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Listen to the ocean

AlgaRisk algal bloom warning system & Data visualisation on the web

Peter Miller, Andriy Kurekin, Steve Groom and the AlgaRisk and PML visualisation teams

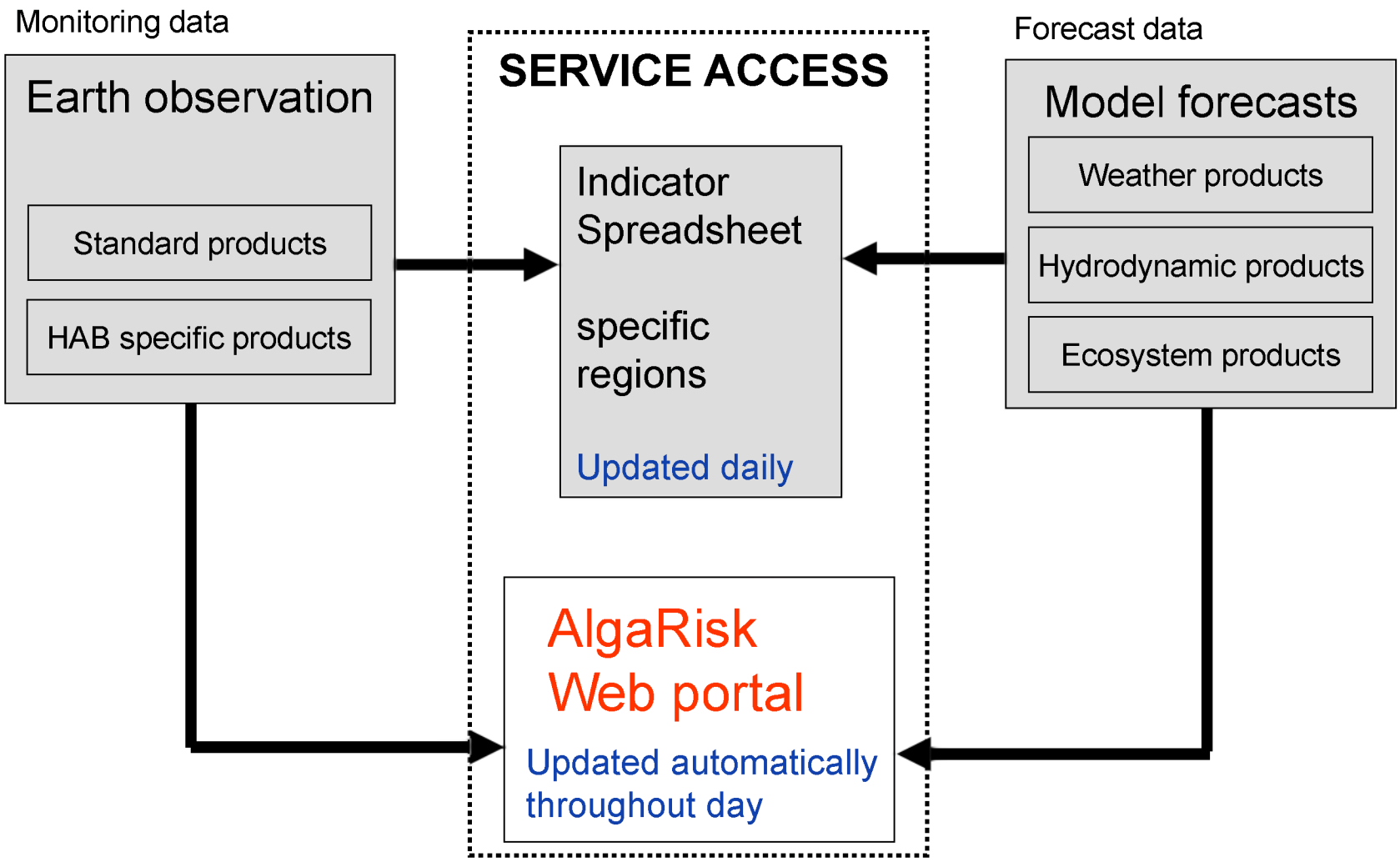
sbg@pml.ac.uk

2 Mers Seas Zeeën
INTERREG IV A
FRANCE - ENGLAND - VLAANDEREN - NEDERLAND

Invest in our future

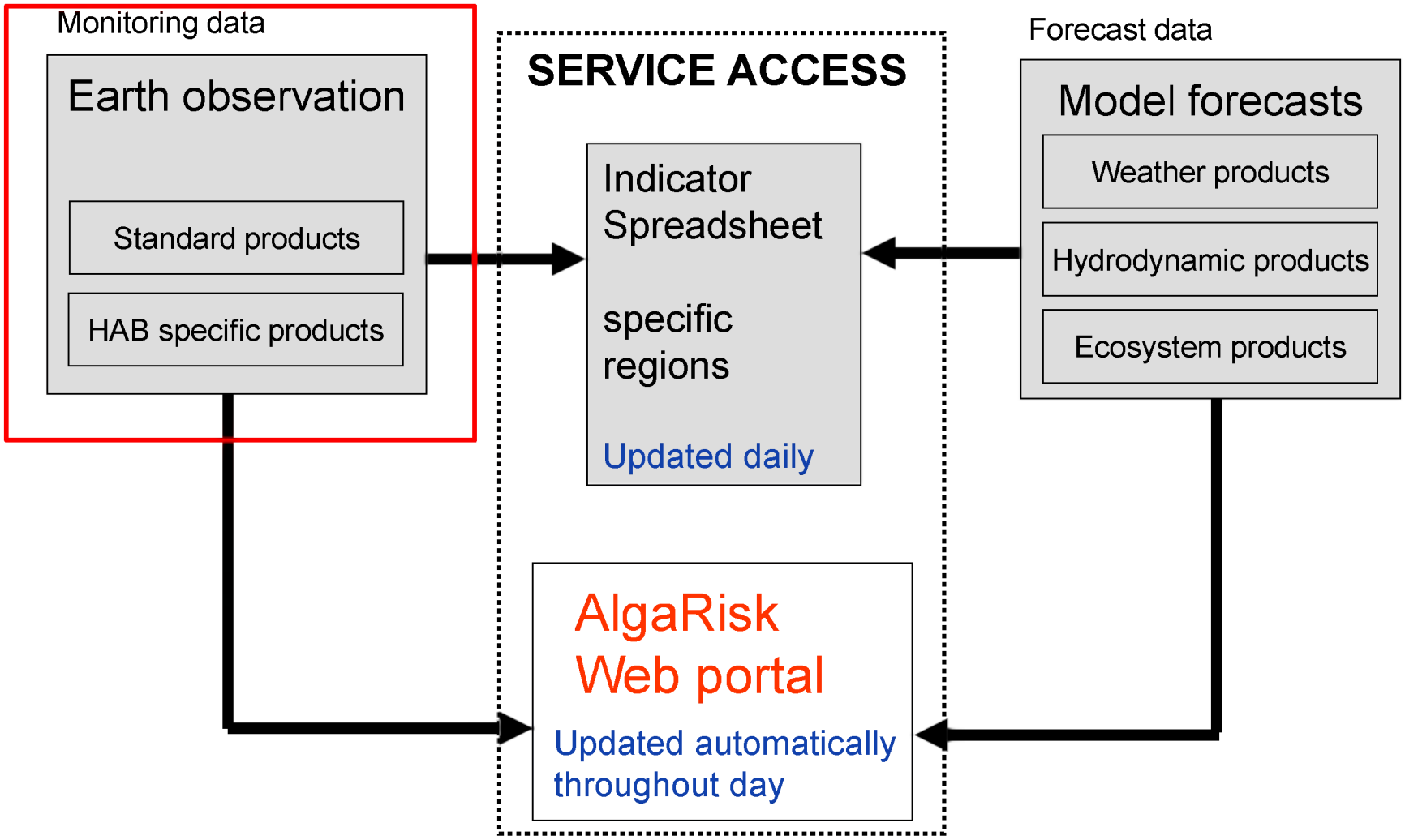
iseca
INFORMATION SYSTEM ON THE EUTROPHICATION OF OUR COASTAL AREAS

AlgaRisk bloom warning system



- Earth observation (satellites) to give a picture of bloom formation
- Numerical models to predict what will happen over the next few days
- Simple stochastic model to apply this to an individual bathing water

