

Figure S1

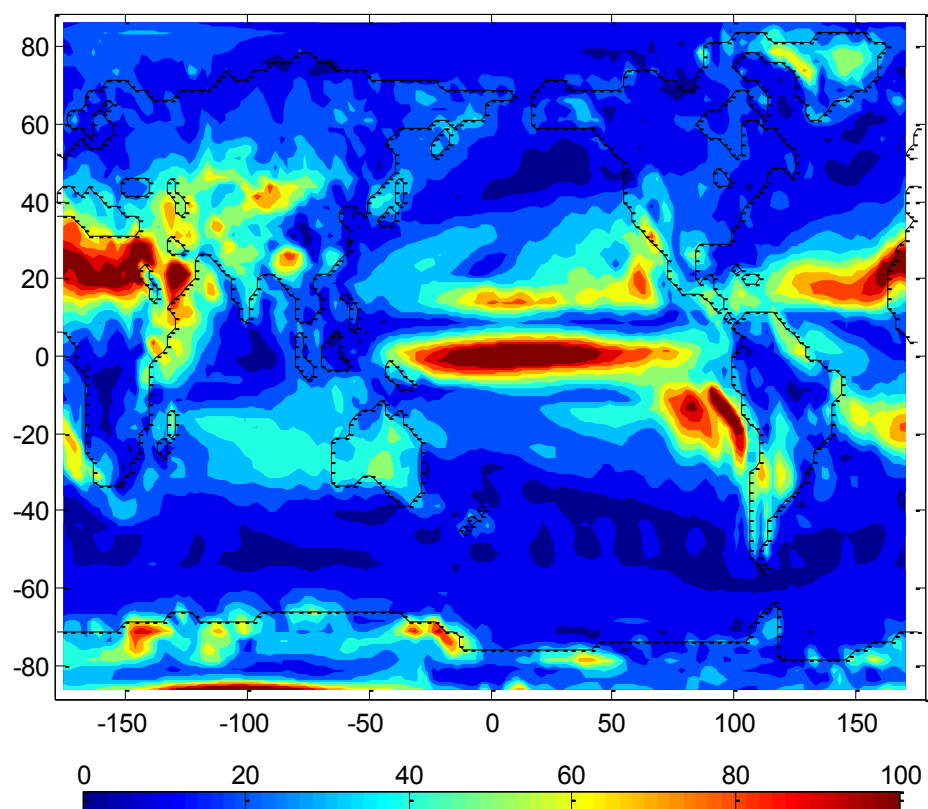
