Reduced complexity model intercomparison project phase 1: Protocol, results and initial observations: supplementary information

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Table S1. Overview of the technical components of the models participating in RCMIP Phase 1.

Model	Development home	License	Approximate release frequency	Codebase size (approximate lines of code)	Simulation years per second (approximate for a single core machine)	Language, distribution format and support platforms	Code testing
ACC2	Internal only			50 000	100	GAMS	Manual validation and verification
AR5IR (both variants)	N/A	AGPLv3	N/A	500	5 000	Python 3.7 (https://github.com/openclimatedata/openscm/blob/ar5ir-notebooks/notebooks/ar5ir_rcmip.ipynb)	Manual validation and verification
CICERO-SCM	Internal only			3000			Fortran 90
ESCIMO		GNU GPLv3				Vensim	Manual validation and verification
FaIR	GitHub	Apache 2.0	Sub-yearly	3 500	3 500	Python 2.7, 3.5, 3.6, 3.7. Linux, macOS and Windows.	Unit tests and continuous integration.
GIR	Github	Creative Commons Attribution 4.0 License		250	200 000	Python 3.6+ (recommended), Excel, MatLAB and IDL available upon request. Linux, macOS and Windows.	Manual validation and verification
GREB	GitHub	Creative Commons Attribution 4.0 License	Yearly	1700	1	Fortran 90 (GrADS or Python 3.7 for data processing)	Fortran 90 code tested by gfortran on Mac and ifort on Linux under continuous integration

Table S1. Continued.

Model	Development home	License	Approximate release frequency	Codebase size (approximate lines of code)	Simulation years per second (approximate for a single core machine)	Language, distribution format and support platforms	Code testing
Hector		GNU GPLv3				R and Python packages (with C++ backend). Linux, macOS and Windows.	Unit tests and continuous integration
Held et al. two layer model	GitHub	AGPLv3	Yearly	500	5 000	Python 3.7 (https://github.com/openclimatedata/openscm/blob/ar5ir-notebooks/notebooks/held_two_layer_rcmip.ipynb)	Manual validation and verification
MAGICC	Private GitLab repository	Custom Community non-commercial license	Decadal (internally approximately monthly, moving to approximately annual public releases)	15 000	350	Fortran 90 (Open-source Python wrapper available). Linux, macOS and Windows.	Unit tests and continuous integration
MCE	Private GitHub, preparing public release	n/a	n/a	760 excluding calibration code	500	Python 2.7 and 3.7 on multiple platforms	Comparing results for idealized scenarios with analytical solutions

Table S1. Continued.

Model	**Development home**	**License**	**Approximate release frequency**	**Codebase size (approximate lines of code)**	**Simulation years per second (approximate for a single core machine)**	**Language, distribution format and support platforms**	**Code testing**
OSCAR	Develoment internal, with release on GitHub https://github.com/tgasser/OSCAR	CeCILL	sub-yearly	5000 excluding calibration code		Python 3.7	Manual validation and verification
WASP	Internal	Creative Commons Attribution License			100000	C++ 11	WASP C++ code tested only on GNU GCC compiler collection

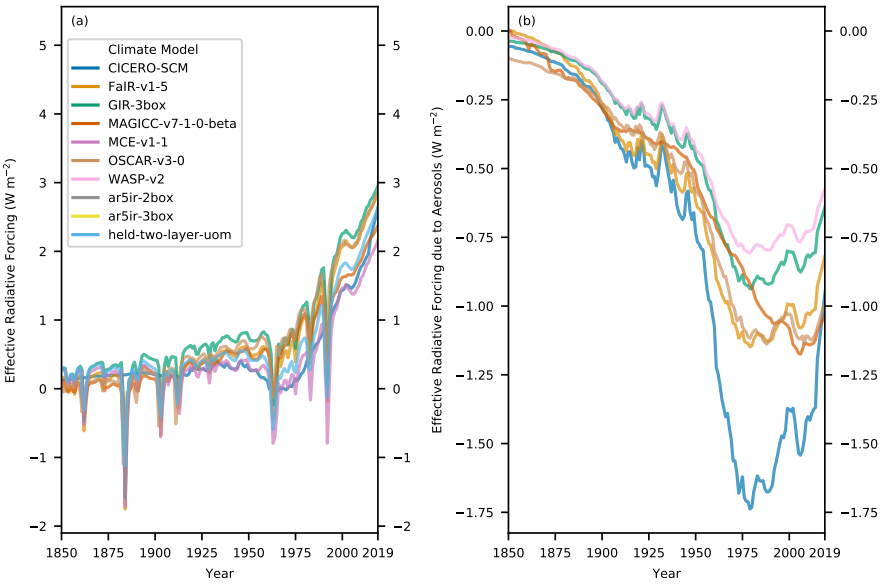

Figure S1. Historical effective radiative forcing for RCMIP models in illustrative configurations. In order to provide timeseries up until 2019, we have used data from the combination of historical and ssp585 simulations. (a) - total effective radiative forcing; (b) - aerosol effective radiative forcing.