AlgaRisk bloom warning system



- Earth observation (satellites) to give a picture of bloom formation

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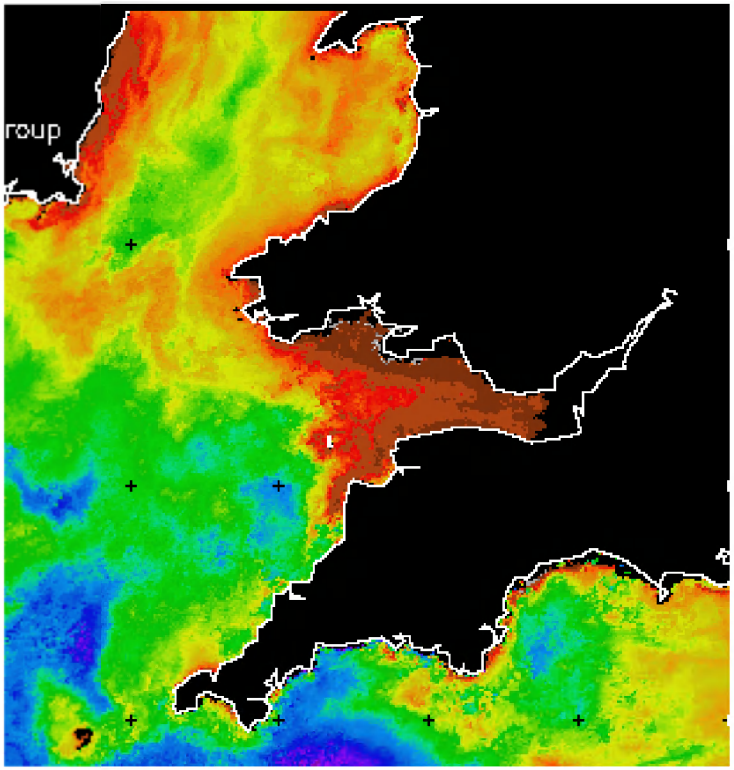
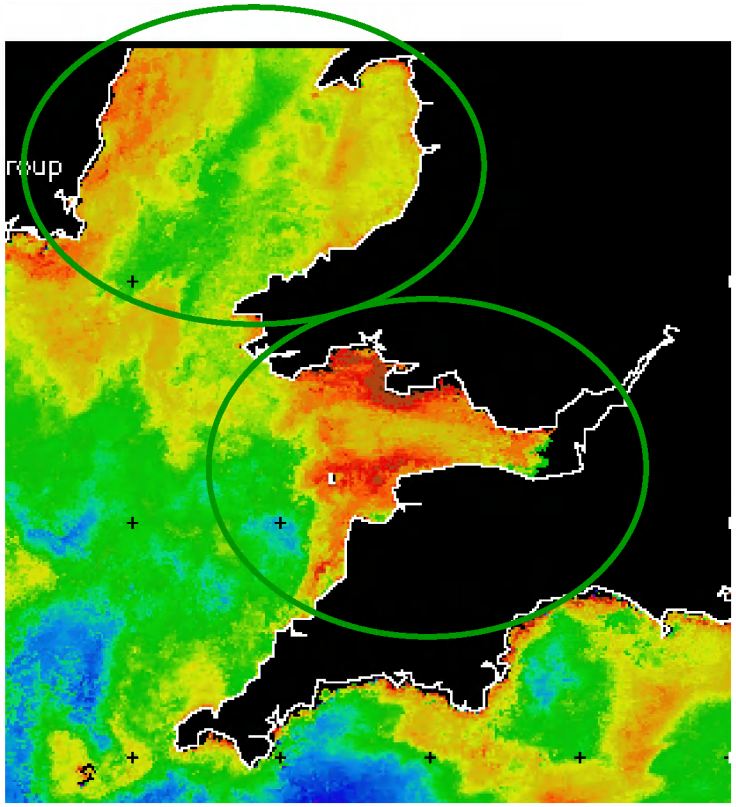
Operational case 2 chl-a algorithm



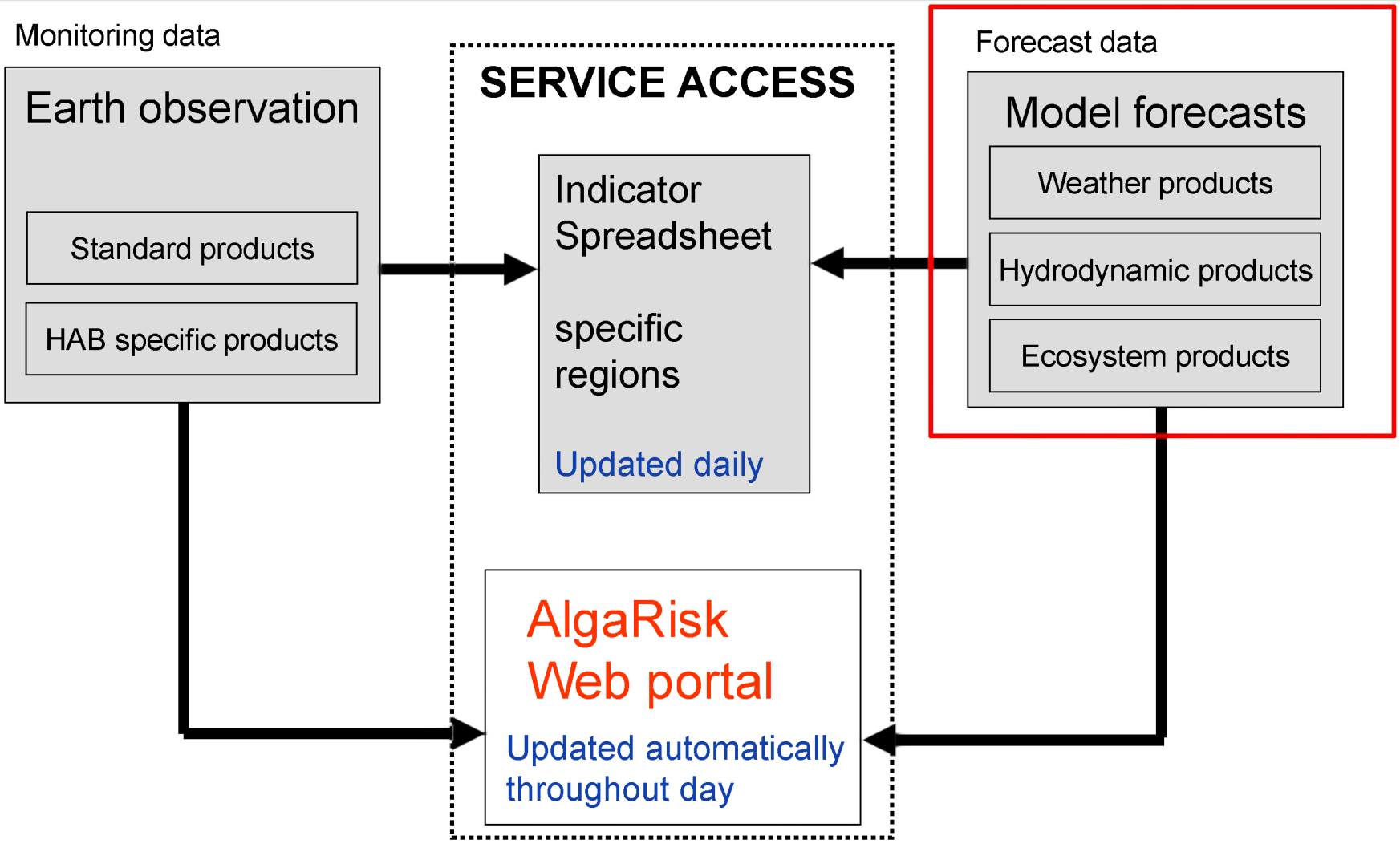
Chl-*a* using standard NASA OC3 algorithm



Chl-*a* using Ifremer OC5 algorithm

7-day chl-a maps for 12 June 2008, PML RSG

AlgaRisk bloom warning system



- Numerical models to predict what will happen over the next few days

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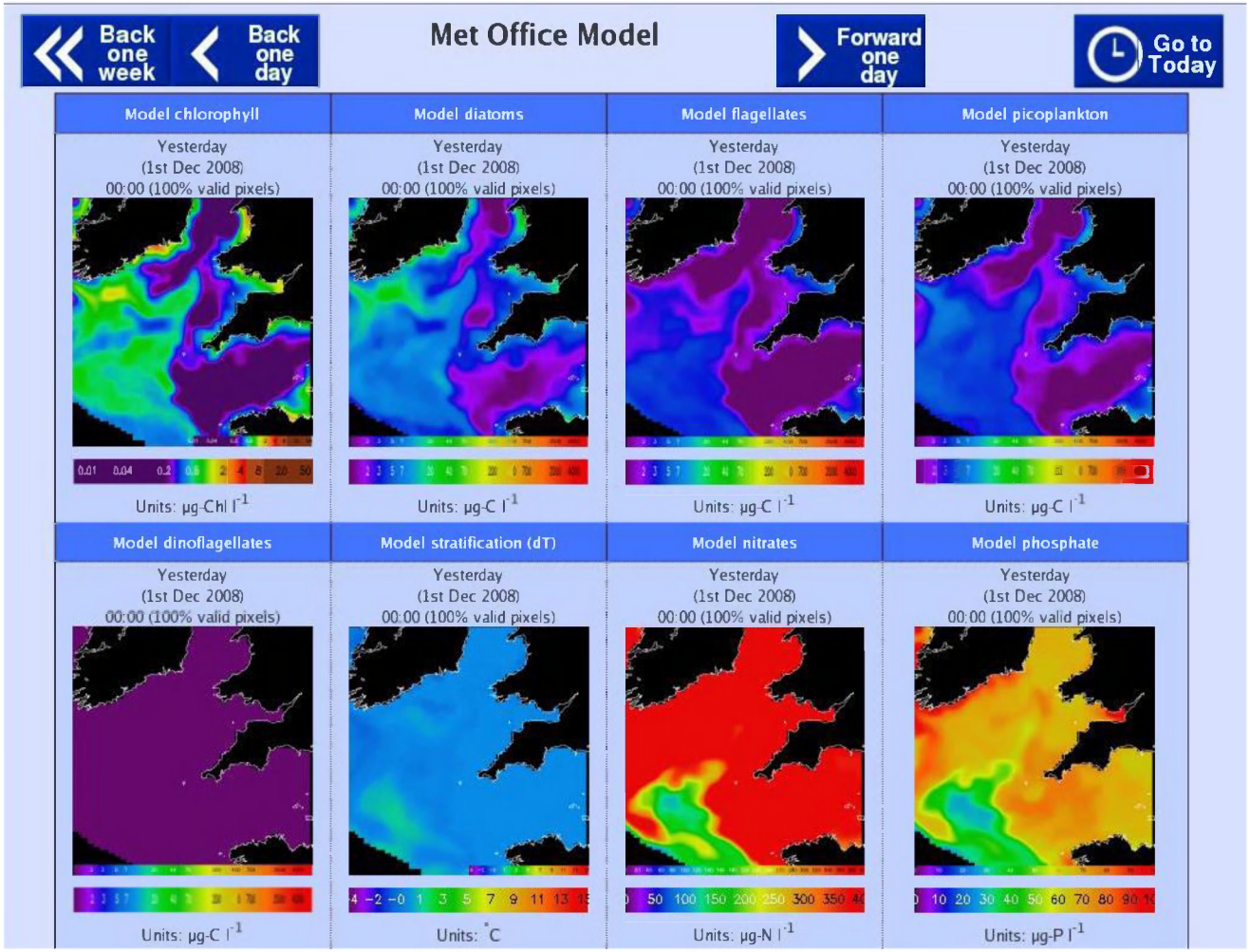
Medium Resolution Continental Shelf model

- UK Met Office MRCS with European Regional Seas Ecosystem Model
- Operational real-time shelf-seas forecasting system.



