Ocean Monitoring and Forecasting in the European MyOcean GMES Marine Initiative

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Met Office NERSC Ifremer HCMR INGV DMI Mercator Ocean

MyOcean = 59 partners all around Europe

supported by the European Commission

using altimetry and other space data, and in situ data,

and models, and operational chains,

organized as a service team,

connected together in a single pan-european system,

sharing data, softwares, practices, formats and skills,

to deliver a unique « European Marine Service »

for global and regional ocean monitoring and forecasting

in the framework of GMES.

They are preparing a European Centre

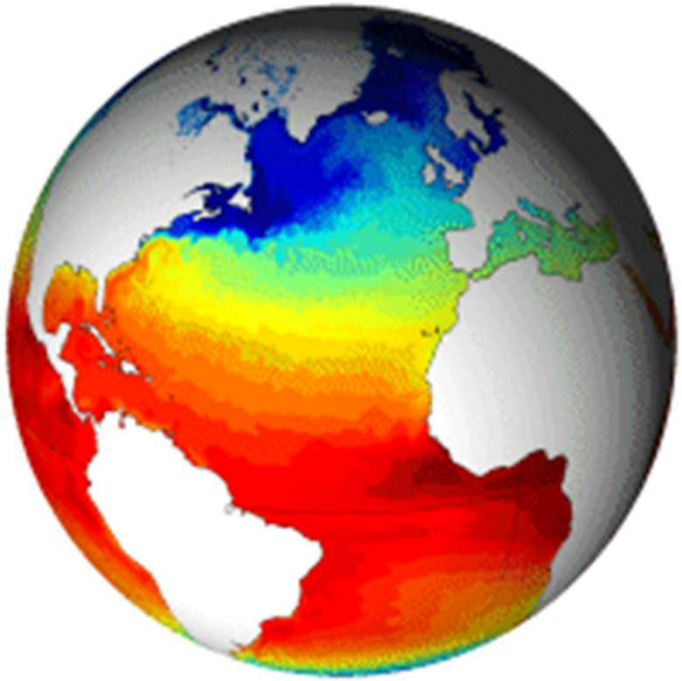
They need altimetry.


59 partners
28 countries

outline

MyOcean2

- 1. The project
- 2. The service
- 3. The users response

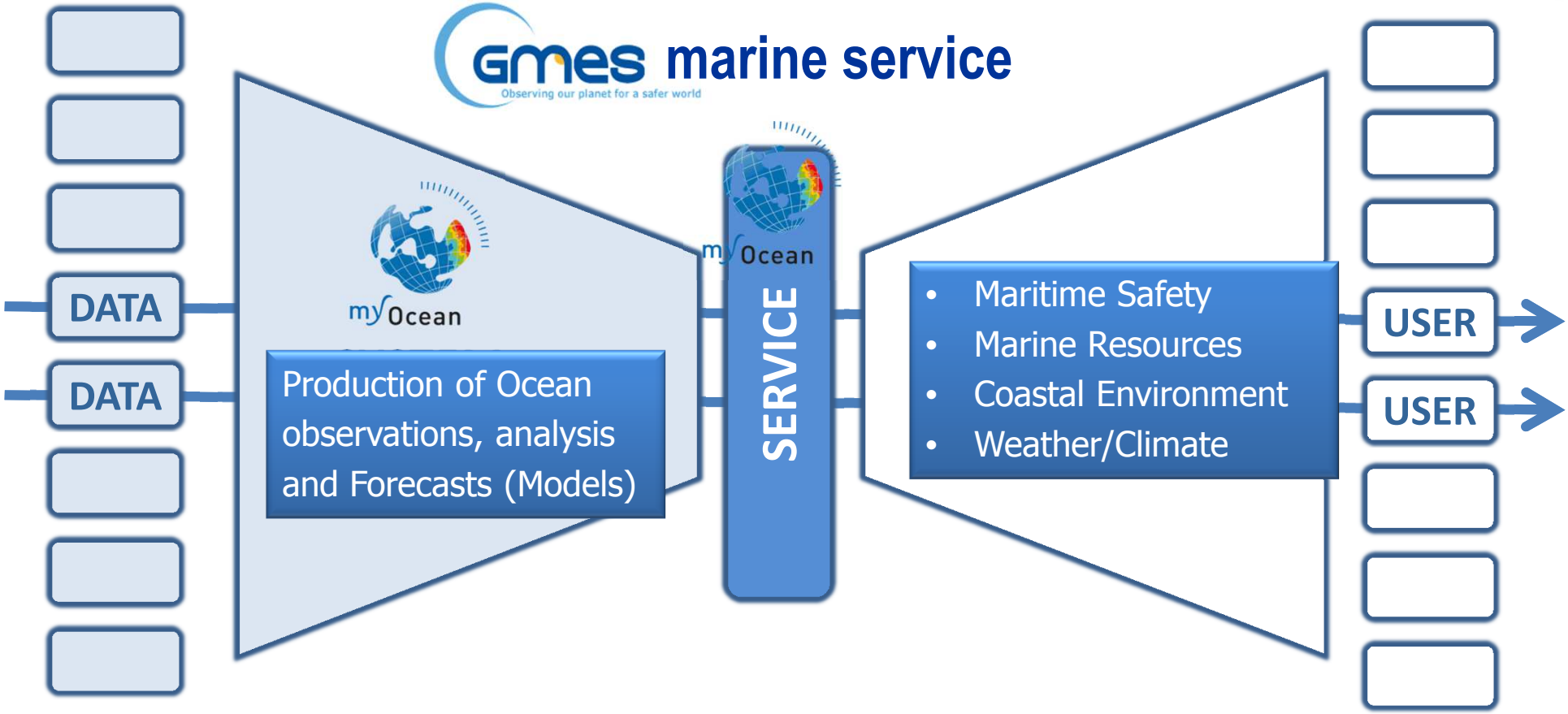


1. The project

A marine data service

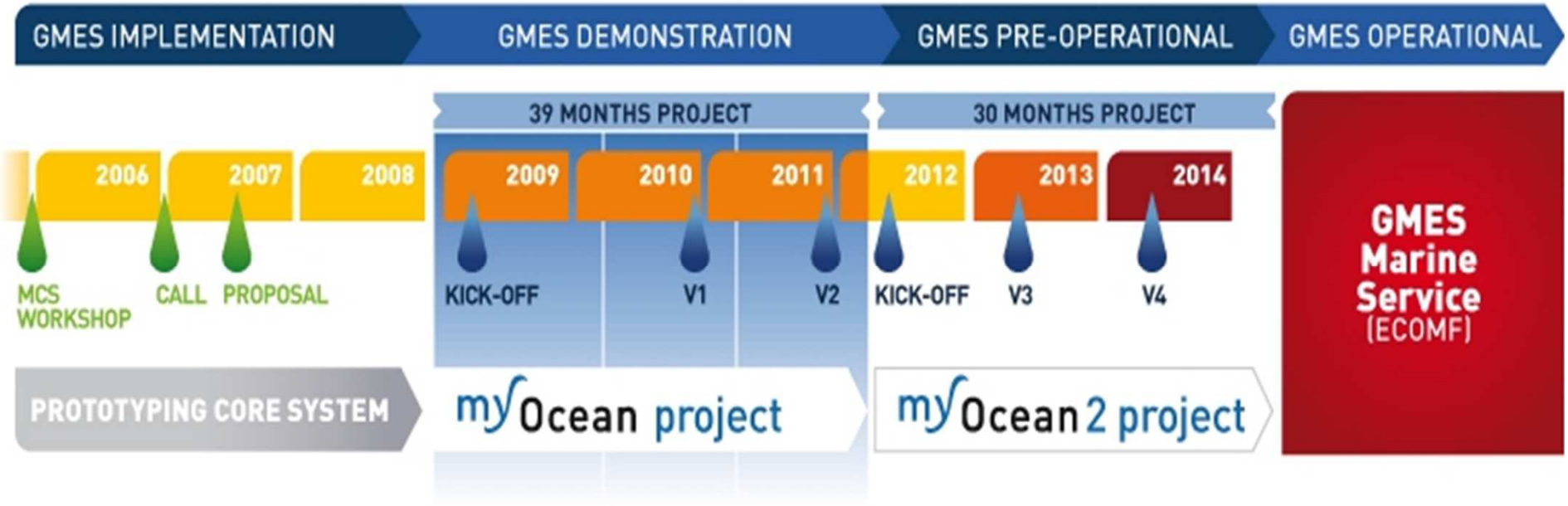
www.myocean.eu

A GMES "Core" Service



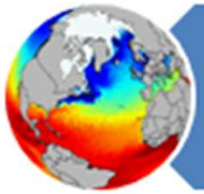
MyOcean2 following MyOcean towards a sustained GMES Marine Service

European Commission FP7 Space GMES program
Marine Service Implementation



EC projects	MyOcean1 Jan 2009 – Mar 2012	MyOcean2 Apr 2012 – Sep 2014
EC Grant	34 M€	28 M€

