

Proposed Work PLAN 2013

Introduction

After 4 years of lifetime, a rapid growth phase and the construction of effective collaborative working between the 6 partners of the consortium, NEMO has changed considerably. We think it is time to review our way of working within the system team. We therefore propose that 2013 will be a transition and a prospective year that will help us improve and adapt our work to the new status of NEMO.

The proposed 2013 WP is therefore a **transitional** one, with **completion** as the master key word.

Transitional because we want a significant evolution of the way of working and propose to start it even if the whole strategy is not yet entirely defined. In particular we want to:

- (1) set up a multi-year prospective of the code evolution (physics, numerics and HPC). A prospective will allow to define the priorities of development for research & operational oceanography and coastal & climate applications, ensure the match between human resources and objectives, design the release calendar, identify obsolescent features to be removed from the system, etc... ;
- (2) move from the production of one release each year to less frequent but more reliable releases, and consequently added value that will motivate the users to upgrade their version;
- (3) give more time to developments (*i.e.* anticipate and control the implementation of multi-year actions) ;
- (4) keep the phasing of the development branches each year to prevent code divergence ;
- (5) avoid the persistence of long lasting unresolved issues ;
- (6) encourage the production of internal reports and short notes to share expertise among consortium members on code behavior ;
- (7) and probably several other things as this list is not exhaustive...

The definition of *all* the goals and of how to proceed to reach them, is not yet "on the table". Identifying and clarifying all of them within a longer-term prospective work-plan will be part of the objectives of the 2013 work.

Completion is the master key word of the proposed 2013 work plan: we want to focus on the achieving closure in almost all the actions started, in some cases dating back several years. Therefore, our four main priorities are to :

- (1) provide a more reliable v3.5 release (extended period of alpha/beta phase)
- (2) complete the long-term actions "*system simplification*" & "*stand-alone modules*" :
 - "*major system simplification*" : following the merge of passive and active transport code, the creation of a surface module (and its generic fldread module), the merge of PISCES/LOBSTER (only one BGC model remaining in the system), the huge simplification of the off-line tracers (OFF), we want to (i) achieve the merge of BDY and OBC functionalities so that only BDY remains ; (ii) merge LIM2 and LIM3, so that only one sea-ice module remains in the system ;
 - "*stand-alone modules*" : following the off-line tracers (OFF) and the surface module (SAS), we want to provide the obs./model comparison (OBS) in stand-alone mode.
- (3) complete the dynamical core evolution
 - the solving of the two time stepping strategy issue ; a more efficient split-explicit time stepping ; a more robust implicit bottom friction ; and the incorporation of z-tilde ALE coordinate.
- (4) complete all the new features introduced in the past few years
 - XIO server ; setting of configurations (CFG); coupling to the atmosphere (CPL) ; interface of iceberg floats (ICB) ; and specification of runoffs (RNF),

We are not fully satisfied with this work plan. First, a longer term vision is missing. Second, it still contains many items without any guarantee that the work will not be postponed by at least one year (as it has always happened in the past). We hope that (i) the Steering Committee will agree on the drawing up of a multi-year prospective in order to fulfill the former point ; (ii) the committee will be able to ensure that key people required to fulfill the four *completion* priorities will have enough dedicated time in 2013 for the latter point.

The description of the Work Plan is structured as follows. **Part I** describes the completion of the release v3.5, **Part II** describes the completion of NEMO system, **Part III** gives the other new features that will enter the system, **Part IV** enumerates some specific points, and **Part V** provides the main tasks associated with the system management. The appendix contains the 2013 Work Plan by institution, as it appears in the NEMO wiki pages.

NB: in colors are indicated the 2013 priorities (high, medium, low). In particular, we will consider our work as a success only if all the 'red' actions have been completed.

I. Completion of v3.5 release

I.1 alpha phase (~2 months) : specific issue to be solved

- ALL • testing of XIO on all consortium computers, provide compilation options, solve remaining bugfixes
- Paris • resolution of LIM3 issue with the new ice/ocean coupling, XIOs with AGRIF
- MetOffice • resolution of restart ability of AMM configuration

I.2 beta phase (~4 months) : public announcement

- ALL • all consortium members should run their home realistic cases (with XIOs) (cases on which they have a strong physical expertise)
- CNRS • ORCA2-LIM2-PISCES and ORCA2-LIM3 forced with COREII ; AGRIF zoom in Peru upwelling area
- CMCC • Med configs
- MetOffice • ORCA1-CICE, ORCA025, AMM-7
- Mercator • ORCA1, ORCA025, IBI12
- NOCS • ORCA1-LIM forced with COREII
- Users • all volunteers (in particular the DRAKKAR group) apply the beta on their configurations and report problems and bugs.

