

LSDMA Community Forum 26.03.2015

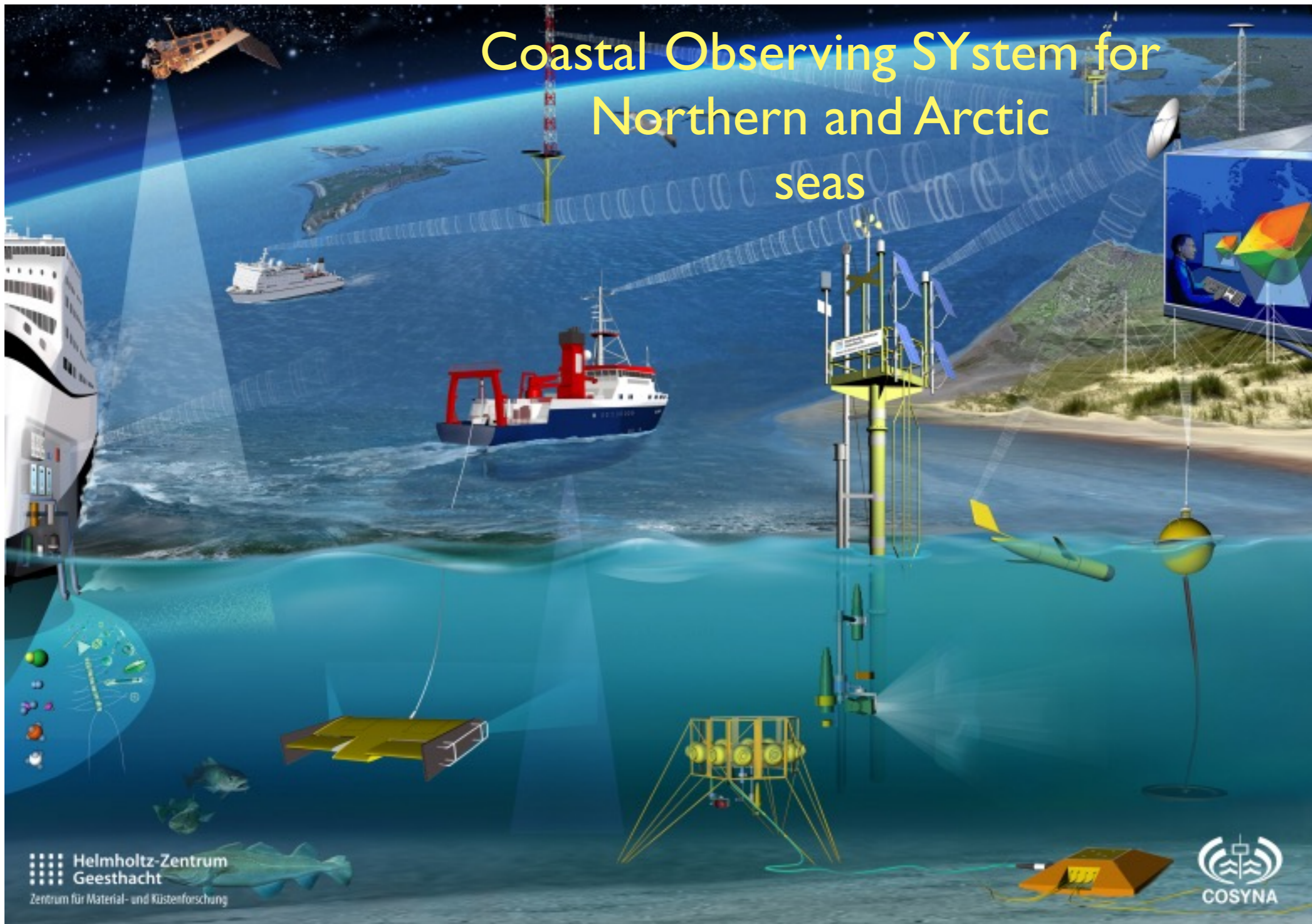
**Data Management in the Coastal Observing
System COSYNA**

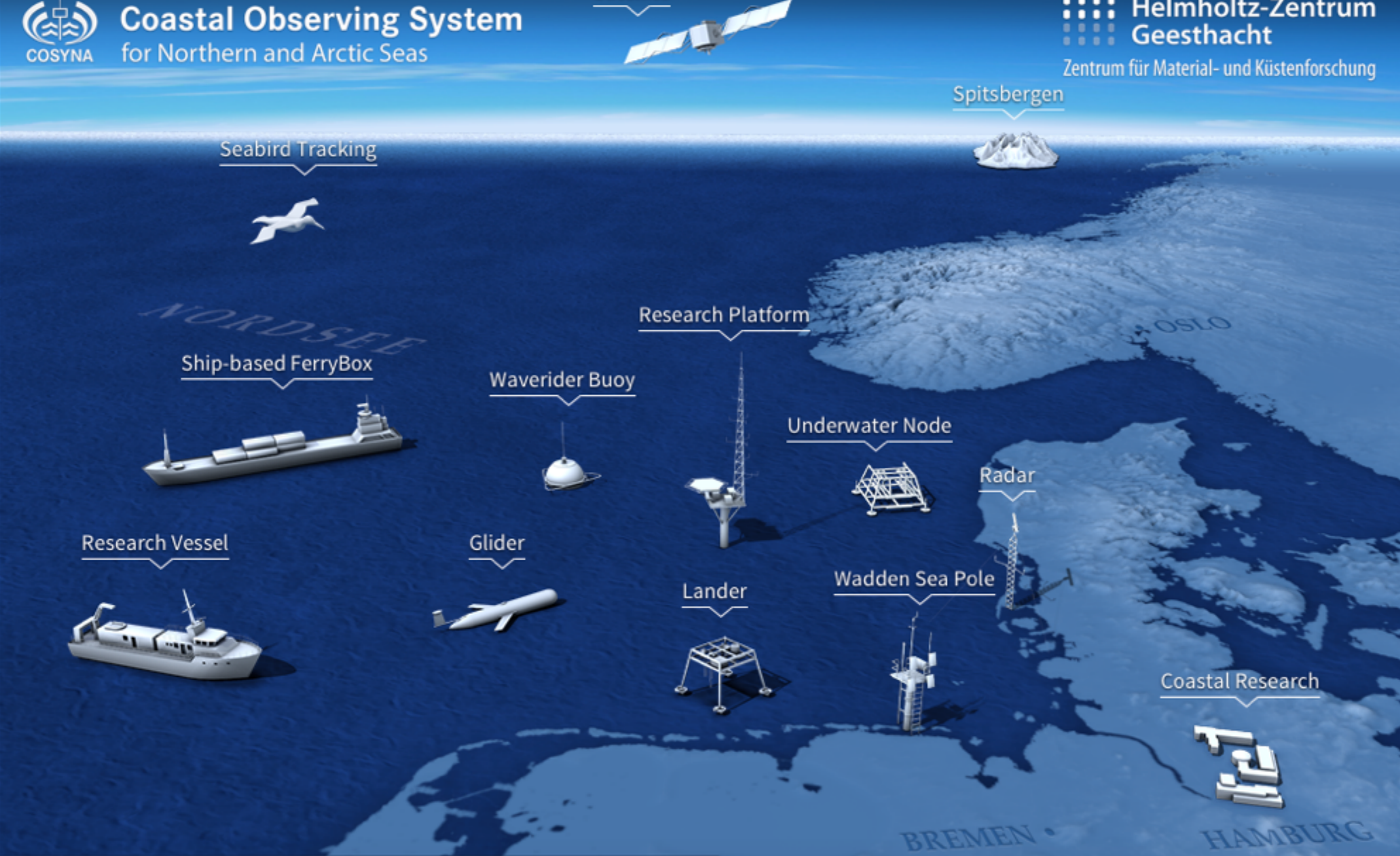
Gisbert Breitbach, HZG



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

Coastal Observing System for Northern and Arctic seas





01:40 PM Water Temperature 3.53 °C
 16-FEB-15 Salinity 17.67 PSU
 Source: FerryBox Cuxhaven

