Seventh Framework Programme
SPA.2011.1.5-03

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 2013

Athens, Greece
December 2013

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

3 December 2013, Athens Greece

Contents

Executive Summary

The 2nd annual science meeting and science review of the OPEC consortium was held in Athens, Greece 3rd December 2013. Representatives from all partner institutes were present along with the Project Officer and the external reviewer. The aim of this meeting was to report and discuss the science achievements during the second year of OPEC to the REA and prepare for the upcoming periodic report. Presentations were made on the status of the hindcast and reanalsysis simulations in all regions. This was followed by a detailed discussion of the implementation plans for the regional model systems (WP2), the status of REA (WP3), plans for seasonal forecast experiments (WP4), progress with the data portal (WP6) and the knowledge exchange activities (WP7). A draft of the roadmap for the implementation of OPEC products in the marine core service was presented. The reviewer noted that the project is progressing well and a lot of good work has been carried out and that the delay in the reanalysis simulations and hence in the REA simulations is not serious and the tasks can be completed on time. It was also noted that a big challenge is to make the outputs available in a way that is useful for the users, to make them visual and easily useable. This remains the perhaps the major challenge for the last year of the project.

Actions

Action number	Action activity	Responsible PI	Date	Notes
1	Revised D2.6 Assimilation type, data used, problems incurred and lessons learnt and conclusion. Emphasis on differences.	**HCMR George Triantifylou** Each region to provide updated section by 19th Dec N.Atlantic: Stefano Ciavatta Med(OGS): Gianpiero Cossirno Med(HCMR): George Triantifylou Black Sea: Sinan Arkin Baltic Sea: Zhenwen Wan	HCMR to submit final version to PML by 10th January	
2	Summary table of Variables agreed and used across regions	Stefano Salon	19th December 2013	
3	Revised D2.8 • Update summary section, what has skill what does not. • Benchmarking of the	**METU Baris Salihoglu** By 13th December N.Atlantic – Sonja Med (OGS) HTL – Simone Libriato Black Sea – Sinan Arkin	METU to submit to PML before 10th January	

	hindcast Additional input required from: METU, OGS (HTL model), North Atlantic (HTL) Overview of HTL and LTL skill			
4	D2.7 Add min and max information Expert judgement of data quality (high, med, low)	19th December MommeButenschon Zhenwen Wan Sinan Arkin Kostas Tsiaris GianP		
5	Revised Periodic Report	Icarus Allen/Jess Heard, with input from all partners. Each institute to double check the report by 19th December	10th January	Report checked by: Baris Salihoglu, GianP. Asbjorn Christiensen Jun She, Jonathan Beecham George T. Thomas Storm and Peter Walker
6	Annual Meeting report	Prepared and distributed by J. Heard with contribution from WP Leaders.	13th December	
7	Workshop 3 Report	**Cosimo Solidoro** with short summaries provided by each speaker	13th December	
8	Workshop 4 Report	**George T.**	13th December	
9	D5.1 Meta data LTL monitoring Med, Black sea, Baltic	PML completed by 19th December George, Cosimo Baris, Zhenwen	Due 31st December – submit 19th December	Must be submitted by 6th January so finalised and submitted to Coordinator by the 19th December
10	Short summary of plan for presentation of REA	Cosimo Solidoro, Icarus	13th December 2013	
11	Disclaimer to be added to the portal – discuss how explicit this needs to be with regards to IP	Icarus to seek advice from colleagues at PML	January 2014	
12	Links with Turkish	Baris Salihoglu to Jess Heard	December 2013 and	

	ministry of fisheries for potential user engagement		ongoing	
13	Updated Data Portal online, with user interface ready for dissemination – demo video added (max 2mins), scalebars updated for all partners.	Peter Walker and Shane Hudson	15th January 2014	
14	Once, next updates to portal are complete, and video demonstration ready, create a focus group to gather feedback on User interaction with the Data Portal	Shane Hudson, Peter Walker and Jess Heard	January 2014	Bring together a varied group to learn about how people engage with the portal. Scientist, Web developer, Comms, non expert
15	Additional features to be added to Portal: • Data provider and OPEC logo pops up on maps and downloads • Source provider ie OPEC details • Disclaimer to be added to the portal – discuss how explicit this needs to be with regards to IP • Email contact to be added to data to users can follow up if need more information • Satellite data to be added – just a few CCI and sea surface temperature data			
16	Data portal sent out to feedback to wide range of potential Users	Jess Heard	1st Feb 2014	
17	Short PowerPoint presentation of portal (5mins). Uses and benefits. For use by partners at meetings and focus group	Peter Walker and Jess Heard	15th January 2014	

