

WHAT IS NEW IN THE CCSM4 OCEAN COMPONENT?

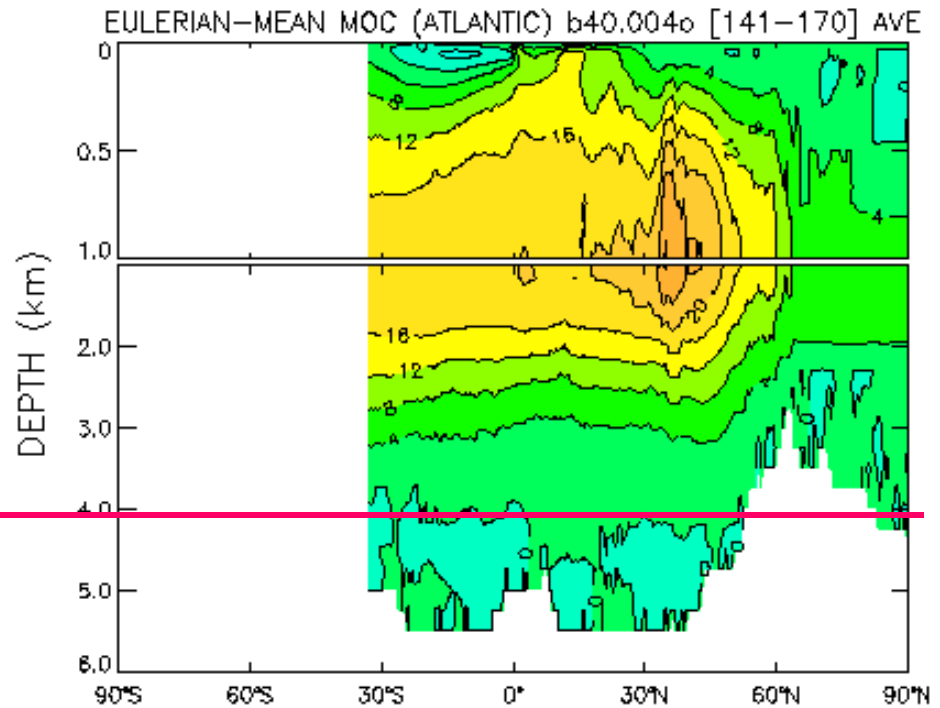
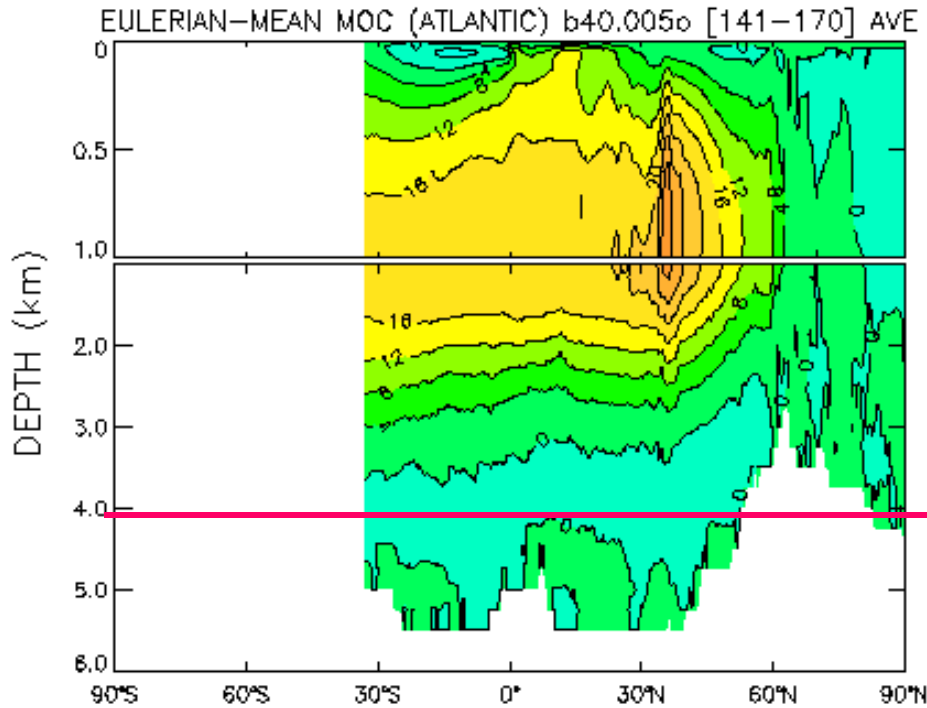
(since CCSM3)