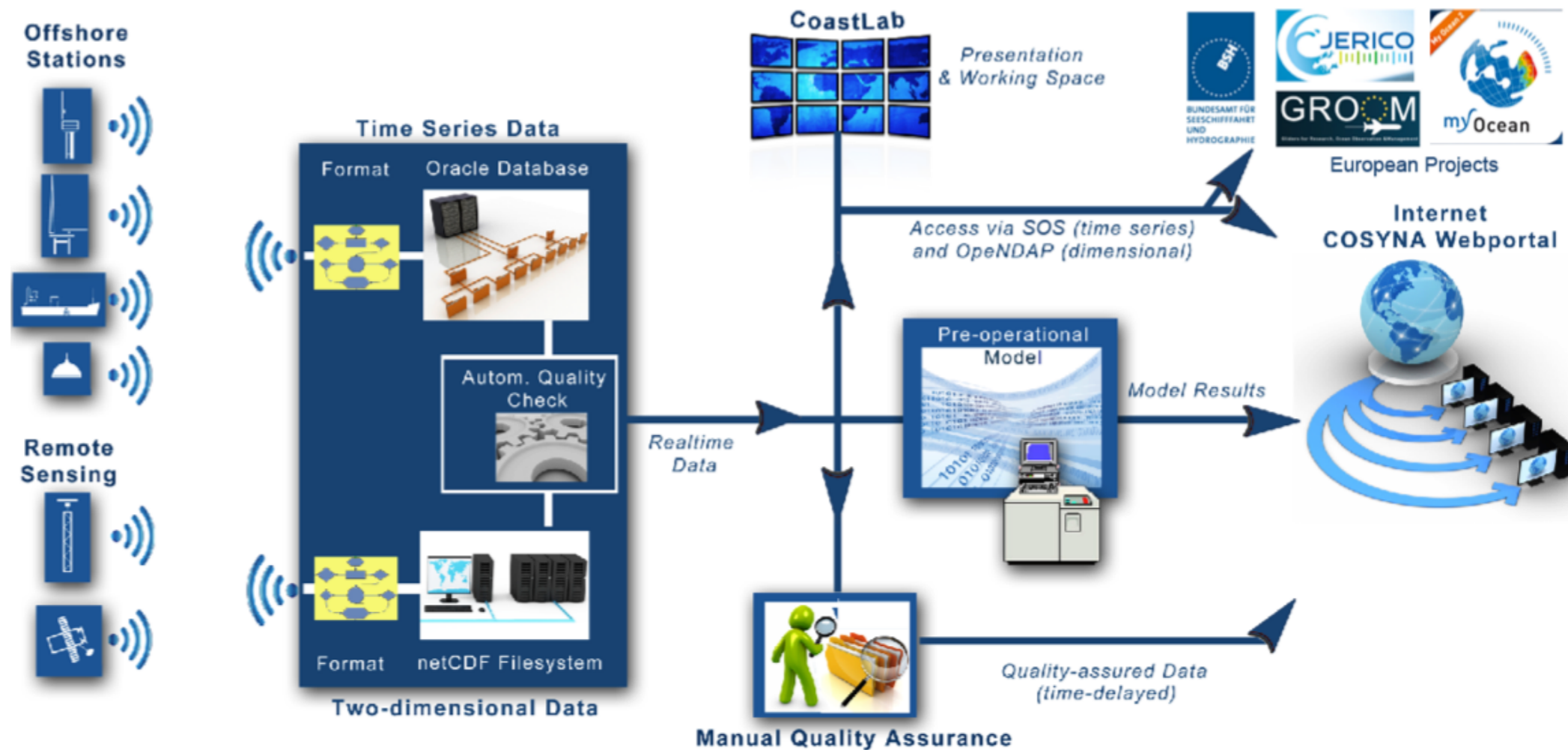
Current Field Today

All Live Data

COSYNA Partners
 HZG NLWKN HPA
 ICBM MARUM BAW
 FTZ BSH AWI

en
de

COSYNA Data Path

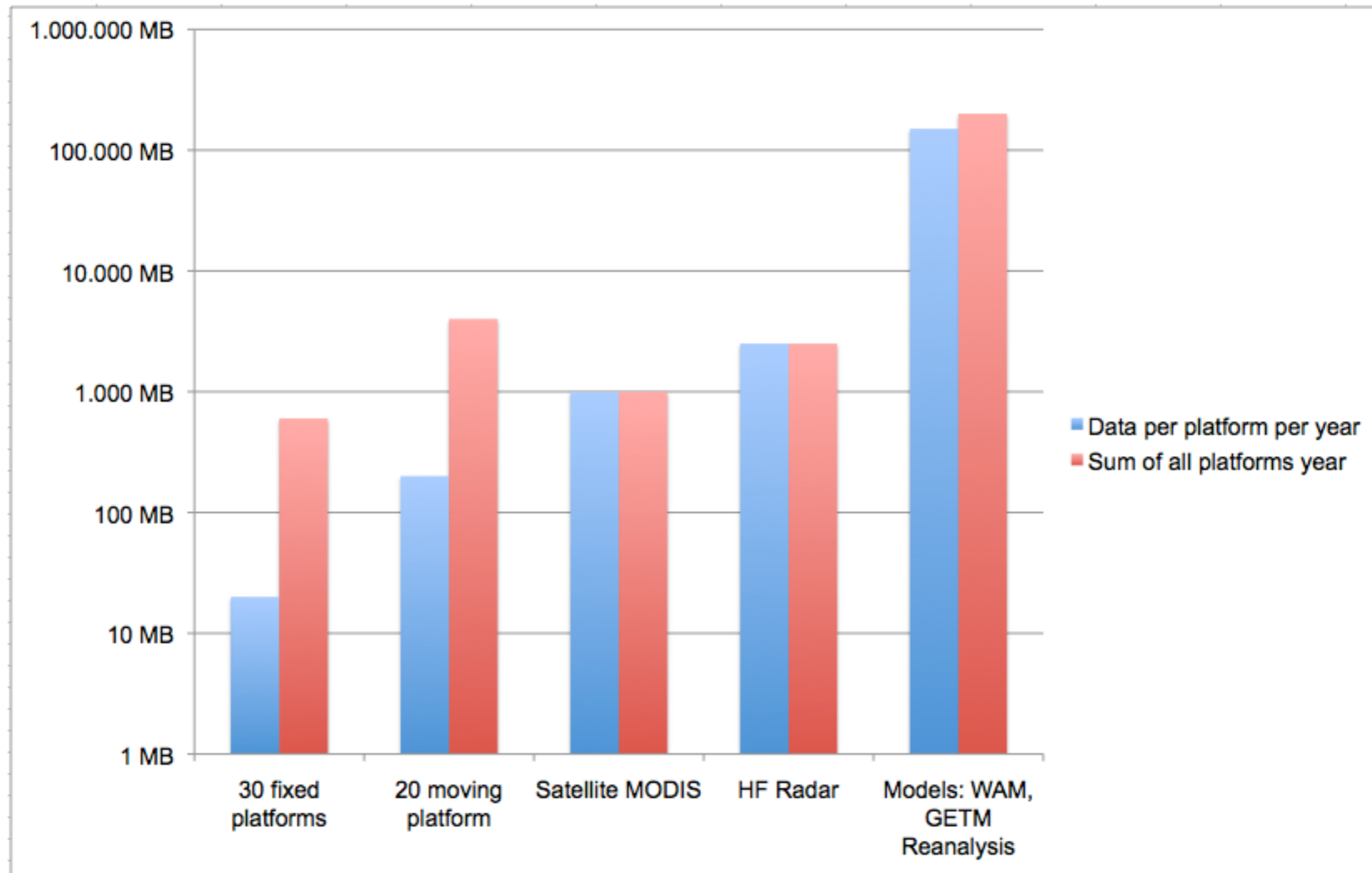


- All in-situ data are imported into an Oracle 11g database.
- All multi-dimension data (satellite, radar, model) are stored as netCDF-files in the filesystem
- the community standard netCDF stands for "network Common Data Format".