	demonstration			
18	All User related interactions reported via a quick email. Meeting, date, topic presented. Focus on engaging with local contacts to promote OPEC REA and portal	All partners to Jess Heard. Especially Work Package Leaders	Ongoing	We need to make a concerted effort to increase and document any discussions of OPEC with possible users
19	3 monthly update reports of key achievements. Any deviations or delays should be reported.	Each institute To Coordinator	March 2013 June 2013 September 2013	
20	3 monthly Web Ex conference for WP Leaders to monitor project	Coordinator and WP Leaders	March 2013 June 2013 September 2013	
21	Input to the Copernicus platform White paper	Icarus Allen and Jun She	19 December 2013	
22	Updated Data Portal online, with user interface ready for dissemination – demo video added, scalebars updated for all partners	Peter and Shane	15th January 2014	
23	OPEC Final Meeting: dates agreed for 8-9 October 2014	Jessica Heard	Location and venue confirmed nearer the time	

Science Reports

Each work package provided a summary their achievements and work towards the project work plan during the second period, highlighting any deviations and remedial actions taken as appropriate. All presentations from the meeting are available to download from http://marine-opec.eu/meetings.html

WP2: Next generation model setup and benchmarking (Baris Salihoglu, METU)

- The purpose of WP2 is to establish core ecosystem forecast model systems in the NE Atlantic, Baltic, Mediterranean and Black Seas.

- Each 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**.
- These will be used to perform 20 yr hindcast of each region and to benchmark model performance.

Summary of Progress

- The hindcast and reanalysis simulations are now complete and model outputs are being placed on the data portal.
- Model validation has been undertaken for all regions using the common benchmarking tools to ensure a consistent approach for quality control.
- There were some delays with some of the regional applications mostly due to external factors.
- Draft versions of the deliverables (D2.6, D2.7 and D2.8) are being finalised and will be completed by M24.

Regional summaries of Tasks 2.5 and 2.6

Task 2.5 Data assimilation

In order to improve hindcast simulations and the initial conditions for Rapid Environment Assessment (WP3) and to assess the predictability of seasonal forecast (WP4) data assimilation systems are adopted for each region. Ensemble based assimilation schemes are implemented in the OPEC regional model system**.**

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

- Each model system performed a 20yr hindcast of their region for the targeted indicators and descriptors.
- Such a hindcast consists of a 10yr reference run without assimilation and 10yr reanalysis run with assimilation scheme developed in T2.5.

Baltic Sea

Description of the reanalysis experiment:

- The 10-years (2000-2009) reanalysis of the Baltic Sea has been made using the physical-biogeochemical coupled model HBM-ERGOM.
- 10yr reanalysis where T&S were assimilated and nutrient profile observations were used for yearly reinitialization.
- When only data of temperature and salinity are assimilated into the model system, the reanalysis improves the hindcast results, especially for the periods 2007-2009.
- The **reanalysis can improve the seasonal evolution of phytoplankton blooms and nutrient dynamics in the surface and can also reproduces the overall features of vertical profiles.** Even though, only data of temperature and salinity are assimilated into the model system.

North East Atlantic

- The data assimilation scheme for the North East Atlantic system is based on the **Ensemble Kalman filter.**
- GlobColour satellite chlorophyll was assimilated into the North East Atlantic model system.
- The data assimilation system of the NE Atlantic has been applied in **a twelve year-long reanalysis simulation for the years 1998-2009.**
- The in situ data used for the skill assessment of the reanalysis and reference simulations is a sub-set of the database used in the benchmarking of the hindcast simulation.
- The **metrics values did not differ substantially from those of the reference run**, being a slight deterioration of the nitrate estimate the most noticeable change. The negligible impact on the metrics occurs despite an evident impact of chlorophyll assimilation on the mean annual distribution of the biogeochemical variables, which reached ~10% for the majority of the variables.
- This apparently contrasting outcome can be partially explained by the **low assimilation impacts in data rich areas**, i.e. the North Sea.