- POP2 base code, including many infrastructure changes,
- Increased vertical resolution (60-levels) and changes in bottom topography,
- Modified anisotropic horizontal viscosity scheme,
- Tidally driven mixing scheme,
- Horizontally-varying internal wave breaking, i.e., background, vertical diffusivity / viscosity,
- Near-surface eddy flux parameterization, (CPT)
- Vertically-varying isopycnal and thickness diffusivities, (CPT)
- Sub-Mesoscale parameterization, (CPT)
- **Overflow parameterization.** (CPT)

ATLANTIC MERIDIONAL OVERTURNING CIRCULATION (Sv)

CONTROL

WITH OVERFLOWS



Denmark Strait and Faroe Bank Channel overflows are parameterized.

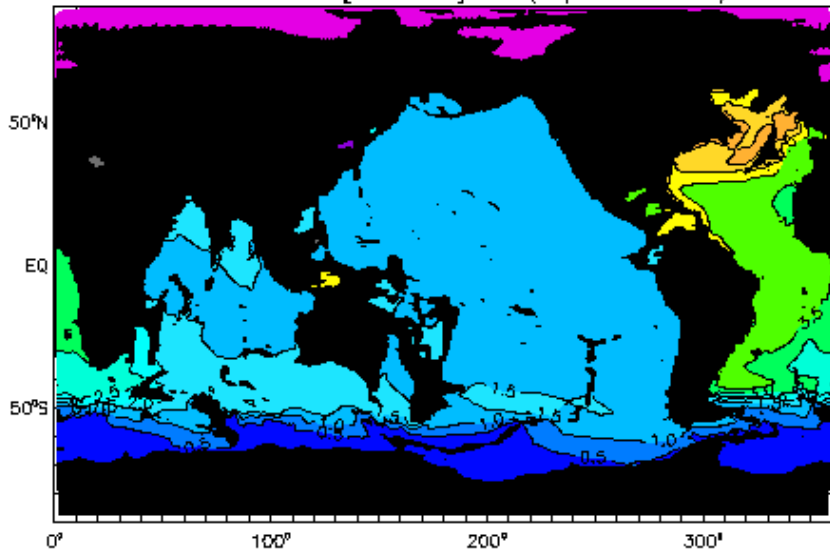
The plots represent 30-year means from two fully-coupled CCSM4- integrations.

POTENTIAL TEMPERATURE AT 3000 m DEPTH (°C)