I.3 release v3.5 (toward the end of spring)

The new release is announced when:

- all reported problems and bugs are solved (both consortium and user ones)
- the number of bugs found has significantly decreased

Nevertheless, a date should be defined as the extreme limit before the release (required for operational purposes)

II. Completion of already started actions

BDY/OBC : *completion of the merge of the two packages of open boundary conditions*

- radiative boundary condition in BDY ([MetOffice.1](#))
- management of biochemistry at the open boundaries) ([Mercator.7](#))
- Patm forcing and volume conservation in regional config. (INGV.1)
- BDY: a capability to allow OBC users to use BDY ==> remove OBC ([MetOffice.2](#), [Mercator.6](#))

OPA : *solving all pending issues: a major evolution of the ocean dynamics*

- reconcile the 2 time-stepping strategy (tracer 1st, then dynamics or vice versa) ([CNRS.7](#), [Mercator.1](#))
- faster split-explicit (Forward-backward stepping) ([Mercator.1](#))
- z-tilde ALE coordinate ([NOCS.03](#))
- better implicit bottom friction (change order of call to spg then zdf) ([Mercator.2](#), [CNRS.7](#))

XIOs : *improve both robustness and portability of the I/O server (XIOs)*

- portability and performance tests ([ALL](#))
- feedback to XIOs developer ([ALL](#))
- test of improvements developed by Yann Meurdesoif ([CNRS.02](#))

CFG : *significant progress in setting a new configuration using NEMO*

- introduce a configuration manager (CFG) and provide a test case of its use ([Mercator.04](#), [INGV.05](#))
- improve the internal configuration setting (namelist, build-in configs.) ([CNRS.09](#), [CMCC](#))
- AGRIF usability evaluation : set a global ocean with an Atlantic AGRIF zoom and a BGC model. Feedback to the tools, tutorials and documentation ([CMCC.07](#))

- tutorial: build a reference configuration with a AGRIF child using the CFG ([Mercator.04](#), [INGV.05](#))
- New 1D reference configuration associated with the PAPA station case and optionally using the OBS/ASM package ([Mercator.05](#), [MetOffice.06](#))
- start to introduce the COMODO test cases for the dynamics and other "simple" test cases (assessment of the dynamical core and its various numerical schemes) (2 years) ([CNRS.10](#), [INGV.02](#))
- provide aside, predefined set of ORCA global ocean configurations (1°, 1/2°, 1/4°) ([ALL](#) + [DRAKKAR](#) group)

LIM : *major evolution of LIM sea-ice model*

- LIM2 as an option of LIM3 (merge LIM2/3, and suppression of LIM2) ([CNRS.08](#))
- start a major evolution of LIM3 (target: BGC model in ice) (multi-years) ([CNRS.08](#))
 - simplify the time stepping and the ice-ocean coupling (ice side)
 - update EVP rheology and add a C-grid VP rheology
 - add an arbitrary number of tracers in the ice and their interface to the ocean

OBS/ASM : observation/assimilation interface: stand alone mode + some improvements

- stand-alone OBS module to compute Obs./model distance from ocean outputs ([MetOffice.04](#))
- add OBS and ASM in a reference configuration (ORCA2) ([MetOffice.04](#))
- enable OBS and ASM to work with generalized vertical coordinate ([MetOffice.04](#))
- model equiv. of ssh ([Mercator.08](#))
- direct interface with data assimilation systems ([CMCC.03](#))
- Divergence damping filter operator ([CMCC.04](#))
- static instabilities & increment: check the existence of static instability, update of the associated increment in ASM ([CMCC.05](#))

TAM : *phasing and reference config. for the linear tangent and adjoint models*

- introduce a reference configuration and associated reference results ([CNRS.06](#))
- phase TAM with v3.5 ([CNRS.06](#))

CPL : coupled interface in phase with next IPCC requirements

- use of OASIS-MCT ([MetOffice.07](#), [CNRS.01](#))
- Multi-category sea-ice (CICE, LIM3) ([MetOffice.07](#), [CNRS.8](#))
- calving and iceberg module ([NOCS.04](#))

ICB : *finalization by adding a user interface*

- add the specification of iceberg calving in both forced and coupled mode ([NOCS.04](#))

RNF : capability of *river runoff package for coastal oceanography and with BGC models*

- river runoffs as lateral OBCs (velocity profile) versus current setting ([INGV.03](#))
- manage BGC tracers with runoffs (both surface and lateral input cases) ([CMCC.06](#))

MPP : *massively parallel processing: assessment and optimization*

- NEMO scalability optimization : use of external library, pursue hybrid parallel approach (multi-years) ([CMCC.01](#))
- evaluate the scalability when using AGRIF, assess AGRIF with BGC models ([CMCC.07](#))

