Diagnosing Stalled Warming in CMIP6 Models

Alyssa N. Poletti

Supplemental Tables and Figures

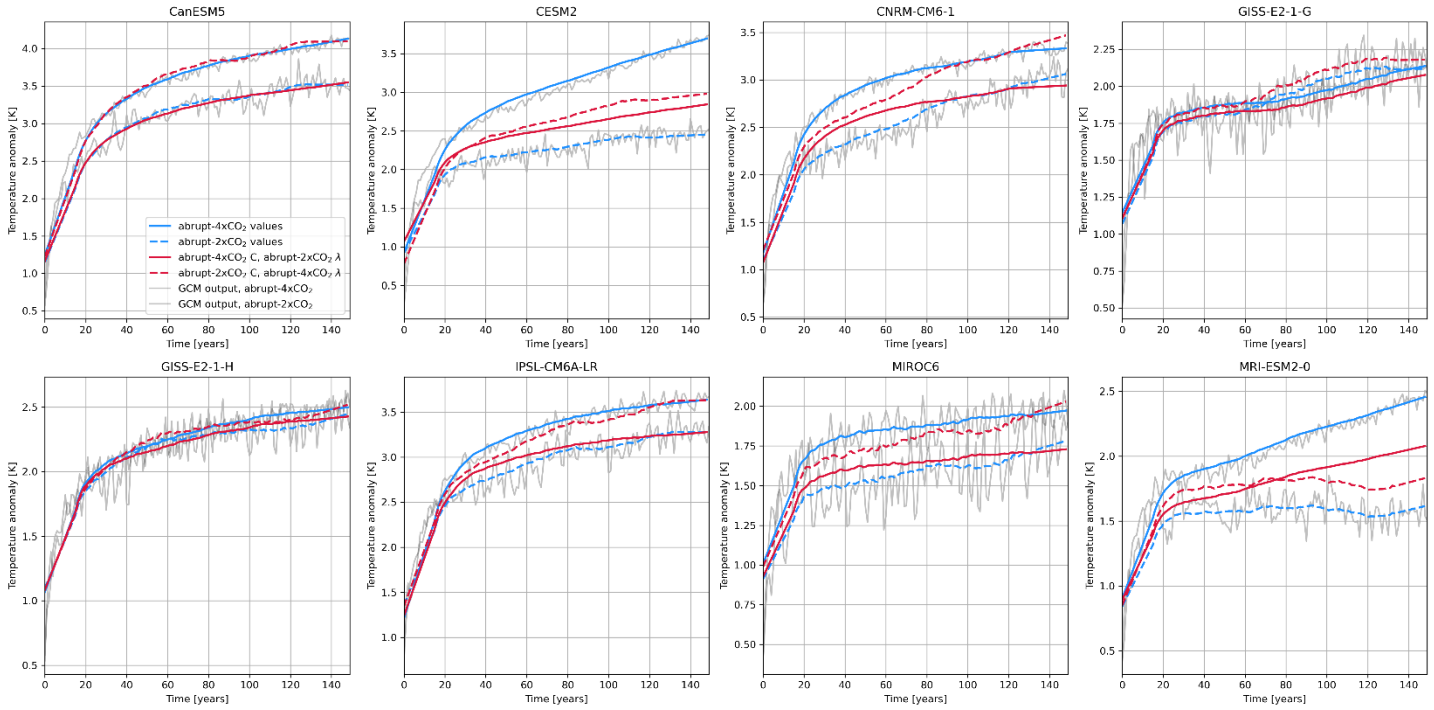

Figure S1: The annual, global mean surface temperature anomaly for each GCM (grey), and the EBM output for abrupt-4xCO2 (blue, solid), abrupt-2xCO2 (blue, dashed), the λ_{2x}/C_{4x} experiment (red, solid), and the λ_{4x}/C_{2x} experiment (red, dashed). Note, the abrupt-4xCO2 values are divided by 2.