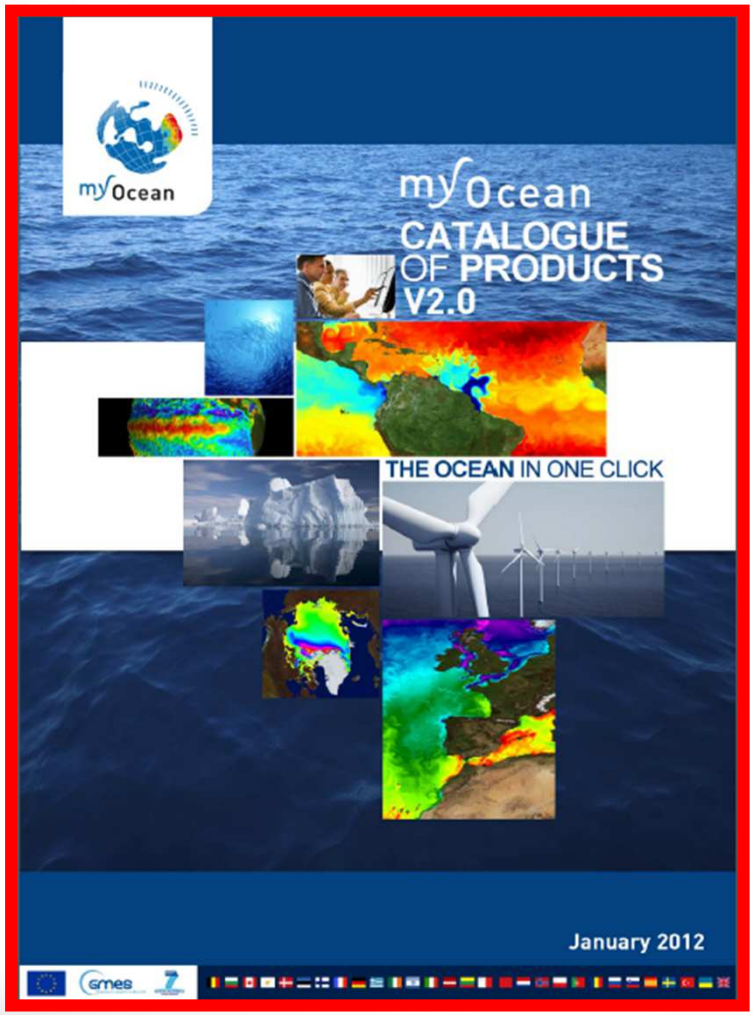
2. The service



Describe the ocean

Deliver the data

Propose information



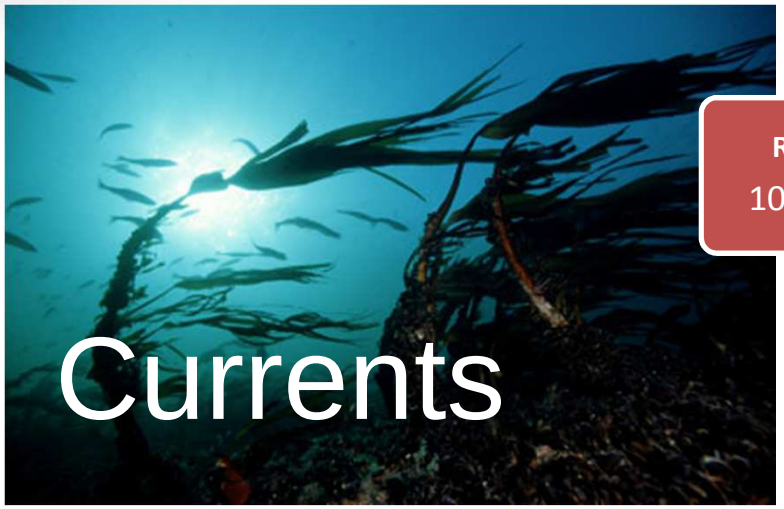
Global ocean & European seas

Mesoscale: 1/12° (1/4° → 1/36°)

Last decades

Real time

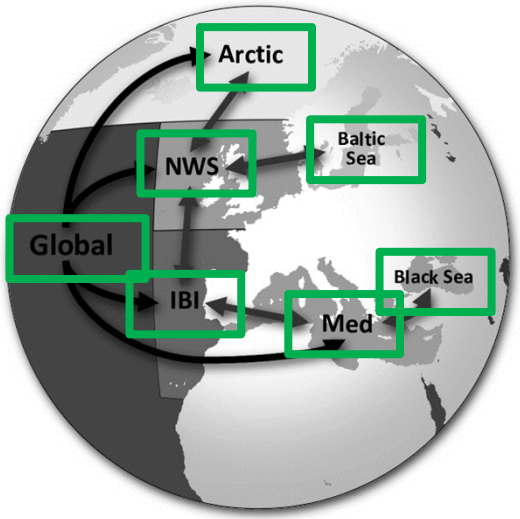
~ 200 products



- **Model products**
  - **CURRENTS (U, V)**
  - From **- 6000 m to surface**
  - Source: 7 MFCS, 13 different systems

REANALYSES	REAL-TIME	FORECAST
10 to 45 years	Daily hourly	2 to 10 days

- **In Situ Observation products**
  - **CURRENTS (U, V)**
  - From **– 100m to surface**
  - Source: 1 TAC, thousands platforms
- Satellite Observation products

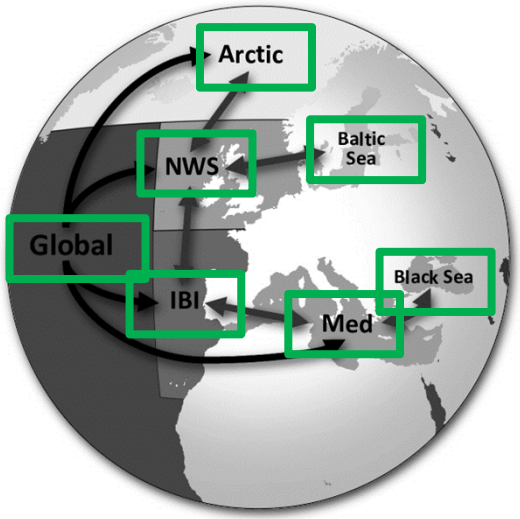


DATA SET	REAL-TIME
1 to 6 years	Daily

Temperature & Salinity

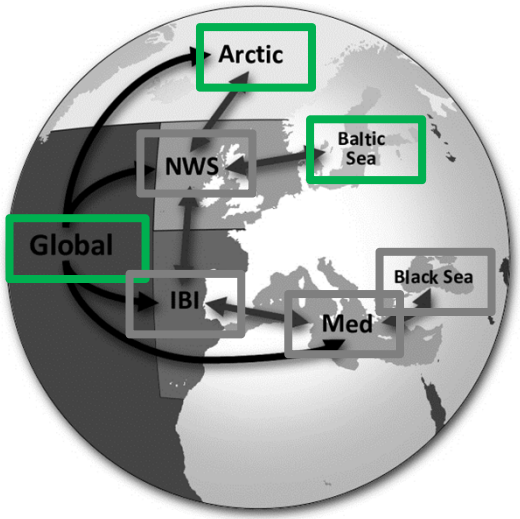
- **Model products**
  - **TEMPERATURE (T)**
  - **SALINITY (S)**
  - From **- 6000 m** to surface
  - Source: 7 MFCS, 13 different systems

REANALYSES 10 to 45 years → **REAL-TIME** Daily hourly → **FORECAST** 2 to 10 days



- **In Situ Observation products**
  - **TEMPERATURE (T)**
  - **SALINITY (S)**
  - From **– 1000 m** to surface
  - Source: 1 TAC, different platforms (ARGO, FerryBox Vessels, XBT, GTS….)
- **Satellite Observation products**
  - **SURFACE TEMPERATURE (SST)**
  - Surface
  - Source: 1 TAC, 8 different satellites

DATA SET 1 to 23 years → **REAL-TIME** Daily



- **Model products**
  - **SEA ICE COVERAGE, THICKNESS, DRIFT**
  - surface
  - Source: 3 MFCS, 6 different systems

REANALYSES 10 to 18 years → **REAL-TIME** Daily Hourly → **FORECAST** 2 to 10 days

- In Situ Observation products

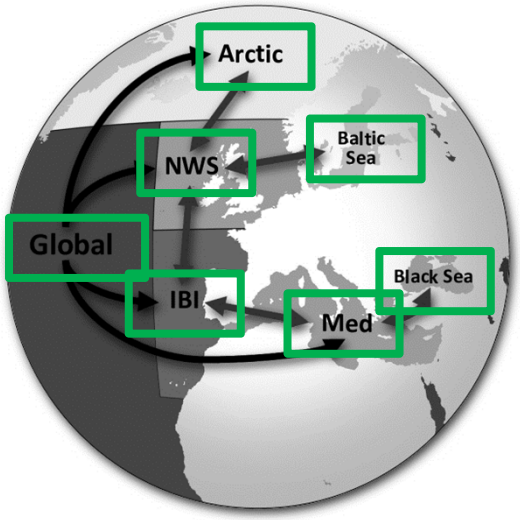
- **Satellite Observation products**
  - **SEA ICE COVERAGE, THICKNESS, DRIFT and TEMPERATURE**
  - **ICEBERG DENSITY**
  - Surface
  - Source: 1 TAC, 6 different satellites

DATA SET 1 to 30 years → **REAL-TIME** Daily

Sea Level

- **Model products**
  - **SEA SURFACE HEIGHT (SSH)**
  - Surface
  - Source: 7 MFCS, 13 different systems

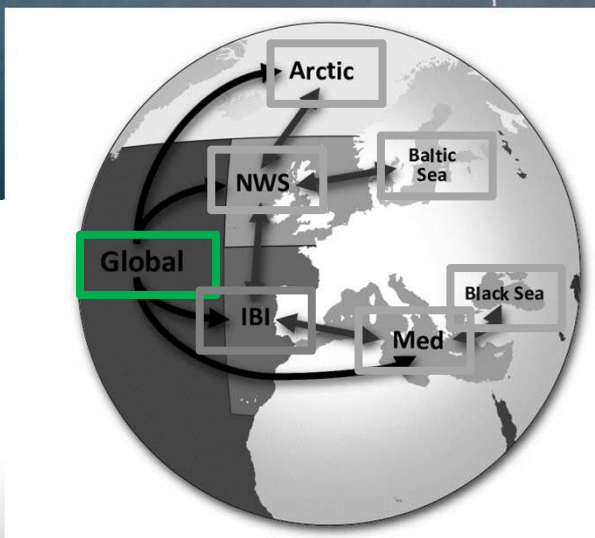
REANALYSES 10 to 45 years → **REAL-TIME** Daily Hourly → **FORECAST** 2 to 10 days



- **In Situ Observation products**
  - **SEA SURFACE HEIGHT (SSH)**
  - Surface
  - Source: 1 TAC, thousand different tidegauges
- **Satellite Observation products**
  - **SEA SURFACE HEIGHT (SSH)**
  - **MEAN DYNAMIC TOPOGRAPHY (MDT)**
  - Surface
  - Source: 1 TAC, 8 different satellites

DATA SET 2 to 20 years → **REAL-TIME** Daily

Surface Wind

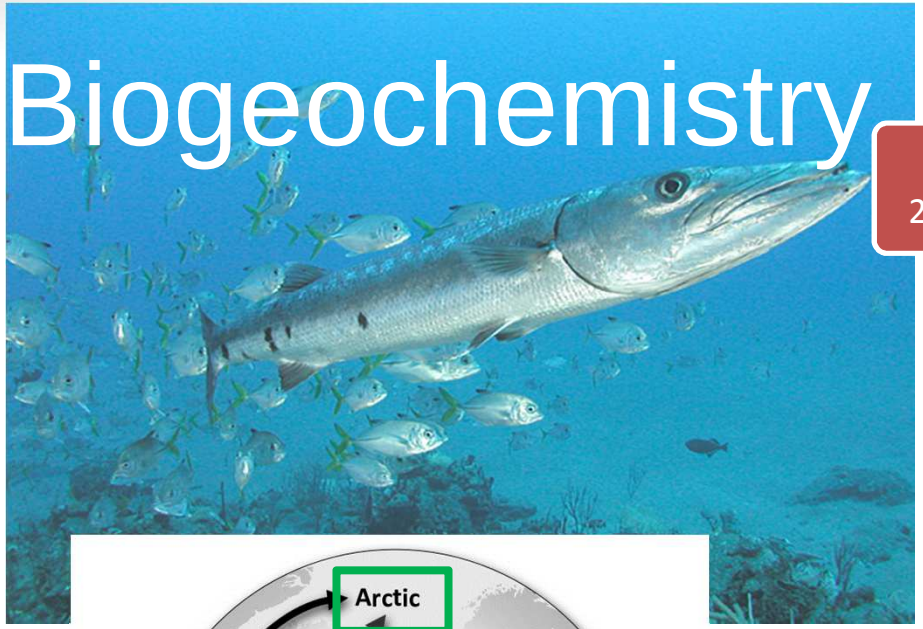


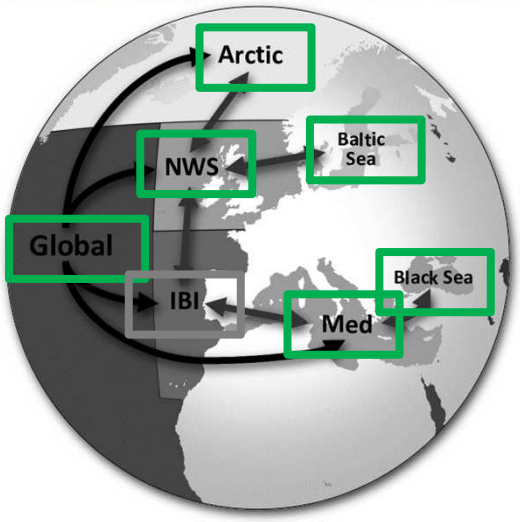
- Model products
- In Situ Observation products
- **Satellite Observation products**
  - **SURFACE WIND**
  - Surface
  - Source: 1 TAC, 2 different satellites

