

UPDATE ON OCEAN MODEL WORKING GROUP ACTIVITIES

OMWG Meeting: December 10-11, 2009, Boulder

POP2 DOCUMENTATIONS FOR THE CCSM4 APRIL 1st RELEASE

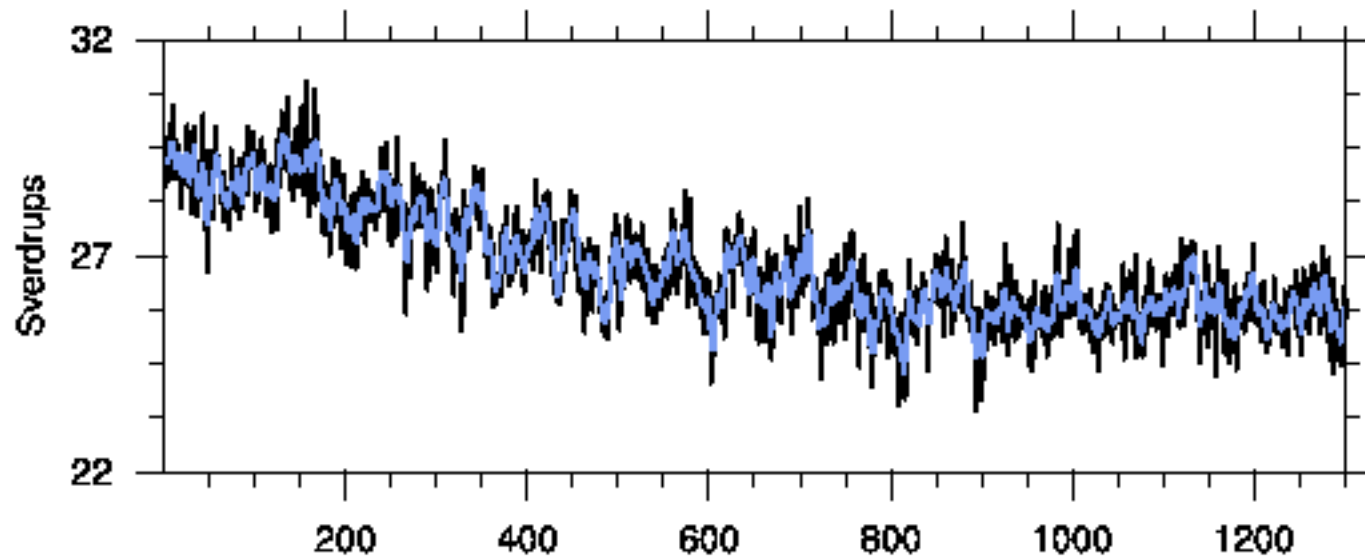
- 1) The Parallel Ocean Program (POP) Reference Manual, Ocean Component of the Community Climate System Model. Los Alamos Tech. Report with 20 authors.
- 2) Parallel Ocean Program version 2 (POP2) User Guide. A web-based document.

CURRENT FOCUS AREAS

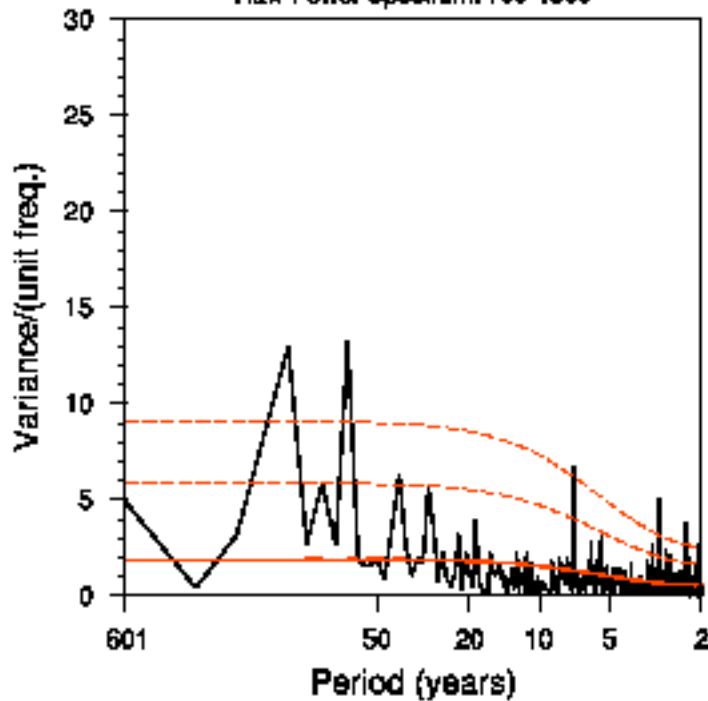
- 1) Analyses of the ongoing CCSM4 simulations.
- 2) Decadal climate variability, prediction, and ocean data assimilation (using the Data Assimilation Research Testbed, DART).
- 3) Low Resolution CCSM4: Nominal 3° ocean with 60 vertical levels coupled to a T31 track1 atmosphere. The ocean model physics is the same as in the nominal 1° resolution version.
- 4) High Resolution CCSM4: The ocean model resolution is 0.1° with 60 vertical levels. The atmospheric model will likely have the HOMME dynamical core. Its resolution???????

