2023 OASIS3-MCT Evolution Plan

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Abstract

This document describes the evolution of OASIS3-MCT planned for the coming years. Funding for coupler development at CERFACS has shifted from IS-ENES to the French national TRACCS PC5 project over the 2024-2032 period. In this context, future efforts will be shared between two parallel tracks, i.e., in the short and mid-term, the development of the next version, OASIS3-MCT_6.0, and, in the longer term, the development and transition to XIOS as a community coupler. During the whole TRACCS period, CERFACS commits to continue to provide training, user support and bug fixing for OASIS3-MCT_6.0 and previous versions. At the same time, CERFACS and IPSL will actively collaborate to evaluate and further develop the coupling functionality in the XIOS IO server to produce a new version of XIOS including full coupling functionality near the end of TRACCS. The objective in the TRACCS project is to gradually transition from OASIS3-MCT to XIOS as coupler in the French climate modeling community. After 2032, CERFACS does not plan to maintain OASIS3-MCT anymore if the XIOS pathway planned in TRACCS proves to be successful. Given this perspective, one objective of the coming years is to enable community developments in OASIS3-MCT to open the door to groups that would be interested in investing in the coupler and even take over its maintenance and development following the 2032 timeline.

1. Context

OASIS development started in 1991 in CERFACS. The current version of the coupler, OASIS3-MCT (Craig et al. 2017), offers fully parallel regridding and distributed exchanges of the coupling fields, thanks to MCT (Model Coupling Toolkit, www.mcs.anl.gov/mct) developed at Argonne National Laboratory in the USA.

In 2019, a survey performed among OASIS users confirmed that OASIS3-MCT is used by at least 67 modelling groups to assemble more than 80 different coupled applications over the 5 continents. These applications include global or regional configurations of ocean and atmosphere models but also sea ice, sea level, wave, ocean biogeochemistry, land, vegetation, river routing, hydrological and atmospheric chemistry models. OASIS3-MCT is used in 5 of the 7 European Earth System Models that participated in the 6th Coupled Model Intercomparison Project (CMIP6).

The latest official release of the coupler, OASIS3-MCT_5.0, was distributed in December 2021 (Valcke et al. 2021a). Since its release, OASIS3-MCT_5.0 sources have been downloaded more than 225 times from groups all over the world.

Given the completion of the IS-ENES3 project and ESiWACE2 Centre of Excellence, which provided important European funding for the development of OASIS3-MCT, we think it is time to plan its evolution in the coming years and share these plans with its user community.

This document presents in section 2 our plans for the general evolution of the coupler and in section 3 the few developments planned for the next OASIS3-MCT version. For completeness, one can find in Appendix 1 the status of the developments announced for the IS-ENES3 and ESiWACE2 period in the last OASIS3-MCT development plan (Valcke et al. 2020). Most developments were released in OASIS3-MCT_5.0. Other tasks discussed at one point in time but not envisaged for further versions of OASIS3-MCT are presented in Appendix 2.

2. Plans for general evolution

As written above, sources of external European funding for OASIS3-MCT have come to an end. However, important funds, equivalent to 2 persons full time during 6 years, will be available for the development of coupler software within the French national TRACCS PC5 project (https://climeri-france.fr/pepr-traccs/) over the 2024-2032 period. In this context, future efforts at CERFACS will be shared between two parallel development tracks, i.e., in the short and mid-term, the development and support of the next version OASIS3-MCT_6.0 and, in the longer term, the development and transition to XIOS (https://forge.ipsl.jussieu.fr/ioserver) as a community coupler.

On one hand, resources will be devoted to the few well-defined OASIS developments described in Section 3, leading to the release of the next version of the coupler, OASIS3-MCT_6.0 in 2024. In addition to TRACCS, some efforts funded by "scientific" projects (in contrast to "infrastructure" projects, like IS-ENES3) like the EU project OptimESM and the VESRI project SASIP, will also cover part of these developments. As OASIS3-MCT will still be used in many European ESMs for the CMIP7 and in many other applications, CERFACS commits to continue to provide training, user support and bug fixing for OASIS3-MCT_6.0 and previous versions during the whole TRACCS period.

