The project's name APPLICATE stands for '**A**dvanced **P**rediction in **P**olar regions and beyond: Modelling, observing system design and **LI**nkages associated with Arti**C** Clim**ATE** change'. The impact of Artic climate change on the weather and climate of the Northern Hemisphere through atmospheric and oceanic linkages will be investigated through multi-model numerical experiments using coupled and uncoupled ocean and atmosphere models in this EU project with multi-national participation. The project goal is to enhance the predictive capability of existing weather and climate models by focusing on aspects that are known to play a vital role in weather and climate prediction. One of these aspects is the horizontal resolution of fully coupled climate models (Haarsma et al. 2016; Hewitt et al. 2017). AWI will determine the effect of higher Arctic grid resolution in the ocean component of a fully coupled climate model, the AWI-CM. In the current version of the AWI-CM 1.0 the ocean is simulated with FESOM v.1.4 (Danilov et al. 2004; Wang et al. 2008; Wang et al. 2014), the atmosphere with ECHAM6.3 (Stevens et al. 2013) and both components are coupled via the parallel OASIS3-MCT coupler. The set-up of the coupled system and its performance has been described by Sidorenko et al. (2015) and Rackow et al. (2016). FESOM, the ocean-sea ice component runs on an unstructured grid. The advantage of using an unstructured grid is that the resolution in an area of interest can be increased while the rest can stay coarser which overall saves computing time.

The experiment goal is to improve the representation of the long-term ocean and sea ice dynamics in the Arctic by employing a resolution which was previously not affordable for climate simulations, and to assess the linkage between the improved Arctic Ocean representation and the large-scale climate change. The planned experiment is to compare climate simulations following the CMIP6 ($6^{th}$ Coupled Model Intercomparison Project) HighResMIP (High Resolution Model Intercomparison Project) protocol (Haarsma et al. 2016) under historic forcing (1950) and under the RCP8.5 scenario on a low resolution grid ('CORE' grid) and a high resolution grid ('fArc' grid). The grid sizes of the low-resolution mesh vary from nominal one degree in the interior of the ocean to 1/3 degree in the equatorial belt and 24 km north of 50°N (127,000 surface nodes; see Figure 1, left panel). For the high-resolution grid the resolution in the Arctic Ocean is refined to 4.5 km (~640,000 surface nodes; see Figure 1, right panel). The resolution in the atmospheric component ECHAM6 is at T127/L95 in both cases. The results of these simulations will be contributions to the APPLICATE work packages 2 and 5.

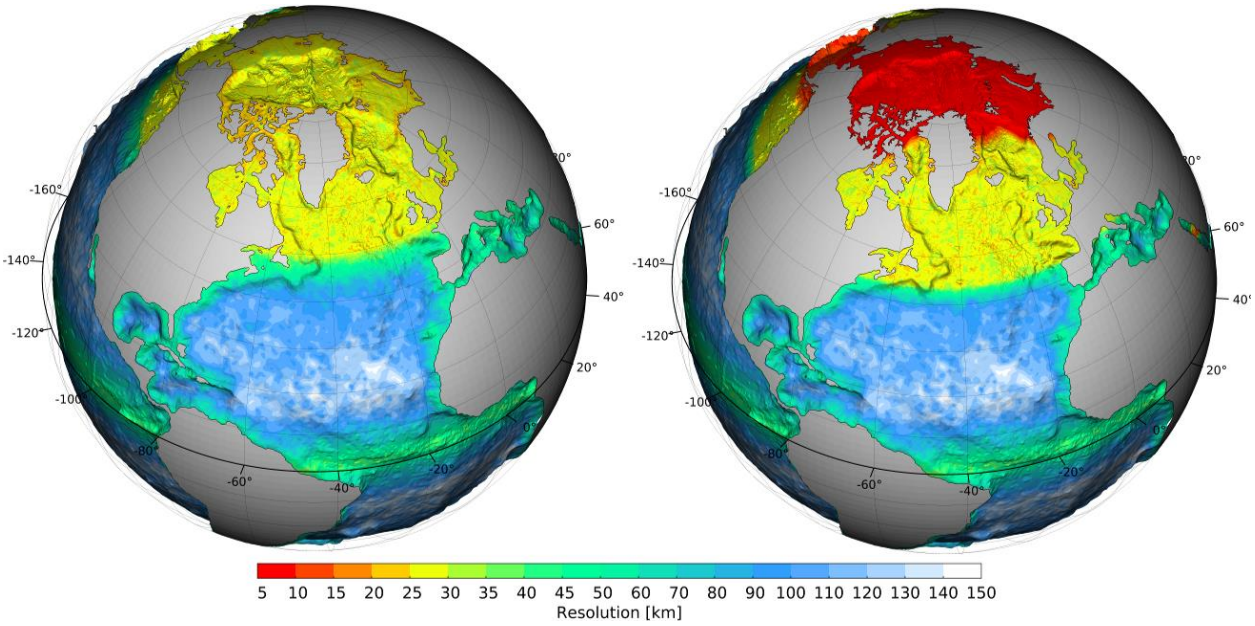


*Figure 1: Mesh resolutions in km used in the ocean and sea ice component of the model*

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