III. New features

- wetting and Drying (first implementation) (NOCL.01)
- Standard Fox-Kemper param. (NOCS.05)
- wave-current interactions: toward a full coupling of a wave model with NEMO (multi-year, continuation) (INGV.4)
- on-line coarsening of the ocean outputs (part of a multi-year action on the on-line coarsening of TOP) (CNRS.5)
- Prather advection scheme (low priority) (NOCS.06)
- diagnostics of the 3D PE and KE 2D tendency terms (CNRS.3)

IV. Specific points

- Solar flux filtering at daily frequency to force BGC models (Mercator.03)
- coastal mask in EEN: evaluation and possibly improvement (CMCC.02)
- Atmospheric forcing at the land-ocean interface (INGV.06)
- allow specification of a restart time (smaller than a day) (MetOffice.09)
- on-line diagnostic of CFL criteria (MetOffice.03)

V. System management (ALL)

- organize the multi-year prospective of NEMO (ALL)
To do so, the idea is to ask to each member of the consortium to write a their own prospective this winter, and then, organize in june a one week meeting to elaborate a joint prospective. External experts will attend this meeting, so associated cost and travel expense have to be allocated.
- participation to the Working Group (BGC, CFG tools, ASSIM, Surface Wave) (ALL)
- Video conference (every 3 weeks), merge party, developer committee (ALL)
- Shared daily support to users, bug fixes. (ALL)
- Code Reviewing - Reviewing code from NEMO partner (ALL)
- improve documentation, in particular TOP (CNRS.05) (ALL)
- provide a long and documented run for each reference configs. (ALL)

Appendix :

Actions by institutions

I. CMCC

CMCC.01 Scalability Optimization ¶

Motivation: Improve NEMO scalability.

Status: to be started

Main tasks:

* Introduction of a new software layer in the NEMO stack software exploiting numerical optimized and parallel libraries such as pBLAS, ScaLAPACK and PETSc.

* Continuation of the implementation of hybrid parallel approach based on the functional parallelism for the tracers, momentum equations and 3D domain decomposition.

* Test performances of XIOS on CMCC architectures

System Reviewer:

Deadline: 2013

Priority: Medium

Principal investigator: Italo Epicoco

CMCC.02 Modification of masks ¶

Motivation: Expand the modification of masks to the EEN scheme

Status: started in 2012, continued in 2013

Main tasks: Evaluate the impact of fmask on the EEN scheme and eventually make modifications.

Science Reviewer: Gurvan Madec

Deadline: 2013

Priority: High

Principal investigator: Srdjan Dobricic

CMCC.03 Direct interface with data assimilation ¶

Motivation: Interface with data assimilation systems

Status: to be started

Main tasks: Develop software interface that will avoid the writing to the disk, provide the possibility to use a different domain decomposition in Nemo and the data assimilation, reduce the memory usage of Nemo when it is inactive.

Science Reviewer: MetOffice

Deadline: 2013

Priority: Medium

Principal investigator: Srdjan Dobricic

CMCC.04 Divergence damping filter operator ¶

Motivation: Additional diffusion on only the divergent component of the velocity could reduce the numerical noise at the high model topography (step topography, deep convection, etc.).

Status: continuation of 2012 activity. Tested but not documented

Main tasks: Add a routine that will apply the divergence filter in addition to the horizontal diffusion of the velocity.

System Reviewer:

Science Reviewer:

Deadline: 2013

Priority: High

Principal investigator: Srdjan Dobricic

CMCC.05 Vertical stability of increment fields ¶

Motivation: Modify the increment field in order to reduce the vertical instabilities.

Status: to be started

Main tasks: Modify the ASM code to add the diagnostics of the vertical stability and the modifications to the increment fields.

System Reviewer:

Science Reviewer: Met Office

Deadline: 2013

Priority: Medium

Principal investigator: Srdjan Dobricic

CMCC.06 Surface and lateral boundary conditions for tracers

Motivation: Add generic interfaces for surface and lateral boundary conditions for BGC tracers (river input, atmospheric deposition, open boundary conditions).

Status: started in 2012, first implementation waiting for the final choice of BDY

Main tasks: Port the interface used for transport routines to the surface and boundary condition routines currently used for T and S.

System Reviewer: C. Ethé

Science Reviewer: C. Ethé

Deadline: 2013

Priority: High

Principal investigator: Marcello Vichi

CMCC.07 Testing of AGRIF: scalability and usage with BGC models

Motivation: evaluate AGRIF performances in realistic domains and utilization with the BFM

Status: to be started

Main tasks: check performances of AGRIF with an Atlantic refinement; assess the compatibility with BGC variables and the related computational overhead

System Reviewer:

Science Reviewer: Dorotea Iovino

Deadline: 2013-2014

Priority: Medium

Principal investigator: Marcello Vichi and Italo Epicoco

II. CNRS

CNRS.01 - Coupled interface (end)

Motivation: OASIS-MCT interface: MPP version of OASIS coupler.

