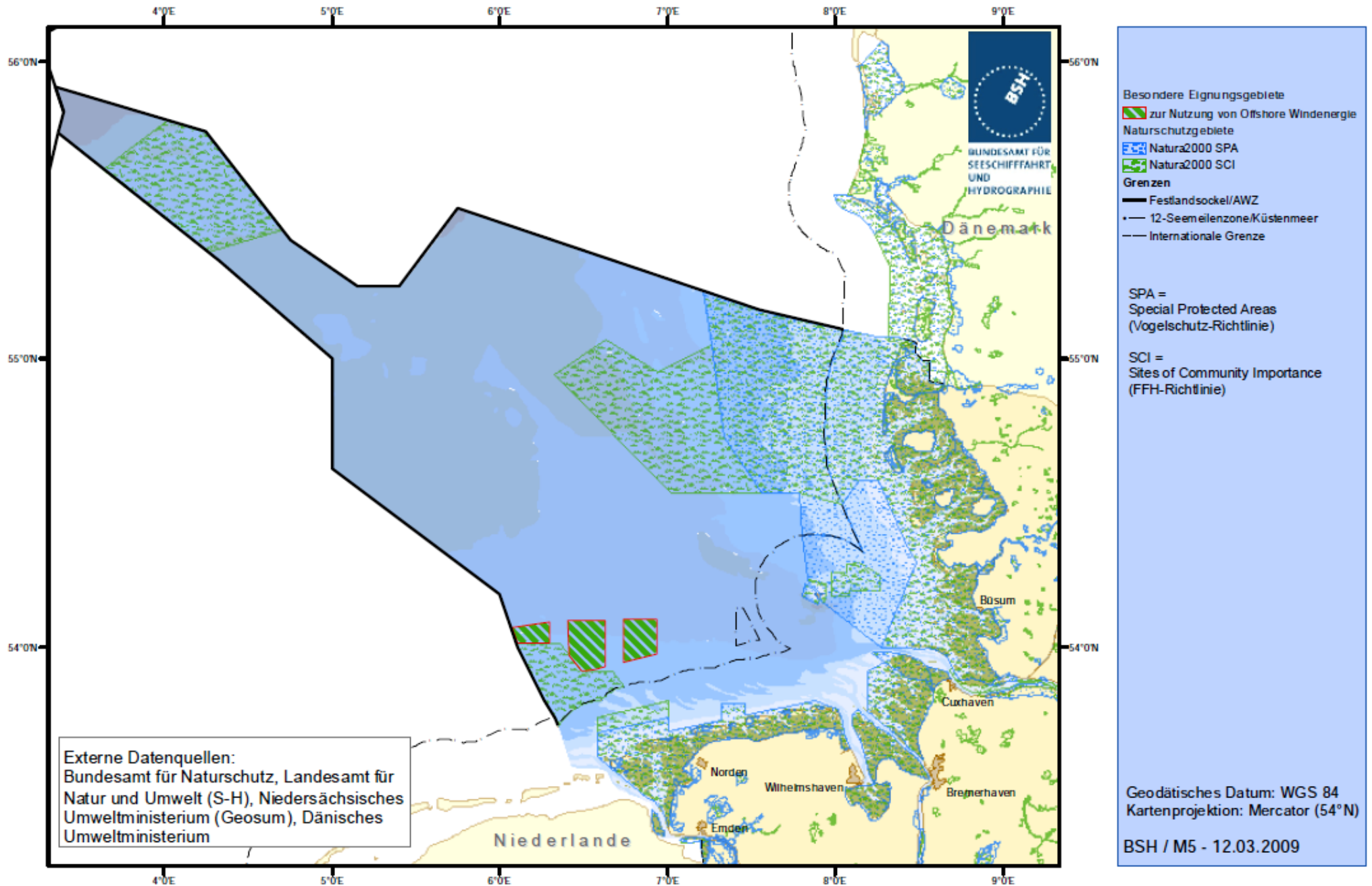
Aims

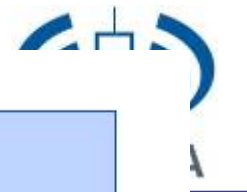
- ❖ Building an automated observing system as a „Community System“
- ❖ Development of an operational „Integrated System“ for
 - ❖ Operational observation of the state, trends and processes in the North Sea,
 - ❖ Operational modelling and prognoses of essential environmental parameters and
 - ❖ Creation 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)

Nordsee: Festlandsockel / ausschließliche Wirtschaftszone (AWZ)

