OPEC WP3 Workshop Report: Rapid Environmental Assessment

4 December 2013, Athens Greece

Contents

Summary of main goals and structure of WP3

This workshop was led by 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 over the short term forecast. This is achieved 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. Modeling HTL dynamic is not required under the project work plan but in case of availability partners are invited to produce also HTL results.

WP3 is structured in 3 tasks. Task 1 is already started, and focuses on performing the REA rolling hindcast. Task 2 and 3 are devoted to the assessment of skills and uncertainty of the REA, and to investigate how results from different models can be used to derive more robust estimates of ecosystem indicators.

After the workshop introduction each partner described their results obtained in WP3 so far, highlighting deviation from plan, if any, and future actions.

Regional REA summaries

Baltic Sea

DMI (Danish Meteorological Institute) model ran from 2012.06.01 to 2013.08.31 and is now extended to 2013.11.30. Currently, REA are performed without assimilation, and therefore they do not differ from hindcast, since there is no latest in-situ data to assimilate.

North West Atlantic

Due to some problems with availability of atmospheric forcing and satellite chlorophyll to be assimilated, PML is experiencing a delay in the start of the REA experiments in north east Atlantic. Currently they are autonomously reprocessing external forcing and GlobCOlour satellite observation to be assimilated. It is expected that REA experiment will start early 2014, and be finalized by June 2014. PML will also run a number of analysis on the results from previous assimilation experiments to help assess the impact of assimilation in data poor regions.

Mediterranean Sea (OGS)

REA experiments performed by OGS systems (assimilation of satellite chlorophyll by means of a 3dvar scheme on a biogeochemical model driven by MyOcean physical forcing) are in agreement with the schedule, i.e. the first 3 REA have been already produced and results data are being uploaded in the data portal

Mediterranean Sea (HCMR)

A first REA experiment were also produced using the HCMR system, in which SeaWiFS Chl-a was assimilated using a new Kalman filter (Hybrid-SEIK) algorithm. Analysis of the impact on assimilated and non-assimilated variables were also briefly discussed. A slight delay has occurred for the second

REA simulation (September 2012-September 2013) due to a delay in the availability of GlobColour Chl-a (weighted average) products. Other satellite products were found (MODIS from MyOcean site, Simple average Globcolour) and the second REA simulation will be completed in January 2014.

Black Sea

METU is still working on finalization of an assimilation scheme and the decadal reanalysis (WP2), as a result the REA experiments have not started, yet. They are confident to be able to finalize this work within first part of 2014, if not REA experiments will be run without assimilation, as was done by DMI.

Summary and discussion

The first REA experiments have already been performed for the Mediterranean System by both the OGS and HCMR teams. In the Baltic a REA experiment has been done without data assimilation, however during the discussions as the workshops several partner pointed to the availability of satellite chlorophyll information. DMI now plans to re-run the exercises in early 2014. Also in the other systems the REA experiments will start in January 2014, and should be completed within the first half of the year, 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.

The North East Atlantic System (PML) is experiencing some delay, because of problems related to the availability of atmospheric forcing and processing of high frequency satellite data, but they are almost resolved 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 this work cannot be not finalized by spring 2014, METU will run REA experiments without assimilation, as DMI.

The discussions at the workshop highlighted that there are several problems common to all systems, such as those arising from the fact that 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 Boundary Conditions used in WP2 for previous years.

Following suggestions from the project reviewer an effort will be made to identify products which might be more mature to be proposed for use by marine core services.

Discussions covered further topics such as reliability of indication provided by model output, in relation to different model variables, and also considering the case in which there are not enough data to validate model output, or in which the model does not have very good skill in reproducing available observation.

Partners concluded that all model systems might provide quantitative information on ecosystem services and intermediate services that ecosystem provide, such as carbon sequestration, nutrient cycling and reproductive volume. However, since most of 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 seem 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 derived by post processing model output, possibly averaged over proper time-space scales, possibly aggregated to the level of qualitative, rather than quantitative information.

Partners decide that indicators might be flagged as more or less robust indicators, depending upon the model skill and uncertainty in simulating them. Also different level of aggregation (e.g. daily fields vs seasonal or annual averages) might be considered.

Agreed indicators list includes:

- Temperature
- Salinity
- Nutrients (nitrate, phosphours, silicate)
- MLD
- Oxygen
- Primary Production
- Chlorophyll
- Plankton biomass
- pH

Partner are also encouraged to provide other indicators (optional) also related to HTL species, to ecosystem functioning and marine ecosystem services (carbon flues at air-water interface), to EU Marine Strategy Framework Directive descriptors (e.g. eutrophication related indicators such as winter DIN, summer Chl, oxygen).

Within several systems (North Sea and Mediterranean Sea) ad hoc experiments will be performed to assess the impact of data assimilation on LTL components on HTL dynamics.

A final list of indicators to upload to the data portal common to all system will be finalized within early 2014, after all partners have completed their first REA. A check on progress on REA rolling hindcast will be made before next periodic intermediate report, early spring 2014. Plans for activities related to task 2 and 3 will be finalized in the same time.

Participant List

Annika Pollani, Greece (HCMR)

Asbjorn Christensen, Denmark (DTU)

Baris Salihoglu, Turkey (METU)

Cosimo Solidoro, Italy (OGS)

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Tian Tian, Denmark (DMI)

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Workshop Agenda

Wp3 workshop within the OPEC Annual Science Meeting

Athens Gate Hotel, 4 December 2013

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