OpEc: Operational Ecology

1st Annual Meeting
Dartington Hall
Totnes UK
Dec 2012

Icarus Allen, PML
Why OpEc?

• Coastal and shelf seas provide many beneficial goods and services but also posing a risk to coastal populations.

• Marine environments are being disrupted by climate change and human activities.

• OpEc will develop and evaluate tools to help assess and manage the risks posed by mans activities to the marine environment.
The primary goal of OpEc is to improve the quality of operational services for biogeochemical and ecological parameters and hence our ability to project the future status of European marine ecosystems by delivering a suite of error quantified indicators which describe changes in ecosystem function suitable for implementation in operational centres.
Towards Risk Assessment

Useful Expert Knowledge about consequences of model outcomes

Known outcomes

Ambiguity (known unknowns)

D5 Eutrophication

D7 Hydrography

D3 Commercial fishing

D4 Foodwebs

D1 Biodiversity (habitats)

D6 Seabed Integrity

D8 Pollutants

D2 Invasive Species

Foodwebs

Uncertainty (known unknowns)

Ignorance (unknown unknowns)

Models have useful (usable) information

High

Low

1990 Reanalysis Hindcast 2011 REA Seasonal Forecast 2015
Fit for Purpose

If we are to use our simulations either for science or policy applications we need to understand and be able to articulate their quality.

Model Skill Assessment

Quantification of Uncertainty

Sources
- Scenario uncertainty
- Structural/parameter uncertainty
- Natural variability (attribution to global change)

Range of Drivers

Range of models

Reference

Hindcasts
Defining the State

Biogeographical Provinces

Spatial distribution of SOM classes

Primary, Secondary and Bacterial Production [Mt]

1990, Reanalysis Hindcast 2011, REA, Seasonal Forecast, 2015

Operational Ecology
Marine Ecosystem Forecasting

D1 Biodiversity
D4 Foodwebs

Food Web Production
Primary, Secondary and Bacteria
Changes in State

Regional impacts of climate change.

- Phytoplankton
- Zooplankton Biomass
- Fish

Graph showing changes in state from 1990 to 2015 with hindcast and seasonal forecast data for various regions.
Probability of a Negative indicator event

- How well can we resolve the observed frequency distribution?
- How well can we resolve the thresholds?
- How might the frequency distribution evolve in the future?
- What are the consequences for GES?
Rapid Ecosystem Assessment

Seasonal Predictability Assessment

Monitoring System Assessment

Downstream Services

Knowledge Transfer

Downstream Applications

System Set-Up

Core Product Development & Assessment

Product Delivery

2015 1990

Reanalysis Hindcast 2011 REA Seasonal Forecast

NE Atlantic

Baltic

Mediterranean

Black Sea
"a thin layer of code for communication and data exchange, enveloped by explicit programming interfaces through which a physical host and any number biogeochemical models can pass information"
**WP2 Assimilation of ocean colour**

**Goal:** to estimate the “true state” better than the data and the model

**Data**
- L4 biogeochem.
- MODIS chlorophyll

**Model**
- ERSEM-POLCOMS

**DA skills**
- hind/forecast

**Output**
- 1990
- Reanalysis Hindcast 2011
- REA
- Seasonal Forecast
- 2015

Quoted from Lewis and Allen, 2007.
WP3: Rapid Environmental Assessment

- Rolling 12 month hindcast of Lower trophic indicators
- Assessment of indicator skill
- Evaluate the contribution of data assimilation
- Assess value of blended model products.
WP4 Predictability of Seasonal Forecast.

- Experimental Design
- Predictability of lower trophic levels
- Predictability of higher trophic levels
- Recommendations for the implementation of seasonal forecasting
Explained variance as a results of the two surface monitoring buoys and weekly/monthly stations maintained by PML

Explained variance as a result of the Baltic network of observations at the surface
WP5 Transition to downstream Services

- Improved products for marine water quality

Downstream Services:

Webbased Data Delivery Tools

http://portal.marineopec.eu/
WP7 Knowledge Transfer

• **Task 7.1 Linking to the GMES Marine Service**
  
  – **T7.1.1 Establish an operational centre user group**
    • The progress of OPEC will be dynamically updated in MyOcean II through DMI’s involvement as part of the MyOcean II Governing Board. The operational user group includes MyOcean II Monitoring and Forecasting Centres (MFCs) for the Baltic (DMI, SMHI), NW Shelf (Met. Office), SW Atlantic Shelf (MERCATOR-OCEAN, Puertos), Mediterranean (INGV, OGS) and Black Sea (MHI). This sub-task will be led by DMI, with inputs from all.

  – **T7.1.2 Road map for roadmap for the future development of sustainable Operational Ecology on a Global scale**
    • Propose a roadmap for the future development of sustainable Operational Ecology on a Global scale and the possible transfer of OPEC research achievements to MyOcean II (e.g., hindcast/reanalysis, ecological data assimilation, REA including high trophic level component etc).

• **Task 7.2 Coordination of inputs from the User Community into OPEC**
  • User Group representatives (from ecosystem management, policy and business) will be invited to meet immediately after annual OPEC consortium meetings to gather their views on the project’s progress.