On the other hand, a large part of the TRACCS manpower will be dedicated to the evaluation and further development of the coupling functionality in the XIOS IO server. XIOS, used in many European climate components, includes basic coupling functionality i.e., communication and regridding of data, and a first 2-way coupling test case with XIOS has already been realised. During TRACCS, the coupling functionality of XIOS will be evaluated and compared to OASIS3-MCT and missing features will be identified. These features will be extracted and merged in XIOS during the second phase of TRACCS. One objective of TRACCS is to gradually transition from OASIS3-MCT to XIOS as a coupler, at least in the French climate community. CERFACS and IPSL will actively collaborate to produce, as TRACCS deliverables near the end of the project: 1) a new version of XIOS including full coupling functionality; and 2) a version of the two French climate models, IPSL-CM and CNRM-CM, using XIOS for their coupling exchanges. This implies in particular that XIOS would be available as coupling interface in NEMO, an important step toward XIOS adoption as community coupler, given NEMO's wide distribution. Community governance for XIOS, including production of development plans and their review by a formal advisory board, will also be set up.

After the TRACCS period, i.e. after 2032, CERFACS does not plan to maintain OASIS3-MCT anymore if the XIOS pathway planned in TRACCS proves to be successful. Given this perspective, one objective of the coming years is to enable community developments in OASIS3-MCT. In particular, resources will be devoted to ensure easier readability of the current code and to other adaptations that should facilitate community developments. We also plan in the coming year to conduct another user survey on the use of OASIS3-MCT to update the 2019 one and to take this opportunity to check the potential interest

of current users to participate in this collective development. This should open the door to groups that would be interested to invest in the coupler and even take over its maintenance following the 2032 timeline.

Our aim is that after 2032, current OASIS users and future scientists, who want to do code coupling, will still be able to do so as easily as they can today.

3. OASIS3-MCT developments

The developments that we plan to include in OASIS3-MCT_6.0 are described here. In most cases, the development is described in a ticket on the OASIS Redmine site (https://inle.cerfacs.fr/projects/oasis3-mct), and we provide the corresponding ticket number. Section 3.a presents developments underway or planned and section 3.b lists the tickets that were recently dropped after approval by the Advisory Board.

3.a Planned developments

To facilitate community developments:

- Clean up the code where possible in order to ensure in particular greater readability of the current code.
- Identify functions that do not work together and update the User Guide (to avoid that users discover those incompatibilities by themselves or, worst, activate those incompatibilities without noticing them).
- Revive doxygen documentation in Fortran sources.
- Migrate to a public github server and then form a "volunteer" committee of administrators to provide basic oversight of changes.
- Ticket #2814 : “Build pkg-config files”; could be useful to encourage community developments.
- Ticket #2813 : “Track Oasis3-MCT version”; could be useful to encourage community developments.
- Ticket #2688 “Oasis interface argument names and documentation”; needs to be reconsidered when reviving the doxygen documentation (see above)

Other developments:

- Interface with YAC full interpolation stack (includes 1st and 2nd order conservative and non-conservative remappings) to complement the current SCRIP library.
- Review the remapping weight calculation environment regrid_environment (which is too benchmark-oriented) considering the Ready2couple (rdy2cpl) tool developed at SMHI.
- Finalisation of ticket #2400 “Weight calculation for grids with mask evolving with time”, i.e., the support of grid fractions evolving during the simulation.
- Finalisation of ticket #2815 “GitLab Continuous Integration to validate oasis3-mct developments”, i.e., the migration from Buildbot to Gitlab CI for the suite of test cases run automatically after each modification committed.
- Feedback in NEMO official version of results of ticket #2355 “Clean construction of OASIS files grids.nc, mask.nc, areas.nc within routine cpl_oasis3.F90”; the revised routine will be reviewed by Aurore Voldoire and then submitted as a ticket for NEMO 4.2.

- Addition of a test case in GitLab test suite coupling a toy atmosphere to NEMO (ticket #2402); such a toy exists with the NEMO sources and has to be clearly accessible for OASIS users.
- Finalisation of ticket #2707 “Improve Oasis build/run scripts”; see the ticket for details, it will be closed as soon as the final report is published.
- Ticket #2856 “Differentiate initial coupling restart files from the ones overwritten at the end of the run.”
- #2702 “For SCRIP BICUBIC, remove the need to pass gradients by inserting their contribution in one same matrix”; needs to be reviewed given the new remapping algorithms offered with YAC interfacing (see above) .
- #2868 “Optimisation/parallelisation of coupling restart reading”; parallel reading of the external files (either coupling restarts, auxiliary or weights files) could become an issue for our coupled model; could also be integrated later if realised as a community development.
- Bugs fixes
  - #2900 “partition duplication”
  - #2859 “Mapping hangs depending on PE count”

