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FESOM under Coordinated Ocean-ice Reference Experiment forcing

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The characteristics of the 500 years ocean simulation with the Finite-Element Sea-Ice Ocean Model (FESOM) under the normalized year forcing of Coordinated Ocean-ice Reference Experiments (COREs, Griffies et al., Ocean Model., 26, 1–46, 2009) are compared to those of other models participating in COREs. FESOM is set apart from these models, because it uses an unstructured mesh (with resolution varying between 20 and 150 km). Its strength lies in the ability to provide local grid refinement without nesting. This is the first global sea-ice ocean simulation produced on a fully unstructured mesh.

It is shown that the ocean state simulated by FESOM is in most cases within the spread of other models, demonstrating that the unstructured-mesh technology has reached a stage where it becomes a reliable tool for studying the large-scale ocean general circulation.

The unstructured character of a grid, however, requires new implementation techniques for the numerical core and parametrizations. As an example, non-uniformity of computational stencils makes the implementation of the GM and Redi schemes be not as straightforward as in structured grid models.