Parameters:

- SST, salinity
- Stratification
- Currents (speed & direction)
- PAR, winds, cloud
- Chl
- Phytoplankton biomass: flagellates, diatoms, dinoflagellates, picoplankton
- Nutrients, N:P ratio

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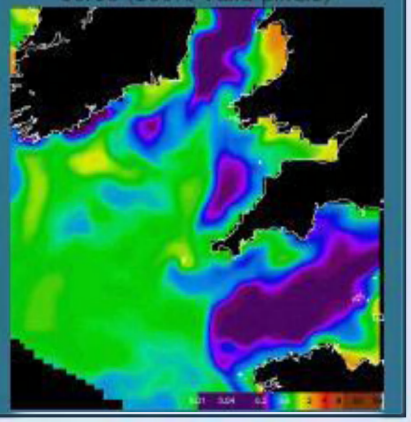
MRCS ecosystem forecast

Back one week | Back one day | Met Office Model | Forward one day | Go to Today

Viewing model forecast starting from: 12th Nov 2008

Nowcast

2 Days Ago
(12th Nov 2008)
00:00 (100% valid pixels)



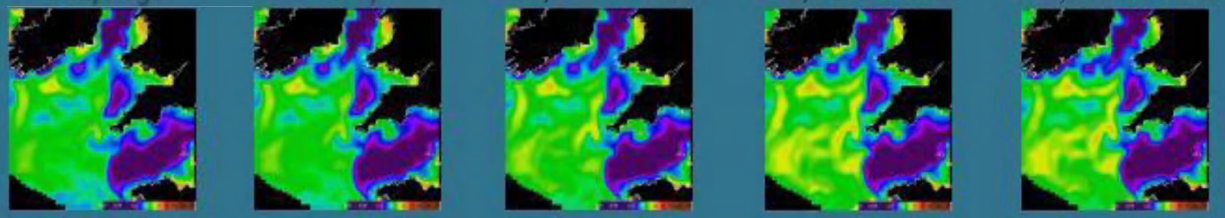
Select product:

Chlorophyll

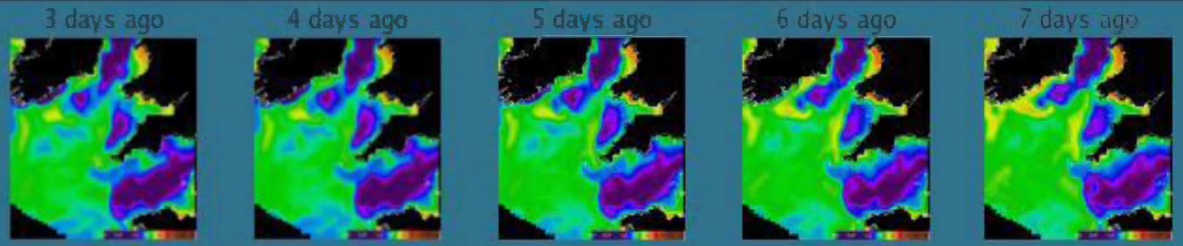
Current product: Chlorophyll

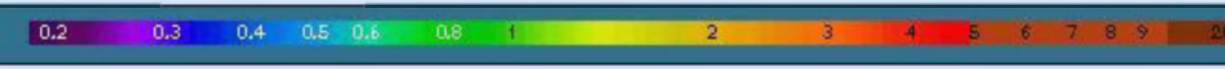
Units: µg-Chl l^{-1}

5 day forecast

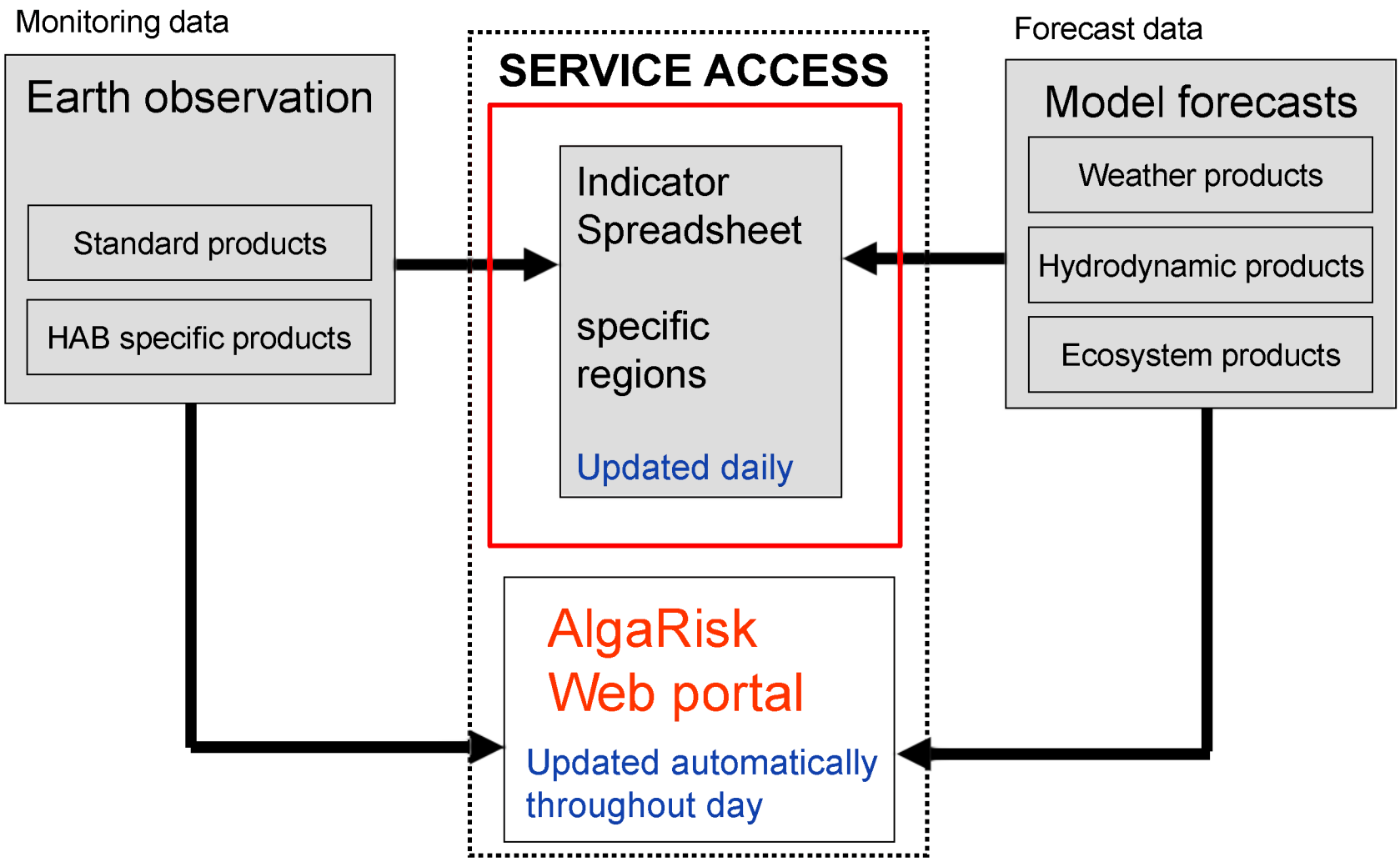


Earlier nowcasts





AlgaRisk bloom warning system



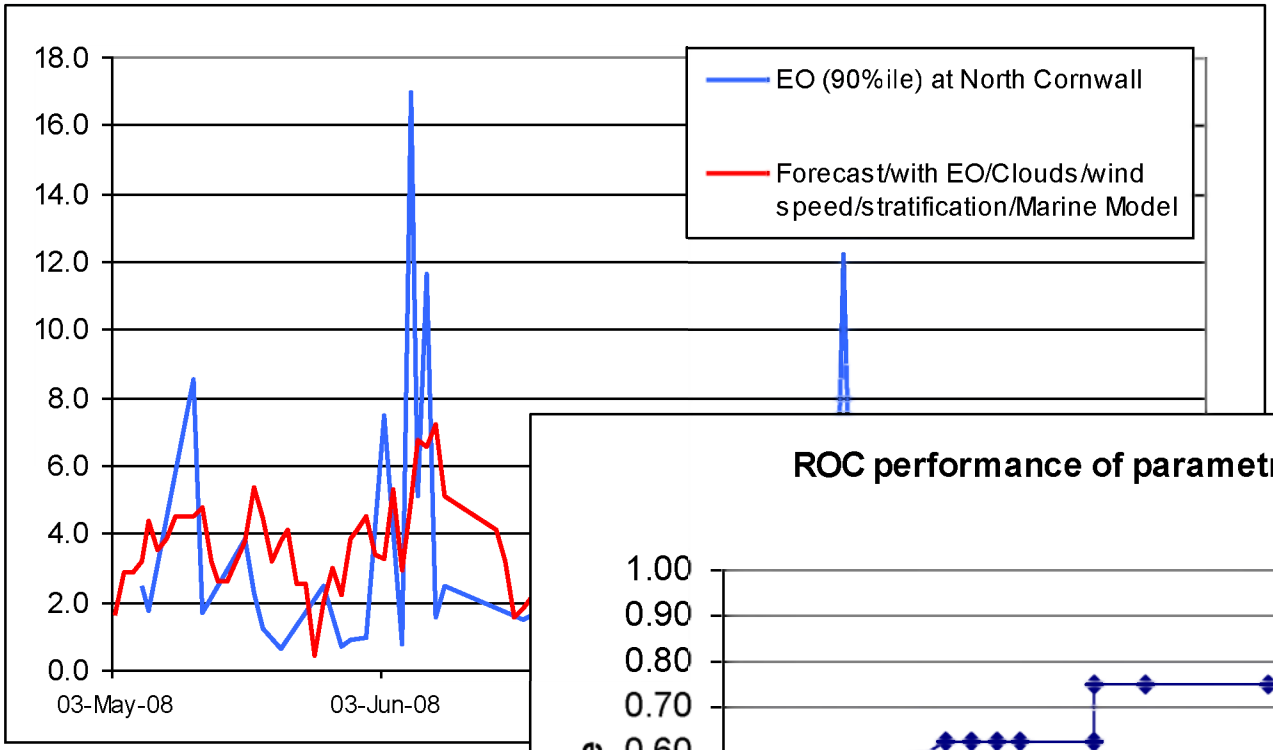
- Simple stochastic model to apply this to an individual bathing water