DATA SET
5 years

REAL-TIME
Daily

Biogeochemistry



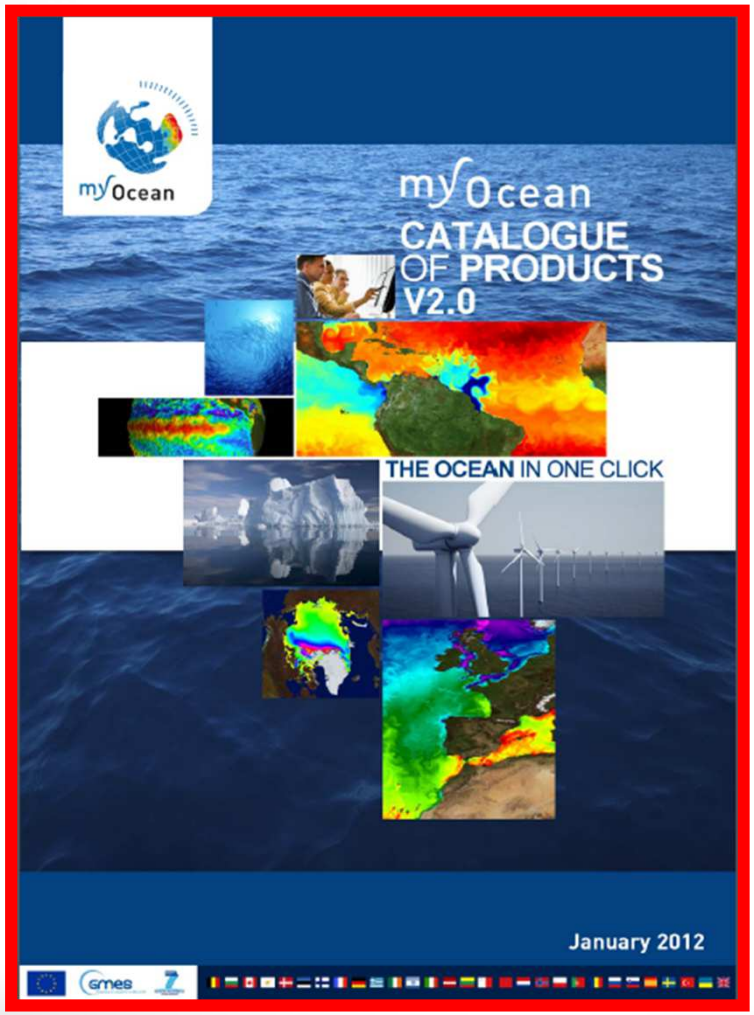


- **Model products**
  - **OXYGEN, NUTRIENTS, CHLOROPHYLL, PRIMARY PRODUCTION**
  - From - 6000 m to surface
  - Source: 6 MFCS, 10 different systems

REANALYSES 2 to 37 years → **REAL-TIME** Daily → **FORECAST** 2 to 10 days

- **In Situ Observation products**
  - **OXYGEN, CHLOROPHYLL**
  - From – 1000 m to surface
  - Source: 1 TAC, thousand different platforms
- **Satellite Observation products**
  - **CHLOROPHYLL**
  - **OPTICAL PROPERTIES**
  - Surface
  - Source: 1 TAC, 5 different satellites

DATA SET 1 to 14 years → **REAL-TIME** Daily Hourly



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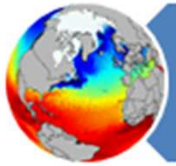

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Deliver the data

Propose information

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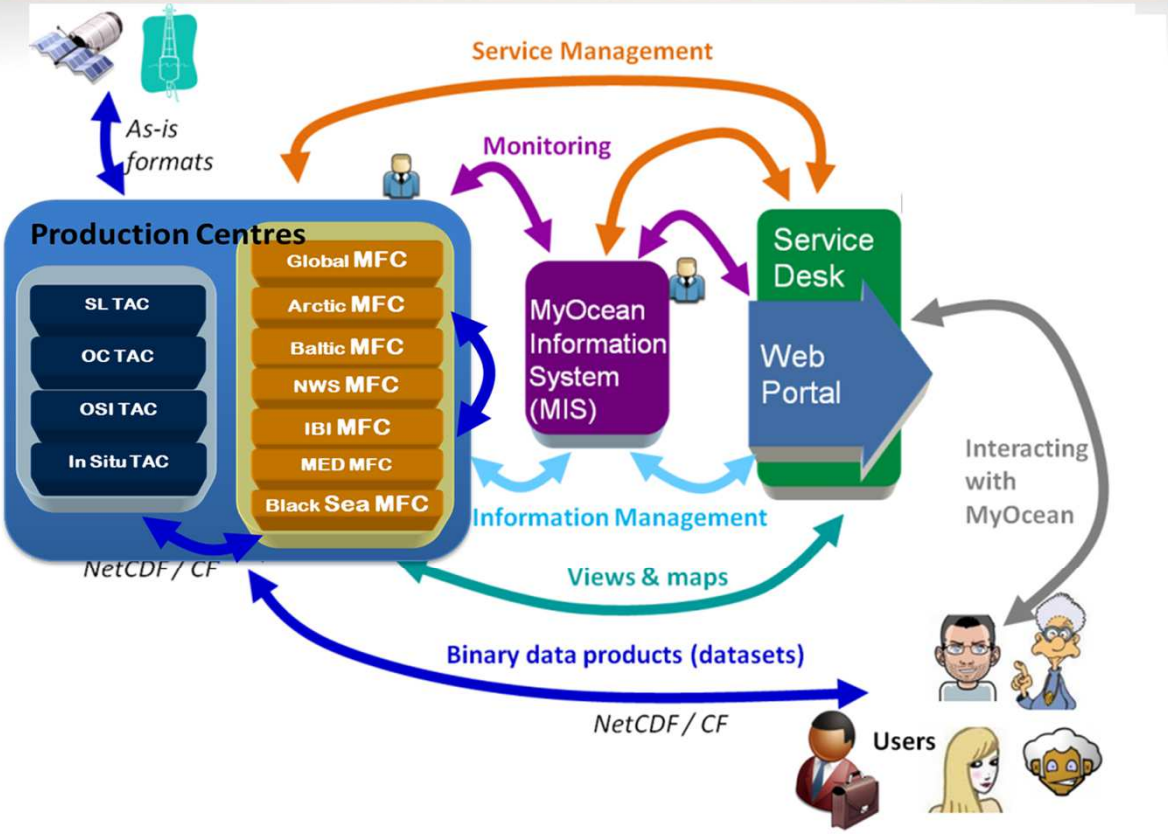
An integrated System and Service



28 European Countries in the consortium

59 public and private partners

350 European Experts

7 Areas covered — Global Ocean and All European Maritime Regions

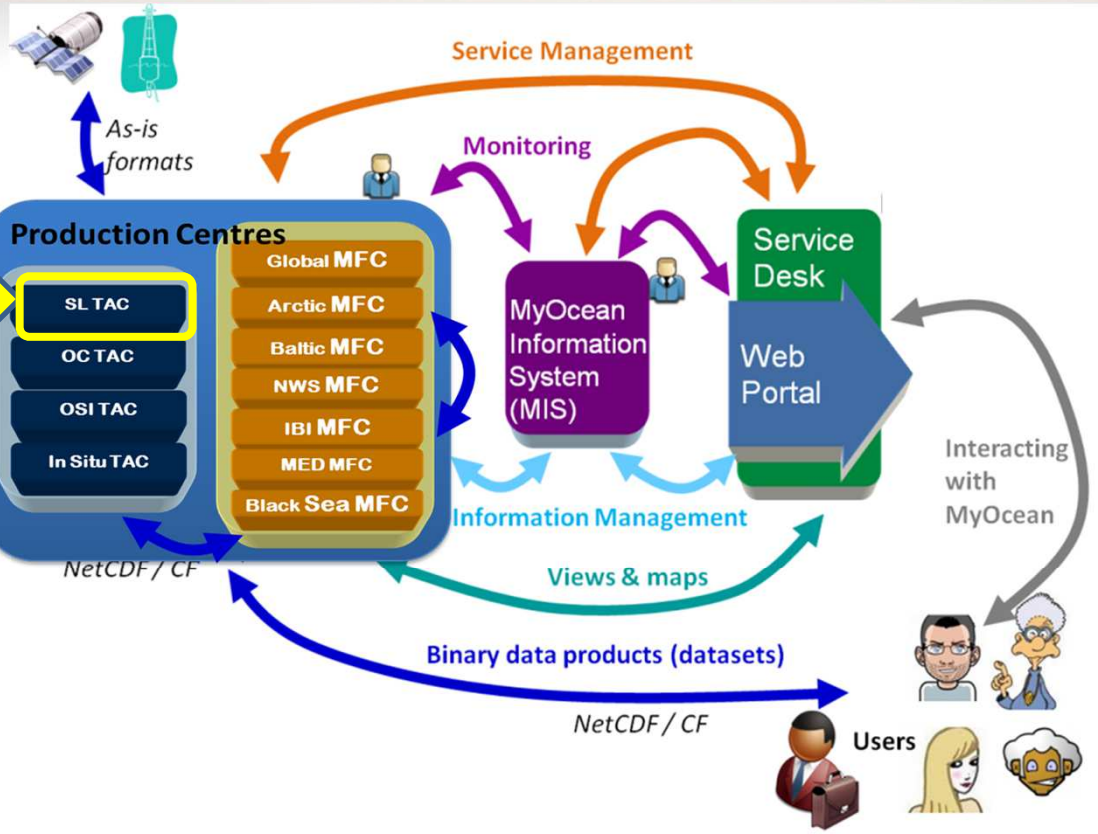
An integrated System and Service

Sea Level Thematic Assembly Centre

Entry point for altimetry

centre of expertise

i/f with space agencies



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Costa Concordia: MyOcean on alert to help control potential oil spill

When the cruiser Costa Concordia ran aground off the Italian coast in January 2012, MyOcean started to provide the Italian Coast Guard Operational Centre with daily valuable information on currents in the Mediterranean Sea.