Mediterranean Sea (HCMR)

- The data assimilation scheme is based on the **SEEK (Singular evolutive Extended Kalman) filter approach.** The models described here consider the Singular Fixed Extended Kalman (SFEK) filter, assuming persistence of the error sub-space with time, and its Ensemble version and the Singular Extended Interpolated Kalman (SEIK) filter, in which the linearization used in the SEEK filter is replaced by linear interpolation (Triantafyllou et al., 2003).
- The skill of the assimilation system (POM-ERSEM) was evaluated against in situ (SeaDatanet, DYFAMED) and remote sensing (SeaWiFS) data. **The assimilation significantly reduced the Chl-a error, exhibiting a good performance on the Chl-a analysis**. Among **the non-assimilated variables, phosphates that are the main limiting factor in the Mediterranean were improved in the re-analysis run.** However, **the filter failed to reduce the error of nitrates and silicates**.
- Therefore, some additional effort is required for a better customization and tuning of the assimilation system.

Mediterranean Sea (OGS)

- The data **assimilation consists of a 3D variational scheme** that uses weekly averaged satellite chlorophyll maps provided by GOS-ISAC-CNR (Italy) within the MyOcean project. The coupling of LTL and HTL models is provided with an off-line integration in agree with the scheme presented in Libralato and Solidoro (2009).
- The assimilation of biogeochemical data produces an improvement of all skill indexes for all variables**. The improvement is much more significant for assimilated variables, while changes in not assimilated variables (nutrients and oxygen) are smaller**. Assimilation improves nitrate and silicate by slightly correcting the model overestimation of the surface data. Surface correction is then propagate to the deeper layer. Assimilation improves oxygen, reducing the model underestimation of surface. For phosphate the changes are almost negligible.

Black Sea

- The assimilation scheme is based on the Singular Fixed Extended Kalman (SFEK) Filter. The assimilated fields are satellite derived 8-day composites of surface chlorophyll-a concentrations obtained from the Globcolour product.
- Currently, the assimilation scheme is in the testing phase. Twin experiments are being performed to calibrate filter parameters and improve filter performance.

Concerns raised by the reviewer on WP2

- Influence of data assimilation on non-assimilated variables should be better emphasized.
- Target indicators should be consistent across regions.
- A table for target indicators that are more relevant for each region should be prepared based on expert judgement and should be used for regional intercomparisons.
- It is value added that the group works together and this should be shown under the D2.6 report.
- Repetition between D2.6 and D2.8 reports. D2.6 should focus on synthesis of differences between hindcast and reanalyzes results.
- Log-log comparisons should be avoided.

Suggestions from the commissioner relevant to WP2

- Outputs on the web should be maintained after the completion of the project.
- Commission is looking into what should be added in the Marine Core Services (MCS).
- Our products should better focus on commercially valuable output, we should include more users, and we should work towards a potential MyOcean contract.
- We should prepare to give input to the Copernicus platform that will take place around February 2014.

WP3 Rapid Environmental Assessment (Cosimo Solidoro, OGS)

The purpose of WP3 is to assess the effects of quantified estimates of the state of the ecosystem in the recent past on the short term forecast. This is done through a series of 12 months rolling

hindcast of the lower trophic components of the ecosystem, using the models defined in WP2. The rolling hindcast will allow us to define the model skill for chosen indicators and to evaluate the contribution of data assimilation in quantifying model uncertainty. REA experiments are to be done for Lower Trophic Level (LTL) model components. Modelling HTL dynamic is not required but in case of availability partners are invited to also produce HTL results.

Summary of progress

First REA experiments have already been performed for the Mediterranean System by both the OGS and the HCMR team. In the Baltic a REA experiment has been done without data assimilation. In the other systems the REA experiments will start in January, and should be completed within the first half of 2014, when the first WP3 deliverable has to be submitted. Planning of activities related to remaining tasks to be done during the third year has been revised and finalized.

Deviation

The North Sea System (PML) is experiencing some delay, because of problems related to availability of atmospheric forcing and processing of high frequency satellite data, but the issues are nearly solved and final results should be delivered in time. The Black Sea System is experiencing a more serious delay in setting up the assimilation scheme already mentioned in WP2. If the work on this will be not finalized by March 2014, METU will run REA experiments without assimilation, as DMI.

Issues and discussion

There are several problems common to all systems, such as:

- Boundary conditions, especially those from rivers, are not easily available and their use in REA cannot be operationalized. Most systems will just use average values of BC used in WP2 for previous years.