Volume of data

- Most time-series at fixed position are 10-minute averages leading to 1 MB per observed property per year. A platform could have up to 50 observed properties and may last up to 20 years.
- Moving platforms measure normally with a higher frequency giving a factor 10-100.
- Satellite data are gridded and give about 50 MB per scene (day) as netcdf. The original ESA data have a volume of 70 TB.
- HF radar measure every 20 minutes 1 MB giving 70 MB a day.
- A 3-dimensional circulation model of the German Bight with 1 hour time resolution, 1 km spatial resolution and 20 depth levels gives 400 MB a day.
- The total volume of COSYNA data with oldest data from 1991 are 800 GB for the database and 3 TB netcdf.

Volume of data



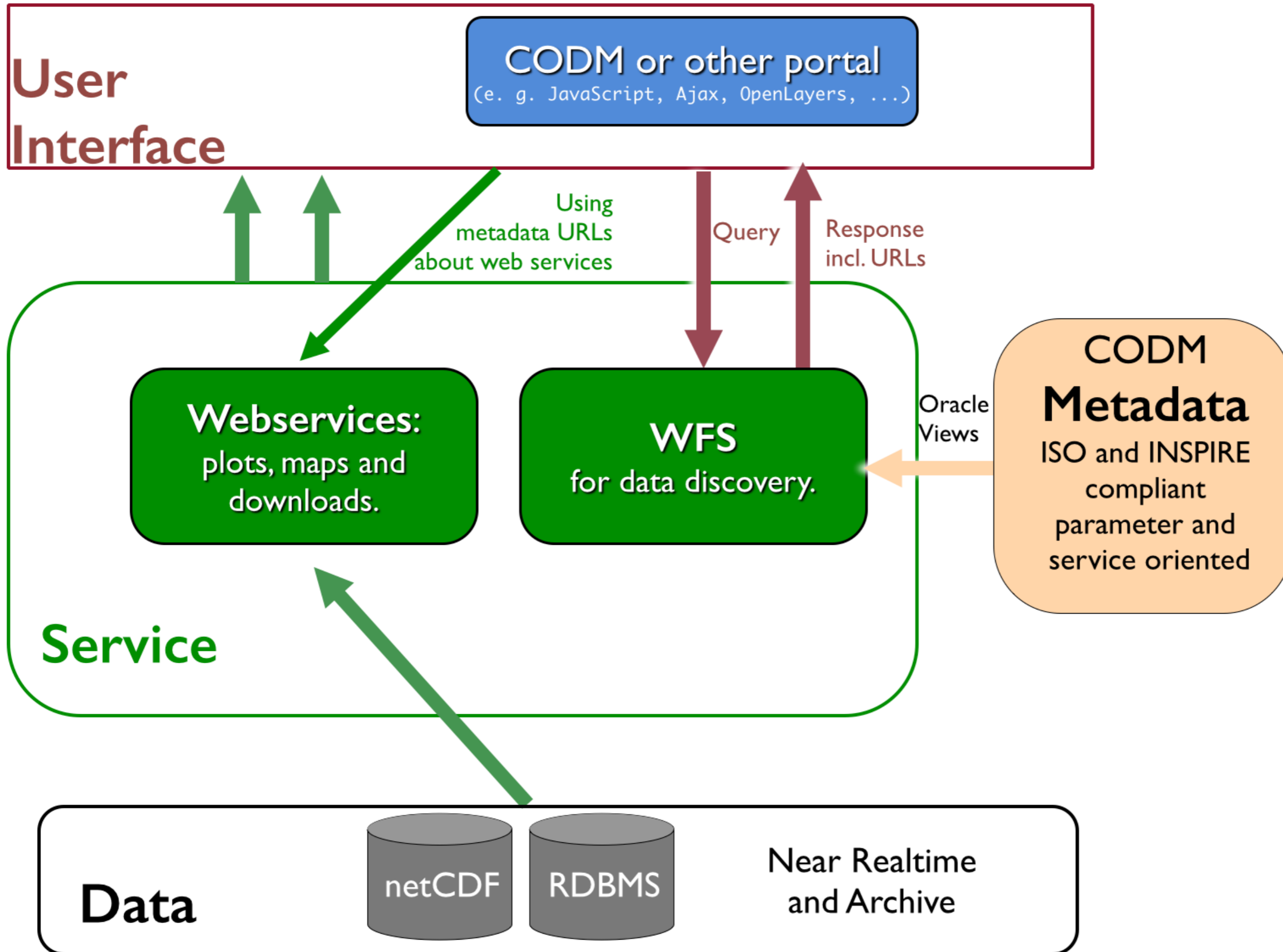
- Observation data are ranging from fixed point measurements via measurements of moving platforms in 2 or 3 dimensions to remote sensing observations of bigger areas.
- Most observations are in-situ and in realtime. Every observation is unique. Observations which are not stored or archived are lost forever.
- Interesting time scales and effects are ranging from decades (anthropogenic effects) to seconds (turbulence) and everything between.

- In Earth and environment the most important metadata are the answers for the questions: What, when, where, who.
- Common metadata standards are ISO19115 with up to 400 parameters (20 core parameters) and the EU directive INSPIRE (Infrastructure for Spatial Information in the European Community)
- 2 types of metadata exist in COSYNA:
 - ▶ One type describing models or platforms, sensors and observed properties (parameters). This type is manually created.
 - ▶ One type describing data or model runs. This type is standardised and is automatically created using Java code.
- COSYNA metadata describing data are ISO19115 compliant and INSPIRE compliant as well.

- In 1994 originated the Open Geospatial Consortium as Open GIS Consortium (OGC) with members like ESRI, Google, Microsoft, IBM as well as MIT, NASA, ESA. The scope is standardisation in Geodata.
- The OGC defined a lot of web services. Most OGC web services are implemented as Open Source software.
- The standardisation of parameters (observed properties) names is crucial for earth observing systems. COSYNA uses the CF (Climate and Forecast) standard names.
- When biological parameters (species) are used an Ontology system is needed to map different names and languages.

- Web Map Service (WMS): Service to create maps from Geodata (vector and raster, like maps in Google maps). COSYNA uses ncWMS for maps from netcdf files and self developed Java servlets for maps from moving platforms.
- Web Feature Service (WFS): Service to give infos about features (A feature can be a photo at a specific location). In COSYNA we have the feature types platform and geodata.
- Catalog Service for the Web (CSW): Service to retrieve catalog information or to write new catalog information.
- Sensor Observation Service (SOS): Specialised WFS for observation data from sensors. In COSYNA mainly used as download service for data from the database.
- Web Processing Service (WPS): Service to process input data. In COSYNA used e.g. to format xml-output as table.

CODM Architecture



- CODM gives the opportunity to request a time range, a spatial bounding box and an observed property.
- The response are all data fulfilling this request.
- The user could select some or all of the data.
- The user can visualise the data as map or as plots or she/he can download the selected data.
- Only 3 clicks are needed to get the data.

COSYNA data web portal CODM

Parameter category:

Parameter:

Water depth:

From: (dd.mm.yyyy)

To: (dd.mm.yyyy)

Use CTRL+Pg up/Pg down and Pg up/Pg down to switch between years and months.

