SEVENTH FRAMEWORK PROGRAMME
THEME 6

Environment (Including Climate Change)

MEECE Model Parameterisation and Model Coupling Workshop Report

Proposal Acronym: **MEECE**

Proposal full title: **Marine Ecosystem Evolution in a Changing Environment**

Grant agreement no: **212085**

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MEECE Model Parameterisation and Model Coupling Workshop Report
Copenhagen, 24-26 January 2011

Executive Summary

The purpose of these workshops was firstly to assess the progress in the development of new model parameterization (WP1), and the model library and coupler (WP2). The second goal was to establish the mechanisms and links whereby modelling tools, scenarios and other information developed in WP1 &3 will be applied in the simulation Work Packages WP3 & 4. The partners demonstrated considerable progress in the development of new model parameterisations and end to end coupled models. Delays in the delivery of work were identified and actions taken to address these issues.

Contents

Action Points

- *To implement and test a new enhancement factor for carbon nutrient uptake stoichiometry of autotrophic productivity* ***(Bellerby, Artioli)***
- *To test the sensitivity of variable Q10 over three trophic levels (autotrophs, zooplankton and bacteria) –* ***Lopez-Urritta/Artioli***
- *WP1 – deliver first drafts of meta-analysis before April 2011, to allow for modellers feedback on parameterization before final reports in May 2011 (and June 2011 Science Meeting) –* ***Bellerby - + section leaders.***
- *Address reviewers comments to reduce "diversity of reporting styles" for certain Deliverables* ***(Heard, Grigorov****)*

1. Summary progress

A review of the current status of WP 1 was presented. The emphasis of the meeting was on the progress of T1.5 Meta-analysis for optimising model parameterisation and its associated deliverable D1.4. New model parameterisations for ecosystem models to be developed in WP2. Presentations were made by individual partners in order to assess progress. An initial version of the deliverable was made in M24. However while many parameterisations have been developed some still require work which has resulted in the deliverable being delayed overall. The status of the deliverable along with future actions and identification of model applications is summarised in table 1.

Table 1. Task 1.5 – Status of meta-data analysis (completed in black; ongoing in orange; responsible parties in brackets)

T1.5 Meta-analysis (FINAL REPORT by MAY 2011)	Statistics performed	Para-meterization	Model Application
Planktonic response (CNRS)	Complete	advanced	Informs the use of climate model data in regional downscaling applications.
Acidification: (UiB, NERC-NOCS)	Ongoing	advanced results	ERSEM/ Eng.Channel + Aegean (HCMR); Linked to D2.5
Metabolic theory (IEO)	Complete	advanced results	ERSEM (Q10 T-forcing); A-L. Urrutia (IEO) to contact CNRS (refer to Section 2.1.4 below)
Fishing: (HCMR)	Complete (D1.4 submitted!)	Preliminary C.Smith (HCMR) to amend	OSMOSE/Aegean ERSEM/POL planned All HTL models
Pollution impacts: (UNIBO & UPiedmont)	Ongoing M. Zavatarelli	MZ SDU (partial)	BFM (Adriatic); ERSEM (PML, UPiedmont, HCMR); 3D Copepod models, IBM (UiB,

	experiments complete		HCMR);
Alien invasive species: (KU CORPI & SAHFOS)	Complete (methods in print)	Preliminary (BPL-type impact)	**PML ongoing; To be appied in GOTM ERSEM water column models in regions as specified in DoW**
Multi driver responses: (UHAM & UiB)	Complete	SDU (see pollution application); UHAM (stressors); UiB (Arctic pH impact, MARCLIM);	TBC –depending on outcomes
Meta-analysis toolbox (AZTI; MetaOceans)	7 PhD thesis. What next ?		PML-AZTI (JIA+ALU), to review useable statistical methods for application in MEECE models (Stromberg PhD thesis)

A review of the current status of WP 2 was presented. The emphasis of the meeting was on the progress of T2.2 the model library along with its associated deliverables. Presentations were made by individual partners in order to help assess progress. Particular emphasis was placed on the pull through of new model parameterisations identified in WP1. However while many parameterisations have been developed some still require work which has resulted in some deliverables being delayed. Progress and potential applications and users are identified in Table 2. The status of the deliverable along with future actions and identification of model applications is summarised in table 3.

