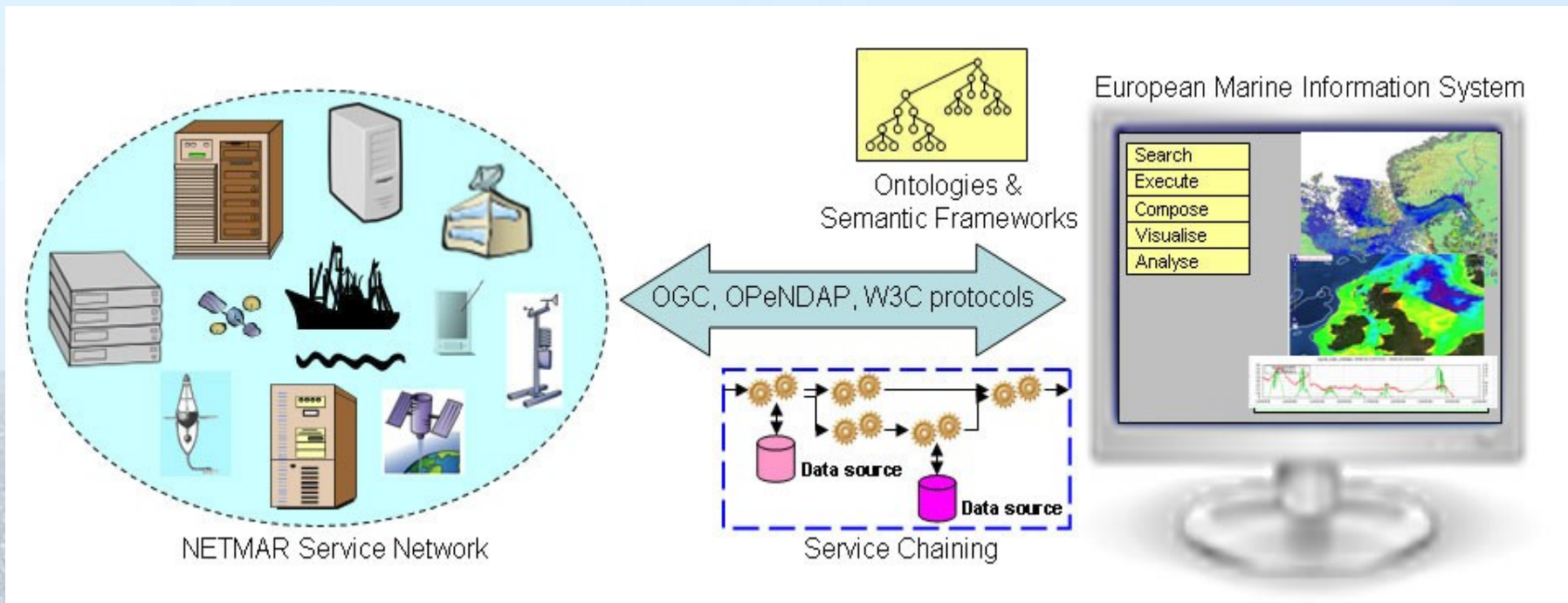




# Open Service Network for Marine Environmental Data

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**GeoViQua Workshop, Barcelona**  
**18/Fev/2011**

# Introduction



**Development of a pilot European Marine Information System (EUMIS)**

**Download satellite data, integrating data, model comparison**

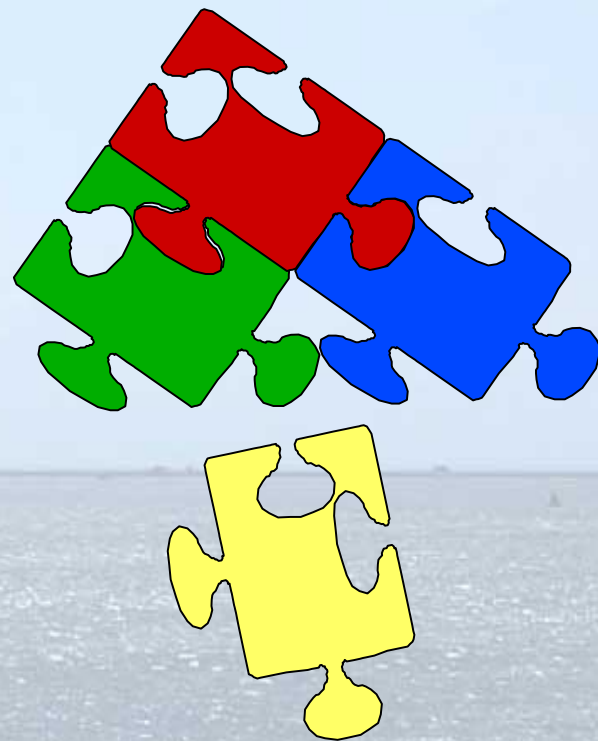
# Why ?