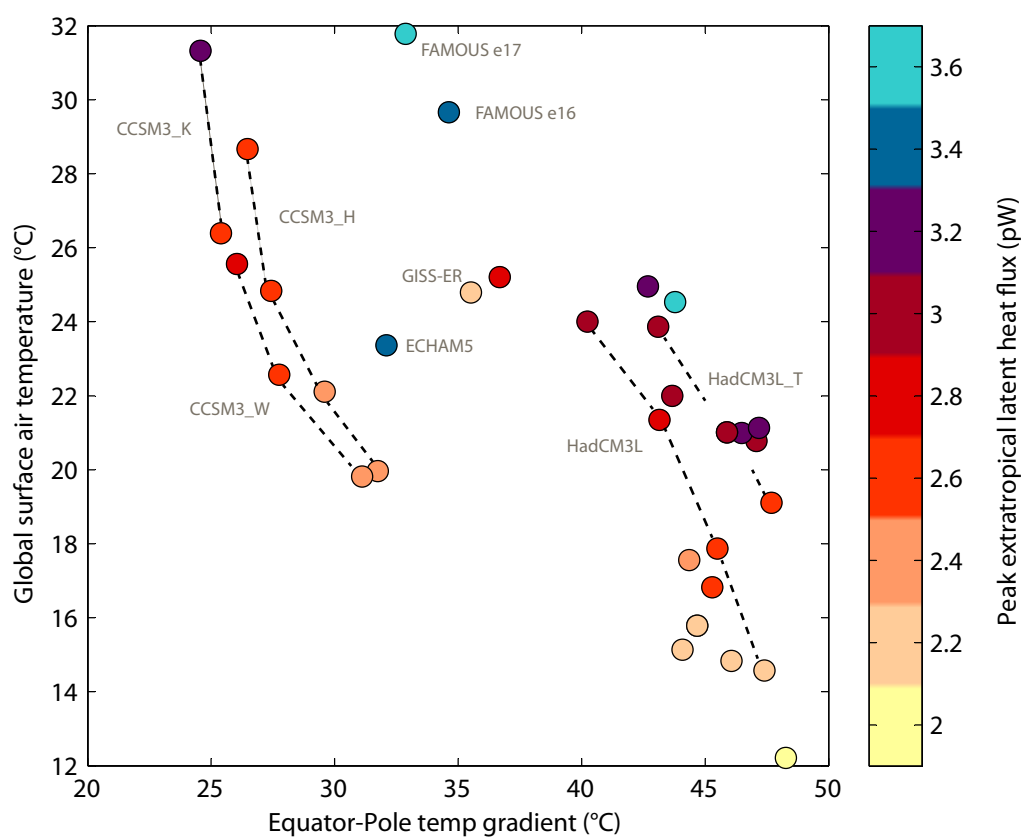
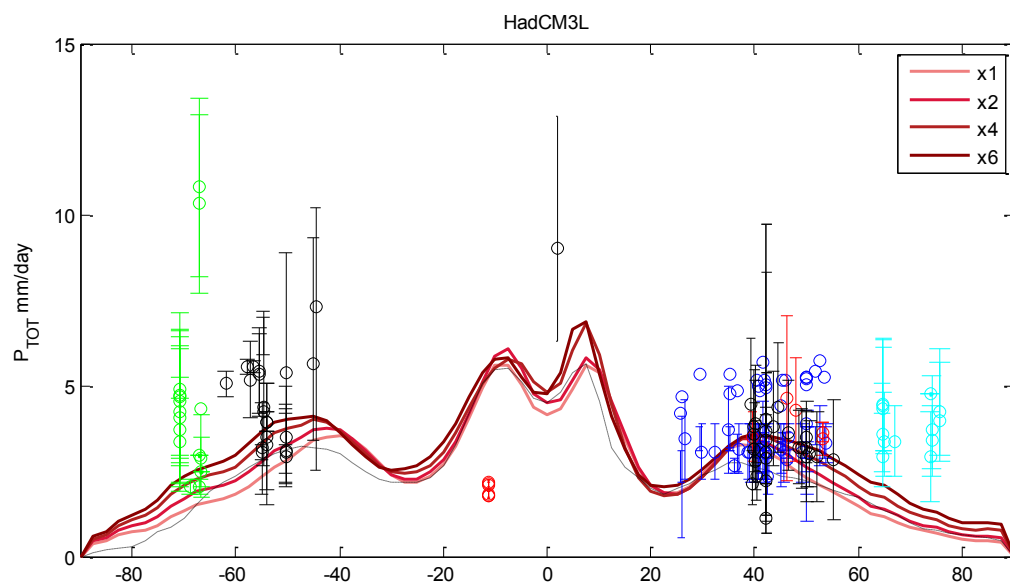
