Summary of Ocean0-2_TYP_MOM6 Results

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October 3, 2016

1 Model Details

- Model and version: Modular Ocean Model v. 6 (MOM6).
- Repository: https://github.com/gustavo-marques/MOM6/releases/tag/ISOMIP.v1.0
- Model configuration and input files:
  - https://github.com/gustavo-marques/ISOMIP/tree/master/setup/Ocean0/TYP
  - https://github.com/gustavo-marques/ISOMIP/tree/master/setup/Ocean1/TYP
  - https://github.com/gustavo-marques/ISOMIP/tree/master/setup/Ocean2/TYP
- Vertical coordinate: layered isopycnal (density) coordinate with a bulk mixed layer scheme.
- Horizontal mixing: harmonic (del2); along-isopycnal for diffusivities and along-layer for viscosity.
- Vertical mixing: del2 with COM constant viscosity and diffusivity set as background values. Additional vertical mixing is also applied based on the parameterization developed by Jackson et al. (2008), more details below. Within the mixed layer, vertical mixing is also controlled by the bulk mixed layer scheme described in Hallberg (2003).
- Advection schemes: momentum - second-order centered; tracers - piecewise linear method.
- Equation of state: linear with ISOMIP+ coefficients.
- Convection parameterization: based on the parameterization developed by Jackson et al. (2008) using a critical Richardson number of $Ri_c = 0.25$.
- Bulk mixed layer: minimum thickness of 2 m and the minimum vertical viscosity of 10^{-2} m^2/s.
- Melt parameterization: T_w, S_w and u_w were averaged within the mixed layer thickness computed by the bulk mixed layer scheme. u_w was averaged the to the tracer grid using four horizontal neighbors. Melting was set to zero in regions where the ice depth was less than 90 m and when the total water column thickness was less than 10 m.
- Modifications to Topography: Interpolated to 2-km grid using a spline method[1] then smoothed the ice thickness using a Gaussian filter[2] with half-width of 1 and 5 km for the

[1] http://docs.scipy.org/doc/scipy/reference/generated/scipy.interpolate.interp2d.html#scipy.interpolate.interp2d
[2] http://docs.scipy.org/doc/scipy-0.16.1/reference/generated/scipy.ndimage.filters.gaussian_filter.html

y and x direction, respectively. An offline calving criterion was used where ice thinner than 100 m was removed. To minimize pressure gradient errors due to a step-like ice cliff, this criterion was not applied near the ice front, which remained smooth. A minimum thickness of $\sim$ 40 m was maintained by decreasing the ice thickness near the grounding line.

- Maintaining sea level: mass fluxes were used and no corrections were applied to maintain the sea level unchanged.
- TYP parameters: horizontal resolution of 2 km and 72 vertical layers. Following Holland and Jenkins (1999), Γ_T and Γ_S were computed based on the stability of the boundary layer. The model included frazil ice formation, where seawater was frozen if the temperature was below the freezing point.
- TYP problem: we would typically apply this configuration in idealized (e.g.,Goldberg et al. (2012a,b)) and realistic (e.g., regional and global configurations) studies.

Bibliography

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