Table 2: Activities performed in WP1 aimed at furthering our modelling capabilities in WP2 for application in subsequent WPs. SP; Structured population models; IBM; Individual Based Models 3-D ECO; 3 Dimensional Ecosystem Models

	Source	Parameterization	Application	USER
Metabolic Theory	IEO	Q10 Trophic variability	3-D ECO	PML; HCMR
Ongoing	**Metadatabase/review**			
Acidification	UNIB	Ocean Acid /Eco stoch	3-D ECO	PML HCMR UNIB
Ongoing	**Metadatabase/review**		**Ongoing**	
Multidriver	Bologna	Diatom Temp Herbicide	3-D ECO	BFM
Pollution		Flagellate Temp Herbicide	3-D ECO	BFM
		D&F Temp Light	3-D ECO	BFM

	Source	Parameterization	Application	USER
Ongoing	**Metadatabase/review; Herbicide-Algae**			
Multidriver	Piedmont			
Pollution		Micro Zoo T Cu	3-D ECO	PML HCMR UNIB
		Mussels CU	3-D ECO	PML; ERSEM
		Mussel antibiotics	3-D ECO	PMI/ ERSEM
		Mussels Genomics	Conceptual model	
Ongoing	**Metadatabase/review; Microzooplankton; Musssels; copper interactions**			
Multidriver	SDU	Copepods Nanophylnol-T	3-D ECO; SP	UNIB
Pollution		Copepods T on develop	3-D ecos SP	
		Herring CU-Temp	IBM	UNIB DTU IMARES
Ongoing	**Metadatabas/review; Herring-Copper-Temp; Copepods-Nonylphenol**			
Fishing	HCMR	Benthic trawling	3D North Sea	PML/Cefas?
ongoing		Fishing mortality	OSMOSE- Aegean Adriatic Benguela EwE? North Sea IMBs – Baltic North Sea Black Sea	 HCMR UBo IRD CEfas UBi/DTU IMR IMS-METU
Alien Invasives	PML, KORPI	Bio-pollution expert system Medusa	Baltic Black Sea	Korpi IMS-METU
Ongoing		Stochastic trait based Multiple phytoplankton in ERSEM	Selected 1D water columns in different regions (present and future climate)	PML, UHAM, KORPI

Table 3 Task 2.2 Model Library - Status of Deliverables (complete in black; ongoing in orange)

WP2 Model Library (status at Month 30)	**Manual & code**	**Model Coupling (responsible partner)**
D2.2 Calcification/CARBONATE rate (PML)	yes	ERSEM (PML, HCMR); UiB (ECOSMO); IMR (NORWECOM); BB (GOTM, MOM4); BIMS (Black Sea; IMS)
D2.3 OSMOSE module: (IRD)	yes	ERSEM/Aegian; Benguela (HCMR); BFM-Adriatic (UNIBO); ROMS (M.Barange/Gorka/Shin; PML)
D2.4 APECOSM (IRD)	yes	PISCES (Biscay, AZTI); ROMS (Benguela; IRD); NEMO-PISCES in N. Atlantic (EURO-BASIN Programme)
D2.5 Carbon Phytoplankton: (UiB)	yes	ERSEM (UiB; HCMR; PML);
D2.6 Stochastic Multi-Species model: (DTU)	yes	ECOSMO (Baltic; UiB / DTU-Aqua) Potentially BB coupler (BB)
D2.8 Ecosim with Ecopath: (Cefas)	yes	GOTM-BFM; GOTM-ERSEM (Cefas) – 1D coupled, 3D planed, links with ATLANTIS (Beth Fulton, CSIRO & VECTORS Programme); POLCOM-ERSEM (PML, Yuri Artioli);
D2.9 Coccolithophores: (NOC)	Theoretical (PML-JIA to amend)	YA, PML running in ERSEM;
D2.10 Copepod structured model (UHAM; include IMR contribution, Geir Huse; DMU???)	yes	UHAM to clarify !!! Potentially UiB (ECOSMO); IMR
D2.11 IBM Library (UHAM)	IMR`s IBM to be added	ERSEM-N.Sea, ECOSMO-Baltic & NORWECOM (DTU-Aqua); NORWECOM (IMR); ECOSMO (UiB); BIMS-Black Sea (IMS-METU); NEMURO/PICES (HCMR, G. Triantafyllou)
D2.12 Ecotoxicology model (UHAM) M32	See presentation by M. St John	ERSEM-North Sea (PML); ERSEM-Aegean (HCMR); ERSEM (IMARES)
D2.13 Alien species (PML) M32	See presentation by Y. Artioli	ERSEM (PML); GOTM-ERSEM-Jellyfish (IMS-METU)

2. Summaries from Breakout Groups

The second part of the meeting involved the groups breaking out into a number of discussion groups to address key topics as summarised below.