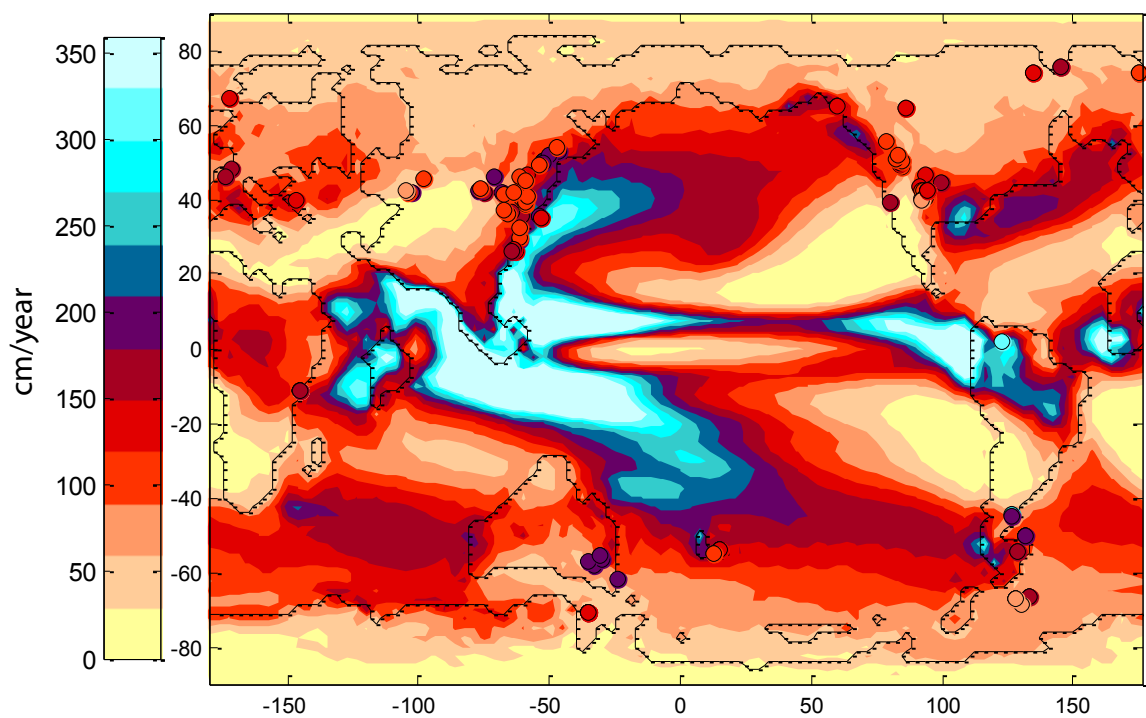