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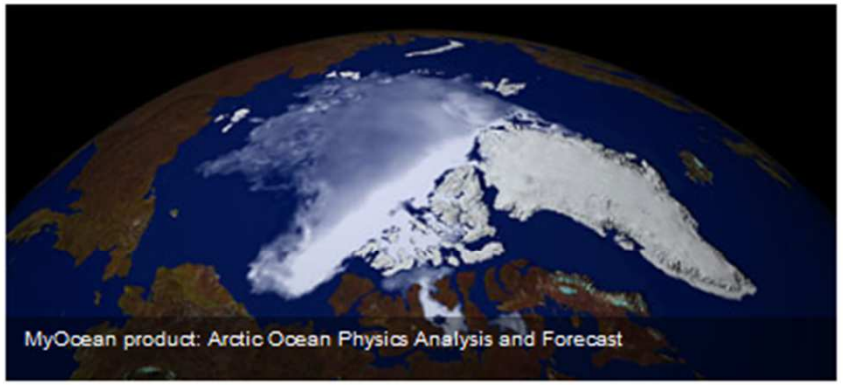
ARCTIC ICE ON THE MOVE



MyOcean product: Arctic Ocean Physics Analysis and Forecast

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EuroGOOS Regional Operational Oceanographic Systems and In-Situ Observations

MyOcean does not operate in situ observing systems but collect observations from data providers outside MyOcean, and mainly from EuroGOOS which have contributed significantly to structure the Operational Oceanography community as an efficient network. **FOCUS ON A MyOcean KEY-SUPPLIER and KEY-PARTNER.**

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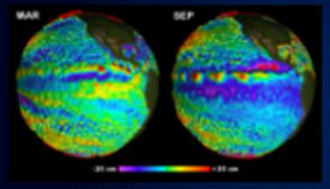
La Niña, the terrible Sister



Following its elder brother (El Niño) from mid-2010, La Niña has in turn wreaked havoc on Pacific coasts (and more). Catastrophic flooding in Australia, in particular , occurred in December 2010-January 2011.
A new La Niña episode is ongoing, even if less intensive than last year one. It is expected to continue up till March-April-May 2012.

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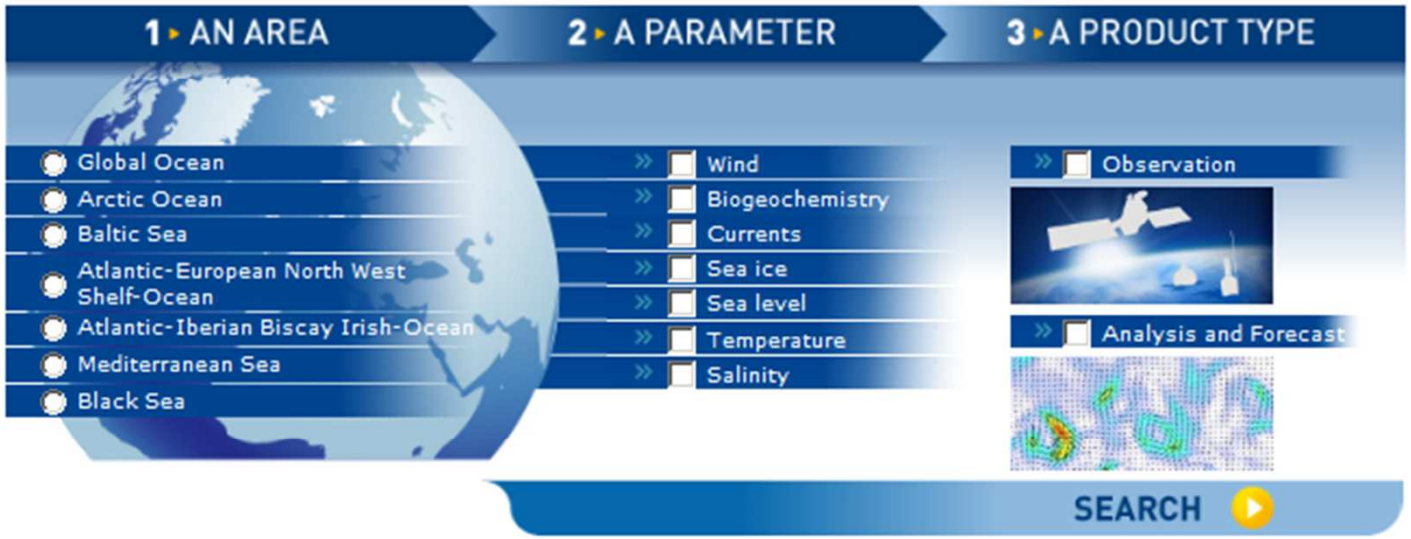