## High volumes of data:

- Satellite and aircraft image
- Human observations, vessels
- In situ measurements (buoys, vessels)
- Weather Forecast
- Ecosystem and drift models

Systems not fully interoperable

Inefficient data usage, transformation, process



# How ?

**Flexible service discovery, access and chaining**

**OGC, OpeNDAP and W3C standards**

**Use of semantic frameworks and ontologies**

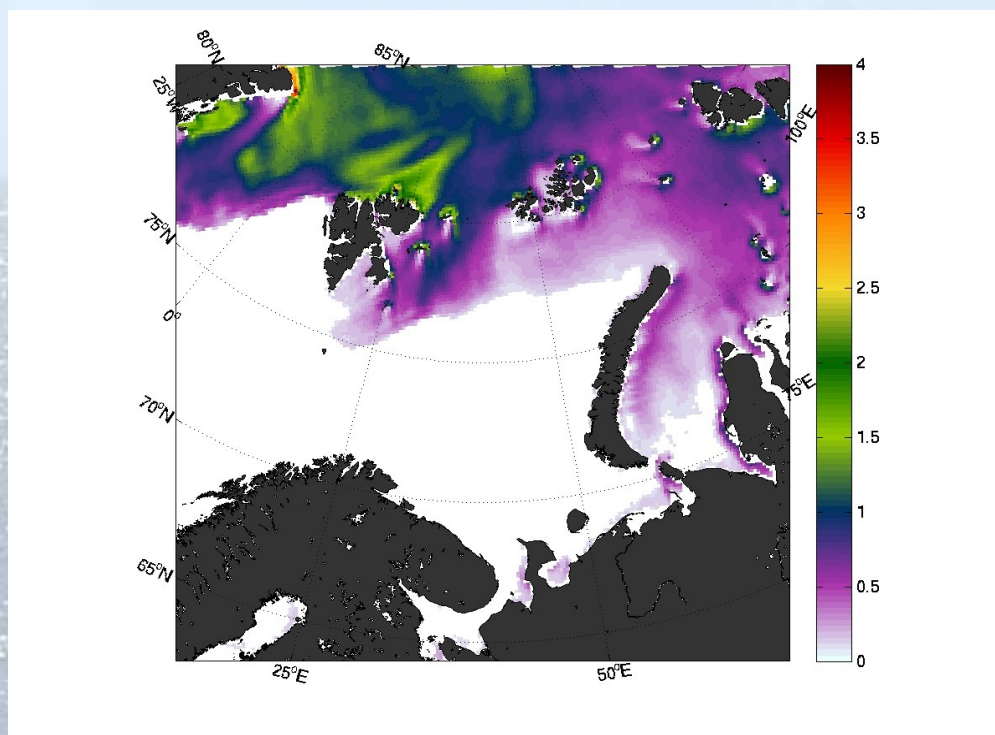
**Complex products, statistical information**

# Strategy – User Cases

- 1. Arctic Sea Ice and Metocean Observing System**
- 2. Near real time monitoring and forecasting of oil spills**
- 3. Relationships between physical and biological variables**
- 4. Ecosystem model validation**
- 5. International Coastal Atlas Network (ICAN) for coastal zone management**
- 6. Phytoplankton blooms in Gulf of Biscay and English Channel**

## UC-1: Arctic Sea Ice

Sea Ice forecast, real time access to latest sea ice



Topaz model ice thickness 16 Dec-2010 (NERSC)