- Systems might provide quantitative information on ecosystem services and intermediate services that ecosystems provide such as carbon sequestration, nutrient cycling and reproductive volume. Since these variables cannot be validated against experimental information, which are not available at the space-time frequency required for a proper validation, partners will:

a) focus on the subset of variables which seems to be more robust

b) provide information in terms of differences of REA in respect to the 'typical' behaviour summarised by the average over WP2 reanalysis

c) provide indicators that are derived from model output, possibly averaged over proper time-space scales, possibly aggregated to the level of qualitative , rather than quantitative information at least

in a few systems (North Sea and Mediterranean Sea) ad hoc experiments will be performed to assess the impact of data assimilation on LTL components on HTL dynamic.

Following reviewer suggestion an effort will be made to identify products which might be more mature to be proposed as marine core services.

Regional Summaries

Baltic Sea
The HRB-ERGOM model has been run forward to M18 and the first REA simulation completed (to M21). Preliminary analysis is underway.

NE Atlantic
A data stream for the meteorological forcing has been established with the UKMO, supplying data from the operational weather forecast and my ocean operational models. Model boundary conditions are in preparation. The REA will start M24 aiming to catch up to M24 and run the M27 simulation on time.

Mediterranean Sea
HCMR: Performed the first rolling hindcast REA simulation (June 2012-June 2013) with and without assimilation. The HCMR operational atmospheric forecast is used for the REA simulations, while GlobColour satellite Chl-a is assimilated. Due to a delay in the availability (currently up to August 2013) of GlobColour weighted average data (delayed mode) the second REA simulation (September 2012-September 2013) was postponed. In order to meet the project time-schedule, alternative satellite datasets (Globcolour simple average near real time data or MODIS/MyOcean data) will be used for the other REA simulations.

OGS: First two Rapid Environment Assessment (REA) experiments have been performed. REA experiments consist of simulations of the Mediterranean Sea performed using the OPATM-BFM model with data assimilation. The first two REA runs cover the periods June2012-June2013 and September2012-September2013, respectively. Physical forcing is downloaded automatically from the MyOcean Mediterranean Forecast System, and data assimilation uses chlorophyll MODIS satellite maps available through MyOcean portal.

Black Sea
The work is delayed by 6 months due to the delays in completing the reanalysis simulations. The

REA will start M24 aiming to catch up to M24 and run the M27 simulation on time. In extremis this region may be run without assimilation in the first instance to ensure some results.

WP4 Assessing the predictability of seasonal forecast, George Triantafyllou, HCMR

The overall objective of this work package is to assess the predictability of target variables at seasonal timescales. The purpose of the WP4 session was to:

1) to setup an experimental strategy for predictability studies at seasonal time scales

2) to describe the experiments for the predictability of LTL and HTL in each forecasting system (2 In Mediterranean (OGS, HCMR), 1 in N. Atlantic (PML), 1 in Black Sea (METU) and 1 in Baltic (DMI)).

T4.1 Definition of experimental strategy for predictability studies at seasonal timescales

Lead by DMI with input HCMR, PML and DTU, a review of the seasonal predictability for atmosphere, ocean and marine ecosystems has been undertaken based on existing research. A draft experimental strategy and implementation plan for European Marine ecosystem seasonal forecast is has been developed (draft of D4.1). An experimental strategy was discussed drawing on the draft deliverable and agreed in the workshop that followed the meeting. It was agreed that all partners would follow a common strategic approach to assess the three months forecast skill of every month in each system and compare it with climatology and reanalysis. Additionally, each partner would perform experiments related to ensemble atmospheric forcing or to sensitivity of nutrient initial conditions or to investigate the ecosystem functioning in relation to NAO positive and negative indices. Based the workshop discussions the revised deliverable (D4.1) will be completed Jan 2014.

T4.2 Predictability in lower trophic level seasonal forecast (ECVs, biodiversity and eutrophication)

A range of seasonal forecast experiments will be carried out on each system following the experimental strategy agreed in WP4 workshop and described above.

T4.3 Assessing the predictability of seasonal forecast for foodweb and commercial fish descriptors.

The response of HTL systems to perturbations in the physics/LTL signal, including temperature, phytoplankton and zooplankton will be examined over a number of years. A protocol for the perturbation analysis of HTL using EwE/Ecospace in the North Sea, Adriatic and Black Sea systems

was agreed in WP4 workshop. Furthermore, the Aegean anchovy IBM response to atmospheric perturbations will be examined to investigate the relation of HTL with LTL.

