1 Directory Organization

As of January 2014, there are two main directories which refer to the two different grids used in our study :

- `GS-60NC` : These runs use the same 60-layer vertical grid employed by our colleagues at the National Center for Atmospheric Research.
- `GS-68C` : These runs uses a 68-layer vertical grid which is refined near the surface to resolve the mixed layer and at depths in which the Gulf Stream interacts with the continental shelf (between 600 meters and 2000 meters).

Underneath each of these directories, the following naming convention holds

`RRBB-nu###`

where `RR` refers to the resolution used in the model, `BB` refers to the lateral momentum boundary condition used, and `###` refers to the value of the lateral viscosity, since these parameters were the main parameters modified between runs.

Available Simulations

- `12NS-nu200/` : $\frac{1}{12}^o$, no-slip lateral boundary condition, with lateral momentum viscosity at $A_h = 200\frac{m^2}{s}$. This run contains 10 years of model output data following a 2 year spin-up (spin-up data not provided yet). Time averaged Barotropic Vorticity Budget Diagnostics have been run and plots are available.
- `12NS-nu20/` : $\frac{1}{12}^o$, no-slip lateral boundary condition, with lateral momentum viscosity at $A_h = 20\frac{m^2}{s}$. This run contains 10 years of model output data following a 2 year spin-up (spin-up data not provided yet). Time averaged Barotropic Vorticity Budget Diagnostics have been run and plots are available.
- `12FS-nu20/` : $\frac{1}{12}^o$, free-slip lateral boundary condition, with lateral momentum viscosity at $A_h = 20\frac{m^2}{s}$. This run contains 10 years of model output data following a 2 year spin-up (spin-up data not provided yet). Time averaged Barotropic Vorticity Budget Diagnostics have been run and plots are available.
- `36FS-nu20/` : $\frac{1}{36}^o$, free-slip lateral boundary condition, with lateral momentum viscosity at $A_h = 20\frac{m^2}{s}$. This run contains 6 years of model output data following a 2 year spin-up (spin-up data not provided yet). Time averaged Barotropic Vorticity Budget Diagnostics have been run and plots are available.
- `36NS-nu20/` : $\frac{1}{36}^o$, no-slip lateral boundary condition, with lateral momentum viscosity at $A_h = 20\frac{m^2}{s}$. Soon to arrive.....

Other than the model output data, a single directory is devoted to publicly available post-processing code (`PostProcess/`). Under this directory are the following directories

- `Fort` : Contains the Fortran code that was used in computing the terms in the Barotropic Vorticity Budget (See Section 2.1 for more details about the code).
- `Plotting` : Contains the MATLAB scripts for plotting the output from the Fortran Post-processing Code (See Section 2.1.2)

1.1 Model Output Organization

Under model run directory, all of the MITgcm standard output and any model diagnostic (supplied from the MITgcm DIAGNOSTICS package) is organized into its own sub-directory. Below is a list of the sub-directories you may find under any of our model runs with a description of what is contained within each.

Model Setup

- `input/` : contains all of runtime files necessary for running the MITgcm, as well as the boundary condition data, cheapaml relaxation and forcing fields, initial conditions, and bathymetry. All of the output is given in the MITgcm meta-data format.

Standard Output

- `Grid/` : contains all of the MITgcm grid information
- `U/` : zonal velocity fields
- `V/` : meridional velocity fields
- `W/` : vertical velocity fields
- `Eta/` : free surface height fields
- `T/` : temperature fields
- `S/` : salinity fields
- `PH/` : hydrostatic pressure
- `PHL/` : hydrostatic pressure at the bottom

Diagnostics

- `AdvFluxes/` : Advective Fluxes of Momentum
- `AdvTend/` : Tendencies of momentum from divergence of advective momentum fluxes
- `Cheapaml/` : Atmospheric Diagnostics as reported from MITgcm, includes heat flux and components, wind stress, and moisture fluxes.
- `Coriolis/` : Tendencies of momentum from Coriolis acceleration
- `Density/` : Density as it is calculated in the MITgcm; mainly for comparison with some post-processing scripts
- `Drag/` : Tendencies of momentum from quadratic bottom drag
- `ViscFluxes/` : Viscous Fluxes of Momentum
- `ViscTend/` : Tendencies of momentum from divergence of viscous momentum fluxes

Post-Processed Data

- `PostDiags/` : Contains post processed data from compiling and running the Fortran post-processing codes `MODEPROJ.f90` and `DOMEAN.f90`. The output here is written in big-endian byte ordering, single precision. The dimension ordering from fastest to slowest varying is ***nX - nY - nT***. In other words the k-th entry (group of 4 bytes for single precision) is related to the dimensions via

$$k = (iX + nX * (iY - 1)) + nX * nY * (iT - 1)$$

  Using MATLAB, one can simply use the reshape command with the appropriate ***nX - nY - nT***, e.g., see the script `MODE_DIAGS_mean.m`

2 Post Processing Code

2.1 Fortran Code

2.1.1 Barotropic Vorticity Budgets

2.1.2 MATLAB Code