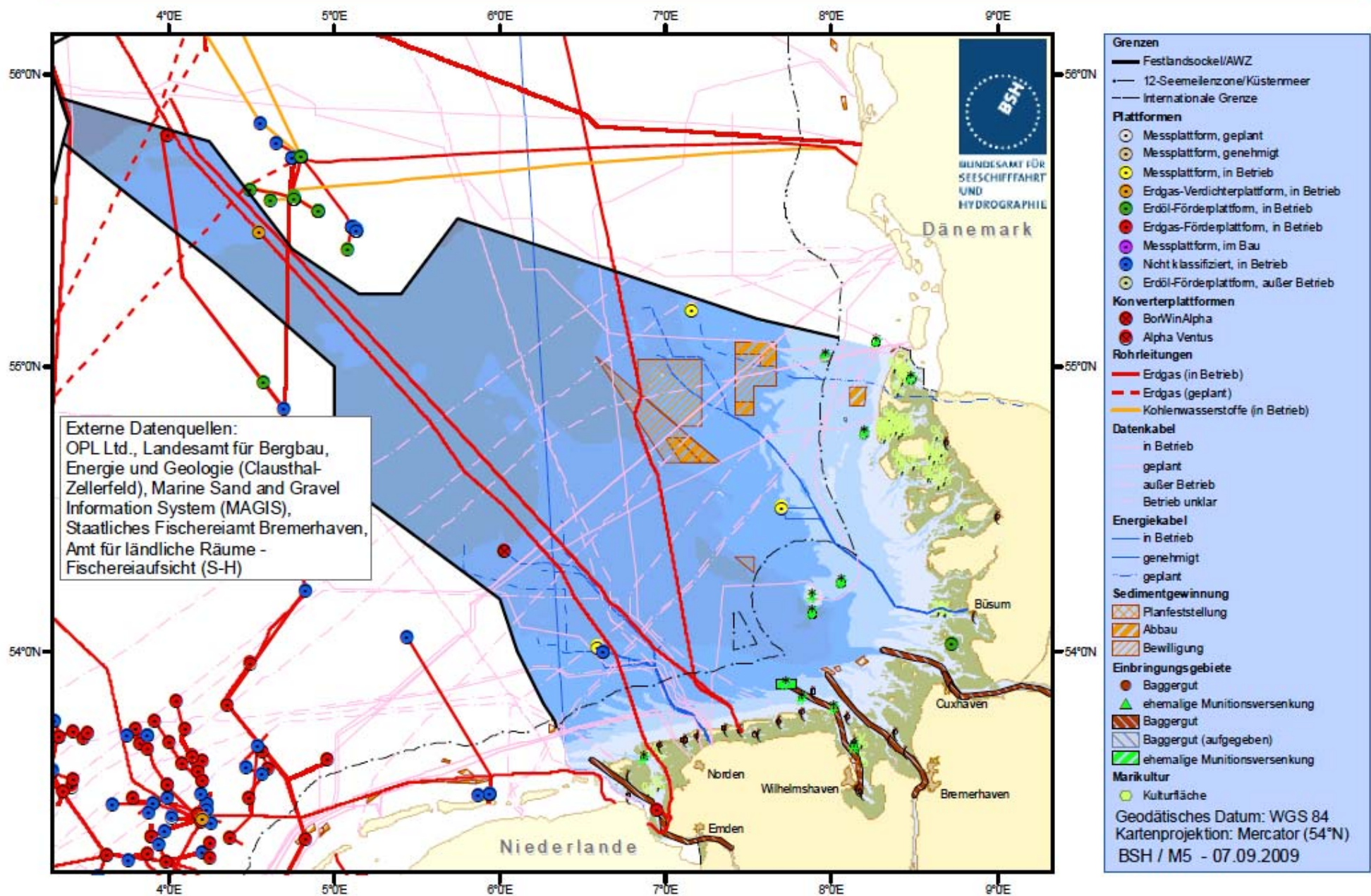


Nordsee: Naturschutzgebiete und besondere Eignungsgebiete nach SeeAnIV



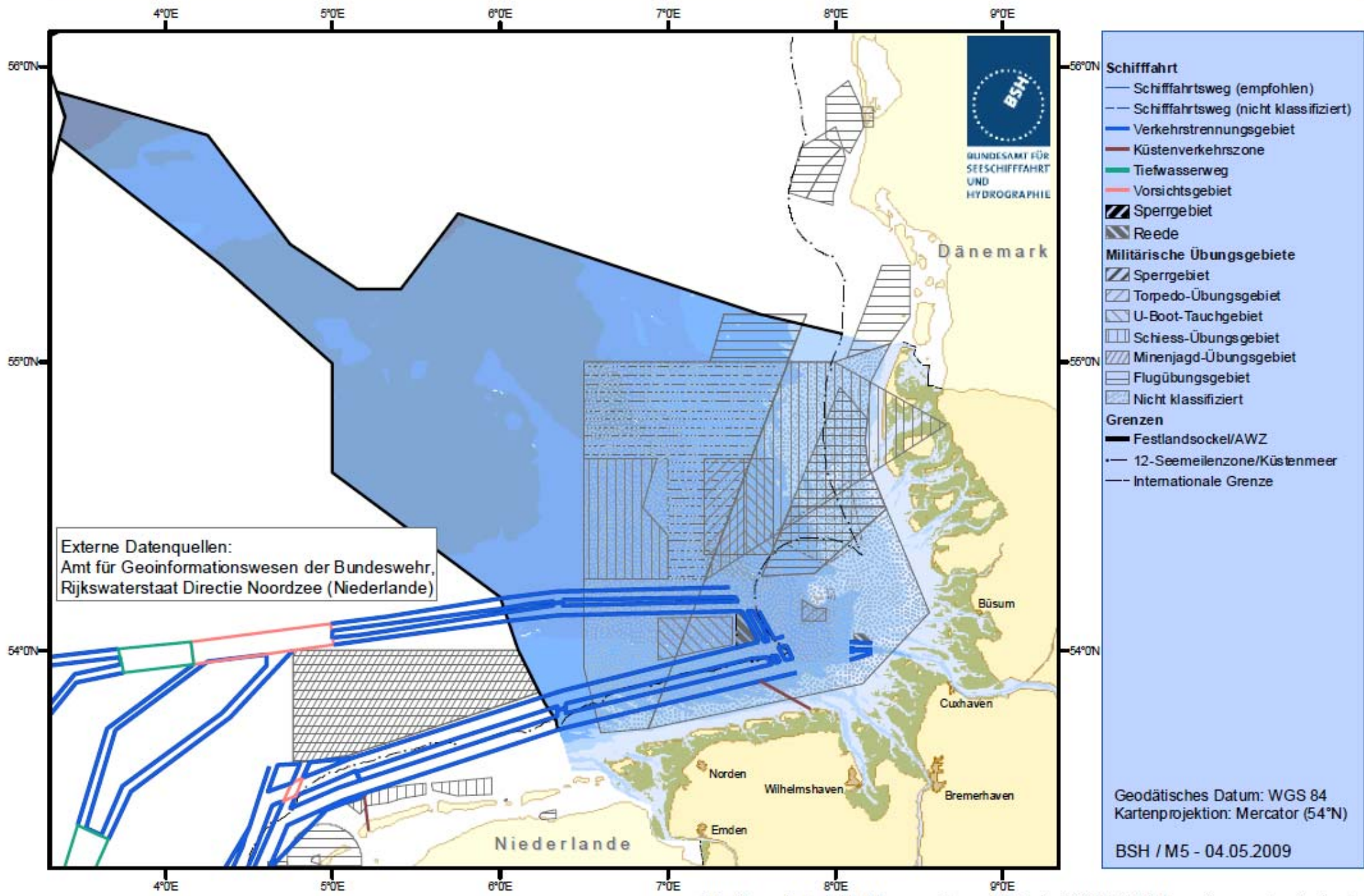


Nordsee: Plattformen, Leitungen, Sedimentgewinnung, Marikultur

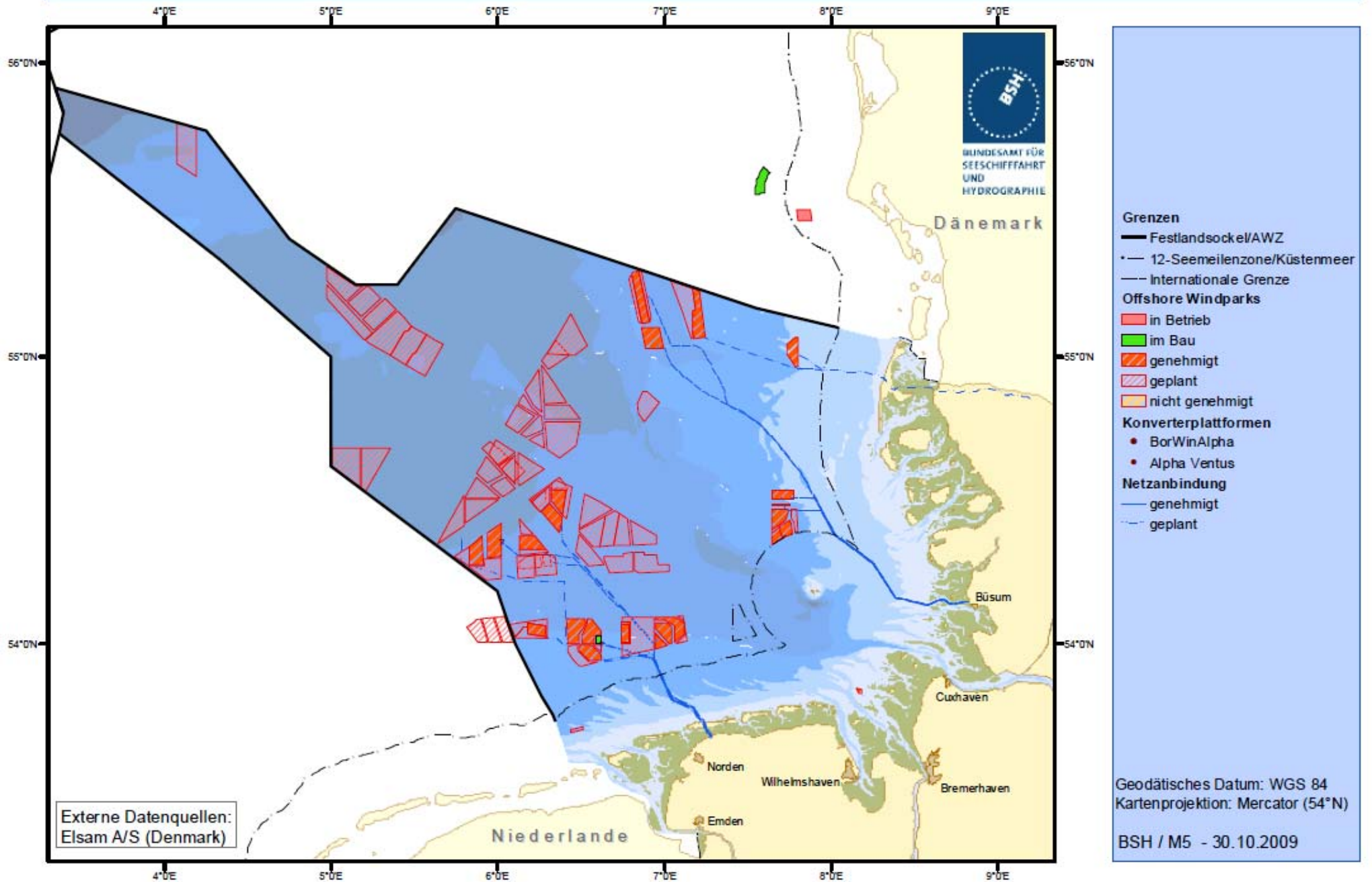




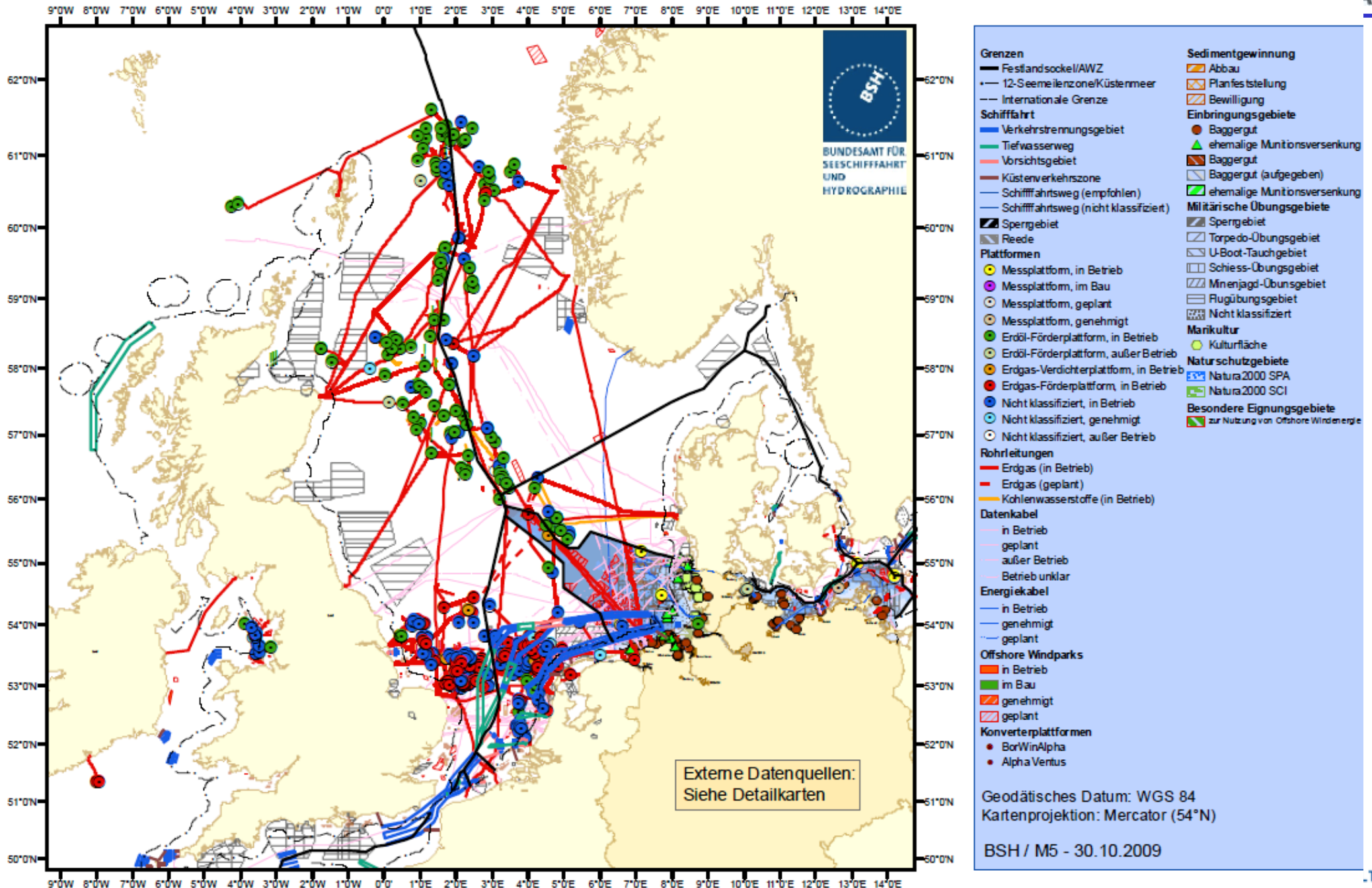
Nordsee: Schifffahrt und Landesverteidigung