See Julio Bacmeister's talk at the OMWG December Meeting: "Benefits from increased horizontal resolution may be limited without significant modifications to convection parameterization schemes."

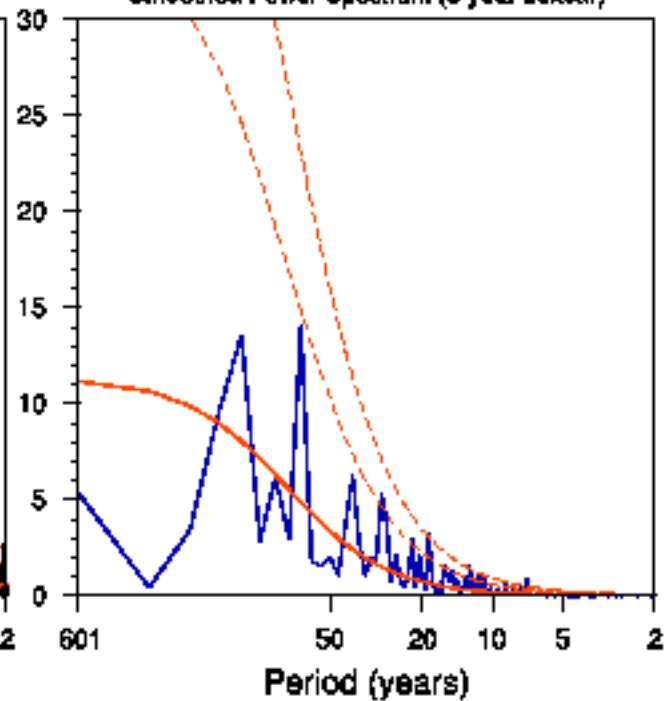
ATLANTIC MERIDIONAL OVERTURNING CIRCULATION MAXIMUM (1850)



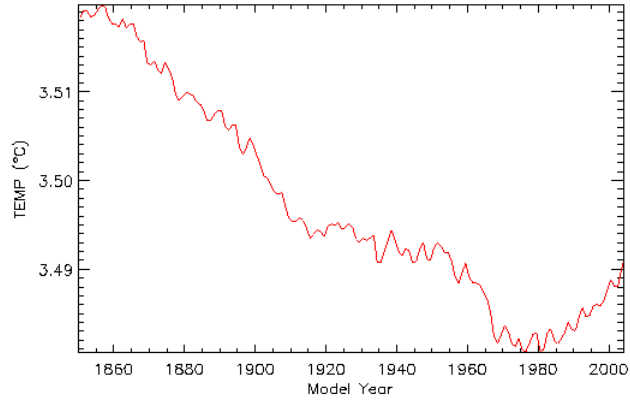
Raw Power Spectrum: 700-1300



Smoothed Power Spectrum (5-year boxcar)

