Biogeosciences

Supplement of

The influence of the ocean circulation state on ocean carbon storage and CO$_2$ drawdown potential in an Earth system model

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S   Supplementary material

This document includes supplementary figures and tables, containing data that is described or shown in other forms in the manuscript. Table S.1 lists the maxima and minima in ocean overturning streamfunction, ψ, that are used to calculate (OVT) in Tables 3 and 4 and Figures 3 and 4. Figure S.1 shows the changes in T_{avg} for the SE ensemble, with respect to the control

5   simulation $PIES278$, versus the change in pCO_2^{atm} that is estimated to result from the corresponding change in $C_{sat,T}$ using the two different methods described in Appendix C. The sections in Figure S.2 show changes in temperature (ΔT) for ensemble members $DDx2$ and $DD/2$ and different basins.

Table S.1. Minimum (*min*) and maximum (*max*) of zonal average ocean overturning streamfunction, ψ [Sv], below 556 m for each ensemble member (*Ens. mem.*) for the Atlantic and Pacific basin, as well as for the Northern and Southern hemispheres.

| Ens. mem.	Atlantic min	Atlantic max	Pacific min	Pacific max	N. Hem min	N. Hem max	S. Hem min	S. Hem max
PIES278	-0.72994	14.351	-10.622	0.82759	-3.0596	13.969	-8.5206	16.109
WSx2	-2.2848	17.18	-12.118	5.1812	-5.4032	19.826	-9.61	37.308
WS/2	-0.8106	12.208	-10.614	-0.0054238	-1.1717	11.73	-9.8906	6.0054