Nordsee: Offshore Windparks



Nordsee: Sämtliche Nutzungen und Schutzgebiete



Examples for relevant questions from different users

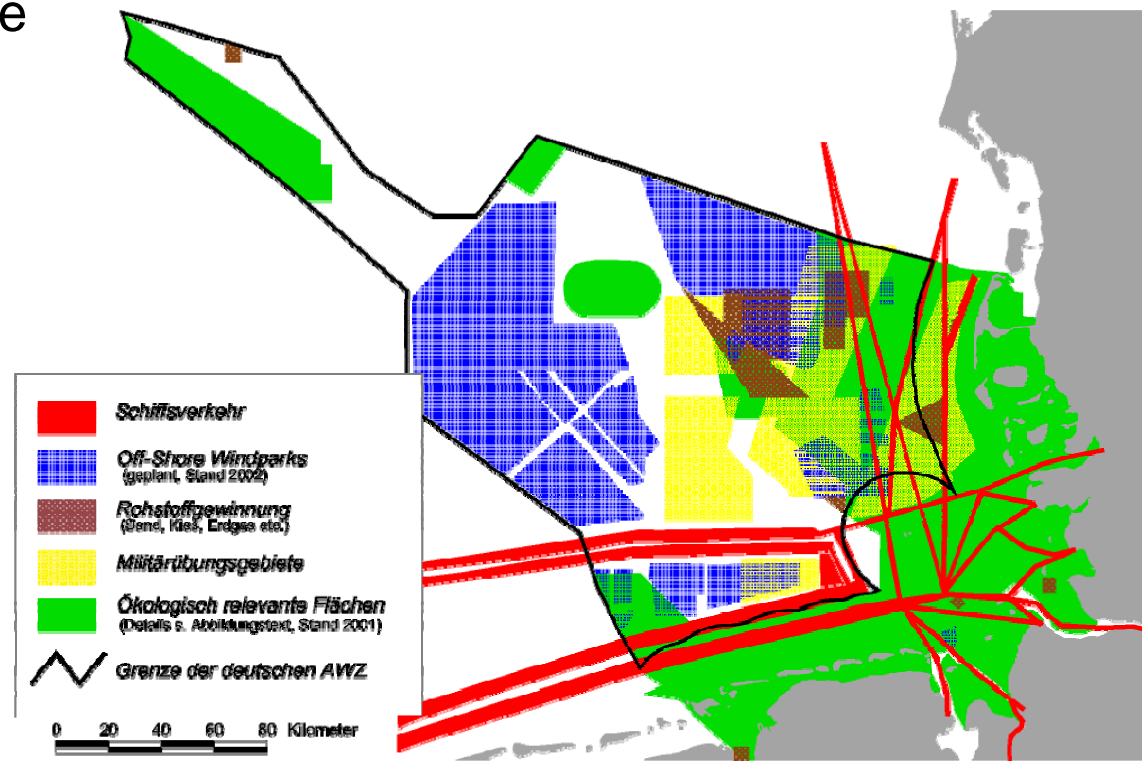


Challenge for Research

Use of coastal waters:



How will the wave statistics change in the future along the main shipping routes?



Challenge for Research

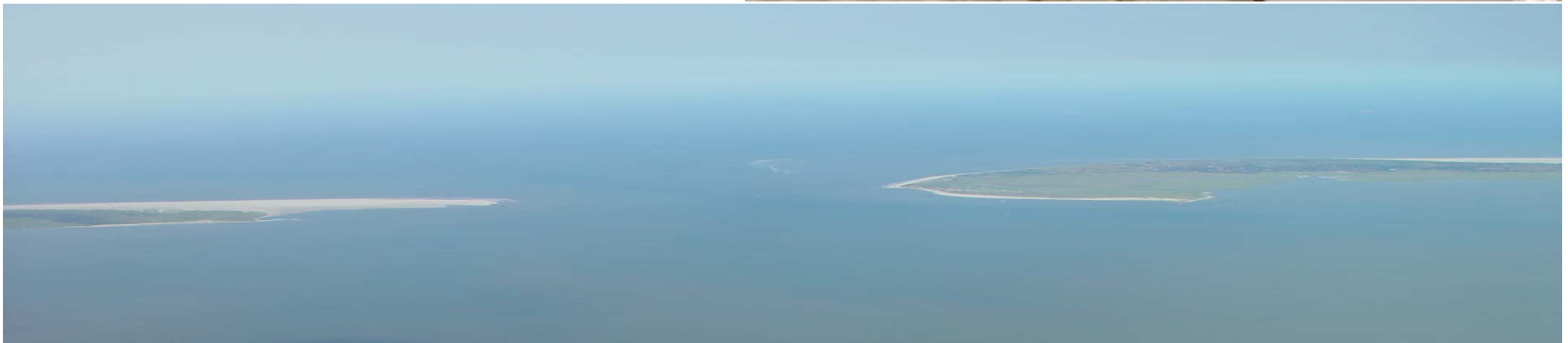
Use of coastal waters:

Impact of offshore windenergy parks on the ecosystem,
Risk of ship collisions



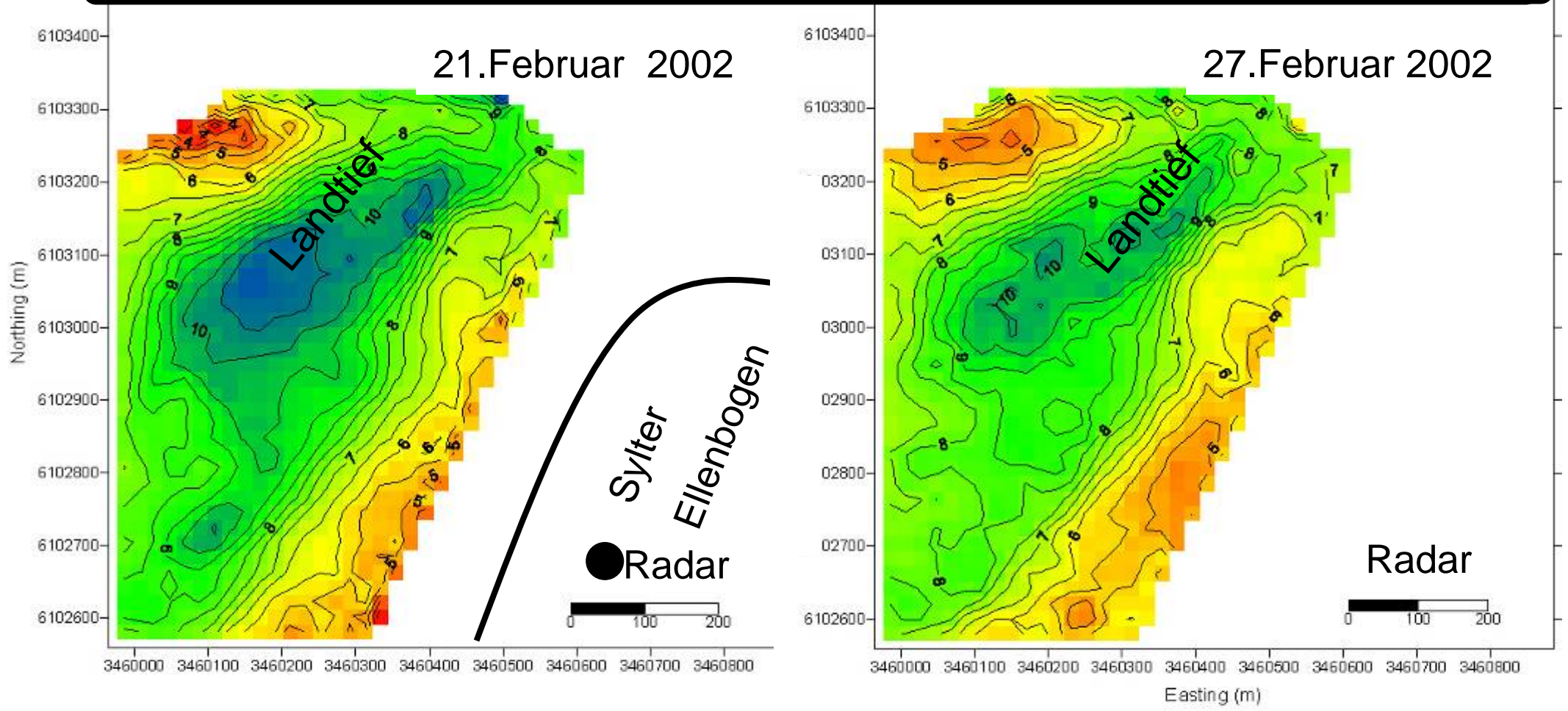
Erosion and movement of sand

Where, when and how much sediment will be eroded/deposited under a changing climate ?



