

## Supplementary Tables and Figures

**Table S1.** Source-wise emissions of NO<sub>x</sub>, CO and NMVOCs for the year 2000 implemented in the ACCMIP models. Anthropogenic emissions include emissions from anthropogenic sources, biomass burning, shipping, and aircraft (for NO<sub>x</sub> only). A cell with n/a means that the quantity was not available.

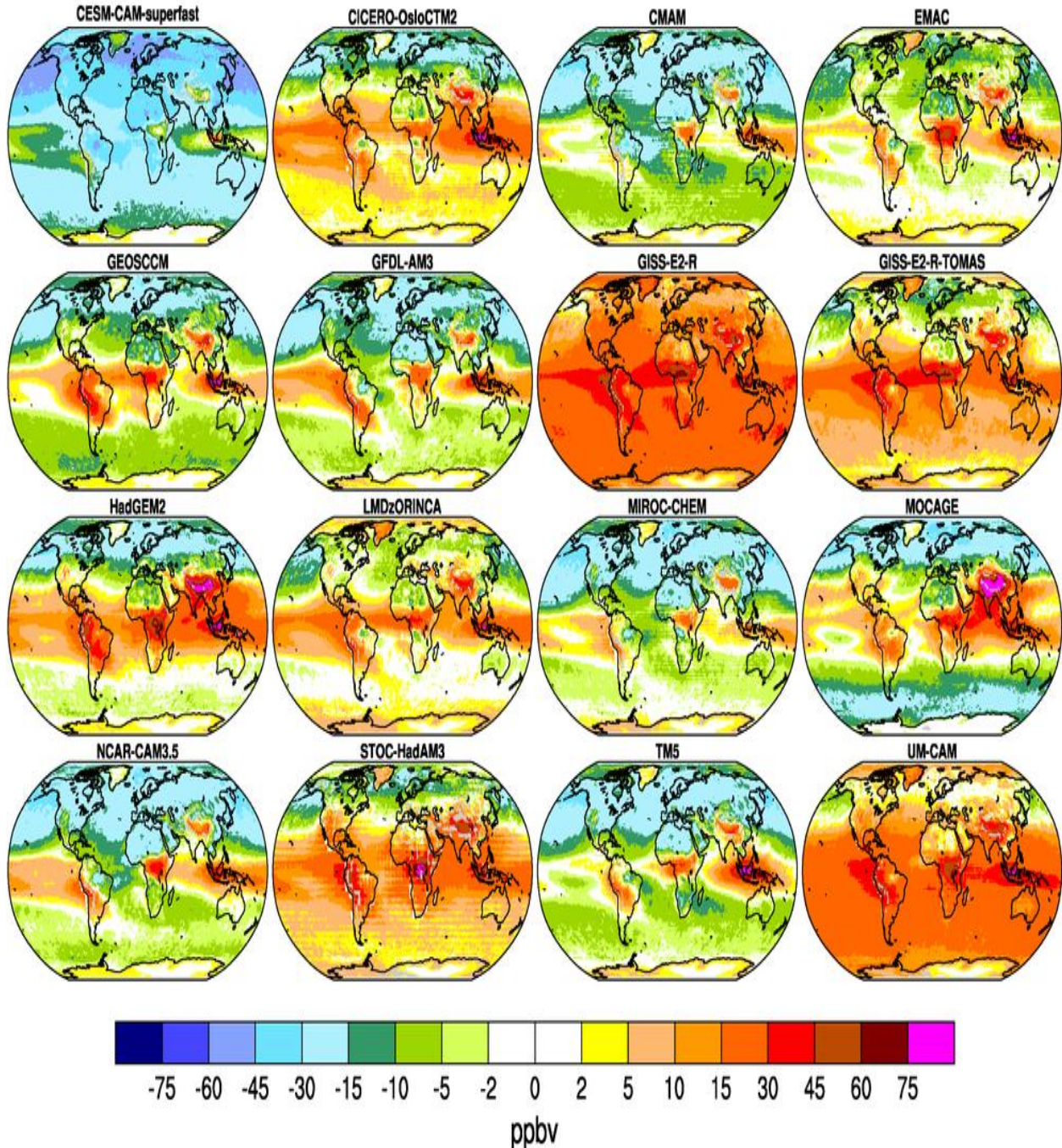
Models	NO <sub>x</sub> (Tg N yr <sup>-1</sup> )				CO (Tg CO yr <sup>-1</sup> )				NMVOCs (Tg C yr <sup>-1</sup> )			
	Anthro	Lightning	Soil	Total	Anthro	Biogenic	Ocean	Total	Anthro	Biogenic	Ocean	Total
CESM-CAM-superfast	n/a	4.2	n/a	47.9	n/a	n/a	n/a	1249	0	429	0	429
CICERO-OsloCTM2	37.7	5.0	8.0	50.7	1070	160	20	1250	65	396	0	462
CMAM	37.7	3.8	9.3	50.8	1073	410	20	1503	0	0	0	0
EMAC	38.0	5.7	3.6	47.3	1065	113	0	1178	161	419	0	580
GEOSCCM	33.0 <sup>a</sup>	5.0	7.2	45.2	1071	166	0	1237	72	556	0	628
GFDL-AM3	38.3	4.4	3.6	46.3	1071	159	20	1250	91	737	4	833
GISS-E2-R	38.2	7.7	2.7	48.6	1072	0	0	1072	78	753	0	830
GISS-E2-R-TOMAS	38.3	7.2	2.7	48.2	1069	0	0	1069	77	764	0	841
HadGEM2	37.3	1.2	5.6	44.1	1068	475	45	1588	104	0	0	104
LMDzORINCA	n/a	5.9	n/a	45.3	n/a	n/a	n/a	1080	n/a	n/a	n/a	657
MIROC-CHEM	n/a	9.7	n/a	47.8	1068	0	0	1068	n/a	n/a	n/a	836
MOCAGE	38.2	5.2	4.5	47.9	609	560 <sup>c</sup>	-	1170	98	962 <sup>c</sup>	-	1060
NCAR-CAM3.5	n/a	4.1	n/a	48.0	n/a	n/a	n/a	1249	n/a	n/a	n/a	668
STOC-HadAM3	38.2	7.2	5.6	50.9	1068	75	25	1168	144	576	0	712
TM5 <sup>b</sup>	38.5	6.0	5.0	49.5	1085	76	20	1181	113	506	3	622
UM-CAM	36.4	5.1	7.0	48.5	1053	100 <sup>c</sup>	-	1153	149	374	0	523

<sup>a</sup> Shipping emissions were not included in the model

<sup>b</sup> Base year is 2006

<sup>c</sup> Oceanic emission totals are included

**Figure S1.** Annual average difference between model CO for 2000 time-slice and average 2000-2006 MOPITT at 500 hPa for individual models. Each model was convolved with the MOPITT operator (a priori and averaging kernels) before taking the difference.



**Figure S2.** Percent change in regional tropospheric OH concentration for present day relative to the preindustrial simulated by each model.





**Figure S3.** Same as in S2, but for percent changes in 2000 relative to 1980.