Table S2. Emulation scores and equilbrium climate sensitivities (ECSs) for RCMIP model calibrations. In parentheses we show the number of simulations available for each model variant.

Target CMIP6 model	RCMIP model	ECS (K)	RMSE (K)
AWI-CM-1-1-MR_r1i1p1f1 (5)	MAGICC-v7-1-0-beta (5)	3.22	0.16
BCC-CSM2-MR_r1i1p1f1 (6)	MCE-v1-1 (2)	2.90	0.21
	MAGICC-v7-1-0-beta (6)	2.83	0.16
	ar5ir-2box (2)	7.35	0.13
	ar5ir-3box (2)	7.78	0.13
	held-two-layer-uom (2)	2.63	0.13
BCC-ESM1_r1i1p1f1 (4)	MCE-v1-1 (2)	2.96	0.12
	MAGICC-v7-1-0-beta (3)	3.13	0.13
	ar5ir-2box (2)	15.30	0.18
	ar5ir-3box (2)	8.06	0.15
	held-two-layer-uom (2)	2.31	0.12
CanESM5_r1i1p1f1 (10)	MCE-v1-1 (2)	5.08	0.13
	hector|62381e71 (4)	4.79	0.42
	MAGICC-v7-1-0-beta (10)	5.72	0.30
	ar5ir-2box (2)	5.24	0.19
	ar5ir-3box (2)	11.82	0.21
	held-two-layer-uom (2)	3.14	0.30
CanESM5_r1i1p2f1 (7)	MCE-v1-1 (2)	5.08	0.13
	hector|62381e71 (4)	4.79	0.43
	MAGICC-v7-1-0-beta (7)	5.64	0.27
CanESM5_r10i1p1f1 (5)	hector|62381e71 (2)	4.79	0.29
	MAGICC-v7-1-0-beta (5)	6.01	0.18
CESM2-WACCM_r1i1p1f1 (6)	MCE-v1-1 (2)	3.85	0.15
	hector|62381e71 (3)	4.17	0.26
	MAGICC-v7-1-0-beta (6)	4.26	0.21
	ar5ir-2box (2)	4.64	0.45
	ar5ir-3box (2)	13.42	0.21
	held-two-layer-uom (2)	2.55	0.13

Table S2. Continued.

Target CMIP6 model	RCMIP model	ECS (K)	RMSE (K)
CESM2_r1i1p1f1 (6)	MCE-v1-1 (2)	4.20	0.17
	hector|62381e71 (3)	4.00	0.67
	MAGICC-v7-1-0-beta (6)	5.32	0.27
	ar5ir-2box (2)	5.40	0.24
	ar5ir-3box (2)	8.31	0.24
	held-two-layer-uom (2)	3.63	0.20
CNRM-CM6-1_r1i1p1f2 (8)	MCE-v1-1 (4)	4.06	0.24
	hector|62381e71 (5)	3.86	0.36
	MAGICC-v7-1-0-beta (8)	4.08	0.18
	ar5ir-2box (4)	8.13	0.43
	ar5ir-3box (4)	9.12	0.43
	held-two-layer-uom (4)	2.91	0.16
CNRM-ESM2-1_r1i1p1f2 (10)	MCE-v1-1 (2)	4.02	0.20
	hector|62381e71 (4)	3.51	0.25
	MAGICC-v7-1-0-beta (9)	3.71	0.18
	ar5ir-2box (2)	8.22	0.27
	ar5ir-3box (2)	12.18	0.27
	held-two-layer-uom (2)	2.29	0.17
E3SM-1-0_r1i1p1f1 (2)	MCE-v1-1 (2)	5.10	0.17
	MAGICC-v7-1-0-beta (2)	5.69	0.22
EC-Earth3-Veg_r1i1p1f1 (7)	MCE-v1-1 (2)	4.13	0.19
	MAGICC-v7-1-0-beta (7)	4.47	0.25
	ar5ir-2box (2)	15.91	0.27
	ar5ir-3box (2)	8.32	0.22
	held-two-layer-uom (2)	3.50	0.19

Table S2. Continued.

