

GODAE OceanView



Task Team meeting

Marine Ecosystem Prediction Task Team (MEP-TT)

28 - 29 February 2012

Met Office, Exeter, UK

Authors:

Rosa Barciela (Met Office) and Pierre Brasseur (LEGI) – Co-chairs of the MEP-TT
Kirsten Wilmer-Becker (Met Office) – GOV Project Office Coordinator

Contact address:

Kirsten Wilmer-Becker
GODAE OceanView Project Coordinator
Met Office
FitzRoy Road
Exeter, EX1 3PB
United Kingdom
Email: kirsten.wilmer-becker@metoffice.gov.uk
Telephone: +44 (0)1392 884916

Table of contents

Executive summary	3
Introduction	4
1. Workshop Aims	4
2. Modus operandi of the MEP TT	4
2.1. MEP-TT work plan	5
2.2. Work Topics.....	5
2.2.1. <i>Assessment of the impact of physical data assimilation on biogeochemical variables (led by Tong Lee)</i>	6
2.2.2. <i>Ocean colour assimilation approaches (led by Richard Matear)</i>	7
2.2.3. <i>Multi-purpose observing systems (led by Pierre Brasseur)</i>	7
2.2.4. <i>Evaluation of current operational oceanography products and their fitness for purpose (led by Rosa Barciela)</i>	9
2.3. Discussion on biological observing systems and data availability	10
2.4. Discussion on decadal predictability.....	10
3. National contributions	11
3.1. MEP Australia Update - BLUElink activities: 3 year perspective (R. Matear, CSIRO).....	11
3.2. MEP OGS/INGV update - OGS activities: 3 year perspective (A. Crise, OGS)	12
3.3. MEP Mercator Ocean update (A. El Moussaoui, Mercator Ocean).....	12
3.4. MEP MRI/JAMSTEC update.....	13
3.5. MEP Met Office update (Rosa Barciela)	13
4. GODAE OceanView support: the GODAE OceanView website and twiki	14
5. Future task team meetings	14
Appendices	15
Appendix 1: Agenda	15
Appendix 2: Attendees list	18
Appendix 3: Actions (tbc).....	19
Appendix 4: References	20

Executive summary

The Marine Ecosystem Prediction Task Team (MEP-TT) was established in the framework of GODAE OceanView (<http://www.godae-oceanview.org>) in the continuation of the former IMBER/GODAE working group created in 2007, with the goal of promoting and coordinating actions between developers of operational systems and biogeochemistry/ecosystem modelling experts. The Task Team reformed in 2011 and, under the auspices of GODAE OceanView (GOV) will foster the long-term development of a capacity for systematic monitoring and prediction of the state of marine ecosystems and biogeochemical cycles in the open oceans and regional seas.

The 2012 MEP-TT workshop, hosted by the UK Met Office in Exeter, 28th and 29th February 2012, was organised in order to:

- review progress made in the various GOV groups over the past 3 to 5 years in terms of operational biogeochemistry/ecosystem modelling, monitoring and prediction,
- discuss models and data assimilation approaches
- consolidate the work plan for the next 2 years.

This was the first actual meeting of the newly formed Task Team, providing thereof an opportunity for the members to meet face to face, share current and planned related activities as well as identify areas of mutual cooperation.

The workshop discussions were organized around 4 main topics: (i) impact of physical data assimilation on biogeochemical variables, (ii) ocean colour assimilation approaches, (iii) multi-purpose observing systems and (iv) operational oceanography products in response to users needs.

The discussion resulted in a number of agreed actions to be developed in a coordinated way over the next 2 years, which included:

- setting up task team sub- groups with specific work plans and deliverables
- the creation of an inventory of national contributions specifically relevant to the MEP-TT
- to improve as much as possible the visibility given to the above activities.

At the next GOVST meeting (Brazil, November 2012), the MEP-TT will conduct an interim progress review of the agreed workshop actions, and will start planning of a second formal meeting of the task team in spring 2013 (to be likely coupled with another international conference on marine biogeochemistry and ecosystems).

Introduction

The integration of new biological and assimilation components into operational systems for the monitoring and prediction of marine ecosystem properties is trying to bridge the gap between the current status of the GODAE OceanView capabilities and emerging applications in areas such as management of marine ecosystems and fisheries, marine pollution, water quality and carbon cycle monitoring. The OceanView Marine Ecosystem Prediction Task Team (MEP-TT) has been set up with the goal to define, promote and coordinate actions between developers of operational systems and experts in ecosystem and biogeochemical modelling and observing systems.