3.b Tickets to drop:

- #2353 “Checks for bin restrictions in the SCRIP”; closed as no efforts should be invested in SCRIP at this point in this task (i.e., implementation of aborts or warnings when the bin restrictions do not respect the constraints described in section 4.3 of the User Guide).
- #2869 “Support of exchange grid”; closed as we did not get feedback from the user who asked for this; could be integrated later if realised as a community development.
- #2696 “Performance issue for 3D exchanges (bundles) for BGC/NEMO coupling”; closed as the performance problem with 3D bundle fields has not been clearly reproduced with toy models, and as no user has (yet?) complained about this performance aspect[1].
- #2365 Some details about the debug files produced in EXPOUT mode; this request from the UK MetOffice (having the different members of a bundle field to be written out in one same file) is no longer pressing; could be integrated later if realized as a community development.
- #2361 “Other possible developments to be further clarified with users (need, priority, difficulty, ...)” : dynamic weight calculation, automatic configuration of the coupling exchanges, multi-threading, standard components, interoperability with ESMF; closed as it covers issues that will definitely not be addressed for OASIS3-MCT (see also Appendix 2 below).
- #2351 Hippo, the Hybrid Interactive Placement in Palm and Oasis; closed as low priority, as Hippo is not further developed at Cerfacs, even if Hippo would give more flexibility to switch among different specialised layouts for MPI/OpenMP hybrid parallel components; without Hippo, the SCRIP weight computation will run on 1 MPI task per node with as many threads as

[1] implementation of 3D bundle coupling with mask varying for the different vertical levels, has been implemented in a specific version of OASIS3-MCT used for the NEMO-TOP-PISCES in the IMMERSE project. In that version, the put-get interface was modified to be able to treat 3D input arrays as unbundled data but this modification has not been merged in OASIS3-MCT official version in order to avoid over-complexification of the coupler code; this is described in this report.

physical cores and all the hybrid components will share the same thread affinity settings, even if they are allowed to run on a different ratio of MPI tasks/OpenMP.

- #2175 OASIS3-MCT toy for the users interpolating the wind components: closed but could be integrated later if realized as a community development.

4. Conclusions

This document is an update of the OASIS3-MCT 2020 development plan, proposing a strategy for OASIS3-MCT evolution. In TRACCS, the objective is to gradually transition from OASIS3-MCT to XIOS as the French community coupler. CERFACS commits to offer development, user support, and bug fixing for OASIS3-MCT for the TRACCS period (next 8 years), but CERFACS does not commit to do so after that period if the XIOS pathway planned in TRACCS proves to be successful. One objective during the coming years is therefore to favour community developments in OASIS3-MCT and open the door to groups that would be interested to take over its maintenance after CERFACS. This strategy now needs to be shared with its user community.

Appendix 1

Status of developments announced for OASIS3-MCT_5.0

All developments that were announced in the 2020 OASIS3-MCT development plan (Valcke et al. 2020) for OASIS3-MCT_5.0 in the framework of the IS-ENES3 and ESiWACE2 projects were realised, except:

- Interfacing with a high-quality parallel library for the calculation of the regridding/interpolation weight-and-address file, tickets #2349 & #1011

  In the framework of ESiWACE1, the SCRIP library was parallelized with OpenMP/MPI leading to great reduction in the calculation time of the remapping weights. But SCRIP still shows specific problems near the pole for some grids and algorithms and this motivated the investigation of other parallel interpolation libraries of higher quality. A benchmarking environment was developed to evaluate more precisely SCRIP, YAC, ESMF, and XIOS regridding functionality. Five regridding algorithms were evaluated for four different functions for seven pairs of grids used in real ocean or atmosphere models. The benchmark conclusion was that YAC, ESMF and XIOS can all be considered as high-quality regridding libraries, even if some features need some upgrades. For more details, see Valcke et al 2021b and Valcke et al 2022.

  Instead of choosing one new library among the ones that we evaluated and replacing the SCRIP library with it, it was decided to provide a unified scripting environment allowing SCRIP, ESMF or XIOS to calculate the regridding weights.

  As written in section 3, interfacing YAC full interpolation stack in OASIS3-MCT is planned and underway.

- Making OASIS3-MCT conformant with CMIP6 standard for weight file format, ticket #2401

  Finally, we decided to close this ticket as CMIP6 simulations were over and we had not received any additional information about the requirements.