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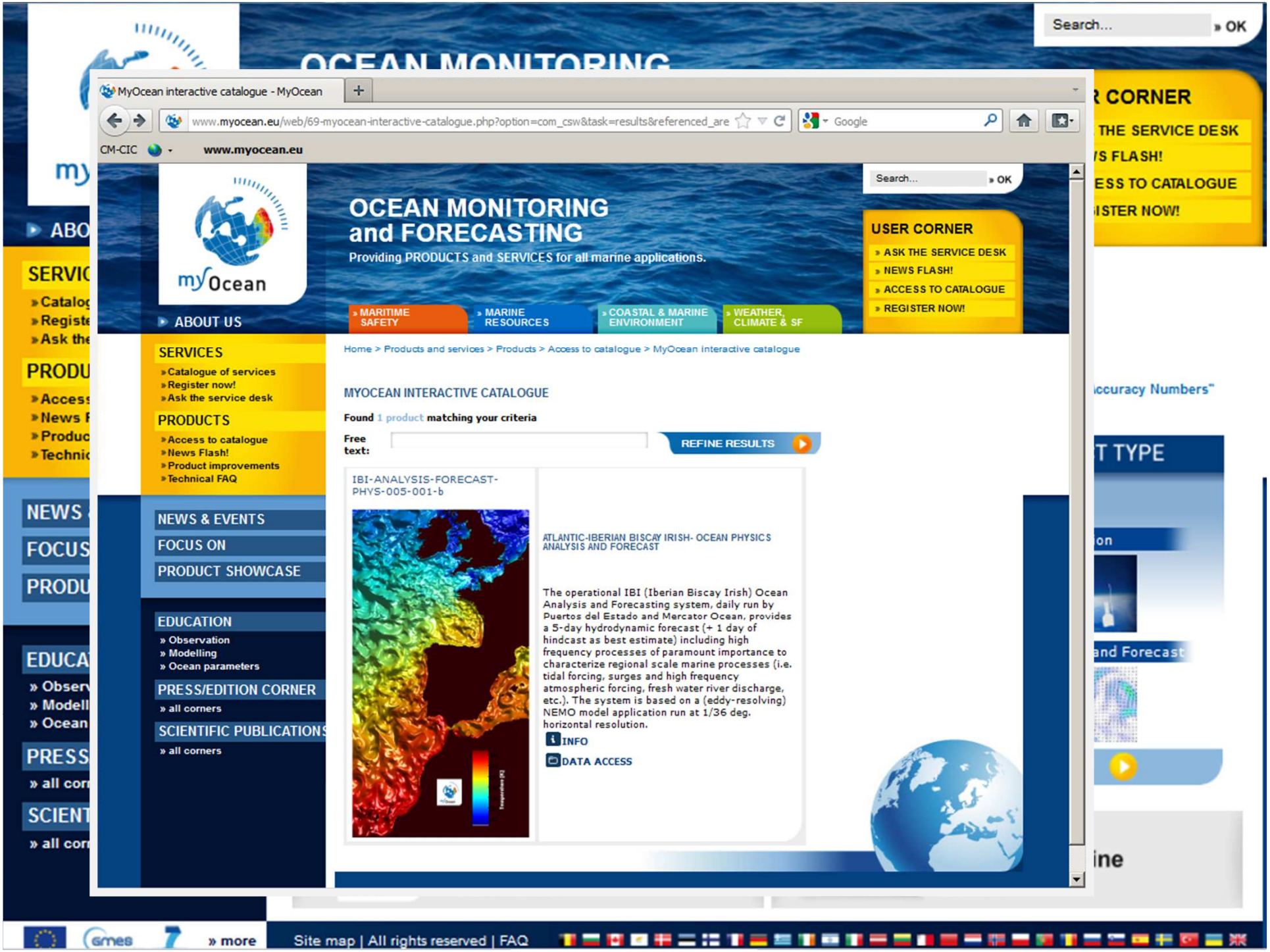
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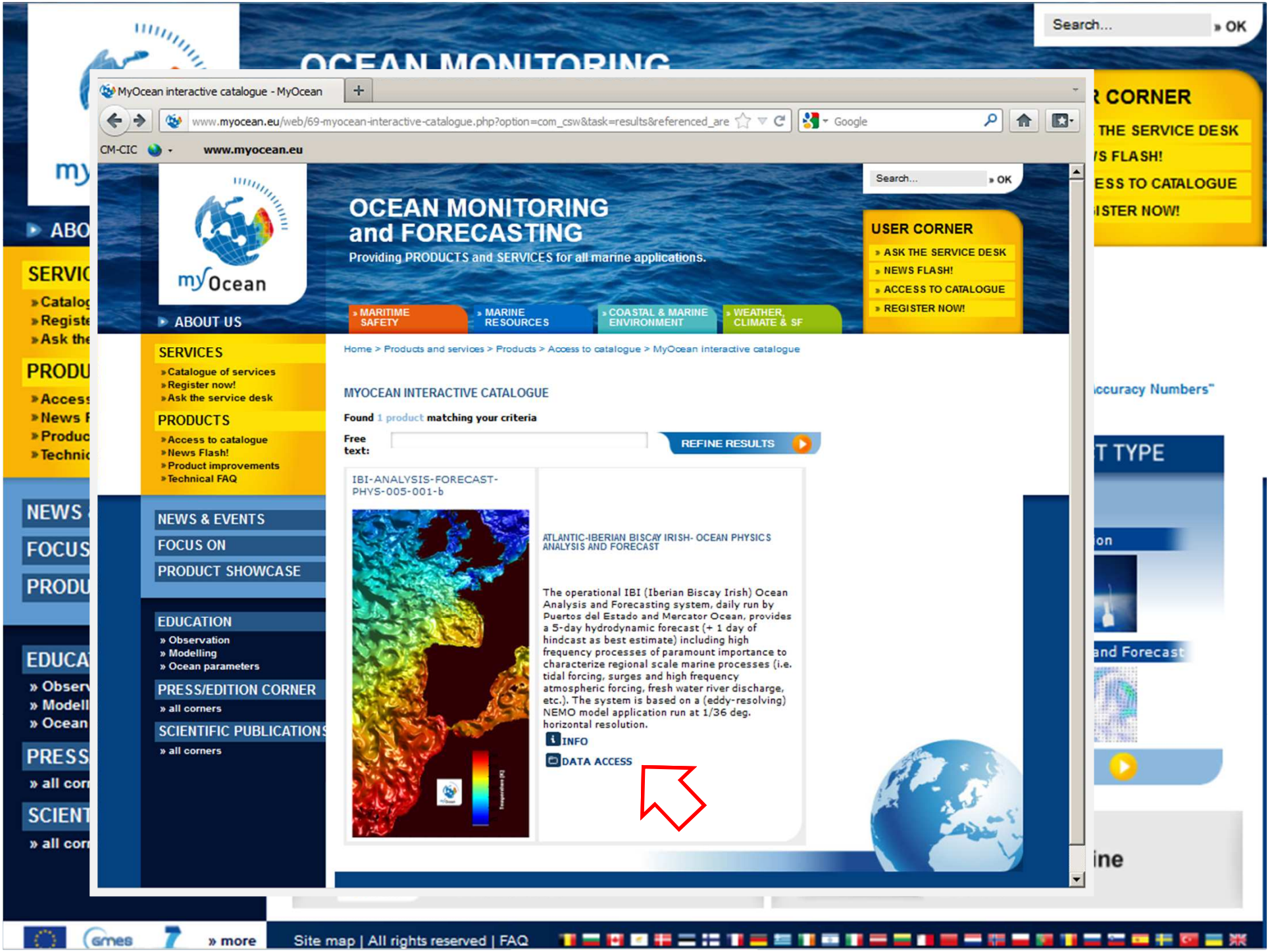
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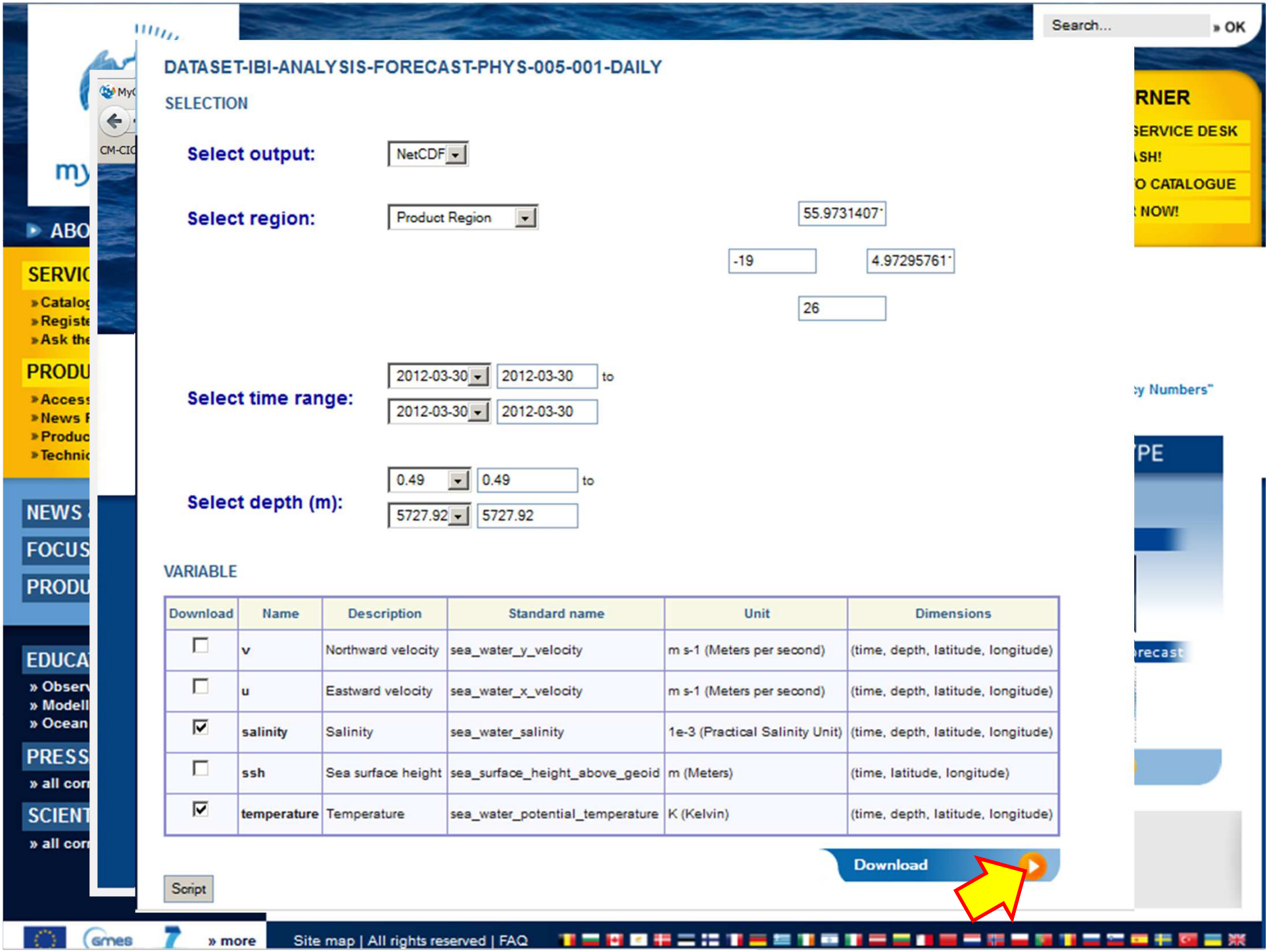
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26
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2012-03-30
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Select depth (m):
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0.49
to
5727.92
5727.92
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Northward velocity
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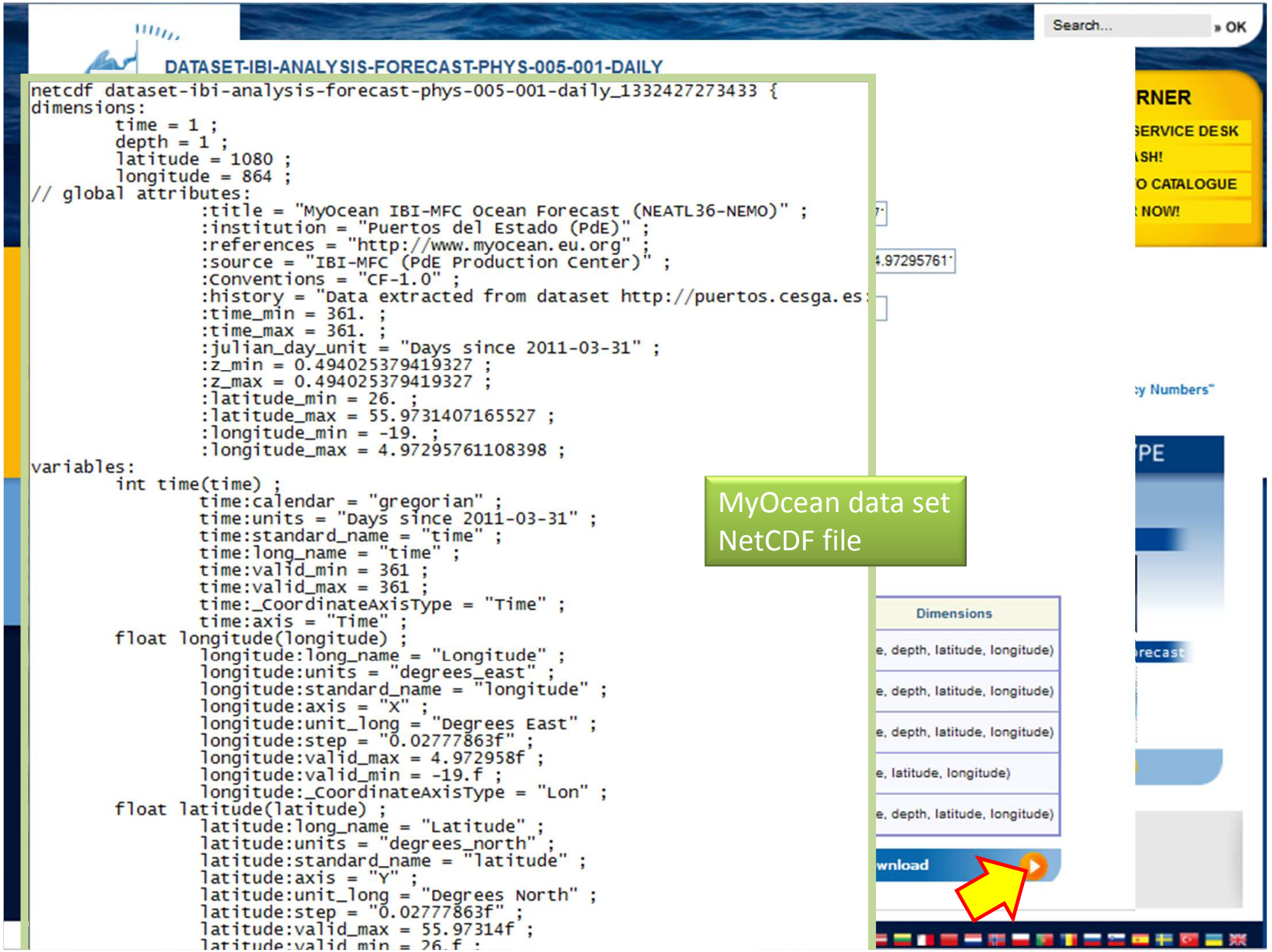
DATASET-IBI-ANALYSIS-FORECAST-PHYS-005-001-DAILY
netcdf dataset-ibi-analysis-forecast-phys-005-001-daily_1332427273433 {
dimensions:
time = 1 ;
depth = 1 ;
latitude = 1080 ;
longitude = 864 ;
// global attributes:
:title = "MyOcean IBI-MFC Ocean Forecast (NEATL36-NEMO)" ;
:institution = "Puertos del Estado (PdE)" ;
:references = "http://www.myocean.eu.org" ;
:source = "IBI-MFC (PdE Production Center)" ;
:Conventions = "CF-1.0" ;
:history = "Data extracted from dataset http://puertos.cesga.es
:time_min = 361. ;
:time_max = 361. ;
:julian_day_unit = "Days since 2011-03-31" ;
:z_min = 0.494025379419327 ;
:z_max = 0.494025379419327 ;
:latitude_min = 26. ;
:latitude_max = 55.9731407165527 ;
:longitude_min = -19. ;
:longitude_max = 4.97295761108398 ;
variables:
int time(time) ;
time:calendar = "gregorian" ;
time:units = "Days since 2011-03-31" ;
time:standard_name = "time" ;
time:long_name = "time" ;
time:valid_min = 361 ;
time:valid_max = 361 ;
time:_CoordinateAxisType = "Time" ;
time:axis = "Time" ;
float longitude(longitude) ;
longitude:long_name = "Longitude" ;
longitude:units = "degrees_east" ;
longitude:standard_name = "longitude" ;
longitude:axis = "X" ;
longitude:unit_long = "Degrees East" ;
longitude:step = "0.02777863f" ;
longitude:valid_max = 4.972958f ;
longitude:valid_min = -19.f ;
longitude:_CoordinateAxisType = "Lon" ;
float latitude(latitude) ;
latitude:long_name = "Latitude" ;
latitude:units = "degrees_north" ;
latitude:standard_name = "latitude" ;
latitude:axis = "Y" ;
latitude:unit_long = "Degrees North" ;
latitude:step = "0.02777863f" ;
latitude:valid_max = 55.97314f ;
latitude:valid_min = 26.f ;
MyOcean data set
NetCDF file
Search...
» OK
RNER
SERVICE DESK
SH!
O CATALOGUE
NOW!
Dimensions
e, depth, latitude, longitude)
e, depth, latitude, longitude)
e, depth, latitude, longitude)
e, latitude, longitude)
e, depth, latitude, longitude)
wnload


