SEVENTH FRAMEWORK PROGRAMME THEME 6 Environment

Collaborative project (Large-scale Integrating Project)

Project no: 246 933

Project Acronym: EURO-BASIN

Project titie: European Basin-scale Analysis, Synthesis and Integration

Deliverable 2.1 Report of WP2 meeting at Kick Off on algorithms

(Task 2.4) and data needs (WP1)

Due date of deliverable: 1 July 2011
Actual submission date:
Organisation name of the lead contractor of this deliverable: DTU Aqua

Start date of project: 31.12.2010   Duration: 48 months
Project Coordinator: Michael St John, DTU Aqua

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)	

Description of Task 2.4:
Task 2.4 will combine new and existing information regarding particle production, sinking and disintegration as derived from retrospective analyses as well as the hierarchical experimental strategy outlined above (laboratory, mesocosm and shipboard experiments T2.1-2.3) in which the degree of control over the system declines as the realism of the studied system increases. This activity, which is critical to ensure that the full benefits of data assembly in WP1 is realized via combining the results with new information to inform modeling actions will be undertaken via workshops conducted between experimentalists and numerical modelers. These workshops will be focused on generating a new cohort of flux algorithms suitable for inclusion in large-scale numerical models (…)

Responsible: IMS-METU ; Participants: NERC, Uni Research; DTU-AQUA; Start: Month 1; End Month 42

Description of Milestone 2: Joint meeting WP1,WP2,WP6 meeting during Kick-Off regarding the algorithms of Task 2.4, identify key literature datasets

Deliverable 2.1: Report of WP2 meeting at Kick Off on algorithms (Task 2.4) and data needs (WP1) (due July 2011)

Version	Author/Editor	Edits
April 2011	Richard Sanders, (NOC)	1st draft
June 2012	Ivo Grigorov (PO) & Adrian Martin, (NOC)	Minor edits following 18 Months Meeting

CONCLUSIONS & ACTION POINTS:
Priorities for key target data sets is placed on particle flux estimates, particle size distributuion and thorium export (incl env. Parameters) but list to be refined by WP2 partners as work progresses.

Post-data mining, parameterisation to be done by WP2 Richard Sanders, A. Martin, A. Poulton all at NOCS), and algorithm validation by WP2 Baris Salihoglu (IMS-METU) and WP6 Icarus Allen (PML), as well subsequent 3D modelling and sensitivity analyses.

USA participation in Task 2.4 will be sought throughout the first half of the project depending on joint NSF proposal submission and success in Feb 2012, as well as scoping for opportunities beyond that.

Action Points:	PI(s) responsible:	Deadline:
Compile Cruise Campaign 2012/2013 timelines, and organize Milestone 9 (Joint WP1-WP5 Workshop, London, Sept 2011)	I. Grigorov + support from cruise PI	15 April 2011
Summary of existing data & data availability: formats and access from higher trophic level surveys	K.J. Staehr	May 2011
Particle algorithm targeted datasets	WP2 R. Sanders	2011
Preliminary algorithm	WP2 R. Sanders, A.Martin	End 2011
Algorithm validation	WP2 & WP6	June 2012

Discussion Summary:

Workshop Report WP1, WP2, WP6
Rapporteur Richard Sanders, NOC

The general aim of WP2 is to improve our understanding of particle flux in the oceans and the way it is represented in models.

WP2 has several components:

1. Experimental work (laboratory and mesocosm) lead by Christina de la Rocha (UBO)

2. Cruise Campaigns in 2012 & 2013, focusing on surface convection, vertical flux, habitat mapping:

Both the latter two are in 2013 and need much more detailed planning at a later stage (e.g. 18 Months General Meeting, June 2012).

Partners agree that the first cruise campaign, Deep Convection Cruise (FS METEOR, Mar-May 2012) will need a specific planning meeting, provisionally planned for September 2011 (Milestone 9, Joint WP1-WP5 Workshop). In the first instance, there is consensus that WP2 should mount a programme on measuring particle flux at various sites and then link this to pelagic community structure and metabolic rates.

3. Time series observations of the Biological Carbon Pump (BCP) at high latitudes:

Richard Bellerby (Uni Research) is proposing a significant research effort on the Deep Convection Cruise (FS METEOR, Mar-May 2012) and transatlantic cruises in 2013 to measure CO_2 levels. Also time series observations at Ocean Weather Station Mike.

4. Algorith development: a core activity and deliverable

The general aim of WP6 is to run numerical models of the North Atlantic to describe and reduce uncertainty in biogeochemical cycling focused on the lower trophic levels. Hind cast model runs will be used coupled to the NEMO hydrodynamics model at a resolution of ¼ and 1/12 degree. A rich array of numerical biological models are present including PISCES, ERSEM, BFM and Medusa (applied by CNRS-UBO, France; NOC-Liverpool, NOC-Southampton, PML in the UK; and IMS-METU in Turkey), including climate predictions to 2040 using CMIP 5 scenarios.

The various model representations of BCP were compared in ERSEM, with partial information about Medusa and PISCES models.

ERSEM has two sinking plankton classes which sink when nutrient stressed and 3 sinking detrital classes which sink at different rates. Consumption in the interior is explicitly modelled by the ecology of the organisms living there. C, N, and P are decoupled.

The discussion highlighted the need for a more in-depth comparison and analysis of the

model BCP representations, with the topic being highly suitable for the Progress in Oceanography Special Issue I (Milestone 57).

PISCES Model BCP representation …. (input from Laurent Memery, CNRS-UBO)
Medusa Model BCP representation …. (input from Baris Salihoglu & V. Ibello, IMS-METU)

The main interaction between WP2 and WP6 will occur at particulate flux algorithm development.

The expected strategy is that observationalists (PI: Adrian Martin, Richard Sanders, S. Torres, NOC-Southampton) will mine the literature for new data, and construct a preliminary new algorithm following the timeline:

- end of 2011, preliminary algorithm;
- June 2012, data transfer to WP1 for archiving and subsequent data publication;
- end 2012, algorithm publication in peer-reviewed journal.

The new algorithm will be statistically evaluated by Baris Salihoglu (IMS-METU, Turkey), and only then applied in large scale models within WP6.

Later in the project (to be re-evaluated at 18 Months General Meeting, June 2012) we will take the new observations and try to make a 'generation 2' algorithm, probably focused on trying to explicitly use the representation of heterotrophs in the interior rather than just describing the recycling rate as a function of what the particles look like, which is where most models are now and where we are probably going to go in our first new algorithm.

Most models describe POC flux attenuation with either a Martin (1989)-style mineralization, or a ballast algorithm. The only robust comparison of these that we are aware of concluded that they are about as good as each other.

The advantage of the ballast description is that it could respond to a changing ecology. If O2 and Temp are added, then the predictive power is increased. Our 'generation 1' algorithm will use surface ballast parameterisations plus O2 and Temp to try and make a better one.

Required datasets for the purpose:
- particle flux,
- particle size distributuion;
- thorium export together with environmental parameters (data mining to be done by NOC-Southampton in 2011).

'Generation 2` algorithm will be revisited at 18 Months General Meeting (June 2012).

-- *End of report* --