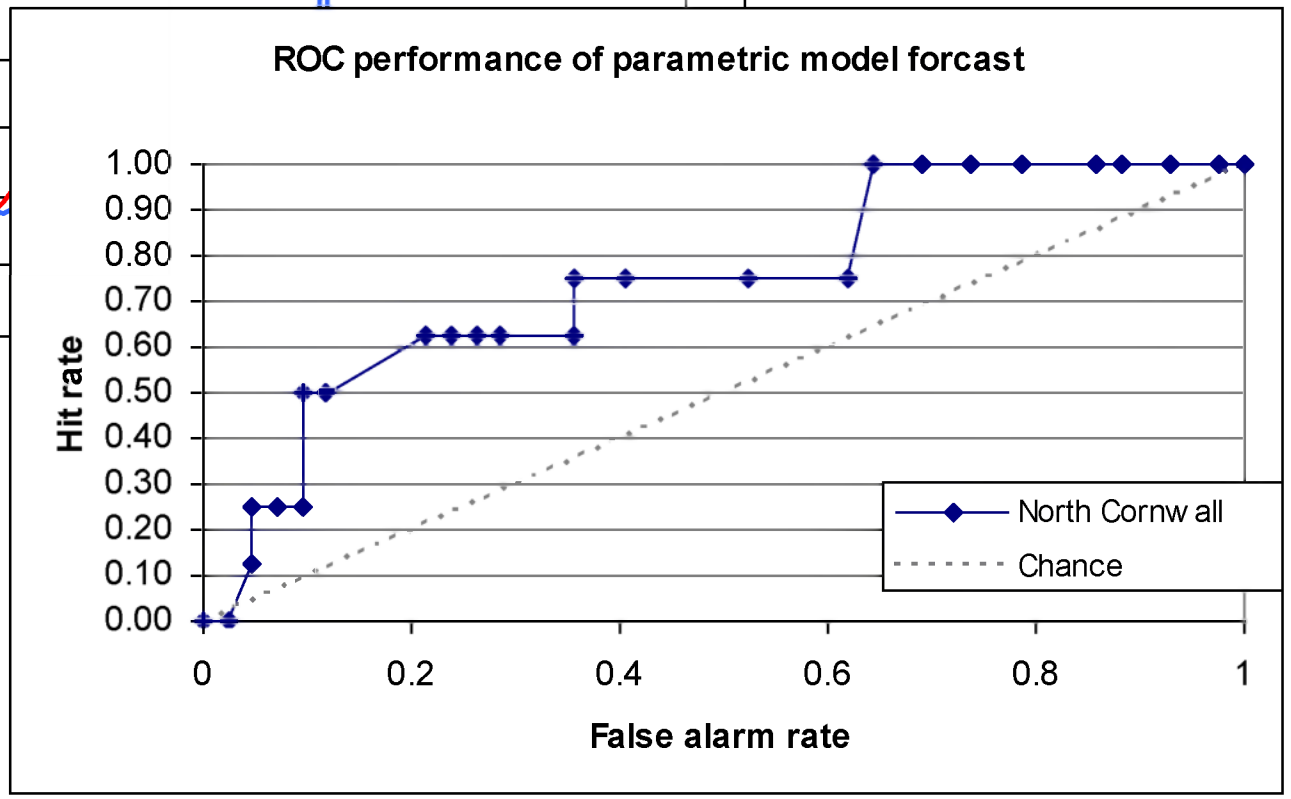
Indicators - Data

- Data extracted automatically from each of 10 regions daily, from model/EO (e.g. median, 90th percentile), and sent to Env. Agency

- Simple parametric model is used to indicate if a bloom is likely within the next few days based on weighting of:
  - sunlight,
  - wind,
  - pressure,
  - SST
  - stratification,
  - EO Chl-a

ROC evaluation of Forecasts 2008





Forecasts had some skill in "certain regions"

AlgaRisk

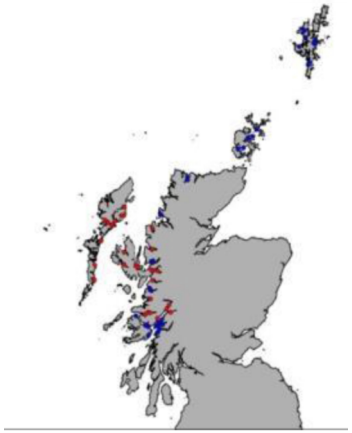
- AlgaRisk as a service is no longer in operation but could be re-established easily

- However, PML provides EO Based services funded through industry for Scotland

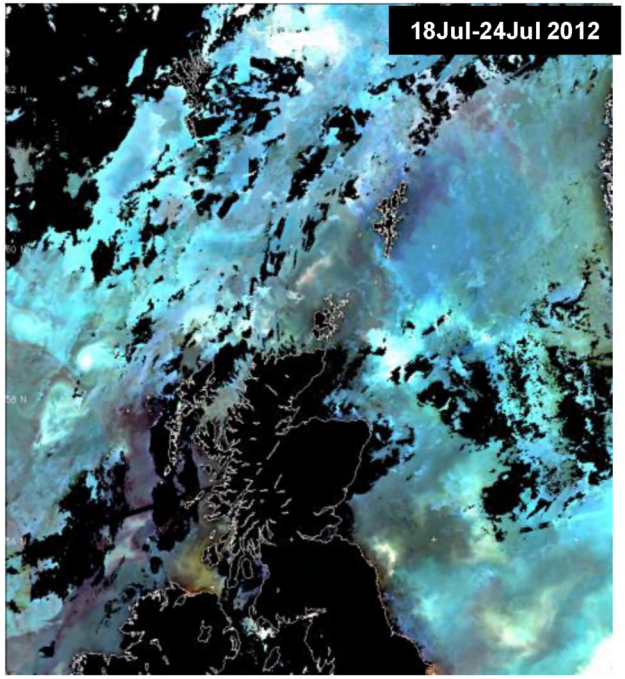
Detection of *Karenia mikimotoi* HAB in western Scottish waters

Karenia mikimotoi bloom in summer 2012:

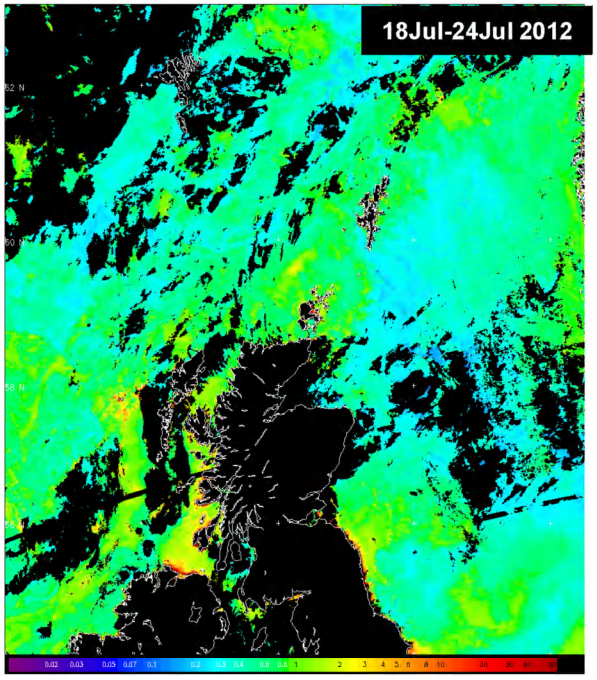
- Initiated in early summer (May-June)
- Series of blooms detected around Irish coastline
- Mid July. Offshore bloom drifts northwards.
- Reports on wild fish and invertebrate mortalities