- Analyse and optimise the memory use in OASIS3-MCT, ticket #1104

  We decided to close this ticket as no memory issue has been raised by users for many years.

All other developments announced have been achieved and are included in OASIS3-MCT_5.0 that was released in December 2021 as a deliverable of the IS-ENES3 project. They are listed here (excluding bug fixes that were regularly incorporated).

Interpolations & transformations

- Conservative remapping for the runoffs, ticket #2556

When coupling traditional fluxes, the basic idea is to provide data on each unmasked target grid point. In the case of river outflow, the rationale is reversed since not all ocean target grid points should receive a value but it is necessary that all source grid points find a target on the ocean grid. The method proposed by Aurore Voldoire at CNRM, based on the regular interpolation weights but taking the reverse interpolation links, is implemented in OASIS3-MCT_5.0. This method allows conservation of the river outflow locally and globally. Details are available in Maisonnave 2020 and in section 4.3 of the User Guide (see `LOCCUNIF, LOCCDIST` and `LOCCGAUS`).

- Improved and additional diagnostics, tickets #2356, #1761 and #1069

Diagnostics performed under the `CHECKIN/CHECKOUT` operations were revised. These operations now calculate the global minimum, maximum, mean, and sum of the source/target field values taking the mask into consideration. If a grid area or fraction field is also available, the area and/or fraction weighted mean and sum are also diagnosed and written out to the output file. See the User Guide, sections 4.2 and 4.3.

- (Pre- and) post-processing transformations, ticket #2364

Post-processing operations under `BLASNEW`, which performs a scalar multiply or scalar addition to any destination field, were extended. In addition, other fields on the destination side can be added with a multiplier and addition weight. We limited the developments to this relatively simple possibility because in most cases, specific post-processing transformations (like combination of the coupling field with observations) can be easily much more coded in the models themselves[2]. See the User Guide, section 4.4.

- Normalisation by the grid cell "true" area for the conservative remapping, ticket #1010

The approximations adopted by the SCRIP library impact its estimation of the grid cell areas. Therefore, to have an exact conservation of the field surface-integrated values, a correction based on the 'True" (TR) area of the cells can be applied by choosing `DESTARTR, DESTNNTR, FRACARTR` or `FRACNNTR` options. These are based respectively on `DESTAREA, DESTNNEI, FRACAREA` and `FRACNNEI` normalisations adding the so-called "TR correction": the true area of the cells, i.e. the ones considered by the component model itself, are used in the remapping normalisation. See the User Guide section 4.3.

- Number of neighbours used in the regridding weight file name, ticket #2350

The number of neighbours used in the regridding is now included in weight file name so to avoid confusion when the same interpolation is used between the same grids but with different number of neighbours for `DISTWGT, DISTWGTNF, GAUSWGT, GAUSWGTNF LOCCUNIF, LOCCDIST` or `LOCCGAUS` regriddings.

- Easy detection of the target grid point that do not receive any value, ticket #731

This is not supported directly by OASIS3-MCT itself but can be realised by using the `regrid_environment` environment (see the User Guide section 6.3.3): the received field is transformed to give the value of 10000 to masked target points and the value of 1.e20 to non-masked points that do not receive any interpolated value (if any), in order to be able to easily detect them.

- Specification of Lambert projection north thresh and south thresh values in the *namcouple* configuration file, ticket #2459

`$NTHRESH` and `$STHRESH` can now be specified in the *namcouple* configuration file. These are the values of respectively the northern and southern latitude (in radians) above and below which the hypothesis about the cell boundary definition for the area computation in `SCRIPR/CONSERV` switches from linear boundaries in longitude and latitude to a Lambert equivalent azimuthal projection.

Communication

[2] We also think that user needs with respect to this functionality are low, as nobody answered the mail and reminder that was sent on the OASIS user mailing list about their corresponding requirements.

- Extension of the `oasis_get_intracomm` API (Application Programming Interface) routine to support multiple components, ticket #2687

The API routine `oasis_get_intracomm` merges two MPI communicators from two different components to form a new communicator. This routine was extended in the new `oasis_get_multi_intracomm` API routine to support more than 2 components. A list of component names is now passed as an array argument. This is needed in coupled models involving both OASIS3-MCT and XIOS when XIOS manages the output of ensemble simulations. See the User Guide section 2.2.9.