This workshop provided the first opportunity for the GODAE OceanView operational groups to meet, review progress and agree future work plans regarding biogeochemical applications in the field of operational oceanography.

1. Workshop Aims

This workshop was organised by the GODAE OceanView Task Team on Marine Ecosystem Prediction (<https://www.godae-oceanview.org/science/task-teams/marine-ecosystem-and-prediction-tt/>), and its aim were: (i) to review the progress in the fields of operational biogeochemical and ecosystem modelling, monitoring and prediction, made not only by the task team participants but also the wider community, over the past 3 to 5 years and (ii) to identify routes to working together more efficiently. The workshop was attended by the MEP-TT members (see *Appendix 2: List of participants*)

Specific **goals** were to:

1. Bring together international players actively working in the field of marine biogeochemistry and ecosystems, mainly but not exclusively, the GODAE-IMBER community, including operational, scientific and observational parties.
2. Understand the existing capability of the TT members as well as their priorities and current lines of work.
3. Agree a joined work plan aligned to the remit of the task team.

The agenda for the meeting is available from the Appendix section (see *Appendix 1: Agenda*).

2. *Modus operandi* of the MEP TT

It was agreed that members of the MEP-TT should be able to make executive decisions in order to move forwards common TT projects. It was also noted that the group should strive to improve communication with other GODAE OceanView Task Teams and identify relevance of their activities. The MEP-TT would also like to see a stronger signal from the GODAE OceanView Science Team (GOVST) on wider TT activities.

The task team scope is understood to mainly have a scientific focus (research, model development and related improvements) rather than look into user engagement. It was suggested to write a *White Paper* on long term perspective to provide visibility of group and GODAE OceanView aims, which should be based on expert knowledge and backed up by the community.

The discussions on future work focused on: current and future work plans, including a review of the working topics this group should concentrate on, the GODAE OceanView national contributions relevant to this task team and a whether or not attempt to expand the remit to also cover decadal predictability. These are all presented in the next sections of this document.

Presentation available from MEP-TT workshop website

- *Workshop aims presentation: [Aims MEP TT Workshop Feb2012 Final.pdf](#)*
- *GODAE OceanView overview presentations: [2.-20120228-GOV-EDY.pdf](#)*

2.1. MEP-TT work plan

One of the workshop tasks was to agree and revise the task team work plan which is implemented in the GODAE OceanView work plan. It was agreed that the MEP TT should try to align the national group work plans (GODAE OceanView representation of national ocean forecasting systems) with the specific BGC modelling activities at national level and also agree on common activities.

The outcome of the workshop resulted in the establishment of 4 areas of work or topics, 3 of which match the priorities identified at the 2010 GODAE GOV-ST meeting held in Tokyo, and one extra area of work focused on ocean colour assimilation approaches (see section 2.2.2 below). Each one of these topics has a brief work plan, and a lead, who will be responsible for engaging TT members in order to develop a more detailed work plan with TT participants. Further details are detailed in section 2.2 below.

Presentation available from MEP-TT workshop website

- *MEP-TT work plan overview: [3.-MEP Exeter PBrasseur KO v2.pdf](#)*

2.2. Work Topics

Four topics, which are described below, have been identified as important issues to be addressed by the MEP-TT. These are:

- Assessment of the impact of physical data assimilation on biogeochemical variables
- Ocean colour assimilation approaches
- Multi-purpose observing systems
- Evaluation of current operational oceanography products and their fitness for purpose

The next steps include formalising the core organisations which will work together on these topics and also writing a short work plan, with specific tasks, owners and timelines.

2.2.1. *Assessment of the impact of physical data assimilation on biogeochemical variables (led by Tong Lee)*

Overall speaking, the observing system for the physical state of the ocean is much more mature than that for biogeochemical state. The assimilation of physical observations is also more advanced than that of biogeochemical observations. Because of the important effects of the physical state on biogeochemistry, there has been an increasing need to use the physical data assimilation products to drive biogeochemical models, which serves as the stepping stone towards coupled physical-biogeochemical data assimilation.

One of the top priorities of GOV as identified in the 2010 GOVST meeting in Tokyo is to assess the “Impact of physical data assimilation on biogeochemical variables”. In the past few years, there have been several reports (e.g., in the 2007 GODAE-IMBER workshop and in the 2011 GOVST MEP-TT meeting) about the degradation of surface chlorophyll-a concentration or CO₂ flux by sequential data assimilation products, most notably in the tropical Pacific. This problem is believed to arise from the well-known problem of spurious vertical flux associated with unbalanced physical state resulted from sequential data assimilation, which typically brings up too much subsurface nutrients to the surface layer to cause over-estimation of chlorophyll-a concentration. In fact, spurious vertical flux is not a unique problem of sequential data assimilation for the ocean, but for atmosphere as well.