CONTROL

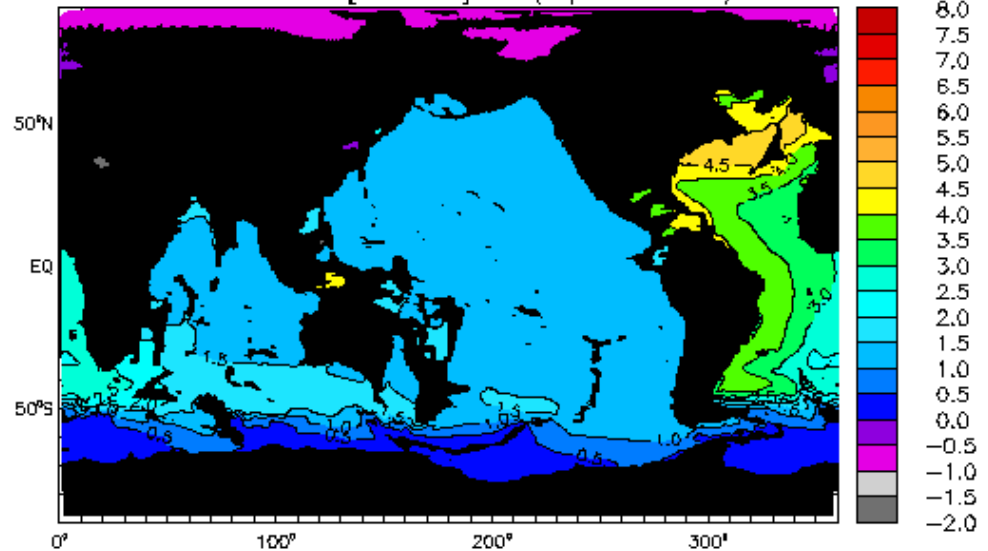
WITH OVERFLOWS

TEMP b40.005o [141-170] AVE (depth = 3000m) mean



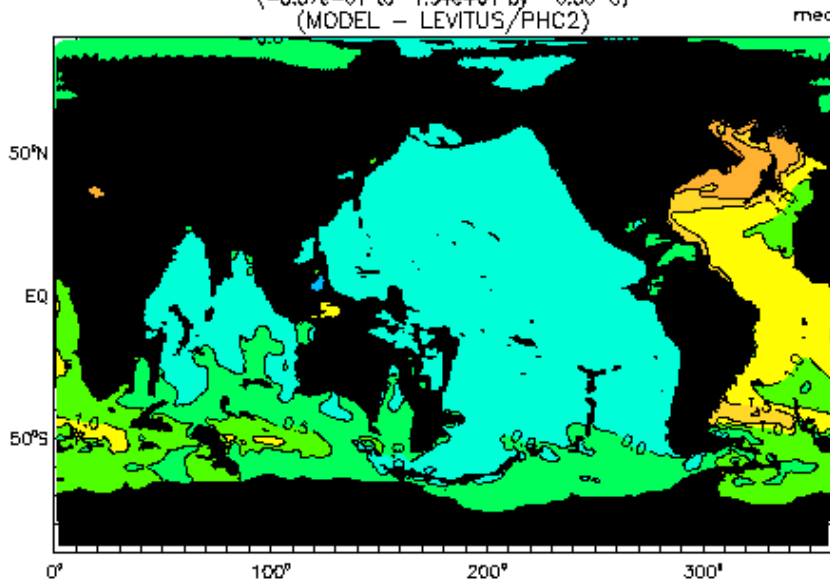
$\langle -8.57e-01 \text{ to } 1.54e+01 \text{ by } 0.50 \text{ } ^\circ\text{C} \rangle$
(MODEL - LEVITUS/PHC2)