	Branch Point in Parent		Metadata		Variant	
Model	**Abrupt-4xCO2**	**Abrupt-2xCO2**	**Unit**	**Parent**	**Abrupt-4xCO2**	**Abrupt-2xCO2**
CanESM5	1223115	0	Days since 1850-01-01	PiControl	r1i1p1f1	r1i1p2f1
CESM2	182500	182500	Days since 0001-01-01	PiControl	r1i1p1f1	r1i1p1f1
CNRM-CM6-1	0	0	Days since 1850-01-01	PiControl	r1i1p1f2	r1i1p1f2
GISS-E2-1-G	0	0	Days since 4150-01-01	PiControl	r1i1p1f1	r1i1p1f1
GISS-E2-1-H	0	0	Days since 3180-01-01	PiControl	r1i1p1f1	r1i1p1f1
IPSL-CM6A-LR	7305	7305	Days since 1850-01-01	PiControl	r1i1p1f1	r1i1p1f1
MIROC6	0	0	Days since 3200-01-01	PiControl	r1i1p1f1	r1i1p1f1
MRI-ESM2-0	0	0	Days since 1850-01-01	PiControl	r1i1p1f1	r1i1p1f1

Table S1: The branch point for the abrupt-4xCO2 and abrupt-2xCO2 runs from the PiControl runs for each model.

Model	**hfls** Latent heat	**hfss** Sensible heat	**rlds** Surface downwelling longwave flux	**rlus** Surface upwelling longwave flux	**rlut** Top of atmosphere outgoing longwave flux	**rlutcs** Top of atmosphere upwelling longwave flux, clear sky	**rsds** Surface downwelling shortwave flux	**rsdscs** Surface downwelling shortwave flux, clear sky	**rsdt** Top of atmosphere downwelling shortwave flux	**rsus** Surface upwelling shortwave flux	**rsuscs** Surface upwelling shortwave flux, clear sky	**rsut** Top of atmosphere upwelling shortwave flux	**rsutcs** Top of atmosphere upwelling shortwave flux, clear sky	**rtmt** Top of atmosphere net flux
CanESM5	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
CESM2	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
CNRM-CM6-1	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	X X X
GISS-E2-1-G	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	X X X
GISS-E2-1-H	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	X X X
IPSL-CM6A-LR	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	X X X
MIROC6	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
MRI-ESM2-0	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	X X X

Table S2a: The radiative variables used and available for each model in Abrupt-4xCO2, Abrupt-2xCO2, and piControl respectively, from the CMIP6 data repository.

Model	areacello*	clt	evspsbl	msftmz	msftyz	pr	psrn	tas	thetao
	Ocean cell area	Cloud area fraction		Ocean meridional overturning mass streamfunction	Ocean y overturning mass streamfunction	Precipitation flux	Snow melt flux	Near surface air temperature	Sea water potential temperature
CanESM5	✓	✓✓✓	x x x	✓✓✓	x x x	✓✓✓	x x x	✓✓✓	✓✓ x
CESM2	✓	✓✓✓	✓✓✓	✓✓✓	x x x	✓✓✓	x x x	✓✓✓	✓✓ x
CNRM-CM6-1	x	✓✓✓	✓✓✓	x x x	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓ x
GISS-E2-1-G	✓	✓✓✓	✓✓✓	x x x	✓ ✓ x	✓✓✓	✓✓✓	✓✓✓	✓✓ x
GISS-E2-1-H	✓	✓✓✓	✓✓✓	x x x	x x x	✓✓✓	✓✓✓	✓✓✓	✓✓ x
IPSL-CM6A-LR	✓	✓✓✓	✓✓✓	x x x	✓ x ✓	✓✓✓	✓✓✓	✓✓✓	✓ x x
MIROC6	✓	✓✓✓	✓✓✓	✓ x ✓	x x x	✓✓✓	✓✓✓	✓✓✓	x x x
MRI-ESM2-0	✓	✓✓✓	✓✓✓	✓✓✓	x x x	✓✓✓	✓✓✓	✓✓✓	✓✓ x

Table S2b: The non-radiative variables used and available for each model in Abrupt-4xCO2, Abrupt-2xCO2, and piControl respectively, from the CMIP6 data repository. (*) Note, areaocello or the ocean cell area is constant across simulations.

	Abrupt-4xCO2		Abrupt-2xCO2	
Model	**λ [w/m^2/K]**	**ERF [w/m^2]**	**λ [w/m^2/K]**	**ERF [w/m^2]**
CanESM5	-0.66	3.73	-0.76	3.53
CESM2	-0.63	3.32	-1.21	4.06
CNRM-CM6-1	-0.73	3.56	-0.78	3.27
GISS-E2-1-G	-1.45	3.91	-1.45	3.78
GISS-E2-1-H	-1.14	3.64	-1.27	3.76
IPSL-CM6A-LR	-0.77	3.53	-0.93	3.70
MIROC6	-1.46	3.71	-1.61	3.52
MRI-ESM2-0	-1.07	3.35	-1.40	3.48

Table S3: The parameters used to fit each CMIP6 model to the energy balance model.