Supporting Material For

Has Coarse Ocean Resolution Biased Simulations of Transient Climate Sensitivity?

Michael Winton, Whit G. Anderson, Thomas L. Delworth,
Stephen M. Griffies, William J. Hurlin and Anthony Rosati

Geophysical Fluid Dynamics Laboratory/NOAA, Princeton, New Jersey

Submitted to *Geophysical Research Letters*

1 August 2014

Corresponding author address: Michael Winton, NOAA/GFDL, Princeton University Forrestal Campus, 201 Forrestal Rd., Princeton, NJ 08540.
E-mail: Michael.Winton@noaa.gov

Table S1. Models and Experiments.

Model	Atmos. Res.	Ocean Res.	Experiments	Notes
CM2.6	50 km	$1/10^{o}$	1860 control; 1%/year CO_2 to 2X	No mesoscale eddy parameterization or background vert. diffusion
CM2.5FLORa6	50 km	1°	1860 control; 1%/year CO_2 to 4X; instant 4X	CM2.1-like friction and mesoscale eddy parameterizations; vert. diffusion
CM2.5FLOR	50 km	1°	1860 control; 1%/year CO_2 to 4X; instant 4X	ESM2M-like friction and mesoscale eddy parameterizations; vert. diffusion

Table S2. Transient Sensitivity Analysis Using Equations 1 and 2.

Model	TCR (K)	TCR/ECS	N/R	ε	γ (W/m^2/K)
CM2.6	2.0	0.65	0.29	1.21	0.51
CM2.5FLORa6	1.9	0.62	0.31	1.24	0.56
CM2.5FLOR	1.5	0.50	0.35	1.41	0.80

Figure S1. Global surface air temperature/net top-of-atmosphere heat flux responses to instant CO_2 quadrupling in CM2.5FLOR and CM2.5FLORa6. The regression line extrapolation to zero heat flux, ignoring the first 20 year period, estimates two times the equilibrium climate sensitivity (ECS). The estimated ECS is 3.1 K.