TEMP b40.004o [141-170] AVE (depth = 3000m) mean = 1.73

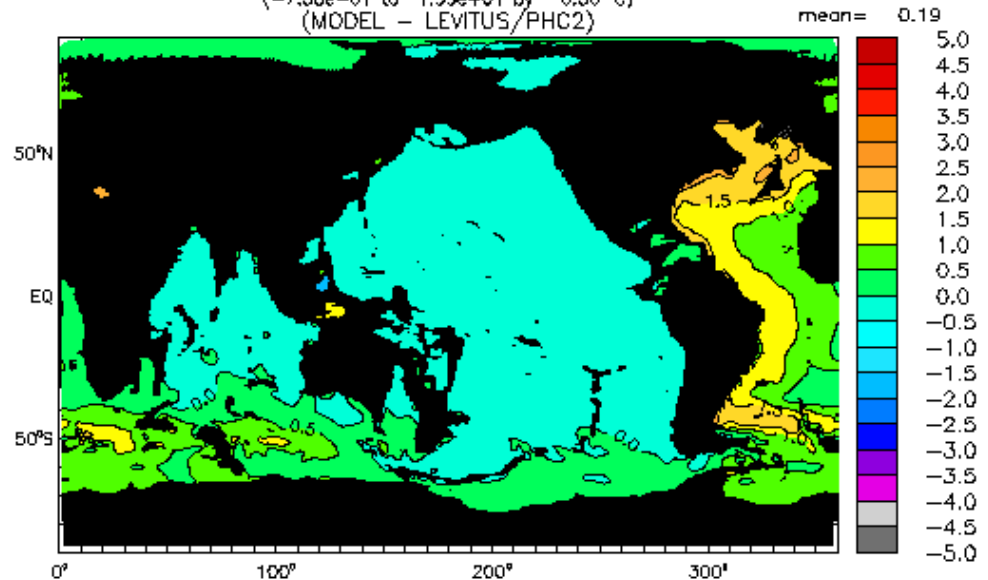


$\langle -7.38e-01 \text{ to } 1.55e+01 \text{ by } 0.50 \text{ } ^\circ\text{C} \rangle$
(MODEL - LEVITUS/PHC2)

mean = 0.19



$\langle -2.05e+00 \text{ to } 1.04e+02 \text{ by } 0.50 \text{ } ^\circ\text{C} \rangle$

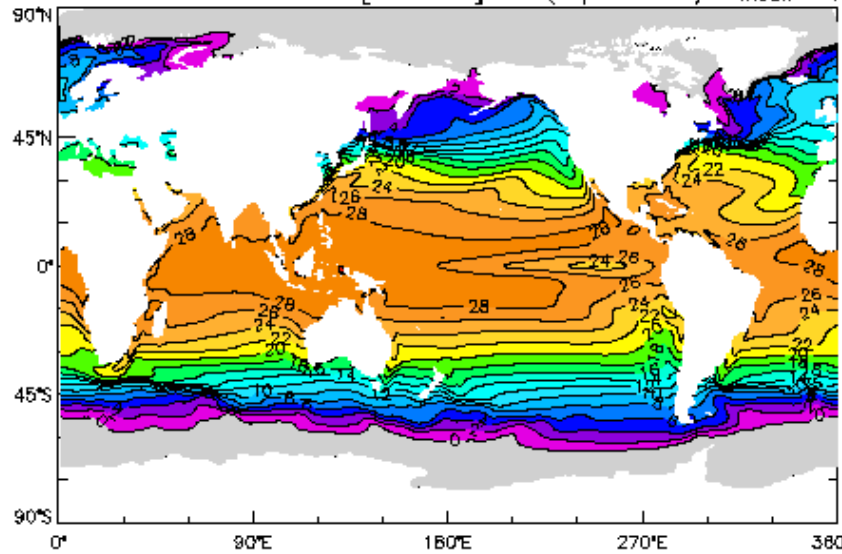


$\langle -2.05e+00 \text{ to } 1.03e+02 \text{ by } 0.50 \text{ } ^\circ\text{C} \rangle$

SEA SURFACE TEMPERATURE (°C)

