



Project No. 249024

NETMAR

Open service network for marine environmental data

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Executive Summary

The NETMAR project will develop a pilot European Marine Information System (EUMIS) that will enable users to search, download and integrate satellite, in situ and model data from ocean and coastal areas. The EUMIS pilot will target the needs of six user communities:

1. Arctic operators, environmental authorities and fishery management
2. Oil spill drift forecast and Shoreline Cleanup assessment services in France (CEDRE)
3. National observatory and global network for monitoring marine ecosystem
4. Research project for ecosystem model validation
5. The International Coastal Atlas Network (ICAN)
6. National authorities for marine pollution (France)

As part of the use case specification process, documented in deliverable D1.1, Use case specification and schedule for testing, a number of data and processing services were identified as necessary for each scenario. For the first phase of the project only data services have been specified. A data service may provide satellite imagery, in situ or model data. This document will be updated to include processing services as they become available. The data services identified cover both operational requirements (safe navigation, oil spill response) and scientific research and will be used both in a near real-time mode and as a long term time-series. A fundamental part of the NETMAR project involves the integration of different data sources so emphasis has been placed on identifying multiple data sources (in situ, model, EO) for related parameters. These data services cover all the requirements identified during the use case specification process, D1.1.

In general, data services are provided by the NETMAR project partners and where possible are made freely available with no (or few) access restrictions; some, however, may contain sensitive information and are restricted to specific users. Data services will be made available using standard methods allowing access by any compatible applications not just the EUMIS portal itself.

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1 Introduction

1.1 Background

NETMAR aims to develop a pilot European Marine Information System (EUMIS) for searching, downloading and integrating satellite, in situ and model data from ocean and coastal areas. It will be a user-configurable system offering flexible service discovery, access and chaining facilities using OGC, OPeNDAP and W3C standards. It will use a semantic framework coupled with ontologies for identifying and accessing distributed data, such as near-real time, forecast and historical data. EUMIS will also enable further processing of such data to generate composite products and statistics suitable for decision-making in different marine application domains. The pilot EUMIS will target six user communities by developing the following case studies:

- CS-1: Arctic Sea Ice and Metocean Observing System
- CS-2: Oil spill drift forecast and Shoreline Cleanup assessment services in France (CEDRE)
- CS-3: Relationships between physical and biological variables
- CS-4: Ecosystem model validation
- CS-5: International Coastal Atlas Network (ICAN) for coastal zone management
- CS-6: Phytoplankton blooms in Gulf of Biscay and English Channel

Deliverable D1.1, Use case specification and schedule for testing [NM10], provides more information on these case studies. Within each case study, we have defined a set of concrete use cases specifying how the user will carry out a specific operation to solve a real-world problem. As part of this analysis we have identified data delivery services required to provide the information needed by the user. These data services cover all the requirements identified during the use case specification process, D1.1.

The NETMAR data services will be based on publicly available datasets, and offer example products free of charge to users in the targeted user communities. In some cases, however, an operational service may also want to offer some products that are commercial or restricted in some way, e.g. high-resolution satellite imagery or customised model forecasts for specific sectors of industry. In these cases, the provider should implement a payment mechanism (if required) and provide an access control solution. These controls are not specifically addressed by the NETMAR project; other GMES projects and initiatives address these topics, providers should take account of these and other standards when implementing their access control systems.

It is also recognised that, even though defined standards such as OGC WxS and OPeNDAP have been used throughout the project, there are still many details within the methods of access that can differ between providers. This has been addressed in part within the Strategy for ontology and tool development to fulfil NETMAR [NM11] which discusses semantic metadata and common vocabularies.

1.2 Objective of this report

This report documents the data services provided by each of the NETMAR service providers (Table 1-1).

Table 1-1 User requirements and corresponding NETMAR products.

Scenario	Requirement	Product	Provider	Delivery
CS-1: Arctic Sea Ice and Metocean System	Sea ice concentration for the Arctic	Sea ice concentration (multiple sensors), sea ice concentration difference	NERSC	WMS
	Topaz model forecasts for the Arctic	Sea ice concentration (forecasted)	NERSC	WMS/OPeNDAP
	SAR images and derived products for the Arctic	SAR quicklook, SAR-wind	NERSC	WMS
	Ice chart for the Arctic	Manually updated Ice chart based on analysis of data from earth observing satellites	METNO	WMS/FTP
	Daily products from EUMETSAT Ocean and Sea Ice SAF	Ice concentration, ice edge, ice type and ice drift derived from combining satellite and sensor input.	METNO	OPeNDAP/WMS
	Operational atmospheric model (HIRLAM)	Products from the METNO numerical weather production. METNO is running the HIRLAM model.	METNO	OPeNDAP/WMS
CS-2: Oil spill drift forecast and Shoreline Cleanup assessment services in France (CEDRE)	Atmospheric model input (ARPEGE and CEPM) Current input (MERCATOR, MFS)	MOTHY results	Météo France	WMS/ WFS
	HYCOM currents NCEP winds PREVIMER current	Oilmap results	Cedre	WMS / WFS
	N/A	POLREP (pollution report)	CROSS (MRCC)	WMS / WFS
	N/A	Shoreline survey	Cedre	WMS / WFS
	N/A	Cleanup site	Cedre	WMS / WFS
CS-3: Relationships between physical and biological variables	EO data (MODIS/MERIS) for Western English Channel	Chlorophyll, nLw	PML	WMS/OPeNDAP
	In Situ data for Western English Channel	Surface Chlorophyll, salinity, oxygen, turbidity, fluorescence	PML	WFS

CS-4: Ecosystem model validation	EO data (MODIS/MERIS) for North West Shelf	Chlorophyll, nLw	PML	WMS/OPeNDAP
	Model hindcast for North West Shelf	Chlorophyll	PML	WMS/OPeNDAP
CS-5: International Coastal Atlas Network (ICAN) for coastal zone management.	A broad range of data is required to support application areas such as marine spatial planning, governance authorities, general public, etc. Requirement to facilitate distributed and cross-border data sharing to support coastal web atlas development.	Many products covering areas such as: Biological environment, Physical environment, Socio-economic activity, Management, etc. Near real-time operational oceanography and remote sensing products are currently limited in ICAN. Therefore, will source third party products (e.g. NETMAR, MyOcean).	Various. Each coastal web atlas is responsible for sourcing data from in- house parties and from external 3 rd parties.	ICAN CSW mediator: (connects to local CSW nodes, e.g. MIDA CSW node) MIDA WMS node (broad range of datasets) MIDA WFS node (focused, e.g. GeoSciML in planning, CSML if available, etc.) MIDA Dapper node (focused, in situ observations in planning) MIDA WCS / OPeNDAP node: (focused, in planning)
CS-6: Phytoplankton blooms in the Bay Biscay and the English Channel	EO data from MODIS	Chlorophyll, Suspended Particulate Matters, Turbidity	Ifremer	WMS/OPeNDAP
	EO data from MERIS	Chlorophyll, Suspended Particulate Matters, Turbidity	Ifremer	WMS/OPeNDAP
	EO data generated from MODIS/MERIS	Chlorophyll, Suspended Particulate Matters	Ifremer	WMS/OPeNDAP
	In Situ data	Chlorophyll-a, Turbidity, Temperature, Salinity	Ifremer	WMS (location), SOS(data access)

1.3 Terminology

ASAR	Advanced Synthetic Aperture Radar
CSW	OGC Web Catalogue Service.
Geotiff	Georeferenced raster imagery format.
JPEG	Joint Photographic Experts Group image file format.
MERIS	Medium Resolution Imaging Spectrometer.
MODIS	Moderate Resolution Imaging Spectroradiometer.
NORSEX	The Norwegian Remote Sensing Experiment in the marginal ice zone
OGC	Open Geospatial Consortium.

OPeNDAP	Open-source Project for a Network Data Access Protocol.
PNG	Portable Network Graphics format.
SAR	Synthetic aperture radar.
SHP	ESRI Shapefile - a popular geospatial vector data format.
SOS	Sensor Observation Service - an API for managing deployed sensors and retrieving sensor data and specifically “observation” data.
SSMI	Special Sensor Microwave/Imager
WFS	OGC Web Feature Service.
WMS	OGC Web Map Service.
XML	Extensible Markup Language - a set of rules for encoding documents in machine-readable form.

1.4 Organisation of this report

Section 1 provides a summary of the data services provided by the NETMAR partners. The following sections provide detailed breakdowns of the data services provided for each case study. These will comprise a brief description of the context of the case study/expect users and all information required to access the service (temporal and geographic coverage, usage restrictions, access URLs and parameter names).

2 Services for CS-1: Arctic Sea Ice and Metocean Observing System

2.1 *Description of the user group*

The users of the Arctic Sea Ice and Metocean Observing System pilot comprises of representatives from offshore and shipping companies, ship and icebreaker captains/ice pilots, national authorities, regional environmental agencies, national ice services and scientists.

Decision-makers and operators in offshore oil and gas industry need access to the latest available sea ice information and forecasts to be able to plan the safe and cost-efficient operation of their installations on a daily basis. Timely and accurate historical and statistical sea ice information is also needed to be able to perform longer term planning of operations in the ice covered waters.

Ship and icebreaker captains and ice pilots makes both selection of sailing routes between ports of destinations as well as tactical decisions on how to penetrate through rough ice conditions when the ship (un)expectedly experience such situations. Decisions need to be made in order to operate safely and efficiently.

Decision- and policy-makers in national authorities and regional organisations also need both recent and historical data. For instance, a decision-maker in the fisheries authorities would need daily data, preferably in near-real time, to be able to assess the current algal situation and if needed decide on mitigation actions for aquaculture installations in a case of a harmful bloom of toxic species. A policy-maker in environmental agencies, on the other hand, would need timely access to long term observation series or derived products such as climate indicators.

To support operational sea ice forecasting, near-real time access to the latest sea ice observations and forecasts is crucial. This is needed to be able to produce detailed and reliable ice charts that can be used in e.g. ship navigation or other offshore activities. Finally, the scientific community would be a large user group of the Arctic Sea Ice and Metocean Observing System pilot. Scientists would be interested in both recent data as well as historical and statistical products. Scientists would also be interested in comparing data from different sources and in trying out different algorithms and models for estimation of sea ice parameters like concentration and drift.

2.2 *Work context*

The Arctic Ocean and the adjacent sub-Arctic seas, including Europe's northern frontiers, have become more important as a result of increased economic activities related to energy exploration, marine resources and transportation. The economic activities have been stimulated by climate change with warming and sea ice reduction in the Arctic during summer. The EU has a policy for the Arctic where protection of the environment and sustainable use of resources in a unique and vulnerable region are issues of high priority. In the High North Strategy of the Norwegian government, environmental issues and safety are also of high concern (<http://www.regjeringen.no/en/dep/ud/campaign/the-high-north.html?id=450629>). The presently observed reduction of the Arctic sea ice extent in particular during the summer months and an increasing demand for natural resources are key mechanisms driving human activities in these areas. Changes in the seasonal ice edge location may also in the longer term shift the location of the high productive fishing and activities. The expected growth in ship traffic, oil and gas exploration, fisheries and tourism in

the coming years will increase the need for marine monitoring and forecasting in this region both to support accessibility and to secure safe and efficient operations.

There is an increasing supply of sea ice information from satellites, in situ platforms and modelling systems that can be exploited by several users groups. Both operational users and scientific users need to combine data from the available observing systems as well as from modelling systems in order to make the best possible assessment of the present and forthcoming ice situation, e.g. by assimilation of observations into forecasting models.

The Arctic ice-covered areas, and in particular the Northern Sea Route is expected to become an important area for and exploitation of natural resources such as oil and gas, sea transportation, fisheries, tourism as well as scientific studies. A recent study has categorised the following user groups among Russian users [JAF+06]:

1. Operational users – in need of updated sea ice information on a daily basis, to plan their immediate activities in or nearby ice covered ocean areas.
2. Consultancy or operation planning services – that need statistical ice information enabling them to plan future operations in a time frame from the coming weeks up to multiple years.
3. Scientific users – in need of sea ice information to conduct scientific studies in the field and for their algorithm and model development to advance the understanding of sea ice phenomena and processes.

Improving sea ice monitoring and forecasting, as well as improving the scientific understanding of the sea ice as part of the climate system, is important for many user groups including European agencies and organisations (e.g. EEA, EuroGOOS). Reduced ice extent in this area during the summer period may lead to increased ship transport from and to Europe and Asia, and changes in sea ice conditions have impact on the overall sea ice climate of the Arctic Ocean, as well as increasing the risk for major environmental accidents in this vulnerable environment.

Some data are available in numeric formats (such as NetCDF) whilst other data may only be used as images for mapping and routing purposes. NERSC will make SAR wind data and SSM/I ice products (also as data) available in the NORMAP project (funded by Norwegian Research Council). This has a longer timescale than NETMAR; however initial data should become available during the lifetime of the NETMAR project.

