

# EXTRATROPICAL–TROPICAL INTERACTION MODEL INTERCOMPARISON PROJECT (ETIN-MIP)

## Protocol and Initial Results

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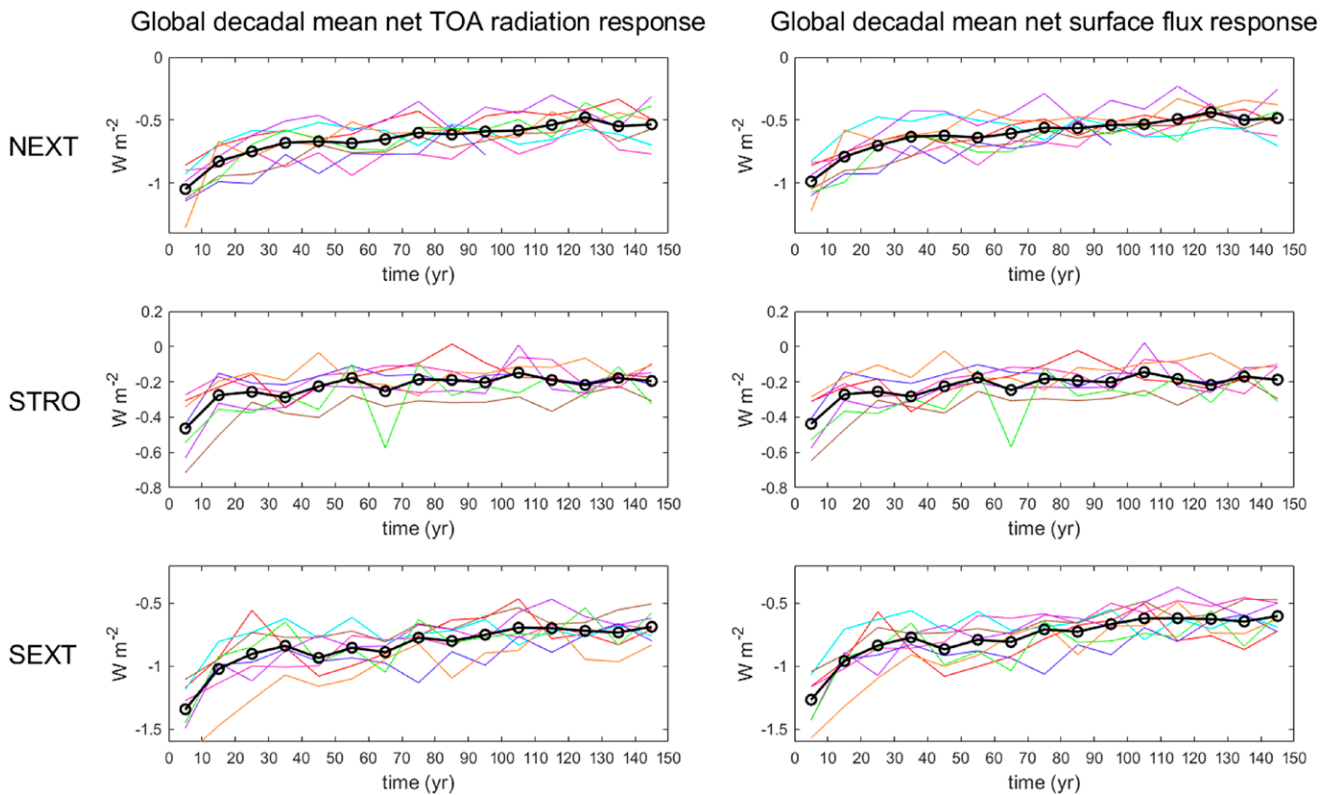
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**TABLE ES1. The weighting factor for all model experiments.**