WP5 Assessment of ecological monitoring system and data needs for GMES ecological service, Jun She, DMI

The purpose of WP5 is to assess biogeochemical monitoring system and data needs for GMES ecological service. The work covers Baltic Sea, NE Atlantic (incl. North Sea), Mediterranean and Black Sea. The workload is 1-3 months for DMI, PML, OGS, HCMR, METU and DTU-Aqua, respectively. Partners have agreed that, due to the limited budget, WP5 should focus on limited number of variables. Minimum required is river loading, chl-a and limiting nutrients. Other important variables such as non-limiting nutrient and oxygen may be added according to the judgments made by the partners. The WP5 assessment of the monitoring network aims to serve needs for REA (Rapid Environment Assessment).

Task 5.1 Meta data for existing monitoring system (M18-M24, PML+All):

Metadata will be collected for the duration of 2011-2013. Stations included in metadata shall have a minimum sampling frequency of once per year. For river load metadata, only the locations are needed. DMI, HCMR, OGS and METU will send PML the metadata in Dec. 2013. The metadata should be delivered by PML before end of Dec. 2013. The metadata shall include following information:

- Parameter, latitude, longitude, depth, sampling frequency, monitoring platform station name, quality flag.
- Parameter name is either chla, DIN, DIP, Si, DO
- Latitude and longitude are in degree.
- Depth's unit is in meters
- Sampling frequency is times/year
- Monitoring platform can be either moored buoy, light house, drift buoy, Argo float, vessel, ferrybox, glider, SOOP(ship of opportunity), undulated profiler or "unknown".
- Station name: use existing station name or "unknown"
- Quality flag: use an existing quality flag or "unknown"
- The suggested format is (a8, 2f8.3, 2I8, a16, a8, I4).

Since D5.1 is the basis for Task5.2 and 5.3, it is very important that the metadata should be ready on time (before end of 2013) while the deliverable report will be ready end of Jan. 2014.

Task 5.2 Assessment of the effectiveness of current monitoring systems (M18-M30, DMI+All):

The methodology for assessing effective coverage of a given monitoring network has been developed by She et al. (2007) in ODON project and further applied by Fu et al. (2011) in ECOOP. Three steps will be taken:

1) Generate a proxy ecosystem dataset (multi-year reanalysis)
2) Calculate spatial-temporal correlation for BGC variables
3) Estimate effective coverage of the given sampling strategy

The proxy ecosystem has been generated in WP2. The 10-year reanalysis will be will be used. The proxy dataset will be used to calculate spatial-temporal correlation for selected BGC variables. Using the metadata and spatial-temporal correlation data, the effective coverage of the current monitoring network can be estimated. DMI has calculated the 2D spatial correlation eclipse. An example is shown for surface chl-a in Figure 1. The maps show significant inhomogeneous feature in space which suggests that design sampling stations in optimal locations (with large correlation scale) can enlarge the effective coverage of a monitoring network.

DMI will send to PML, HCMR, OGS and METU the source code for calculating effective coverage in Dec. 2013. The effective coverage of each parameter should be estimated and the work completed before end of May 2014. PML, HCMR, OGS and METU send to DMI their estimation summary report before 15 June 2014. DMI will make the final deliverable of D5.2 based on the inputs.