Status : developed and start to be used in PULSATION project

Main tasks : return back in the system all required NEMO changes

Science Reviewer: MetOffice

System Reviewer: MetOffice

Priority: medium

Principal Investigator : Sebastien Masson

CNRS.02 - IO-SERVER (continuation)

Motivation: evolution of XIOS introduced in 2012.

Status : XIOS has been introduced in v3.5-alpha

Main tasks : Test of the XIO server by all consortium members ; integrate, debug and benchmark the new version

Science Reviewer:

System Reviewer:

Priority: high

Depends on: work done on new IOserver at IPSL

Principal Investigator : Sebastien Masson

CNRS.03 - Energy diagnostics (end)

Motivation: output 3D trends of tracers, momentum, kinetic energy and potential energy.

Status : almost done (see [dev_r3309_LOCEAN12_Ediag](#)) Finalisation in 2013.

Main tasks : (1) implement the 3D output of tracers and momentum trends (done with validation in 2012) ; (2) compute and output the 3D trends of PE and KE : vvl case to be validated ; (3) documentation

Science Reviewer: NOCS ?

System Reviewer: NOCS ?

Priority: low

Principal Investigator : Guran Madec and Fabien Roquet

CNRS.04 - On-line coarsening of TOP (2 years action)

Motivation: introduce a coarsening of the model resolution on the biogeochemical model (TOP) (Lévy et al. Ocean Modelling, 2012)

Status : Part of the EMBRACE FP7 project. Work started in may 2012. The project duration is 2 years, with 2 deliverables in NEMO: 1st year (2013) : on-line coarsening of the ocean outputs ; 2nd year (2014) : on-line coarsening of TOP

Main tasks : In 2013, introduce the on-line coarsening of the ocean outputs with a factor of 2 or 3, interfaced with XIOs only.

Science Reviewer: ?

System Reviewer: ?

Priority: high

Principal Investigator : Christian Ethé & Guran Madec

CNRS.05 - reference manuels (continuation)

Motivation: paper documentation, a never-ending story

Main tasks : (1) Create the TOP documentation (TRP + interface to bio-model) using Latex (similar to the NEMO ocean engine documentation) ; (2) review of the written documentation (NOCS)

Science & System Reviewer: NOCS?

Priority: medium

Principal Investigator : Christian Ethé

CNRS.06 - TAM (continuation)

Motivation: Development of the OPA Tangent and Adjoint Model.

Status : In 2012, first release of tangent linear and adjoint model phased with **nemo_v3_4_1** , ocean dynamics, which includes ORCA2_Z31, GYRE_Z31 configurations, MPP capabilities, documentation and adjoint validation tools available

Main tasks : (1) Include a new reference configuration for data assimilation, called SEABASS ; (2) Provide reference results from SEABASS configuration for testing purpose ; (3) Phasing TAM with nemo_v3_5

Science Reviewer: Arthur Vidard

System Reviewer:

Priority: medium

Principal Investigator : Pierre-Antoine Bouttier

CNRS.07 - Internal evolution of the ocean dynamics ¶

Motivation: improvement of some aspect of the ocean dynamics, and in particular resolve the "2 versions of time-stepping" issue (see also Mercator.2 and 3)

Status : conception done

Main tasks :

- (0) split explicit resolution of the ssh (key_dynspg_ts): move the time integration of the ssh from dynspg to sshwzv (coll. with Mercator.1, and with P. Marsaleix).
 - (1) implicit bottom friction: change the order of call : dynspg 1st, then dynzdf (coll. with Mercator.2)
 - (2) momentum advection (all dynadv modules, dynspg_ts) : ensure the consistency between non-linear free surface (vvl) and vector invariant / flux form for non linear terms of the momentum equation
 - (3) horizontal pressure gradient in density anomaly and its impact on dynspg_ts (Marsaleix et al 2008) (all dynspg modules in particular dynspg_ts, dynhpg)
- NB: need also realistic test case: ORCA12 with vvl (NOCS).

Science & System Reviewer: G. Nurser (?)

Priority: high

Depends on: Mercator 1 and 2 actions, & P. Marsaleix collaboration

Principal Investigator : [Gurvan Madec](#) & [Jerome Chanut](#)

CNRS.08 - LIM evolution ¶

Motivation: LIM3 as the only sea-ice model in the reference and LIM3 major evolution toward the BGC compartment in the ice.

Status : conception done ; first tests started.