Search...
» OK
DATASET-IBI-ANALYSIS-FORECAST-PHYS-005-001-DAILY
SELECTION
Select output:
NetCDF
Select region:
Product Region
55.9731407
-19
4.97295761
26
Select time range:
2012-03-30
2012-03-30
to
2012-03-30
2012-03-30
Select depth (m):
0.49
0.49
to
5727.92
5727.92
VARIABLE
Download
Name
Description
Standard name
Unit
Dimensions
v
Northward velocity
sea_water_y_velocity
m s-1 (Meters per second)
(time, depth, latitude, longitude)
u
Eastward velocity
sea_water_x_velocity
m s-1 (Meters per second)
(time, depth, latitude, longitude)
salinity
Salinity
sea_water_salinity
1e-3 (Practical Salinity Unit)
(time, depth, latitude, longitude)
ssh
Sea surface height
sea_surface_height_above_geoid
m (Meters)
(time, latitude, longitude)
temperature
Temperature
sea_water_potential_temperature
K (Kelvin)
(time, depth, latitude, longitude)
Download
Script
» more
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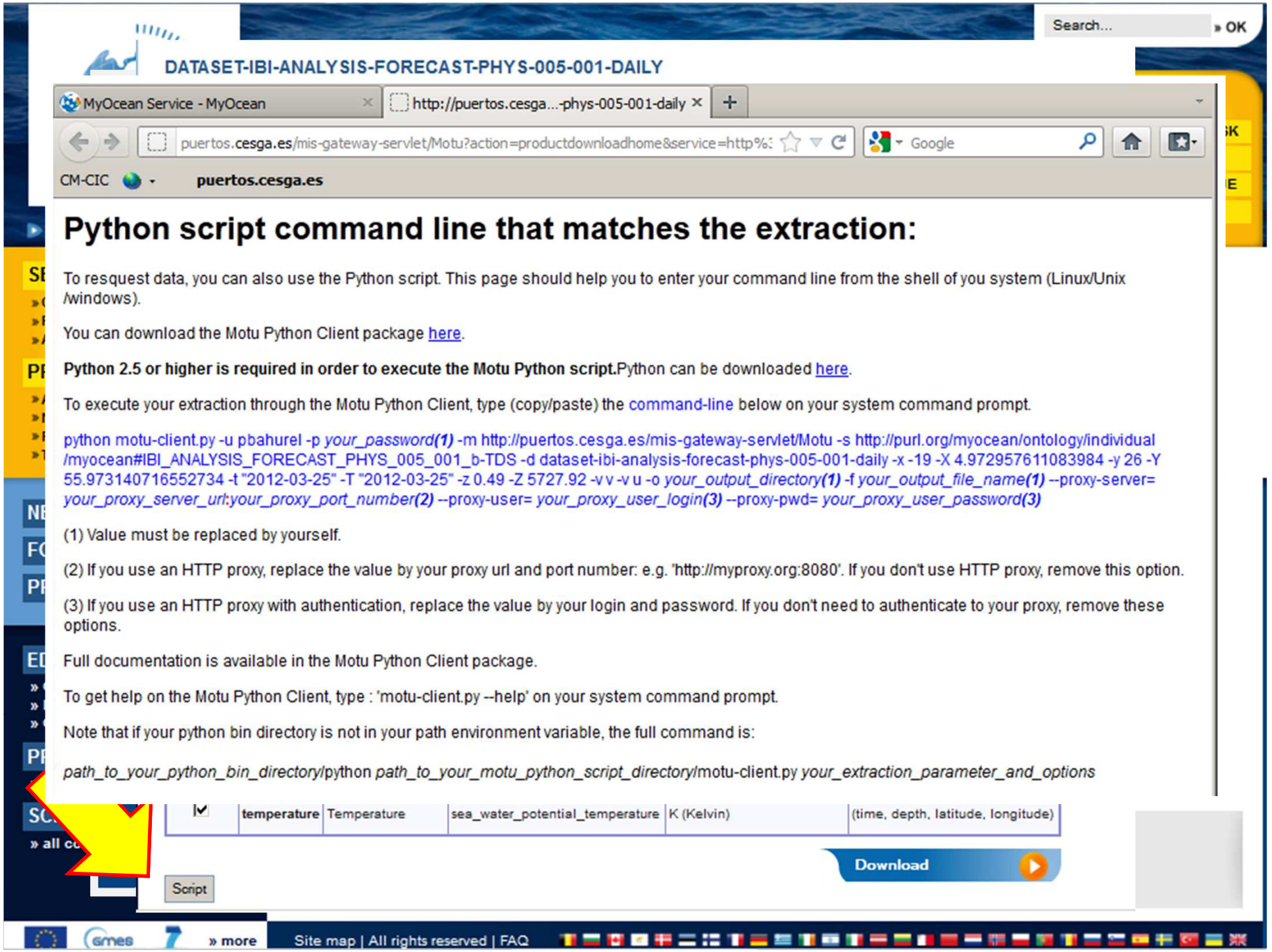
Search...
» OK
DATASET-IBI-ANALYSIS-FORECAST-PHYS-005-001-DAILY
MyOcean Service - MyOcean
http://puertos.cesga...-phys-005-001-daily
puertos.cesga.es/mis-gateway-servlet/Motu?action=productdownloadhome&service=http%3
Google
CM-CIC
puertos.cesga.es
Python script command line that matches the extraction:
To resquest data, you can also use the Python script. This page should help you to enter your command line from the shell of you system (Linux/Unix /windows).
You can download the Motu Python Client package here.
Python 2.5 or higher is required in order to execute the Motu Python script.Python can be downloaded here.
To execute your extraction through the Motu Python Client, type (copy/paste) the command-line below on your system command prompt.
python motu-client.py -u pbahurel -p your_password(1) -m http://puertos.cesga.es/mis-gateway-servlet/Motu -s http://purl.org/myocean/ontology/individual /myocean#IBI_ANALYSIS_FORECAST_PHYS_005_001_b-TDS -d dataset-ibi-analysis-forecast-phys-005-001-daily -x -19 -X 4.972957611083984 -y 26 -Y 55.973140716552734 -t "2012-03-25" -T "2012-03-25" -z 0.49 -Z 5727.92 -v v -v u -o your_output_directory(1) -f your_output_file_name(1) --proxy-server= your_proxy_server_url:your_proxy_port_number(2) --proxy-user= your_proxy_user_login(3) --proxy-pwd= your_proxy_user_password(3)
(1) Value must be replaced by yourself.
(2) If you use an HTTP proxy, replace the value by your proxy url and port number: e.g. 'http://myproxy.org:8080'. If you don't use HTTP proxy, remove this option.
(3) If you use an HTTP proxy with authentication, replace the value by your login and password. If you don't need to authenticate to your proxy, remove these options.
Full documentation is available in the Motu Python Client package.
To get help on the Motu Python Client, type : 'motu-client.py --help' on your system command prompt.
Note that if your python bin directory is not in your path environment variable, the full command is:
path_to_your_python_bin_directory/python path_to_your_motu_python_script_directory/motu-client.py your_extraction_parameter_and_options
temperature
Temperature
sea_water_potential_temperature
K (Kelvin)
(time, depth, latitude, longitude)
Download
Script
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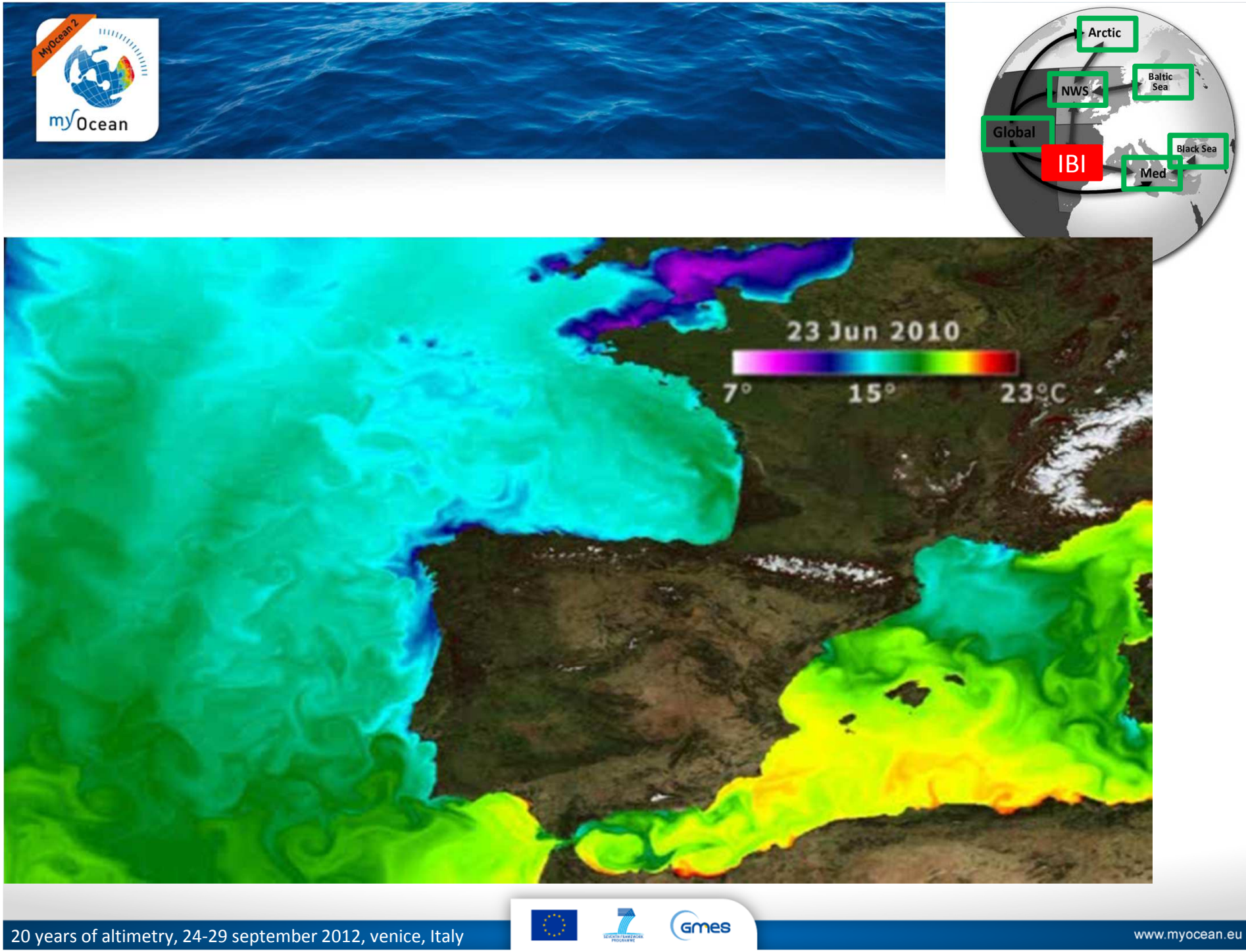
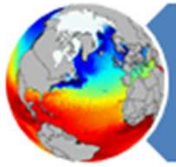

