COSYNA
Coastal Observing System for Northern and Arctic Seas

- a contribution to future European, marine environmental observing initiatives

Franciscus Colijn,
Rolf Riethmüller,
Friedhelm Schroeder,
Emil Stanev

Institute for Coastal Research, GKSS Research Centre, Geesthacht
COSYNA

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 SeeAnlV

Externe Datenquellen:
Bundesamt für Naturschutz, Landesamt für Natur und Umwelt (S-H), Niedersächsisches Umweltministerium (Geosum), Dänisches Umweltministerium

Geodätisches Datum: WGS 84
Kartenprojektion: Mercator (54°N)

BSH / M5 - 12.03.2009

http://www.bsh.de/de/Meeresnutzung/Wirtschaft/CONTIS-Informationssystem/index.jsp
Nordsee: Offshore Windparks

Externe Datenquellen: Elsam A/S (Denmark)

Geodätisches Datum: WGS 84
Kartenprojektion: Mercator (54° N)
BSH/M5 - 30.10.2009

http://www.bsh.de/de/Meeresnutzung/Wirtschaft/CONTIS-Informationssystem/index.jsp
Nordsee: Sämtliche Nutzungen und Schutzgebiete

Externe Datenquellen: Siehe Detailkarten

Geodätisches Datum: WGS 84
Kartenprojektion: Mercator (54°N)

BSH / M5 - 30.10.2009
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?
Within 5 days a sand volume of +50,000 m³ (error ~25%) was transported.
Challenge for Research
Use of coastal waters:

Climate:
Budget of trace gases in
Coastal waters:
CO$_2$, CH$_4$, N$_2$O

Example: About 4% of the global CO$_2$
originates from shallow water areas in Europe
Water quality
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
Fisheries

Availability of food
Invasion of foreign species
Shift of species due to global warming
Will jellyfish populations dominate the North Sea ecosystem in the future?
Chemistry/Biology

Will mussels be affected by the decline in the pH?

(\text{CO}_2\text{-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
FerryBox

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

Salinity

NO3-N (µg/l)

Chl-a (µg/l)

DO – Saturation (%)
Data and Remote Sensing InterRisk Project (Data from 13 Apr 2008)
## Time Table

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detail specifications</td>
<td>2008-2009</td>
</tr>
<tr>
<td>Building of system &amp; development</td>
<td>2009-2013</td>
</tr>
<tr>
<td>operation, national</td>
<td>2011 ff</td>
</tr>
<tr>
<td>Integration into european systems</td>
<td>2012 ff</td>
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</tbody>
</table>
Conclusions

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.