Main tasks :

- (1) merge LIM2/LIM3 (i.e. LIM3 mono category gives almost same results as LIM2) and remove LIM2 in 2013 or 2014.
- (2) optimization: diagnose where it cost the most and try to improve the situation
- (3) update of EVP rheology (Bouillon et al 2012s)
- (4) LIM3 coupled interface
- (5) ice-ocean interface: rewrite from a ice point of view the ice-ocean heat, salt and radiation exchanges ; assess the energy, salt and water conservation.
- (6) introduce an arbitrary number of tracers (today only "age")

Science Reviewer:

System Reviewer:

Priority: high

Principal Investigator : [Martin Vancoppenolle](#)

CNRS.09 - Configuration setting ¶

Motivation & tasks: (1) whole namelist in all standard configuration: heavy to make any changes, difficult to see the specificities of a config., and default values for namelist hard coded in the code, but never used ! ==> Standard namelist at CONFIG/SHARED/, the namelist in CONFIG/MY_CFG/EXP1/namelist only contains the changes from default value ; and a pearl script to build the used namelist

(2) global model size not in the namelist but still in many par_...h90 ==> put all this in the namelist

(3) several old non-doctor namelist variable names still in the code ==> to be suppressed

See [Configuration_Setting](#) page for more detail

Status : conception done

Science & System Reviewer: All members

Priority: high

Depends on: pearl script provided by CMCC

Principal Investigator : [Gurvan Madec](#)

CNRS.10 - COMODO test cases (multi-years)

Motivation: Assess the behaviour of the ocean dynamics and its sensitivity to the choice of various schemes available in NEMO.

To that purpose, 11 test cases has been designed in COMODO project and standard diagnostics will be designed. The objective, at the end, is to have those test cases as build-in configuration of the system, with the associated diagnostics.

Status : some test cases have already been performed in v3.4

Main tasks : for 2013, implement at least 5 test cases ; run them with the various relevant schemes ; wrote an associated report. In 2014, after concertation, put the most interesting ones as build-in configuration, systematically tested on each new code release.

Science Reviewer: ALL members

System Reviewer: INGV?

Priority: medium

Depends on: -

Principal Investigator : [simona flavoni](#)

III. INGV

INGV.01 — Surface Pressure and limited area model

Motivation: Once the OBC-BDY merging will be completed and new developments can start, INGV would like to implement a new Volume/Mass constraint for the filtered free-surface. Actual version of the NEMO code forces, in case of filtered free surface, the total volume to be conserved each time-step. INGV proposes to control the mass exchange through the lateral open boundaries using a generalized Flather lateral boundary condition. During this year INGV proposes a deep Study of model response and sensitivity to time-splitting and filtered free surface with and without the atmospheric pressure forcing. Producing a Peer-reviewed manuscript or NEMO-technical report

Status: Preliminary test already done

Main tasks: Recode according consortium rules; ensure compatibility between filtered free-surface / volume conservation and new mass fluxes through lateral open boundaries

Science Reviewer:

System Reviewer:

Priority: medium

Principal Investigator : Paolo Oddo (paolo.oddo@bo.ingv.it)

INGV.02 — NEMO model reliability

Motivation: assessment of the dynamical core of NEMO and its various combination of numerical schemes

Status:

Main tasks: Perform basic coherency/consistency tests. NEMO-technical report (wiki page).

Science Reviewer: Gurvan Madec

System Reviewer: Simona Flavoni

Priority: medium

Principal Investigator : Damiano DelRosso (damiano.delrosso@bo.ingv.it)

INGV.03 — River lateral open boundary conditions

Motivation & Main tasks: A proper representation of river volume inflow. In case of large runoff, including the river effects only in the surface water balance (Evaporation minus Precipitation minus runoff/area) could limit the model capability in reproducing the dynamics in the Region Of Fresh water Influence (ROFI). An open lateral boundary condition with a vertical current profile is preferable. However the full functionality of BDY module should allow to include rivers as LOBC. First step will be to investigate this possibility and evaluate the need for further developments.

Status: waiting for a stabilized new BDY module

Science & System Reviewer: Gurvan Madec

Priority: medium

Principal Investigator : Paolo Oddo (paolo.oddo@bo.ingv.it)

INGV.04 — Wave-current interaction

Motivation: full coupling of a wave model with NEMO

Status: effect of surface waves have been introduced in the wind stress computation (v3.4). The diagnostics of Stokes velocity field is available in v3.5-alpha.

Main tasks: In 2013, the linear superposition of the Stokes velocity field (computed from an offline wave model) with circulation velocity from the OGCM will be considered. The study of this particular issue indicates the need to finalize the discussion before proceeding with any new implementation. INGV will lead the wave-coupling Working Group in the NEMO system team promoting the discussion.

Science Reviewer:

Priority: high

Principal Investigator : Emanuela Clementi (emanuela.clementi@bo.ingv.it)

INGV.05 — Participate to the Configuration Manager WG. ¶

Motivation & Main tasks: During the annual meeting the need to have a flexible and scientifically valid tool to configure new model set-up has been identified. INGV will actively participate to this WG.

Science & System Reviewer: Mercator?

