IS-ENES – WP4

D 4.8 – web NEMO configurations database filled up by NEMO team and partners

Abstract:

For NEMO, user support also includes consulting on model configuration, physical options and key scientific choices that must be done when building an ESM. Therefore, a database of experiment results and key diagnostics, illustrating the different aspects and impacts of the main physical packages and helping the users to select the most appropriate ones for their ESM has been set-up and is accessible through the vERC, the IS-ENES portal. The database has been designed in a way that the NEMO team as well as partners can fill it during the projects duration, and later on.

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Executive Summary

NEMO (Nucleus for European Modelling of the Ocean) user support also includes the definition of key diagnostics, the setting-up of tools and a web database that will facilitate the documentation/illustration of the diversity of the simulations that can be achieved with NEMO, helping the users to understand the processes at stake in ocean modelling and to select the most appropriate configuration for their ESM. The definition of the experimental protocol and the implementation of extensive diagnostics were made in deliverable 4.5. The current report concerns deliverable 4.8 and constitutes the second part of this work: filling up the database by NEMO team and partners.
Results of this work are accessible through NEMO wiki (at https://forge.ipsl.jussieu.fr/nemo/wiki/NEMOConfigurationDataBase) and through the IS-ENES portal, at https://verc.enes.org/models/is-enes-support-services/copy_of_nemo

1. INTRODUCTION

The inter-comparisons on which a large part of the IPCC report from Working group 1 is based, explore differences between different coupled models. However the same model version can be used in numerous configurations (physical options, choice of parameterizations, horizontal and vertical grid description and resolution, definition of the initial state…) that can lead to very different results. It is therefore essential to make developers and users aware of the important difference existing between a model version (the source code) and a model configuration (how the code was used: options, grids…).

Following this idea, we proposed that for NEMO, user support also includes the definition of key diagnostics, the setting-up of tools and a web database that will facilitate the comparison between different configurations of the same NEMO component model. The final goal of this task is therefore to offer a web infrastructure able to document/illustrate the diversity of the simulations that can be achieved with NEMO, helping the users to understand the important processes at stake in ocean modelling and to select the most appropriate configuration for their ESM.

This report concerns deliverable 4.8 that constitutes the second part of this work, i.e. the web NEMO configurations database filled up by partners, while deliverable 4.5 was dedicated to the first part, i.e. the web NEMO configuration database as set-up by the NEMO team..

2. RESULTS

The diagnostics defined in D4.5 have been applied by the NEMO system team to validate NEMO v3.4.1 that was released early March 2013. It will also be used to validate the beta version of NEMO v3.5 due mid-March 2013.

As expected in this deliverable, these diagnostics have also been applied by partners (mainly the climate variability group at IPSL, Paris), in a study focussing on the impact of the sea-ice model on ocean at global scale. This work explored the impact of the radiative fluxes used in CORE bulks, the different ways to close the freshwater budget in forced configuration, the impact of different ice rheology parameters. Results given by LIM2 and LIM3 were compared.

For these experiments, the partner did the validation/comparison plots defined in D4.5. These plots are available as pdf documents in the NEMO configuration data base: http://forge.ipsl.jussieu.fr/nemo/wiki/NEMOConfigurationDataBase.

In more detail, the list of the tests available early March 2013 are:

- L2_500 and L3_500 use the default versions of the 2 sea-ice models (NEMO3.4)
- L3fwb3 similar to L3_500 but with different correction on fwb (global fwf set to zero and spread out over erp area)
- LEVIT_500y includes levitating sea-ice in lim3
- l3T_corr has corrected temp and salinity initialization files at high latitudes (using PHC3 and WHOA09), it includes the tuning on solar radiation and air-ice stress (as all runs following)
- l3T_ps differs from the previous one for the value of P* (=2.75 104 as CICE) and hiccrit (.3 for both hemispheres)
- l3bcorr includes modifications and debugging on salt fluxes and a correction on salinity in the Southern Ocean as in Griffies et al 2009.
- l3b_ps1 1 and 2 as l3bcorr + P* =2.75 104
- l2ps has all corrections on initialization files and same tuning as l3b_ps1

The following 3 runs are preliminary tests on radiative fluxes (modification in the CORE bulk ice parameters) compared with default version of lim3:

- LW3_t1se has a 10% reduction on downward long wave in both hemispheres. Here it is compared with default lim3 over 100y.
- redLW_14 has a 5% reduction on downward long wave only over the Northern hemisphere and air-ice stress = 1.4 103.
- LWArAn10 has a 5% reduction on downward long wave only over the Northern hemisphere and 40% reduction in the south.

3. CONCLUSION

This work illustrates the variety of results that can be obtained with the same model and the same configuration just by “playing” with some parameters of the sea-ice component (that has for example a key impact on the intensity of the global overturning circulation). This is a first example of the usefulness of this database. We hope that this first work will encourage other users to fill up the database in order to enlarge the variety of examples and therefore help the users to select the most appropriate physical packages for their ESM.