2.3 Data Service Descriptions

2.3.1 Sea ice concentration service

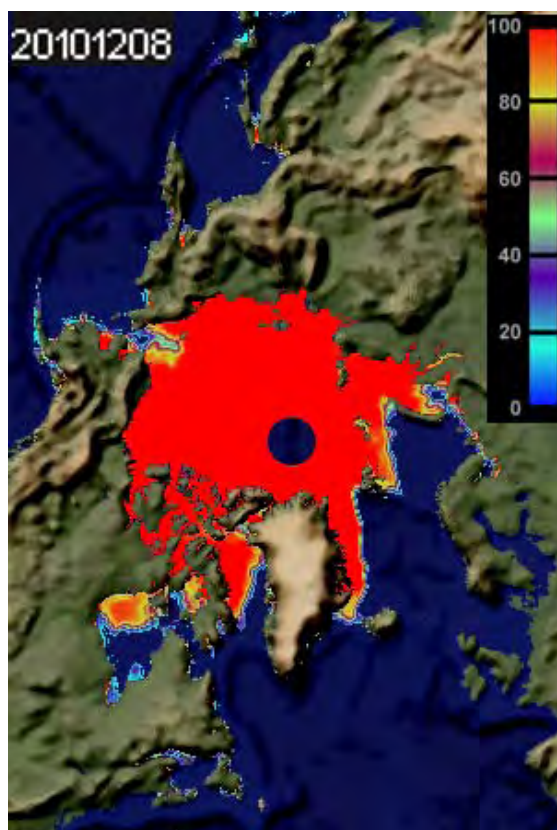


Figure 2-1 SSMI sea ice concentration for 8 December 2010 computed by NORSEX algorithm.

Dataset	Sea ice concentration
Service Type	WMS
Description	Sea ice concentration from satellite passive microwave
Provider	NERSC
Access Restrictions	Freely available
Status	In preparation
Parameters	Ice concentration
Type of data	Satellite imagery (derived)
Area covered	Arctic: Northern Hemisphere Westernmost longitude = -180.0 Easternmost longitude = 180.0 Southernmost latitude = 34.6865 Northernmost latitude = 90.0
Spatial resolution	25 km
Native projection	Polar Gridded
Output projections	Geographic
Temporal resolution	Daily
Forecast length	N/A
Time span	11 September 2008 and onwards
Update frequency	Daily
Native data formats	NetCDF
Output data formats	PNG
Catalogue Service URL	TBD
Service URL	http://mapsrv.nersc.no/cgi-bin/mapserv?request=GetCapabilities&service=WMS&version=1.3.0

2.3.1.1 Parameters

Parameter	Sea ice concentration
Description	Sea ice concentration
Units (URN)	SDN:P061::UPCT
Units (Text)	Percent (%)
SeaDataNet Name (URN)	SDN:P011::SICECSAT
SeaDataNet Name (Text)	Coverage (by area) of ice on the water body by image analysis
WMS Layer Name	cice_YYYYMMDD

2.3.2 Sea ice concentration forecast service

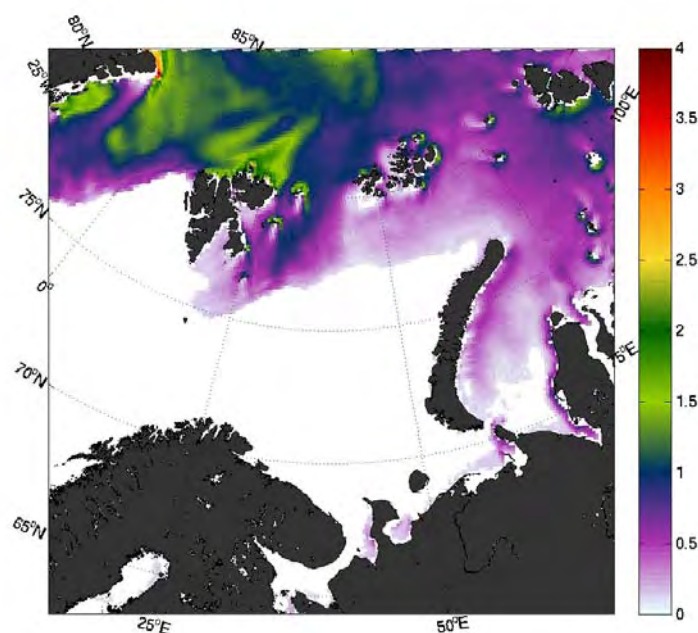


Figure 2-2 Topaz ice thickness forecast 16 December 2010.

Dataset	Topaz sea ice concentration forecast
Service Type	WMS
Description	Forecasted sea ice concentration
Provider	NERSC
Access Restrictions	Freely available
Status	In preparation
Parameters	Sea ice concentration
Type of data	Model data
Area covered	Arctic: 0-360 deg.E, 34.6865-90 deg.N
Spatial resolution	25 Km
Native projection	Polar Gridded
Output projections	Geographic
Temporal resolution	Daily averages
Forecast length	10 days
Time span	Weekly fields are available since 27 April 2008
Update frequency	Every 10 days
Native data formats	NetCDF
Output data formats	NetCDF
Catalogue Service URL	TBD
Service URL	http://topaz.nersc.no/thredds/catalogs/mersea-ipv2-class1-arctic-b.html

2.3.2.1 Parameters

Parameter	Sea ice concentration forecast
Description	Forecasted sea ice concentration
Units (URN)	SDN:P061::UPCT
Units (Text)	%
SeaDataNet Name (URN)	SDN:P011::SICECMOD
SeaDataNet Name (Text)	Coverage (by area) of ice on the water body by model prediction
OPeNDAP Layer Name	Bulletin YYYYMMDD - Arctic

2.3.3 SAR image and derived wind service

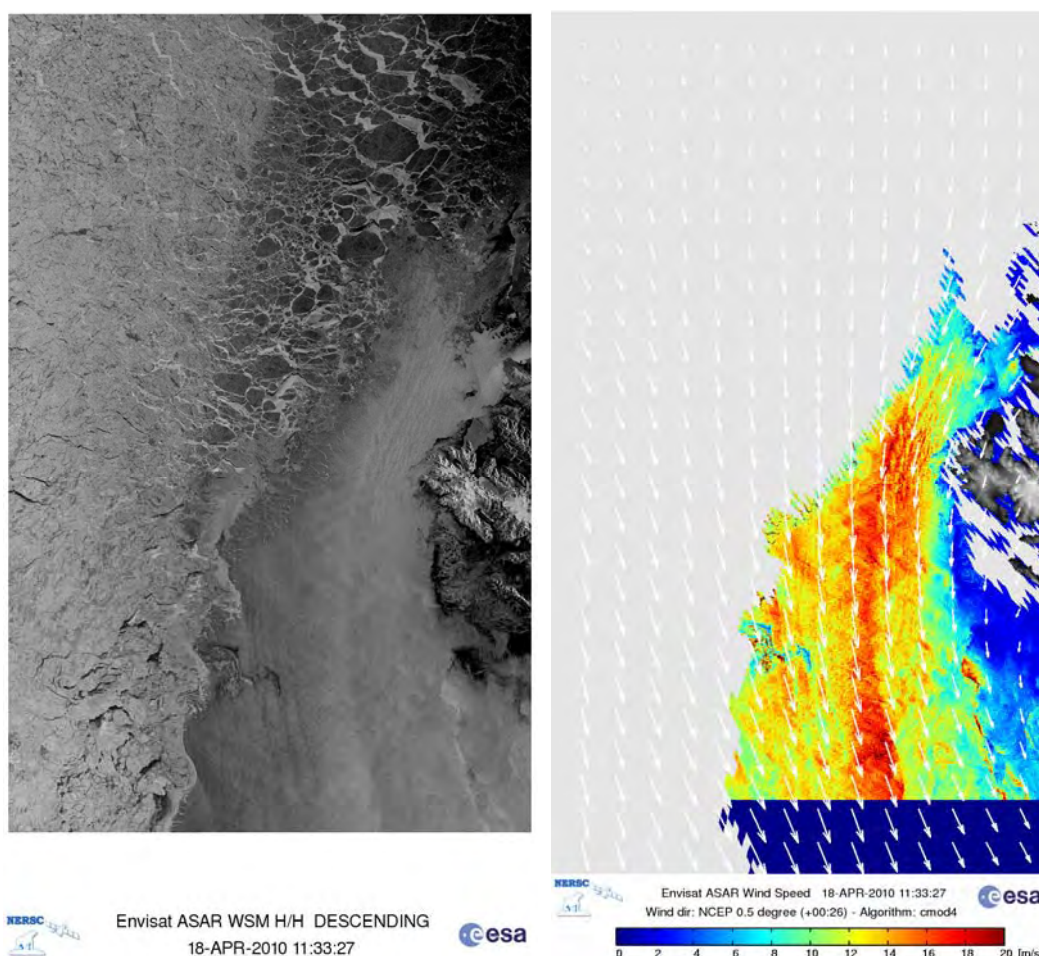


Figure 2-3 ENVISAT ASAR image from 18 April 2010 and ASAR-wind field computed with CMOD-4.

Dataset	SAR image and derived wind
Service Type	WMS
Description	SAR quick-look and derived wind field
Provider	NERSC
Access Restrictions	Freely available
Status	In preparation
Parameters	SAR backscatter, wind speed
Type of data	Satellite imagery (and derived product)
Area covered	Arctic: The coverage of each scene depends on mode (wide swath, image mode, etc.) and duration of time the ASAR sensor is turned on.

Spatial resolution	500m
Native projection	Geographic
Output projections	Geographic
Temporal resolution	On average every 3 days
Forecast length	N/A
Time span	A rolling archive of the last (approx.) 14 days is foreseen to be offered. Older data can be made available for specific case studies.
Update frequency	Daily
Native data formats	GeoTIFF
Output data formats	PNG
Catalogue Service URL	TBD
Service URL	http://mapsrv.nersc.no/cgi-bin/mapserv?request=GetCapabilities&service=WMS&version=1.3.0&map=/mnt/fritjof/wms/netmar-asar.map

2.3.3.1 Parameters

Parameter	SAR backscatter
Description	SAR backscatter
Units (URN)	SDN:P061::UDBL
Units (Text)	Decibel (dB)
SeaDataNet Name (URN)	SDN:P011::RADBSSAR
SeaDataNet Name (Text)	Radar backscatter by synthetic aperture radar
WMS Layer Name	ASAR_YYYYMMDD_HHMMSS

Parameter	Wind speed
Description	Wind speed from SAR
Units (URN)	SDN:P061::UVAA
Units (Text)	Metres per second (m/s)
SeaDataNet Name (URN)	SDN:P011::WINDSSAR
SeaDataNet Name (Text)	Wind speed in the atmosphere by synthetic aperture radar
WMS Layer Name	ASAR_YYYYMMDD_HHMMSS_wind

2.3.4 Manual ice chart service

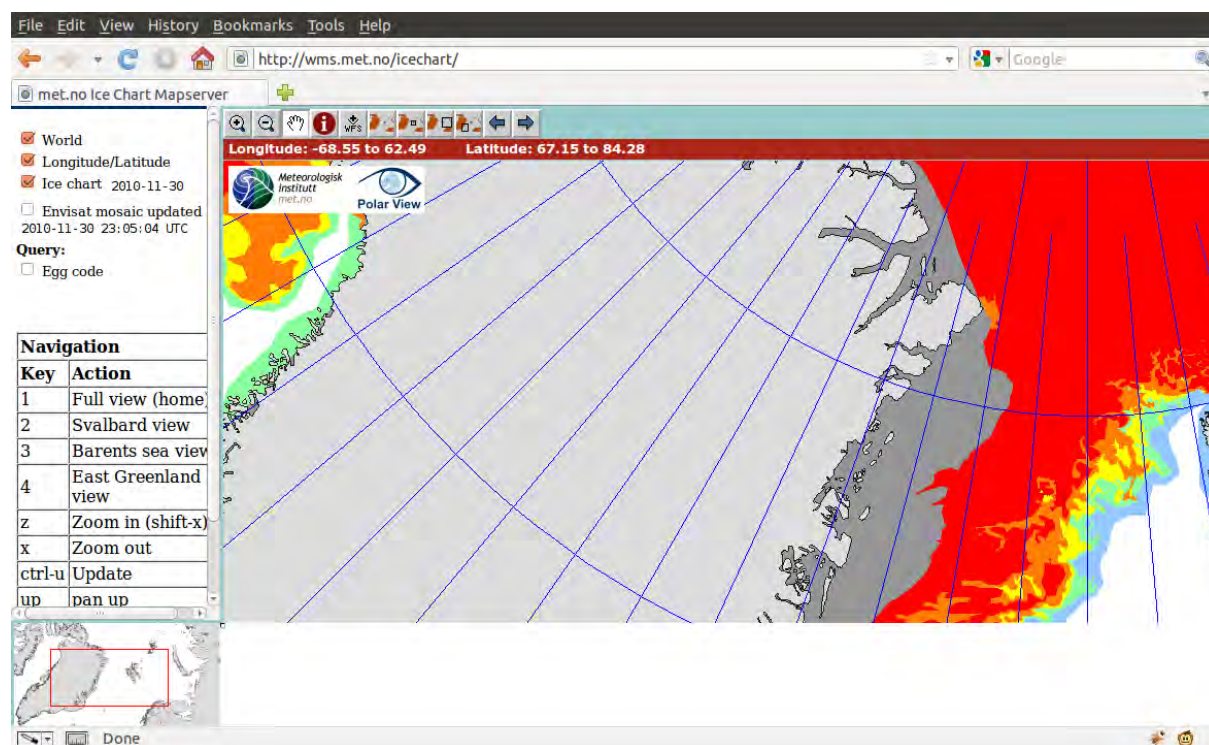


Figure 2-4: Ice chart for 30 November 2010

Dataset	Radarsat2, Envisat, Aqua, Noaa, AMSRE
Description	Ice chart based on a manual interpretation of satellite data from earth observing satellites
Provider	METNO
Access Restrictions	Freely available
Status	Operational
Parameters	Ice concentration
Type of data	Vector data
Area covered	Arctic region: Westernmost longitude = -30.0 Easternmost longitude = 80.0 Southernmost latitude = 55.0 Northernmost latitude = 90.0
Spatial resolution	150m – 6.25 km (depends on available data source)
Native projection	Polar Stereographic 90/0
Output projections	Polar Stereographic 90/0
Temporal resolution	Work days
Forecast length	N/A
Time span	Current via WMS, since 2005 via ftp since 1997
Update frequency	Daily
Native data formats	Esri shapefile
Output data formats	png, netCDF jpeg, shp
Catalogue Service URL	NA
WMS URL	http://wms.met.no/cgi-bin/icechart/?SERVICE=WMS&REQUEST=GetCapabilities&VERSION=1.1.1
HTTP URL	http://wms.met.no/icechart/
FTP URL	ftp://ftp.met.no/projects/icecharts/