ADx2	-1.7676	13.393	-10.431	0.19119	-4.6907	13.037	-10.125	14.205
AD/2	-0.90637	13.343	-9.5614	0.67199	-3.289	12.758	-7.821	17.496
DDx2	-1.5467	18.001	-14.518	2.8046	-6.0425	17.998	-14.648	12.872
DD/2	-0.9551	12.01	-8.216	0.35484	-2.5218	11.695	-5.685	17.737
IDx2	-0.69754	10.881	-10.634	1.2097	-2.2037	10.584	-8.3644	21.294
ID/2	-1.2487	16.588	-9.3395	0.80844	-3.6345	16.071	-8.73	11.925
WS/2_DD/2	-0.55727	3.5649	-6.7039	0.6078	-3.3234	2.4071	-7.6655	7.3873
ADx2_DDx2	-2.5161	15.909	-13.521	0.92228	-7.613	15.614	-15.484	11.301
DDx2_IDx2	-1.0229	14.554	-15.156	2.4531	-4.9616	15.176	-14.387	18.074
DD/2_IDx2	-0.58072	8.6163	-7.7396	0.63172	-1.956	7.9347	-5.4419	22.768
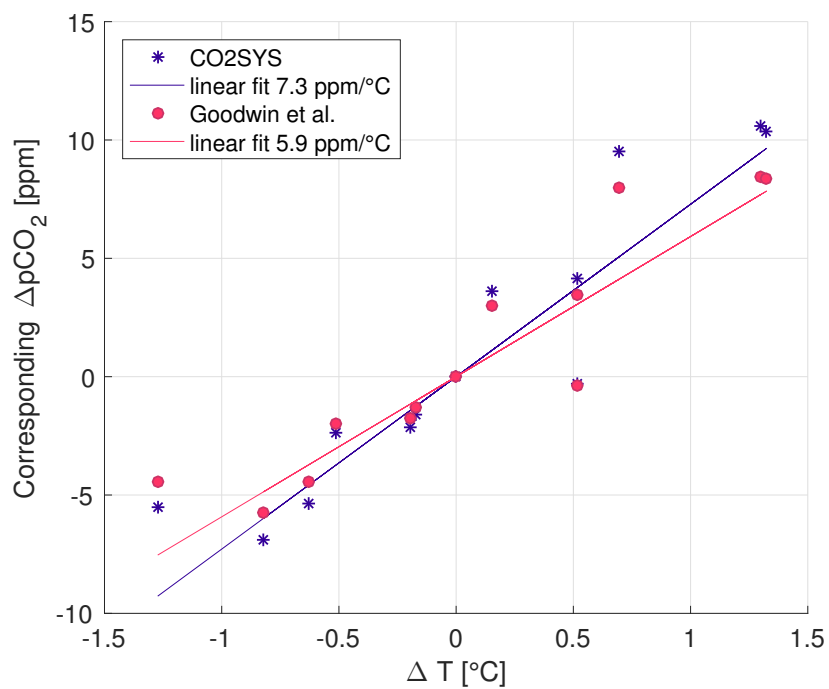
Figure S.1. Global ocean average temperature change (ΔT_{avg}) and the changes in pCO_2^{atm} corresponding to the $\Delta C_{sat,T}$ caused by the changes in temperature in the ensemble members $SE1 - SE12$. The control state is found at coordinates (0,0). The scattered behaviour is due to the temperature restriction on the solubility constants.
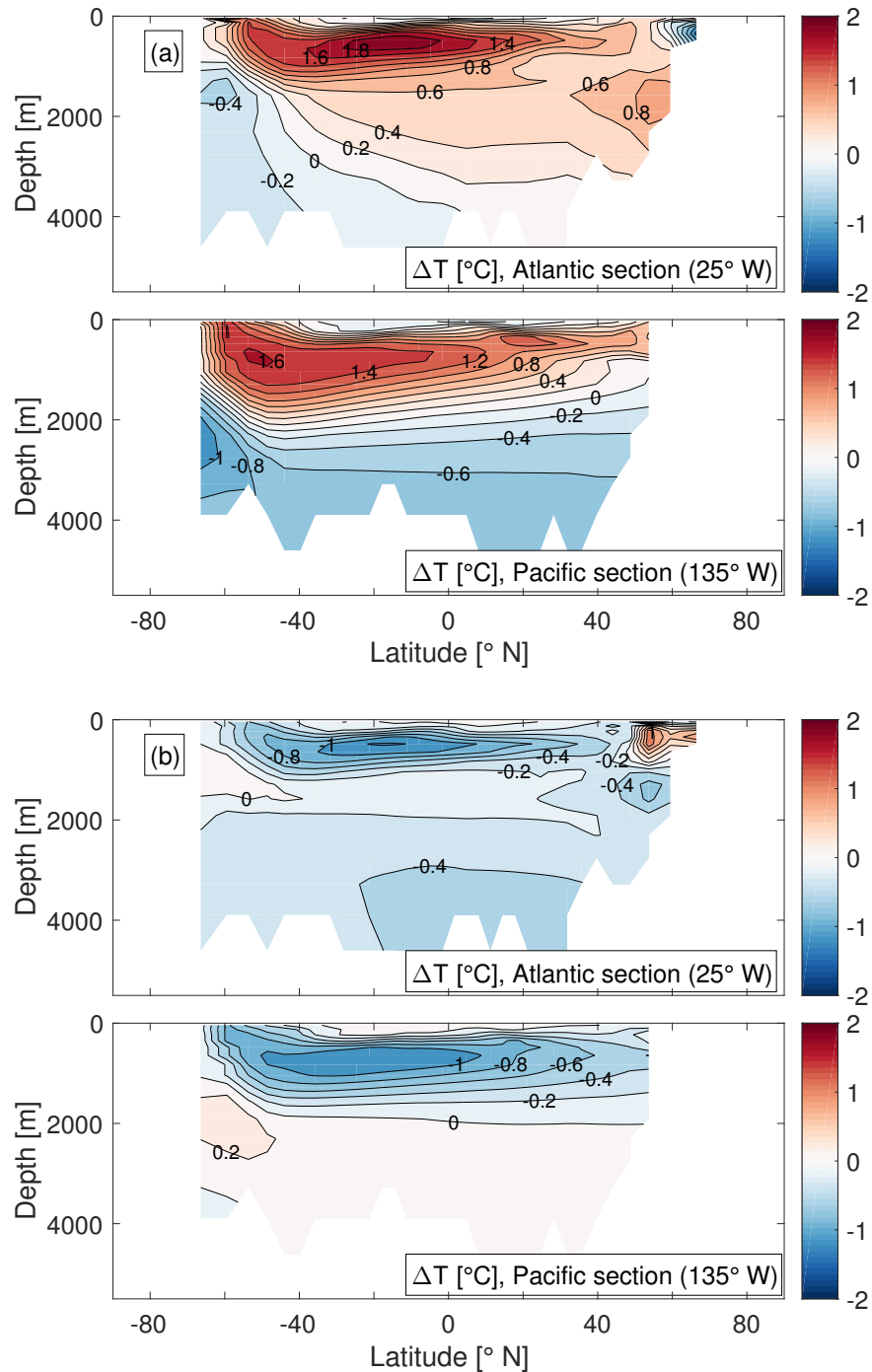
Figure S.2. Changes in ocean temperature (ΔT, [° C]), with respect to the control state $PIES278$, for a) $DDx2$, with high diapycnal diffusivity, b) $DD/2$, with low diapycnal diffusivity. The upper panel of each subfigure shows a section through the Atlantic, at 25° W and the lower panel shows a section through the Pacific, at 135° W. Both sections also cover latitudes that are in the Southern Ocean (south of -30° N).