2.1 WP1 Discussions

2.1.1. Fishing Scenarios: Parameterisation *(Chris Smith, HCMR)*

The first Draft Scenario incorporated 20% changes to reflect A1 and B1 Scenarios to be applied to Fishing Mortality and Fish Biomass across the board in all the geographic areas. This approach was not realistic and a more appropriate scenario would be by implementing parameterisation around FMSY (Fishing mortality for maximum sustainable yield) for the B1 Scenario, which is highly relevant to Good Environmental Status. The A1 scenario would concern a worse case of F, with a number of different options shown below.

Data Sources

It will be difficult to have a unified approach, due to the differing models and the differing levels of data in different geographical areas. Where data is not available it may be possible to transfer between species by using known values from specie with similar life history (age-span).

1. FMSY: ICES values from latest advice 2010 (various stocks in various eco-regions to match to model regions)
2. FMSY: Some specific publications where FMSY has been calculated for various stocks in various eco-regions to match the model regions.
3. Fworsecase: Models can be run for a range of Fs to see changes in biomass and where it may depart from some limits, i.e. run several F values higher than the parameterization in the form of a sensitivity analysis.
4. Fworsecase: ICES values from latest advice 2010: for some stocks there are F trajectory plots: the worst value can be taken.
5. Fworsecase: ICES values from latest advice 2010: for some stocks there are F histories combined with biomass plots. We can look at F leading to worst case biomass
6. Fworsecase: Consider other standard F-values: Flim, Fmax

Data and Geographic Areas

ICES areas all have high levels of assessment data (including, Barents Sea, Norwegian Sea, North Sea, Celtic Sea, Bay of Biscay, Baltic Sea). The Benguela should have a high level of data (needs to be checked). The Mediterranean (Adriatic Sea, Aegean Sea) and Black Sea have a much lower level of data, where F-values (assessments) are not readily available and may need to be estimated (e.g. Catch/Biomass estimates).

Level of Model Discrimination

EWE: (North Sea, Baltic Sea, Black Sea) at the level of species and common species groups (fishing impacts will not necessarily be required for all species/groups). Fishing mortality can be directly applied:

OSMOSE: (Adriatic Sea, Aegean Sea, Benguela) at the level of species. Fishing mortality can be directly applied

SYSTMOD, NORWECOM.E2E have specific species, within ICES area, specific data is available. Fishing mortality can be directly applied

ECOSMO: some form of higher trophic group will be parameterized. Fishing impact will use an estimate based on average F estimate for the principal species in that geographic area (both for FMSY and Fworstcase).

2.1.2. Validation Group *(Momme Butenschon, PML)*

The group focused on gathering information on datasets currently in use by the members of the group and recommended for use as well as the methods relevant for a common tool-set of validation.

Datasets

- **Global Ocean Database**
  Nutrients, Temperature, Salinity, O2
- **Glodap**
  Dissolved inorganic carbon
- **CPR**
  Zooplankton, Phytoplankton (PIC, Total Diatoms, Totla Dinoflagellates)
- **ICES**
  Nutrients
- **IOPs (PANGEA)**
  light attenuation
- **CARINA**
  Nutrients, Oxygen, Carbonate System
- **SeaWIFS, GlobColour, MODIS/MERIS**
  Ocean Colour
- **PHYSAT**
  Phytoplankton functional group 1997-2007, climatology
- **LDEO**
  partial pressure CO2
- **CANOBA**
  Nutrients, Carbonate System

It was further mentioned that for some subregions of MEECE data is still sparse and that not all of the above we could find linked on the MEECE web-page.

