Seventh Framework Programme
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Collaborative Project

Project no. **283291**

Project acronym: **OPEC**

Project title: OPerational ECology: Ecosystem forecast products to enhance marine GMES applications

OPEC Annual Science Meeting Report

Dartington, UK December 2012

Start date of project: 01.01.12   Duration: 36 months

Project Coordinator: Icarus Allen, Plymouth Marine Laboratory

Project co-funded by the European Commission within the Seventh Framework Programme, Theme 6 Environment	
Dissemination Level	
PU	Public	x
PP	Restricted to other programme participants (including the Commission)	
RE	Restricted to a group specified by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	

OPEC Annual Science Meeting Report

11-12 December 2012, Dartington, UK

Contents

Executive summary

The first annual science meeting of the OPEC consortium was held in Dartington, UK. Representatives from all partner institutes were present. The aim of this meeting was to present and discuss the science achievements during the first year of OPEC, and prepare for the upcoming periodic report to the European Commission. The meeting was very fruitful and had a lively atmosphere. Presentations were made on the status of the coupled regional models in all regions. This was followed by a detailed discussion of the implementation plans for the regional model systems (WP2) and the ecological monitoring system (WP6), the key activities at the 12 month point of the project. Considerable progress is evident in all regions and all partners are on track to make the first Rapid Environmental Assessment (REA) simulations by month 18.

The rapid ecosystem assessment (WP3) and seasonal forecast activities (WP4) were also discussed in detail as both of these tasks will begin in the coming year. Finally the importance of knowledge transfer activities was stressed and a live demonstration of the OPEC web portal was made which highlighted the abilities of the system to present data. In addition the user requirements were discussed in detail.

Action List

Number	Action	Delivery date	Person responsible
1	Completion of the regional hindcast simulations	By June 2013 (M18) to WP3	Each regional representative
2	WP3 simulation strategy workshop	June 2013 TBC	Lead by G. Triantafyllou, supported by J. Heard
3	WP4 Workshop	September 2013 TBC	Lead by C. Solidoro, supported by J. Heard
4	Written justification for Delay of D2.3	January 2013	Thomas Storm
5	D2.4 submitted to Coordinator	January 2013	Baris Salihoglu
6	Deliverable 6.1 submitted to Coordinator	December 2012	Carole Lebreton
7	Instructions for getting the light attenuation coefficient from satellite products IOP	January 2013	Momme Butenschon to provide to all partners

Agreements

Following a range of discussions at the meeting, the following agreements were made:

Task 2.6, Hindcast the ecosystem of each region and benchmark the target variables

- *Each model system will perform a 20yr hindcast (1990-2010) of their region for the targeted indicators and descriptors.*
- *Such a hindcast consists of a 20yr reference run (1990-2010) without assimilation and 10yr reanalysis run (2000-2010) with assimilation scheme developed in T2.5.*
- *These simulations will be used to provide a benchmark. All simulations will be made using boundary conditions and external forcing defined in T2.1.*
- *Model skill will be assessed using the benchmarking metric and tools defined and developed in T2.2*

WP3 Rapid Environmental Assessment (REA) will start at month 18 with a first run covering the 12 months from June 2012 - June 2013.

Partners agreed to provide the following by June 2013:
- ***DMI will provide the corresponding meteorological forcing for the 4 regional seas.***
- ***OGS team will get meteorological forcing from MyOcean consortium.***
- ***All relevant partners - each modelling system will obtain initial condition by extending the WP2 hindcast simulation up to June 2013. Preferably, those simulations will be constrained by Data Assimilation.***

1. Session 1: Management and Reporting

Chaired by Icarus Allen

To start the meeting Icarus Allen, Project Coordinator welcomed all the partners and provided report on the status of OPEC to date. During this first phase of the project the main activities were centered on model development. Consequently there was a heavy focus on regional modelling developments during the first day. Discussions around the work packages that will be initiated in the coming months were held on the second day.

Along with the status report of the project, the Coordinator also outlined the upcoming expectations and commitments around project reporting as the first period of OPEC came to an end.

All presentations given at the meeting can be found at:
http://www.marineopec.eu/meetings/science2012/meeting_pr.html

2. Session 2: Regional Modelling

Chaired by Baris Salihoglu

2.1 Work package objectives (Next generation model setup and benchmarking)

- The objective of this work package is to set-up the ecological model system for the next generation GMES marine ecological service in European Seas.
- Each <u>region will have a model system comprising a core coupled hydrodynamic-plankton model, a HTL component, a representation of the carbon chemistry and a data assimilation system</u>.
- These will be used to perform 20 yr hindcast of each region and to benchmark model performance.