CCSM3

TEMP b30.009 [571-600] AVE (depth = 0m) mean= 18.78

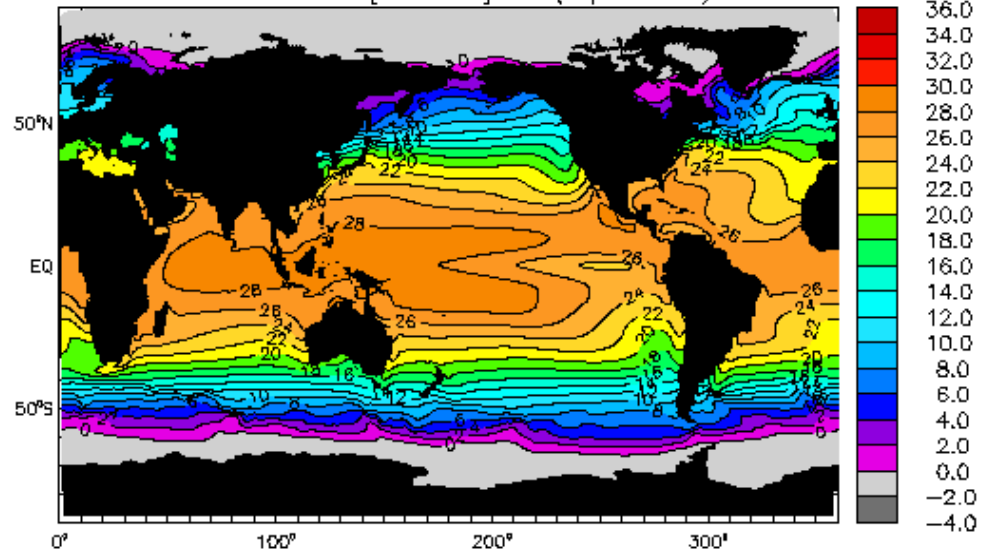


$\langle -1.97e+00 \text{ to } 3.05e+01 \text{ by } 2.00 \text{ }^\circ\text{C} \rangle$
(MODEL - LEVITUS/PHC2)