Priority: high

Principal Investigator : Paolo Oddo (paolo.oddo@bo.ingv.it)

INGV.06 — Atmospheric forcing at the land-ocean interface ¶

Motivation & Main tasks: Masking of atmospheric fields over land is crucial in coastal or near-coastal areas, in order to avoid spurious fluxes due to the wrong usage of "land" values from the coarse atmospheric model when spatial interpolation is required.

Science & System Reviewer: -

Priority: medium

Principal Investigator : Paolo Oddo (paolo.oddo@bo.ingv.it)

IV. NOC

NOCS.01 - User Interface

Description: Provide support to users of NEMO. NOC will provide in depth support for code supplied by them.

Motivation: Shared daily support to users, web & paper documentation.

Main task: (2 wk)

Principal Investigator : Andrew Coward (acc@noc.ac.uk)

NOCS.02 - System maintenance

Main tasks : (a) Code Reviewing - Reviewing code from NEMO partners (1 w)

(b) Beta Testing - Beta testing of new versions (1 w)

(c) Collaboration (2wk) - Time spent:

¥ hosting visitors from partner institutes on the NEMO system team

¥ travelling to partner institutes for exchange visits

¥ attending NEMO Steering, **Developers** and System Team meetings

¥ attending "merge party"

Principal Investigator : Andrew Coward(acc@noc.ac.uk)

NOCS.03 — z-tilde coordinate

Description: New vertical coordinate which responds to high frequency vertical motions

Motivation: Introduce an arbitrary lagrangian eulerian coordinate to reduce spurious diapycnal mixing due to high frequency vertical variations. Relevant to tidally forced simulations and internal wave resolving configurations.

Status: done in a phd thesis, see Leclair 2010 ; a 2011 branch exists: see [here](#)

Main task (5 wk)

Deadline : August 2013

Priority: **High**

Science Reviewer : Gurvan Madec

System Reviewer : Paris (TBC)

Principal Investigator : Andrew Coward(acc@noc.ac.uk)

NOCS.04 — Iceberg drift component enhancements

Description: Improvements to the iceberg drift component interface in order to provide easy input of key control fields

Motivation: An ice berg drift component was introduced in v3.5. The basic component requires additional code to allow greater control over features such as temporally and spatially varying calving rates.

Main task (3 wk)

Deadline : June 2013

Priority: **Medium**

Science Reviewer :

System Reviewer : Paris (TBC)

Principal Investigator : Andrew Coward(acc@noc.ac.uk)

NOCS.05 — Classic Fox-Kemper

Description: To provide the original Fox-Kemper eddy parameterisation.

Motivation: The Fox-Kemper scheme is an established and published eddy parameterisation. This work will introduce the original scheme into the system but will also track ongoing research which is expected to improve on the standard scheme. The submitted scheme will be the best available (dependent on research results and publication) by the development deadline.

Status: first implementation and test performed on ORCA2-LIM

Main task (3 wk)

Deadline : 22nd September 2013

Priority: **High**

Science & System Reviewer : Paris (TBC)

Principal Investigator : Andrew Coward(acc@noc.ac.uk)

NOCS.06 — Prather advection

Description: To provide a high order, reference advection scheme against which more computationally efficient schemes can be compared.

Motivation: The Prather advection scheme is currently the advection scheme of choice in other key modelling systems (MOM, ROMS etc.)

Main task: (2 wk)

(1) Implementation in the trunk+ NVTk + documentation (1 wk) v3.6 release

Principal Investigator : Andrew Coward/George Nurser (acc@noc.soton.ac.uk)

Deadline : 22nd April 2013

Priority: Low

Science Reviewer : Gurvan Madec (TBC)

System Reviewer : Rachid Benshila (TBC)

NOCL.01 — Wetting and Drying ¶

Motivation: Add Wetting/Drying functionality to NEMO for coastal ocean applications

Status: In preparation

Main task (26 wk)

Deadline : End of 2013

Priority: High

Science Reviewer : TBC

System Reviewer : TBC

Principal Investigator : Hedong Liu (Hedong.Liu@noc.ac.uk)

V. MERCATOR

MERCATOR.01 — resolving the 2 versions of time-stepping

Motivation: Tracer conservation and time splitting. reference: Shchepetkin, A. F., and J. C. McWilliams, 2005

Status : Running in NEATL36 at Mercator.

main tasks : Main idea: replace Leapfrog scheme by a Fb temporal scheme, but keep actual method for updating ssh at 3D time-stepping. see also CNRS.07

workplan:

1. test some eventual problem of divergence of SSH in barotropic mode compared to SSH in 3d mode (cf Hallberg and Adcroft, OM 2009: Reconciling estimates of the free surface height in Lagrangian vertical coordinate ocean models with mode-split time stepping).
2. implementation in NEMO_3.3 of this time-splitting.
3. test in high-resolution configuration at Mercator.
4. take a decision for reorganization of step for time-splitting.