Remote sensing data
 Insitu data
 Model data

COSYNA Data Use

1. [COSYNA Homepage](#)
2. [COSYNA Product: Currents \(Maps\)](#)
3. [COSYNA Product: Currents \(Downloads\)](#)
4. [COSYNA Product: Currents \(Online Validation\)](#)
5. [COSYNA Glider Campaigns in Google Earth](#)
6. [Imprint/Disclaimer](#)
7. [Data disclaimer](#)
8. [Usage docu](#)

Other Data Access

1. [Model hind/forecast: Waves North Sea](#)
2. [Model hind/forecast: Waves German Bight](#)
3. [Model hind/forecast: Circulation North Sea-Baltic Sea](#)
4. [Model hind/forecast: Circulation German Bight](#)
5. [AERONET \(incl. Helgoland/Buesum\)](#)

Access to COSYNA Data via the Data Portal CODM

As part of our efforts to improve COSYNA's products and services, as well as to justify our efforts to our funding bodies, we have introduced a simple user registration procedure for the COSYNA data portal. We will collect some information regarding types of institution and your interest in our site.

This information is collected strictly for statistical purposes and will not be used in any other way. We continue to be committed to an open data policy, i.e., our data and products will continue to be free of charge and available for everyone.

We will NOT have a password management system that is connected to your e mail address or other personal information. If you lose your password or user name you have to create a new one.

This is done to ensure your privacy while providing us with necessary information.

Thank you for your interest in COSYNA. We appreciate your visit.

With the link to [user registration](#) a new username is entered.

Please enter username and password if you are already registered.

Username **Password**

If you have no username or if you forgot you password: [User registration](#)



1. [@ OpenStreetMap](#) and partners, License: [CC BY-SA](#).
2. ImportXml script(s) provided for free by <http://www.howtcreate.co.uk>.

Click and drag for panning. <SHIFT>-click and drag for zooming.

- ▶ [Glider amadeus](#)
- ▶ [Glider sebastian](#)
- ▶ [Gridded gauges platforms based on Data by WSD \(Nord, Nordwest\) \(www.pegelonline.de\)](#)
- ▶ [HF Radar](#)

For selected data sources:

Number of datasets per platform:

Area, 40 platform(s) were found in this area.

Num datasets (total / selected)

Dnet

e1

(provided by AWI)

en (AWI and HZG)

(to Helgoland)

otterdam-Immingham)

Norw-Holl Belg-Engl)

COSYNA data web portal CODM

[Feedback](#)

Parameter category:
Basic Parameters

Parameter: chlorophyll-a

Water depth:
All water depths

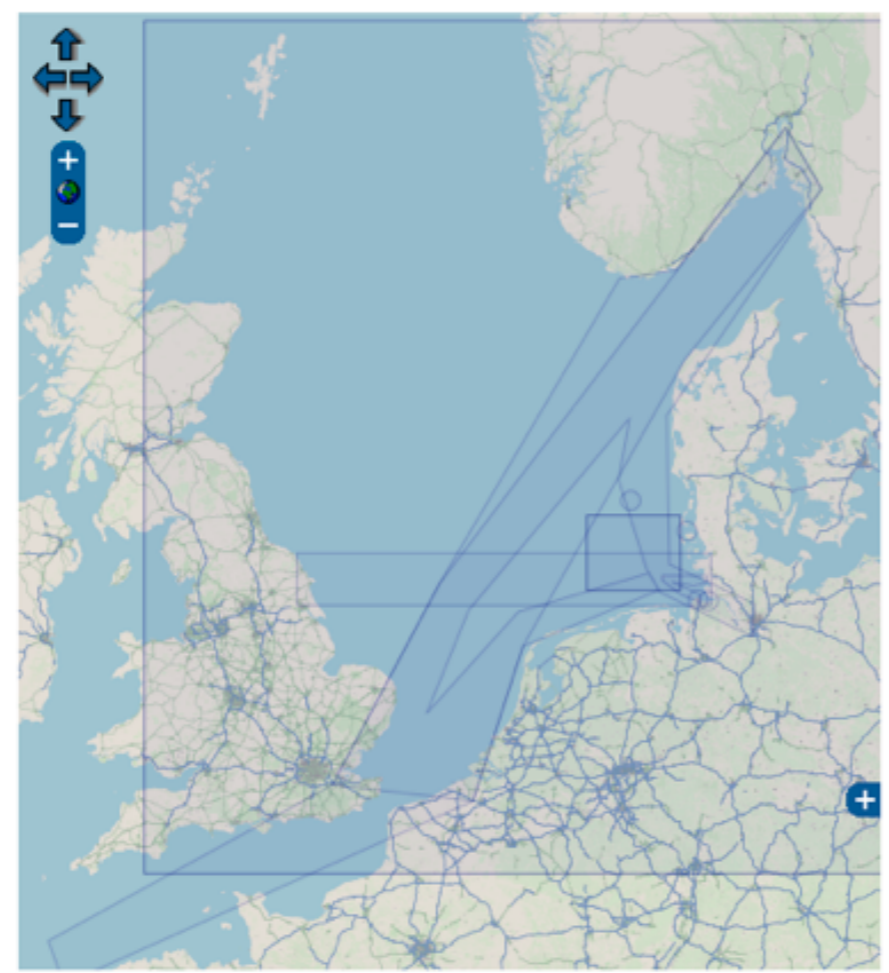
From: 25.02.2012
(dd.mm.yyyy)

To: 26.03.2012
(dd.mm.yyyy)

Use CTRL+Pg up/Pg down and Pg up/Pg down to switch between years and months.

Remote sensing data
 Insitu data
 Model data

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



1. ?? [OpenStreetMap](#) and partners, License: [CC BY-SA](#).
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- Other Data Access**
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 2. [Model hind/forecast: Waves German Bight](#)
 3. [Model hind/forecast: Circulation North Sea-Baltic Sea](#)
 4. [Model hind/forecast: Circulation German Bight](#)

Select all datasets

List datasets

Number of datasets per platform: 20

According to your search criteria, 13 platform(s) were found in this area.

- Num datasets (total / selected)
- ▶ [Ferrybox at Cuxhaven](#)
 - ▶ [Ferrybox at FINO3](#)
 - ▶ [Ferrybox on FunnyGirl \(to Helgoland\)](#)
 - ▶ [Ferrybox on Lysbris \(Germany-England-Norway\)](#)
 - ▶ [Ferrybox on Lysbris \(Norw-Holl Belg-Engl\)](#)
 - ▶ [Ferrybox on RV Polarstern provided by AWI and HZG](#)
 - ▶ [Ferrybox on TorDania \(Cuxhaven-Immingham\)](#)
 - ▶ [Glider amadeus](#)
 - ▶ [Glider sebastian](#)
 - ▶ [Meris on Envisat](#)
 - ▶ [Modis on Aqua or Terra](#)
 - ▶ [Pile HPAEibe1 operated by HPA und HZG](#)
 - ▶ [Pile Hoernum1](#)

For selected data sources:

Create map

Create plots

Downloads

COSYNA data web portal CODM

[Feedback](#)