Efforts have been made to understand and to alleviate the spurious vertical flux (e.g., Martin et al. 2002). Incremental analysis update that spreads out the assimilation increment in time has been found to reduce the spurious vertical flux but does not eliminate the problem. There has also been report that the introduction of a “smoother” into the sequential assimilation avoided the degradation (e.g., McKinley et al. 2004). While using a smoother-type assimilation scheme can prevent spurious vertical flux, introducing the smoother-type assimilation is a major endeavour that may not be practical to many groups currently engaging in sequential assimilation.

Understanding the nature of the spurious vertical flux and identifying a solution are critical to biogeochemical applications of physical data assimilation. In the MEP-TT, we propose a close collaboration between researchers engaged in physical data assimilation and in biogeochemistry to tackle this problem. Specifically, we plan to:

- (i) analyze and compare the vertical advective and diffusive fluxes in selected sequential assimilation products to examine the nature of the spurious vertical flux;
- (ii) determine if the spurious vertical fluxes are related to vertical velocity, vertical mixing, or both;
- (iii) examine if the “spuriousness” is due to spatial and/or temporal noise;
- (iv) identify potential commonality for the regions where spurious vertical flux and degradation of biogeochemical variables are found;
- (v) investigate similarity in the nature of spurious vertical flux among different sequential assimilation products;

- (vi) contrast the vertical flux resulted from smoother-type assimilation different from those resulted from sequential assimilation using the same model to gain insight;
- (vii) seek a work-around solution such as post-processing of vertical velocity and/or vertical diffusivity that may alleviate (or even eliminate) the spurious vertical flux and degradation of biogeochemical variables.

While seeking a work-around is practical near-term solution, ultimately, we want to identify a fundamental (as opposed to “work-around”) solution to solving the problem.

2.2.2. Ocean colour assimilation approaches (led by Richard Matear)

Many groups are now assimilating remotely sensed ocean colour chlorophyll a into their ocean models and generating BGC re-analysis products using a range of different data assimilation methods. Given the present effort of the various groups, now is an appropriate time to compare the biogeochemical data assimilation products generated with the goals of assessing their strengths and weaknesses, and determining their robustness. The activity will exploit existing data assimilation experiments with biogeochemical models already being pursued by various groups with global and regional models.

To facilitate the comparison, participants will need to provide a short description of the BGC model, ocean forcing used, the data being assimilated, the time period used in the assimilation. To assist in the comparison it would be helpful to use the same ocean colour dataset (SeaWiFS - 1997 – 2008 or a blended product with MODIS to extend the time-series by several years).

To help focus the activity, the comparison will be confined to the North Atlantic where the greatest number of groups are doing data assimilation and the most additional non-assimilate data are available to evaluate the data assimilation products. Key datasets to evaluate the data assimilation would include: new primary production (NPP), pCO₂ seasonality, and phytoplankton, zooplankton and dissolved oxygen concentrations. The activity will also use past and present initiatives (e.g. OCMIP, MAREMIP, My Ocean, SOCAT) to assemble the datasets useful for assessing the simulated biogeochemical fields.

This work topic should exploit existing or planned data assimilation effort to minimize the effort required to participate. We expect to compare results from models with only biological assimilation as well as models with both physical and biological assimilation.

2.2.3. Multi-purpose observing systems (led by Pierre Brasseur)

In spite of efforts achieved in the past two decades to observe the ocean in a way that meets requirements for operational oceanography, the ocean is still critically undersampled particularly in terms of biological and biogeochemical oceanic

properties. This is currently a main obstacle to implement operational systems suitable for routine and accurate monitoring of marine ecosystems and biogeochemical cycles. One of the objectives of the MEP-TT is to **specify the essential sets of physical and biogeochemical observations** required to constrain coupled physical-biogeochemical models, to identify the best sampling strategies and to formulate educated recommendations to improve the observing capacity needed to sustain full-fledged integration of biogeochemistry into operational systems.