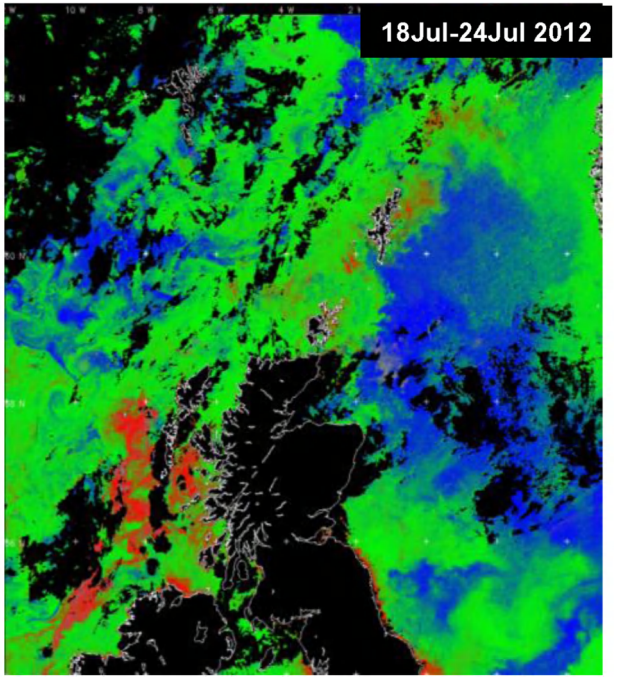
Enhanced ocean colour image



Chlorophyll-a map



HAB risk map



HAB risk harmless no bloom

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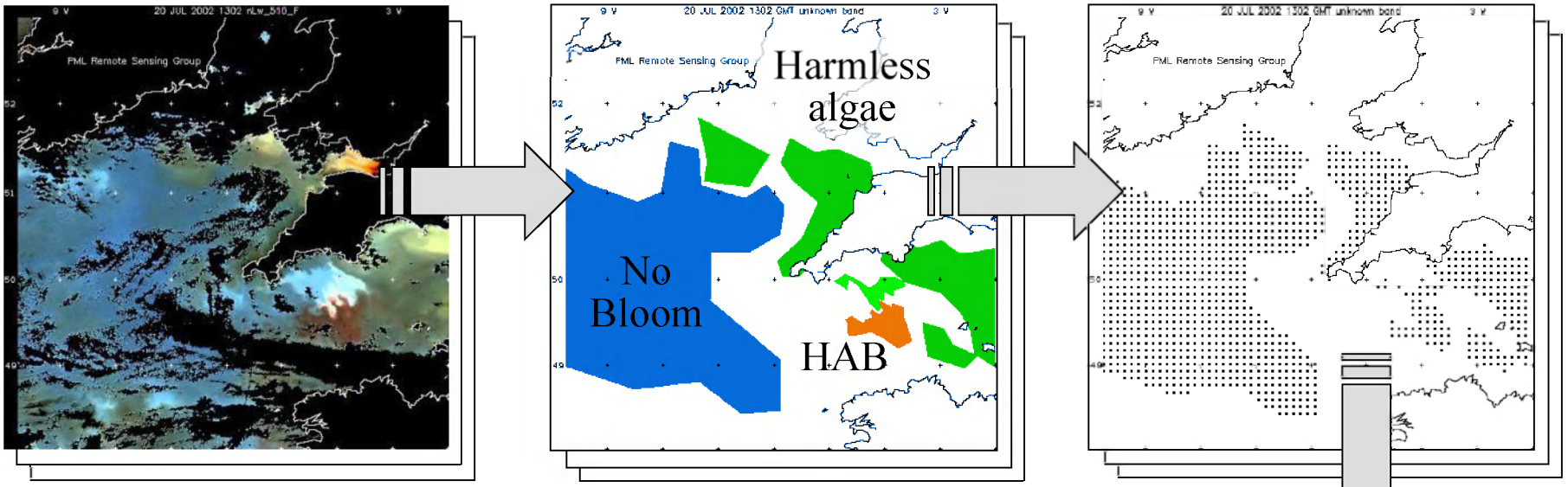
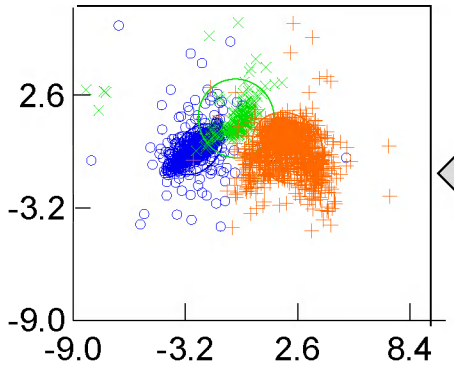
Multivariate HAB discrimination method

Ocean colour scenes

Manual training

Training samples





Classifier

SYSTAT

Multivariate analysis

$Lwn(\lambda)$
$a(\lambda)$
$bb(\lambda)$

Ocean properties

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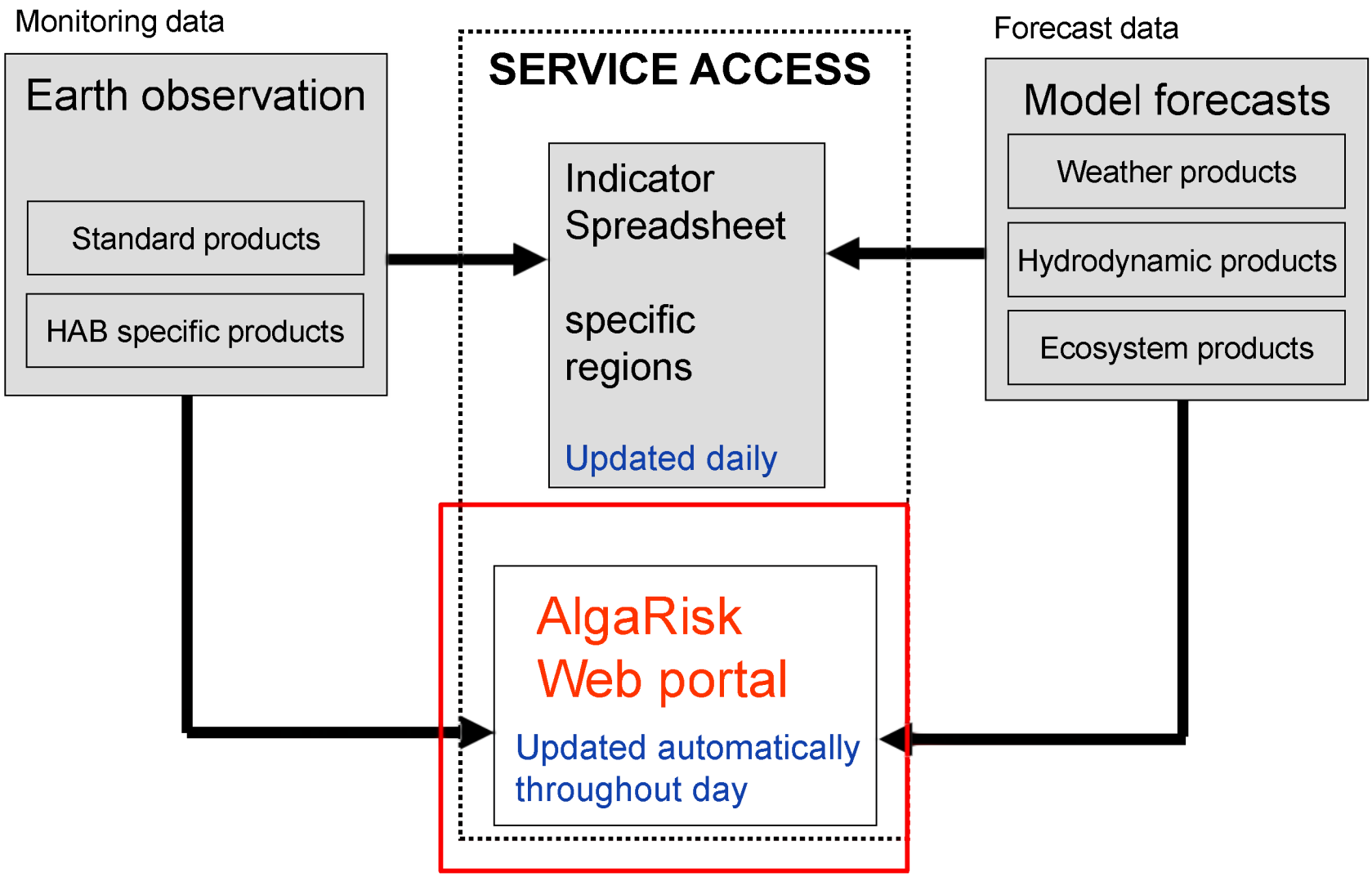
AlgaRisk bloom warning system