2.3.4.1 Parameters

Parameter	Ice classification
Description	Ice classification
Units (URN)	SDN:P061::UPCT
Units (Text)	[fast Ice, very close drift ice, close drift ice, open drift ice, very open drift ice, open water]
SeaDataNet Name (URN)	SDN:P011::SICECSAT
SeaDataNet Name (Text)	Coverage (by area) of ice on the water body by image analysis
WMS Layer Name	chart_ice

2.3.5 Sea ice concentration service

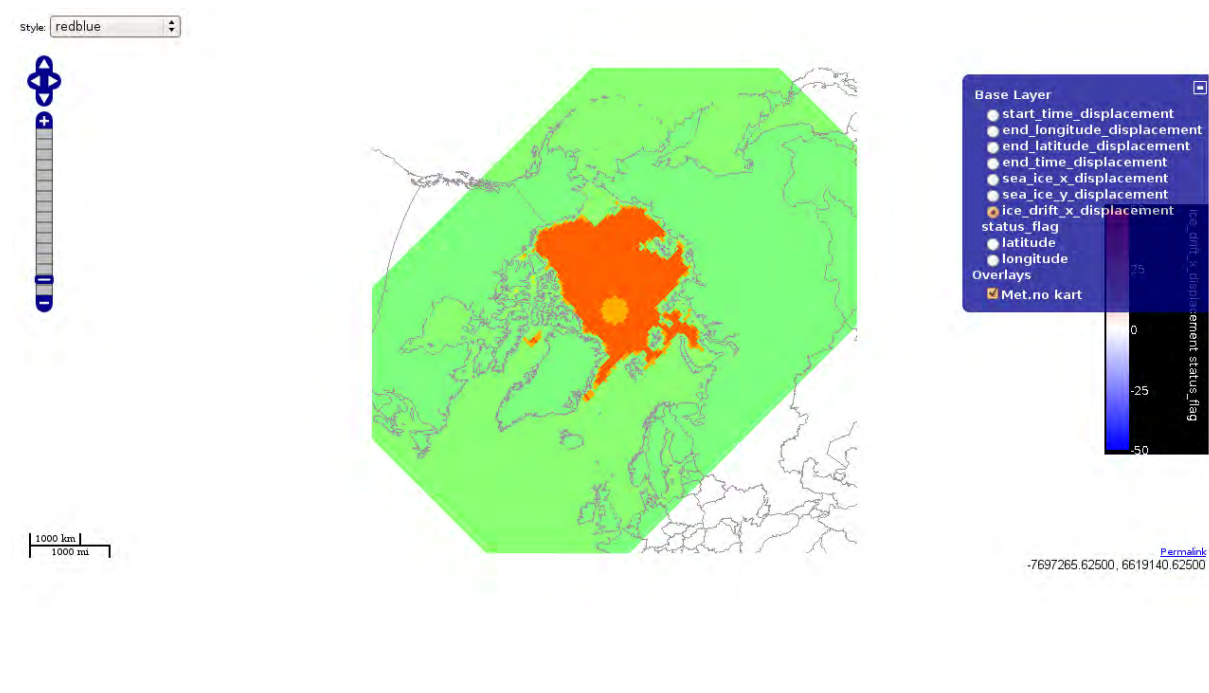


Figure 2-5: Ice drift x-displacement from OSISAF service

Dataset	EUMETSAT OSISAF
Description	<p>An automatic analysis system, which derives sea ice products by combining satellite data from different sensors, has been developed and implemented for operational use.</p> <p>Three operational products are defined:</p> <ul style="list-style-type: none"> Ice concentration (%) (Global) Ice edge: closed ice/open ice/open water (Global) Ice type: multi-year/first-year (Global) <p>One re-processed dataset is available:</p> <ul style="list-style-type: none"> Ice concentration (%) (1978-2007, global) <p>Finally, several pre-operational or demonstration products are available. Those products require more scientific and/or technical validation before they can be declared operational.</p> <ul style="list-style-type: none"> Ice concentration from AMSR-E (%) (Global) Low Resolution Sea Ice Drift (NH)
Provider	METNO
Access Restrictions	Freely available
Status	Planned (currently not available as through METAMOD, but data can be found at the supplied web address)
Parameters	Conc, type, edge, dX, dY

Type of data	Satellite-product
Area covered	> 32deg north
Spatial resolution	10km, drift 62.5km
Native projection	Satellite-swath
Output projections	Polar-stereographic
Temporal resolution	daily
Forecast length	-
Time span	Current formats available since 2010-02, archived until 2005, older formats/products since 1978
Update frequency	daily
Native data formats	netcdf
Output data formats	WMS, OPeNDAP, netcdf
Catalogue Service URL	-
WMS URL	Example for drift, (1 parameter 1 day per file): http://osisaf.met.no/thredds/wms/osisaf/met.no/ice/drift_lr/merged/2010/11/ice_drift_nh_polstere-625_multi-oi_201011281200-201011301200.nc.gz?request=GetCapabilities&service=WMS&version=1.3.0
HTTP URL	Example (one url per parameter per day): http://thredds.met.no/thredds/fileServer/osisaf/met.no/ice/drift_lr/merged/2010/12/ice_drift_nh_polstere-625_multi-oi_201011291200-201012011200.nc.gz
FTP URL	ftp://saf.met.no/prod/

2.3.5.1 Parameters

Parameter	conc
Description	Ice concentration.
Units (URN)	SDN:P061::UPCT
Units (Text)	Percent
SeaDataNet Name (URN)	SDN:P011::SICEAMSR
SeaDataNet Name (Text)	The proportion of a given sea area covered by ice as determined from passive microwave image from the EOS AMSRE
WMS Layer Name	conc

Parameter	type
Description	The sea ice type product from the EUMETSAT OSI SAF. Ice classes are assigned from atmospherically corrected SSM/I brightness temperatures and ASCAT backscatter values, using a Bayesian approach. It is operational since 2005.
Units (URN)	SDN:P061::UUUU
Units (Text)	None
SeaDataNet Name (URN)	SDN:P011::ICETYPEX
SeaDataNet Name (Text)	Type (EUMETSAT OSI-SAF) of ice on the water body by classification of brightness temperature and ASCAT backscatter
WMS Layer Name	type

Parameter	dX
Description	Component of the displacement along the x axis of the grid
Units (URN)	SDN:P061::ULKM
Units (Text)	km
SeaDataNet Name (URN)	SDN:P011::ICEXDISP
SeaDataNet Name (Text)	Displacement (over last 48 hours along x-axis) of ice on the water body
WMS Layer Name	dX

Parameter	dY
Description	Component of the displacement along the y axis of the grid
Units (URN)	SDN:P061::ULKM
Units (Text)	km
SeaDataNet Name (URN)	SDN:P011::ICEYDISP
SeaDataNet Name (Text)	Displacement (over last 48 hours along y-axis) of ice on the water body
WMS Layer Name	dY

Parameter	edge
Description	The sea ice edge product from the EUMETSAT OSI SAF. Ice classes are assigned from atmospherically corrected SSM/I brightness temperatures and ASCAT backscatter values, using a Bayesian approach. It is operational since 2005.
Units (URN)	SDN:P061::UUUU
Units (Text)	None
SeaDataNet Name (URN)	SDN:P011::ICEEDGE
SeaDataNet Name (Text)	Edge (EUMETSAT OSI-SAF) of ice on the water body by classification of brightness temperature and ASCAT backscatter
WMS Layer Name	edge

2.3.6 Weather forecast service

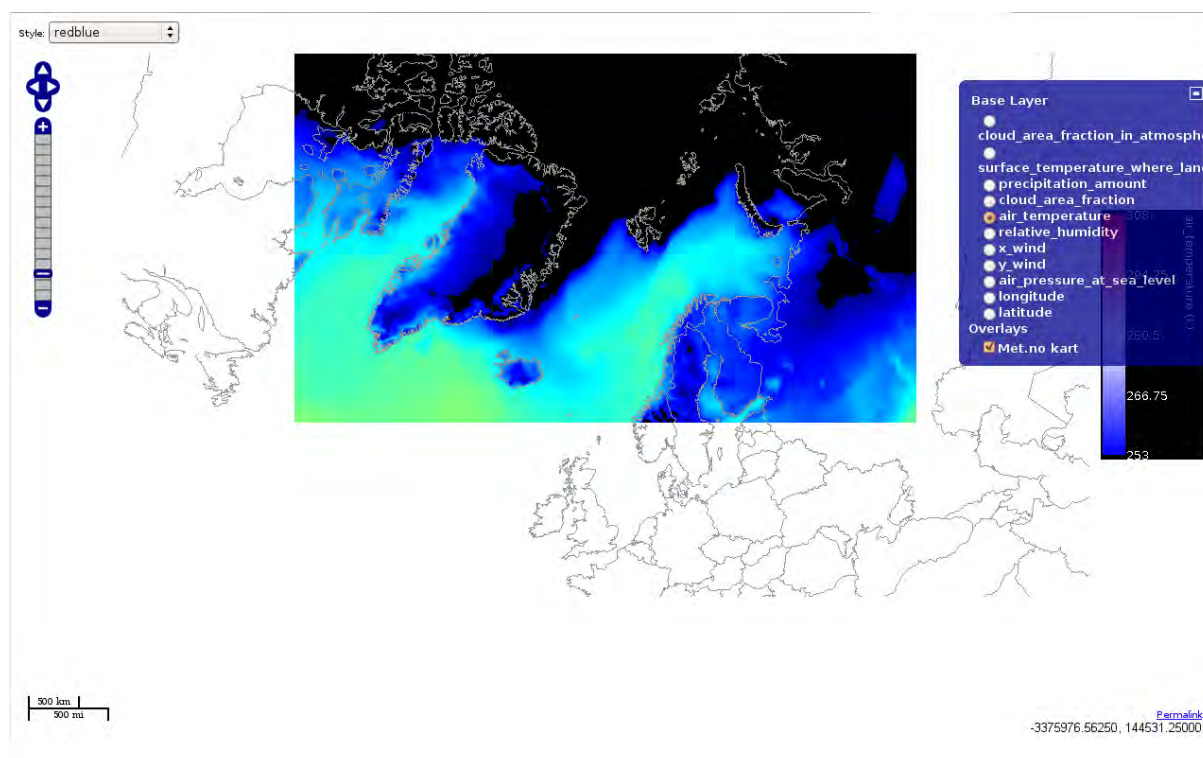


Figure 2-6: HIRLAM air temperature forecast

Dataset	HIRLAM
Description	Products from the METNO numerical weather production. METNO is running the HIRLAM model.
Provider	METNO
Access Restrictions	Freely available
Status	Operational, the current information is on a 12km resolution model of northern region to be updated with a higher (8km) resolution in the near future
Parameters	air_temperature, x_wind, y_wind
Type of data	Forecast, Model run. Gridded data.
Area covered	> 60deg north, to be increased to
Spatial resolution	12km
Native projection	Rotated latitude longitude
Output projections	polar-stereographic
Temporal resolution	1h, 3h
Forecast length	~ 60h
Time span	On disk usually 1 month
Update frequency	6h
Native data formats	Felt
Output data formats	Netcdf
Catalogue Service URL	-
WMS URL	Example (one url per file): http://thredds.met.no/thredds/wms/data/met.no/hirlam12/hirlam12_sf_1h_2010-12-02_06.nc?service=WMS&version=1.3.0&request=GetCapabilities
OPeNDAP URL	Example (one url per file): http://thredds.met.no/thredds/dodsC/data/met.no/hirlam12/hirlam12_sf_1h_2010-12-02_06.nc.html

2.3.6.1 Parameters

Parameter	air_temperature
Description	Air temperature at 2 meters
Units (URN)	SDN:P061::UPKA
Units (Text)	K
SeaDataNet Name (URN)	SDN:P011::ATEMP2MM
SeaDataNet Name (Text)	Temperature (at 2m) of the atmosphere by model prediction
WMS Layer Name	air_temperature

Parameter	x_wind
Description	Wind in coordinate x-axis at 10 meters.
Units (URN)	SDN:P061::UVAA
Units (Text)	ms
SeaDataNet Name (URN)	SDN:P011::WINDXMOD
SeaDataNet Name (Text)	Windspeed along coordinate x-axis at 10 meters.
WMS Layer Name	x_wind

Parameter	y_wind
Description	Wind in coordinate y-axis at 10 meters.
Units (URN)	SDN:P061::UVAA
Units (Text)	ms
SeaDataNet Name (URN)	SDN:P011::WINDYMOD
SeaDataNet Name (Text)	Windspeed along coordinate y-axis at 10 meters.
WMS Layer Name	y_wind

3 Services for CS-2: Oil spill drift forecast and Shoreline Cleanup assessment services in France (CEDRE)

3.1 Description of the user group

The oil spill drift forecast service will be used by the members of the French Slick Drift Monitoring and Prediction Committee, which include Cedre, Ifremer, MRCC, French Navy and possibly several Met offices. These organisations are in charge of obtaining and analysing all relevant data in order to make an assessment of how the pollution will spread. Using this assessment the authorities in charge of aircraft and vessels deployment may optimise survey and cleanup operations. In this context, the Committee members will rely on different software models, as well as their extensive expertise to make a best possible assessment of the fate of the slicks.