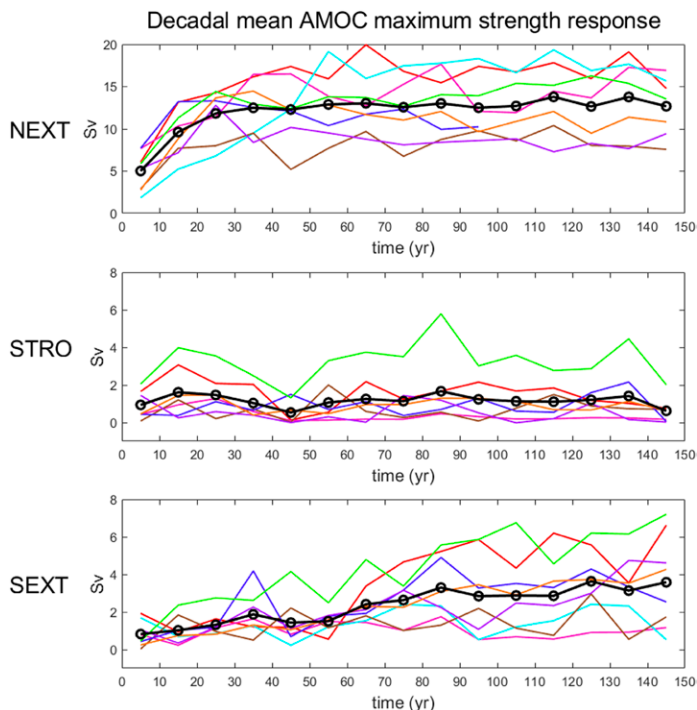
Model	SEXT	STRO	NEXT
MPI-ESM1.2	0.80	0.86	0.96
HadGEM2-ES	0.89	1.04	0.90
NorESM1-HAPPI	0.91	1.00	0.88
IPSL	1.10	1.02	0.94
GFDL AM4-FLOR	0.92	1.01	0.92
GFDL CM2	0.96	1.05	0.89
CESM	0.92	1.06	0.91
MIROC	0.88		0.87
UCLA-MIT GCM	0.93	1.13	1.02

**TABLE ES2.** List of requested variables, with  $u$  the zonal velocity,  $v$  the meridional velocity,  $q$  the specific humidity,  $T$  the temperature,  $dp$  the pressure difference between two vertical levels,  $Z$  the geopotential height,  $C_p$  the specific heat at constant pressure, and  $\theta$  seawater potential temperature.