Change of the bathymetry, measured by radar

Change during a single storm



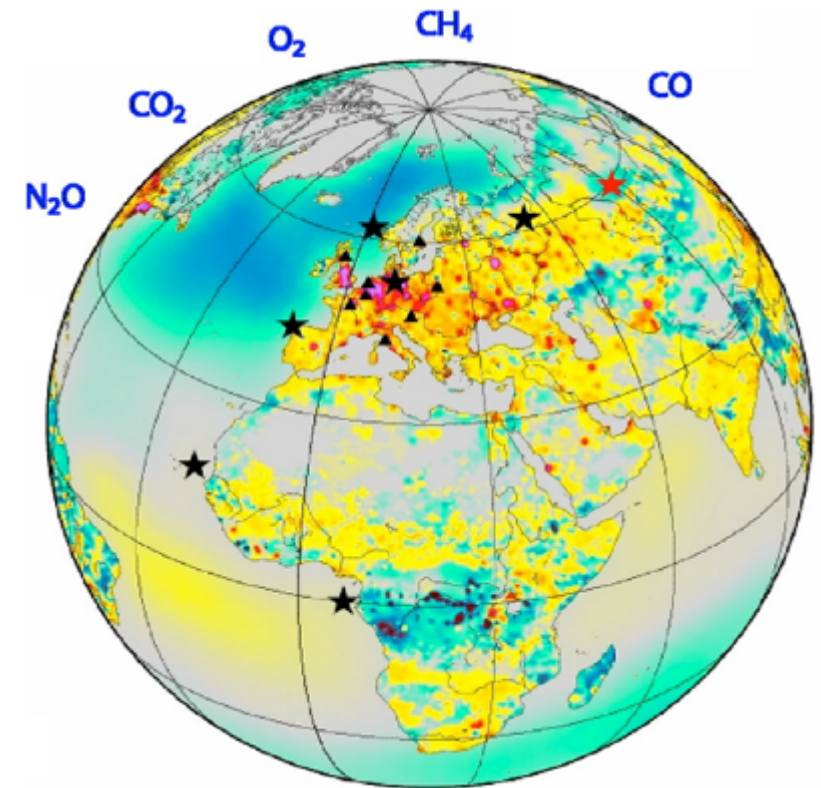
Within 5 days a sand volume of $+50.000 \text{ m}^3$
(error $\sim 25\%$.) was transported.

Climate:

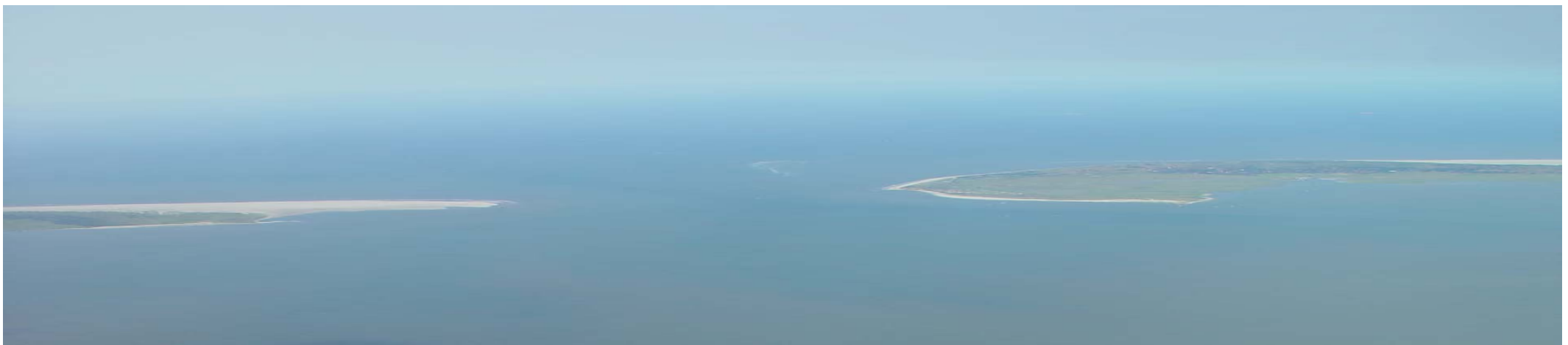
Budget of trace gases in

Coastal waters:

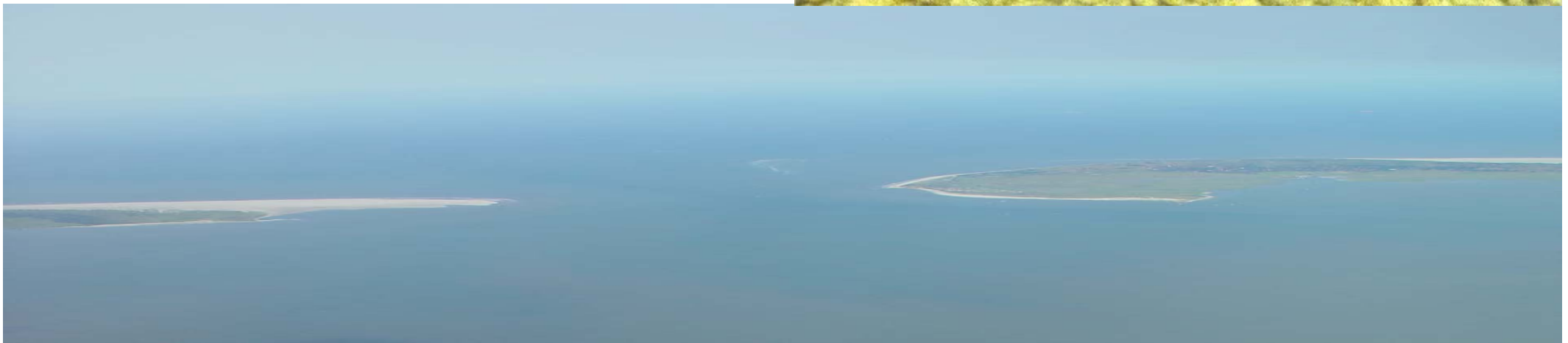
CO_2 , CH_4 , N_2O



Example: About 4% of the global CO_2 originates from shallow water areas in Europe

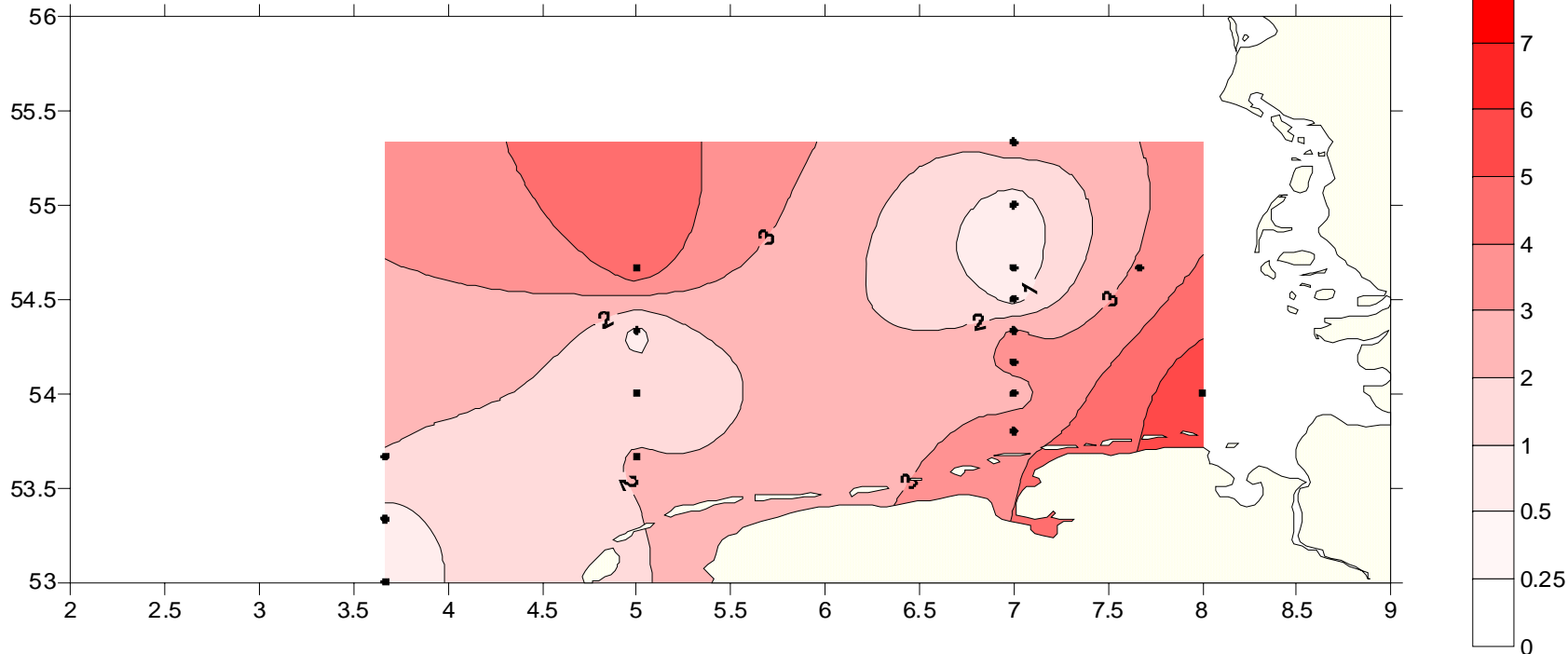


Water quality



Heincke 211 (June 2004)

NH_4 (μM)