2.2 Update on Tasks:

Tasks 2.1-2.4 are completed, reports of Tasks 2.1 (Assembly of boundary conditions and forcing functions) and 2.3 (Collation of validation data) are completed, 2.2 (Definition of target variables and metrics for benchmarking them) and 2.4 (Implementation of the model system) are underway.

Tasks 2.5 (Data assimilation) and 2.6 (Hincast the ecosystem of each region and benchmark target variables) will be completed within the next 6 months, Jan-June 2013.

2.3 Regional Modelling discussions

Each group gave a detailed presentation of their progress on the implementation of the model system, which will be part of the report for this task. A common regional climate hindcast from 1990-2009 performed by DMI was used to provide atmospheric forcing for the hindcast simulation of the four regional seas. The only exception being OGS as they have no regional ocean model and will therefore run the ecological model in off-line mode using the MyOcean circulation fields.

For each region the responsible partner assembled the best available river input (e.g. runoff and nutrient loads) and open ocean boundary condition data. The assembly of forcing fields and boundary conditions will be used to force a different ocean model in each region to perform 20 yr hindcast and to benchmark model performance by each responsible partner as it was planned to be done in other sub-tasks of the WP2.

Details on Task 2.6, Hindcast the ecosystem of each region and benchmark the target variables

- Each model system will perform a 20yr hindcast (1990-2010) of their region for the targeted indicators and descriptors.
- Such a hindcast consists of a 20yr reference run (1990-2010) without assimilation and 10yr reanalysis run (2000-2010) with assimilation scheme developed in T2.5.
- These simulations will be used to provide a benchmark. All simulations will be made using boundary conditions and external forcing defined in T2.1.
- Model skill will be assessed using the benchmarking metric and tools defined and developed in T2.2

[Click here to see presentation on D2.6](#)

Regional summary presentations can be found at:

http://www.marineopec.eu/meetings/science2012/meeting_pr.html

3. Session 3: Rapid Environmental Assessment

Chaired by Cosimo Solidoro

3.1 Work package Objectives (Rapid Environmental Assessment)

The overall objective of this work package is provided error quantified estimates of the state of the ecosystem in the recent past to provide up to date information for environmental management.

The sub objectives are:
- To make a 12 month rolling hindcast of the lower trophic components of the ecosystem of each region using the model system defined in WP2.
- To assess the skill of each indicator.
- To evaluate the contribution of data assimilations and multiple models in quantifying model uncertainty and reducing model error.

3.2 REA discussion

After an introduction on WP3 objectives, milestone and deliverables there was a discussion on current state and potential issues for a timely implementation of WP3 activities within the different regional and modelling systems.

Rapid Environmental Assessment (REA) will start at month 18 with a first run covering the 12 months from June 2012 - June 2013.

Partners agreed to provide the following by June 2013:
- DMI will provide the corresponding meteorological forcing for the 4 regional seas.
- OGS team will get meteorological forcing from MyOcean consortium.
- All relevant partners - each modelling system will obtain initial condition by extending the WP2 hindcast simulation up to June 2013. Preferably, those simulations will be constrained by Data Assimilation.

Taking a pragmatic approach and recognising that it might prove difficult to get updated information on actual observations, climatological condition may be used for extending the hindcast simulations up to June 2013 and for the REA simulations.

The first REA run should be completed before month 21 (September 2013), so to provide initial conditions for the second run (month 21). The following runs will be performed in a similar way.
It was discussed that there is no formal commitment to provide simulation of HTL models within REA, but modelling systems are encouraged to do so if they have the capabilities to do so.

REA simulations must be posted in the website by month 30, but it is expected that the first simulations will be posted as soon as they become available, possibly by month 24.

All 6 modelling systems confirmed that presently no significant potential problems were anticipated, and that they all should be able to perform REA simulations as foreseen, insofar as WP2 simulations will be completed on time.

It was agreed to run a WP3 dedicated workshop in late summer early autumn 2013, to check the proceedings of activities, to discuss emerged problems, if any, and to plan the second task of WP3 activities (third year). This will include a comparison of free run versus data assimilated run in the region where there are two modelling system (Mediterranean) - the estimates of selected ecosystem indicators obtained by blending the output of different modelling systems.

Related meeting presentation

4. Session 4: Seasonal Forecasting

Chaired by George Triantafillou

4.1 Work package objectives (Assessing the predictability of seasonal forecast)

The overall objective of this work package is to assess the predictability of target variables at seasonal timescales.
The sub objectives are:
- To devise a strategy for assessing the predictability of key indicators at seasonal time scales.
- To assess the predictability of ECVs and key indicators for GES descriptors biodiversity (in terms of habitat) and eutrophication at seasonal timescales.
- To assess the predictability of key indicators for GES descriptors food webs and commercial fish at seasonal timescales.