Parameter category:
Basic Parameters

Parameter: chlorophyll-a

Water depth:
All water depths

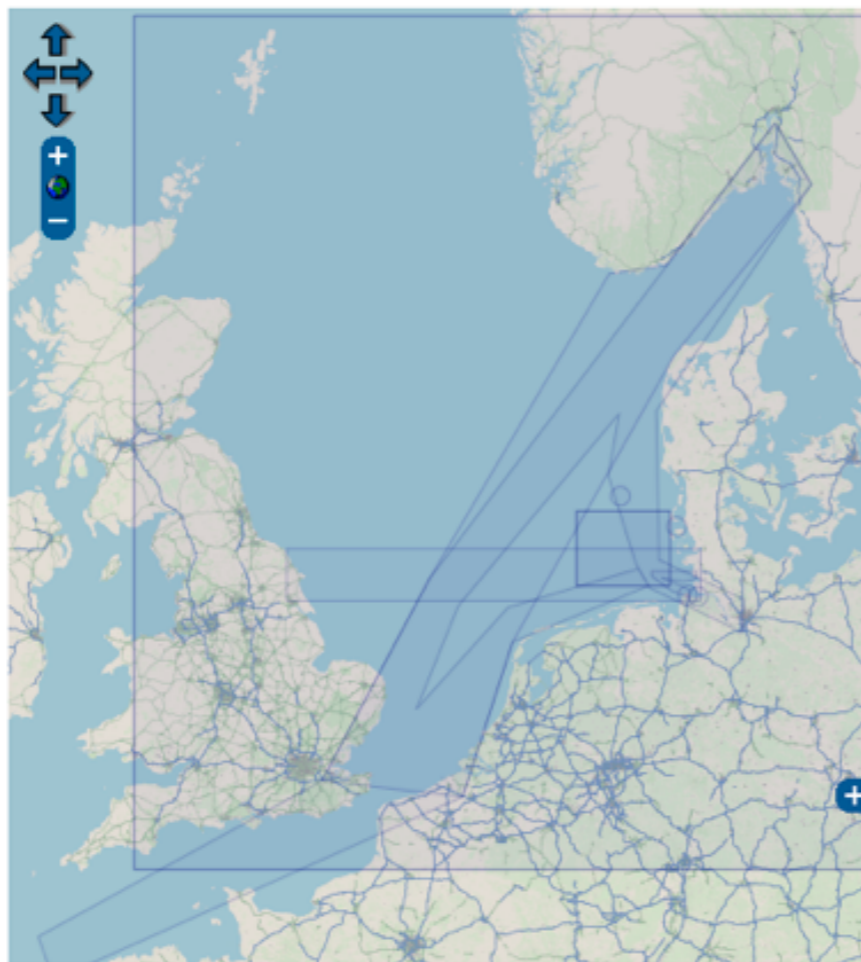
From: 25.02.2012
(dd.mm.yyyy)

To: 26.03.2012
(dd.mm.yyyy)

Use CTRL+Pg up/Pg down and Pg up/Pg down to switch between years and months.

Remote sensing data
 Insitu data
 Model data

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



12.53613, 54.93689

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4. [Model hind/forecast: Circulation German Bight](#)

Select all datasets

List datasets

Number of datasets per platform: 20

According to your search criteria, 13 platform(s) were found in this area.

	Num datasets (total / selected)
Ferrybox at Cuxhaven	(1 / 1)
Ferrybox at FINO3	(2 / 2)
Ferrybox on FunnyGirl (to Helgoland)	(33 / 33)
Ferrybox on Lysbris (Germany-England-Norway)	(5 / 5)
Ferrybox on Lysbris (Norw-Holl_Belg-Engl)	No datasets available!
Ferrybox on RV Polarstern provided by AWI and HZG	(1 / 1)
Ferrybox on TorDania (Cuxhaven-Immingham)	(20 / 20)
Glider amadeus	(1 / 1)
Glider sebastian	(1 / 1)
Meris on Envisat	(30 / 30)
Modis on Aqua or Terra	No datasets available!
Pile HPAEIbe1 operated by HPA und HZG	(1 / 1)
Pile Hoernum1	(1 / 1)

For selected data sources:

Create map

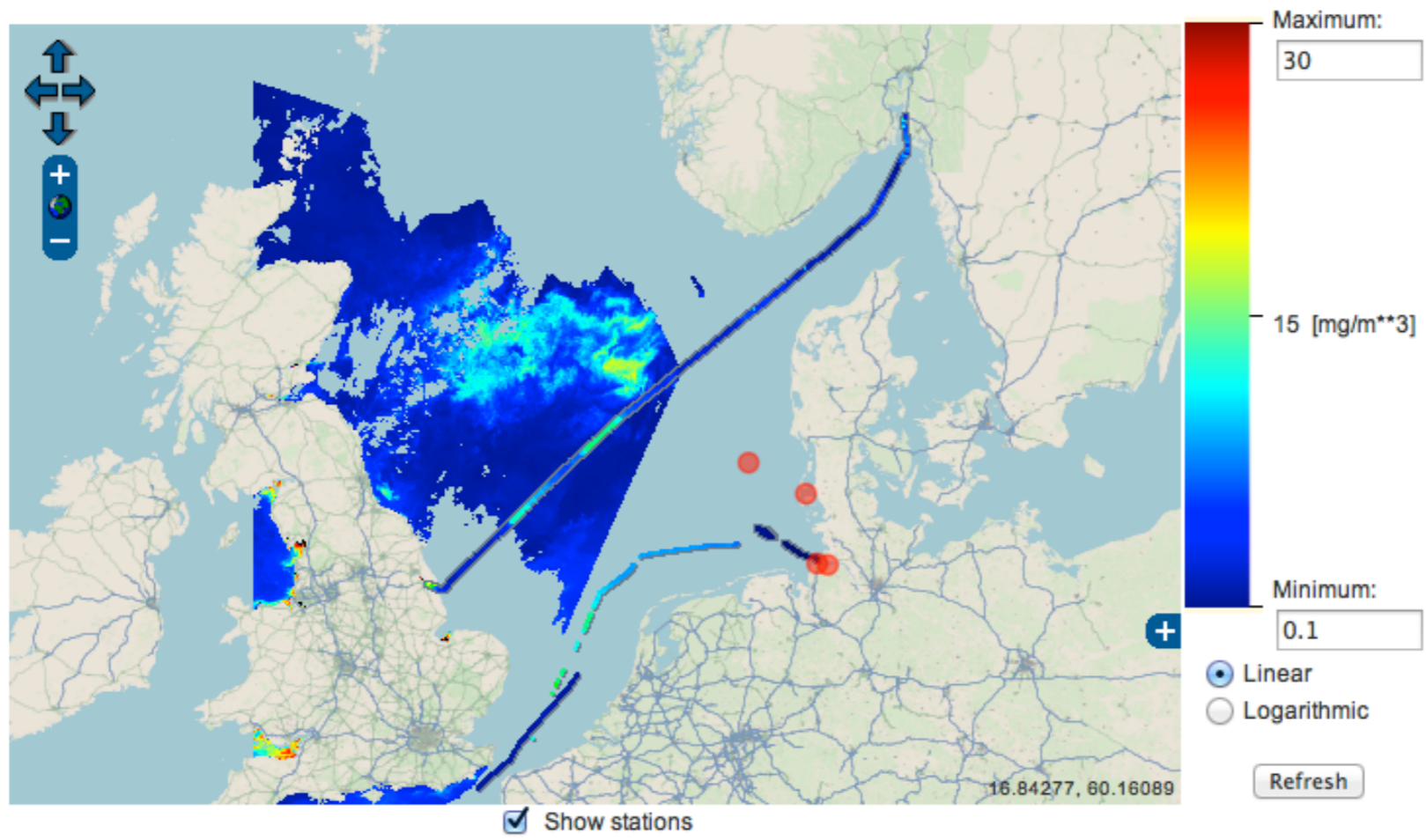
Create plots

Downloads

Maps for chlorophyll-a [mg/m³]

Date range: 25.02.2012 - 26.03.2012

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



Platforms:

show **Meris on Envisat**

selected layer with time slider show 4 of 30 layers, starting with selected

25.03.2012 - 11:12:59



show **Ferrybox on FunnyGirl (to Helgoland)**

selected layer with time slider show 4 of 33 layers, starting with selected

23.03.2012 - 10:49:42



show **Ferrybox on Lysbris (Germany-England-Norway)**

selected layer with time slider show 4 of 5 layers, starting with selected

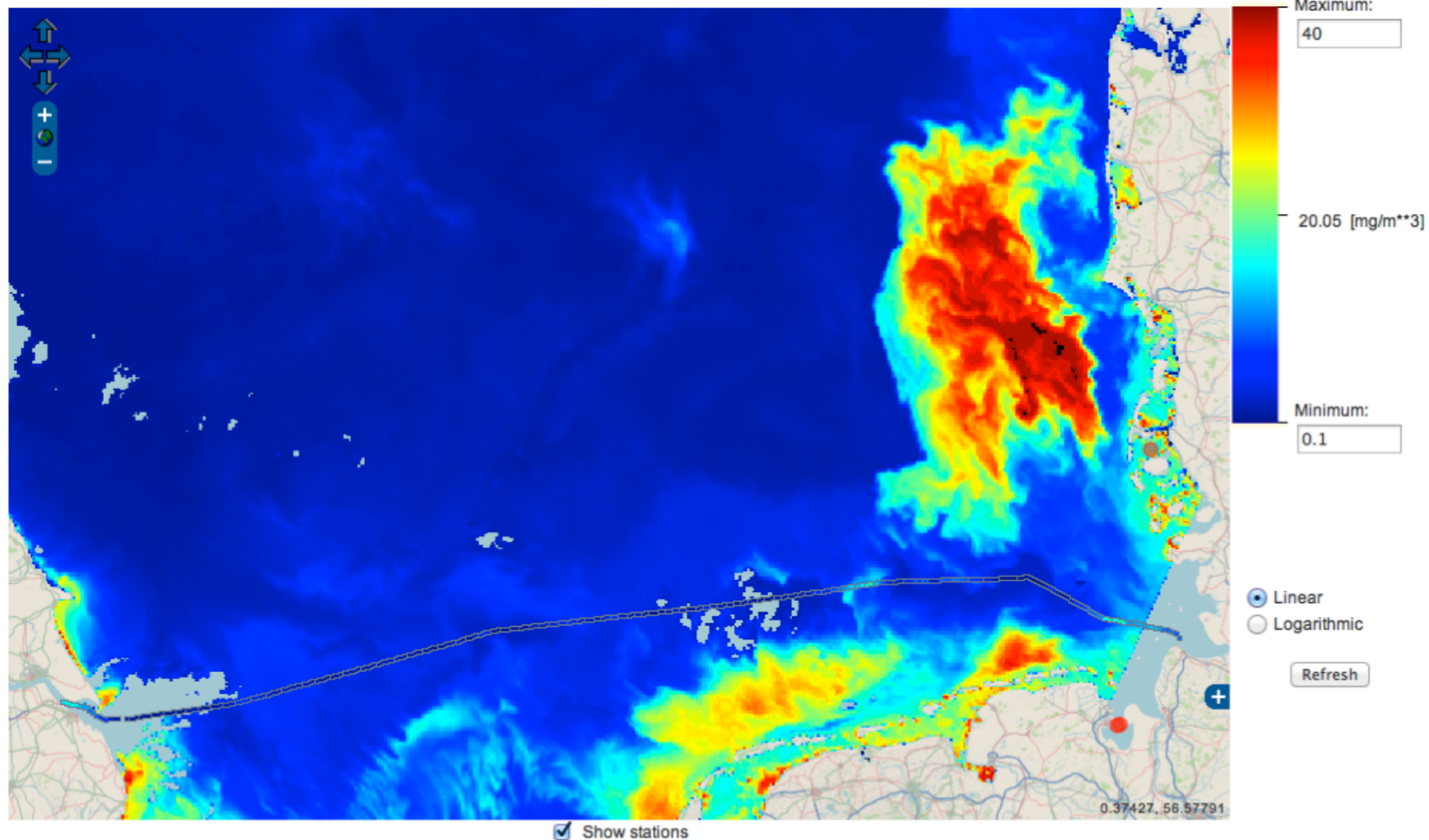
13.03.2012 - 12:45:57



- COSYNA defines 5 data levels ranging from raw data level 0 (mV from sensor) to level 4 for a peer reviewed data publication in a data journal. The data in the COSYNA data portal have data level 3 (geo referenced, automatic quality checks, units, ...)
- In data level 3 all data have a quality flag. The quality flag scheme is a community standard defined in the project SeaDataNet.
 - ▶ QF=0: No quality control yet
 - ▶ QF=1: Good data, all defined tests for this parameter are passed and a data curator checked consistency
 - ▶ QF=2: Probably good data, all checks applied so far are passed
 - ▶ QF=3: Probably bad data, some checks failed, data have the potential to get corrected
 - ▶ QF=4: Bad data
- The final quality control will be made by a data curator who checks the consistency of the data in the context of related parameters. In future every data point will get an additional accuracy value beside the quality flag.
- COSYNA has an open data policy. All data are free. The use for commercial purposes should be requested. As major part of a publication a co-authorship should be provided to the COSYNA PIs.

- All examples are direct results of operating the data portal
- 1. An Algal bloom from spring 2008 detected by Meris on Envisat compared to Ferrybox fluorescence measurements.
- 2. Results of the prognostic wave model WAM as map and as a time-series compared to the results of wave rider buoy measurements for the storm Alexandra late 2014.
- 3. Global salinity distribution from the Ferrybox on the research vessel Polarstern. Data are from 4 campaigns from 2009 to 2010.

Algal Bloom April 2008



Platforms:

- show **Meris on Envisat**
 selected layer with time slider show 4 of 10 layers, starting with selected
21.04.2008 - 10:48:39



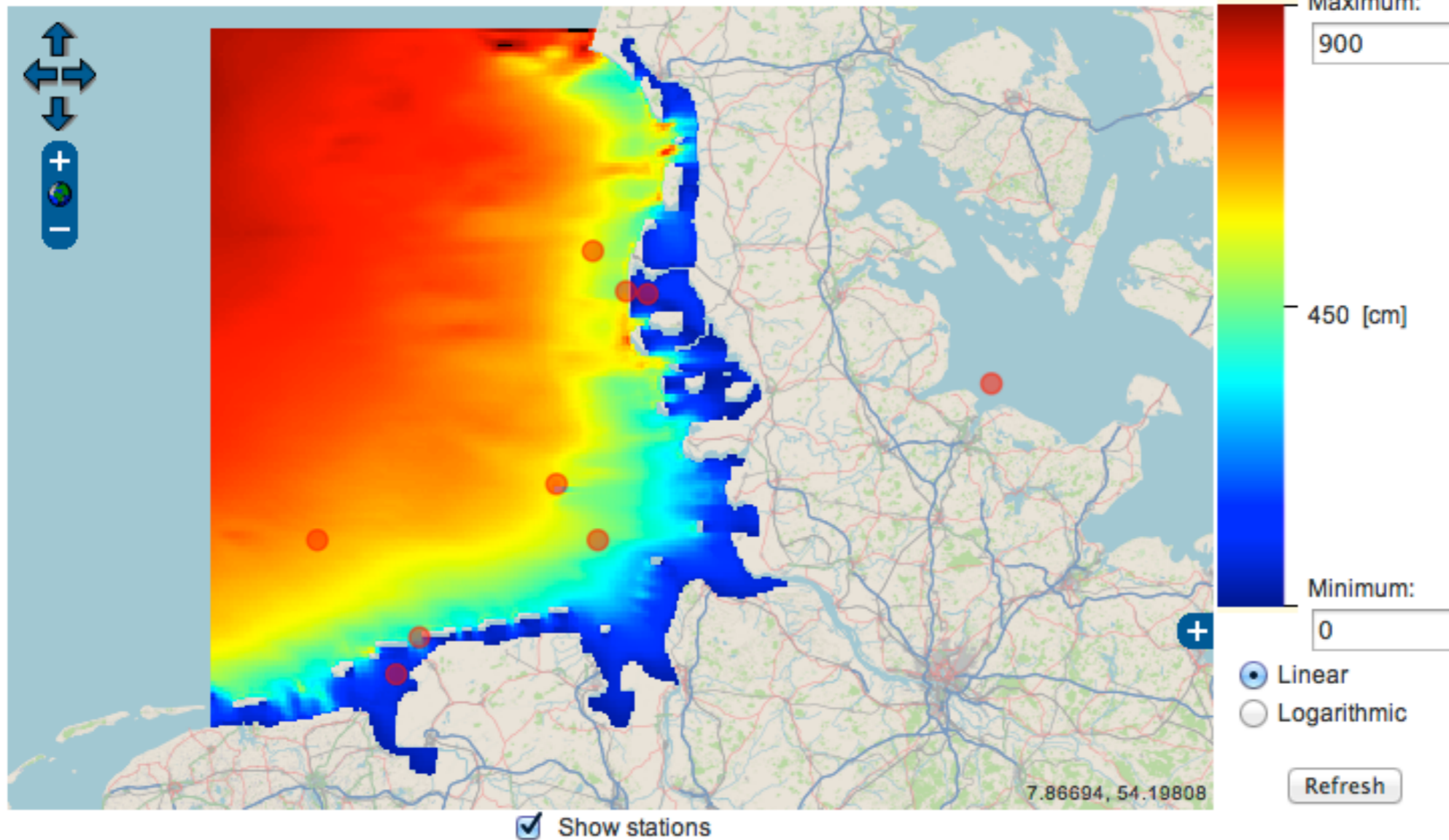
- show **Ferrybox on TorDania (Cuxhaven-Immingham)**
 selected layer with time slider show 4 of 7 layers, starting with selected
22.04.2008 - 00:50:38