## UC-3: Physical / Biological Variables

Attribute table - rsg:wfs\_insitu\_l4wqm :: 0 / 9170 feature(s) selected

	time	site_name	TEMP	PSAL	OXYC	FVLT
0	2009-06-21T...	L4	14.92	35.09	5.69	1.36
1	2009-06-21T...	L4	15.13	35.15	5.67	1.27
2	2009-06-22T...	L4	15.12	35.17	5.67	1.25
3	2009-06-22T...	L4	15.12	35.19	5.67	1.11
4	2009-05-28T...	L4	11.95	35.05	6.06	2.36
5	2009-05-28T...	L4	11.85	35.04	6.07	2.17
6	2009-05-28T...	L4	11.76	35.04	6.08	2.47
7	2009-06-25T...	L4	15.44	35.19	5.63	0.57
8	2009-06-25T...	L4	15.67	35.20	5.61	0.55
9	2009-06-25T...	L4	15.73	35.20	5.60	0.63
10	2009-06-25T...	L4	15.75	35.20	5.60	0.91
11	2009-07-20T...	L4	15.32	35.08	5.65	1.36
12	2009-07-20T...	L4	15.07	35.07	5.68	2.62

Look for  in  Search

Show selected only  Search selected only  Case sensitive

In situ WFS

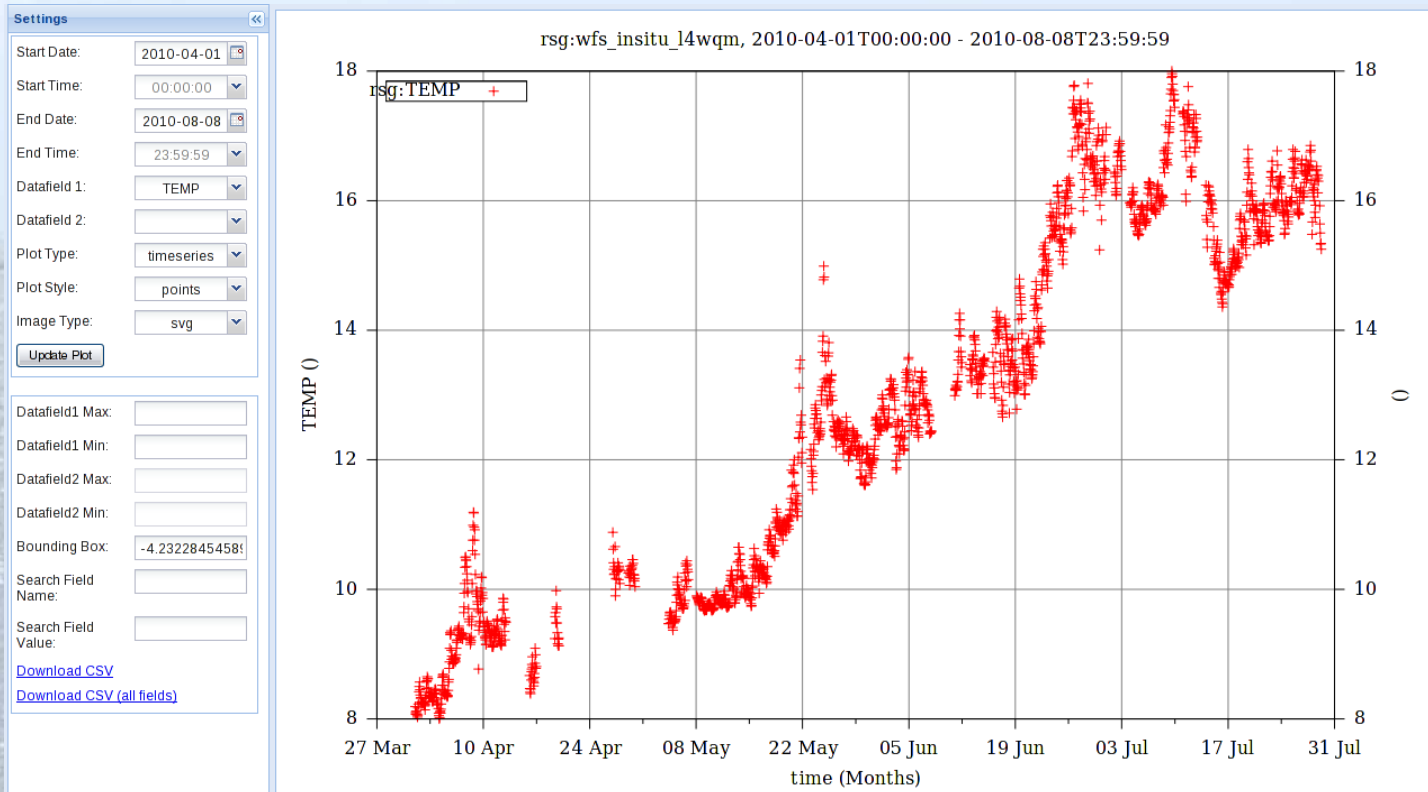


MODIS scene - WMS/WCS

Comparison of long term chlorophyll measurements at the L4 station with satellite observations by MODIS and MERIS