Methods:

- Scatter plots
- Point-to-point metrics: e.g. Bias, RMS, Correlation Coefficient, Model skill, Cost Functions.
- Taylor Diagram

Examples for more advanced methods would be: PCA, wavelets
It was further suggested that in almost all cases it is more feasible to aggregate the data in space and time before validation for two reasons:

- *for scientific interpretation (so that the data is actually characteristic for that body of water at that time)*

- *for the sake of relevance as policy drivers (e.g. the ICES boxes).*

2.1.3 Experiments **(Mike St John, UHAM/DTU)**

Focus: Meta analysis of the driver databases and development of new parameterisations relevant to the ecosystem models reconciling
Critical for the furthering of our modelling capabilities in WP2 and as a result the modelling activities in WP3 and 4 is advancing our knowledge base on driver impact on marine ecosystems and defining new process descriptions with associated parameters which can be applied in the MEECE numerical models. To this end MEECE employs approaches such as univariate and multivariate methods, including mixed-effect models, generalized additive models, spatial and temporal models, multi dimensional scaling and PCA to develop advanced parameterizations.

2.1.4 Metabolic theory of plankton production group **(Richard Bellerby, UiB)**
Parameterisation of primary productivity and stoichiometry of biogeochemical uptake:

A. Parameterisations for informing the variable stoichiometry of carbon and nutrient uptake under ocean acidification
Approach 1. Relates the overconsumption of carbon relative to nutrient uptake through an enhancement factor related to the initial atmospheric pCO2 level relative to a standard year of 2005 (Deliverable 2.5)
CEN =(pCO2yr-pCO22005)*αEN +1, where αEN = 0.0005

Approach 2. Assumes that we can represent the forcing of net community production for each time step as a function of the standing stock of nutrients, autotrophic cell numbers (or dominant PFT) and the seawater CO2 system at the beginning of a time step
dNCPx-y ~ fn([PO4]x, [Cells/Euk]x, [CO2aq]x

This can either be enforced as an enhancement factor or can be converted to cell specific carbon uptake rates
Specific carbon uptake ~ fn{([PO4]x, [Cells/Euk]x, [CO2aq]x}/[cell countx]

B. Metabolic theory
MTE predicts a differential temperature scaling of heterotrophic processes and autotrophic rates. Our meta-analysis of heterotrophic respiration rates and photosynthetic rates of marine plankton both in laboratory and in the field supports this theory suggesting that models should be reparameterised to account for these differences. The Q10 formulation is an approximation to Arrhenius factor and because most models represent temperature dependence on growth rates through Q10 relationships, we have recalculated these different activation energies for autotrophs and heterotrophs and provide them as new parameters for the models.

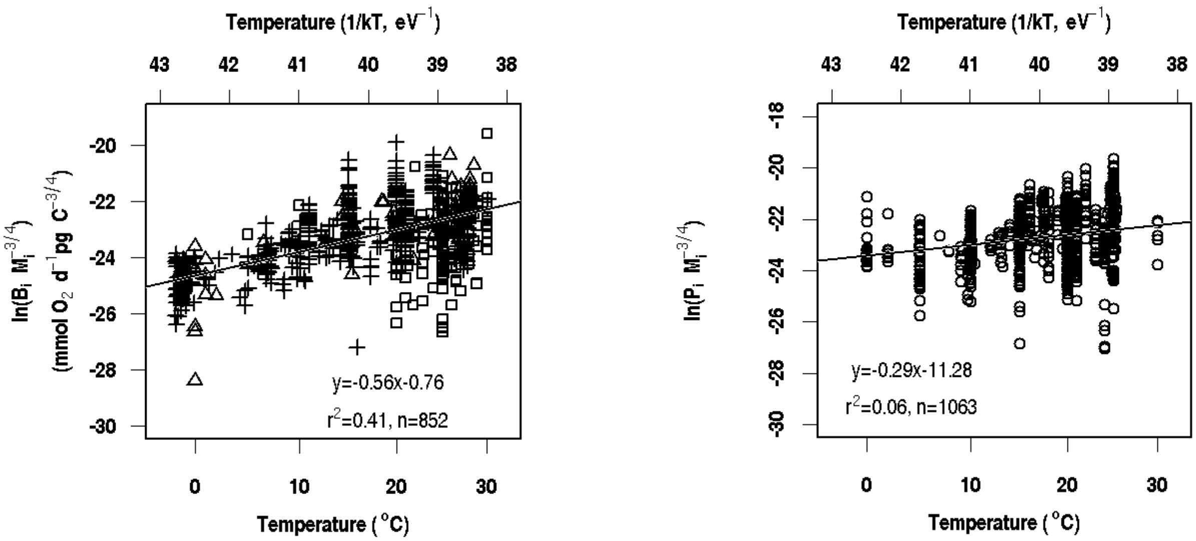


Figure 1: a) Bacteria and Zooplankton Activation energy Eh _ 0.65 Q10 of 2.75; b) *Phytoplankton,* Activation energy Ea _ 0.32 Q10 of 1.64. Lopez-Urrutia, San Martin, Irigoien and Harris (2006). PNAS. 103. 8739-8744

Hence, the new parameterization should follow the formulation:

*Weight-specific growth rate=e^(TD*Temperature)*

where Temp is Temperature in degrees Celsius and TD has different values for heterotrophs (zooplankton and bacteria) and autotrophs (phytoplankton).