Arctic
Baltic Sea
NWS
Global
IBI
Black Sea
Med
23 Jun 2010
7°
15°
23°C



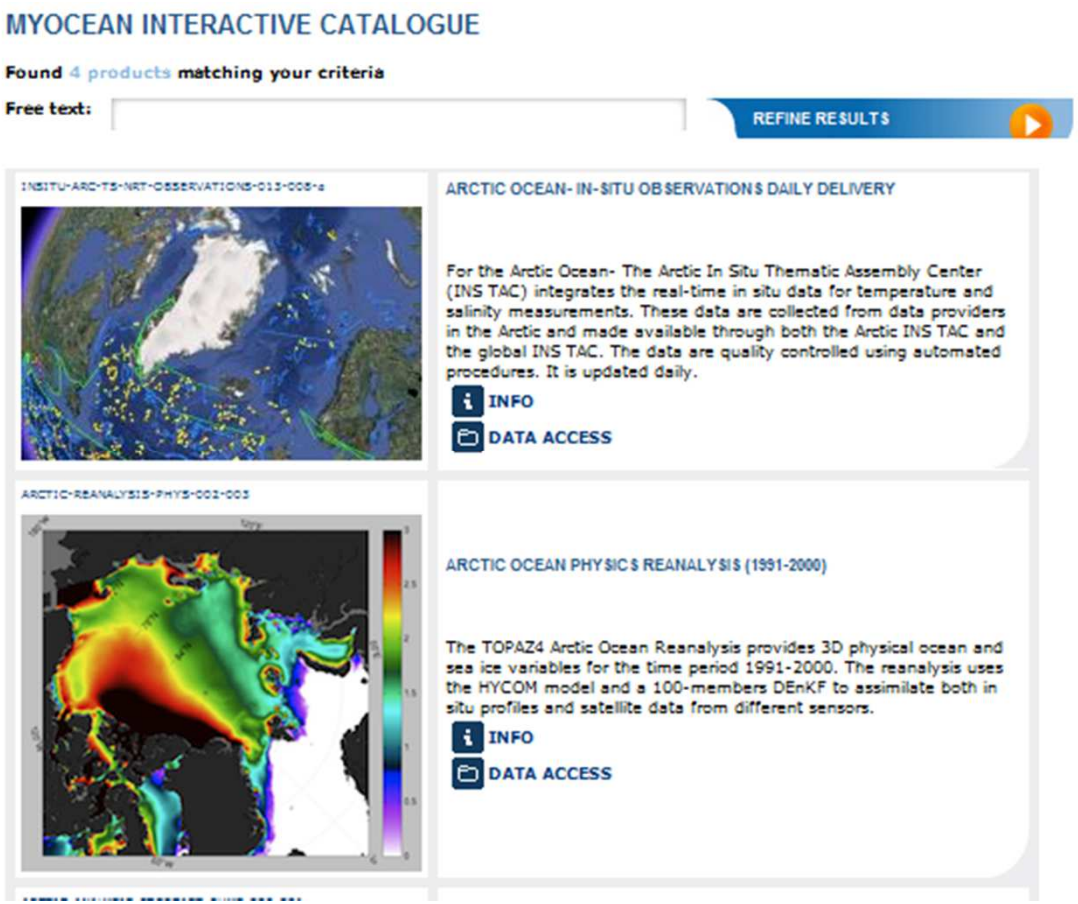
Describe the ocean

Deliver the data

Propose information

Information about us

Information about the systems



Observation platforms

Modelling/assimilation systems

Information about the product quality

Product:	IBI-ANALYSIS-FORECAST-PHY-005-001

Sea surface temperature (K)		
	Hindcast	
	Mean difference	RMS difference
Full domain	0,04	0,55
On-shelf	0,07	0,60
Off-shelf	0,03	0,57

Sea surface height (cm)		
	Hindcast	
	Mean difference	RMS difference
	7,5	13

Temperature (K)		
	Hindcast	
	Mean difference	RMS difference
0-50m	0,12	0,65
0-500m	0,07	0,54

Salinity (PSU)		
	Hindcast	
	Mean difference	RMS difference
0-50m	0,03	0,14
0-500m	0,01	0,09

Information about the product quality

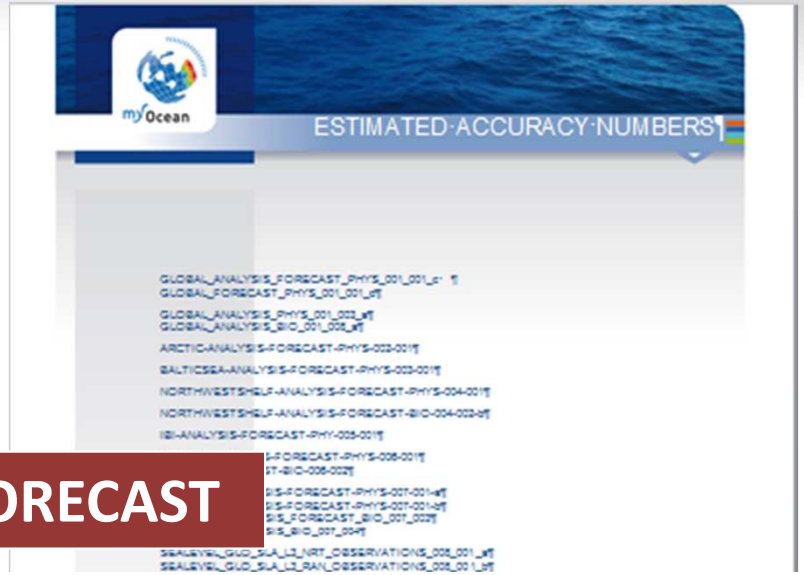
Product:	IBI-ANALYSIS-FORECAST-PHY-005-001

Sea surface temperature (K)		
	Hindcast	
	Mean difference	RMS difference
Full domain	0,04	0,55
On-shelf	0,07	0,60
Off-shelf	0,03	0,57

Sea surface height (cm)		
	Hindcast	
	Mean difference	
	7,5	

Temperature (K)		
	Hindcast	
	Mean difference	
0-50m	0,12	
0-500m	0,07	

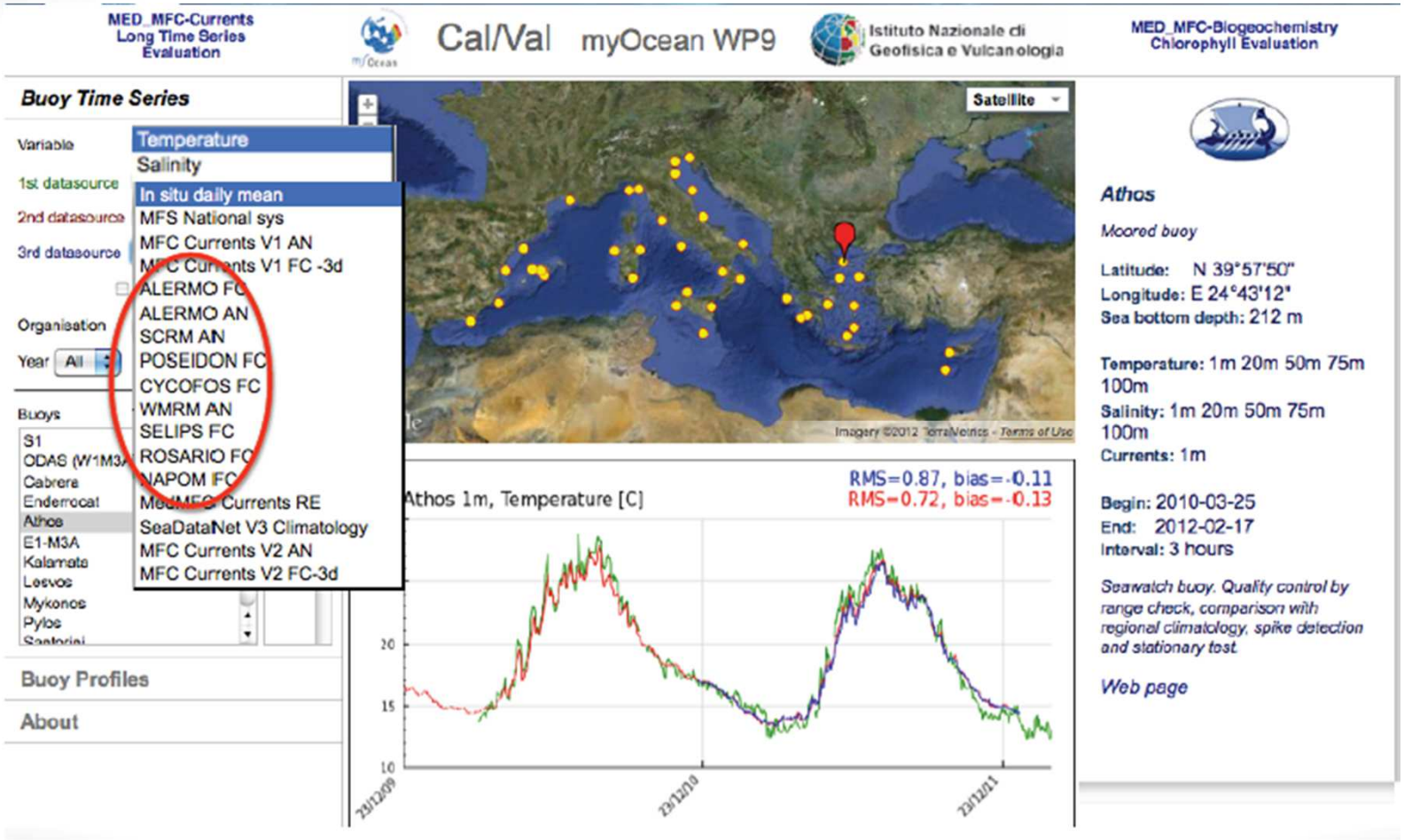
Salinity (PSU)		
	Hindcast	
	Mean difference	
0-50m	0,03	
0-500m	0,01	0,09