The MEP-TT expressed concern about the lack of a clear perspective regarding future ocean colour missions needed to consolidate the space component in the next 20 years, notwithstanding the Sentinel-3 mission planned in 2014. The MEP-TT discussed the opportunity offered by new *in situ* observing programs such as Bio-ARGO to improve synergies with present and, hopefully, future ocean colour satellite missions. A first solid set of recommendations was provided by the OceanObs09 conference (e.g. Claustre *et al.*, 2010), though more precise questions should be addressed by the MEP-TT, including:

- (i) how to optimally balance *in situ* measurements permitted by autonomous profiling floats and gliders between nutrients, oxygen or fluorescence?
- (ii) what are the best sampling strategies in space (where to deploy the instruments) and time (how to design the profiling cycles), and
- (iii) what are the potential benefits expected from adaptive sampling as permitted by Iridium interactive communication systems?

OSSEs provide an elegant and powerful conceptual framework to address these questions objectively, but the coupled physical-biogeochemical assimilative systems in place today are merely mature to address these questions. Instead, simplified sampling experiments could be implemented using existing multi-annual 3D simulations (be it existing free runs or ocean colour assimilation experiments covering the SeaWiFS period) with the goal to assess the variability that future biogeochemical reanalysis systems should be able to capture, given different sampling scenarios.

As an activity of the MEP-TT, it is proposed to design a “standard” protocol for operating such optimal sampling experiments compliant with the models and regions of interest of the TT members. Pierre Brasseur will lead this activity in liaison with other TT members (F. D’Ortenzio to be approached) to draft a position paper document that will be circulated between the TT members before the next GOVST meeting. The standard protocol will be tested in a North Atlantic region where the deployment of more than 50 Bio-ARGO floats and gliders is planned during 2013-2014, in the framework of ongoing initiatives such as REMOCEAN (PI H. Claustre) and NACycle (proposal submitted to NFS by M.-J. Perry). In a second step, the sampling protocol will be shared between the MEP-TT members (possibly through dedicated tools developed for easy replication with different models/simulations). A

presentation of the first results of this activity is targeted at the GODAE OceanView/CLIVAR workshop on OSSEs-OSEs for coupled models as planned by Peter Oke in April 2013 in Hobart, Tasmania.

2.2.4. Evaluation of current operational oceanography products and their fitness for purpose (led by Rosa Barciela)

Over the past 10 years there has been a big leap in the routinely generation and provision of operational products, including biogeochemical ones, which have now sufficient skill to provide key information to many real world applications, from regular monitoring to statutory advice on ecosystems.

Despite the wealth of data available, there appears to be significant barriers which still prevent the optimal exploitation of these operational products and has resulted in many potential end-users still relying on the traditional uni-disciplinary (as opposed to multidisciplinary) approaches (Berx *et al.*, 2011). One perceived user group that could benefit immensely from using operational products is the fisheries and environmental scientific community. This community has often been criticised for failing to be multidisciplinary in focus and is currently under mounting pressure to provide management advice, for fish stock assessments, based on the integration of environmental, including ecological, information.

For these reasons, the TT has decided to focus on facilitating and championing the exploitation of operational oceanography products in “real world” applications. In order to do so, a task team subgroup has committed to the design of simple experiments aimed to demonstrate the viability of using operational products in fisheries applications.

This subgroup will focus on:

- (i) The use of operational products to aid the specific management of the tuna fishery.

We will use modelled primary production from several operational systems (e.g., FOAM, Mercator) to force SEAPODYM (a spatial ecosystem and population dynamics model used as an ecosystem-based fishery management system) and assess the results using fisheries data (Lehodey *et al.*, 2010)

- (ii) Set up joined activities with ICES in order to build a road map to make environmental operational products become one of the building blocks of the annual integrated fish stock assessment. Champion end-users have been identified and are willing to engage in these activities.

The next steps will be to: (i) outline detailed tasks, including experiments and a short list of products to be delivered to the champion users; (ii) identify the resources required for, and efforts in place to, conduct experimental trials; (iii) provide assessment of trial results and feedback from end-users.

2.3. Discussion on biological observing systems and data availability

Availability of biogeochemical observational data is still an issue. MyOcean made a big difference in increasing the number and variety of data available through a single point of contact and there are other projects trying to provide biogeochemical data (mentioned was OceanSites as a good contact point). However, there is need to explore the requirements for modellers in order to define/specify data collection and to learn about data needs which should lead to providing input to the development of the ocean observing system. This group could be well placed to make recommendation on the future developments, but it has to make sure to stay within a sensible range. Regarding Ocean Colour missions, the paper by Cara Wilson (NOAA) provides a good case of data underused in fisheries and explains the difficulties of the transition from research mode to operations.