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Environment Agency

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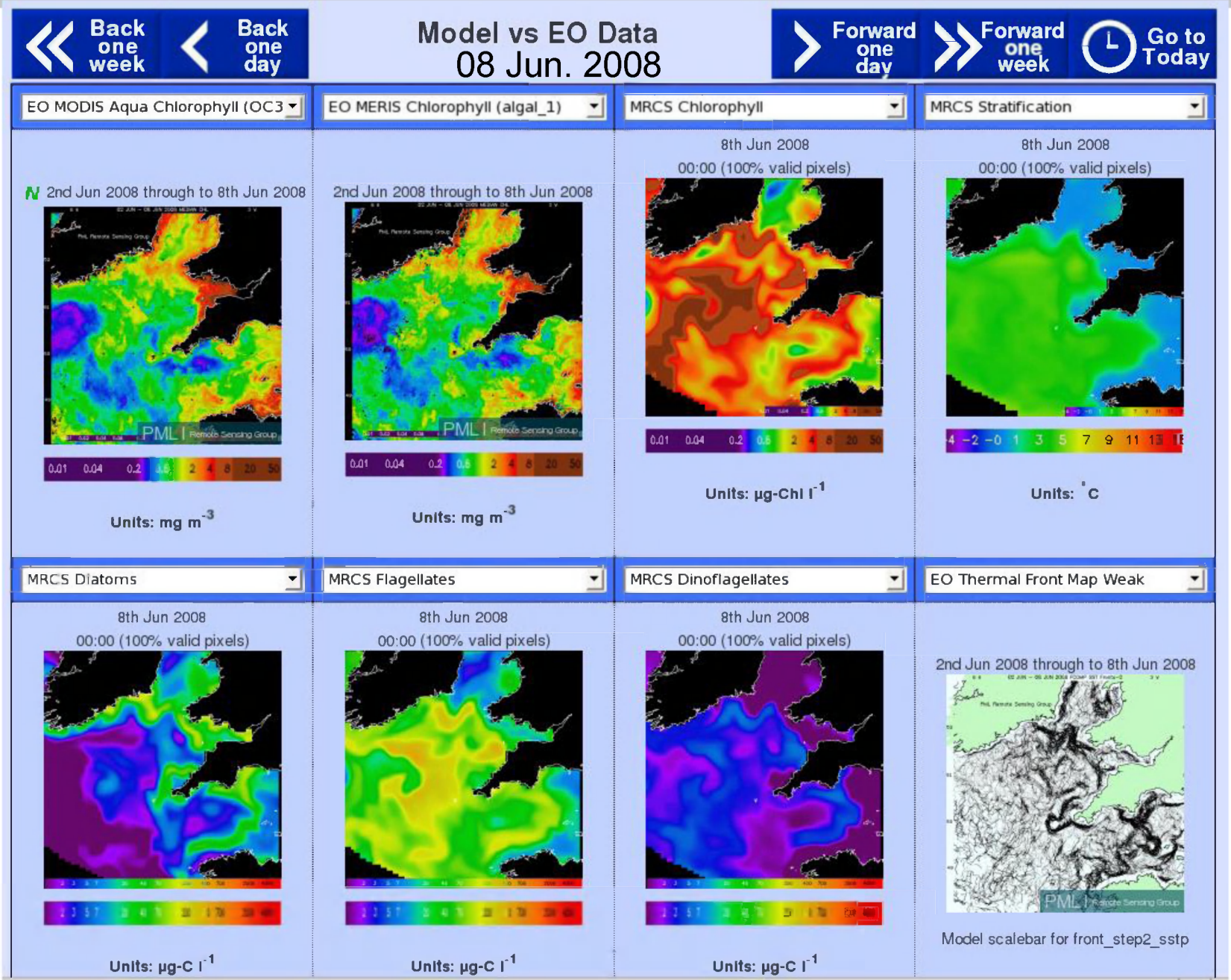
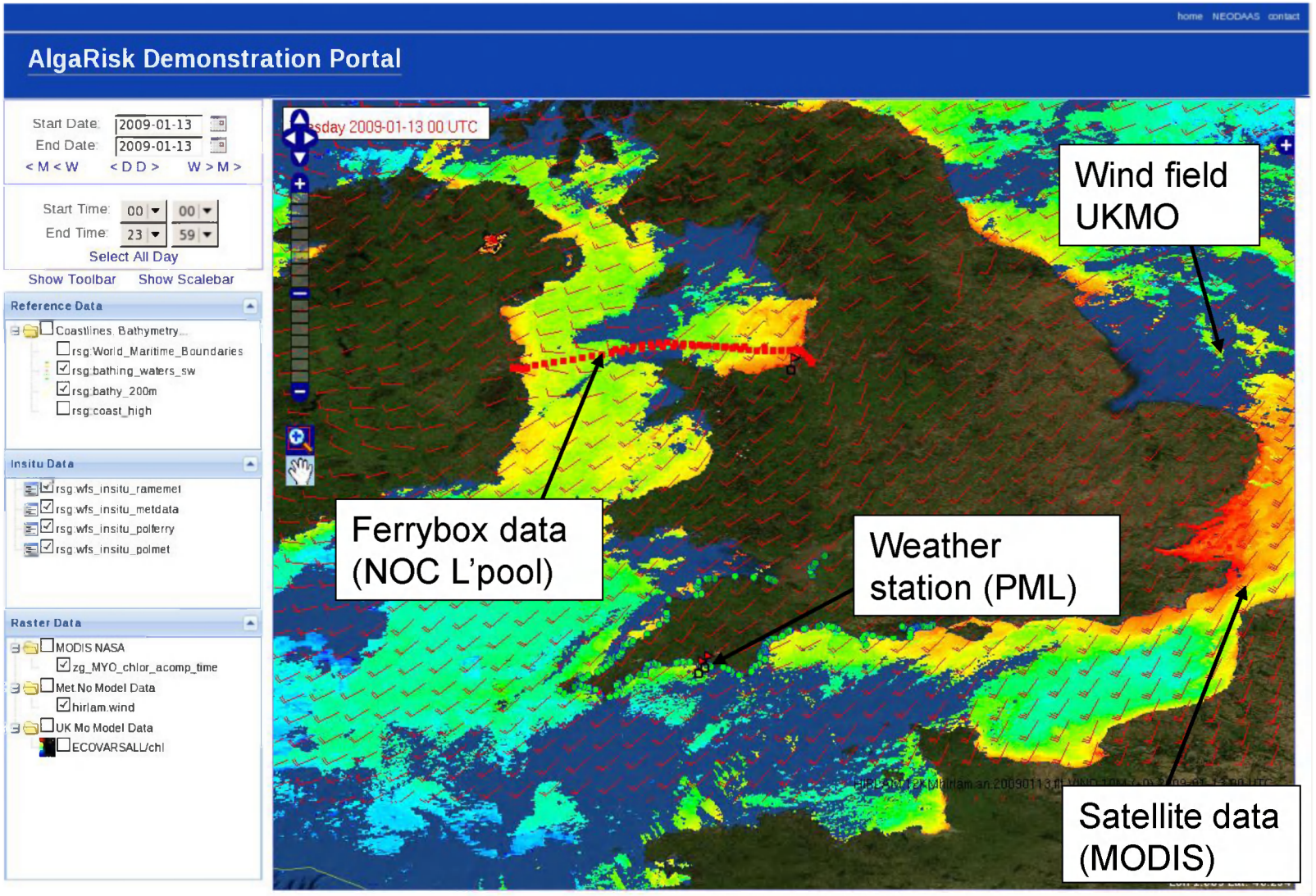
Model vs EO comparison tool



ISECA Web-GIS

- Uses Open Geospatial Consortium web standards (like WAS)
- Different data (model/ EO /in situ) from different sources



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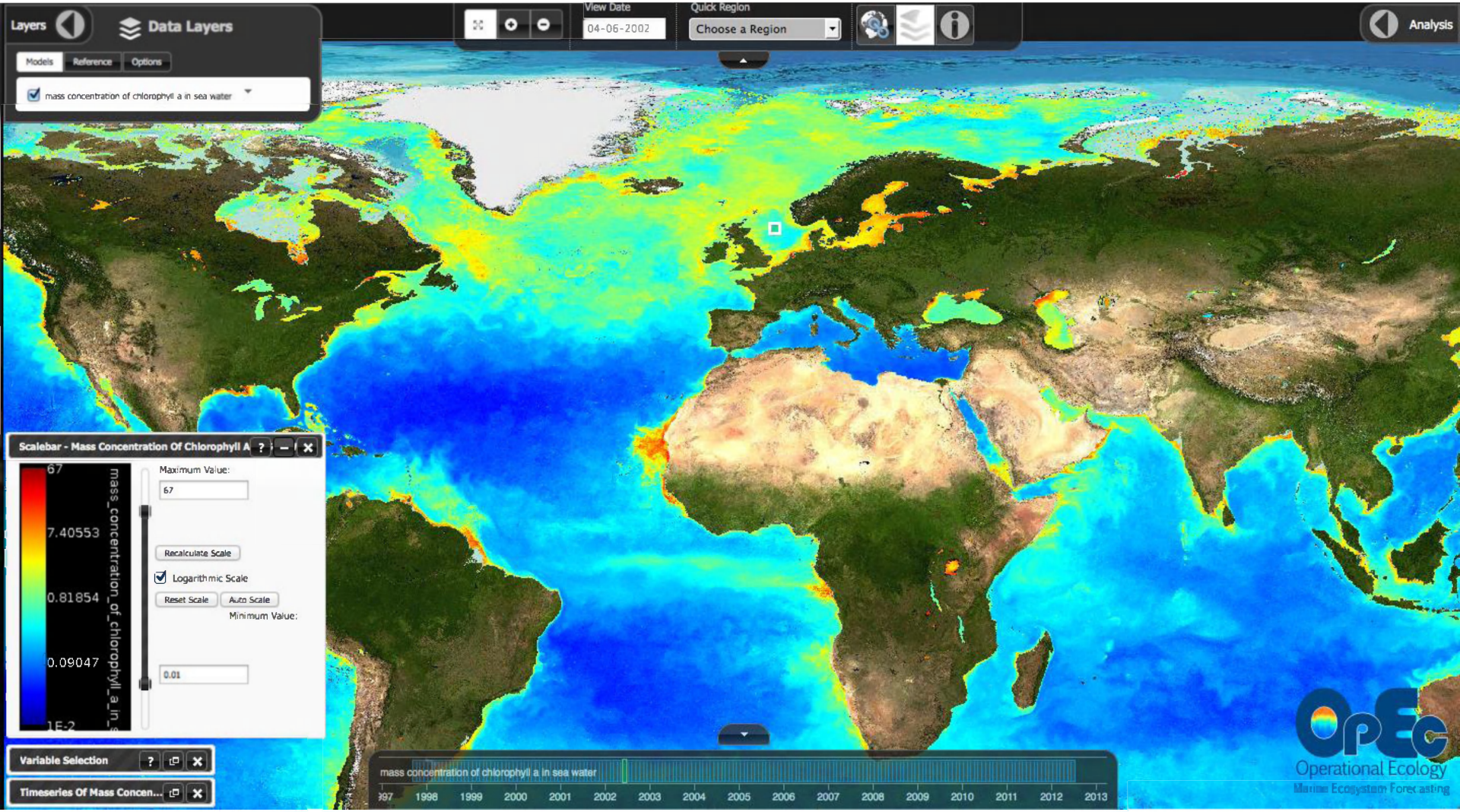
Current PML Web Visualisation