- To make recommendations for the implementation of seasonal forecasting in operational ecology.

4.2 WP4 discussion

The start date for WP4 activities is M18 (June 2013). In order to prepare for its initiation WP4 discussions focused on the main objectives of the work-package and centred around its four tasks, namely:

- Task 4.1 Definition of experimental strategy for predictability studies at seasonal timescales
- Task 4.2 Predictability in lower trophic level seasonal forecast (ECVs, biodiversity and eutrophication)
- Task 4.3 Assessing the predictability of seasonal forecast for food-web and commercial fish descriptors" and
- Task 4.4 Recommendations for the implementation of a seasonal forecast system for ecosystems", as well as on the time frame for the Deliverables and the Milestones.

One of the main issues of WP4 is with Task 4.1 for which a strategy for assessing the predictability of the OPEC forecast systems must be agreed. More specifically the predictability in lower trophic level seasonal forecast (ECVs, biodiversity and eutrophication) on the ERGOM model for the Baltic Sea, on the POLCOMS-ERSEM model for the NE Atlantic, on the OGS OPA-BFM and the HCMR POM-ERSEM models for the Mediterranean, and on the BIMS-ECO models for the Black Sea. Also, the predictability of seasonal forecast for food-web and commercial fish descriptors on the HRB-ERGOM-SMS model for the Baltic fish species, on the POLCOMS-ERSEM-EwE and POLCOMS-ERSEM-Size spectra models for North Sea, on the OPA-BFM-ECOSIM model for the Adriatic Sea, on the POSEIDON anchovy IBM model for the Aegean Sea, on the BIMS-ECO-FISH and ECOPATH models for the Black Sea.

In an attempt to discuss the local predictability using ensemble Kalman filters, the idea of the E-dimension was introduced (Kuhl et al., 2007; Oczkowski et al., 2005; Patil et al., 2001), where the behavior of the ensemble can be explained, since a low value of the E-dimension guarantees that the ensemble can span to describe a large portion of the forecast error. More details and other strategies will be discussed and decided during the workshop that will be held during month 18 (June 2013) in Greece or Italy.

In addition there was a discussion of the seasonal forecast for HTL. The challenge is can we predict on seasonal time scale some indicators that could be used in management; shorter timescales being perceived to be less important. Focused on whole system and how it

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works. The timescales of predictability need to be appropriate for policy and management questions (both fisheries and MSFD) and can range from 6months to 2-3 years.

References for additional reading:

Kuhl, D., Szunyogh, I., Kostelich, E.J., Gyarmati, G., Patil, D.J., Oczkowski, M., Hunt, B.R., Kalnay, E., Ott, E., Yorke, J.A., 2007. Assessing predictability with a local ensemble Kalman filter. J Atmos Sci 64, 1116-1140.

Oczkowski, M., Szunyogh, I., Patil, D.J., 2005. Mechanisms for the development of locally low-dimensional atmospheric dynamics. J Atmos Sci 62, 1135-1156.

Patil, D.J., Hunt, B.R., Kalnay, E., Yorke, J.A., Ott, E., 2001. Local low dimensionality of atmospheric dynamics. Phys Rev Lett 86, 5878-5881.

5. Session 5: Monitoring System and GMES ecological service

This task does not start until month 24 and will not be active in the current year. Some forward planning is required later in the year to collate information on the current status of environmental and biological monitoring in the 4 core OPEC regions.

6. Session 6: Data Delivery and Downstream services (WP6)

6.1 Work package Objectives:

The success of the OPEC concept is dependent in being able to deliver information to its stakeholder in a timely and relevant manner. The stakeholder should be able to query and export data, visualise it, download and process it. The economic exploitation of OPEC product by SME's requires the further development of information products relevant to marine water quality, which are both relevant to the end user and suitable for operational production.

The aim of this work package is to establish the technological infrastructure to disseminate OPEC products and to develop a suite of end user relevant downstream data products. Our specific objectives are:
- To setup a web-based visualisation system for the dissemination of OPEC information products.
- To develop downstream, information products suitable for integration into production chains of SMEs.

This session was divided into 2 parts.

6.2 Data Delivery

The first one presented the progress and developments made to the OpEc Visualisation tool (Task 6.1 *Data Visualisation*). This part was presented and led by Martyn Atkins (PMLA). Martyn gave a live demonstration of the current portal Fig 1). The portal is freely available, the code is open source and downloadable from the wiki (http://trac.marineopec.eu). The main features are:

- The portal is organised data layers, one can select several data layers to use
- There is context help based for windows.
- First select layers, then date
- Graphing tool and data analysis, point analysis, box analysis, define a polygone. These will be defined and expanded in the future.
- Csv, netdcf, pdf, geotiff are the export formats that will be made available.

