AGU

PUBLICATIONS

Supporting Information for

Enhanced upper ocean warming projected by the eddy-resolving Community Earth System Model

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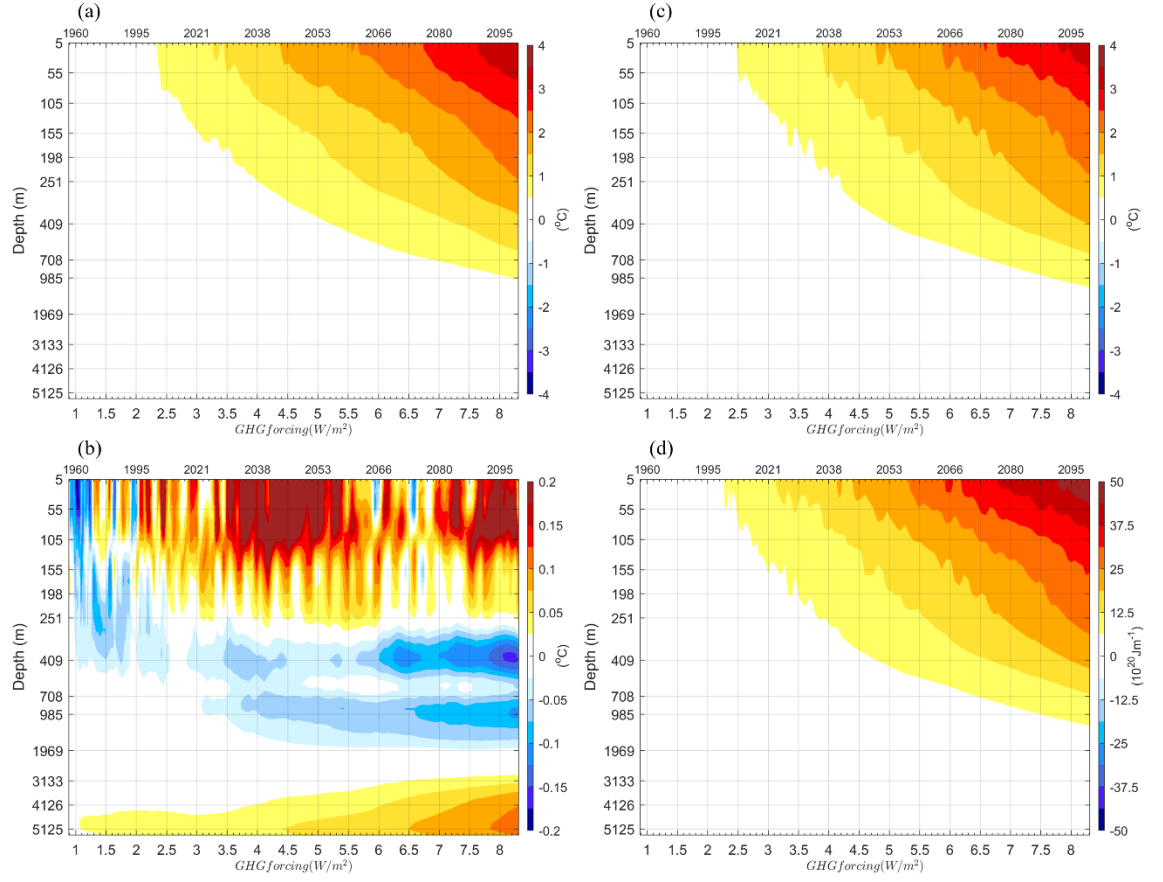
Contents of this file