Model application

Planned model runs

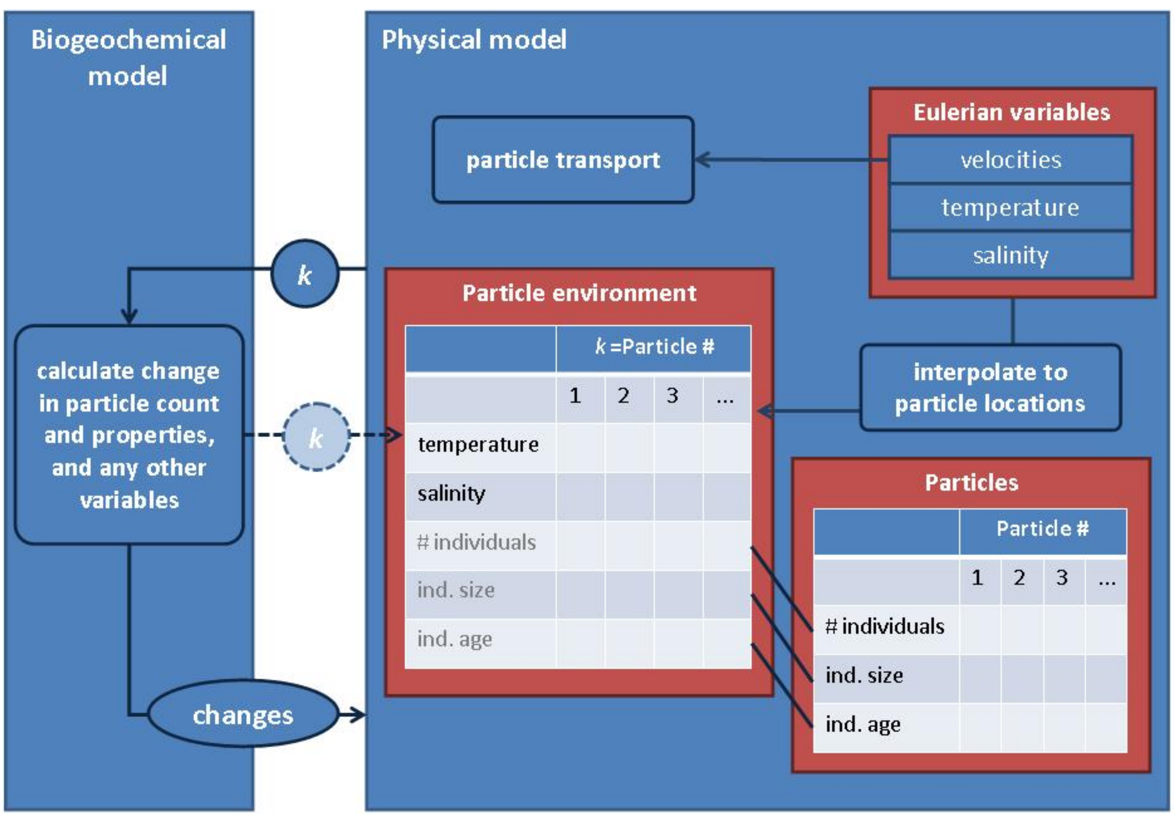
Parameterisation	**Provider**	**Model**	**Version**	**Region**	**User**
Stoichiometry #1	UiB	ERSEM	1-D	English Channel	UiB, PML
Stoichiometry #1	UiB	ERSEM	3-D	North Sea	PML, UiB
Stoichiometry #2	UiB	ERSEM	1-D	English Channel	UiB, PML
Stoichiometry #2	UiB	ERSEM	3-D	NW Shelf	UiB, PML
Stoichiometry #2	UiB	ERSEM	1-D	Aegean	HCMR, UiB
Metabolic theory	IEO	ERSEM	3-D	English Channel	PML
Metabolic theory	IEO	ERSEM	1-D	Aegean	HCMR
Combined drivers	UiB, IEO	ERSEM	3-D	NW Shelf	PML, UiB
Combined drivers	UiB, IEO	ERSEM	1-D	Aegean	HCMR