# UC-3: Physical / Biological Variables

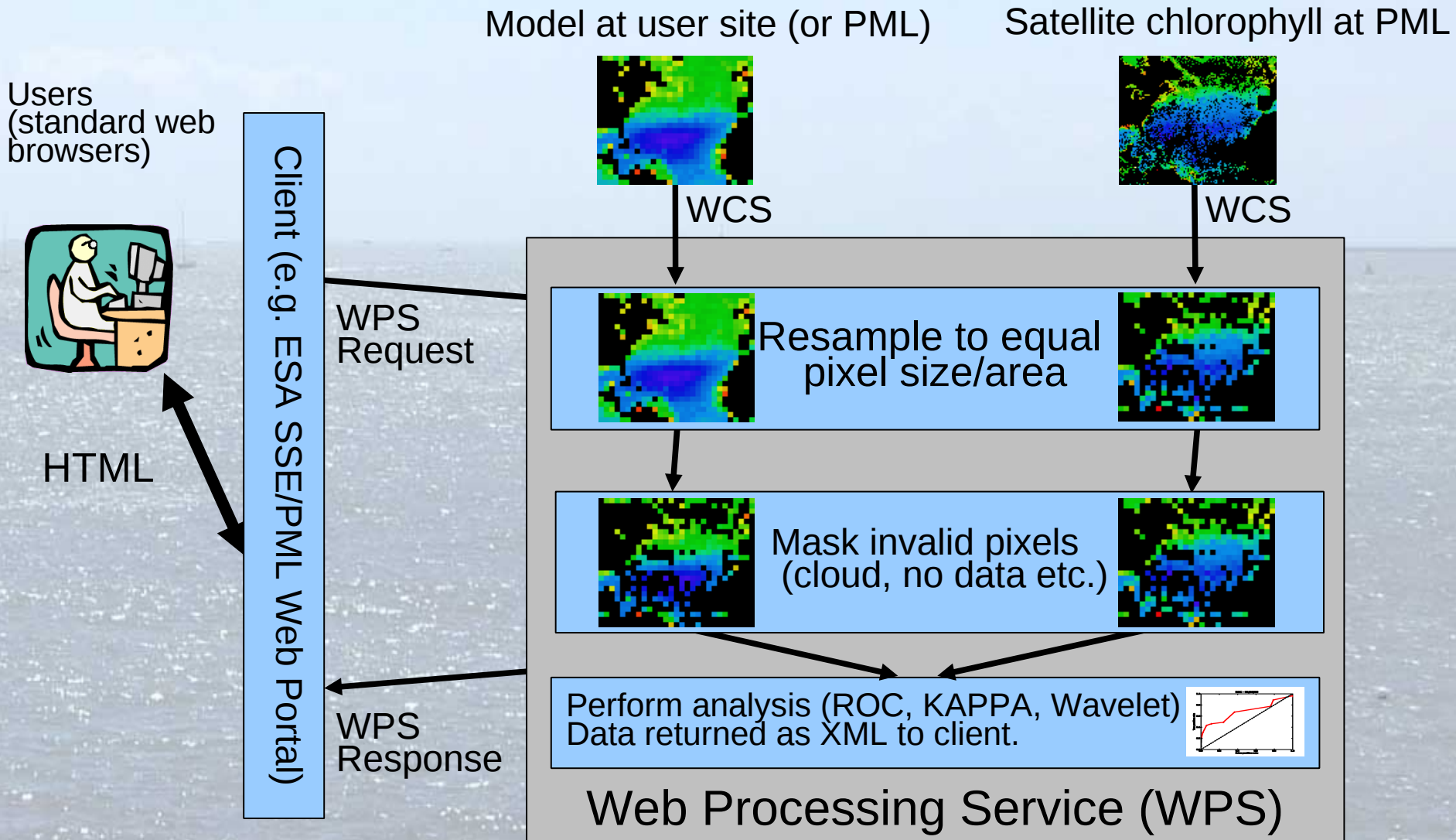
## Time series and spatial comparisons



L4 In situ – Time series



# UC-4: Satellite/Model comparison



## Solutions:

### Data Quality:

- Providing uncertainty when possible
- Consuming uncertainty when possible

Developers

Users

**uncert** | web



## Solutions:

### NetCDF file format using UncertML standard:

```
:netcdf_file_type = "NETCDF4_CLASSIC" ;
```

```
:Conventions = "CF-1.4" ;
```

```
:institution = "Plymouth Marine Laboratory Remote Sensing Group" ;
```

```
:history = "Created during RSG Standard Mapping (MODIS-AQUA-NASA-  
refined-mapper-config.cfg) [SGE Job Number: 3653900]" ;
```

```
:Conventions="CF-1.4,UncertML"
```

# Solutions:

## NetCDF file format with uncertainty definition

variables:

```
double Lon(Lon) ;
```

```
    Lon:units = "degreesE" ;
```

```
double Lat(Lat) ;
```

```
    Lat:units = "degreesN" ;
```

```
float temperature_Gaussian_Mean(Lat, Lon) ;
```

```
    temperature_Gaussian_Mean:units = "degC" ;
```

```
    temperature_Gaussian_Mean:missing_value = -999.f ,
```

```
    temperature_Gaussian_Mean:uncertML_ref =
```

```
    "http://dictionary.uncertml.org/distributions/Gaussian/Mean" ;
```

**Explanation of Uncertainty**

# Solutions:

## NetCDF file format with uncertainty relations

variables:

```
float temperature_Gaussian_Mean(Lat, Lon) ;  
.....:ancillary_variables="temperature_Gaussian Variance"
```

```
float temperature_Gaussian_Variance(Lat,Long)  
temperature_Gaussian_Mean:uncertML_ref ="http://...Variance"