- Sending/receiving simple scalars, ticket #1937

Coupling scalar variables is possible using OASIS3-MCT_5.0 available API. Scalar variables are variables such as date and time, logical flags, integer or real parameters, or other scalar data that might be defined identically across all MPI tasks in a component or even just on a subset of tasks. The procedure to implement this type of exchange is described in detail in the User Guide, section 2.5.2.

Other functionalities

- Further development of LUCIA, the load balance analysis tool, tickets #2357 & #1003

LUCIA was the tool delivered with OASIS3-MCT to automatically evaluate the load balance of the coupled components. This tool was completely revised in collaboration with the Barcelona Supercomputing Center (BSC) and a new load balancing analysis tool is now available. It can be simply activated through the *namcouple*. When activated, this functionality outputs the full timeline of all OASIS3-MCT related events, for all allocated resources. This timeline is saved in one NetCDF file per coupled component. It provides the comprehensive sequence of all operations related to the coupling (field send and receive through MPI, field output on disk, field interpolation and mapping, field reading on disk, restart writing, initialisation and termination phase of the OASIS3-MCT setup) so that any simulation slowdown in OASIS3-MCT can be identified. See the User Guide, section 6.5, Maisonnave et al. 2020 and Piacentini & Maisonnave 2020.

- Python bindings, ticket #2362 and #2509

OASIS3-MCT_5.0 comes with full support of python and C bindings. First, the OASIS3-MCT Fortran code is wrapped in Fortran using ISO-C bindings, which are subsequently wrapped in C. Finally, the C is wrapped in Python. The python wrapper functions and the Fortran-python API correspondence are fully described in the User Guide section 2.4. Equivalent Fortran, python and C examples are provided. Python bindings will bring OASIS3-MCT to a much wider ecosystem and is a good way to attract countries less advanced in HPC. This required an update of the compiling environment, see next item below. For details, see Gambron et al. 2021.

- Develop, maintain, and systematically apply the buildbot test suite, ticket #232

Buildbot is software used to compile OASIS3-MCT when development is committed on the Git master version or on an active Git branch. It then performs a full test suite with toy models to verify the development code and to check that new bugs were not introduced in the updated source code. As part of this process, results are compared automatically to the results of a reference state that was verified earlier. The use of Buildbot provides validation during the development process and prior to merging to the master version.

The old Buildbot test suite used toys testing multiple functionalities and toys from users. A new Buildbot test suite was constructed in 2019-2020 based on the functional toy

concept. Each of the ~30 toys included now tests one functionality of the OASIS3-MCT coupler (see Coquart et al. 2021).

This new test suite is under migration to GitLab Continuous Integration system, as mentioned in section 3.

- Updated API interface for `oasis_def_var`, ticket #2273

One argument of `oasis_def_var` is not used anymore but is mandatory for backward compatibility. A new interface has been defined without the unused argument and both the old and new API are supported. See the User Guide, section 2.2.5

- Systematic tests of NetCDF returned error code, ticket #550

Systematic check of error code was implemented for all NetCDF calls in OASIS3-MCT_5.0.

Support and training

We have kept on delivering high-quality user support through the forum, by mail or by phone.

We also delivered one face-to-face training to 3 persons in May 2019 and we have developed a SPOC (Small Private Online Course) on "Code Coupling with OASIS3-MCT" thanks to ESiWACE2 funding. Three SPOC sessions have been organised, one in July 2020 with 10 participants, one in May 2021 with 11 participants and one in March-April 2022 with 9 participants. The 2022 satisfaction survey confirmed that the overall satisfaction of the participants is globally quite high with 86% absolutely satisfied and 14% satisfied.

A total of 13 PMs of dedicated user support was also granted to (see details in Maisonnave 2022):

  - NERSC (Norway), to implement a coupling between an ocean global configuration and two hemispheric sea ice models, setting the basis of a future NEMO-neXtSIM ocean/sea-ice coupled model; to modify the coupling interface of the HYCOM model to allow the exchanges at surface with the neXtSIM ice model;
  - UK Met Office, to start the development of a 3D coupling between NEMO and the MEDUSA biogeochemistry module; to upgrade the ocean/surface module coupled interface between NEMO and the new sea-ice component SI3 ;
  - ETH Zürich (Switzerland), for an upgrade of the COSMOCLandM coupled system;
  - GEOMAR Kiel (Germany), for an upgrade of the OpenIFS-NEMO-AGRIF coupling (FOCI); and to introduce a new runoff interpolation algorithm in the existing OpenIFS-NEMO coupled model;
  - DWD (Germany), to port the NEMO-ICON coupled model, including ICON internal and XIOS external I/O servers, on the new DWD vector machine NEC SX-Aurora TSUBASA;
  - Météo-France PREVIMER R&D team (France), to ensure the efficient exchange of coupling fields between the NEMO ocean and MFWAM wave models.
  - SMHI (Sweden), to help set up and check the rdy2cpl tool allowing generation of interpolation weights with SCRIP; this was the occasion to test the new pyOASIS interface and establish the efficacy of Python based coupled toys.

