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Properties of mesoscale eddies in the Arctic Icean from a very high-resolution model

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Mesoscale eddies are believed to play a substantial role for the dynamics of the Arctic Ocean, influencing the interaction of the ocean with the atmosphere and sea-ice as well as the transport and mixing of water masses. Especially their effects on the thermohaline structure and stratification could be crucial for better understanding future changes in the Arctic and the ongoing 'atlantification' of the Arctic Ocean water masses. Better understanding of Arctic eddy dynamics also allows the improvement of parametrization of eddy processes in models, which is critical for a realistic representation of the Arctic in climate models and understanding the role of the Arctic Ocean in the global climate. However, simulating Arctic Ocean mesoscale eddies in ocean circulation models presents a great challenge due to their small size at high latitudes and adequately resolving mesoscale processes in the Arctic requires very high resolution, making simulations very computationally expensive.
Here, we use the new unstructured□mesh Finite volumE Sea ice-Ocean Model (FESOM2) with 1-km horizontal resolution in the Arctic Ocean to evaluate properties of mesoscale eddies. This very high-resolution model setup can be considered eddy resolving in the Arctic Ocean and has recently been used to investigate the distribution of eddy kinetic energy in the Arctic. The analysis here is based on automatically identifying and tracking eddies using a vector geometry-based algorithm and focuses on the model's representation of eddy properties and dynamics. In-situ observations from the year-long MOSAiC expedition give us the unique possibility to assess the model's representation of eddy properties against direct observations, both in the Arctic summer and winter seasons.