Maps for wave_height_significant [cm]

Date range: 04.12.2014 - 16.12.2014

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



Platforms:

- show **Wave Model for the German Bight**
 - selected layer with time slider
 - show 4 of 318 layers, starting with selected



XY timeseries plots for sea_surface_wave_significant_height [cm]

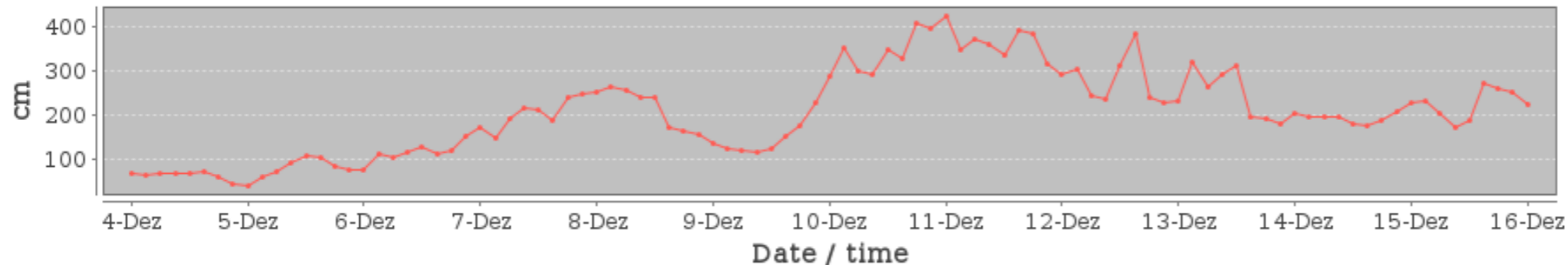
Plot data with quality flag(s): quality flag 0 quality flag 1 quality flag 2 quality flag 3 quality flag 4 (deselect all flags for plotting all data)

y axis: Minimum: Maximum:

1. Selected Layers

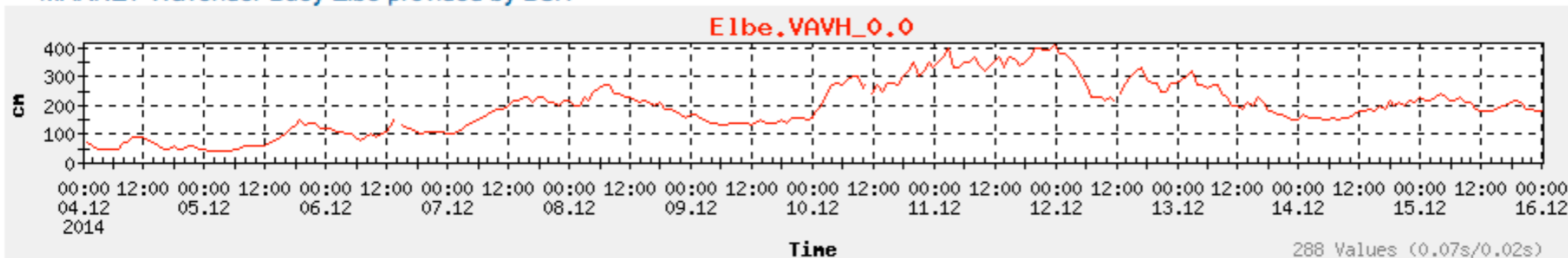
▲ Wave Model for the German Bight

sea_surface_wave_significant_height
(Lon: 8.1361, Lat: 53.9666)



2. Selected stations



▲ MARNET Waverider Buoy Elbe provided by BSH

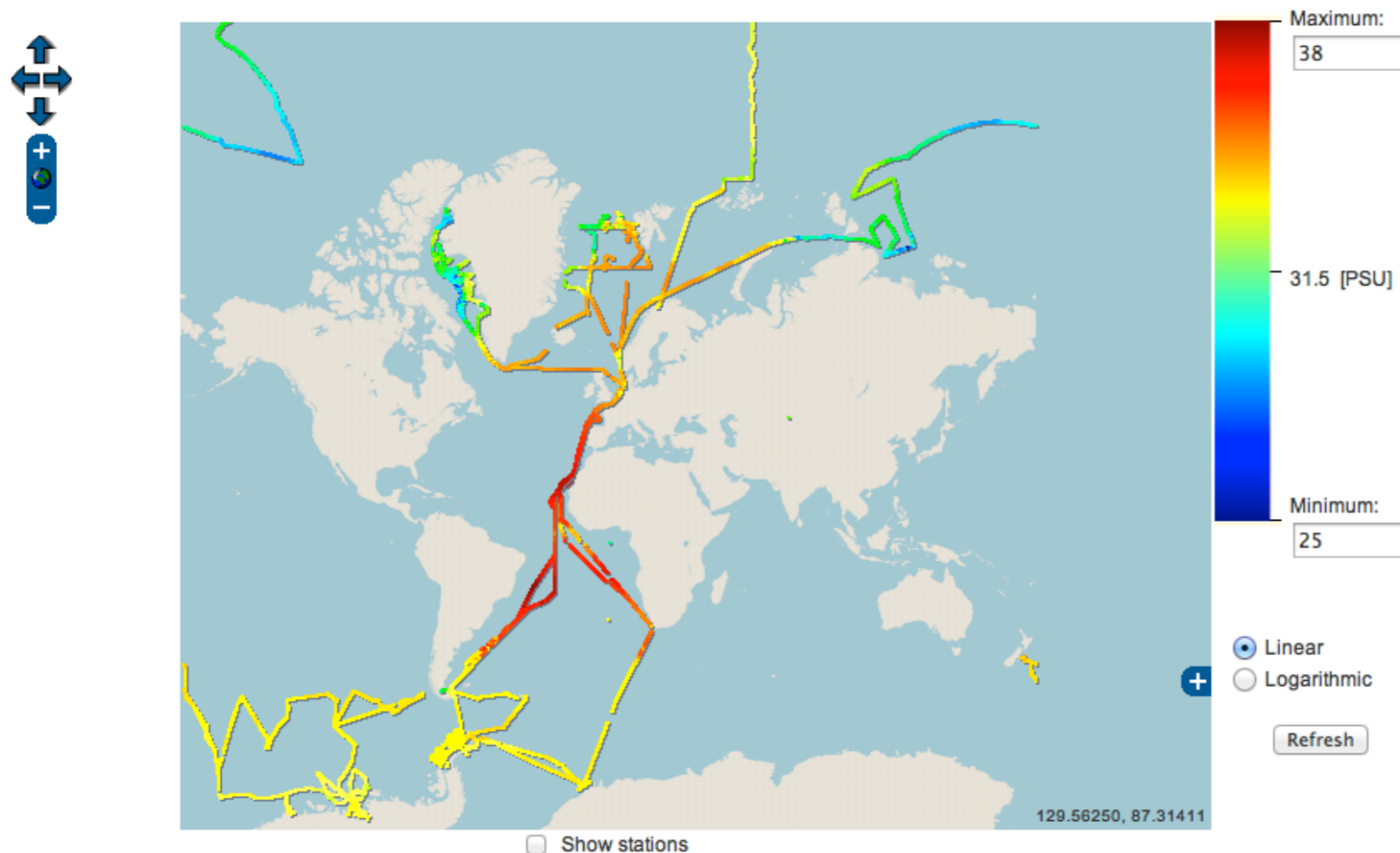


Salinity Maps from Polarstern Ferrybox

Maps for salinity [PSU]