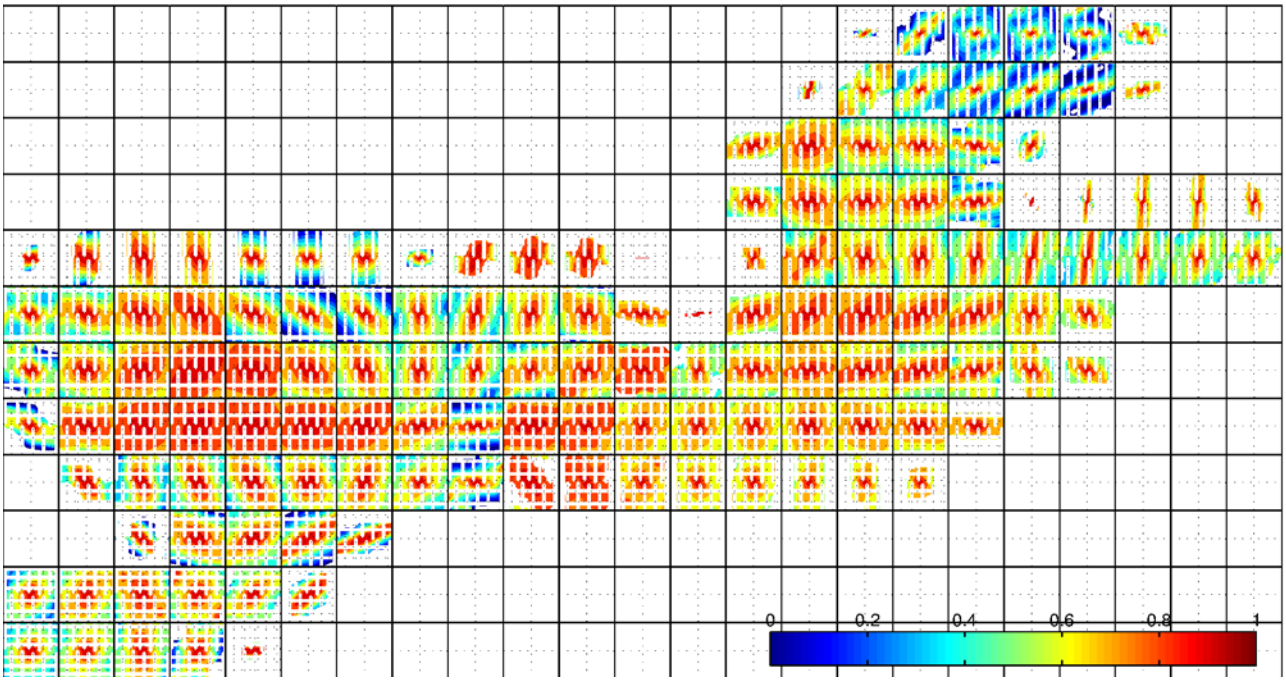

Fig. 1 Baltic Sea spatial correlation map for surface chl.a: derived from the 10yr reanalysis from WP2 used 1.5°×1.5° bins

Task 5.3 Recommendations for monitoring to underpin Operational Ecology in the GMES Marine Service (M30-M36, DMI+All)

The results from T5.2 and other OPEC WPS will be further analyzed in order to give some recommendations to underpin Operational Ecology in the Copernicus Marine Service, especially for Rapid Environment Assessment. Following scientific issues in designing monitoring network will be discussed:

- Obs. data uncertainty estimation: important both for validation and assimilation
  - Sampling error estimation
  - Hybrid satellite and in/situ to reduce uncertainty
  - Use model ensemble to estimate uncertainty
- Effective sampling frequency: Is a yearly cruise useful?
- Effective spatial sampling coverage: usefulness of a few stations

- Optimal sampling locations: where to sample?
- Importance of different variables for REA and Eco-forecast?
- Effective data delivery time for REA?
- Importance of T&S monitoring for eco-forecast?

It is decided that the results of WP5 should be disseminated to key stakeholders such as Copernicus Marine Service, EMODNET, EuroGOOS and SeaDatanet.

WP6 Data Delivery and Downstream Services, Shane Hudson (PMLA) and Thomas Storm (BC)

Summarised work planned in DoW for Year 2 and what work had been carried out (Tasks 6.1 and 6.2.2). Work is currently on target.

PMLA listed major development work this year:

- New timeline
- Tag based variable selection
- Extra analysis plot types available
- Data download facility
- User identification (OpenId)
- Shareable states
- Structured “walk throughs”

Hindcast data is now available on the portal for almost all products. The remaining datasets have been produced by the partners but need some work to integrate into the portal and will appear shortly.

The broad brush portal development plan was outlined and a live demonstration of the portal was given showing the new features and datasets in use.

Brockmann summarised the work carried out for the Water Quality downstream service (WAQQS) and showed the proposed new design which will use the OPEC portal as a base front end.

Portal discussion session

- Will long running plots be useful? If dataset it over a certain size, a pop which links to an email request comes up. This will ensure the user actually wants the data and has to make that extra effort to get the data. Avoid clogging up the server with large requests.
- Would it be useful to have if running on tablets?
- Limited degree of commonality for scales and colours. So partners to provide min and max to allow developers to set scale bar.

