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# **Operational Ecology**

#### Marine Ecosystem forecasting to enhance marine GMES applications

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- A flavour of FP7 OPEC
- Presentation focus:
  - Data visualisation (WP6)
  - Importance and link to GEOSS
  - State of the art and sharing ideas
  - Lessons and experiences applicable to other European projects



# **OPerational ECology**

- A prototype forecast system for marine ecosystems, including:
  - Hydrodynamics

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- Lower and higher trophic levels (plankton to fish)
- Biological data assimilation
- 4 model systems for different areas, forced by MyOcean, Globcolour or ESA CCI data and error quantified
- Benchmarking tool for rapid assessment of model skill
- Assessment of capabilities and needs for a GMES service







### Graphical overview



# **Objectives and challenges**

 The OPEC project (Operational Ecology) will help develop and evaluate ecosystem forecast tools to help assess and manage the risks posed by human activities on the marine environment, thus improving the ability to predict the "health" of European marine ecosystems.

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 Products and services generated by OPEC will provide tools and information for environmental managers, policymakers and other related industries, laying the foundations for the next generation of operational ecological products and identification of knowledge / data gaps





- Making data available and *usable* is a key GEOSS goal

Visualisation

- PML has worked in web-based data visualisation and research for about a decade
  - Simple websites -> advanced data portals
  - Web-based processing

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- Large scale data handling
- In OPEC, we spun out the developed parts of this work to an SME
  - Separate employees, but working closely with PML web vis research team
  - SME focus is on "operationalising" portal work

#### Portals

- Portals have become well understood:
  - Technology (GEOSS CI)
  - Application
- But things don't stand still..
  - Web is ubiquitous
  - Users expect smooth experience
  - Advanced analysis





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# **OPEC** portal

- Focus on ease of use and simplification
- Modern Javascript toolkits
- Summarisation tools
- Advanced graphing capabilities
- Linkage with research
  - 3D support
  - "Big data"; FP7 Earthserver
  - Uncertainty handling; ESA CCI
  - Processing; FP7 NETMAR
- Open source









#### Start screen



- Starts with basics loaded and prompts for most likely first step
- Integrated getting-started tutorial
- Active help (prompts, warnings, etc)



# Clean views



#### Gets the interface out of the way as much as possible

# Smooth interface



- Modern jQuery interface smooth with no interface pauses
- Hide and unhide space-swallowing layers and data analysis toolboxes



#### Time bar



# Easy overview of time

mass concentration of chlorophyll a in sea water	
sea_surface_temperature	
concentration_of_chlorophyll_in_sea_water	
11/05/03 18/05/03 25/05/03 01/06/03 08/06/03 15/06/03 22/06/03 29/06/03 06/	07/03 13/07/03 20/07/03 27/07/0

#### PML Applications Ltd Data summarisation/graphing



- Graphing of data in a selected region
- Summarising over time with basic statistics

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 Advanced graphing; Hovmöller plots (time vs latitude or longitude)

#### PML Applications Ltd Data summarisation/graphing



13 other user-driven graph types in development
Aiming towards publication quality



# Polygon regions



- Rectangular regions don't capture natural features or user interests
  - -> Arbitrary polygon regions in development

# 3D globe



- 3D virtual globe (c.f. Google Earth) using Cesium
  - Needs modern browser with WebGL support
  - Not all 2D functionality works



Close link to users

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- Talk regularly and avoid long periods of protracted development
- Exploit new frameworks
  - Better interfaces, more powerful functionality
- Don't try to be too generic; customise
- Be aware many problems are "solved", but many are still research areas
  - Big data, online analysis, uncertainty
  - Finding data, understanding how to use data
  - Multiple languages (human and machine!)
- Share what you do!



# Links

- Portal
  - http://portal.marineopec.eu/ (stable)
  - http://portal.marineopec.eu/alpha/static/ (dev version!)
- Demo video showing portal:
  - http://www.youtube.com/watch?v=Nui3Lzdyk68
- OPEC website:
  - http://www.marineopec.eu/
- Email contacts:
  - mggr@pml.ac.uk (research angles)
  - tim.fileman@pml-applications.co.uk (SME)