Figure S2

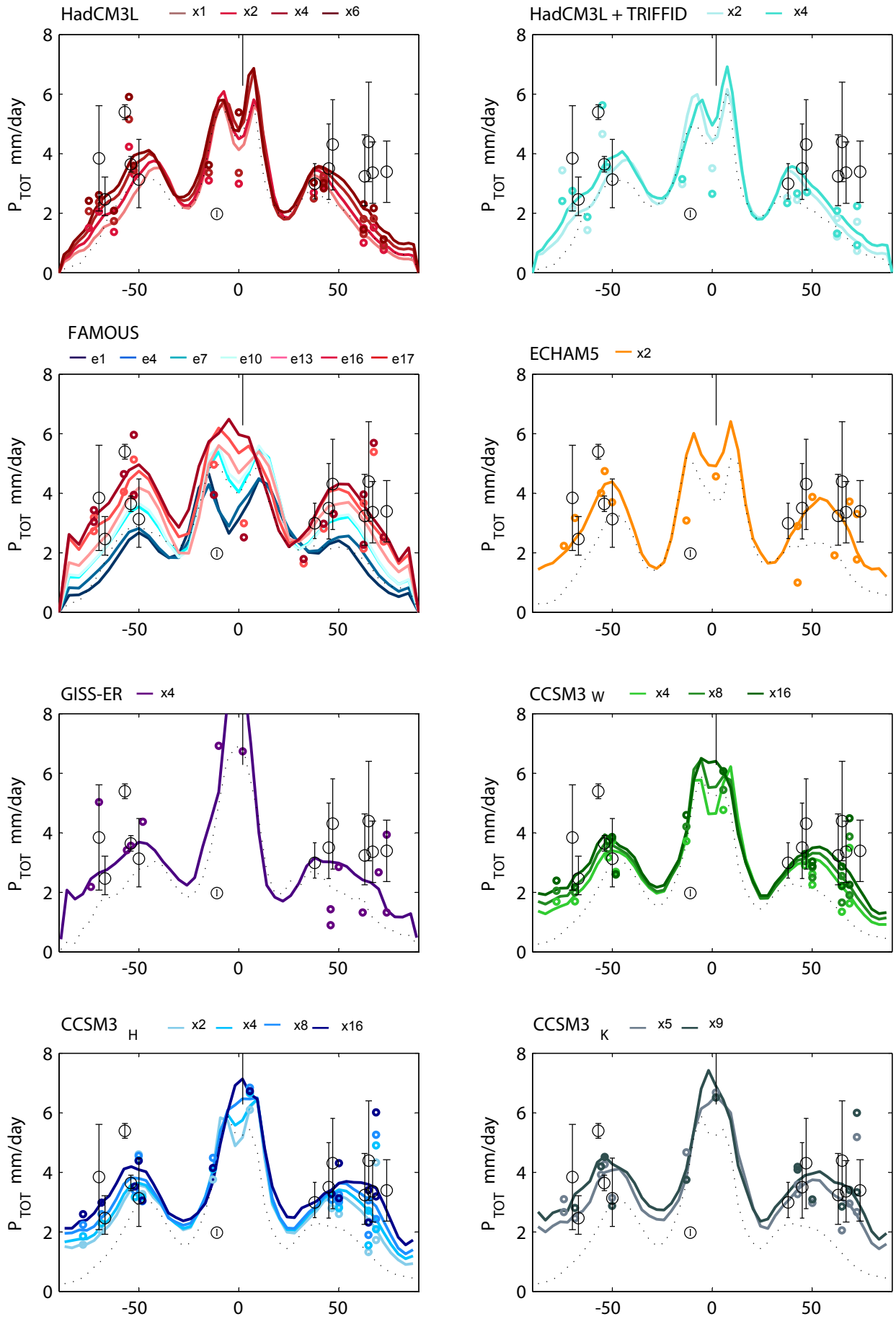




Green = Antarctica
 Black = Chile and Argentina
 Red = Tanzania
 Black = Colombia (Paleocene)
 Blue = China
 Black = US
 Red = Europe
 Blue = Arctic

