



Eddy resolving simulations with global finite element OGCM FESOM

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The AWI Finite Element Ocean Model (FESOM) uses unstructured triangular meshes of variable resolution. The mesh resolution can be selected so as to efficiently improve model results with the least possible computational cost.

Our strategy for model horizontal resolution refinement is as follows. First, we adjust the model resolution to the half of the first internal Rossby radius but not lower than 4 km. Second, we add further refinements in the regions where Rossby radius is relatively large but the satellite-observed sea surface height variability (AVISO) is high. The ocean setup with the mesh refined in such a way is eddy resolving everywhere where the Rossby radius is larger than 8 km and eddy permitting in the regions where it varies from 4 to 8 km.

The resulting computational mesh has about 5 million (M) surface vertices and about 800 M 3D elements. Simulations were carried out for the period of 1948-2009 and compared with the results obtained from the coarser resolution setup, which did not take into account the Rossby radius and had the mesh resolution adjusted to the sea surface high variance only. Significant improvement occurs mainly in the high latitudes, i.e. in the regions of North Atlantic current and ACC.