mean= 18.78

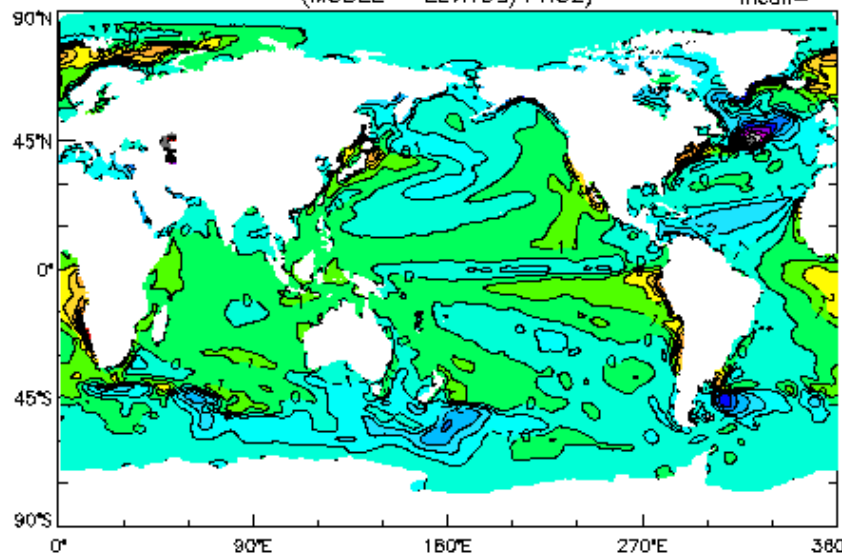
CCSM4-

TEMP b40.004o [141-170] AVE (depth = 0m) mean= 18.78



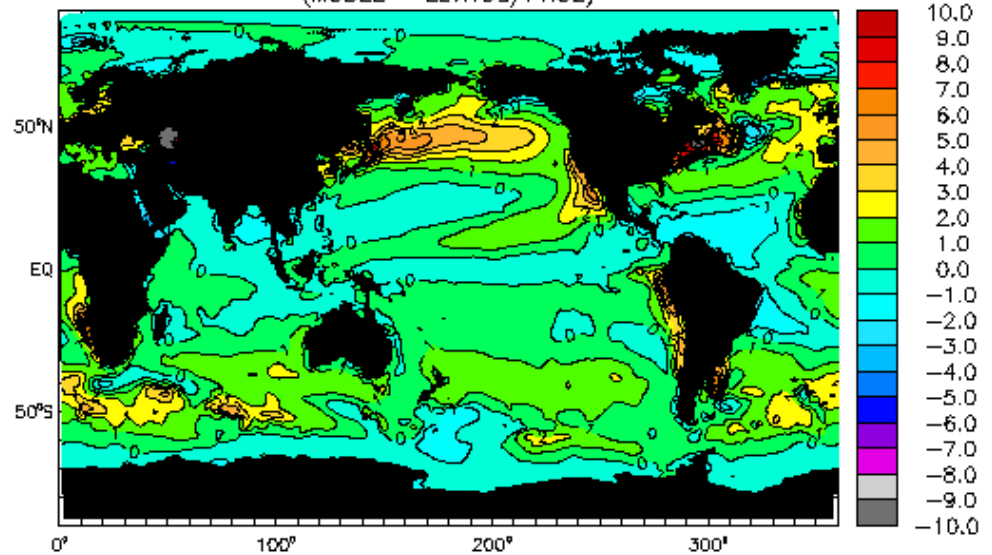
$\langle -1.81e+00 \text{ to } 2.98e+01 \text{ by } 2.00 \text{ }^\circ\text{C} \rangle$
(MODEL - LEVITUS/PHC2)

mean= 18.78



$\langle -1.02e+01 \text{ to } 8.76e+00 \text{ by } 1.00 \text{ }^\circ\text{C} \rangle$

mean= 0.62

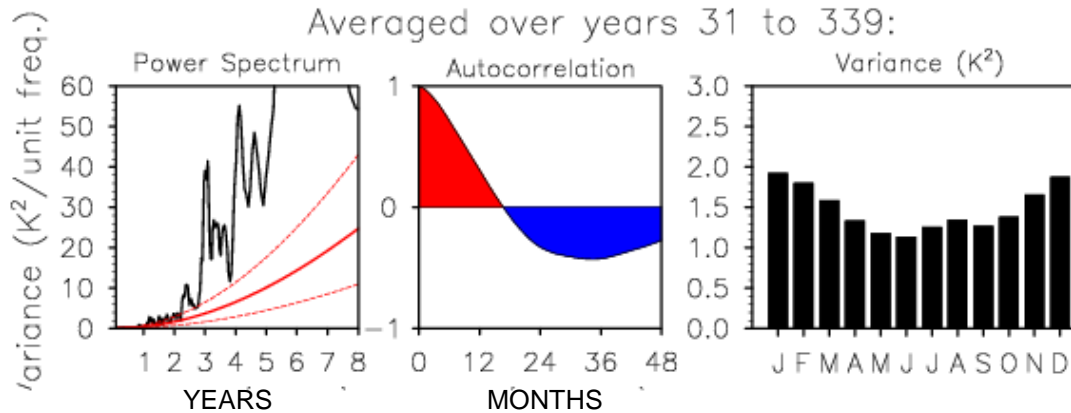
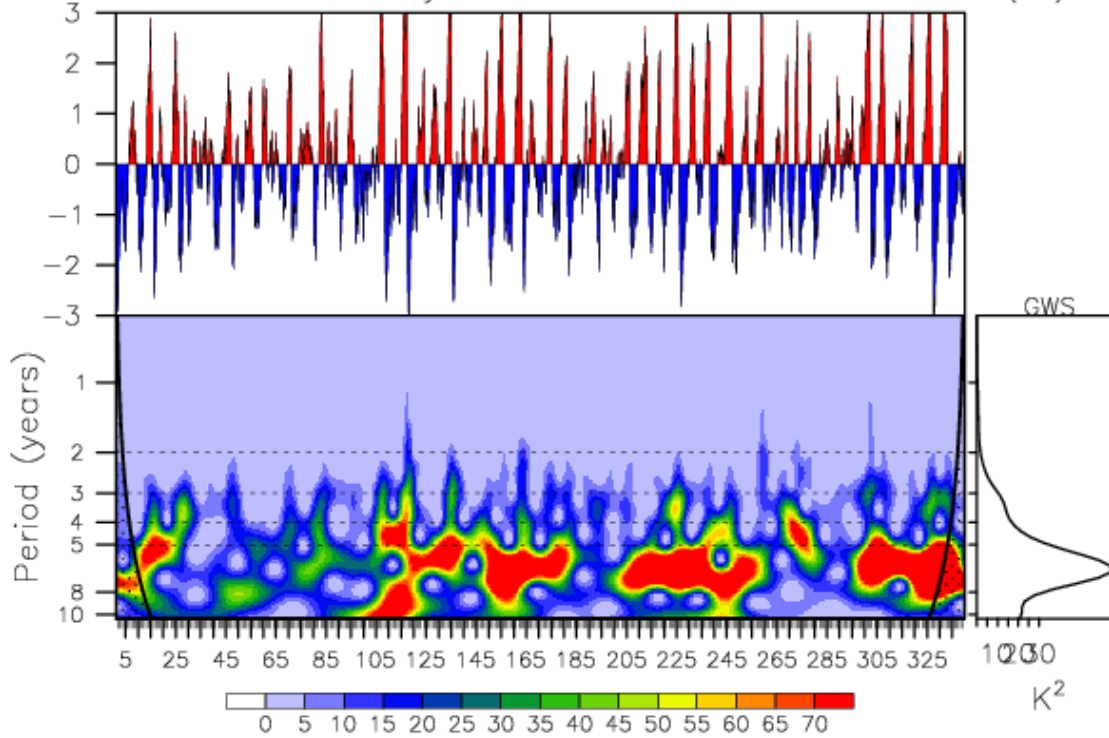


