

Minutes of the NEMO Developers' Committee Meetings

23rd January 2019 in Grenoble and 4th February 2019 by Webex

1) 23rd January 2019 in Grenoble

Present: Mike Bell (Chair), Rachid Benshila, Momme Butenschon(VC), Clement Bricaud (VC), Miguel Castrillo, Jerome Chanut, Emanuella Clementi (VC), Andrew Coward, Pier Guiseppe Fogli, James Harle, Dorotea Iovino, Florian Lemarie, Claire Levy, Gurvan Madec, Nicolas Martin, Sebastien Masson, Pierre Mathiot, Jean Marc Molines, Simon Muller, Clement Rosseau, Joanna Staneva, Julien le Sommer, Dave Storkey, Oriol Tinto, Martin Vancopenale

Apologies: Helene Hewitt, David Marshall

1. Role of NEMO Developers' Committee (NDC)

Mike introduced a discussion of the role of the NDC. It is currently:

- i) To give advice on research developments plan
- ii) To coordinate developments planned by scientists outside the NEMO System Team and in particular to coordinate them with the Work-Plan for the NEMO System Team
- iii) To set up working groups, to appoint their leaders and to validate the report drafted by the working group
- iv) To propose opportunities for funding to the Steering Committee

A major part of the work of the group on i) relates to the NEMO development strategy which is not mentioned explicitly. The work on ii) seems to be done mainly through the working groups. The roles were probably written whilst the Consortium was being formed. A Scientific Advisory Board usually performs i) but not ii) – iv). Mike asked whether we could define roles that fit the needs of NEMO better: both fairly close to what we are doing already and that also “make sense” on paper.

2. Presentation on the systems team work in 2018

Claire gave a short overview of a very informative report describing the NST work in 2018 that was circulated the week before the meeting. Briefly, all the work leading up to the v4.0 release (scheduled for Friday 25th January 2019) has been completed. The new release includes the SI³ model and major simplifications to both the organisation of the code and the code that defines the model grid. The code has been validated more thoroughly than ever before. Reference manuals for SI³ and TOP have also been started. The NST has achieved cohesion through regular team meetings and includes members with a very wide range of expertise.

Julien thanked the ST on behalf of the IMMERSE project which requires this release as a starting point for major developments.

Jerome recommended that the emphasis on vertical grid refinement with AGRIF be removed from the release notes since it is only partially implemented and full functionality is an IMMERSE deliverable [**Action: Claire**].

Rachid inquired about the independent status of SI³. Although it is currently embedded within NEMO, it may benefit from a separate identity and contact point. The case in point being a desire to use SI³ with CROCO, it is not clear if this is possible or permissible. Clement suggested that it is possible to adapt the surface module of CROCO and deploy SI³ in a similar way to how SI³ can be used with the Stand Alone Surface (SAS) module of NEMO. SI³ developers would be happy to see the code used with other models.

3. Plan for System Team work in 2019

The plan for NEMO development in 2019 is heavily influenced by IMMERSE. IMMERSE is probably bringing extra resources but this is difficult to track. EU deadlines and deliverables bring stronger commitments to the developments.

4. Reports from Working groups

Mike presented the HPC WG report. This WG has been very active including contributions from outside the consortium. Silvia now has a reducing role at CMCC and has stepped down as Co-chair. Italo is back, however, and is also leading the HPC WP in IMMERSE. Lots of performance improvements are already in v4.0 (particularly evident at high processor counts). Mostly improvements in OCE and SI³ but TOP will benefit from changes to the transport modules.

The Kernel WG has also been active and has done a lot of preparatory work for the IMMERSE developments. The WG benefits from cross-membership with COMMODORE which also formed this year. The main gap between the strategy aims and current plans is in the full implementation of ALE coordinates but good progress has been made toward a more robust implementation of z-tilde. The eventual aim for the time-stepping scheme remains a compensated time and space scheme which is only possible with flux-form formulation. The RK3 time-stepping scheme will, therefore, be done in flux-form only (but it should be easy to re-introduce a vector invariant form later, if required).

A discussion of the case for an Ocean Physical Processes WG covering chapter 5 of the strategy concluded that the range of processes covered was too wide and membership would be split between those looking to resolve processes (waves, tides etc.) and those looking to parameterise (e.g. GEOMETRIC approach to balanced turbulence); with little shared interest. The first category can be accommodated in other WGs. The second category will be assisted by user support and the new suites of physical test cases including the external repository for test cases provided by users. But this still leaves a gap in the implementation of the NDS that needs further consideration.

[Action: Nicolas and Claire to setup and communicate the existence of an external repository for user-provided test cases]

Jerome reported on the AGRIF WG. There has been a lot of good development and more to come within IMMERSE and the CMEMS funded Renumerate project. Gaps between strategy and plans still exist though. Chiefly, the lack of support for developing the 'grandmother' grid possibility for coarsening (coarsening will not be ported forward from its current v3.6 state). Clement (Bricaud) pointed out that plans to couple BGC models via OASIS provide an alternative (and more sustainable) route to achieve coarsening that will be explored in IMMERSE WP 4. Other gaps include better distribution of MPP resources (which will be needed

to move the concept of AGRIF nests for all overflows from the IMMERSE pilot into global operation) and AGRIF coupling at the barotropic sub-timestepping.