Fig. S1. (a-b) same results as those in Fig.2b-c, respectively, but not scaled with horizontal ocean area, c_p and ρ_0. (c-d) Temperature changes in CESM-LR with the unit of °C and 10^{20} Jm^{-1}, respectively.
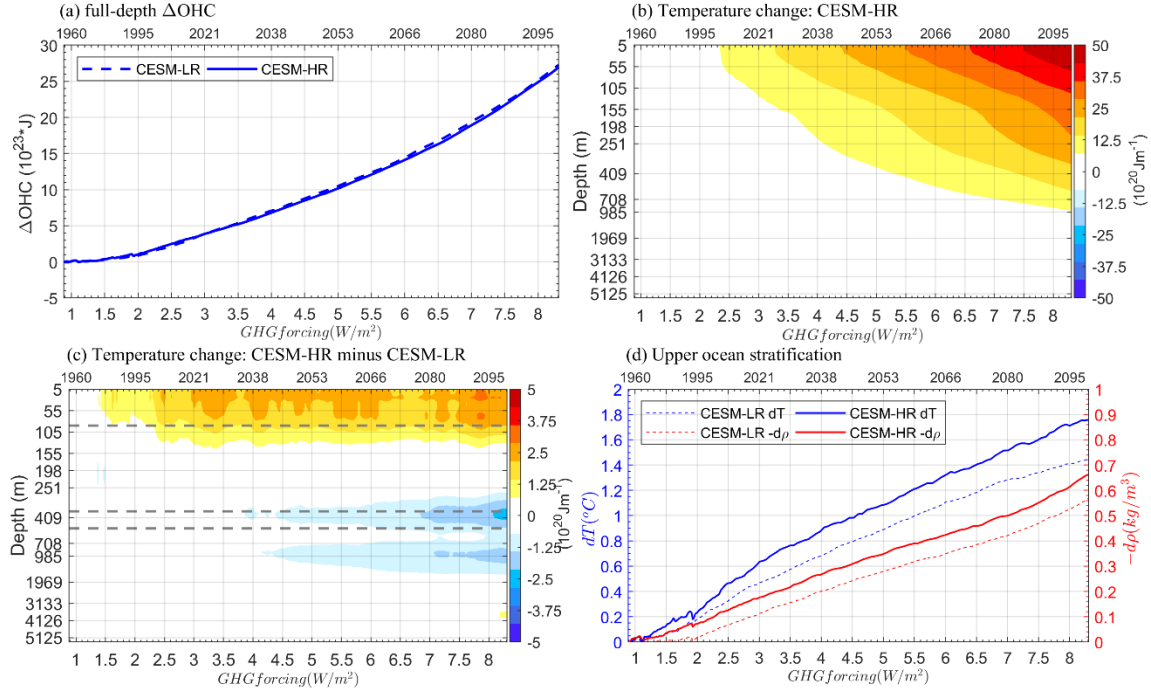
Fig. S2. Similar to Fig. 2a-d, but signal-to-noise maximizing EOF is applied to global-mean temperature and density as a function of depth and time. The forced patterns are chosen with more than 70% explained total variance.
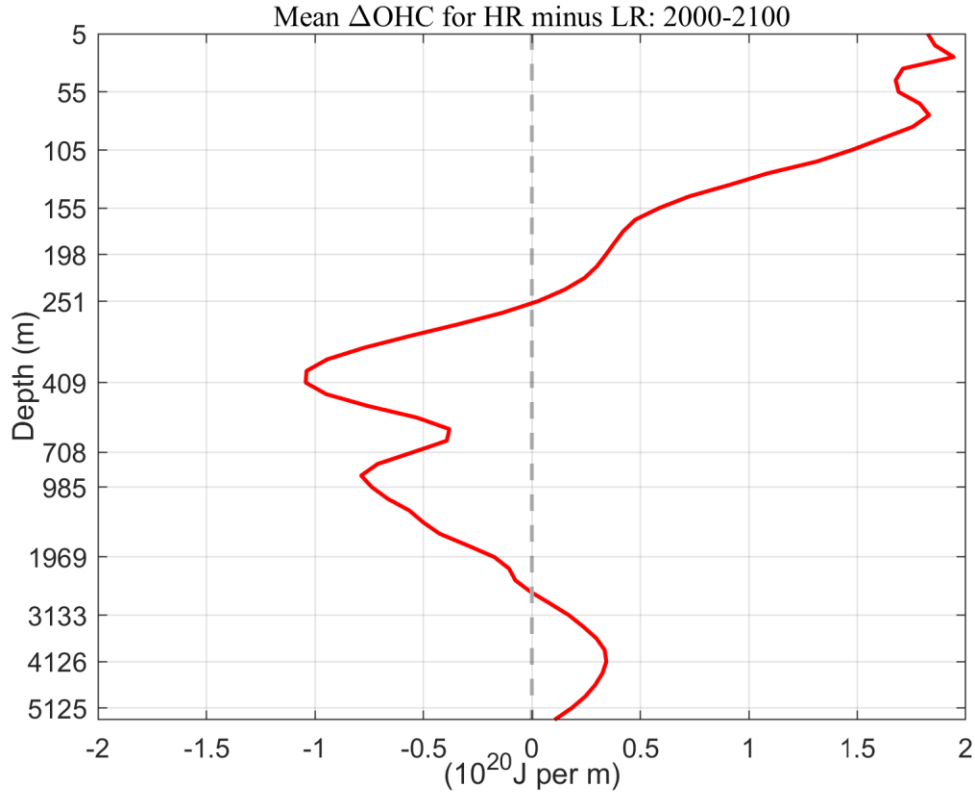