$\langle -4.49e+00 \text{ to } 1.19e+01 \text{ by } 1.00 \text{ }^\circ\text{C} \rangle$

mean= 0.62

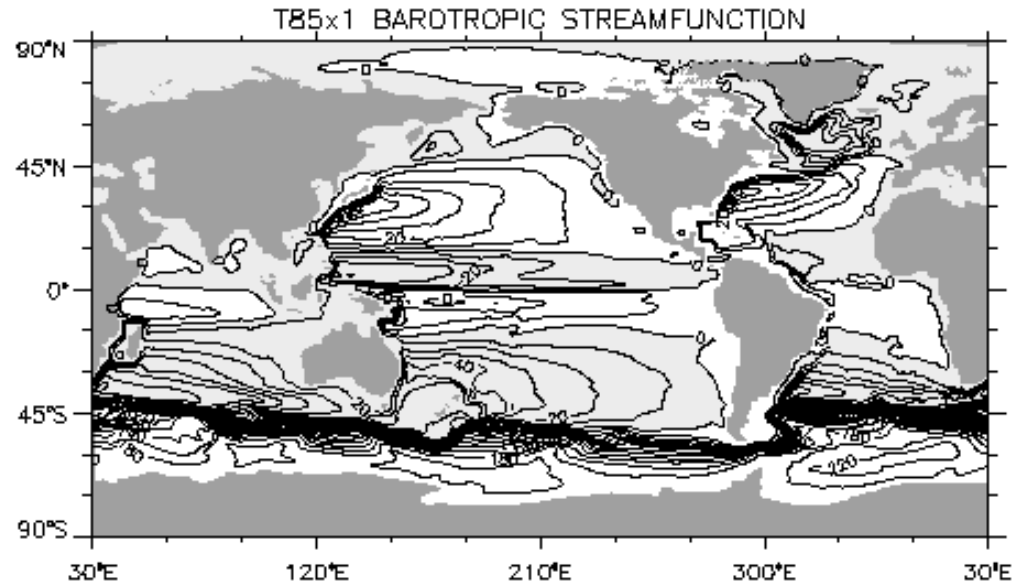
NINO 3.4 SST CHARACTERISTICS

b40.004o nino3.4 Monthly SSI Anomalies + Wavelet Power (K^2)



VERTICALLY-INTEGRATED (BAROTROPIC) STREAMFUNCTION (Sv)

CCSM3



CCSM4-