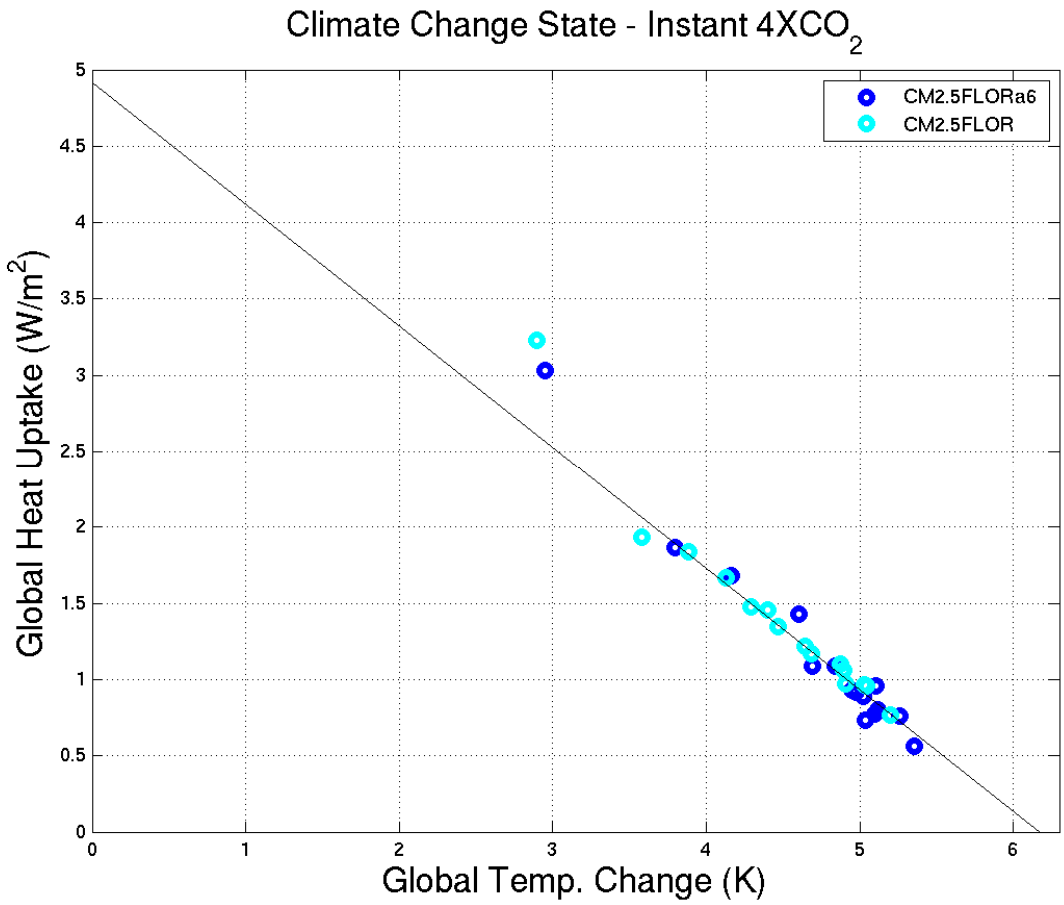
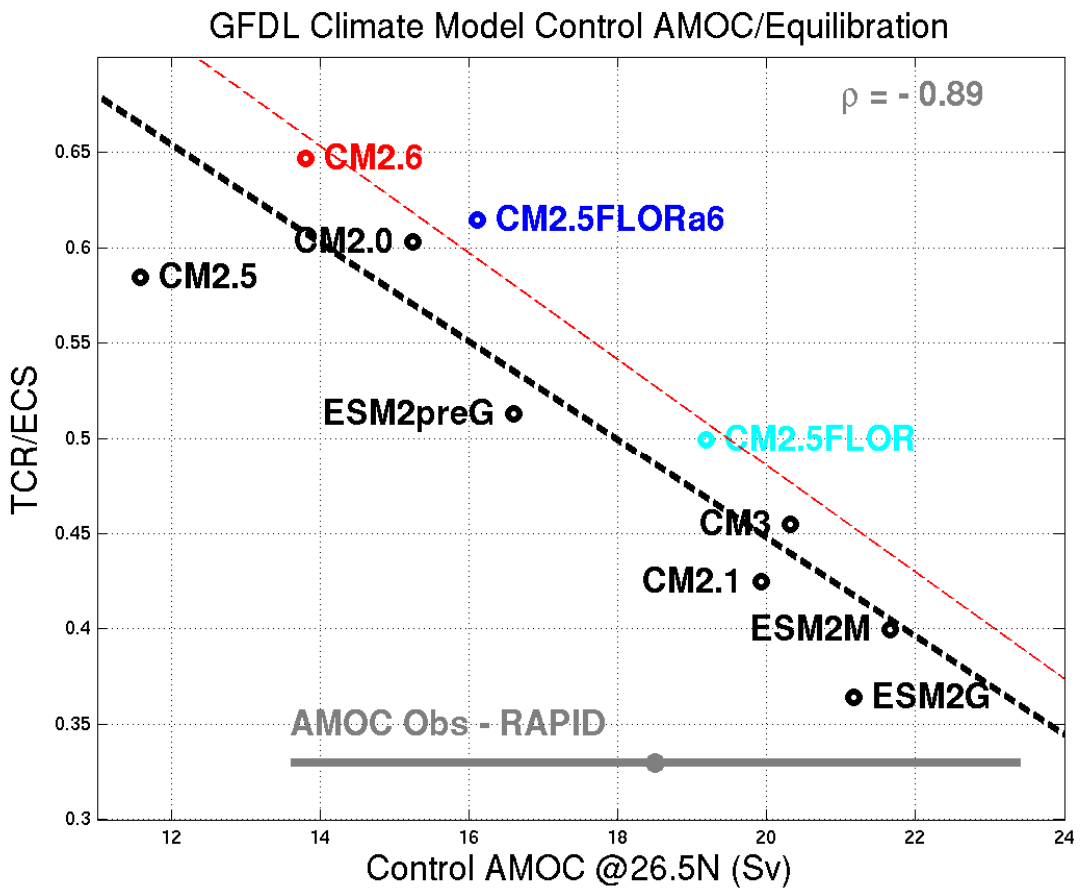
Figure S2. GFDL climate model relationship between control climate Atlantic meridional overturning (AMOC) at 26.5^{o}N and the equilibration ratio. The observed AMOC is from the RAPID array (Johns et al 2011).