Categories of tags people would find interesting:

- Provider
- Region
- Physics
- Chemistry
- Zooplankton
- Phytoplankton
- Higher trophic level
- MSFD Descriptors

Additional features to be added to Portal:

- Data provider and OPEC logo pops up on maps and downloads
- Source provider ie OPEC details
- Disclaimer to be added to the portal – discuss how explicit this needs to be with regards to IP
- Email contact to be added to data to users can follow up if need more information
- Satellite data to be added – just a few CCI and sea surface temperature data

WP7 Knowledge Exchange, Jessica Heard, PML

The aim of this WP is Service to engage with people outside of GMES Marine Service to show the potential uses of OPEC's products.

T7.1.1 Establish the Marine Core Service Stakeholder Group (MCSSG)

A MCSSG user group has been formed with involvement of MyOcean2 Monitoring and Forecasting Centres for Arctic (NERSC), Baltic Sea (DMI), NW Shelf (Met.O), SW Shelf (Puertos), Mediterranean SeChera (OGS), Black Sea (MHI) who are responsible Production Units for ecosystem forecast. Progresses made in OPEC have been broadcasted to MyOcean Board through DMI Board Member. The linkage between MyOcean2 service and MSFD is not explicitly presented due to lack of research on MSFD indicators in MyOcean2. OPEC has worked on this field. A face to face working meeting is needed between OPEC and MCSSG User Group, to figure out a practical approach for taking over OPEC achievements in the next phase of Copernicus Marine Service.

T7.1.2 Road map for roadmap for the future development of sustainable Operational Ecology on a Global scale

A first draft of the roadmap for the transitioning of OPEC research into the marine core service has been prepared. The aim of this document is to provide a straw man for discussion and refined in consultation with representatives of the Marine Core Service, and the OPEC user group. The pressing need to define a list of core data products was noted and will be acted upon. The requirement for interactions with the group developing the white paper on coastal systems was also noted.

Task 7.2 Coordination of inputs from the User Community into OPEC

A User Group has been established and expanded to include new members relevant to the current products under development. Whilst the User Group has been engaged to provide input and feedback into the development of the Data portal, very limited response has been received.

A number of important User Interface developments are being carried out on the portal over the next month to ensure it is ready for feedback and comment from the broader potential user community. Once these developments are completed users will be engaged more actively to gain insight into how the portal can be further tailored to meet their needs.

The other key area that requires User engagement is around the Rapid Environmental Assessment. Following the meeting an approach for the presentation of these assessments will be agreed and then sent out to User's for comment. The engagement of the User group has met with limited success and so looking forwards Users will be targeted more directly and individually, partners will

engage closer with their national contacts to ensure sure engagement is carried out at a regional level as well as more broadly across Europe.

Task 7.3 Development of KT / PO tools and strategies

A number of tools have been created and implemented. KT webpages are online and regularly updates. A fact sheet series has begun with the first fact sheet available online and disseminated electronically to stakeholders using information from the 'User Contacts Database'. Tools currently employed include:

- Project Flyer
- Fact Sheet series
- Dedicated webpages
- Face to face contact
- Stakeholders Contact database
- Input from User Group
- Scientific dissemination

Summary table of some dissemination activities carried out in the second period, focusing on demonstrations and feedback on the Data portal.

Meeting	Venue	Topic	Date
Operational Oceanographic Products for Fisheries and Environment (WGOOFE) working group	ICES	Presentation of OPEC Portal	December 2013
EarthServer project Meeting	Frascati, Italy	Demonstration of OPEC Portal	15 Nov. 2013
EUROMARINE Web Service workshop	Bremen	Presentation of OPEC Portal	21st May 2013
MyOcean Annual Meeting	Cork, Ireland	DTU Aqua demonstrations in the	15-17 April 2013

		Baltic	
ESA Ocean Colour Climate Change Initiative progress meeting held on	London	Portal demonstration	19-20 Feb 2013
OPEC Portal demonstration	Skype demonstration to University of Cape Town	Portal development	January 2013

Participant List

Annika Pollani, Greece (HCMR)

Asbjorn Christensen, Denmark (DTU)

Baris Salihoglu, Turkey (METU)

Cosimo Solidoro, Italy (OGS)

George Triantafyllou, Greece (HCMR)

Icarus Allen, UK (PML)

Jessica Heard, UK (PML)

Jonathan Beecham, UK (Cefas)

Jun She, Denmark (DMI)

Kostas Tsiaras, Greece (HCMR)