The code is ever evolving and PMLA is making good progress in integrating new and relevant features. PMLA already has a large sample data set, but partners were encouraged to provide more when available. The format these files shall be compliant to is the very format BC proposed in the Technical Specification that has been submitted as part of Deliverable D2.2.

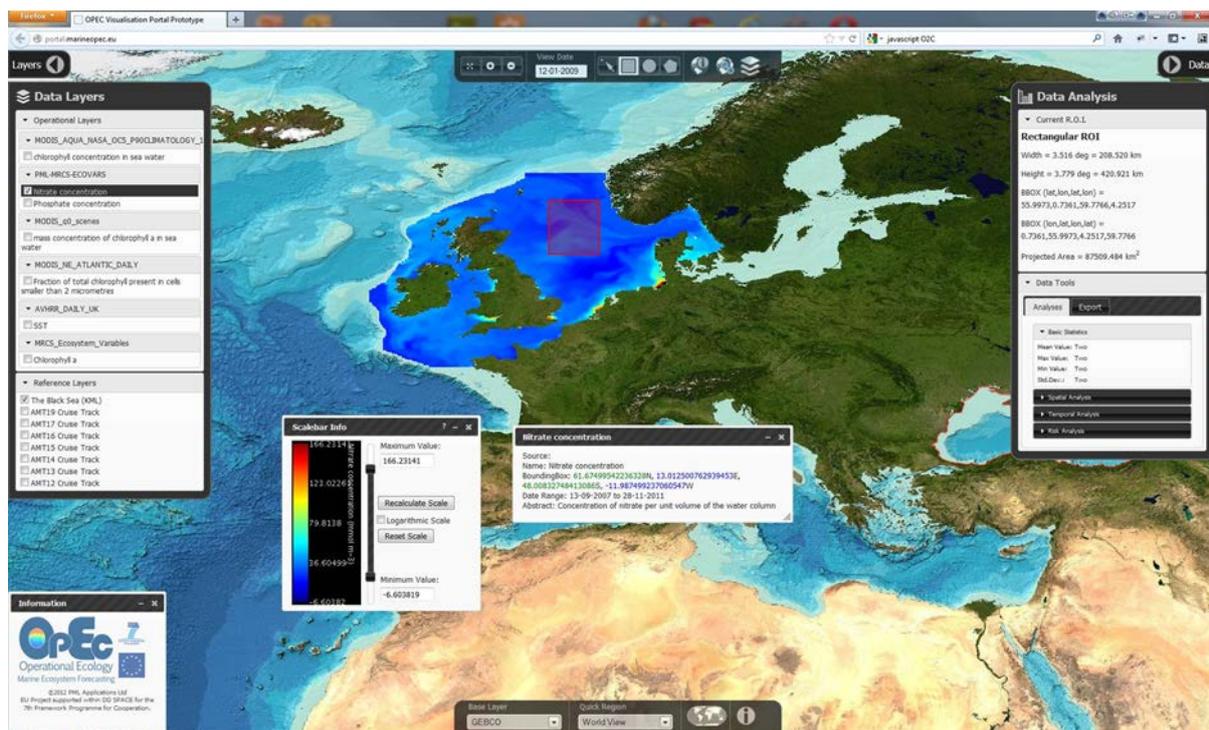The portal is accessible here: http://portal.marineopec.eu.

Figure 1. Snapshot of the OPEC web portal interface

6.3 User requirements

The second part of the session was presented by Carole Lebreton (BC) and showed the results of the User Requirements investigation (Task 6.2.1 *Downstream user requirements analysis*). This investigation focused on the lower trophic levels variables. The target variables proposed by OPEC are also required by the users. Other variables specified by some interviewed users can also be provided by OPEC.

We need also to look for a user community interested in higher trophic levels information, but it was noted that information from higher trophic levels is too sparse: sometimes one only gets 1 value for a year and a full region; this is not yet ready for customers/users.

The OPEC consortium should keep looking to expand the user community (e.g. GFEM, Ices, Cefas).

Deliverable 6.1 is near completion and will be delivered by Dec 31st "2012.