Fig. S3. Mean CESM-HR and -LR difference in ΔOHC over 2000-2100.
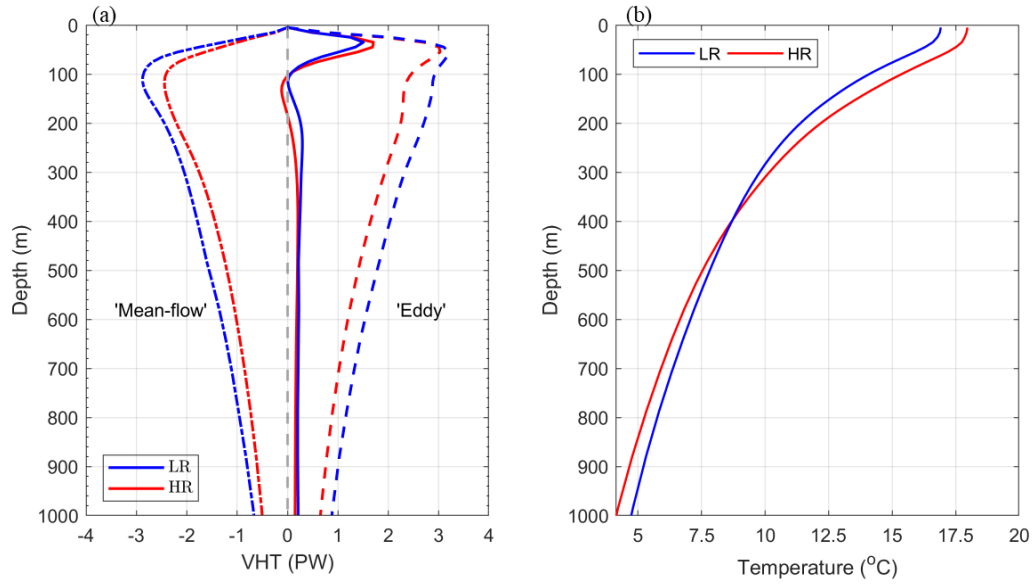
Fig. S4. Vertical profiles of globally-averaged vertical heat transport fluxes (a) and temperature (b) in CESM-LR (blue) and CESM-HR (red) PI-CNTL averaged over year 350-500. In (a), solid for total VHT, dot-dashed for MVHT, and dashed for EVHT.
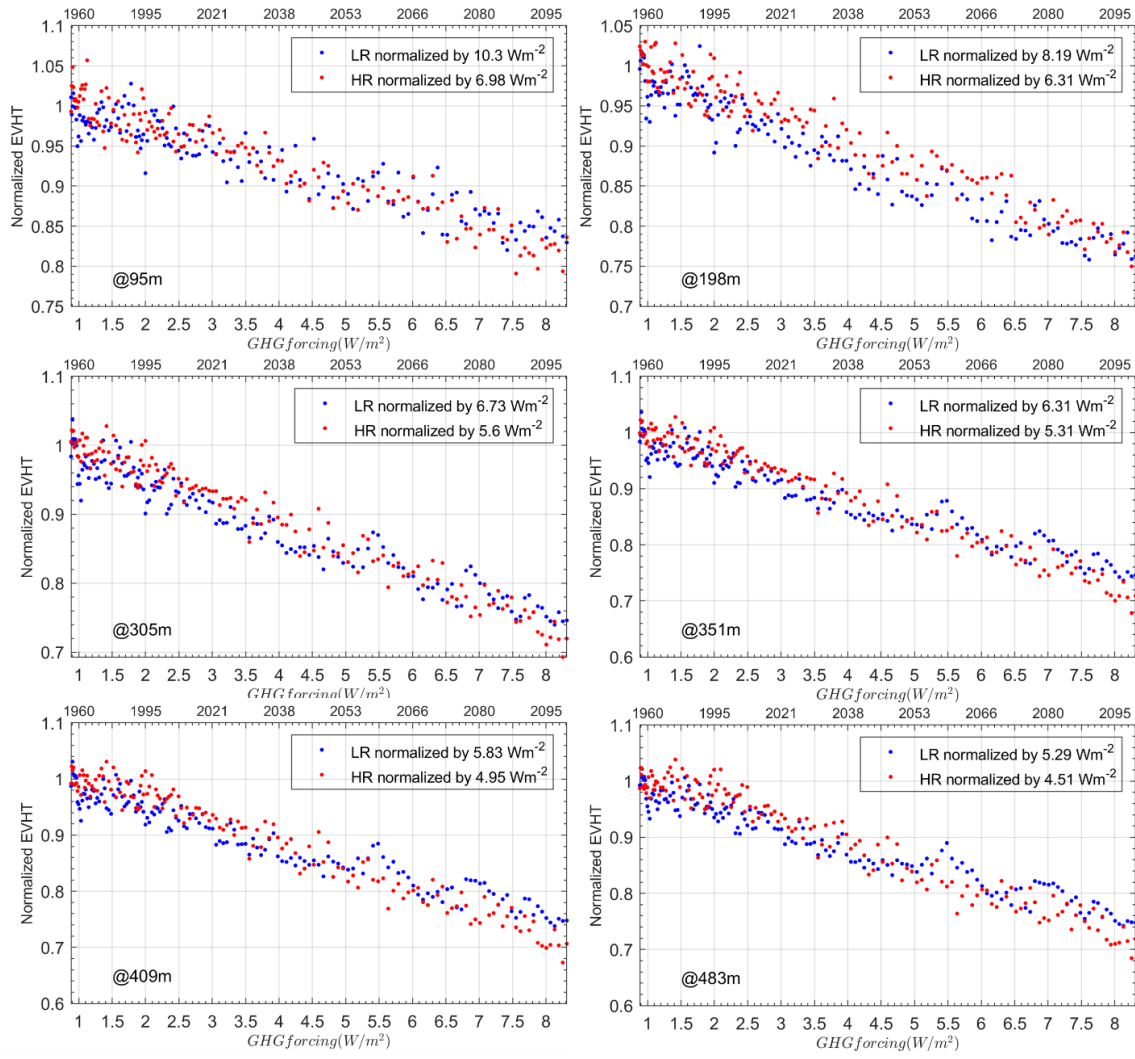
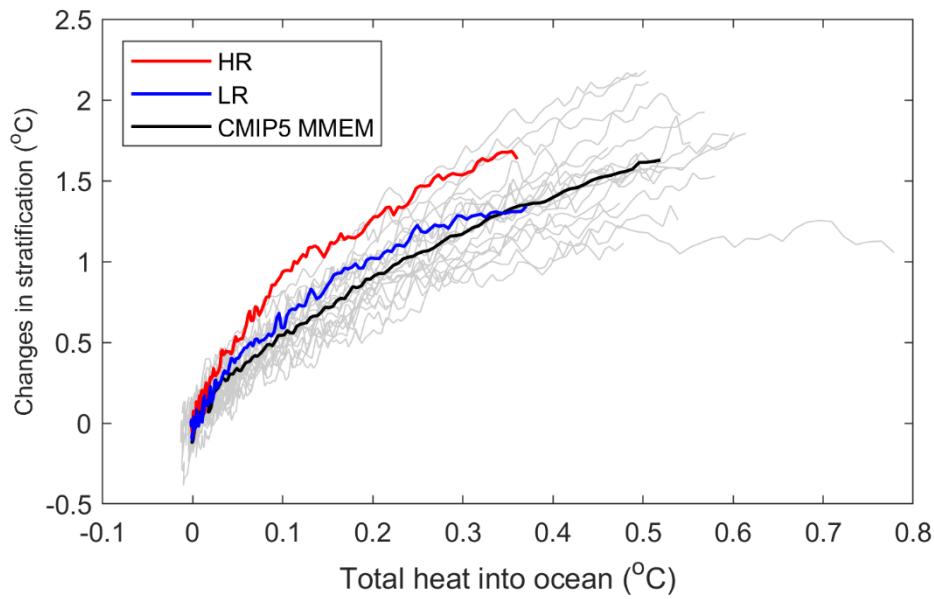Fig. S5. Similar to Fig. 4, but at different depths.