Momme Butenschon, UK (PML)

Peter Walker, UK (PML)

Shane Hudson, UK (PML Applications)

Simone Libralato, Italy (OGS)

Sinan Arkin, Turkey (METU)

Sofia Kalaroni, Greece (HCMR)

Sonja Van Leeuwen, UK (Cefas)

Stefano Ciavatta, UK (PML)

Stefano Salon, Italy (OGS)

Thomas Storm, Germany (BC)

Tian Tian, Denmark (DMI)

Zhenwen Wan, Denmark (DMI)

External participants

Paola di Chiarini, (REA), Brussels

Morten Skogen (Reviewer), Norway

Meeting Agenda

OPEC Annual Science Meeting

Athens Gate Hotel, 3-5 December 2013

DAY 1

Session 1 – Project Review

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

9:20 Questions

Status report and review of active work packages from WP leaders 2,3,4 ,6,7. Allotted time to included questions

9:30 WP2 Next generation model setup and benchmarking *Baris Salihoglu*

10:15 WP3 Rapid Environmental Assessment *Cosimo Solidoro*

10:45 WP4 Assessing the predictability of seasonal forecast *George Triantafillou*

11:15 Coffee

11:45 WP6 Data Delivery and Downstream Services *Shane Hudson/Peter Walker*

12:10 WP7 Knowledge Transfer *Jessica Heard*

12:20 WP7 Progress towards implementation of road map for operational ecosystem services *Icarus Allen and Jun She*

12:30 Question and Answer, Discussion session with EC Project Officer and Reviewers

13:00 Lunch

14:00 Discussion continues as needed with reviewers

Session 2: Ongoing activities and future planning

Data delivery and downstream services

14:00 Development on Data Visualization, data needs and communication *Shane Hudson*

14:30 Downstream service integration *Thomas Storm*

15:00 Discussion on data needs and provision, data strategy and communication

15:45 Coffee

WP5 Ecological monitoring and GMES service needs – Lead by DMI

16:00 Assessment of ecological monitoring system and data needs for GMES ecological Service – *work plan, current activities, and potential problems* *DMI*

16:20 Assessment of the effectiveness of current monitoring systems *DMI*

16:40 Metadata for existing monitoring systems – *Icarus Allen*

17:00 Current status of routine monitoring of ecosystem properties in European regional seas [month 24] *Icarus Allen*

17:30 Wrap up of the day by Project Coordinator, final discussions and comments from Reviewers. Additional discussions as needed, on Knowledge Exchange activities, User group engagement, Peer review publications and any other matters arising from the meeting.

Work packages 3 and 4 will be discussed in detail over the next 2 days

Deliverables due by the meeting

D2.6 Report on reanalysis hindcast skill [month 18] HCMR

D2.7 Hindcast simulation results on webserver [month 18] PML

D2.8 Report on benchmarking the target variables [month 18] METU

D4.1 Experimental Strategy for assessing seasonal forecast predictability [month 21] DMI

Day 2

Workshop on Rapid Environmental Assessment *led by OGS*

9:00 Welcome and Intro by *Cosimo Solidoro*

Status report from Regional leads following October workshop

10 mins regional reports

9:30 Med Sea

10:00 NE Atlantic

10:30 Baltic Sea

11:00 Coffee

11:30 Black Sea

12:00 Discussion as needed

13:00 Lunch

14:00 Plenary discussion to plan continued WP3 activities and completion of Deliverables. Improvement, coordinate and validation of runs. Consistency of product, demonstrations.

Break out groups as required.

16:00 Coffee

17:30 Day ends

Day 3

Workshop Work Package 4 – *Lead by HCMR*

Seasonal Forecasting

9:00 Welcome and Introduction *George T.*

9:10 Experimental Strategy for assessing seasonal forecast predictability (*deliverable status and draft report*) *DMI*

9:40 Demonstration of use of CV (coefficient of variation) for assessing the predictability, by disturbing the initial conditions *HCMR*

10:00 Reducing uncertainty and benefits of multiple model systems – Lead by HCMR

Presentations followed by discussions and break out groups as needed.

- *Discussion topics for the day include:* A brainstorming to decide collectively on the strategy of assessing the predictability of key indicators at seasonal time scales
- Space and time scale predictability for ECV and key indicators for GES descriptors (eutrophication, food webs, commercial fish).

16:00 Meeting closes

Coffee Break and lunch as appropriate