- Systems allow web-based visualisation and data analysis



- Data from the ESA Ocean Colour Climate Change Initiative project

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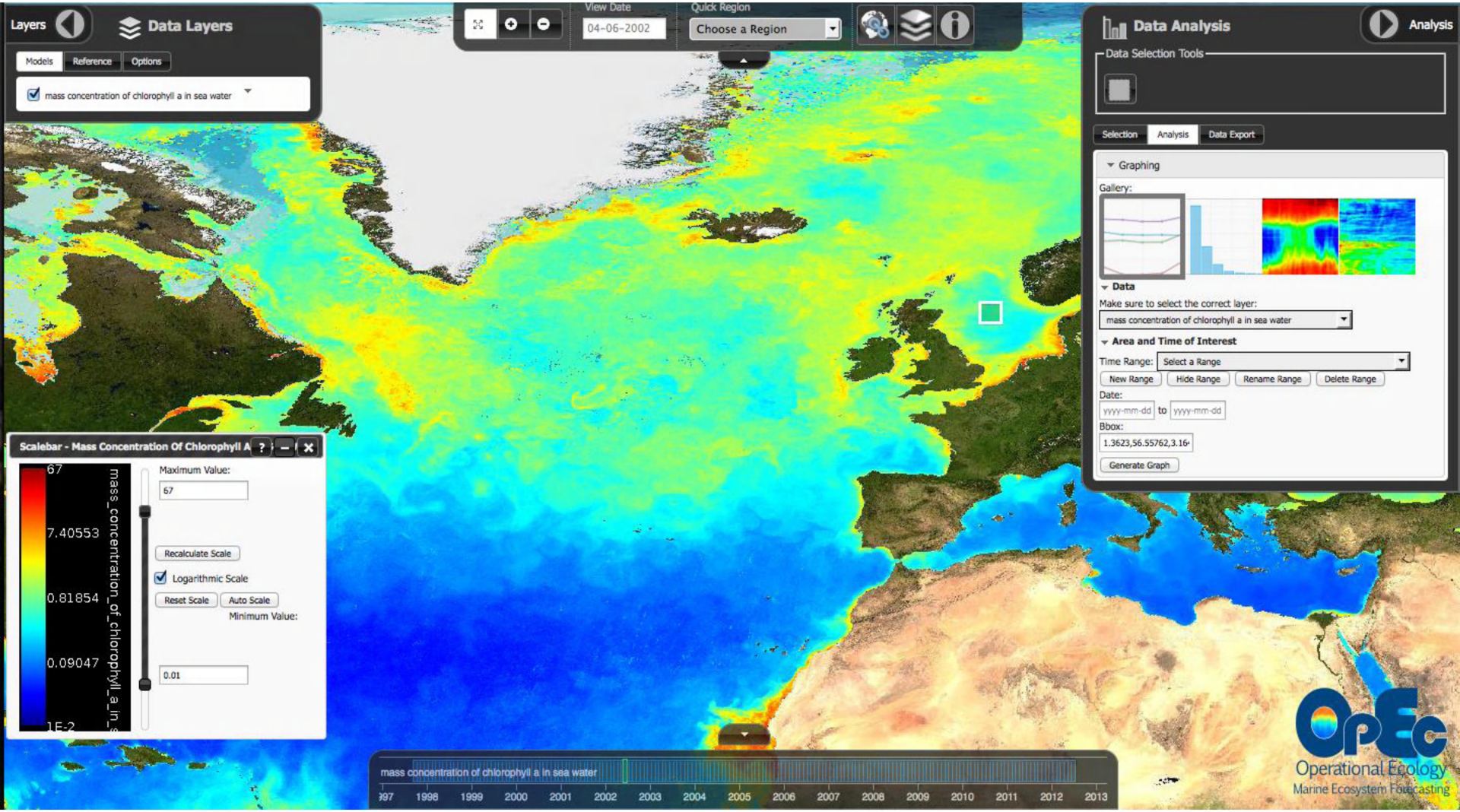

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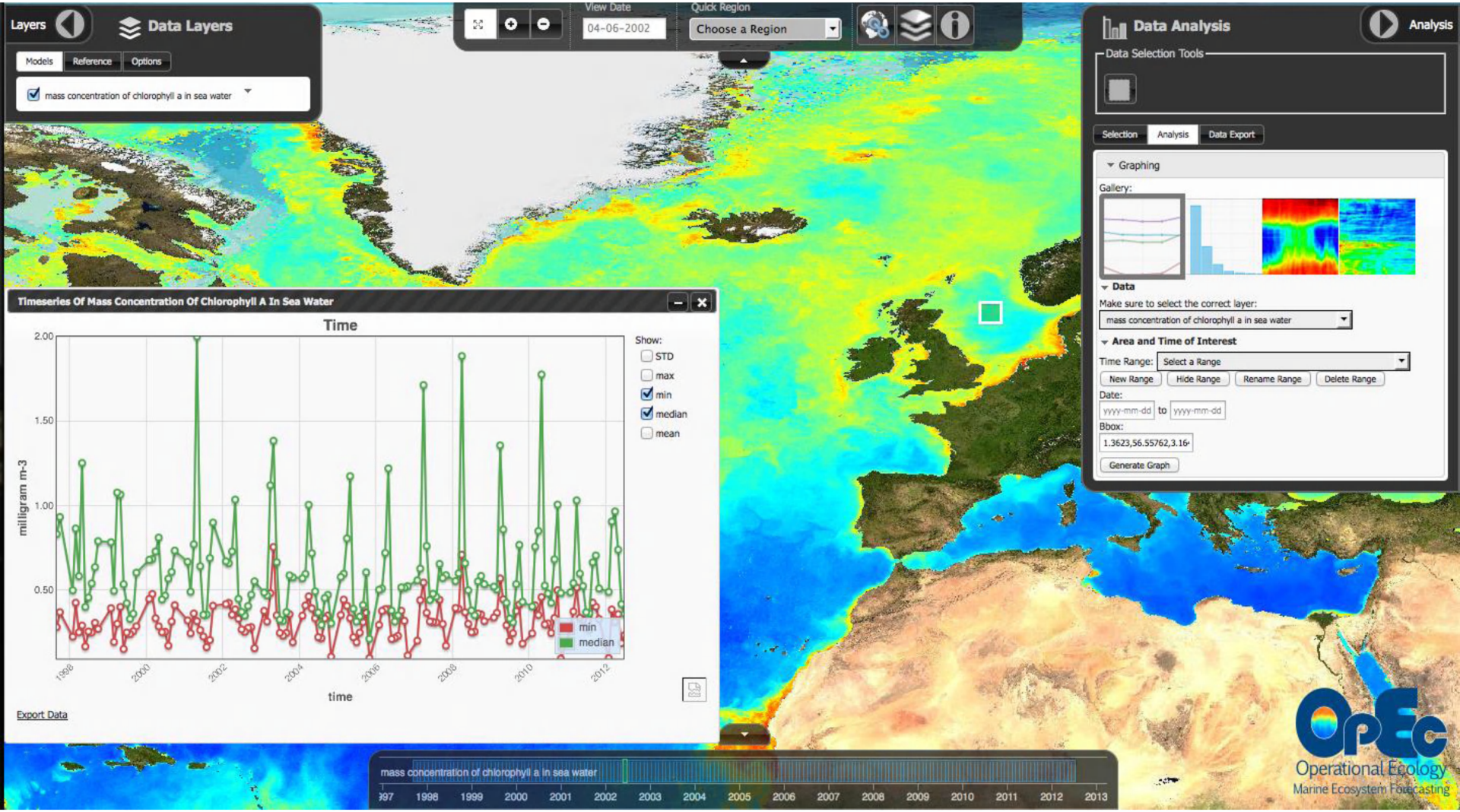

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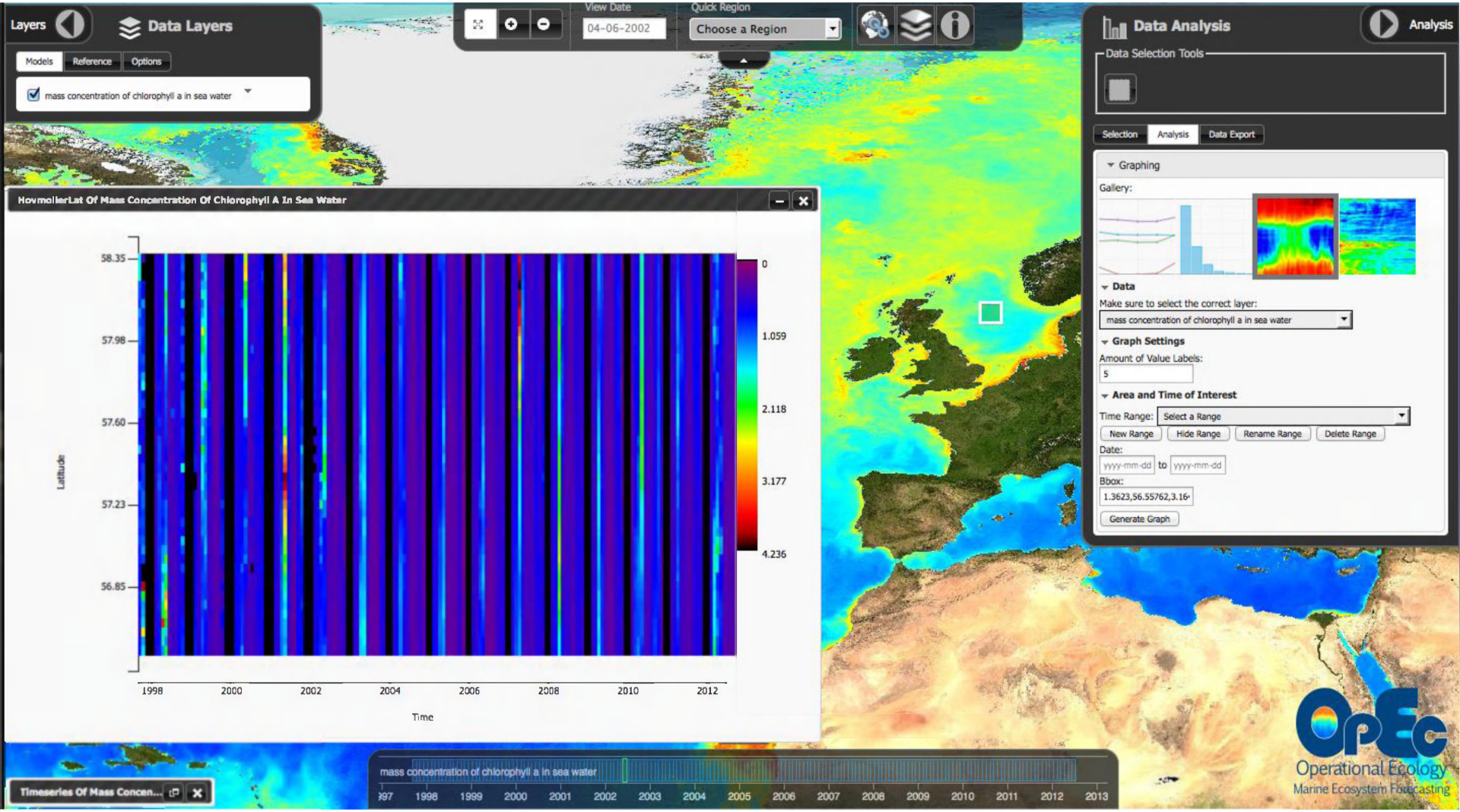