The Integrated Marine Observing System (IMOS), developed under the National Collaborative Research Infrastructure Strategy (NCRIS) is increasingly interested in learning about the need for observation sensors. More specific requirements mentioned included focussing on ocean optics/ acoustics. The plan for 50 Bio-Argo floats in the North Atlantic will also need to be addressed with respect to its location. There is a problem with bio-sensors and where to put them, as they could not go in any region due to issues with fisheries/ exploitation.

Another issue relates to finding useful observational data online, which seems not always clear. MyOcean was mentioned as one portal for biogeochemical data. Please compare paper by Barbara Berx (Marine Scotland – Science) which reflects potential mismatch between user requirements and the perception of requirements by the providers, among other things, through the outcome of an ICES/WGOOFE questionnaire.

2.4. Discussion on decadal predictability

The integration of biogeochemistry into operational oceanography systems raises the question of our theoretical capacity to predict the evolution of marine ecosystems and biogeochemical systems over time scales ranging from days to decades. Much progress has been accomplished in terms of coupled ocean-atmosphere predictions at seasonal and decadal timescales (Sefarian et al., 2012), while the issue of marine ecosystem predictability is identified as potentially an exciting scientific issue to be explored. Since there is some potential skill to predict ocean temperature and salinity properties at decadal scales, it is reasonable to believe that biogeochemistry too could be predictable using coupled models, at most at the same range.

A discussion was introduced by Marion Gehlen to explore how the MEP-TT could contribute to marine ecosystem predictability issues. It was recognized that a number of well-identified users, namely in the field of fisheries management, would be very interested in reliable decadal predictions for instance in case of regime shift detections etc. As this is presumably an initial value problem, the best possible identification of the

present status of marine ecosystems is a relevant goal that Operational Oceanography should endorse as part of its future challenges.

It was mentioned by the group that, before addressing the decadal issue, looking at seasonal predictability could make a more tractable target given the present status of coupled ocean-atmosphere predictions. The MEP-TT showed much interest in these predictability topics, but considered in the same time that it was not the right group to initiate investigations in this field. It was recommended to further develop the discussion in the frame of a forum to be established in liaison with expert teams from other task teams (e.g. the for Short- to Medium-Range Coupled Prediction - SMRCP-TT) or international programs such as IMBER and CLIVAR. Of course, individual members will be interested in providing expertise and taking part to the discussion.

3. National contributions

MEP-TT members representing one of the GODAE OceanView national systems presented feedback on their institutes/system future plans.

3.1. *MEP Australia Update - BLUElink activities: 3 year perspective (R. Matear, CSIRO)*

The BLUElink 3 project has started with funding till 2014 and will be a key project in delivering results to GODAE Ocean View. With BLUElink 3, several new initiatives are planned. The ocean model is now eddy-resolving in its entire domain (1/10 degree resolution between 75S to 75N). A simple biogeochemical (BGC) model with phytoplankton, zooplankton, nitrate, detritus, oxygen, and carbon has been added to the ocean model to enable the simulation of the carbon cycle. A re-analysis product with BGC fields will be produced along with an assessment of how physical data assimilation impacts the BGC. The BLUElink 3 project will also deliver regional simulations with the global model providing the boundary conditions for the open boundary of the regional (e.g. Great Barrier Reef) and local (e.g. Heron Island) simulations. Both the global and regional models will deliver both forward running and data assimilation products with BGC in the water column and in the sediments. The BLUElink 3 effort intends to exploit the data streams generated by the Integrated Marine Observing System to provide data to assimilate and to assess our model simulations. These data streams will include coastal BGC reference sites, Argo drifters, ocean colour products, gliders and moorings.

In addition to the BLUElink project, data assimilation is also done in ACCESS-o (the coupled ocean and sea-ice model that Australia is using for its AR5 climate simulations). With ACCESS-o, a multi-decadal re-analysis product will be generated. Several test re-analysis products have been generated and it is expected to complete a re-analysis simulation, coupled to the same BGC model that is being used in BLUElink 3), by next year. Furthermore, with the recently funded Centre of Excellence on Climate Research, effort is underway to merge the ACCESS and BLUElink 3 effort by developing a new

ocean model grid that would be appropriate for both ocean forecasting, prediction and climate modelling. Within the next year, it is expected to have a global 1/10 degree ocean model with sea-ice and marine BGC running. The effort will enable BLUElink, ACCESS and seasonal prediction simulations to occur within the same modelling framework.