Science & System Reviewer : Gervan Madec

Priority: High

Principal Investigator : Clement Bricaud & Jerome Chanut

Number of weeks : 4 (TBC)

MERCATOR.02 — exploration of implicit bottom friction ¶

Motivation: Use NEMO standard implicit bottom friction in Mercator Regional configuration and compare with IBI implementation. Update the trunk with the best solution.

Status :

main tasks : see also CNRS.07

Science & System Reviewer : Gervan Madec

Principal Investigator : Jerome Chanut (jchanut@mercator-ocean.fr)

Priority: high

Science & System Reviewer : Gervan Madec

Number of weeks : 2 (TBC)

MERCATOR.03 — Solar flux filtering at daily frequency to force BGC model. ¶

Motivation: In bio-dyn coupled model : physic needs daily (+ diurnal cycle redistribution) or high frequency (typically 3 hours) solar fluxes, whereas some BGC applications always need daily solar fluxes.

Status : need a finalization

main tasks : add an option to the Surface Module providing a daily solar fluxes when a higher frequency is set for the dynamics

Principal Investigator : Clement Bricaud (cbricaud@mercator-ocean.fr)

Priority: high

Science Reviewer : --

System Reviewer :

Number of weeks : 2 (TBC)

MERCATOR.04 — Implementation of a configuration manager

Motivation: Add a configuration manager

Status :

main tasks : upgrade SIREN (now based on NEMO v2.3) to make it suitable with new release of NEMO :

- new classification tree and use of *makenemo* (FCM tools)
- change name management. now SIREN is based on Mercator naming: so it will be helpful, if each member of the NEMO consortium could send me some output of their models (bathymetry, coordinates, and 1 or 2 days of outputs)
- improve error management.
- use gridgen tools.
- get file from opendap.
- use weight tools (developed for on-the-fly interpolation)

Principal Investigator : Julien Paul (jpaul@mercator-ocean.fr)

Priority: high

Science & System Reviewer : -ALL

Number of weeks : 2 (TBC)

MERCATOR.05 — Add a 1D reference config. at PAPA station

Motivation: Vertical physics and numerics assessment

Status :

main tasks :

Principal Investigator : Romain Bourdalle-Badie, Guillaume Reffray (greffray@mercator-ocean.fr, rbourdal@mercator-ocean.fr)

Priority: high

Science & System Reviewer : Gurvan Madec

System Reviewer :

Number of weeks : 2 (TBC)

MERCATOR.06 — End of OBC-BDY merge, with UK Metoffice

Motivation: see MetOffice.01 and 02

Status :

main tasks :

Principal Investigator : Jerome Chanut & Guillaume Reffray

Priority: high

Science & System Reviewer : -

Number of weeks : 2 (TBC)

MERCATOR.07 — implement OBC's schemes for BGC models

Motivation: Use new BDY package ; implement specific code for BGC models.

Status :

main tasks :

Principal Investigator : Guillaume Reffray (greffray@mercator-ocean.fr)

Priority: high

Science Reviewer : INGV?

System Reviewer : MetOffice?

Number of weeks : 2 (TBC)

MERCATOR.08 — Data assim. interface: model equivalent of a SLA

Motivation: improve ASM for sea level data

Status :

main tasks :

Principal Investigator : Elisabeth Remy (eremy@mercator-ocean.fr)

Priority: Medium

Science & System Reviewer : --

Number of weeks : 2 (TBC)

VI. MetOffice

MetOffice.01 - Include radiation conditions in BDY

Description: The OBC radiation condition needs to be implemented in BDY

Motivation: To enable the merge of OBC and BDY

Status : Preparatory work done

Main tasks : Implement implicit version of Orlanski radiation condition.

System Reviewer: Rachid Benshila?

Science Reviewer: Jerome Chanut

Deadline: September 2013

Priority: high

Principal Investigator: Dave Storkey (dave.storkey@metoffice.gov.uk)

MetOffice.02 - Develop a capability to allow OBC users to use BDY

Description: Develop tools or code to allow OBC-style boundary data files to be used with BDY

Motivation: It is planned to suppress OBC in the long term and use BDY for open boundary conditions, this work is needed to enable users to switch easily

Status :

Main tasks : Provide tools for generation of open boundary coordinates files and external data files.

System Reviewer: Rachid Benshila?

Science Reviewer: Guillaume Reffray (and Paolo?)

Deadline: September 2013

Priority: high

Depends on:

Principal Investigator: Dave Storkey (dave.storkey@metoffice.gov.uk)

MetOffice.03 - Add a CFL diagnostic ¶

Description: Add code to calculate and output (to ocean.output) the maximum CFL parameter during a run

Motivation: To inform users of stability constraints.