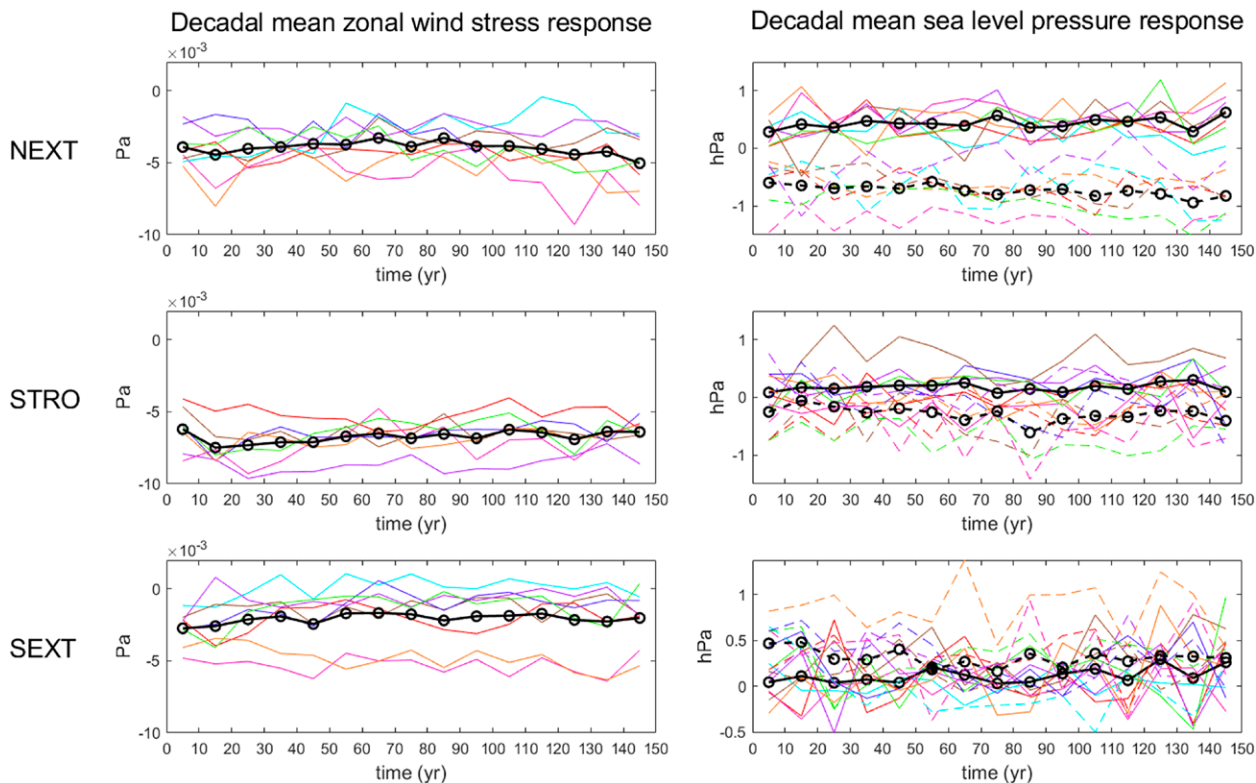
Model	Long name	Equation	Unit
Atmosphere	3D zonal momentum $Y$ transport	$uu$	$m^2 s^{-2}$
	3D moisture $Y$ transport	$uqdp$	$Pa m s^{-1}$
	3D temperature $Y$ transport	$uTdp$	$Pa K m s^{-1}$
	3D geopotential height $Y$ transport	$uZdp$	$Pa m^2 s^{-1}$
	3D atmos mass $Y$ transport	$udp$	$Pa m s^{-1}$
Ocean	3D ocean mass $Y$ transport	$\rho u dx dz$	$kg s^{-1}$
	3D ocean heat $Y$ transport	$\rho C_p u \theta dx dz$	$W$
	3D ocean heat content	$\rho C_p T dx dz$	$N$
	Potential density with reference pressure of 2,000 dbar minus 1,000		$kg m^{-3}$



**FIG. ES1.** Global and decadal mean response of (left) net TOA radiation and (right) net surface flux for (top) NEXT, (middle) STRO, and (bottom) SEXT. The individual models are color coded as in Fig. 3 in the main text and the multimodel mean is shown in black with circles. Units in  $W m^{-2}$ .



**FIG. ES2.** Global and decadal mean response of Atlantic meridional overturning circulation (AMOC) strength for (top) NEXT, (middle) STRO, and (bottom) SEXT. The individual models are color coded as in Fig. 3 in the main text and the multimodel mean is shown in black with circles. Units in Sv.



**FIG. ES3.** Global and decadal mean response of upper-ocean circulation properties that represent the Ekman transport and the subtropical gyres, respectively. (left) Zonal-mean zonal wind stress averaged between 5° and 15°N for (top) NEXT, and that averaged between 5° and 15°S for (middle) STRO and (bottom) SEXT. (right) Sea level pressure response averaged over 20°–40°N and 160°E–130°W (solid: the region of maximum sea level pressure in the northern subtropics in CNTL) and that averaged over 20°–40°S and 80°–160°W (dashed: the region of maximum sea level pressure in the southern subtropics in CNTL) for (top) NEXT, (middle) STRO, and (bottom) SEXT. The individual models are color coded as in Fig. 3 in the main text and the multimodel mean is shown in black with circles.