Figure S4

Figure S5



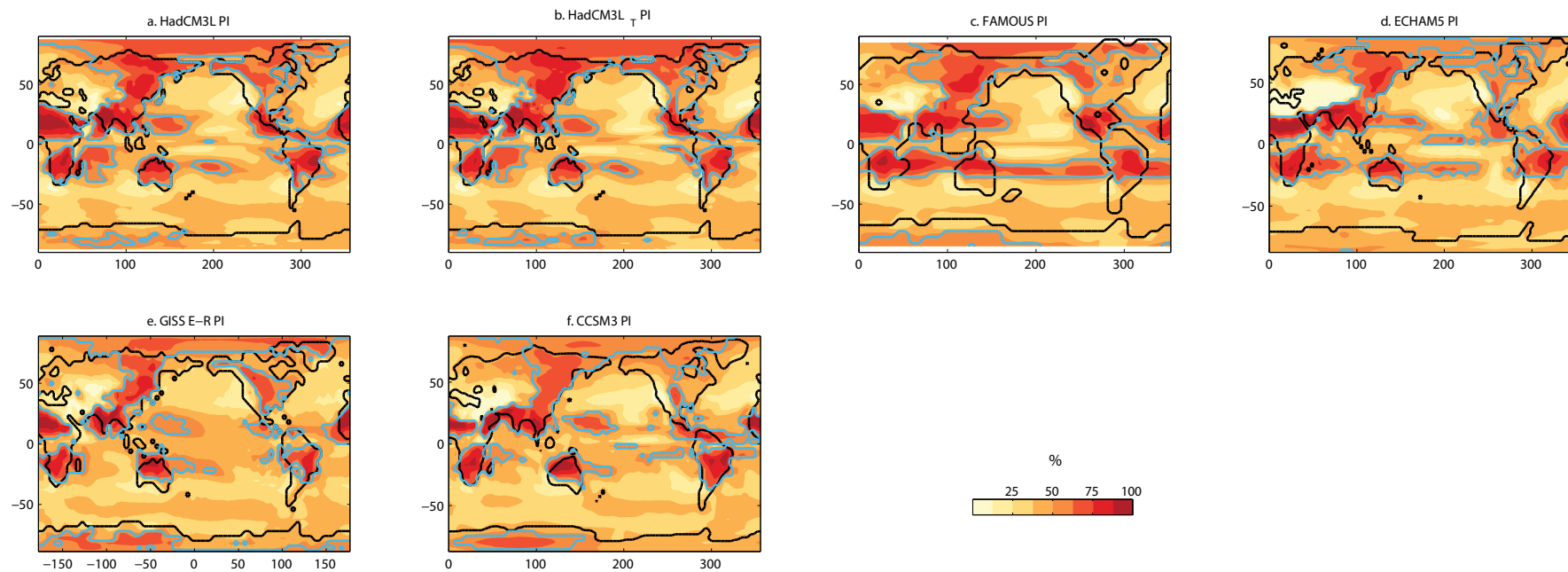


Figure S6

Simulation	Global mean precipitation (mm day⁻¹)	Global mean evaporation (mm day⁻¹)	Residual water mass (x 10¹² kg)	Latent heat forcing (x 10¹³ W)
HadCM3L				
Preindustrial	2.915	2.910	2.565	6.710
Eocene x1	3.007	3.005	1.254	3.279
Eocene x2	3.202	3.199	1.380	3.610
Eocene x4	3.376	3.372	1.707	4.465
Eocene x6	3.510	3.507	1.878	4.916
Preindustrial TRIFFID	2.866	2.866	0.2212	0.5786
Eocene x2 TRIFFID	3.233	3.233	0.1615	0.4225
Eocene x4 TRIFFID	3.415	3.415	0.1819	0.4758
ECHAM5				
Preindustrial	2.749	2.759	-5.154	-13.48
Eocene x2	3.423	3.433	-5.264	-13.77
GISS-ER				
Preindustrial	2.968	2.966	0.5774	1.510
Eocene x4	3.675	3.673	1.077	2.816
FAMOUS				
Preindustrial	2.908	2.912	-2.361	-6.176
E16	3.936	9.939	-1.545	-4.042
E17	4.135	4.137	-1.245	-3.255
CCSM3				
Preindustrial	2.650	2.648	1.164	3.044
Eocene H x2	3.288	3.285	1.082	2.830
Eocene H x4	3.415	3.413	1.121	2.932
Eocene Hx8	3.572	3.570	1.208	3.159
Eocene Hx16	3.790	3.780	5.062	13.24
Eocene Wx4	3.168	3.166	1.080	2.824
Eocene Wx8	3.332	3.330	1.166	3.049
Eocene Wx16	3.499	3.496	1.248	3.263
Eocene Kx5	3.678	3.677	1.321	3.455
Eocene Kx9	3.969	3.966	1.640	4.290

Table S1 Assessment of the imbalance between global precipitation and evaporation rates in the EoMIP ensemble. The imbalance is additionally shown as a global residual water mass and equivalent latent heat forcing.