Status: Done (subject to review)

Main tasks: None

System Reviewer:

Science Reviewer:

Deadline: June 2013

Priority: Low

Depends on: Nothing

Principal Investigator: Ed Blockley (ed.blockley@metoffice.gov.uk)

MetOffice.04 - Improvements to OBS and ASM ¶

Description: Enable OBS and ASM code to work with generalised vertical coordinates (i.e. s-coordinates) ; add OBS and ASM options to a reference configuration ; use OBS in stand-alone mode

Motivation: Extend use of OBS and ASM for all vertical coordinate options. Also to allow easy use and testing by adding to reference configuration. Last, but not least, OBS applicable to standard model outputs (Stand-alone mode)

Status :

Main tasks : - Extend use of OBS and ASM for all vertical coordinate options (tested in the North West Shelf configuration).

- Allow easy use and testing by adding OBS files (and perhaps ASM) to reference configuration.

- Add an offline version of the OBS operator code to the TOOLS directory (to be done by Andy Ryan)

Science Reviewer: Gurvan Madec

System Reviewer: Gurvan Madec

Deadline: September 2013

Priority: High

Depends on:

Principal Investigator : Dan Lea (daniel.lea@metoffice.gov.uk)

MetOffice.05 - Inclusion of extra diagnostics ¶

Description: Inclusion of diagnostics for meridional heat transport and model values at moorings.

Motivation: Inclusion of these additional GODAE metrics will allow useful model assessments and inter-model comparisons

Status :

Main tasks : Add diamoor routine to allow output to an ASCII file of model values at a mooring site for all required time steps

Add diamht routine to compute and output the meridional heat transport and the meridional stream function

Science Reviewer: Clement Bricaud?

System Reviewer: Clement Bricaud?

Deadline: September 2013

Priority: Medium

Depends on:

Principal Investigator : Rachel Furner (rachel.furner@metoffice.gov.uk)

MetOffice.06 - Updates to 1-d model configuration ¶

Description: Updates to 1-d Model configuration to include more options and improve usability

Motivation: To make this configuration more useful to users by expanding the options available, and to make it easier to run.

Status :

Main tasks : Add BDY and OBS option, and add changes to allow flux mooring data (i.e. 1D files) to be used to drive the SBCs via fldread

Science & System Reviewer: Christian Ethe

Deadline: September 2013

Priority: Medium

Principal Investigator : Daley Calvert (daley.calvert@metoffice.gov.uk)

MetOffice.07 - Improvements to coupling ¶

Description: Address general issues surrounding coupling to CICE and atmosphere models, and investigate use of OASIS-MCT

Motivation: To enhance coupling to CICE and in particular the Met Office UM atmosphere model

Status :

Main tasks : Update NEMO to cope with modified treatment of ice categories in the UM (which means some additional atmosphere coupling fields can be category rather than aggregate)

Update NEMO to deal with multilayer ice in UM-NEMO-CICE coupled models (additional CICE->NEMO and NEMO->atmos coupling fields will be required)

Implement new SST coupling method to possibly improve diurnal cycle (may require extra NEMO->atmos coupling fields)

Include use of salinity dependent freezing temperature even when using UM atmosphere (requires an extra NEMO->atmos coupling field as well as changes in the NEMO-CICE interface routines)

Introduce capability to couple to atmosphere models using OASIS-MCT in addition to OASIS3

Science Reviewer: Internal Met Office (these changes are largely UKMO-specific and will already have been science reviewed internally for inclusion in Met Office configurations)

System Reviewer: Sebastien Masson?

Deadline: July 2012

Priority: Medium

Principal Investigator : Chris Harris (chris.harris@metoffice.gov.uk)

MetOffice.08 - Assess use of Met Office UM testing systems for NEMO

Description: Configure UM testing facilities (based on ROSE) to allow their use with NEMO

Motivation: Enable standard tests to be easily carried out at UKMO for coupled runs. Possibility of submitting this testing function back to the community

Status : Under development

Main tasks : Ensure ROSE-based testing facility is fit for purpose w.r.t. UM coupled models featuring NEMO and CICE. Assess suitability of system for use with stand-alone NEMO, NEMO-CICE (and CICE-only) configurations. Advise on suitability for wider use within and outside the met office.

Science Reviewer:

System Reviewer:

Priority: Medium

Depends on: Development of ROSE system functionality.

Principal Investigator : Richard Hill (richard.hill@metoffice.gov.uk)

MetOffice.09 - Allow specification of a start time

Description: Allow user to specify (via a namelist variable) the time of day at which a model run is to begin

Motivation: Coupled data assimilation within the Met Office runs on a 6 hourly cycle, and it is therefore necessary to run NEMO starting at times other than 00z

Status :

Main tasks : Assess practicality of outputs etc. for non-full days. Add namelist variable and asses and make any necessary amendments in daymod

Science Reviewer: -

System Reviewer: Sebastien Masson

Deadline: September 2013

Priority: Medium

Principal Investigator : Dan Lea and Dave Storkey