



Assimilation of Earth rotation parameters into a global ocean model (FESOM)

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Earth Rotation Parameters (ERP) are used to improve estimates of the ocean circulation and mass budget. GRACE data can be used for verification or for further improvements.

The Finite Element Sea-ice Ocean Model (FESOM) is used to simulate weekly ocean circulation and mass variations. The FESOM model is a hydrostatic ocean circulation model with a fully non-linear free surface. It solves the hydrostatic primitive equations with volume (Boussinesq approximation) and mass (Greatbatch correction) conservation. Fresh water exchange with the atmosphere and land is modelled as mass flux. This flux is the weakest part of the mass budget as it is the difference of large and uncertain quantities: evaporation, precipitation and river runoff. All uncertainties included in these parameters are directly reflected in the model results. ERP help in closing the budget in a realistic manner.

Our strategy is designed for testing parametric estimation on a weekly basis. First, Oceanographic Earth rotation parameters (OERP) are calculated by subtracting atmospheric and hydrologic estimates from observed ERP. They are compared to OERP derived from a global ocean circulation model. The difference can be inverted to diagnose a correction of the oceanic mass budget. Additionally mass variations measured by GRACE are used for verification. In a second step, the global mass correction parameter, derived by the inversion, is used to improve the fresh water budget of FESOM.