IBI-ANALYSIS-FORECAST

Temperature (K)	Mean Difference
Surface	0,04
0-50m	0,12
0-500m	0,07

Information about the product quality

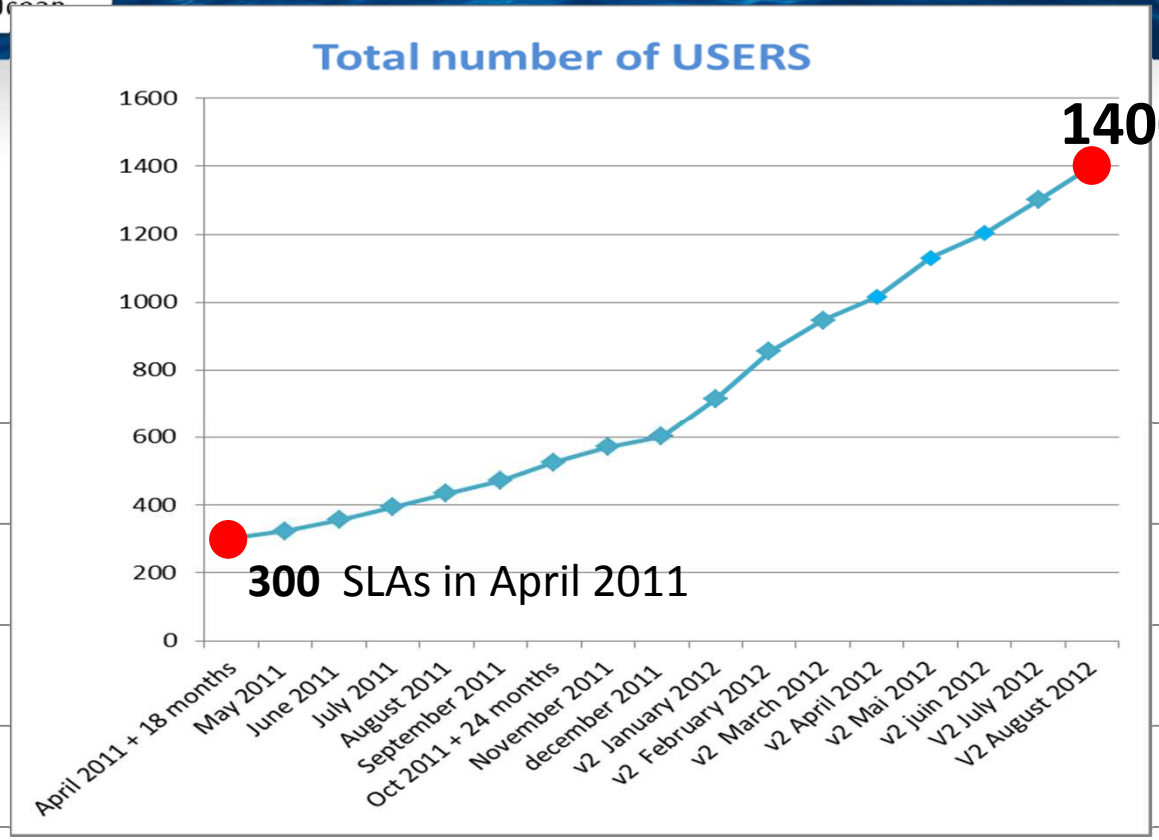


Human assistance to users

Providing assistance
Connecting users and experts

3. The users response

A growing number of users



1400 Service Level Agreements in August 2012

300 SLAs in April 2011

1200
1000
800
600
400
200
0

Service v0

Service v1

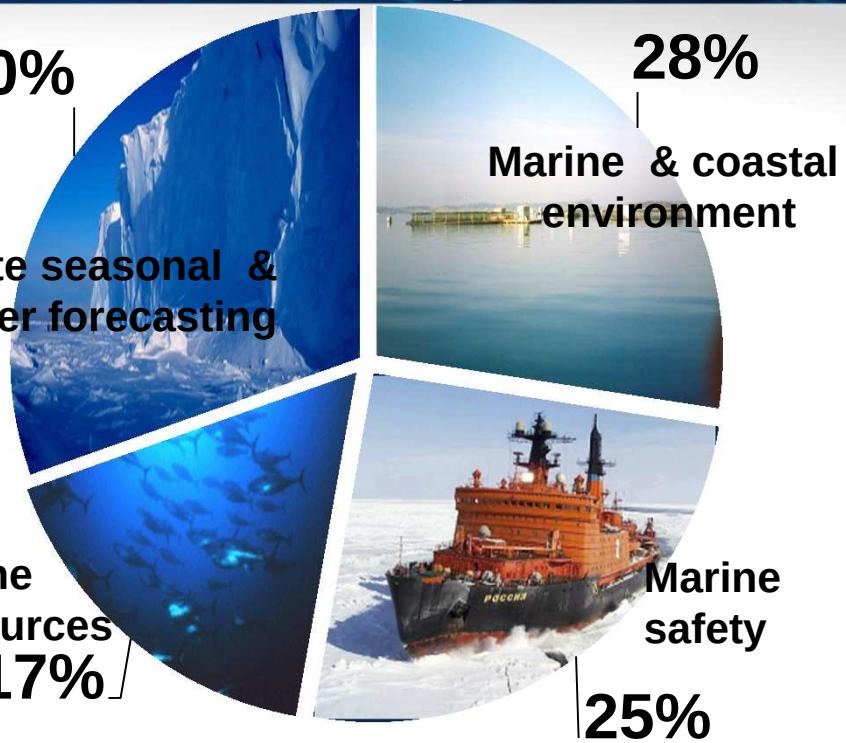
Service v2

A M J J A S O N D J F M A M J J A S S N D J F M A M J J A S O N D J F M

2009 | 2010 | 2011 | 2012

An international and multi-sector response

Users in 65 different countries (25 EU members)

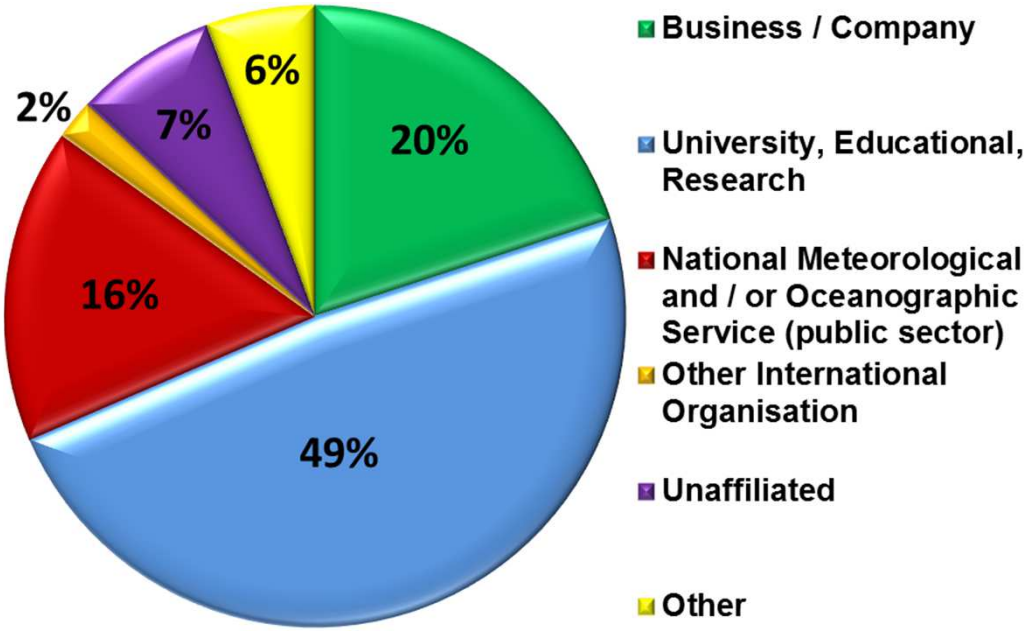


A fair repartition in application areas

And 67% of users using the core service in more than one sector

Highly-qualified users, experts in their application fields

- Types of users, areas of benefit



Conclusion

Our driver : users needs

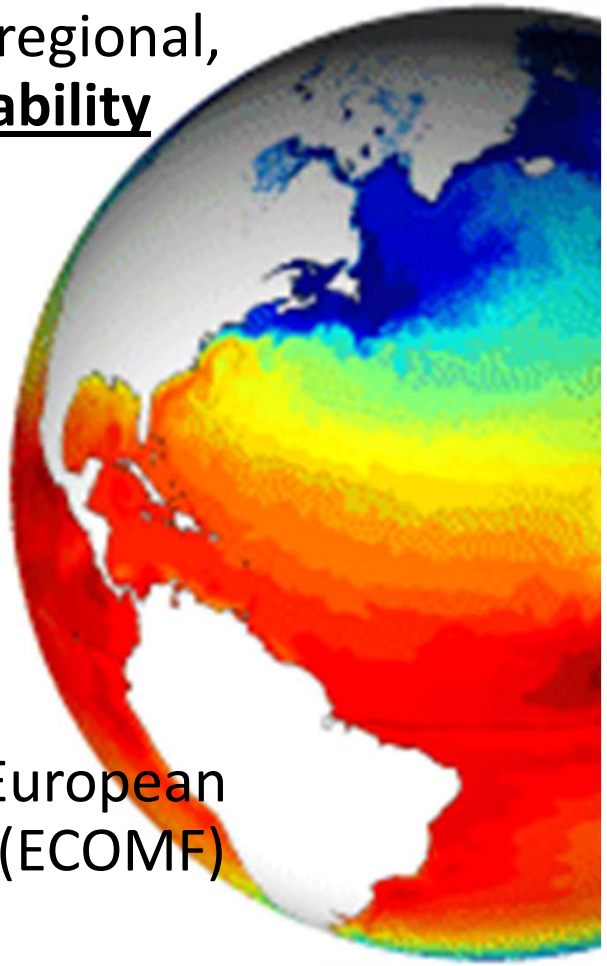
- Highly qualified and consistent data, global & regional, last decades & real time, continuity & **sustainability**

The situation: a successful start for GMES

- A European Marine Service for Ocean Monitoring and Forecasting
- A pan-European organization in place
- A very positive users' uptake
- A perfect integration of altimetry information

Our challenge: sustainability

- An initiative of 14 leading agencies to form a European Centre for Ocean Monitoring and Forecasting (ECOMF)
- A critical dependence on altimetry!



Contact us and learn more

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Pierre.Bahurel@mercator-ocean.fr

MyOcean project manager:

Joel.Dorandeu@mercator-ocean.fr

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End