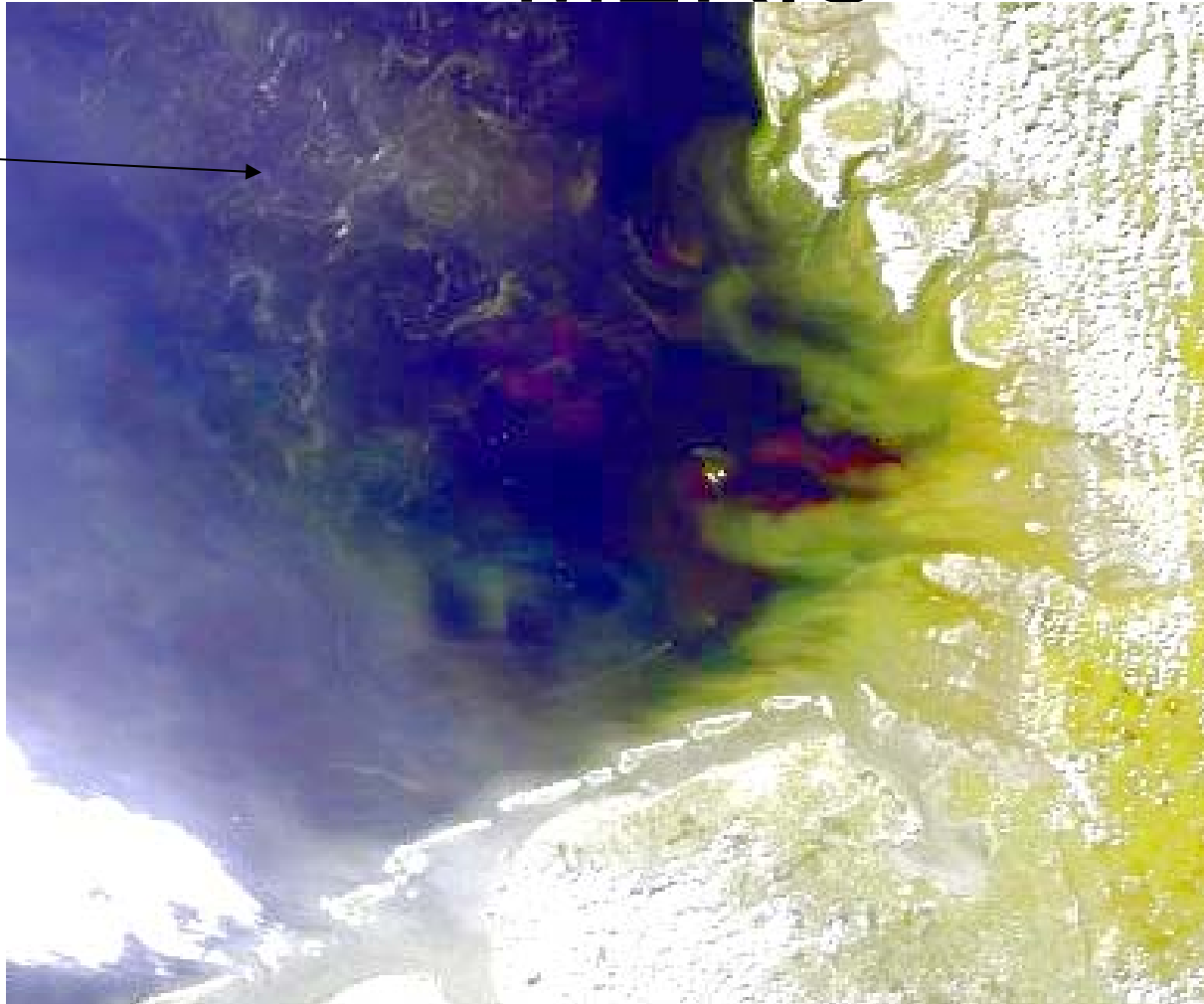


(J. Beusekom)

How big are the regional differences in the water quality?
What are the reasons (sources & sinks)?

Red Tide in the German Bight Aug. 3, 2004, MERIS

Red Tide

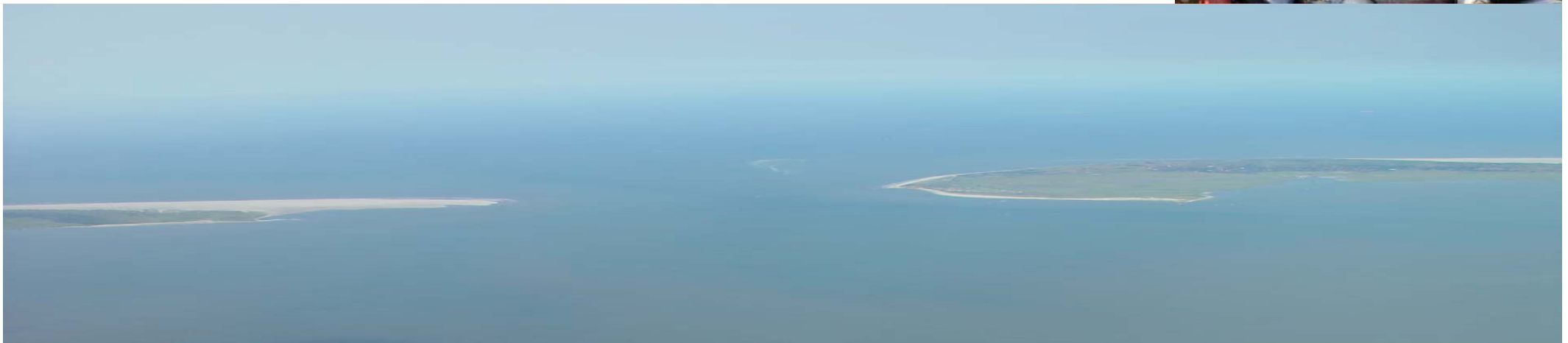


Fisheries

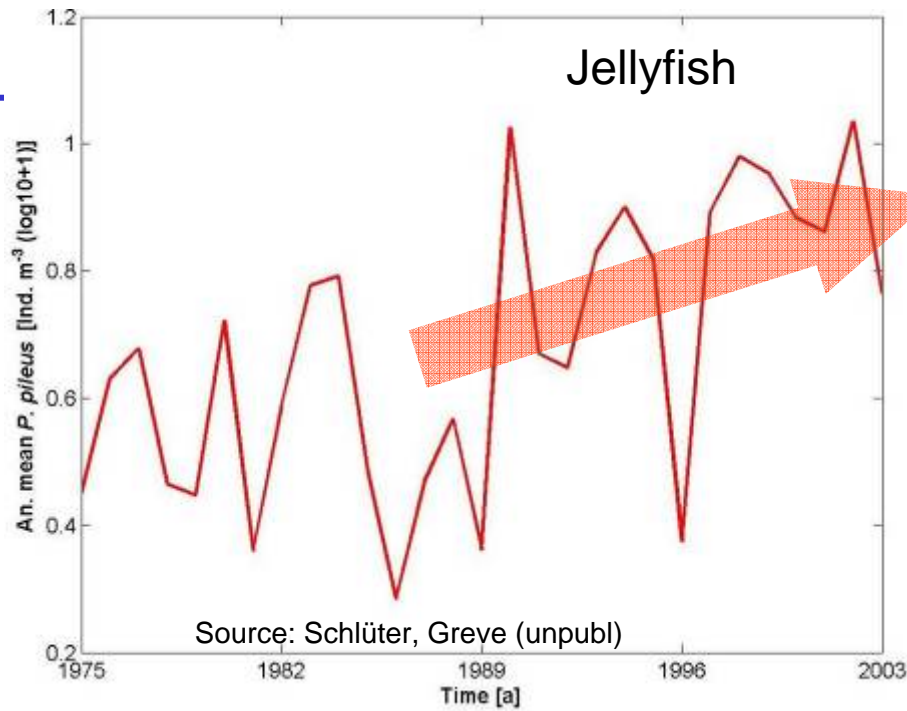
Availability of food

Invasion of foreign species

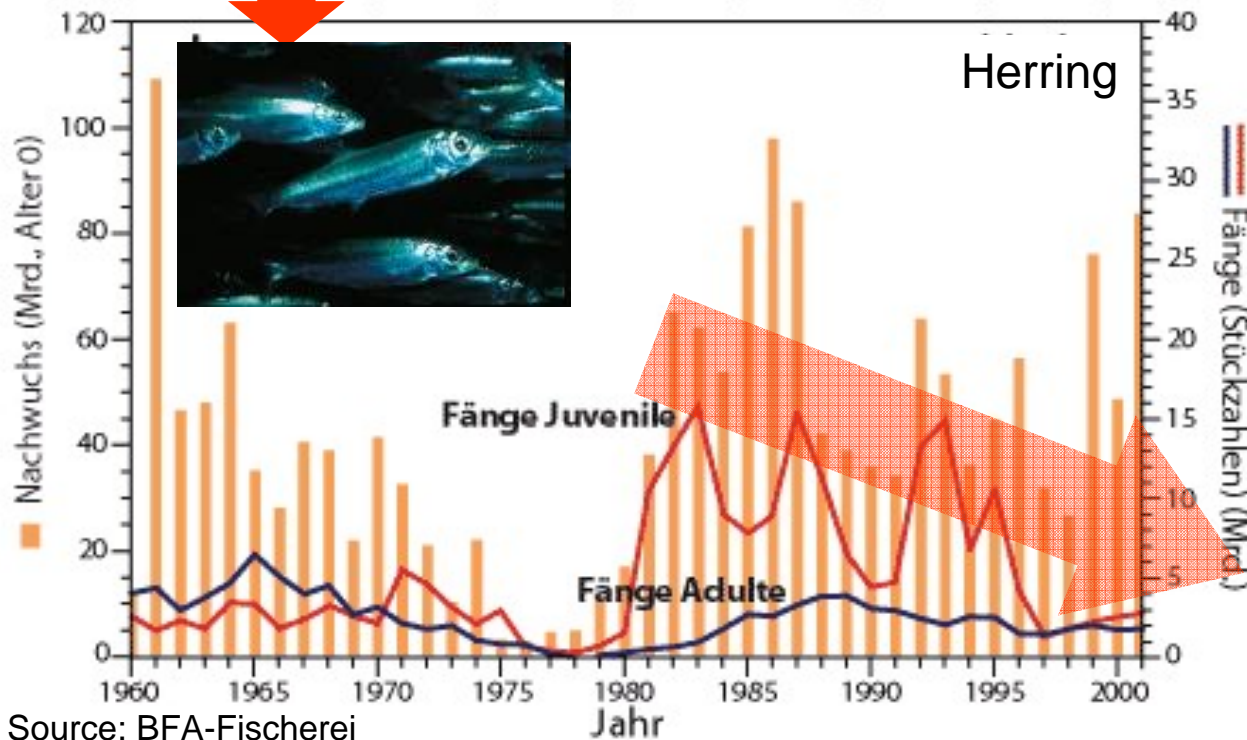
Shift of species due to global warming



Biologie



Will jellyfish populations dominate the North Sea ecosystem in the future?