3.2. MEP OGS/INGV update - OGS activities: 3 year perspective (A. Crise, OGS)

OGS is involved in the MyOcean2 project and its main task in the GODAE OceanView perspective will be the pre-operational short term forecast and prediction of some key biogeochemical variables (chlorophyll, dissolved oxygen, nitrate and phosphate) for the Mediterranean Sea, using the OPATM-BFM coupled model. This activity is carried out within the Mediterranean MFC and takes advantage of the dynamical fields operationally produced by INGV and using the MyOcean Ocean Colour TAC products especially tailored by CNR-ISAC GCOS. During this project, improvements in the model and in its spatial resolution (1/8degree → 1/16degree) are foreseen.

Large effort will be paid to qualify the products through an automatic Cal/Val procedure and assessment and improving the DA scheme. Presently a variational scheme (3Dvar) for the surface Chl-a assimilation is implemented by decomposing the error covariance matrix in simpler operators (Dobricic and Pinardi, 2007). Improvement of the DA scheme is expected, in particular extending the number of variables interested in the DA process.

The number of certified accesses to biogeochemical products is pretty high (over 60) but few of them are interested in routinely downloading the data to be used in nested coastal areas (e.g. Turkey, Cyprus). A larger number is expected as the products will be more popular and the downloading procedure less cumbersome.

Within the OPEC project (MyOcean R&D companion project) OGS is supposed to improve the products and to customize the results in order to attract a larger user interest, also by means of the qualification of the products.

A quantum leap is expected from the forthcoming NAOS project (OGS is member of it) where a significant number of Bio-ARGO floats (roughly 20) will be deployed in the Mediterranean Sea providing a synoptic data set for the products Cal/Val activities.

3.3. MEP Mercator Ocean update (A. El Moussaoui, Mercator Ocean)

BIOMER: BIOgeochemical MERcator systems

This group plans to work on how to improve the impact of physical data assimilation on the integration of the biogeochemical coupling into Mercator Ocean systems, two inter-annual degraded simulations (physics at 1/4°, biogeochemical at 1°) were performed covering the GLORIS1 period (2002-2007). The first, BIOMER_GLORYS1 forced by physical fields produced by GLORYS1V1 (with physical data assimilation). The second, BIOMER_ORCA025 is forced by physical fields produced by a free run (without physical data assimilation).

The calibration of the two simulations revealed a good accordance at large scale between annual mean fields from our model and from observations. The large scale structures corresponding to specific biogeographic regions (double-gyres, ACC, etc) are well reproduced. However, there are serious discrepancies in the tropical band. This problem has been thoroughly studied and is attributed to a bias in the Mean Dynamic Topography which is combined to Sea Level Anomalies in the assimilation process. This induces overestimated vertical velocities which are the source of anomalous levels of nitrates in equatorial shallow waters.

Finally, to improve the impact of the horizontal degradation of the biogeochemical model (from $\frac{1}{4}^\circ$ to 1°) and to study the inter-annual and seasonal cycles, two simulations without horizontal degradation (biogeochemistry on $\frac{1}{4}^\circ$) covering the period of GLORYS2V3 (1992-2011) will be performed. The first will be forced by physical fields of GLORYS2V3 (with physical data assimilation), while the second will be forced by physics produced by a free run covering the same period.

3.4. MEP MRI/JAMSTEC update

No contribution has been made available to the MEP-TT at the time of writing this report.

3.5. MEP Met Office update (Rosa Barciela)

The plans over the next 2 to 3 years include the following:

- Climate Simulations with the Met Office's HadGEM3-ESM

We are currently working on the assessment of the marine carbon cycle in the Met Office HadGEM3-ESM climate simulations, including understanding the impact of ocean acidification on climate, and the inter-comparison of air-sea fluxes of CO_2 in a variety of CMIP5 models for contribution to IPCC AR5.

Next year, we will be part of a UK team which will inter-compare the main biogeochemical models used in the UK (i.e. HadOCC, diat-HadOCC, Medusa, Plankton-10 and ERSEM) in the same modelling framework (the NEMO ORCA1 physical model configuration) in order to choose the ocean biogeochemical component of the next Met Office ESM framework. This task is part of a much bigger initiative (i-MarNet) which aims to provide a pathway for the development of the next generation of ocean biogeochemical models (or a hierarchy of models) for use by the UK science community. I-MarNet will also establish the vision for a 5 to 10 year model development program.

