



The AWI Climate Model: response to increased resolution in dynamically active regions

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State-of-the-art climate models do still exhibit pronounced deviations from the measured climate. Those deviations are often common between those models. The challenging problems in the Northern hemisphere include warming and salinization of the deep ocean being most pronounced in the northern North Atlantic, reduced deep water formation in the Labrador Sea which is sometimes accomplished by the sporadic ice coverage of the whole Labrador Sea, and an extensive ice presence in the Barents Sea. All these biases are often attributed in literature to the lack of oceanic resolution.

The multi-resolution approach used in the ocean component of the AWI climate model (ECHAM6-FESOM) allows to use enhanced horizontal resolution in dynamical active regions while keeping a coarse-resolution setup everywhere else. In this study we develop strategies for improving the climate model biases by means of increasing resolution in the ocean. The current computations have been performed on multi-centennial time scales using refinement in the different parts of the global ocean. Benefits from the local refinement have been analyzed. It is found that already with moderate refinement of the unstructured ocean grid, AWI-CM performs as well as some of the most sophisticated climate models participating in CMIP5.