2.2 WP2 Discussions (Model Coupling)

2.2.1 Individual Based Models (IBMs) *(Jorn Bruggeman, BB)*

Foremost, the break-out group briefly discussed the merit of IBMs compared to Eulerian "mean field" approaches. The value of IBMs shows when particles/individuals have many specific "properties", which may range from internal states (age, size) to more abstract properties such as "genes" that encode behaviour. An Eulerian representation of such particles would require each property to appear as state variable defined on each grid point. These would be advected and diffused individually, which quickly becomes prohibitively expensive in terms of computational cost. A Lagrangian representation requires advection and diffusion of each individual particle, which becomes relatively less costly with an increasing number of particle properties. Additionally, IBMs naturally represent heterogeneity in particle properties at a given location, whereas this heterogeneity would – by definition – not be represented in a "mean field" model (these can be extended to include measures of heterogeneity, but that would further increase computational cost). Heterogeneity is relevant in some cases, e.g., when used as a source of genetic diversity, i.e., adaptability.

Two groups that develop IBMs and were represented in the break-out group (IMR: zooplankton, different fish species, DTU-Aqua: fish eggs, fish larvae, bioenergetic model in progress) agreed on a considerable number of technical aspects of IBM modelling. This prompted a detailed discussion of the potential division of tasks in a typical IBM. This is summarized in the following diagram.



In brief summary: all IBM models will maintain disjoint sets of Eulerian variables (at minimum: temperature, salinity, velocities) and (super) individuals, i.e., Lagrangian particles [right-hand side of the diagram]. The Eulerian variables are derived from online or offline physical models. Velocities in particular are needed to calculate the [advective] transport of particles. The "biogeochemical model", i.e., the model that specifies the change of individual particles (numbers and properties), will need to retrieve applicable values for Eulerian variables (commonly temperature). This can be done on demand, by asking the physical model to interpolate within Eulerian fields to the particle location, or upfront by setting up relevant values for all required variables for all particles. In the latter case, the model is very similar to a 1D (column) model, which a particle index replacing the vertical layer index. This agrees very well – conceptually – with the design of the Framework for Aquatic Biogeochemical Models (FABM). This can provide the change of biogeochemical variables when presented with the full spatial environment, e.g., a column. Therefore, it may be possible without too great an effort to let FABM specify the dynamic behaviour of IBM/Lagrangian particles, just like it currently can specify the dynamic behaviour of Eulerian variables in a column [GOTM]. Hence, the following aim was proposed: BB will take the current DTU-Aqua IBM model (which reads in offline physics, and already describes particle behaviour with exchangeable software modules), and develop a [particle behaviour] module for it based on the FABM. This would demonstrate the capacity of the FABM to be used in IBMs.

In addition to the definition of a generic structure of IBMs, the following challenges on the side of the physical/Lagrangian transport model were identified:

(1) What schedule should be used to update particles? Different approaches can be used: (A) changes across all particles of all classes can be collected and then applied simultaneously. (B) individual particles or particle classes can be updated individually. In the latter case, the order of updating matters (unless the time step becomes very – unrealistically – small; the time step used in the IMR IBM varies from one hour to one day). Additionally, the order of updating may be fixed or random, and this will affect results. Choosing between these methods is not straightforward.

(2) How should one define interactions between a given particle and variables of another particle class (e.g., zooplankton and fish in the IMR model)? Currently, when updating a particle [fish], all other relevant Lagrangian fields [zooplankton] are first projected onto an Eulerian grid. Within these gridded fields, relevant values are then obtained by interpolating to the precise location (x,y,z) of the particle. If the particle changes any of these other fields, these changes are translated into relative changes on the Eulerian grid, which are then applied proportionally to the particles that the Eulerian field was derived from. This is not necessarily the only way of defining particle-particle interactions: one can imagine gridless approaches: direct interaction with the nearest particles of other classes (e.g., fish feeding exclusively on the nearest zooplankton particle) or with many neighbouring particles, with the degree of interaction determined by proximity (e.g., normal distribution around the acting particle). Additionally, one could imagine approaches where the "interaction grid" is independent from that used by the physical model. In that case, coupling libraries that map between grids may be useful, e.g., the Model Coupling Toolkit (MCT), http://www-unix.mcs.anl.gov/mct/.