- Hindcast simulations in the operational FOAM framework

We are currently running a number of long (1997-2010) re-analyses with the global NEMO ORCA1 FOAM-HadOCC. These include a free run and various other runs with and without assimilation of physical and biological variables. Once these runs are completed we will assess the impact of the physical and biological assimilation on the model's

carbon cycle variables. Work will also focus on the assessment and mitigation of the (undesirable) impact of the physical data assimilation on biological variables

We also plan to assimilate the new ESA Climate Change Initiative Ocean Colour products as soon as these become available. We will assess their impact on model results and analyse the different results obtained when assimilating GlobColour products instead.

Our work related to operational regional capability with the coastal North West Shelf (NWS) NEMO AMM7-ERSEM-sediment model will include also running a long hindcast, from 1970 until present day. This system is the GMES Marine Core Service provider for ecosystem products in the NWS region. Future plans include the development of biological assimilation within this regional modelling framework.

All the work presented here is our contribution to national as well as international (e.g. EU-FP7 MyOcean-2, CarboChange, EMBRACE and the ESA CCI) programmes.

Related presentations available from the [MEP-TT workshop website](#)

4. GODAE OceanView support: the GODAE OceanView website and twiki

There was an informative presentation on the use and usage of the GODAE OceanView website (<https://www.godae-oceanview.org/>) which should be facilitated for information exchange among the TT members as well as for promoting the MEP-TT activities to a wider community.

Presentation available from MEP-TT workshop website [15.-GOV-website-MEP-TT.pdf](#)

5. Future task team meetings

The next International Liege Colloquium on Ocean Dynamics (13 -17 May 2013) will focus on the variability of primary production in the ocean: from the synoptic to the global scale. The colloquium will attract many of the TT members and will offer a good opportunity to meet and also raise awareness with, and engage, the wider community.

Appendices

Appendix 1: Agenda

(Please click on presentation title below (dark blue) to download abstract)

Day 1 - Tuesday, 28th Feb 2012 (Board Room)

09:00 - 09:30 *Coffee*

09:30 - 09:45 **Welcome participants**

09:45 - 09:50 **House keeping info & logistics**

09:50 - 10:00 **Workshop aims and objectives** (R. Barciela)

10:00 - 10:15 **Overview of GODAE OceanView?** (E. Dombrowsky)

10:15 - 10:30 **Introduction to GODAE OceanView MEP Task Team: ToRs and workplan** (P.Brasseur)

10:30-11:00 *Coffee break*

11:00-12:40 **Presentations from workshop participants**

(15' presentation + 5' Q&A)

11:00 - 11:20 [Marine biogeochemistry activities at the Met Office: from operational short-term prediction to climate scales](#) (R. Barciela, Met Office, UK)

11:20 – 11:40 [Towards Green Operational Oceanography](#) (M. Gehlen, LSCE/CEA, France)

11:40 – 12:00 [Prediction of the Mediterranean marine biogeochemistry: from short-term forecast to scenario analysis](#) (A. Crise, OGS, Italy)

12:00 – 12:20 [Biological response in the tropical Pacific to ENSO diversity](#) (T. Lee, NASA/JPL, USA)

12:20 – 12:40 [One more step towards operational management of the world largest tuna fishery](#) (P. Lehodey, CLS, France)

12:40 - 14:00 *Lunch break*

14:00-15:40 Presentations from workshop participants

(15' presentation + 5' Q&A)

14:00 – 14:20 [Measuring and modelling phytoplankton functional types in the North Sea](#) (R. Forster, CEFAS, UK)

14:20 – 14:40 [Simplified approach data assimilation for a 3D Ocean Circulation Model](#) (R. Matear, CSIRO, Australia)

14:40 – 15:00 Assimilation of ocean colour data in a North Atlantic physical-biogeochemical model (P. Brasseur, France)

15:20 – 15:40 [Data assimilation system for marine ecosystem in North pacific](#) (I. Youichi, University of Kyoto/JAMSTEC, Japan)

15:20 – 15:40 [Assessing the decadal predictability of marine productivity in IPSL-CM5A-LR](#) (R. Seferian, LSCE, France)

15:40 - 16:10 Coffee break

16:10 - 17:30 Discussion session 1:

This will be based around the earlier presentations from participants and would focus on:

1. Alignment with MEP topics in work plan?

Current topics are:

- Assessment of “fitness for purpose” of current operational oceanography products
- BGC development phase: ecosystem predictions; downscaling?
- Impact of biological data assimilation on biogeochemistry dynamics
- Multi-purpose observing system

2. Ideas for collaboration?

Homework – think about how you can contribute to the task team

19:30 Task Team Dinner (ASK Restaurant, 5 Cathedral Close, Exeter)

Day 2 – Wednesday, 29th February 2012 (Board Room)

09:00-09:30 Coffee

09:30 – 09:45 Short introduction to GODAE OceanView website and twiki (*Kirsten Wilmer-Becker, Met office, UK*)

09:45-10:00 Aims for the day:
 identify joint activities, participants and leads
 Identify how and by when
 Communication plans?