Data management concerning shoreline cleanup assessment consists in collecting and organizing all the information about the pollution itself as well as all the ensuing operations. Daily data analysis has proven to be essential to inform and help decision makers and Department Prefect on land, because it allows them to assess the evolution of events.

3.2 Work context

The two NETMAR oil spill use cases primarily concern tasks that need to deal with huge amounts of data day after day. These data are needed to support emergency response services during long lasting oil spill crisis situations to provide accurate information about the oil pollution allowing more efficient usage of human resources and equipment.

The first use case is intended for an oil spill drift forecast service in France that will be based on new tools and enhanced functionality to support the experts in making estimates of where a slick or a group of slicks will drift. The second use case concerns the collection of all operational information about onshore pollution landings and mitigation actions during the response phase.

Considering the first use case, oil slick drift models rely on adequate forecasts of both currents and weather to accurately predict the oil's future drift and fate. To enable forecasters to take full advantage of the wealth of metocean and drift models available in the world, either from national agencies or other sources, there is a need for a Marine Information System for searching, downloading and integrating or displaying data in an efficient way. The overall objective of the first use case is to allow maritime responders and scientists to undertake consensus forecasting for oil spills and possibly chemical spills. This requires access to different drift forecasts and the corresponding metocean fields that were used as input to each oil slick drift model. By comparing the different forecasts, the oil spill expert will be able to determine if different models predict different fates of the same oil slick (same initial location and characteristics), or if different forecasts show similar drift patterns. Based on this assessment, a consensus forecast is prepared, marking the areas with the highest probability for oil slick drift.

During an oil spill crisis, it is also necessary to systematically survey and document the affected area to provide a rapid and accurate geographic picture of shoreline oiling conditions. The information is used to develop real-time decisions regarding shoreline treatment and cleanup operations. The daily information regarding the shoreline treatment and cleanup operations are also collected. This information needs to be stored in an Internet

database for easy access from all the stakeholders, being either in central administration or being local responders or decision makers.

This second use case is defined to collect all of these pieces of information and make them readily available during the crisis. The main objective is to provide a detailed view of the evolution of the pollution response on shore in near real time, exploiting all the cleanup data at different levels (commune, district, department, region) of organization (count of stranded oil slick, on going cleanup operations, actual manpower resources, special equipments being used, collected and disposed waste, etc.). This use case aims at supporting both detailed and global view of all response actions, while providing a user-friendly communication system for all parties involved in the pollution mitigation activities. Moreover, the archived data can be used as a possible support for cleanup cost claims later on.

3.3 Data Service Descriptions

3.3.1 MOTHY service

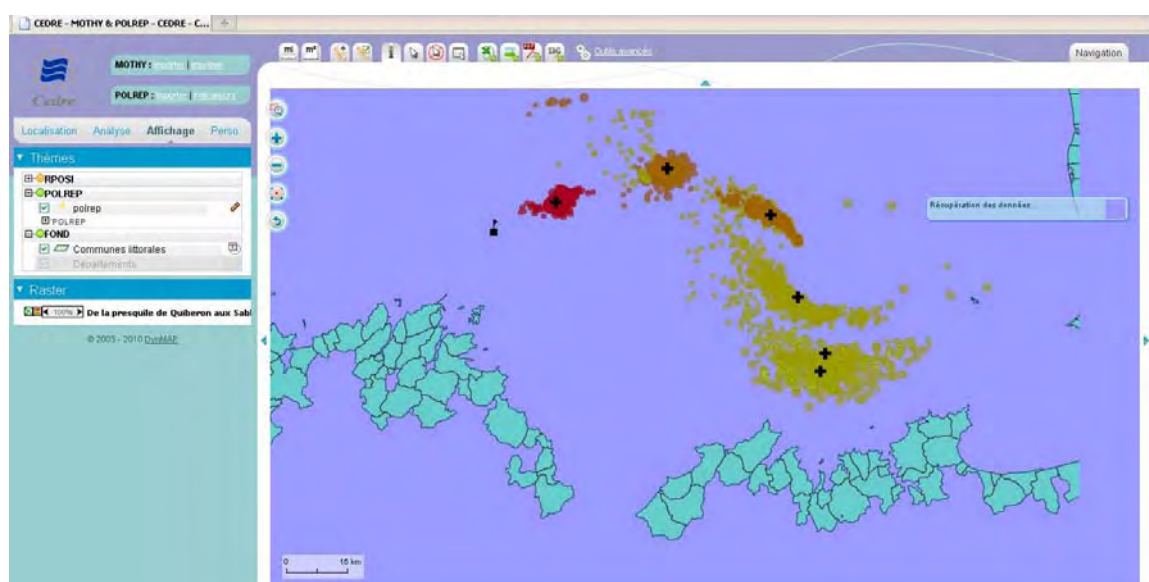


Figure 3-1: Screenshot of MOTHY service

Dataset	MOTHY
Service Type	WMS / WFS
Description	MOTHY (Oil slick Drift model)
Provider	METEO FRANCE
Access Restrictions	Restricted
Status	Test
Parameters	Diameter, depth of each spillet every 12 hours.
Type of data	Model results, Lagrangian model with 500 spillets
Area covered	French area surveillance (but also : World coverage)
Spatial resolution	From 9 km to 150 meters. Around the french shoreline (metropole), the resolution is about 1800 meters.
Native projection	Mercator
Output projections	Mercator
Temporal resolution	every 12 hours
Forecast length	3 days
Time span	
Update frequency	During the crisis : Every day or every new pollution observation

Native data formats	GPX
Output data formats	GIF picture (or animation) and GFX (spillet location), XML (metadata)
Catalogue Service URL	TBD
Service URL	http://cedre.dynmap.eu/netmar/carteWS.php?request=getCapabilities&service=WMS&version=1.3.0

3.3.2 OILMAP service



Figure 3-2: Screenshot of OILMAP service

Dataset	OILMAP
Service Type	WMS / WFS
Description	OILMAP (oil slick drift model)
Provider	CEDRE (from ASA, american model)
Access Restrictions	Restricted
Status	Test
Parameters	spillet behaviour and location every timestep (6 to 12 hours)
Type of data	Model results, Lagrangian model spillets
Area covered	French area surveillance (but also : World coverage)
Spatial resolution	From 10 km (US-Navy current to 100 meters (PREVIMER current)
Native projection	Mercator
Output projections	Mercator
Temporal resolution	From 1 hour to 12 hours
Forecast length	3 days
Time span	
Update frequency	Each new pollution observation
Native data formats	SHAPE
Output data formats	GIF picture (or animation) and DBF data (rough data), shape
Catalogue Service URL	TBD
Service URL	http://cedre.dynmap.eu/netmar/carteWS.php?request=getCapabilities&service=WMS&version=1.3.0

3.3.3 POLREP service

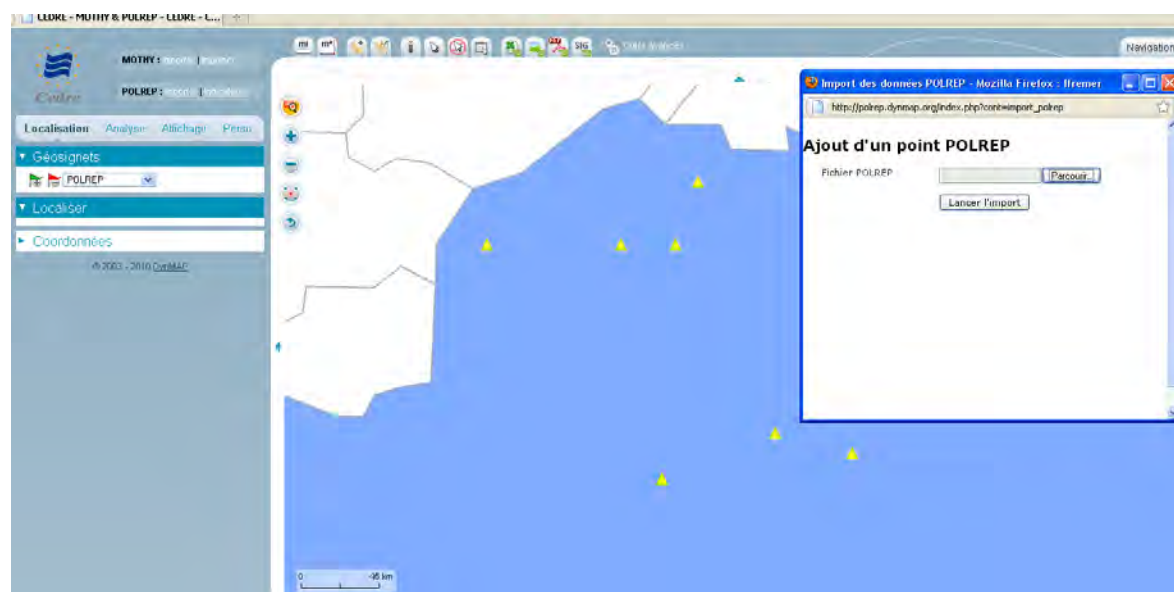


Figure 3-3: Screenshot of POLREP service

Dataset	POLREP
Service Type	WMS / WFS
Description	Pollution reports at sea
Provider	CROSS (or Navy or Customs)
Access Restrictions	Restricted
Status	Test
Parameters	Bonn agreement code appearance (identification number for each POLREP)
Type of data	Database / MySQL
Area covered	French area surveillance
Spatial resolution	N/A
Native projection	Mercator
Output projections	Mercator
Temporal resolution	Each pollution observation
Forecast length	N/A
Time span	N/A
Update frequency	Each pollution observation
Native data formats	XML
Output data formats	Shape / XML
Catalogue Service URL	
Service URL	http://cedre.dynmap.eu/netmar/carteWS.php?request=getCapabilities&service=WMS&version=1.3.0

3.3.4 Shoreline survey service

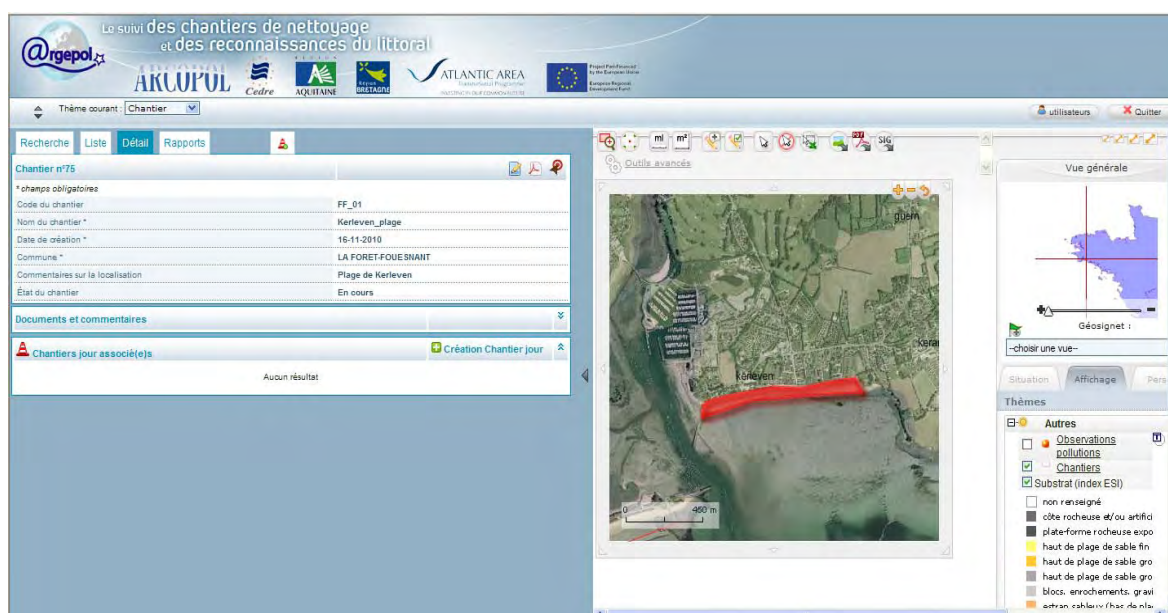


Figure 3-4: Screenshot of “shoreline survey” service

Dataset	Shoreline survey
Service Type	WMS/WFS
Description	Observation of shoreline pollution
Provider	Cedre
Access Restrictions	Restricted
Status	Test
Parameters	Description of pollution (nature of pollution, location, length of survey, shoreline type ...)
Type of data	Database / Mapserver
Native projection	Lambert II étendue / NTF
Output projections	Lambert II étendue / NTF
Area covered	French Area
Temporal resolution	N/A
Time span	
Update frequency	After each shoreline survey
Native data formats	Database / Mapserver
Output data formats	Shape
Catalogue Service URL	TBD
Service URL	TBD