Chemistry/Biology

Will mussels be affected by the decline in the pH ?
(CO₂-increase due to climate change)

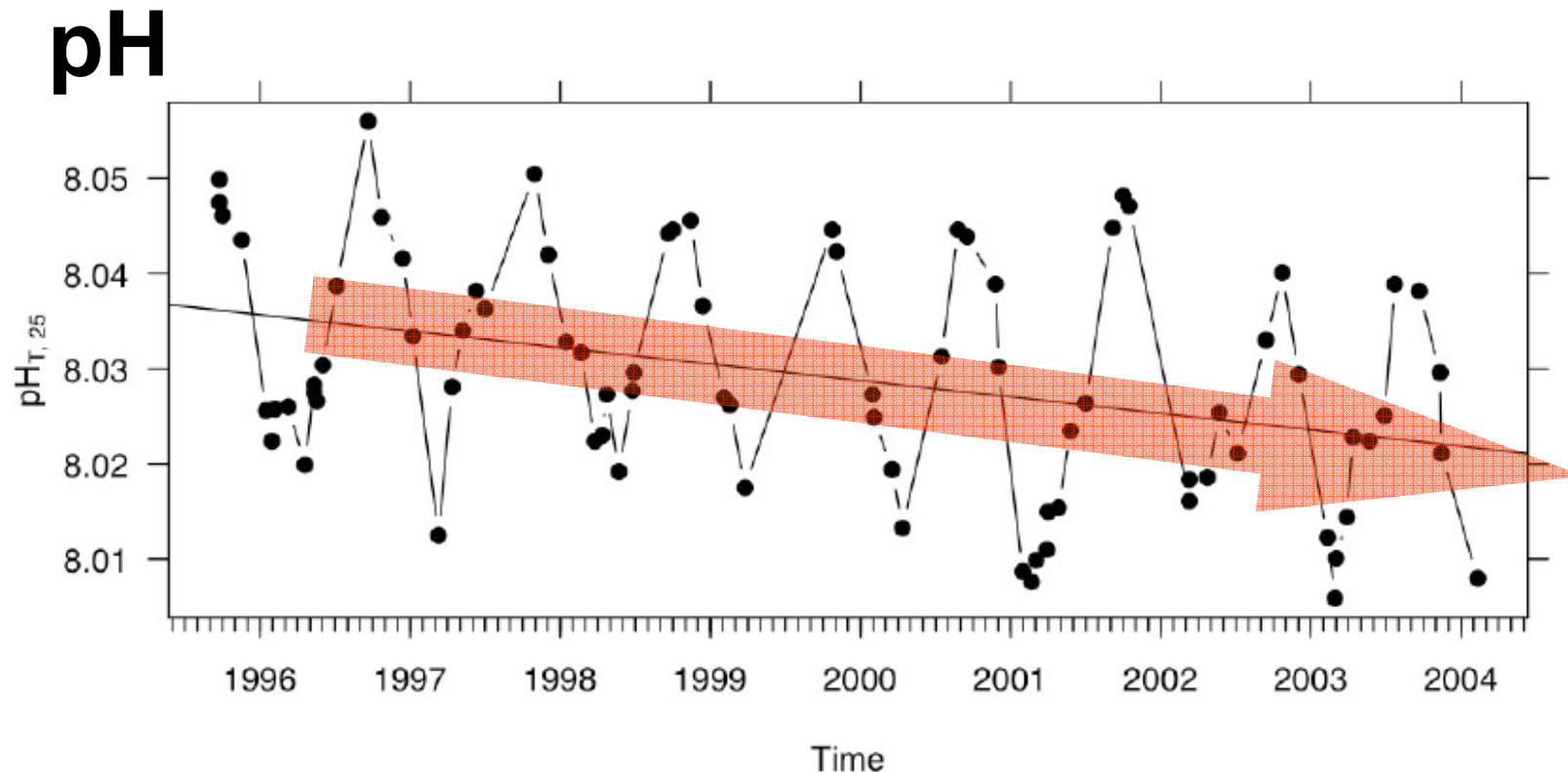
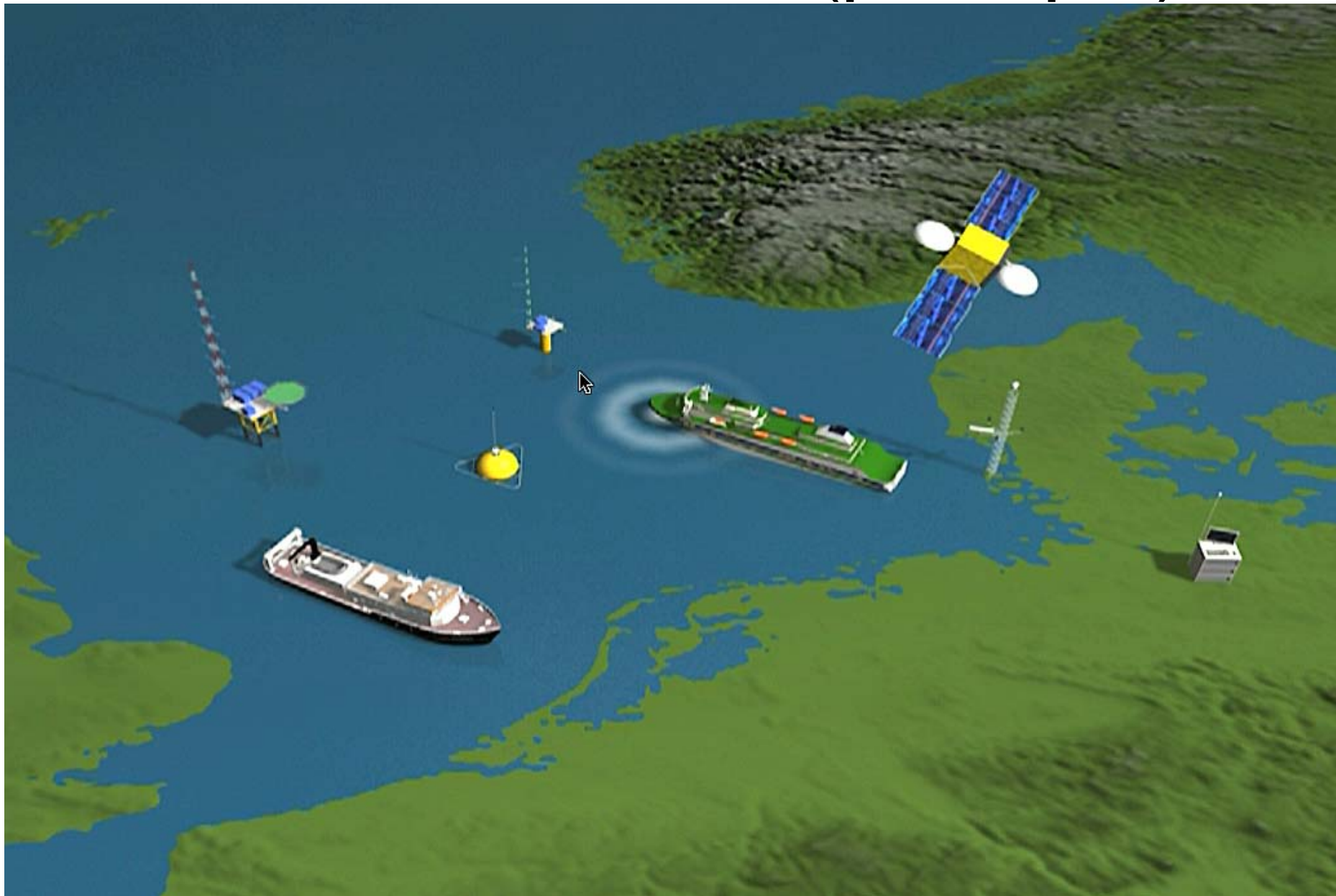
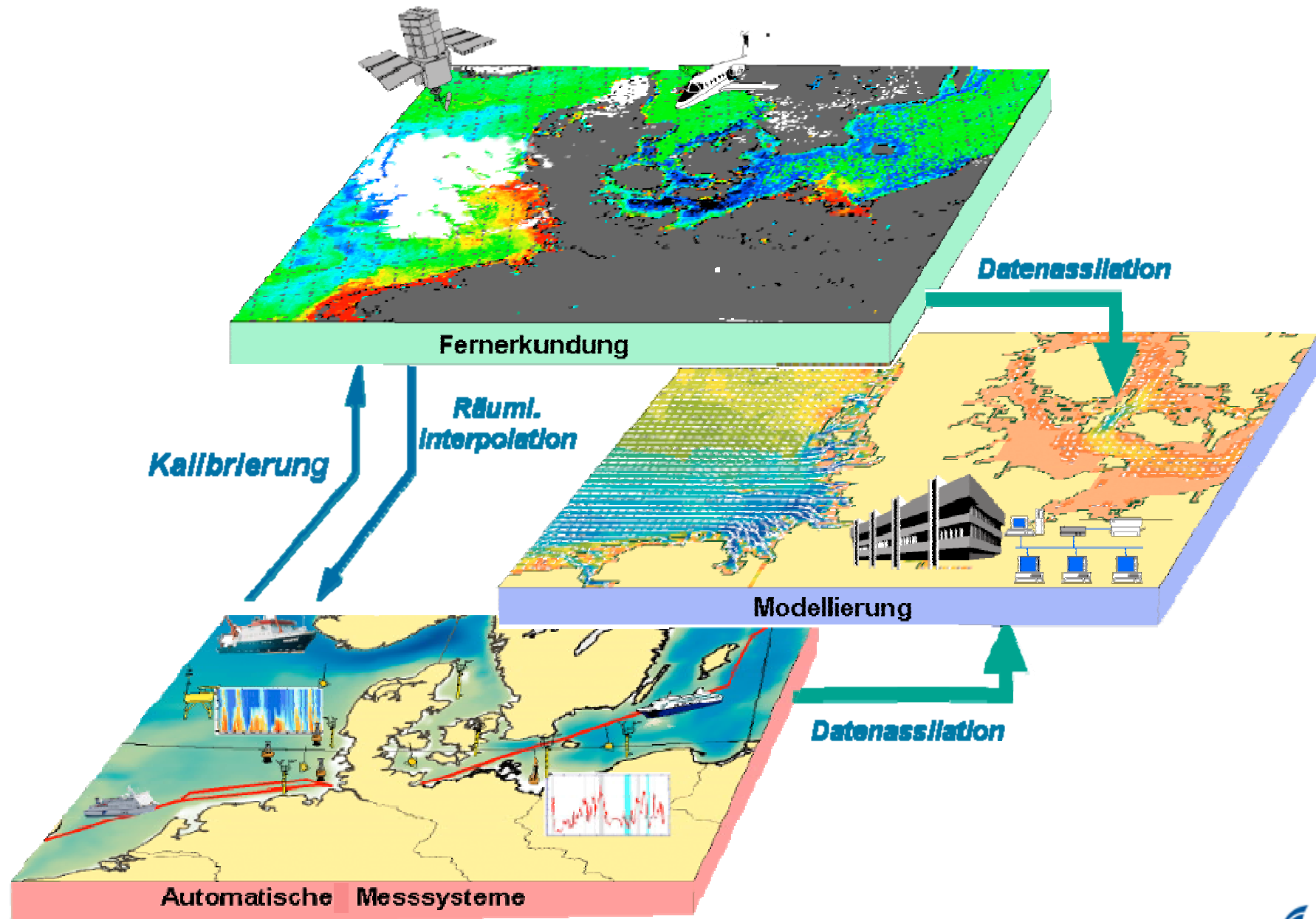