10:00-11:00 Discussion: Impact of physical assimilation on biogeochemistry (T. Lee)

11:00-11:15 Coffee break

11:15-12:15 Discussion: Ocean colour assimilation approaches (R. Matear)

12:15-13:15 Discussion: Multi-purpose observing systems (P. Brasseur)

13:15-14:00 Lunch break

14:00-15:00 Discussion: Operational Oceanography products, their `fitness for purpose and end user (R. Barciela)

15:00-16:00 Review members' contribution to the GODAE OceanView Work Plan
Presentation of National Plans:

- BLUElink (R. Matear)
- MSFD (A. Crisse)
- Mercator (A. el Moussaoui)
- FOAM (R. Barciela)
- Japanese (I. Youishi)
- ECCO (T. Lee)

16:00 Working Coffee break

16:00-17:00 Wrap up & close workshop

Appendix 2: Attendees list

Surname	Affiliation	Country
Rosa Barciela	Met Office	UK
Pierre Brasseur	LEGI/CNRS	France
Alessandro Crise	OGS	Italy
Eric Dombrowsky	Mercator Ocean	France
Abdelali El Moussaoui	Mercator Ocean	France
Rodney Forster	CEFAS	UK
Marion Gehlen	LSCE/CEA	France
Youichi Ishikawa	Kyoto University/ JAMSTEC	Japan
Tong Lee	NASA/JPL	USA
Patrick Lehodey	CLS	France
Richard Matear	CSIRO	Australia
Roland Seferian	LSCE	France
Kirsten Wilmer-Becker	Met Office	UK

Appendix 3: Actions

Actions 1– predictability:

- 1.1: Identify overlapping interest among TTs
- 1.2: Define scope
- 1.3: Make a decision on including user requirements

Action 2: Representatives from national centres related to BGC activates to update work plan contributions to national plans, as well as provide input for the MEP-TT work plan.

Action 3: All reporters to iterate with national representative on updating the MEP-TT contribution to GODAE OceanView work plan.

Action 4: KWB to inform national reps of plan of MEP-TT to update contributions of TT work plan and the need to align this with national system work plans.

Action 5: Co-chairs to consider publishing a Newsletter in EOS or other journal.

Appendix 4: References

- Berx B., M. Dickey-Collas , M. D . Skogen, Y.-H. De Roeck ,H. Klein , R. Barciela, R. M . Forster , E. Dombrowsky, M. Huret, M. Payne , Y. Sagarmínaga, and C. Schrum, 2010, “Does Operational Oceanography Address the Needs of Fisheries and Applied Environmental Scientists?”, *Oceanography*, Vol.24, No1.;
http://www.tos.org/oceanography/articles/24-1_berx.pdf
- Claustre, H. & Co-Authors (2010). "Bio-Optical Profiling Floats as New Observational Tools for Biogeochemical and Ecosystem Studies: Potential Synergies with Ocean Color Remote Sensing." in *Proceedings of OceanObs'09: Sustained Ocean Observations and Information for Society (Vol. 2)*, Venice, Italy, 21-25 September 2009, Hall, J., Harrison, D.E. & Stammer, D., Eds., ESA Publication WPP-306, doi:10.5270/OceanObs09.cwp.17
- Martin M., M.J. Bell, N.K. Nichols, 2002: “Estimation of systematic error in an equatorial ocean model using data assimilation”, *International Journal for Numerical Methods in Fluids*, Volume 40, Issue 3-4, pages 435–444. DOI: 10.1002/flid.298;
<http://onlinelibrary.wiley.com/doi/10.1002/flid.298/abstract>
- Sefarian & Co-Authors, 2012 : Assessing the decadal predictability of marine productivity in IPSL-CM5A-LR. MEP-TT meeting Feb. 2012.
- Wilson, C. (2010): The rocky road from research to operations for satellite ocean-colour data in fishery management *ICES Journal of Marine SCIENCES, J. Mar. Sci. (2011) 68 (4): 677-686. doi: 10.1093/icesjms/fsq168;*
<http://icesjms.oxfordjournals.org/content/68/4/677.short?rss=1>