```

**Use of ancillary\_variables**

## **Solutions:**

**Development of WPS that understand uncertainty**

**Should coexist with existing systems, without change**

**Wrapping existing analysis code as WPS**

**Use semantics to increase service description and  
functionality**

# Developments:

## WPS orchestration using WSDL/SOAP

The screenshot displays the Taverna Workbench 2.2.0 interface. On the left, the 'Service panel' lists various WPS services, with 'ExecuteProcess\_histogramprocess' selected. Below it, the 'Workflow explorer' shows a tree view of the workflow components, including 'Workflow input ports', 'Workflow output ports', 'Services', and 'Data links'. The 'Workflow diagram' on the right shows a sequence of steps: 'imageInput\_value' (input) feeds into 'imageInput' (process), which outputs to 'ExecuteProcess\_histogramprocess\_DataInputs'. This process outputs to 'DataInputs', which then feeds into 'ExecuteProcess\_histogramprocess\_ProcessO outputs', resulting in 'input' and 'histogramOutputResult'. The 'input' feeds into 'base64' (process), which outputs 'bytes', which finally feeds into 'Decode\_Base\_64\_to\_byte\_Array' (process), resulting in 'Output'.

**WPS service running inside Taverna**

## Developments:

### - WPS / PyWPS wiki

[http://wiki.rsg.pml.ac.uk/pywps/index.php/Main\\_Page](http://wiki.rsg.pml.ac.uk/pywps/index.php/Main_Page)

### - Netmar portal

<http://netmar.nerisc.no>



## Acknowledgements :

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**Thank you !!!!!!!**