

NEMO action ASINTER-02_emanuelaclementi_Waves

This action is an activity of IMMERSE Task5.2 and focuses on the upgrade the ocean-wave coupling representation:

- Gather and check developments carried out in the ocean-wave community related to breaking waves modified vertical mixing. Couvelard et al. (2020) paper → **DONE**
- Deliver a development branch including all the code modifications from Couvelard paper: [dev r12702 ASINTER-02_emanuelaclementi_Waves](#) → **DONE**
- Test the development branch using the reference configuration ORCA2_ICE_PISCES:
 - Forced mode using ECMWF atm. forcing data provided some years ago in the NEMO-WAVE WG context → **DONE**
 - Coupled mode: NEMO-WW3 through OASIS → **ONGOING** (the set up is finalized, the tests are ongoing)
- Test case: Literature checks and selection of an adiabatic case to provide the validation of the Generalized Lagrangian Mean implementation for the wave-current interaction. The initial set-up of the test case has been done and the final implementation and code checks are ongoing → **ONGOING**

This dev branch is not aligned with the trunk yet

Test case before the merge

Rachid Benshila (and maybe Gurvan) would review the dev branch



NEMO action TOP-04_lovato_IMMERSE_BGC_interface

This action is part of IMMERSE Task5.3 and address the implementation of a shared module to treat light penetration

- Gather potential developments in the treatment of light penetration along the water column used in BGc models coupled to NEMO (Yool et al., 2013; Aumont et al, 2015; Vichi et al., 2020) → **DONE**
- Deliver a development branch including a first draft of the module *trcopt* to handle light penetration (IMMERSE M18): [dev r12985 TOP-04 IMMERSE BGC interface](#) → **DONE**
- Test the development branch using the reference configuration ORCA2_ICE_PISCES → **ONGOING** (the set up is finalized, the tests are ongoing)
- Revise the module implementation to align with *action* ENHANCE-10 addressing the improved computational performances of RGB light penetration in traqsr → **ONGOING**



NEMO action DATAINT-01_sciliberti_IMMERSE_Interfaces

This action corresponds to IMMERSE Task7.3 and refers to integration of prototypes and development of new generic interfaces CMEMS-NEMO

- Design and implementation of Access Module (AM) of CMEMS catalogue → **DONE**
- Design and implementation of Process Module (PM) for visualizing and analysing CMEMS data → **DONE**
- First release of the IMMERSE Generic Interfaces on <https://github.com/CMCC-Foundation/immerse>
- Design and implementation of Boundary Module (BM) to extract and reshape boundary information from CMEMS for NEMO-based configurations → **ONGOING**
- Porting of modules on Wekeo DIAS infrastructure → **ONGOING**



NEMO action HPC-08_epico_Extra_Halo

This action is part of IMMERSE Task4.1

- Extra halo management: a complete support for NEMO execution with halo = 1 and halo = 2 has been implemented
→ **DONE (validation still on)**

A dynamic management of halo size for different NEMO kernels will be added. Some NEMO routines will continue to be executed with halo = 2. Others selected routines will benefit of a greater halo region.

In dynspg_ts routine, for example, could be convenient to enlarge the halo region (up to 5 lines or more) to reduce the communication steps in the time sub-stepping loop. → **ONGOING (foreseen for 2021)**



NEMO action HPC-09_epico_Loop_fusion

This action is part of IMMERSE 4.1 and aims to improve the memory hierarchy reuse on different architectures:

Adoption of the 'loop fusion' optimization technique to reduce the cache misses and to improve the computational performance

- Loop fusion will be applied on the most computing intensive routines → **ONGOING (deadline Dec 2020)**
- Loop fusion will be applied on all the remaining NEMO routines as long as the intermediate communications can be successfully moved thanks to extra-halo support → **foreseen for 2021**



NEMO action HPC-07_mocavero_mpi3

This action is supported by Is-ENES3

Use of MPI-3 collective neighbours communications instead of point to point communications

- The MPI-3 neighbourhood collective communications based on graph topology (instead of the cartesian one) have been implemented in order to support land domain exclusion. Both 5-points and 9-points stencil versions have been completed.
The calls to the 9-points stencil version will be introduced within the NEMO code and will be ready for merge → **ONGOING**
- the calls to the 9-points stencil version will be replaced by calls to the 5-points version within the routines where it will be enough to preserve data dependencies. → **To be done (foreseen for 2021)**



CMCC ensures 1 FTE as member of NEMO Consortium

CMCC activities are largely supported by H2020 projects

- **participating in 4 WG (High performance Computing, Sea Ice modeling, Tracers in Ocean Paradigm, Air-Sea interactions)**
- **IMMERSE Scientific Coordination Board (NDC PrePARATION Team)**