3.3.5 Cleanup site service

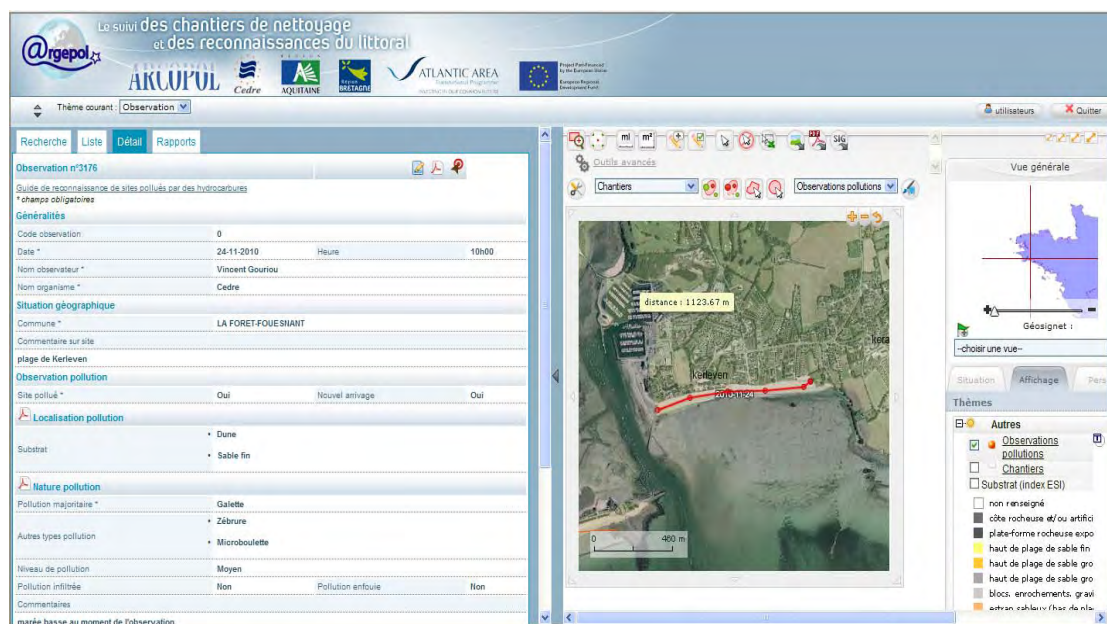


Figure 3-5: Screenshot of “Cleanup site” service

Dataset	Cleanup site
Service Type	WMS/WFS
Description	Cleanup site evolution
Provider	Cedre
Access Restrictions	restricted
Status	Test
Parameters	Description of daily cleanup site (on going cleanup operations, actual manpower resources, special equipments being used, collected and disposed waste, etc.).
Type of data	Database / Mapserver
Native projection	Lambert II étendue / NTF
Output projections	Lambert II étendue / NTF
Area covered	French Area
Temporal resolution	N/A
Time span	
Update frequency	Daily
Native data formats	Database / Mapserver
Output data formats	Shape
Catalogue Service URL	TBD
Service URL	TBD

4 Services for CS-3: National Observatory and Global Network

4.1 Description of the user group

The Western Channel Observatory (WCO) is an oceanographic time-series and marine biodiversity reference site in the Western English Channel. It has demonstrated excellence in marine monitoring for over a century. The aim of the Western Channel Observatory (WCO) is to draw together long-term in situ measurements made at L4 and E1; ecosystem modelling studies; and Earth Observation (EO) and integrate these using web-based Geographic Information System (GIS) technology.

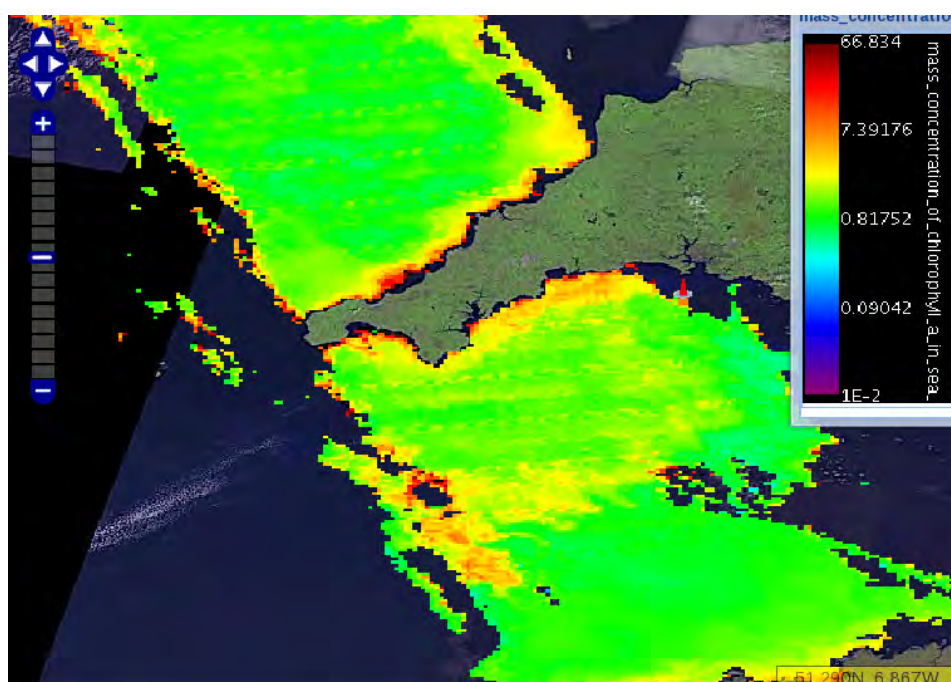
The Chlorophyll Global Integrated Network (ChloroGIN) project aims to promote in situ measurement of chlorophyll in combination with satellite derived estimates. It links together data providers in Europe, Africa, North and South America and in India. ChloroGIN is mentioned in the GEO 2009-2011 work plan within EC-09-01, and is the focus for the African marine component of the EC FP7 DevCoCast project. In essence, ChloroGIN is building components of the GEO System of Systems focusing on marine ecosystems, and inherent in the project is the concept of distributed data providers.

4.1.1 Work context

Researchers in ecosystems need to be able to identify and use long term time series in order to quantify ecosystem responses to natural variability, climate change or the impact of anthropogenic activities. An example use would be a comparison of the long term chlorophyll measurements at the L4 station with satellite observations by the MODIS and MERIS instruments; comparing long term change in zooplankton concentration to water temperature or relating optical properties to chlorophyll concentration. Operational users may find it useful to compare, in near real time, contemporary satellite and in situ data in order to provide input to water quality monitoring systems, for example, on phytoplankton chlorophyll-a concentration. EO data are available both as images (served via WMS) for visualisation purposes and as netCDF (OPeNDAP) which may be used within other processing chains.

4.2 Data Service Descriptions

4.2.1 MODIS Ocean Colour Service



© 2012 Figure 4-1: MODIS Chl-a image viewed through WCO data portal

Dataset	MODIS Aqua
Service Type	WMS
Description	EO data from the MODIS instrument on the NASA Aqua satellite.
Provider	NASA/MYOCEAN
Access Restrictions	Freely available
Status	Production
Parameters	nLw_xxx, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -15 Easternmost longitude = 9 Southernmost latitude = 47 Northernmost latitude = 63
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Time span	2008 onward
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	http://rsg.pml.ac.uk/csw
Service URL	http://rsg.pml.ac.uk/wms?SERVICE=WMS&REQUEST=GetCapabilities&VERSION=1.3.0
OPeNDAP URL	http://rsg.pml.ac.uk/thredds/catalog/RSG_MODIS_UK_OC/catalog.html

4.2.1.1 Parameters

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	-2 -1 -1 mWcm μ m sr
SeaDataNet Name (URN)	SDN:P011::RXXX412N
SeaDataNet Name (Text)	Normalised water-leaving radiance (412nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_412

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	-2 -1 -1 mWcm μ m sr
SeaDataNet Name (URN)	SDN:P011::RXXX443N
SeaDataNet Name (Text)	Normalised water-leaving radiance (443nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_443

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX488N
SeaDataNet Name (Text)	Normalised water-leaving radiance (488nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_488

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX531N
SeaDataNet Name (Text)	Normalised water-leaving radiance (531nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_531

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX551N
SeaDataNet Name (Text)	Normalised water-leaving radiance (551nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_551

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX667N
SeaDataNet Name (Text)	Normalised water-leaving radiance (667nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_667

Parameter	Chlorophyll (chlor_a)
Description	Chlorophyll concentration estimates
Units (URN)	SDN:P061::UMMC
Units (Text)	mg m^{-3}
SeaDataNet Name (URN)	SDN:P011::CHLMOOC5
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body by Moderate Resolution Imaging Spectroradiometer (MODIS) and OC5 algorithm
WMS Layer Name	MYOCEAN_MYO_DT/chlor_a

4.2.2 MERIS Ocean Colour Service

Dataset	MERIS
Service Type	WMS
Description	EO data from the MERIS instrument on the ESA Envisat satellite.
Provider	ESA/MYOCEN
Access Restrictions	Freely available
Status	Production
Parameters	nLw_XXX, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -15 Easternmost longitude = 9 Southernmost latitude = 47 Northernmost latitude = 63
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Time span	2008 onward
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	http://rsg.pml.ac.uk/csw
Service URL	http://rsg.pml.ac.uk/wms?SERVICE=WMS&REQUEST=GetCapabilities&VERSION=1.3.0
<u>OPeNDAP URL</u>	http://rsg.pml.ac.uk/thredds/catalog/meris_UK_singlescenes/catalog.html

4.2.2.1 Parameters

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	-2 -1 -1 mWcm ⁻² μm ⁻¹ sr ⁻¹
SeaDataNet Name (URN)	SDN:P011::RXXX413N
SeaDataNet Name (Text)	Normalised water-leaving radiance (413nm wavelength) from the water body
WMS Layer Name	MYOCEN_MER/ nLw_413

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	-2 -1 -1 mWcm ⁻² μm ⁻¹ sr ⁻¹
SeaDataNet Name (URN)	SDN:P011::RXXX443N
SeaDataNet Name (Text)	Normalised water-leaving radiance (443nm wavelength) from the water body
WMS Layer Name	MYOCEN_MER/ nLw_443

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX490N
SeaDataNet Name (Text)	Normalised water-leaving radiance (490nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_490

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX510N
SeaDataNet Name (Text)	Normalised water-leaving radiance (510nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_510

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX560N
SeaDataNet Name (Text)	Normalised water-leaving radiance (560nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_560

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX619N
SeaDataNet Name (Text)	Normalised water-leaving radiance (619nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_619

Parameter	Chlorophyll (chlor_a)
Description	Chlorophyll concentration estimates
Units (URN)	SDN:P061::UMMC
Units (Text)	mg m^{-3}
SeaDataNet Name (URN)	SDN:P011::CHLMEAL1
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body by programmable medium-spectral resolution imaging spectrometer (MERIS)
WMS Layer Name	MYOCEAN_MER/chlor_a

4.2.3 L4 in situ Service

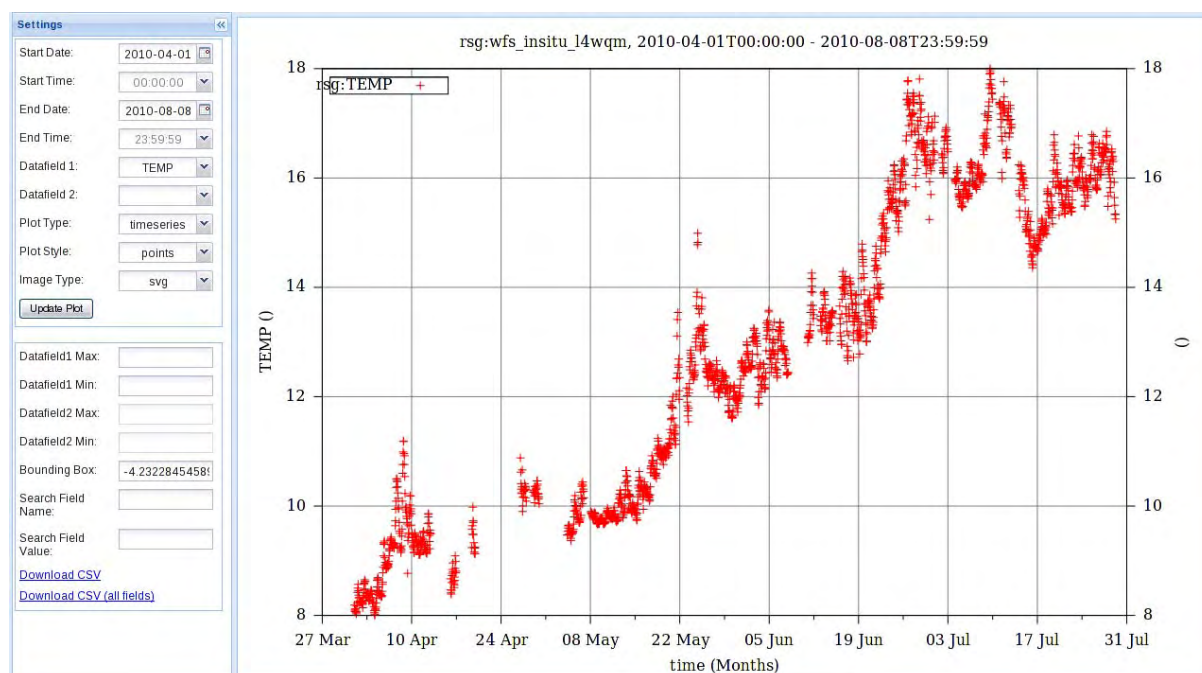


Figure 4-2: Surface temperature time series from L4 station

Dataset	L4 in situ data
Service Type	WFS
Description	<i>In situ</i> observations from station “L4” in the western English Channel.
Provider	PML
Access Restrictions	Freely available subject to restrictions
Status	Test
Parameters	chlor_a, SST, salinity, oxygen, turbidity, fluorescence
Type of data	In-situ data
Area covered	Western English Channel, 50.22°N 4.22°W
Temporal resolution	Weekly depending on weather.
Time span	2001 onwards
Update frequency	When processed.
Native data formats	PostgreSQL database
Output data formats	GML
Catalogue Service URL	http://rsg.pml.ac.uk/csw
Service URL	http://rsg.pml.ac.uk/wfs?service=WFS&request=describefeaturetype&typename=rsg:wfs_insitu_l4wqm