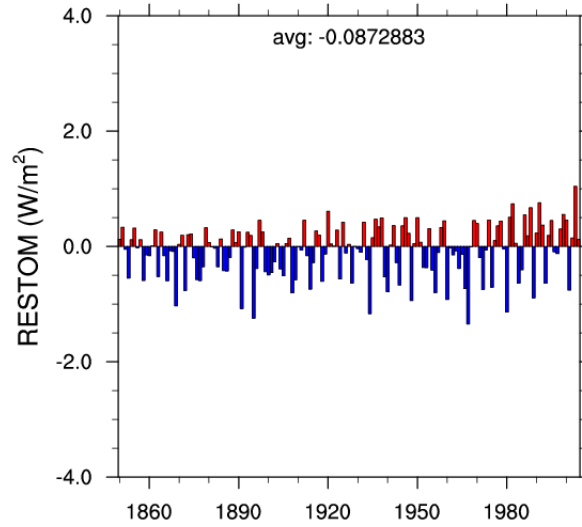


GLOBAL-MEAN OCEAN TEMPERATURE

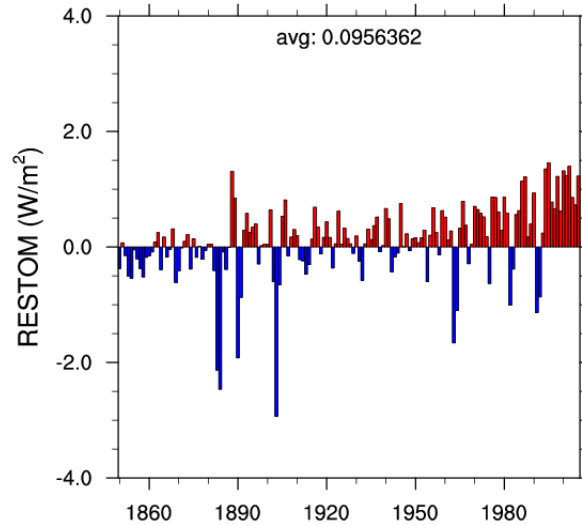


TRACK 5

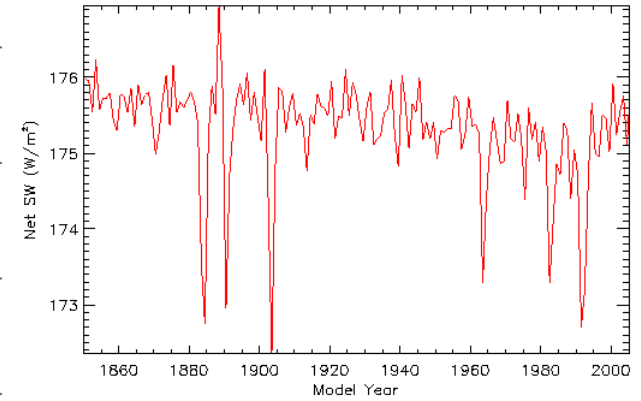
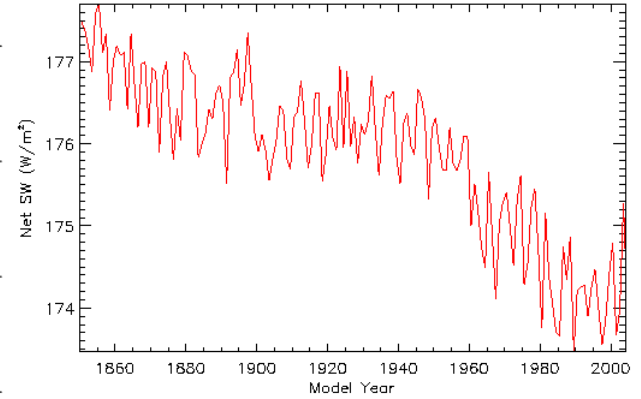
b40_20th_b36c2_58f



b40.20th.track1.1deg.007



NET SHORT-WAVE AT OCEAN SURF.



TRACK 1

ONGOING and PLANNED DEVELOPMENTS

Physics Developments:

- New Climate Process Teams,
- Wave modeling and Langmuir mixing parameterization,
- Anisotropic mesoscale eddy diffusivities,
- Surface freshwater fluxes and associated issues,
- Nested modeling,

Numerical Developments:

- Elimination of the linearization assumption in the surface height equation,
- Two-time level time stepping,
- New advection schemes,
- Revisit partial bottom cells.

WHICH CODE BASE DO WE USE?

HyPOP is dead!

LANL is developing a new dynamical core with local mesh refinement:

- Ringler, Gunzburger, Skamarock, Duda, Thuburn, Klemp, and Ju,
- The method is a C-grid staggering that conserves total energy and potential vorticity,
- The method is applicable to a very wide class of meshes, including variable resolution meshes.

BENEFITS:

- The code can be backwards compatible with POP in terms of meshes, boundary conditions, ...
- The ability to conduct regional eddy-resolving simulations within a global model.
- Local mesh refinement.
- Some of the desired numerical developments are already included.

DISADVANTAGES:

- New code and framework,
- Compatibility with the CCSM framework.

PLAN:

- LANL is to aim for a "realistic" global simulation and its code base by the summer 2010 CCSM Workshop.
- OMWG may consider other code base options.

ATLANTIC MERIDIONAL OVERTURNING CIRCULATION (AMOC)