Seb presented the report from the Air-Sea-waves interaction WG. This has already delivered code into the v4.0 release (and is an example of WG actions moving from advisory to implementation). Additional actions are already in the IMMERSE WP.

Martin presented the Sea-ice WG report. The strategy chapter still needs updating but the SI3 partnership is progressing well. A joint meeting with CICE developers will be held later this year. The WG doesn't contain any iceberg or ice shelf expertise so there are gaps here. Pierre is supporting a community of ice shelf users but he remains the only developer.

There was no representation from the Biogeochemical WG

Mike presented the report from the data interfaces WG. There has been good progress towards the aims of the strategy chapter. A Mercator Ocean International (MOI) Marine Data Assimilation (MDA) workshop was held during the year and an MOI MDA Expert group has been set up.

5. Other Business

Florian Lemarie drew attention to online methods for documentation such as Doxygen (<http://www.doxygen.nl>) which could be useful for NEMO.

It was agreed to hold a Webex meeting to discuss the role of the Developers Committee further and the position on the Validation and User Support chapter of the NDS.

[Action: Mike to arrange a follow-up Webex call]

2) 4 February 2019 by Webex

Present: Mike Bell (Chair), Miguel Castrillo, Jerome Chanut, Andrew Coward, Massimiliano Drudi, Italo Epicoco, Pier Guiseppe Fogli, Victor van Gucht, Dorotea Iovino, Claire Levy, Sebastien Masson, Pierre Mathiot, Clement Rosseau, Julien le Sommer, Oriol Tinto, Martin Vancopenale

Apologies: Rachid Benshila, Emanuella Clementi, Florian Lemarie, David Marshall, Jean Marc Molines

1. Roles the Developers' Committee should have in future

The NDC owns the NEMO Development Strategy (NDS) and organises the Working Groups. It should provide advice, in the context of the NDS, on 1) the proposed Work Plan and progress each year in the NST and 2) progress within the Working Groups.

The NDC is evolving because of the widening range of expertise and topics involved. Most of the real discussions now take place in the WGs and it is difficult for the NDC to assess this work properly.

There are three types of members: external experts; consortium representatives; and System Team members. The current membership is large which makes discussion difficult. The attendees for each meeting might vary according to the agenda.

2. Stock-take of the Validation and User Support

These tasks were covered in one chapter of the NDS. Both are very important aspects of the NST's work. But they are different tasks and should probably be considered separately.

Validation encompasses verification and validation of both software functionality and scientific fidelity. Claire proposed that the NST should prepare, for discussion at the next NDC, 1) a summary of the NST's verification and validation activities, and 2) an analysis of ideas and priorities for improving them. This would include definitions of the verification and validation considered to be within scope.

Some of the difficulties with the validation of the NEMO v4.0 release were discussed. Probably because of IMMERSE, the final period for validation was very compressed; the number of beta-testers was limited; and the trusting component of SETTE was disabled in the latter stages of testing. The balance of effort between verification of test cases and validation of longer integrations was also discussed.

To decide priorities for improvement of user support, we need, of course, to consult users. But holes in documentation, the lack of a working user forum and the support offered by other model systems should also be considered. The level of priority for external user support within the NST and the support given to users who could assist NEMO in future should be reviewed. This task/topic needs more consideration.

3. Messages for the Steering Committee

The NEMO Developers Committee is evolving. Its working groups (WGs) are now aligned with the NEMO Development Strategy and there is a sub-group which agrees the agenda. Its roles and membership are both quite broad and are being reviewed. It would be helpful if the Steering Committee appointed a chair-person for the group.

The main conclusions from the stock-take of the implementation of the NDS are:

- a kernel WG has formed. There are gaps in the implementation of ALE coordinates;
- some good progress has been made by members of the HPC WG this year;
- progress has been made on some of the issues identified in the chapter on the representation of physical processes, but there are no targeted WGs to improve the representation of specific processes;
- there has been good progress on AGRIF and further work is planned within the CMEMS funded Remunerate project. No work is planned to implement grid coarsening through AGRIF but IMMERSE plans to implement it through OASIS;
- most of the actions identified in the Data Interface chapter have been completed. An MOI Marine Data Assimilation Expert Team has been formed;
- good progress is being made on the SI3 sea-ice model; a scientific workshop is being planned for the coming year;
- good progress is being made in the air-sea interaction WG;

- verification and validation of the new version of the NEMO code will be a focus of discussion at the next NDC;
- the priorities for improvement of user and developer support could be reviewed

The IMMERSE project will test a mechanism for funding to accelerate implementation of the NDS. The project team will be attentive to the effectiveness of this mechanism and make sure it does not break existing working practices. The additional resources IMMERSE will bring are not entirely clear at this stage.