4.2.3.1 Parameters

Parameter	CHL
Description	Chlorophyll concentration
Units (URN)	SDN:P061::UMMC
Units (Text)	mg m ⁻³
SeaDataNet Name (URN)	SDN:P011::CPHLPR01
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body [particulate phase] by in-situ chlorophyll fluorometer
WFS Parameter Name	CHL

Parameter	SST
Description	Sea Surface Temperature
Units (URN)	SDN:P061::UPAA
Units (Text)	C
SeaDataNet Name (URN)	SDN:P011::TEMPPR01
SeaDataNet Name (Text)	Temperature of the water body
WFS Parameter Name	TEMP

Parameter	Salinity
Description	Salinity
Units (URN)	SDN:P061::UUUU
Units (Text)	None
SeaDataNet Name (URN)	SDN:P011::PSLTZZ01
SeaDataNet Name (Text)	Practical salinity of the water body
WFS Parameter Name	PSAL

Parameter	Oxygen
Description	Oxygen
Units (URN)	SDN:P061::UPOX
Units (Text)	uM
SeaDataNet Name (URN)	SDN:P011::DOXYZZXX
SeaDataNet Name (Text)	Concentration of oxygen {O ₂ } per unit volume of the water body [dissolved phase]
WFS Parameter Name	OXYC

Parameter	Turbidity
Description	Turbidity.
Units (URN)	SDN:P061::USTU
Units (Text)	NTU
SeaDataNet Name (URN)	SDN:P011::NEPHIF01
SeaDataNet Name (Text)	Turbidity of the water body by in-situ nephelometer
WFS Parameter Name	TSED

Parameter	Fluorescence
Description	Fluorescence
Units (URN)	SDN:P061::UUUU
Units (Text)	None
SeaDataNet Name (URN)	SDN:P011::FLUOZZZ
SeaDataNet Name (Text)	Fluorescence of the water body
WFS Parameter Name	FVLT

5 Services for CS-4: Research Project for Ecosystem Model Validation

5.1 Description of the user group

The Marine Ecosystem Evolution in a Changing Environment (MEECE) project aims to use a combination of data synthesis, numerical simulation and targeted experiments to boost knowledge and develop the predictive capabilities needed to learn about the response of marine ecosystems.

5.2 Work context

There is a need to compare the coupled physical and biological models which are being run in hindcast mode with historical EO data for validation, enabling future forecasts to observe the impacts of climate change such as changes in primary production or ocean acidification. This can be achieved using in situ data sets such as the Continuous Plankton Recorder (CPR); long term sampling stations, such as in the western English Channel, in operation for over 100 years, and satellite remote sensing for which SST data have been continuously available for approximately 30 years and ocean colour for approximately 12 years. These time series are therefore valuable “ground truthing” to test hindcast runs of numerical models. EO data are available both as images (served via WMS) for visualisation purposes and as netCDF (OPeNDAP) which may be used within other processing chains.

5.3 Data Service Descriptions

5.3.1 MODIS Ocean Colour Service

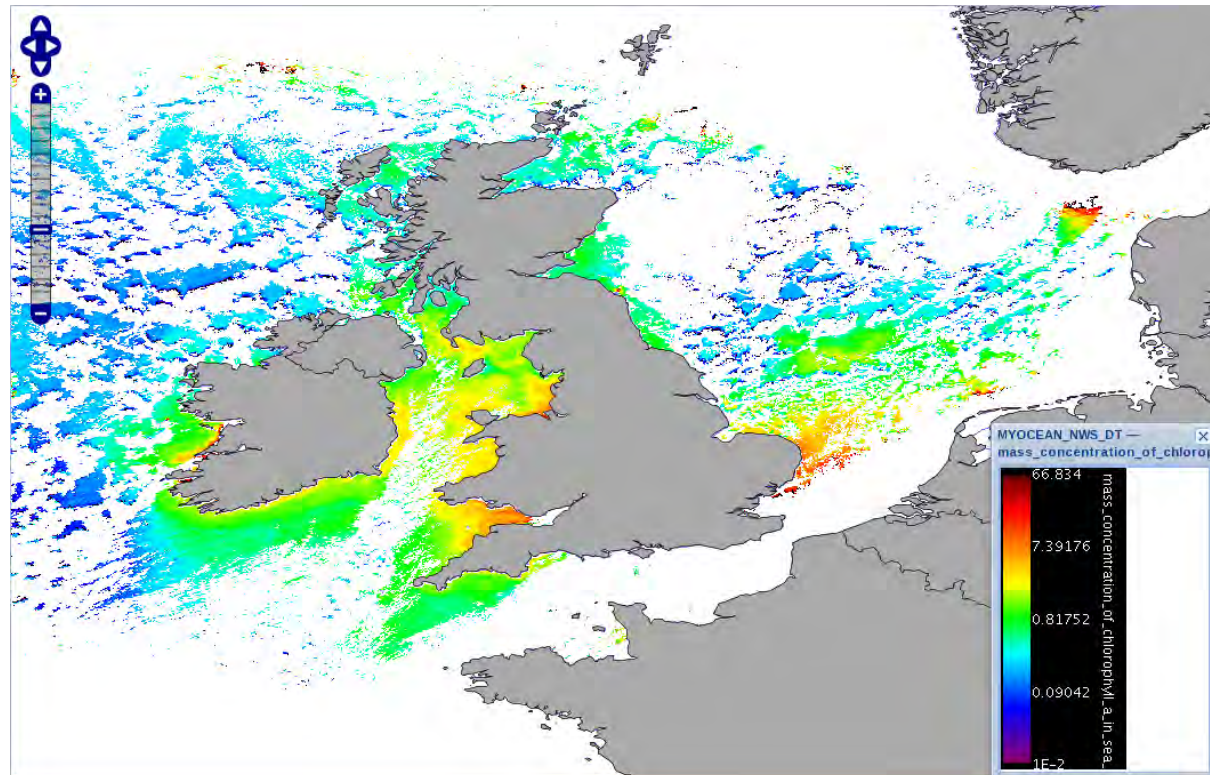


Figure 5-1: MODIS Chl-a viewed through WCO Data Portal

Dataset	MODIS Aqua
Service Type	WMS
Description	EO data from the MODIS instrument on the NASA Aqua satellite.
Provider	NASA/NEODAAS
Access Restrictions	Freely available
Status	Production
Parameters	nLw_xxx, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -15 Easternmost longitude = 9 Southernmost latitude = 47 Northernmost latitude = 63
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Time span	2008 onwards (may backprocess later)
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	http://rsg.pml.ac.uk/csw
Service URL	http://rsg.pml.ac.uk/wms?SERVICE=WMS&REQUEST=GetCapabilities&VERSION=1.3.0
OPeNDAP URL	http://rsg.pml.ac.uk/thredds/catalog/RSG_MODIS_UK_OC/catalog.html

5.3.1.1 Parameters

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	-2 -1 -1 mWcm μ m sr
SeaDataNet Name (URN)	SDN:P011::RXXX412N
SeaDataNet Name (Text)	Normalised water-leaving radiance (412nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_412

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	-2 -1 -1 mWcm μ m sr
SeaDataNet Name (URN)	SDN:P011::RXXX443N
SeaDataNet Name (Text)	Normalised water-leaving radiance (443nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_443

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX488N
SeaDataNet Name (Text)	Normalised water-leaving radiance (488nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_488

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX531N
SeaDataNet Name (Text)	Normalised water-leaving radiance (531nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_531

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX551N
SeaDataNet Name (Text)	Normalised water-leaving radiance (551nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_551

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX667N
SeaDataNet Name (Text)	Normalised water-leaving radiance (667nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MYO_DT/ nLw_667

Parameter	Chlorophyll (chlor_a)
Description	Chlorophyll concentration estimates
Units (URN)	SDN:P061:: UMMC
Units (Text)	mg m^{-3}
SeaDataNet Name (URN)	SDN:P011:: CHLMOOC5
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body by Moderate Resolution Imaging Spectroradiometer (MODIS) and OC5 algorithm
WMS Layer Name	MYOCEAN_MYO_DT/chlor_a

5.3.2 MERIS Ocean Colour Service

Dataset	MERIS
Service Type	WMS
Description	EO data from the MERIS instrument on the ESA Envisat satellite.
Provider	ESA/MYOCLEAN
Access Restrictions	Freely available
Status	Production
Parameters	nLw_XXX, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -15 Easternmost longitude = 9 Southernmost latitude = 47 Northernmost latitude = 63
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Time span	2008 onward
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	http://rsg.pml.ac.uk/csw
Service URL	http://rsg.pml.ac.uk/wms?SERVICE=WMS&REQUEST=GetCapabilities&VERSION=1.3.0
OPeNDAP URL	http://rsg.pml.ac.uk/thredds/catalog/meris_UK_singlescenes/catalog.html

5.3.2.1 Parameters

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$10^{-2} \text{ mWcm}^{-2} \mu\text{m}^{-1} \text{ sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX413N
SeaDataNet Name (Text)	Normalised water-leaving radiance (413nm wavelength) from the water body
WMS Layer Name	MYOCLEAN_MER/ nLw_413

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$10^{-2} \text{ mWcm}^{-2} \mu\text{m}^{-1} \text{ sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX443N
SeaDataNet Name (Text)	Normalised water-leaving radiance (443nm wavelength) from the water body
WMS Layer Name	MYOCLEAN_MER/ nLw_443

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX490N
SeaDataNet Name (Text)	Normalised water-leaving radiance (490nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_490

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX510N
SeaDataNet Name (Text)	Normalised water-leaving radiance (510nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_510

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX560N
SeaDataNet Name (Text)	Normalised water-leaving radiance (560nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_560

Parameter	Water Leaving Radiance (nLw)
Description	surface_upwelling_spectral_radiance_in_air_emerging_from_sea_water
Units (URN)	SDN:P061::MWSR
Units (Text)	$\text{mWcm}^{-2} \mu\text{m}^{-1} \text{sr}^{-1}$
SeaDataNet Name (URN)	SDN:P011::RXXX619N
SeaDataNet Name (Text)	Normalised water-leaving radiance (619nm wavelength) from the water body
WMS Layer Name	MYOCEAN_MER/ nLw_619

Parameter	Chlorophyll (chlor_a)
Description	Chlorophyll concentration estimates
Units (URN)	SDN:P061::UMMC
Units (Text)	mg m^{-3}
SeaDataNet Name (URN)	SDN:P011::CHLMEAL1
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body by programmable medium-spectral resolution imaging spectrometer (MERIS)
WMS Layer Name	MYOCEAN_MER/chlor_a

5.3.3 MEECE POLCOMS ERSEM Hindcast

Dataset	MEECE POLCOMS ERSEM Hindcast
Service Type	WMS
Description	Coupled ecosystem model hindcast
Provider	PML/MEECE
Access Restrictions	N/A
Status	Test
Parameters	ChIM
Type of data	Model
Area covered	North West Shelf
Temporal resolution	month
Time span	10 years
Update frequency	static
Native data formats	netCDF
Output data formats	png
Catalogue Service URL	http://rsg.pml.ac.uk/csw
Service URL	TBD
OPeNDAP URL	TBD

5.3.3.1 Parameters

Parameter	ChIM
Description	Monthly Mean Chlorophyll-a
Units (URN)	SDN:P061::UMMC
Units (Text)	mg m-3
SeaDataNet Name (URN)	SDN:P011::CPHLMMMO
SeaDataNet Name (Text)	Monthly mean concentration of chlorophyll-a {chl-a} per unit volume of the water body by model prediction
WMS Layer Name	TBD

6 Services for CS-5: The International Coastal Atlas Network (ICAN)

6.1 Description of the user group

In recent years significant momentum has occurred in the development of Internet resources for decision makers, scientists and the general public who are interested in the coast. A key aspect of this trend has been the development of coastal web atlases (CWA), based on web enabled geographic information systems (GIS).

A CWA has been defined by the ICAN (International Coastal Atlas Network) community as: a collection of digital maps and datasets with supplementary tables, illustrations and information that systematically illustrate the coast, oftentimes with cartographic and decision support tools, all of which are accessible via the Internet.

The application scope of CWAs is broad. Driving factors for CWA development include the need for:

- Better planning to cater for increased **population pressures** in the coastal zone (e.g. the UN estimate that by 2020 75% of the world's population will be living within 60 km of the coastal zone (United Nations, 1992; Shi and Singh, 2003).
- Decision support systems in relation to **climate change** scenarios in vulnerable coastal regions.
- Information to facilitate assessments of **risk to natural hazards** (including tsunamis and floods).
- Access to data and maps to support **marine spatial planning** (MSP) as a tool for better coastal and marine area management.
- Maps of jurisdictional boundaries for maritime territories in support of claims related to the **United Nations Convention on the Law of the Sea (UNCLOS)**, which has a deadline for submissions of 2013.
- More efficient and effective coastal and marine area **governance** including access to relevant data and information.
- Information on **resource availability and exploitation** including habitat and species information, as well as ecological and community resilience.