7. Session 7: Knowledge Transfer

Chaired by Jessica Heard

7.1 Work package Objectives

- To make cooperative links with the Marine Core Service: *led by DMI*
- To develop strategies, frameworks and tools to transfer knowledge acquired during OPEC to user communities: led by PML
- Coordinate user inputs to OPEC through interactions with a dedicated User Group: led by PML
- Web-based tools and printed documents to support knowledge exchange: led by PML
- To disseminate OPEC science achievements: led by PML

7.2 Project website

The knowledge transfer (WP7) activities began at the beginning of the project, with the development and implementation of a project website which was completed on time and continues to receive regular updates. The website provides general project information as well as having pages dedicated to promoting OPEC science in an accessible format to a range of prospective users. In order to facilitate the outward facing image of the project and encourage communication both internally and externally, a 'Scientists Profiles' section was developed which provides details of everyone working on the project including information about their particular area of expertise and role in OPEC.

During the first months of OPEC a project flyer was produced which was disseminated at various meetings and sent to all partners for distribution at their discretion. This flyer will be updated at regular intervals during the project as new advancements are made.

7.3 User Contacts Database

A further addition to the website was the 'Users Contacts Database'. This database is intended to help target knowledge transfer outputs to specific target groups in a timely fashion. The database includes policy makers, advisory bodies, research managers, NGO's and private enterprise and has been made available on the KT webpages
http://www.marineopec.eu/Contacts.aspx

7.4 OPEC User Advisory Group

The OPEC User Group was initiated during this first period. "User" representatives have been engaged to gather their views on how project outputs can be tailored to meet their

needs. As project progress we will present examples of what we can produce and ask for feedback. UG will receive updates and have access to documentation and project outputs through website. The current membership includes:

- Black Sea Commission: Prof Halil Ibrahim Sur

- Marine Board - European Science Foundation: Dr Kate Larkin

- International Council for the Exploration of the Sea: Dr Manuel Barange

- LAMANS, Greece: George Triantaphyllidis

- European Environment Agency: TBC

- Defra, UK: TBC

Additional members will be invited to join the group as the project develops.

7.5 MyOcean User Group

Jun She (DMI) was unable to attend the meeting but sent through the following list of potential members for the OPEC MyOcean User Group:

- Vibeke Huess, Baltic MFC, DMI
- Annette Samuelsen, Arctic MFC, NERSC
- Gennady Korotaev, Black Sea MFC, MHI
- Adrian Hines, NW Shelf MFC, Met Office
- Alessandro Crise, Med Sea MFC
- Dominique Obaton, SW Atlantic MFC, MERCATOR-Ocean

7.6 Scientific Dissemination

Finally with regards to dissemination of scientific achievements this will largely be done through peer reviewed papers, partners were reminded to provide details of any papers arising from the OPEC activities and advised that the following citation should be included.

Citing OPEC:

The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 283291.

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Meeting Agenda

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OPEC Annual Science Meeting

11-12 December 2012, Dartington UK

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DAY 1

Session 1

9:00   Project overview and current status, periodic report Project Coordinator Icarus Allen

Session 2 – Led by METU

Model development and preparation for hindcast simulations, presented regionally

30mins each including discussion time

9:30   Baltic *DTU (Stefan N.)*

10:00   Baltic   *DMI (Jun She)*

10:30   Black Sea *METU (Baris S.)*

11:00   Coffee break

11:30   North Sea/NE Atlantic *Cefas (Jonathan B.)*

12:00   North Sea/NE Atlantic *PML (Stefano/Momme)*

12:30   Mediterranean *HCMR (George T)*

13:00   Lunch

14:00   Mediterranean *OGS (Cosimo)*

14:30   Hindcast discussion session (D2.6) – led by METU

15:30   Status of benchmarking activities and follow on discussion BC (Norman Fomferra)

16:00   Coffee

16:30   Follow up discussion on benchmarking activities

Session 3 – Dissemination and user working groups

17:15   Dissemination activities *PML (Jess Heard)*

17: 30 MyOCean links, working group etc *DMI (Jun She)*

 19:15 Conference Dinner: Riverfood Farm

DAY 2

9:00   Review of Day 1 - *Icarus Allen*

Session 3 – Lead by OGS

9:15   Rapid environmental assessment – Presentation on what needs to be done

9:30   Discussion on achieving work

Session 5 – Led by HCMR and DMI

10:00   Planning and discussion on initiation WP4s and WP5s

Work package leaders (HCMR and DMI) to give short presentation/discussion on kicking off WPs (30mins each)

Session 6 – Led by PMLA/BC

11:30   Visualization tools progress and development – *PMLA*

12:00   Visualization tools progress and development - *BC*

Discuss work and activities, links to user groups, links to model outputs

13:00   Lunch

14:00   Working group, discussion internal data transfer led by Icarus Allen (1hr)

15:00   Additional sessions to be confirmed

The OPEC Group, December 2012