Date range: 02.01.2009 - 02.02.2015

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



Platforms:

show **Ferrybox on RV Polarstern provided by AWI and HZG**

selected layer with time slider show 4 of 8 layers, starting with selected

30.01.2010 - 17:29:17

02.01.2009  02.02.2015



- AWI, Geomar and HZG are HGF centres dealing with marine data, AWI and HZG within the program PACES (Polar Regions and Coasts in a Changing Earth System) and Geomar with the program OCEANS.
- The HGF senate requested a deeper cooperation between PACES and OCEANS especially in the field of data management.
- Such a cooperation started with the aim of a coordinated data management among this centres.
- In COSYNA the 3 centres are partners. The COSYNA data management is an example of such a cooperation.
- The MaNIDA (Marine Network for Information and Data Access) project focuses on a coordinated data management. The marine HGF centres AWI, Geomar and HZG are prominent members of MaNIDA.

- MaNIDA partners beside AWI, Geomar and HZG are: BSH (Bundesamt für Seeschifffahrt und Hydrographie), MARUM Bremen, ICBM Oldenburg, CAU Kiel, University Hamburg.
- MaNIDA developed the "Data Portal German Marine Research" to access data from different sources of the partners.
- Another objective of MaNIDA is the development of a data management workflow for all German research vessels to make most data especially underway data reusable for the community.
- The MaNIDA financial support ended in January. MaNIDA tasks are continued within the program PACES.

- A 5-dimensional geodata cloud of mostly all observed Geodata with the 3 space dimensions, one time dimension and one dimension for the observed property (e.g. temperature ...)
- Beside the observed value of the property the cloud should imply the accuracy of the value, the originator, a link to metadata and some more information.
- A first step towards this vision is the MaNIDA direct data access. Selecting a time and location region and one of 3 observed properties a user gets all fulfilling data from PANGAEA (AWI, MARUM), DOD (BSH), and COSYNA (HZG).

Direct Data Access allows you to request and download aggregated data from our data providers. Please note that we delete data files after 7 days.

Pay attention to data originators and cite!

[Bookmark your request overview!](#)

Data request

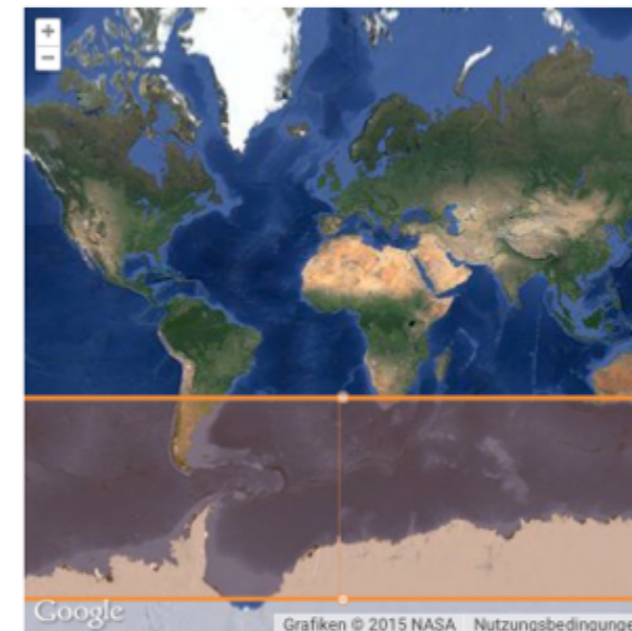
Parameter

Provider

Format

Constraints

	Begin	End
Date	<input type="text" value="2013-01-01"/>	<input type="text" value="2013-03-31"/>
Depth	<input type="text"/>	<input type="text"/>
North	<input type="text" value="-32.828974"/>	
East	<input type="text" value="172.109375"/>	
South	<input type="text" value="-76.924303"/>	
West	<input type="text" value="-167.890625"/>	



Your requests

Date	Parameter	Provider	Data points	Percent	Remaining	Status
2015-03-02 11:40:45	sea_water_salinity	COSYNA, DOD, PANGAEA	307955			FINISHED

Direct Data Access allows you to request and download aggregated data from our data providers. Please note that we delete data files after 7 days.

Pay attention to data originators and cite!

Bookmark your request overview!

Data request

datetime	latitude	longitude	depth	sea_water_salin	quality	repository	provider	dataset
2013-01-01 00:00:00.000	-63,8943	-49,0867	3380	34,623		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818558
2013-01-01 00:00:00.000	-63,8943	-49,0867	3430,1	34,612		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818558
2013-01-01 00:00:00.000	-64,398	-45,8658	4329,4	34,649		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818559
2013-01-01 00:00:00.000	-64,398	-45,8658	4379,5	34,649		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818559
2013-01-01 00:00:00.000	-65,6173	-36,4213	270,3	34,687		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818556
2013-01-01 00:00:00.000	-65,6173	-36,4213	4755,2	34,642		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818556
2013-01-01 00:00:00.000	-65,6173	-36,4213	4805,2	34,638		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818556
2013-01-01 00:00:00.000	-66,6117	-27,1218	293,9	34,686		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818557
2013-01-01 00:00:00.000	-66,6117	-27,1218	4716,5	34,643		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818557
2013-01-01 00:00:00.000	-66,6117	-27,1218	4770,4	34,643		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.818557
2013-01-01 00:00:00.000	-67,23185	-27,26038	4	34,054432	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:01:00.000	-67,230467	-27,25927	4	34,060263	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:02:00.000	-67,2291	-27,25852	4	34,064237	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:03:00.000	-67,227733	-27,25755	4	34,06389	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:04:00.000	-67,2264	-27,25577	4	34,043712	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:05:00.000	-67,2168	-27,2605	11	34,002		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.808838
2013-01-01 00:05:00.000	-67,224933	-27,25472	4	34,047941	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:06:00.000	-67,223333	-27,25538	4	34,06779	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:07:00.000	-67,22165	-27,25688	4	34,074856	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:08:00.000	-67,219967	-27,2585	4	34,062051	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:09:00.000	-67,218417	-27,25973	4	34,048093	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:10:00.000	-67,217017	-27,26055	4	34,049229	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:11:00.000	-67,215967	-27,26143	4	34,017653	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:12:00.000	-67,214783	-27,26222	4	34,04539	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:13:00.000	-67,213317	-27,26272	4	34,055559	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:14:00.000	-67,211583	-27,26345	4	34,060822	2	COSYNA	HZG and AWI	http://kopc03.hzg.de:8080/nokis/servants/~Render?recordId=53c6c94c-1fd4-40c7-8425
2013-01-01 00:15:00.000	-67,2013	-27,2705	11	34,019		PANGAEA		http://doi.pangaea.de/10.1594/PANGAEA.808838

Your requests

Date	Parameter	Provider	Data			Status
			points	Percent	Remaining	
2015-03-02 11:40:45	sea_water_salinity	COSYNA, DOD, PANGAEA	307955			FINISHED

- Observed Geodata are no classical Big Volume Data. Only remote sensing data have the capability of big volumes in the future.
- All Geodata observations which are not archived are lost forever. They could be reproduced only in very rare cases.
- Fast access to observed Geodata is needed to get informations for forecasts as soon as possible.
- Observations should be homogenous and back dating as much as possible for comparison with models and to see long term trends.
- The comprehensive access to very different types of observations and to get a synoptic view is a challenge for the data management.

A photograph of a sunset over the ocean. The sun is low on the horizon, creating a bright orange glow that reflects on the water. The sky is a deep orange, and the water is dark with ripples. The text "Thank you" is overlaid in the lower center in a yellow font.

Thank you