The strategic aim of ICAN is to share experiences and to find common solutions to CWA development whilst ensuring maximum relevance and added value for the end users. In 2007, the ICAN community selected the topic of **coastal erosion** as the main focus of a project to demonstrate semantic interoperability among selected coastal web atlas. However, it is recognised that there are many more topics that coastal web atlas can address. For the coastal erosion use case example, the following user roles were targeted (however other roles do exist):

- **Coastal Manager/Planner** (uses an inventory to take regulatory action; helps form policy guidelines as potential statutes or regulatory rules)
- **Private Property Owner** (seeks insight about adverse impacts to a property)
- **Emergency Responders** (need information about past, present, or future hazardous events)
- **Scientist** (investigates research questions for knowledge building, relevant for policy implications and decision support action)
- **Local CWA administrator** (supports other users with getting access to data, perhaps from own system or other systems)

6.1.1 *Work context*

CWAs contain a diverse range of dataset products. For example, the 2007 ICAN coastal erosion use case listed several key datasets, which include:

- Coastal access and recreation
- Coastal armouring
- Cadastral datasets with assessor attribution
- Geology
- Land use and zoning
- Current shoreline position
- Historic shoreline positions
- Permit tracking systems and a dynamic link to cadastral data
- Aerial imagery
- Streams
- Beaches
- Bluff and dune fields
- Regulatory jurisdictions
- Community development
- Geomorphology profiles
- Erosion Risk study results – Risk Zones or Lines
- Topography
- Wave climate data
- Shallow water bathymetry
- Transportation networks
- Public utilities
- Public lands

While CWAs contain a diverse range of datasets, the inclusion of both near real-time and historical data products from the operational oceanography and remote sensing communities has been more limited, often because such data has been difficult to access in terms of both data policy and data interoperability. This interoperability issue will be addressed by NETMAR. In addition, the ability to generate new value-added data products on the fly will be demonstrated by NETMAR.

6.2 *Data Service Descriptions*

ICAN will include several CWA nodes. Current nodes include MIDA (Marine Irish Digital Atlas) and OCA (Oregon Coastal Atlas). Access to these nodes for data and service discovery will be made through the ICAN CSW mediator. Once data or service metadata are obtained, EUMIS may then access these data or services directly via the local CWA node. The current ICAN CSW Mediator V1 URL is located at:

<http://ican.ucc.ie/ican/ICANMediator>

However, this CSW mediator will be upgraded to meet improved semantic framework requirements being researched and developed in the NETMAR project.

Within the ICAN use case, MIDA will initially implement and test the network services and semantic framework under development by NETMAR. Results of this work will feed into the ICAN community via NETMAR deliverables, workshops, WIKI, etc. Therefore, the following sections focus on MIDA datasets and services.

6.2.1 MIDA WMS maps

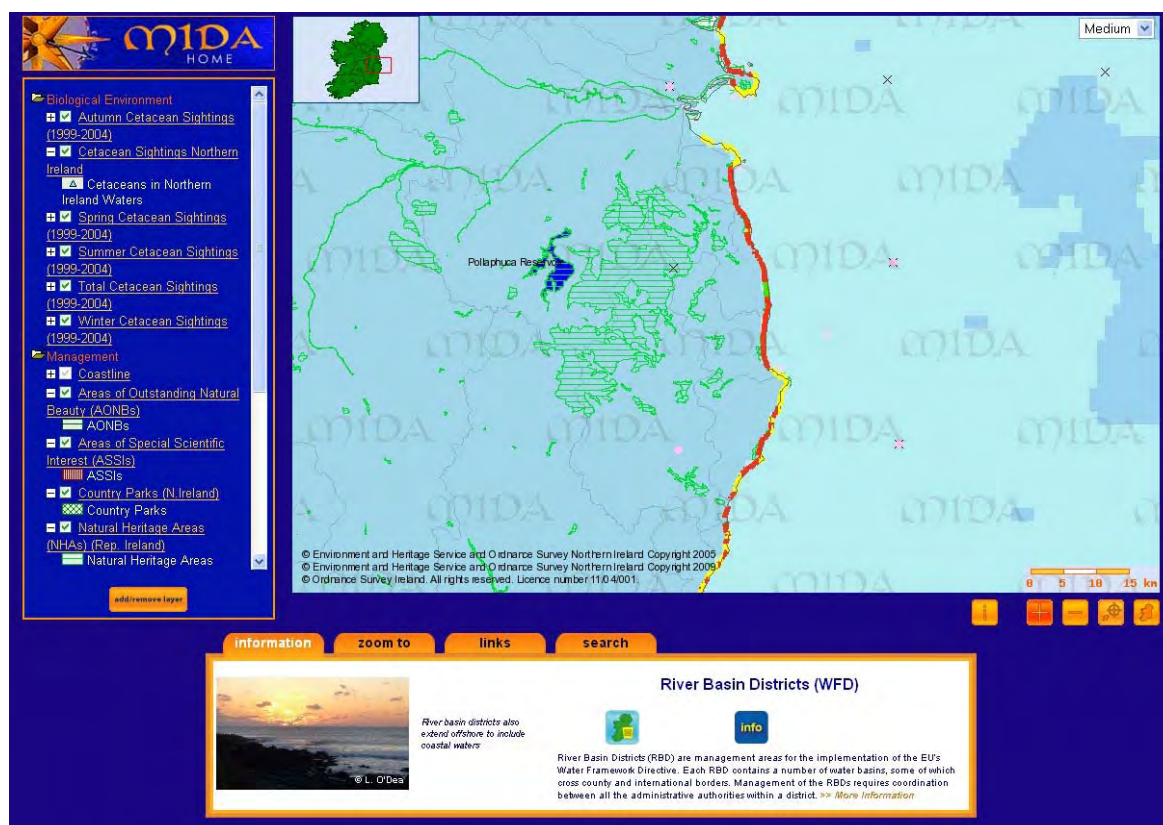


Figure 6-1: Marine Irish Digital Atlas with numerous datasets displayed

Dataset	MIDA WMS maps
Service Type	WMS
Description	Numerous static maps ranging from physical environment to biology to socio-economic, etc.
Provider	Data sourced from multiple 3 rd party data providers. Currently data centrally stored in MIDA database.
Access Restrictions	MIDA has license agreements with multiple third party data providers. Metadata will be freely available, but WMS services will be limited to unrestricted datasets.
Status	In preparation
Parameters	Ranges from physical environment to biology to socio-economic, etc. parameters.
Type of data	Vector and Raster maps
Area covered	Datasets coverage range from Republic of Ireland, Northern Ireland, Island of Ireland, North East Atlantic, Irish territorial seas
Spatial resolution	Various
Native projection	Irish National Grid (EPSG:29900). Will be upgraded to Irish Grid (EPSG:29902) at a future date.
Output projections	EPSG:29900 (update to EPSG:29902 in future) EPSG:4326 EPSG:900913 EPSG:4258 EPSG:3034 EPSG:3035 EPSG:3041 EPSG:3042

Temporal resolution	Various
Forecast length	Various
Time span	Various
Update frequency	Datasets reviewed for available updates at least once a year
Native data formats	Shapefile and GeoTIFF
Output data formats	PNG (MIME type "image/png") GIF without LZW compression (MIME type "image/gif")
Catalogue Service URL	http://mida.ucc.ie/geonetwork (under upgrade)
Service URL	WMS server under development

6.2.1.1 Parameters

Very broad. Range from physical environment to biology to socio-economic parameters, etc.

6.2.2 *MIDA near real-time maps*

MIDA is currently a centralised data repository. At first, MIDA will use data from other NETMAR service providers to initially test near real-time connectivity. MIDA will examine data products from other third parties (e.g. MyOcean) once these products become available for use.

6.2.2.1 Parameters

To be determined based on third party products review.

7 Services for CS-6: Phytoplankton blooms in the Bay of Biscay and the English Channel

7.1 Description of user group

The first level of dissemination is within this Ifremer's network REPHY of marine laboratories (around 15 laboratories) located along the French coasts (European and overseas). The REPHY (Réseau PHYtoplankton) is the National Phytoplankton and Phycotoxins monitoring network for French coastal waters.

The second level of dissemination is towards the Department Prefectures and towards the Governmental services in charge of Maritime Affairs. Part of the duty of these two administrative bodies is, after advice from the REPHY network, to temporary stop shellfish fishery and aquaculture activities in areas which are concerned by potential harmful algae blooms.

Both internal observers and scientists of the REPHY network and representatives of Department Prefectures and Maritime Affairs services will be part of the User Group.

7.2 Work context

Permanent monitoring of micro-algae blooms is performed by the Phytoplankton and Phytotoxins networks (REPHY) operated under the control of Ifremer. Other sources of information are also taken in account such as satellite sea-colour imagery and hydrodynamical models outputs.

One of Ifremer's objectives is to use systematically joint time series of in situ and satellite data for these parameters at some selected stations for the surveillance of the eutrophication risk (Chlorophyll) (MarCoast2, ESA funded project).

EO data are available both as images (served via WMS) for visualisation purposes and as netCDF (OPeNDAP) which may be used within other processing chains.

7.3 Data Service Descriptions

7.3.1 MODIS EO service

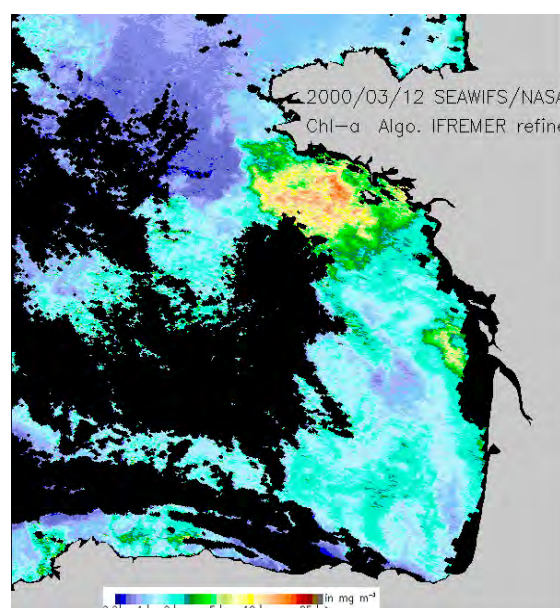


Figure 7-1: MODIS Chl-a, computed with Ifremer regional algorithm

Dataset	MODIS
Service Type	WMS
Description	EO data from the MODIS instrument
Provider	NASA
Access Restrictions	Freely available
Status	Planned
Parameters	nLw, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -12 Easternmost longitude = 13 Southernmost latitude = 36 Northernmost latitude = 60
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	
Service URL	http://www.ifremer.fr/thredds/wms/IFREMER-WESTERN_EUROPE-CHL_ISPM_MODIS_L3-NRT-OBS_FULL_TIME_SERIE?service=WMS&version=1.3.0&request=GetCapabilities
OPeNDAP URL	http://www.ifremer.fr/thredds/dodsC/IFREMER-WESTERN_EUROPE-CHL_ISPM_MODIS_L3-NRT-OBS_FULL_TIME_SERIE.html

7.3.1.1 Parameters

Parameter	chl_a
Description	OC5 chlorophyll-a concentration
Units (URN)	SDN:P061::UKMC
Units (Text)	kg m-3
SeaDataNet Name (URN)	SDN:P011::CHLMOOC5
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body by Moderate Resolution Imaging Spectroradiometer (MODIS) and OC5 algorithm
WMS Layer Name	chl_a

Parameter	inorganic_suspended_matter
Description	Inorganic suspended matter
Units (URN)	SDN:P061::UKMC
Units (Text)	kg m-3
SeaDataNet Name (URN)	SDN:P011::SPMIMOXX
SeaDataNet Name (Text)	Concentration of suspended particulate material (inorganic) per unit volume of the water body by Moderate Resolution Imaging Spectroradiometer (MODIS)
WMS Layer Name	inorganic_suspended_matter

Parameter	turbidity
Description	Turbidity
Units (URN)	SDN:P061::USTU
Units (Text)	NTU
SeaDataNet Name (URN)	SDN:P011::TURBMOXX
SeaDataNet Name (Text)	Turbidity of the water column by Moderate Resolution Imaging Spectroradiometer (MODIS)
WMS Layer Name	turbidity

7.3.2 MERIS EO service

Dataset	MERIS
Description	EO data from the MERIS instrument
Provider	ESA
Access Restrictions	Freely available?
Status	Planned
Parameters	nLw, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -12 Easternmost longitude = 13 Southernmost latitude = 36 Northernmost latitude = 60
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	
Service URL	http://www.ifremer.fr/thredds/wms/IFREMER-WESTERN_EUROPE-CHL_ISPM_MERIS_L3-NRT-OBS_FULL_TIME_SERIE?service=WMS&version=1.3.0&request=GetCapabilities
OPeNDAP URL	http://www.ifremer.fr/thredds/dodsC/IFREMER-WESTERN_EUROPE-CHL_ISPM_MERIS_L3-NRT-OBS_FULL_TIME_SERIE.html

7.3.2.1 Parameters

Parameter	chl_a
Description	OC5 chlorophyll-a concentration
Units (URN)	SDN:P061::UKMC
Units (Text)	kg m-3
SeaDataNet Name (URN)	SDN:P011::CHLMEOC5
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body by programmable medium-spectral resolution imaging spectrometer (MERIS) and OC5 algorithm
WMS Layer Name	chl_a

Parameter	inorganic_suspended_matter
Description	Inorganic suspended matter
Units (URN)	SDN:P061::UKMC
Units (Text)	kg m-3
SeaDataNet Name (URN)	SDN:P011::SPMIMEXX
SeaDataNet Name (Text)	Concentration of suspended particulate material (inorganic) per unit volume of the water body by programmable medium-spectral resolution imaging spectrometer (MERIS)
WMS Layer Name	inorganic_suspended_matter

