Project: **1254**

Project title: **Global climate modelling on eddy-resolving scales with AWI-CM3**

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Report period: **2022-11-01 to 2023-10-31**

During the reported period the following simulations and tasks were performed.

1. We realized that it will be impossible to make AWICM3 simulations with its proposed setup (1km FESOM2 and TCO799 OpenIFS) with very restricted computational recources. Therefore, as the first stage, the coarser 2km FESOM2 setup (XR) coupled to TCO639 (ca. 15km resolution) OpenIFS was chosen (Fig.1). Having 13 million surface nodes (instead of 33 million in ER setup) but being still the most highest resolved setup doing long term climate simulations, it allowed us to reduce computational resources for ca. 4 times.

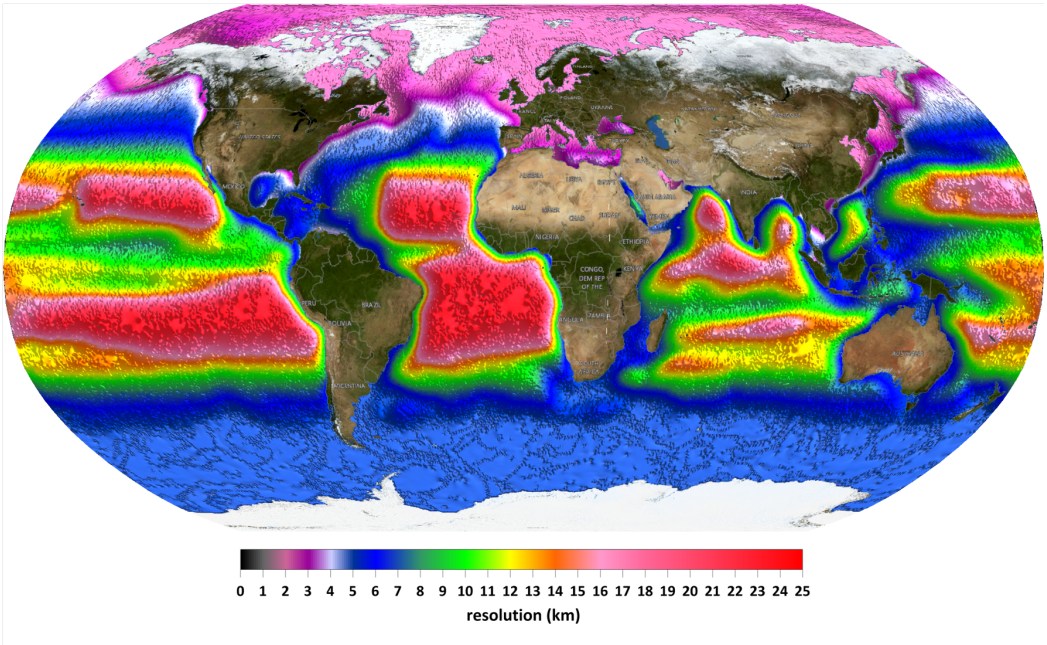

***Figure 1**. FESOM2-XR resolution*

2. FESOM2-XR stand-alone 60-year spin-up was performed

3. Short 30-year spin-up AWI-CM3-XR was carried out to adjust FESOM2-XR to the coupled mode with OpenIFS TCO639L139.

4. Historical CMIP6 simulations according to CMIP6 HighResMIP protocol were performed for the period 1950-2014

5. Everything is prepared for ssp585 CMIP6 scenario simulation which should be performed in the next year.

6. 1km FESOM2 setup (ER) was modified in the way to increase its stability and further performance. Keeping the same resolution, we were able to increase time step by the factor of 2 and reach the model performance of 1 SYPD on 150 nodes. Note, that setup is scalable for up to 600 nodes coming to the performance 4 SYPD.

7. 1km FESOM2 modified setup is currently running in stand-alone mode and in case of sufficient computational resources can be continued as coupled with OpenIFS TCO639 in the beginning of the next year.