• **Task 7.3 Development of KT / PO tools and strategies**
  • Fact Sheets: Double-sided information sheets describing the work conducted in OPEC, and the different results obtained during the project.
  • KT/ PO dedicated website: Dedicated to expand the information in the Fact Sheets with additional information and downloads
Goals for the Meeting

1. Assess progress of active WP’s
   - WP2 Model setup and benchmarking
   - WP6 Data delivery and downstream services
   - WP7 Knowledge transfer.

2. Communication within and between workpackages;
   - Exchange of (technical) expertise and data between beneficiaries;
   - Deliver linkages and dependencies between WP’s
   - Review of the deliverables for the first phase (0-12M) of the project;
   - Implementation of the work plan for the 2nd phase of the project. WP3, 4 & 5.

3. Prepare for the first Periodic report.
   - Reporting templates
## Status of Deliverables to M12

<table>
<thead>
<tr>
<th>Deliverable Nos.</th>
<th>Name</th>
<th>Lead partner</th>
<th>Dissemination</th>
<th>Delivery date</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2.1</td>
<td><strong>Service level agreements for data access for all partners with My Ocean</strong></td>
<td>PML</td>
<td>PP</td>
<td>January 2012 (M1)</td>
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<tr>
<td>D8.1</td>
<td><strong>Risk register, and process diagram and Gantt chart</strong></td>
<td>PML</td>
<td>PU</td>
<td>February 2012 (M2)</td>
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<tr>
<td>D8.2</td>
<td><strong>Report of kick off meeting</strong></td>
<td>PML</td>
<td>PU</td>
<td>February 2012 (M2)</td>
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<tr>
<td>D1.1</td>
<td><strong>Project Intranet</strong></td>
<td>PML</td>
<td>PU</td>
<td>March 2012 (M3)</td>
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<tr>
<td>D7.1</td>
<td><strong>Project Website</strong></td>
<td>PML</td>
<td>PU</td>
<td>March 2012 (M3)</td>
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<tr>
<td>D2.2</td>
<td><strong>Meta data for the boundary conditions and forcing functions for each region</strong></td>
<td>PML</td>
<td>PU</td>
<td>March 2012 (M3)</td>
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<tr>
<td>D2.5</td>
<td><strong>Report listing meta data for validation data for regional system</strong></td>
<td>METU</td>
<td>PU</td>
<td>June 2012 (M6)</td>
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<tr>
<td>D2.3</td>
<td>Target variables and benchmarking metrics</td>
<td>Brockman Consult</td>
<td>PU</td>
<td>September 2012 (M9)</td>
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<tr>
<td>D2.4</td>
<td><strong>Description of the coupled model for each region</strong></td>
<td>METU</td>
<td>PU</td>
<td>December 2012 (M12)</td>
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<tr>
<td>D6.1</td>
<td>Report on Downstream user requirements</td>
<td>Brockman Consult</td>
<td>PU</td>
<td>December 2012 (M12)</td>
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## Status of Deliverables to M24

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<th>Name</th>
<th>Lead partner</th>
<th>Dissemination</th>
<th>Delivery date</th>
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<tbody>
<tr>
<td>D2.6</td>
<td>Report on reanalysis hindcast skill</td>
<td>HCMR</td>
<td>PU</td>
<td>June 2013 (M18)</td>
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<tr>
<td>D2.7</td>
<td>Hindcast simulation results on webserver</td>
<td>PML</td>
<td>PU</td>
<td>June 2013 (M18)</td>
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<tr>
<td>D2.8</td>
<td>Report on benchmarking the target variables</td>
<td>METU</td>
<td>PU</td>
<td>June 2013 (M18)</td>
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<tr>
<td>D4.1</td>
<td>Experimental strategy for assessing seasonal forecast</td>
<td>DMI</td>
<td>PU</td>
<td>Sept 2013 (M21)</td>
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<td>D5.1</td>
<td>Current status of routine monitoring of ecosystem properties in European regional seas.</td>
<td>DMI</td>
<td>PU</td>
<td>Dec2013 (M24)</td>
</tr>
</tbody>
</table>
Work progress and achievements during the period

Please provide a concise overview of the progress of the work in line with the structure of Annex I of the Grant Agreement.

For each work package -- except project management, which will be reported in section 3.5--please provide the following information:

A summary of progress towards objectives and details for each task;

Highlight clearly significant results;

If applicable, explain the reasons for deviations from Annex I and their impact on other tasks as well as on available resources and planning;

If applicable, explain the reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning (the explanations should be coherent with the declaration by the project coordinator);

A statement on the use of resources, in particular highlighting and explaining deviations between actual and planned person-months per work package and per beneficiary in Annex 1 (Description of Work)

If applicable, propose corrective actions.
Reporting Template

Work progress and achievements during the period

WPX ..................

Science Highlights and Significant results
- Example of progress / science delivery from each partner active in the WP. 200/300 words illustration of relevant

Progress Towards Objective:
- Report of activities by task
  - TX.1
  - TX.2

Deviations from the workplan

<table>
<thead>
<tr>
<th>Deviations</th>
<th>Corrective actions</th>
<th>Impacts on other tasks/resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxxxxx</td>
<td>yyyyyyy</td>
<td>None</td>
</tr>
</tbody>
</table>

Also require
- Peer reviewed publications
- Presentations as meetings
- Dissemination to GMES / policy community