Parameter	turbidity
Description	Turbidity
Units (URN)	SDN:P061::USTU
Units (Text)	NTU
SeaDataNet Name (URN)	SDN:P011::TURBMEXX
SeaDataNet Name (Text)	Turbidity of the water column by programmable medium-spectral resolution imaging spectrometer (MERIS)
WMS Layer Name	turbidity

7.3.3 Combined MODIS/MERIS EO service

Dataset	MODIS/MERIS
Description	EO data generated from MODIS/MERIS
Provider	Ifremer
Access Restrictions	Freely available
Status	Planned
Parameters	nLw, chlor_a
Type of data	Satellite imagery
Area covered	European waters: Westernmost longitude = -12 Easternmost longitude = 13 Southernmost latitude = 36 Northernmost latitude = 60
Spatial resolution	1km
Native projection	Geographic
Output projections	Geographic
Temporal resolution	Daily (subject to visibility)
Forecast length	N/A
Update frequency	Daily
Native data formats	netCDF
Output data formats	png, netCDF
Catalogue Service URL	
Service URL	http://www.ifremer.fr/thredds/wms/IFREMER-WESTERN_EUROPE-CHL_ISPM_MODIS_MERIS_L4-RAN-OBS_FULL_TIME_SERIE?service=WMS&version=1.3.0&request=GetCapabilities
OPeNDAP URL	http://www.ifremer.fr/thredds/dodsC/IFREMER-WESTERN_EUROPE-CHL_ISPM_MODIS_MERIS_L4-RAN-OBS_FULL_TIME_SERIE.html

7.3.3.1 Parameters

Parameter	chl_a
Description	analysed chlorophyll-a
Units (URN)	SDN:P061::UKMC
Units (Text)	kg m-3
SeaDataNet Name (URN)	SDN:P011::CHLAMSAT
SeaDataNet Name (Text)	Concentration of suspended particulate material (inorganic) by synthesis of calibrated data from multiple sensors on one or more satellite platforms
WMS Layer Name	chl_a

Parameter	inorganic_suspended_matter
Description	Analysed inorganic suspended matter
Units (URN)	SDN:P061::UKMC
Units (Text)	kg m-3
SeaDataNet Name (URN)	SDN:P011::SPMIMSAT
SeaDataNet Name (Text)	Chlorophyll concentration determined by analysis and synthesis of calibrated data from multiple sensors on one or more satellite platforms
WMS Layer Name	inorganic_suspended_matter

7.3.4 REPHY in situ service

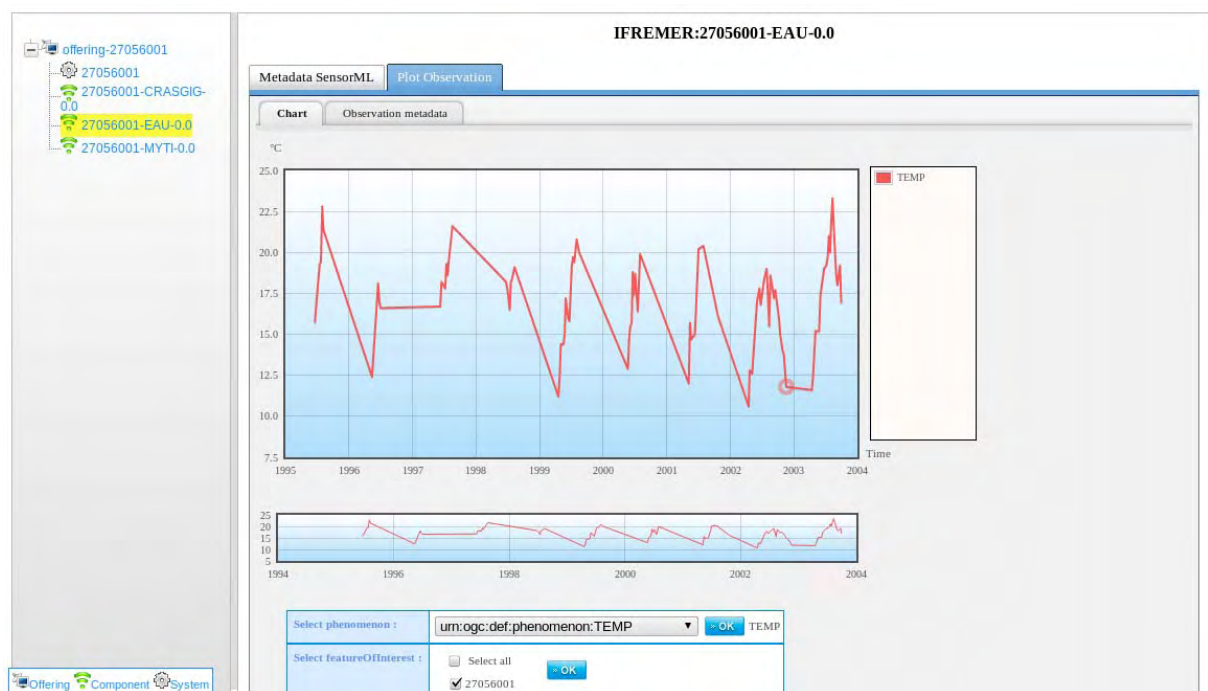


Figure 7-2: Surface temperature time series from Penarf station

Dataset	In Situ
Service	SWE (SOS)
Description	<i>In situ</i> observations from the REPHY network
Provider	Ifremer

Access Restrictions	Freely available
Status	Planned
Parameters	Chlorophyll-a, Turbidity, Temperature, Salinity
Type of data	In-situ data
Area covered	French coasts
Temporal resolution	
Time span	1984 onwards
Update frequency	When processed
Native data formats	Oracle database
Output data formats	CSV
Service	SWE (SOS)
Catalogue Service URL	
Service URL	http://www.ifremer.fr/swe_q2_TS_WS/WS/sos?request=getCapabilities&service=SOS&version=1.0.0

7.3.4.1 Parameters

Parameter	Chlorophyll (chlor_a)
Description	Surface chlorophyll
Units (URN)	SDN:P061::UMMC
Units (Text)	-3 mg m
SeaDataNet Name (URN)	SDN:P011::CPHLPR01
SeaDataNet Name (Text)	Concentration of chlorophyll-a {chl-a} per unit volume of the water body [particulate phase] by in-situ chlorophyll fluorometer
Phenomenon Name	CHLOROA

Parameter	Turbidity
Description	Turbidity
Units (URN)	SDN:P061::USTU
Units (Text)	NTU
SeaDataNet Name (URN)	SDN:P011::NEPHIF01
SeaDataNet Name (Text)	Turbidity of the water body by in-situ nephelometer
Phenomenon Name	TURB

Parameter	Temperature
Description	Temperature
Units (URN)	SDN:P061::UPAA
Units (Text)	C
SeaDataNet Name (URN)	SDN:P011::TEMPPR01
SeaDataNet Name (Text)	Temperature of the water body
Phenomenon Name	TEMP

Parameter	Salinity
Description	Salinity
Units (URN)	SDN:P061::UUUU
Units (Text)	PSU
SeaDataNet Name (URN)	SDN:P011::PSLTZZ01
SeaDataNet Name (Text)	Practical salinity of the water body
Phenomenon Name	SALI

8 Additional services not specific to a case study

8.1 Description of user group

These services are used by multiple user groups.

8.2 Work context

Additional information such as bathymetry is often useful when visualising other datasets. An example service provided by BODC is described below.

8.3 Data Service Descriptions

8.3.1 GEBCO_08 Grid

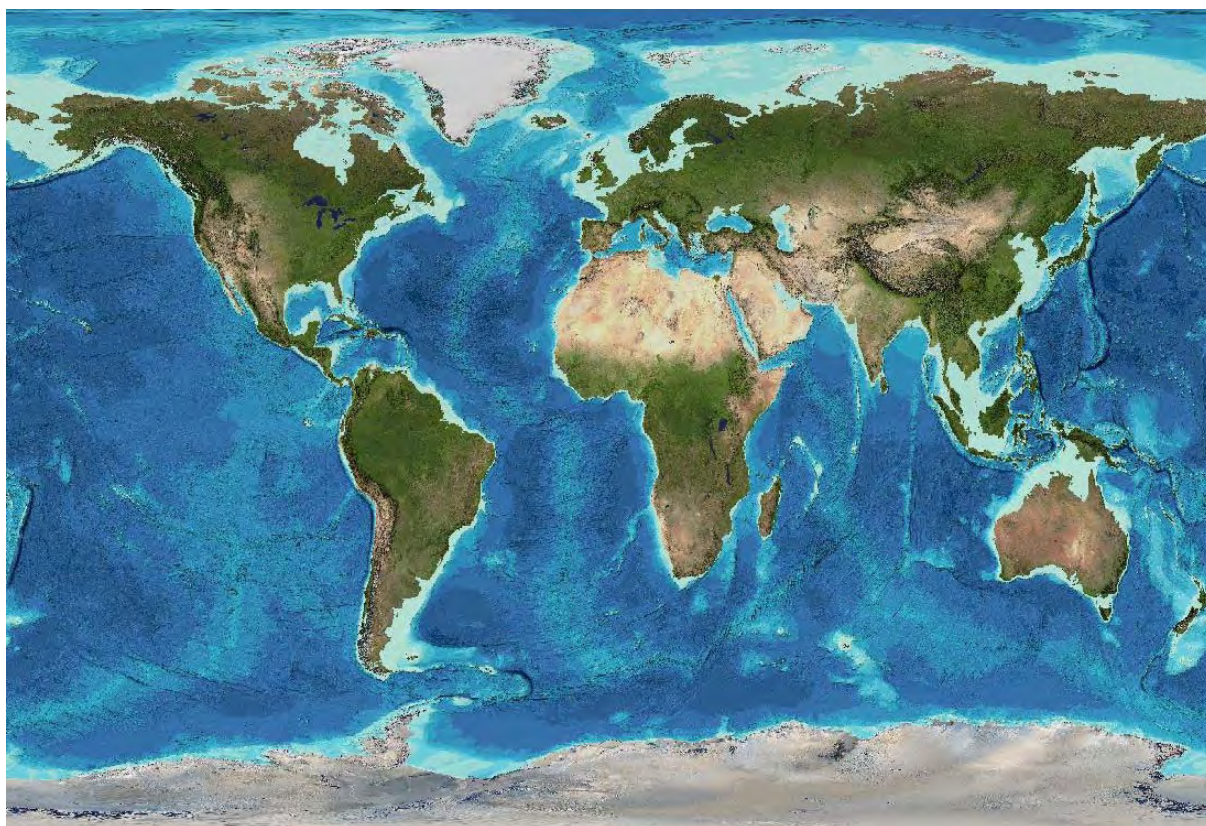


Figure 8-1:GEBCO 30 arc-second bathymetry

Dataset	GEBCO_08 Grid
Description	<p>The GEBCO_08 Grid is a global terrain model for oceans and land at 30 arc-second intervals. The bathymetric portion of the grid is largely based on a database of ship-track soundings with interpolation between soundings guided by satellite-derived gravity data. Data sets generated by other methods have been included in some areas. The land data included in the GEBCO_08 Grid is largely taken from the SRTM30 data set.</p> <p>The GEBCO_08 WMS is based on the GEBCO_08 Grid and shows the bathymetry data in shaded relief. For land areas, the GEBCO_08 WMS includes imagery taken from the NASA Blue Marble data set.</p>
Provider	BODC on behalf of the General Bathymetric Chart of the Oceans

	(GEBCO)
Access Restrictions	Freely available, users need to agree to a set of terms and conditions to access the GEBCO_08 Grid.
Status	Published
Parameters	Bathymetry
Type of data	Gridded elevation data at 30 arc-second intervals.
Area covered	Global Westernmost longitude = -180.0 Easternmost longitude = 180.0 Southernmost latitude = -90.0 Northernmost latitude = 90.0
Spatial resolution	30 arc-seconds
Native projection	Geographic
Output projections	Geographic
Temporal resolution	N/A
Forecast length	N/A
Time span	January 2009 and onwards
Update frequency	Periodically
Native data formats	NetCDF
Output data formats	NetCDF
Catalogue Service URL	TBD
WMS URL	http://www.gebco.net/data_and_products/web_map_service/mapserver?request=getmap&service=wms&BBOX=-180,-90,180,90&srs=EPSG:4326&format=image/jpeg&layers=GEBCO_08_Grid&width=1100&height=750&version=1.1.1

8.3.1.1 Parameters

Parameter	GEBCO_08 Bathymetry
Description	Bathymetric depths derived from the 30 arc-second grid published by the GEBCO community in 2008
Units (URN)	SDN:P061::ULAA
Units (Text)	Metres
SeaDataNet Name (URN)	SDN:P011::MBANGBCE
SeaDataNet Name (Text)	Sea-floor depth (below mean sea level) {bathymetric depth} in the water body by derivation from GEBCO_08 30 arc-second global grid
WMS Layer Name	GEBCO_08 Grid

9 References

- [JAF+06] Johannessen, O. M., V. Y. Alexandrov, I. Y. Frolov, S. Sandven, L. H. Pettersson, L. P. Bobylev, K. Kloster, V. G. Smirnov, Y. U. Mironov and N. G. Babich, 2006. Remote Sensing of Sea Ice in the Northern Sea Route. Springer; 1 edition (November 13, 2006)
- [NM10] Pladsen J, Treguer M, Sandven S, Hamre T, Pettersson L, Parthiot F, Gouriou V, Lassoued Y, Walker P, Lowry R. NETMAR deliverable D1.1, Use case specification and schedule for testing.
- [NM11] Lowry R, Leadbetter A, Clements O. NETMAR deliverable D3.4 Strategy for ontology and tool development to fulfill NETMAR.