- Toy coupled models, ticket #2555, #2175 and #2402

Practical examples, in the form of toy coupled models, are also available with the OASIS3-MCT_5.0 sources, to help users learn about the coupler in `oasis3-mct/examples` directory. They are described in section 6.3 of the User Guide.

Also, an atmosphere toy, TOYATM, coupled to the real ocean code NEMO was developed and is distributed with the sources of NEMO. See details at https://forge.ipsl.jussieu.fr/nemo/wiki/2020WP/VALID-11_clevy_OASIS_TESTCASE.
We plan to integrate this TOYATM-NEMO coupled application in our test suite.

However, we did not have the time to develop a toy model showing how a vector field should be coupled and we propose to drop this task (see section 3).

- Migration from SVN to GIT for source management, ticket #2352

OASIS3-MCT source management was migrated from SVN to GIT in November 2019. Using GIT for source management is of great benefit for the OASIS3-MCT users, in particular, given its distributed method for version control, which means that each user clones a full version of the repository.

- Migration of the OASIS3-MCT web site from DKRZ to Cerfacs, ticket #2697

The OASIS3-MCT web site is now hosted at Cerfacs using the content manager Wordpress, see https://oasis.cerfacs.fr/en. The old site at DKRZ, using Plone, is no longer valid. See Coquart et al. 2022.

- Environment to create fractional areas for truly conservative remapping, ES2, ticket #2460

In an ocean-atmosphere coupling, the binary (i.e., not fractional) ocean mask should be taken as it is from the model. For the atmospheric model, coupling cell fractions should be defined by the conservative remapping of the ocean mask on the atmospheric grid, retaining fractions above a certain threshold. These coupling cell fractions should be used in the atmospheric model to define the % of ocean subsurface to be considered. Then the atmospheric coupling mask should be adapted associating a non-masked index to all cells with an ocean fraction above the chosen threshold. An environment reproducing all these steps has been developed and made available to the users.

Appendix 2

Other aspects discussed but not planned

Interpolations & transformations

- Dynamic weight calculation for dynamic grids, in ticket #2361

  Supporting coupled applications including components with grids having grid fractions evolving with time is under development in OASIS3-MCT. However, support of fully-dynamic grids, i.e., which grid point position evolve in time, will not be considered.

- Vertical interpolation

  Simple level-to-level or pressure-to-pressure interpolation would be relatively simple to implement but more sophisticated pressure-to-level or hybrid-to-level would be much more complex (because the interpolation then depends on auxiliary field that changes at each coupling timestep). We consider that this is better done in the models, and we do not propose to include this directly in the coupler. It is also already supported in XIOS.

Configuration

- Modernisation and extension of namcouple syntax

  The priority of this task is debatable. We have considered transforming the namcouple format (xml, yaml, standard FORTRAN namelist). Finally, we have always come back to the conclusion that the current ASCII format, even if not extremely friendly, fulfils its mandate and changing it, while keeping the same quality of error handling, would require a non-negligible effort and maybe other external libraries, for low benefits.

- Layer for "automatic" configuration of the coupling exchanges in the models based on the namcouple, in ticket #2361

  The idea was to define, in the namcouple, a unique identifier for each coupling field. The identifier would have to be associated to a coupling field array in the model but, besides this, all coupling actions would be automatic. This was discussed but we do not plan to include this in the coupler environment.

Other functionalities

- Specific support for accelerators, e.g. GPUs
- Support of dynamic process and threads affinity, in ticket #2351
- Support OpenMP models, C4, in ticket #2361
- Interoperability with other couplers, C3, in ticket #2361 . Of course, interoperability with XIOS, which is currently effective, will keep on being ensured, especially during the transition phase.
- Develop standard components for standard workflow tasks, C2, in ticket #2361

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