COST STSM Scientific report:

Petteri Uotila, FMI, Helsinki (FIN)

COST Action: ES1402

STSM Topic: Assessing a sea-ice model of an ocean model

Hosts: Simona Masina and Dorotea Iovino, CMCC, Bologna(IT)

Purpose of the STSM

During the STSM, we worked two weeks on a study that compares two versions of the NEMO-LIM ocean-ice model, LIM2 and LIM3. As the new major release, NEMO v3.6, includes a new sea-ice model (LIM3), extensive testing and assessments of realism with this new model configuration are very much needed by the NEMO users in general, and by the CMIP6 climate modellers who use NEMO, in particular. Our comparison aims to provide information about differences of the behaviour of varying NEMO configurations. Furthermore, we hope to advise on adjustments required to produce a realistic looking sea-ice distribution and upper ocean properties.

Description of the work carried out during the STSM

During the visit, we carried out additional NEMO3.6 ORCA1L75 model simulations with the DFS5.2 1958-2012 forcing and configurations that follow the recent SHACONEMO recommendation for the NEMO3.6 in the computational grid we use. We plotted and analysed results of these new simulations in connection with our earlier simulation results, particularly from the global sea-ice and ocean surface properties and convection, perspective. Furthermore, we agreed on the structure of the manuscript, which will result from our analysis, produced most figures for it and started writing the manuscript so that Introduction and Methods sections are now practically complete. After we realised that some additional simulations were needed to confirm our results, we decided to postpone the completion of the manuscript after the STSM and after we have analysed these additional simulations.

Description of the main results obtained

We found that, in terms of global sea ice, LIM2 has more sea ice than observed, while LIM3 is more realistic. Notably, both LIM2 and LIM3 have a too fresh Arctic with a weak thermocline, and a relatively weak AMOC which could be linked to a relatively high sea-ice transport from the Arctic to the East Greenland Current. Further investigation is required to find out the cause of the excessive oceanic convection that occurred in an earlier simulation in contrast to the recent ones. This will take a few days and after that all the material to finalise the manuscript is available.

These results will be presented to the NEMO modellers at the DRAKKAR workshop in Grenoble in January 2016. Meanwhile, we will complete the related manuscript, and after DRAKKAR, by early February, submit it to the Geoscientific Model Development journal.