	Preindustrial						Eo x 1 CO2	Eocene x 2 CO2					Eocene x 4 CO2					Eo x ~5 CO2	Eo x 6 CO2	Eocene x 8 CO2				Eo x ~9 CO2	Eocene x 16 CO2		
	HadCM	HadCM TRIFFID	FAMOU S	CCSM *	ECHA M	GISS	HadC M	HadC M	HadC M	FAMOU SEI7	ECHA M	CCSM H	HadC M	HadC M	CCSM H	CCSM W	GISS	CCSM K	HadC M	CCSM H	CCSM W	CCSM K	CCSM H	CCSM W			
GL P _{TOT}	2.91	2.87	2.91	2.65	2.75	2.97	3.01	3.20	3.23	4.13	3.42	3.29	3.38	3.42	3.42	3.17	3.67	3.68	3.51	3.57	3.33	3.97	3.79	3.50			
GL P _{CV}		2.16	2.37	1.99	1.80		2.38	2.56	2.60	3.75	2.37	2.65	2.73	2.80	2.78	2.57		3.12	2.89	2.96	2.76	3.39	3.19	2.93			
GL P _{LS}		0.71	0.54	0.66	0.95		0.63	0.64	0.63	0.39	1.05	0.63	0.64	0.62	0.63	0.60		0.56	0.62	0.61	0.58	0.60	0.57				
GL P _{CV} /P _{TOT}		0.75	0.81	0.75	0.65		0.79	0.80	0.80	0.91	0.69	0.81	0.81	0.82	0.81	0.81		0.85	0.82	0.83	0.83	0.85	0.84	0.84			
GL Temp /°C	12.72	11.87	14.36	11.62	13.54	13.79	14.57	17.87	19.11	31.77	23.36	19.96	21.35	23.86	22.10	19.82	24.79	26.39	24.00	24.83	22.56	31.32	28.67	25.56			
LA P _{TOT}	2.14	2.20	2.62	1.90	1.81	2.45	2.08	2.25	2.29	3.22	2.57	3.11	2.40	2.36	3.36	2.90	3.12	3.66	2.65	3.61	3.18	3.93	3.86	3.43			
LA P _{CV}		1.66	2.17	1.40	1.05		1.59	1.71	1.77	2.63	1.37	2.37	1.84	1.80	2.61	2.26		2.98	2.07	2.85	2.52	3.23	3.10	2.76			
LA P _{LS}		0.54	0.44	0.50	0.76		0.49	0.54	0.52	0.60	1.21	0.74	0.56	0.55	0.75	0.64		0.69	0.58	0.76	0.66	0.70	0.76	0.67			
LA P _{CV} /P _{TOT}		0.75	0.83	0.74	0.58		0.76	0.76	0.77	0.82	0.53	0.76	0.77	0.76	0.78	0.78		0.81	0.78	0.79	0.79	0.82	0.80	0.80			
LA Temp /°C	6.26	5.65	10.64	6.18	7.70	8.19	8.05	12.07	14.64	30.01	20.90	16.24	16.54	21.03	18.93	16.71	21.98	24.65	20.14	22.17	19.99	30.68	26.85	23.59			
OC P _{TOT}	3.23	3.14	3.12	2.96	3.12	3.18	3.38	3.59	3.62	4.80	3.74	3.35	3.77	3.85	3.43	3.26	3.87	3.68	3.86	3.56	3.38	3.98	3.77	3.52			
OC P _{CV}		2.36	2.52	2.23	2.10		2.70	2.90	2.94	4.58	2.75	2.75	3.09	3.21	2.85	2.68		3.17	3.23	2.99	2.83	3.44	3.22	2.99			
OC P _{LS}		0.76	0.61	0.73	1.02		0.68	0.69	0.68	0.23	0.99	0.60	0.68	0.64	0.59	0.58		0.52	0.63	0.57	0.55	0.54	0.55	0.53			
OC P _{CV} /P _{TOT}		0.75	0.81	0.75	0.67		0.80	0.81	0.81	0.95	0.74	0.82	0.82	0.83	0.83	0.82		0.86	0.84	0.84	0.84	0.86	0.85	0.85			
LA/OC P _{TOT}	0.66	0.70	0.84	0.64	0.58	0.77	0.62	0.63	0.63	0.67	0.69	0.93	0.64	0.61	0.98	0.89	0.81	0.99	0.69	1.01	0.94	0.99	1.02	0.97			
OC Temp /°C	15.35	14.41	17.14	13.88	15.88	16.12	17.23	20.23	20.92	33.08	24.29	21.21	23.30	25.02	23.17	20.86	25.91	26.96	25.58	25.72	23.43	30.68	26.85	23.59			

Table S2 Sensitivity of the global Eocene hydrological cycle. Rates shown represent annual mean precipitation mm day⁻¹. GL = globally averaged rate; LA = land surface rate; OC = sea surface rate. TOT = total precipitation rate; CV = convective precipitation; LS = large-scale precipitation. Note that CV and LS sum to give total precipitation rate, but land and ocean represent averages over those regions.

* CCSM_W, CCSM_H and CCSM_K share a preindustrial simulation.