Fig. 2: Time series of pH (total scale at 25°C) at the ESTOC station (redrawn from Santana-Casiano *et al.* (2007)).

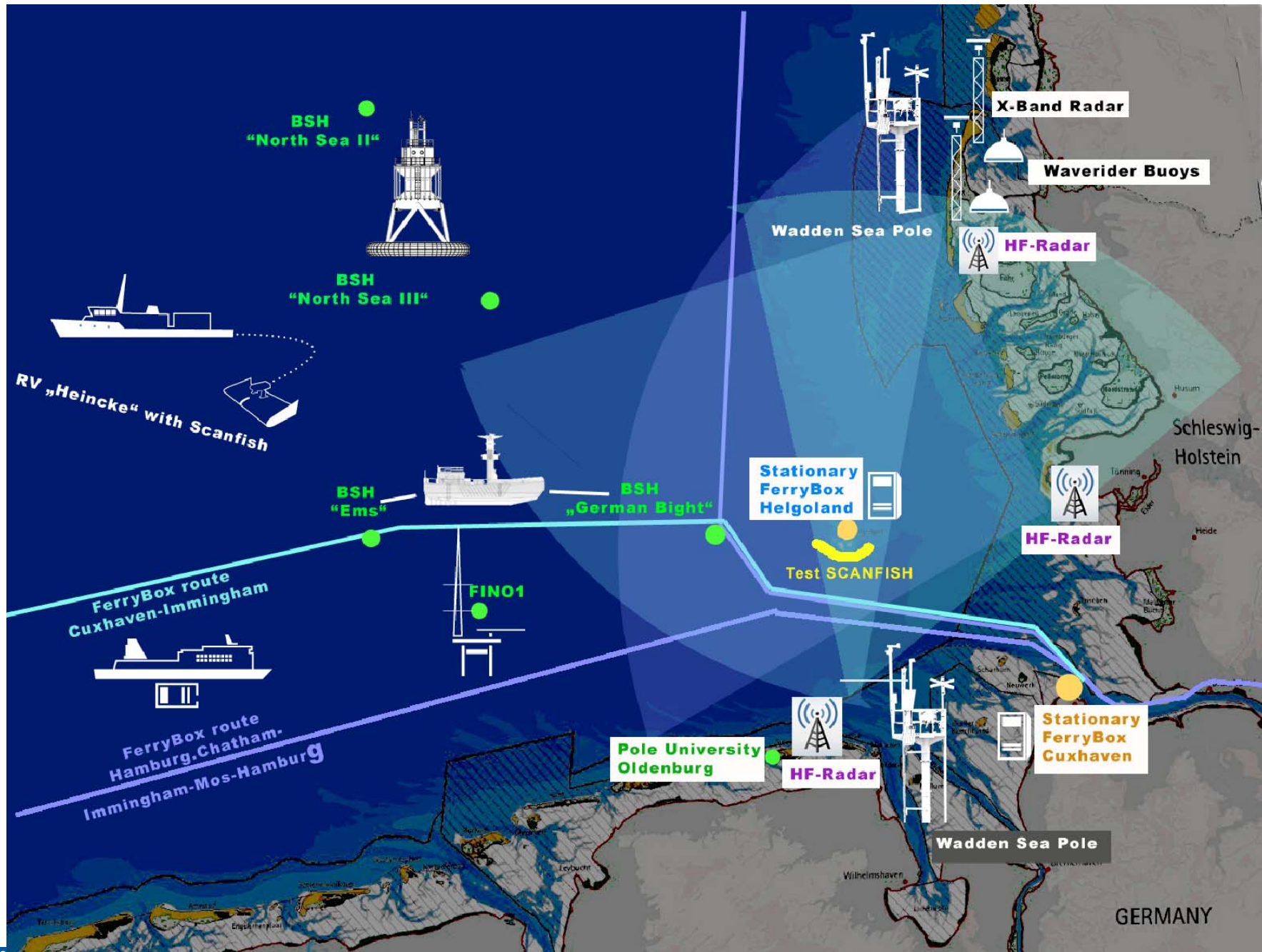
COSYNA Observation Modules (principle)