Fig. S6. Changes in dT in CMIP5.

Table S1. Model information of 20 models included in CMIP5 simulations**.**

Model name	Nation	Atmospheric model Atmosphere resolution	Ocean model Ocean resolution
ACCESS1-0	Australia	HadGEM2 r1.1 N96 (~1.875° x 1.25°); 38 levels	MOM4p1 Nominal 1° x 1°; 50 levels
ACCESS1-3	Australia	Global Atmosphere 1.0 N96 (~1.875° x 1.25°); 38 levels	MOM4p1 Nominal 1° x 1°; 50 levels
BCC-CSM1-1	China	BCC-AGCM2.1 T42 (2.8125° × 2.8125°); 26 levels	MOM4-L40v1 Nominal 1° x 1°; 40 levels
CanESM2	Canada	CanAM4 ~2.8° x 2.8°; 35 levels	CanOM4 256 x 192 longitude/latitude; 40 levels
CESM1-CAM5	USA	CAM5 ~ 1.25° × 0.9°; 30 levels	POP2 320 × 384 longitude/latitude; 60 levels
CMCC-CESM	Italy	ECHAM5 T159 (0.75°x 0.75°); 31 levels	OPA8.2 2° average, 0.5° at the equator; 31 levels
CMCC-CM	Italy	ECHAM5 T159 (0.75° x 0.75°); 31 levels	OPA8.2 2° average, 0.5° at the equator; 31 levels
CMCC-CMS	Italy	ECHAM5 T65 (0.75° x 0.75°); 95 levels	OPA8.2 2° average, 0.5° at the equator; 31 levels
CNRM-CM5	France	ARPEGE-Climat V5.2.1 T127 (~1.4°x1.4°); 31 levels	NEMO 3.2 ~1° x 1°; 42 levels
CSIRO-Mk3-6-0	Australia	AGCM v7.3.4 T63 (~1.875°x1.875°); 18 levels	MOM2.2 ~1.875°x0.9375°; 31 levels
FGOALS-s2	China	SAMIL2 R42 (~1.66°x2.81°); 26 levels	LICOM2 ~1° x 1°; 42 levels, 31 levels

Model name	Nation	Atmospheric model Atmosphere resolution	Ocean model Ocean resolution
GFDL-CM3	USA	AM3 2.5° x 2°; 48 levels	MOM4p1 Tripolar 360 x 200; 50 levels
HadGEM2-ES	UK	HadGAM2 N96 (1.875°x1.25°); 38 levels	HadGOM2 1° longitude x 0.3° to 1° latitude; 40 levels
IPSL-CM5A-LR	France	LMDZ5 95 x 96 equivalent to 3.75°x1.9°; 39 levels	NEMO 3.2 2° longitude x 0.5° to 2° latitude; 31 levels
IPSL-CM5A-MR	France	LMDZ5 143 x 144 equivalent to 1.25°x2.5°; 39 levels	NEMO 3.2 2° longitude x 0.5° to 2° latitude; 31 levels
IPSL-CM5B-LR	France	LMDZ5 95 x 96 equivalent to 3.75°x1.9°; 39 levels	NEMO 3.2 2° longitude x 0.5° to 2° latitude; 31 levels
MIROC-ESM-CHEM	Japan	MIROC-AGCM6 T85 (1.40625°x1.40625°); 40 levels	COCO4.5 1.4° longitude x 0.5°-1.4° latitude; 50 levels
MIROC-ESM	Japan	MIROC-AGCM T42 (2.8125°x2.8125°); 80 levels	COCO3.4 1.4° longitude x 0.5°-1.4° latitude; 44 levels
MPI-ESM-LR	Germany	ECHAM6 T63 (~1.8°x1.8°); 47 levels	MPIOM Average 1.5°; 40 levels
MPI-ESM-MR	Germany	ECHAM6 T63 (~1.8°x1.8°); 95 levels	MPIOM ~0.4°x 0.4°; 40 levels