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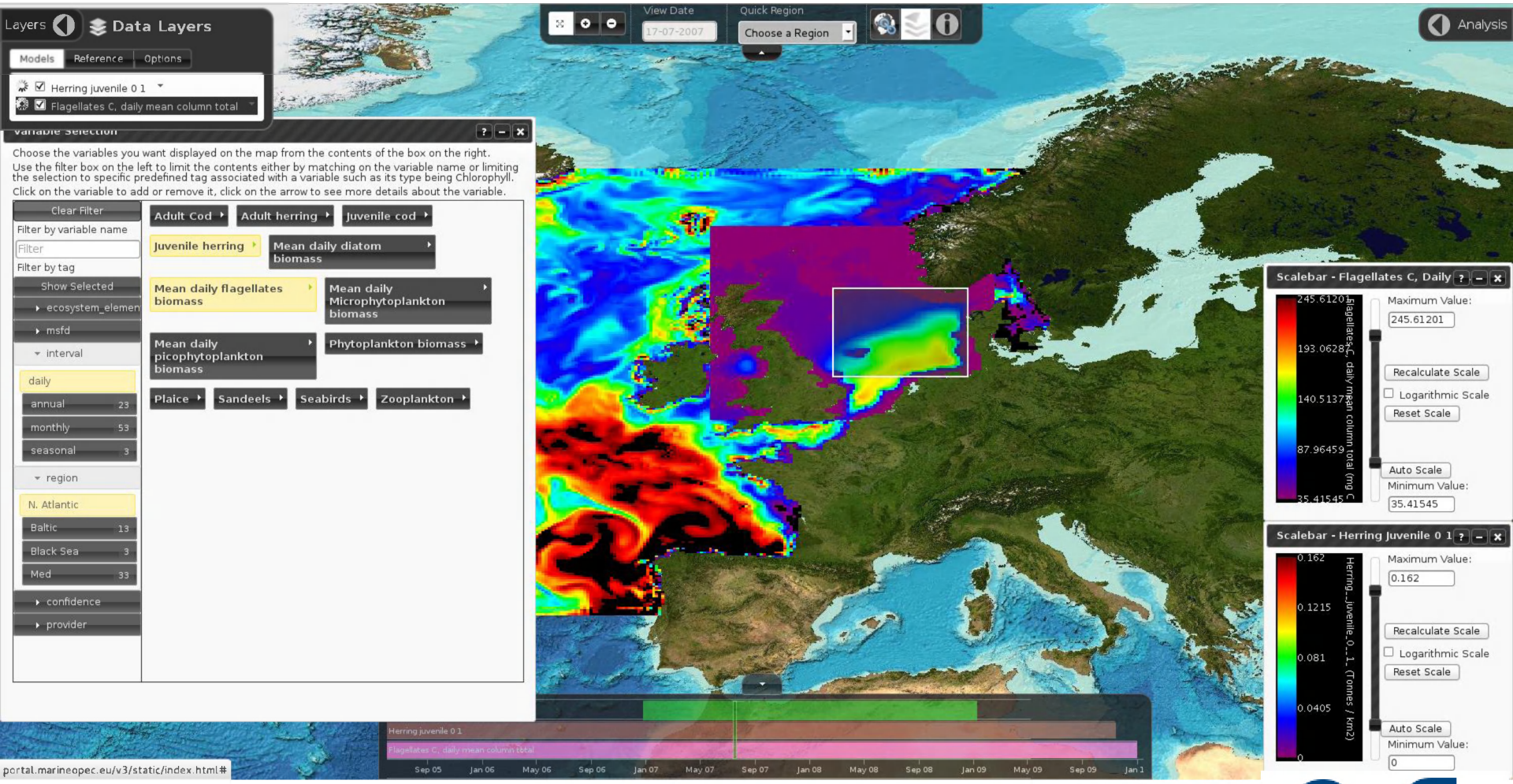
Current PML Web Visualisation

- With multiple layers

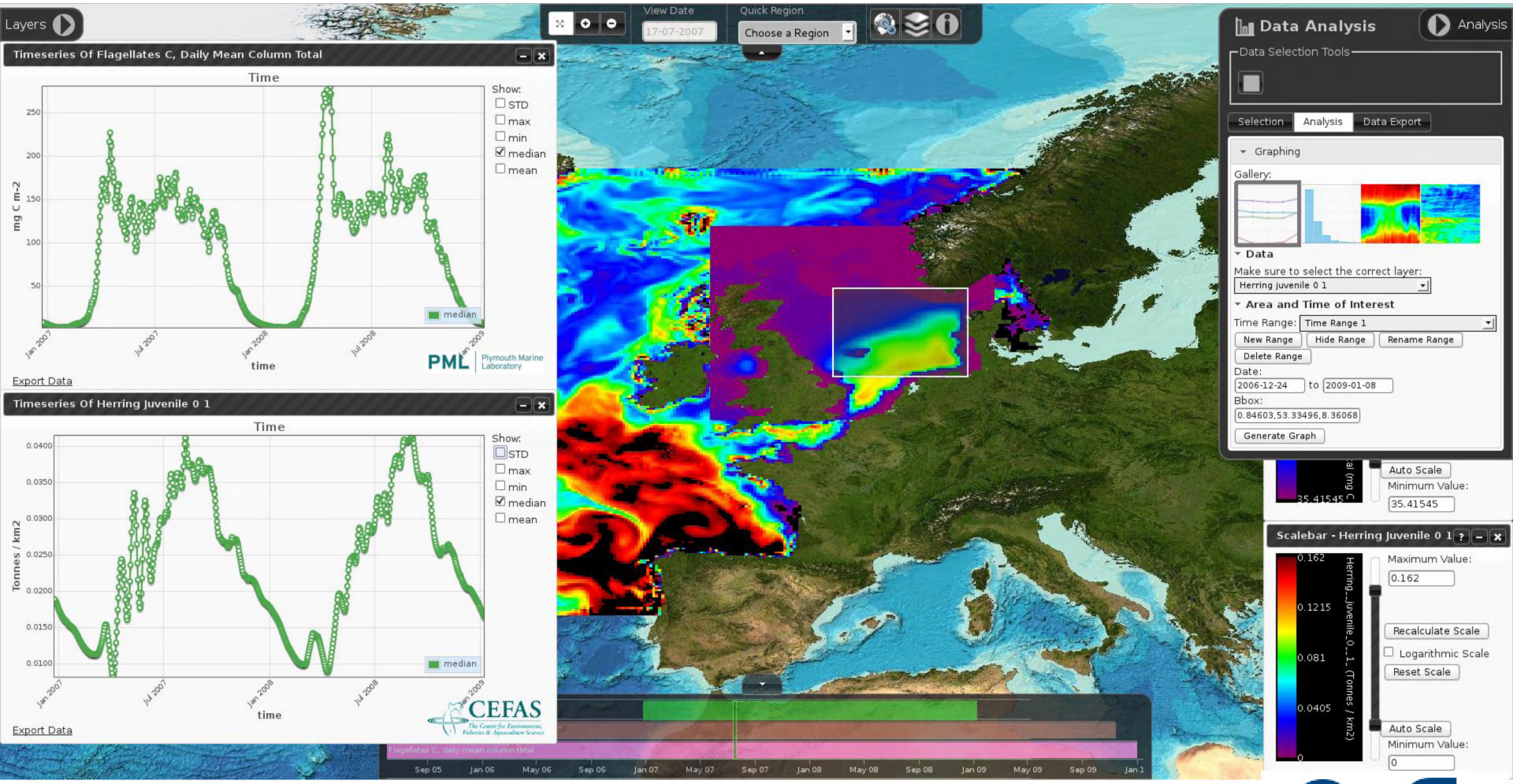


- From the EC FP7 OpEc project

OpEc
Operational Ecology
Marine Ecosystem Forecasting

Current PML Web Visualisation

- With multiple layers



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Operational Ecology
Marine Ecosystem Forecasting

Conclusions

- Web visualisation and analysis systems extend data usage to non-specialists
  - PML system is being developed in
    - EC FP7 OpEc;
    - EC FP7 EartH2Observe (global water cycle integrator)
    - ESA Ocean Colour Climate Change Initiative
    - EC FP7 EarthServer

- By using common standards systems are interoperable ie they can talk data to each other