Anyone that would like to comment on these challenges is encouraged to contact IMR (Geir Huse) and DTU-Aqua (Asbjorn Christensen).

2.2.2 Climate downscaling breakout group (Jason Holt, NERC-POL)

Global BGC models tend to have poor nutrient fields (absolute values). To prevent adversely influencing regional models apply climate Δ approach. Estimate present day mean and calculate off set (spatially varying?) – apply this uniformly in time or seasonal ? Adjusting to keep concentrations positive.

- Developing similar approaches is potentially useful for other forcing fields in addressing biases e.g. winds too low leading to too shallow mixed layers. This should be explored, but issues of consistency in dynamic fields make this more complex – so not in first cut.
- May be an issue of T, S, N relationships
- Also improves use of on-line forcing data.

Issue of balancing need to complete runs and to explore downscaling methodology.

Plan: Run with simulations prescribed in Bologna Workshop, diagnose problems, explore solutions.

Now we need to (sensitively) explore properties of IPSL model (from ensembles), its validity and biases and compare with CMIP3 – have done this for QF with IPSL from AR4 (from CMIP3).

How does this model compare with 1. other IPSL model runs; 2. Other CMIP4 type model; 3 ERA-40 ERA-interim, NCEP

Diagnosis for atmos model:
- Regional means
- 2D plots
- Wind diagnostics (e.g. storm track positions)
- Share scripts and effort in downloading (e.g. interpolation package)

Need to explore access to other forcing data sets.

2.2.3 Summary of Discussion on Linking to Ecopath with Ecosim (EwE) and other Higher Tropic Level Models (Jonathon Beecham, Cefas).

1. A comment was made that although the source code of EwE was available online from University of British Columbia, there was insufficient documentation at the source level to describe in full the mathematical relationships used in the model.
2. There is a need to cross –check the published model relationships with coded model
3. Reconstructing EwE in different system / Language would be a useful, albeit expensive way of carrying out this cross check.
4. The issue was raised in terms of open source models is to what extent is a derivative private model was still in terms of referencing the same original model and how it would be referenced in the literature – do models need not just references but pedigrees? This could be a topic for a paper.

The discussion then turned to wider High Trophic Level modelling and what other system might be used.

1. Reference was made to Levins (1966) paper on the strategy of model building – in that models had properties of Generality, Realism and Precision and that it was not generally possible for models to possess all three properties.
2. It is probably unsatisfactory to link two models that are very different in terms of these properties – ie. EwE is a general framework, ERSEM is geared to realism (and to some extent precision).
3. Other modelling frameworks suggested were BALMAR (Lindgren et al.) a more empirically oriented model, Size or other stage structured models and Individual based models.
4. Work on EwE should make reference to critiques of EwE including those by Eva Plygami, Steve Martell, Cosimo Solidaro etc.

In terms of action points it was seen as important to expand couplerlib to a wider range of models. It was considered that as the type of output of LTL models was broadly similar (boxed 1D or 3D arrays of values) that we should focus on variation of these.

Too this end we should consider linking of POLCOMS-ERSEM Plymouth and ECOSMO models. To this end Linux version of Couplerlib would be ported, see appendix paper.

Reference:

Levins, R. (1966). The strategy of model building in population biology, American Scientist 54:421-431.

3. Participant List

1	Ekin Akoglu	*IMS-METU*
2	Icarus Allen	*PML (Coordinator)*
3	Yuri Artioli	*PML*
4	Jonathon Beecham	*Cefas*
5	Richard Bellerby	*UiB (WP1 Leader)*
6	Karsten Bolding	*BB*
7	Jorn Bruggeman	*BB*
8	Momme Butschenson	*PML*
9	Asbjorn Christensen	*DTU-Aqua*
10	Ute *Daewel*	*UiB*
11	Alessandro Dagnino	*Upiedmont*
12	Helene Frigstad	*UiB*
13	Ivo Grigorov	*DTU-Aqua*
14	Jessica Heard	*PML (Project Manager)*
15	Jason Holt	*NERC-POL*
16	Priscilla Licandro	*SAHFOS*
17	Angel Lopez-Urrutia	*IEO*
18	Steve Mackinson	*Cefas*
19	Gisle Nodal	*UiB*
20	Baris Salihoglu	*IMS-METU*
21	Corrina Schrum	*UiB*
22	Morten Skogen	*IMR*
23	Chris Smith	*HCMR*
24	Mike St. John	*UiB (WP2 Leader)*
25	Lorna Teal	*IMARES*
26	Macje Tomasz Tomasz	*Stockholm University*
27	Kostas Tsiaras	*HCMR*
28	Tobias van Kooten	*IMARES*
29	Evaristo Vázquez	*IEO*
30	Aldo Viarengo	*Upiedmont*
31	Sarah Wakelin	*NERC-POL*
32	Marco Zavatarelli	*UNIBO (WP4 Leader)*