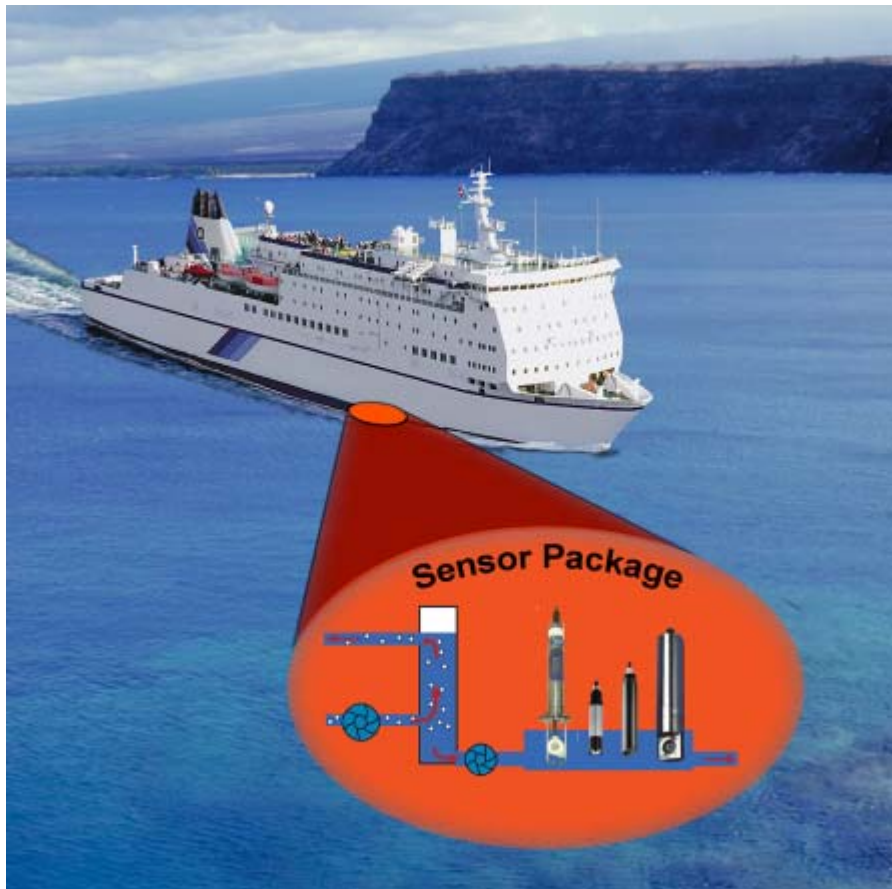
Integrated Monitoring Concept



Observations



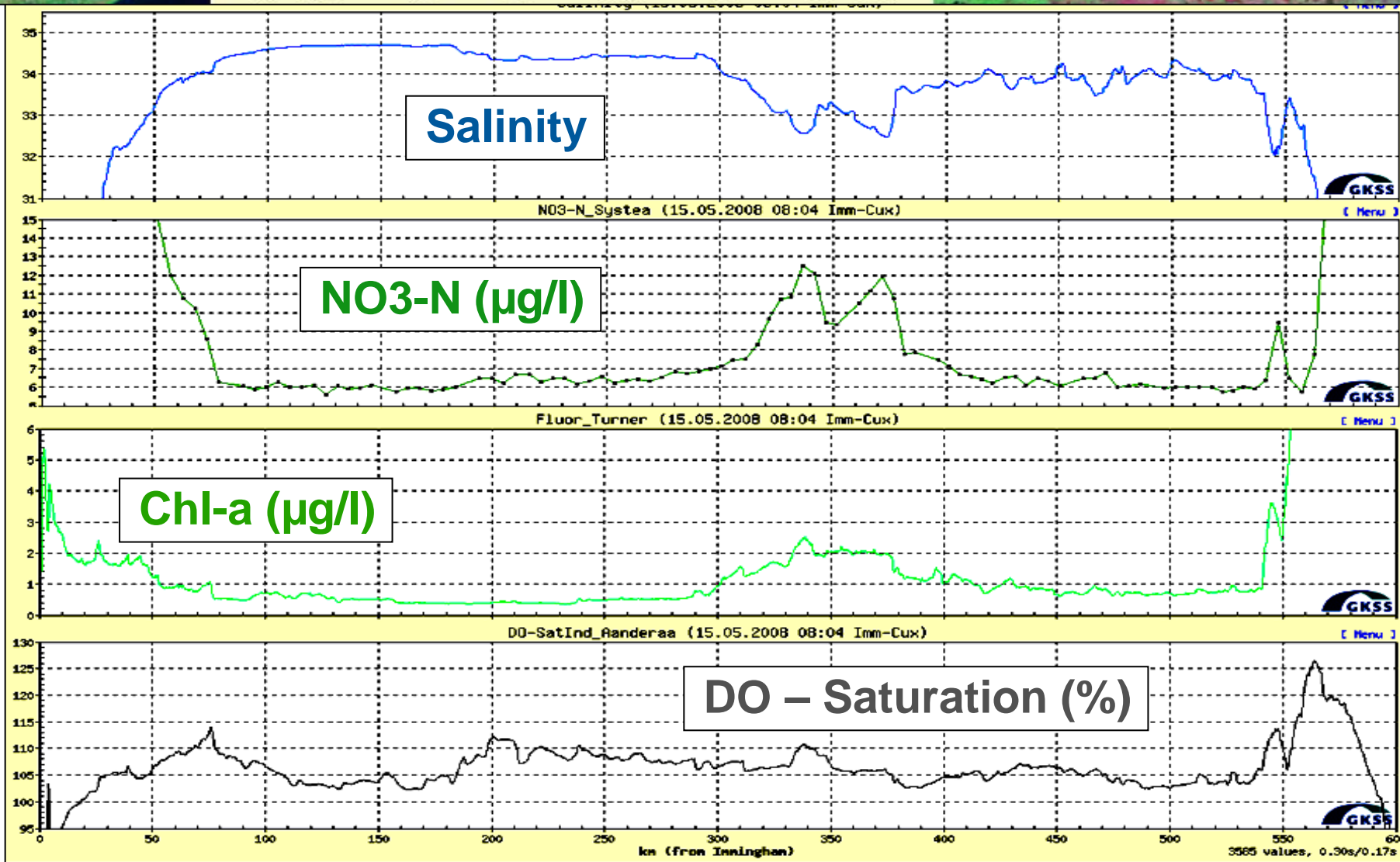
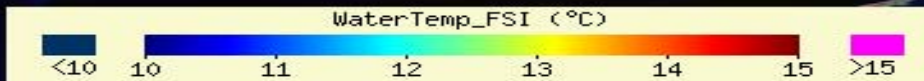
Monitoring system, that measures automatically the water quality on ferries or ships on regular routes (ships of opportunity) and transmits the results to shore (mobile phone or satellite communication)



Cuxhaven Transect from 15th of May 2008

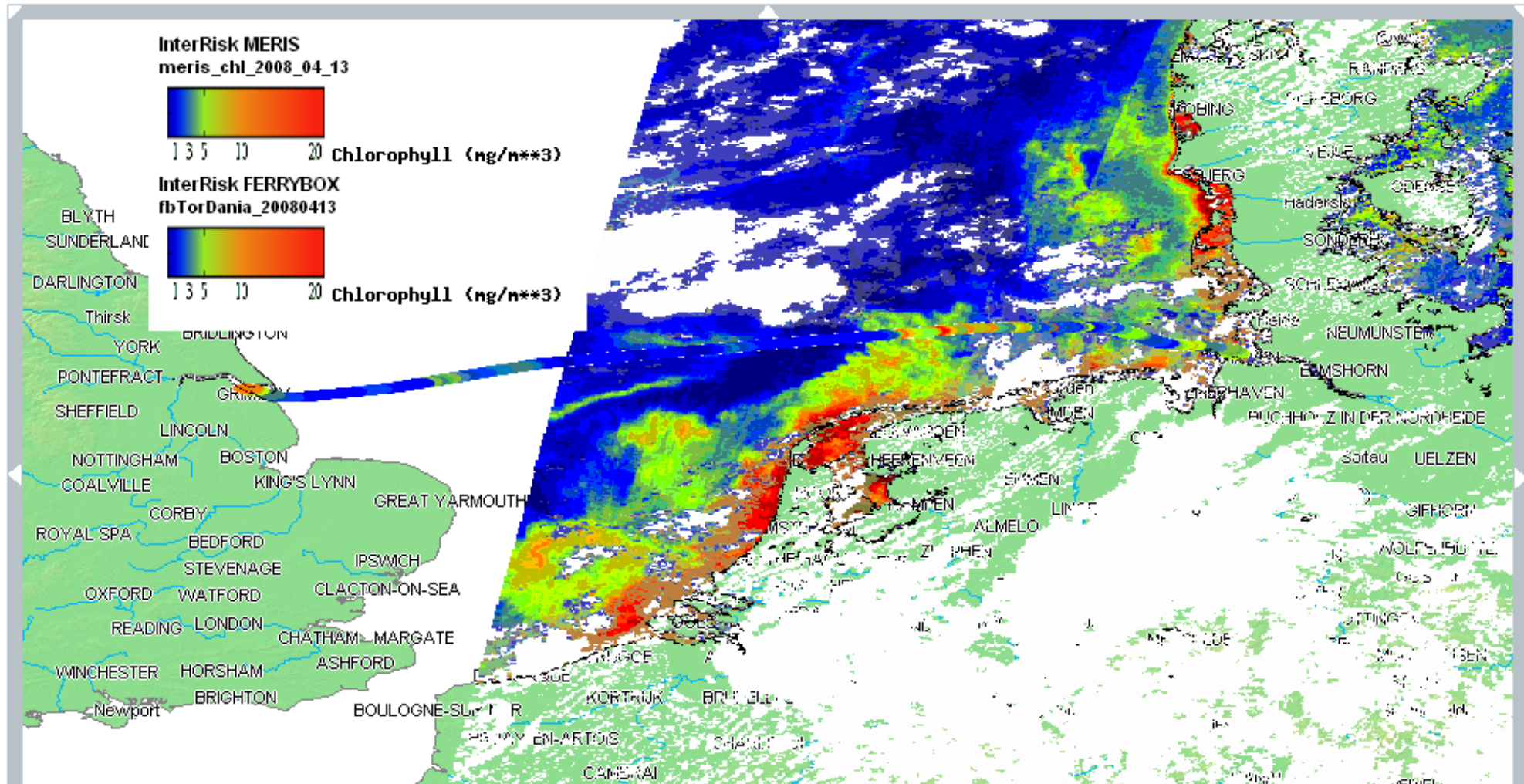
Immingham

Cuxhaven



Data and Remote Sensing

InterRisk Project (Data from 13 Apr 2008)





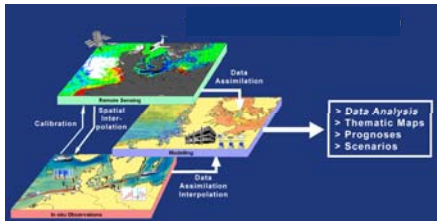
Detail specifications

2008-2009



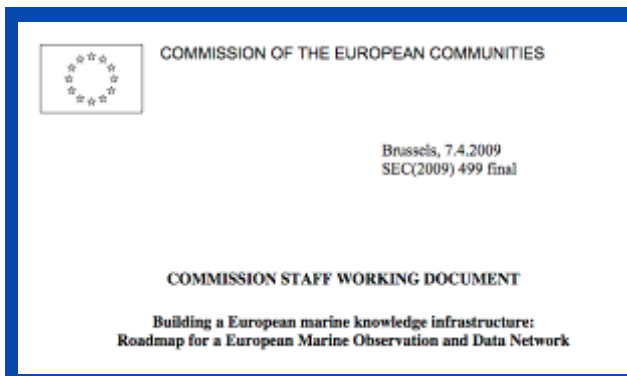
Building of system & development

2009-2013



operation, national

2011 ff



Integration into european systems

2012 ff

The Institute for Coastal Research is in the process of building a set of tools, consisting of observation modules and numerical models, that enables us to solve important questions and problems of coastal waters.

In this context COSYNA is the main instrument:

- COSYNA is being build together with other German institutions until 2013
- COSYNA shall be integrated into European initiatives for marine long-term observing systems.