4. Agenda

Model Parameterisation and Coupling Workshop

24-26 January 2011, Copenhagen

Monday Afternoon

13:30 Welcome and Introduction (Allen)

13:40 Overview of workshop (Bellerby and/or St. John)

14:00 Transparency and information flow between WPs and Project Status (Allen)

WP1 Session (Chair: Richard Bellerby)

14:30 WP1 Introduction, Update and Status of Deliverables (Bellerby)

14:40 O*cean acidification metaanalysis* update (Bellerby)

14:50 *Multi Stressor Review* (St. John)

15:00 *The differential temperature dependence of autotrophic and heterotrophic metabolic rates: potential consequences at macroscopic scales* (Lopez-Urrutia)

15:15 *Fisheries Metadata Analysis & Model Scenarios* (Smith and Tsiaras)

15:30 *LTL modelling in the North and Baltic Sea: ECOSMO II model validation and sensitivity* (Daewel)

15:45 *Implementation of OSMOSE and CARBONATE system modules in the Aegean* (Smith and Tsiaras)

16:00 Coffee

16:30 WP1 Discussion and breakout groups - *focused on Task 1.5…meta analysis of database, development of new parameterisations. How to achieve D1.4 and D1.6*

18:30 End of day

(Steering committee dinner)

Tuesday

WP1 session continued

9:00 *Temperature- and pollutant-induced effects on the transcriptomic profile in different mussel tissues* (Dagnino/Viarengo)

9:10 *Changes in proteomics of haemolymph cells in mussels exposed to pollutants at different temperatures* (Dagnino/Viarengo)

9:20 *Role of biomonitoring and bioassays in the environmental risk assessment of marine coastal areas: MEECE activity in the framework of MEDPOL and ICES ERA approach* (Dagnino/Viarengo)

9:30 WP1 Discussion and breakout groups continued

10:30 Conclusion of WP1 session, summary, upcoming work, actions and responsibilities

11:00 Coffee

WP2 Session 2 (Chair: Mike St John)

11:30 WP2 Update and Status of Deliverables (St. John/Grigorov)

11:45 *The Framework for Aquatic Biogeochemical Models (FABM): a demonstration of current capabilities* (Bruggeman)

12:00 *Dynamics of a linked Higher and Lower Trophic Level System in the North Sea* (Beecham)

12:15 *NORWECOM.E2E biophysical model system* (Huse and Skogen)

12:30 *Towards a generic zooplankton IBM module in NORWECOM.E2E* (Huse & Skogen)

12:45 *IBM Modelling (*St. John)

13:00 Lunch

14:00 Modelling the invasion of the aliens (Artioli)

14:15 *Adaptation of EwE, a jellyfish model and a simple anchovy larvae IBM to the Black Sea* (Salihoglu)

14:30 *Adaptation of Ecopath with Ecosim to GOTM: Linking fisheries to physical and biogeochemical processes* (Akoglu)

14:45 *Coupling growth models with ecosystem models to investigate spatio-temporal dynamics in fish* (IMARES)

15:00 *The state of the Adriatic Sea Modelling* (Zavatarelli)

15:15 WP2 Discussions and breakout groups – *focus on Ecotox modules, invasive modules and pull through of information to WP3 & WP4*

16:00 Coffee

16:30 WP2 Discussions and breakout groups

18:00 End of day

Workshop dinner hosted at the Hotel. 8pm

Wednesday

Programme for final morning is flexible and will be confirmed depending on progress of previous days.

9:00 Summary of previous days (Bellerby/St. John)

9:30 Review of information flow between WPs (Allen)

10:00 Next steps to meet deliverables, fact sheets (Allen/St. John)

11:00 Coffee

11:30 Any other business

13:00 Meeting closes