Target CMIP6 model	RCMIP model	ECS (K)	RMSE (K)
FGOALS-g3_r1i1p1f1 (4)	MAGICC-v7-1-0-beta (4)	2.77	0.15
GISS-E2-1-G_r1i1p1f1 (4)	MCE-v1-1 (4)	2.69	0.16
	MAGICC-v7-1-0-beta (4)	2.81	0.19
	ar5ir-2box (4)	5.24	0.15
	ar5ir-3box (4)	18.98	0.58
	held-two-layer-uom (4)	2.50	0.15
GISS-E2-1-H_r1i1p1f1 (3)	MCE-v1-1 (3)	3.07	0.15
	MAGICC-v7-1-0-beta (3)	3.20	0.16
	ar5ir-2box (3)	16.68	0.16
	ar5ir-3box (3)	8.05	0.15
	held-two-layer-uom (3)	2.48	0.14
GISS-E2-2-G_r1i1p1f1 (3)	MAGICC-v7-1-0-beta (3)	2.88	0.19
	ar5ir-2box (3)	3.70	0.16
	ar5ir-3box (3)	18.86	0.66
	held-two-layer-uom (3)	1.90	0.14
IPSL-CM6A-LR_r1i1p1f1 (9)	MCE-v1-1 (4)	3.83	0.25
	hector\62381e71 (6)	3.07	0.67
	MAGICC-v7-1-0-beta (9)	4.53	0.25
	ar5ir-2box (4)	13.57	0.34
	ar5ir-3box (4)	5.71	0.26
	held-two-layer-uom (4)	4.57	0.29
IPSL-CM6A-LR_r1i1p1f2 (2)	MAGICC-v7-1-0-beta (2)	4.43	0.21
IPSL-CM6A-LR_r10i1p1f1 (3)	MCE-v1-1 (1)	3.83	0.21
	hector\62381e71 (1)	3.07	0.40
	MAGICC-v7-1-0-beta (3)	3.77	0.32
MCM-UA-1-0_r1i1p1f2 (4)	MAGICC-v7-1-0-beta (4)	3.45	0.16

Table S2. Continued.

Target CMIP6 model	RCMIP model	ECS (K)	RMSE (K)
MIROC6_r1i1p1f1 (14)	MCE-v1-1 (4)	2.44	0.28
	MAGICC-v7-1-0-beta (12)	2.20	0.19
MPI-ESM1-2-HR_r1i1p1f1 (2)	MAGICC-v7-1-0-beta (2)	2.90	0.15
	ar5ir-2box (2)	8.02	0.16
	ar5ir-3box (2)	6.08	0.16
	held-two-layer-uom (2)	2.17	0.12
NorCPM1_r1i1p1f1 (2)	MAGICC-v7-1-0-beta (2)	2.73	0.29
	ar5ir-2box (2)	7.24	0.13
	ar5ir-3box (2)	8.60	0.23
	held-two-layer-uom (2)	4.15	0.18
NorESM2-LM_r1i1p1f1 (3)	MCE-v1-1 (2)	2.19	0.32
	MAGICC-v7-1-0-beta (2)	2.27	0.22
	ar5ir-2box (2)	13.37	0.19
	ar5ir-3box (2)	12.48	0.19
SAM0-UNICON_r1i1p1f1 (2)	MCE-v1-1 (2)	3.80	0.15
	MAGICC-v7-1-0-beta (2)	3.42	0.24
UKESM1-0-LL_r1i1p1f2 (9)	MCE-v1-1 (2)	5.31	0.16
	MAGICC-v7-1-0-beta (9)	6.05	0.30
	ar5ir-2box (2)	16.92	0.26
	ar5ir-3box (2)	7.22	0.19
	held-two-layer-uom (2)	4.11	0.19

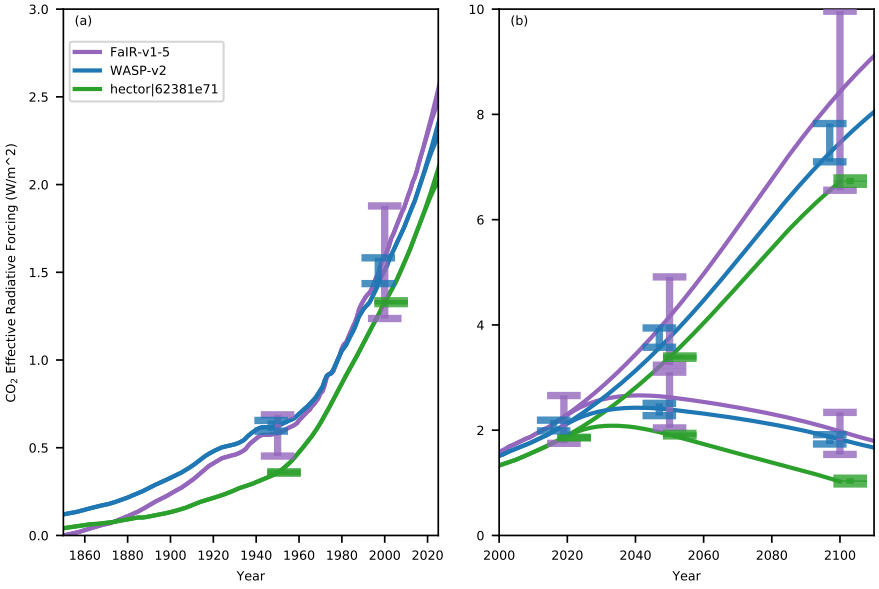

Figure S2. Probabilistic estimate of CO_2 effective radiative forcing for ssp119 and ssp585 (note, for Hector CO_2 radiative forcing is shown as effective radiative forcing is not available). (a) - historical period (1850-2025); (b) - projections (2000-2110).

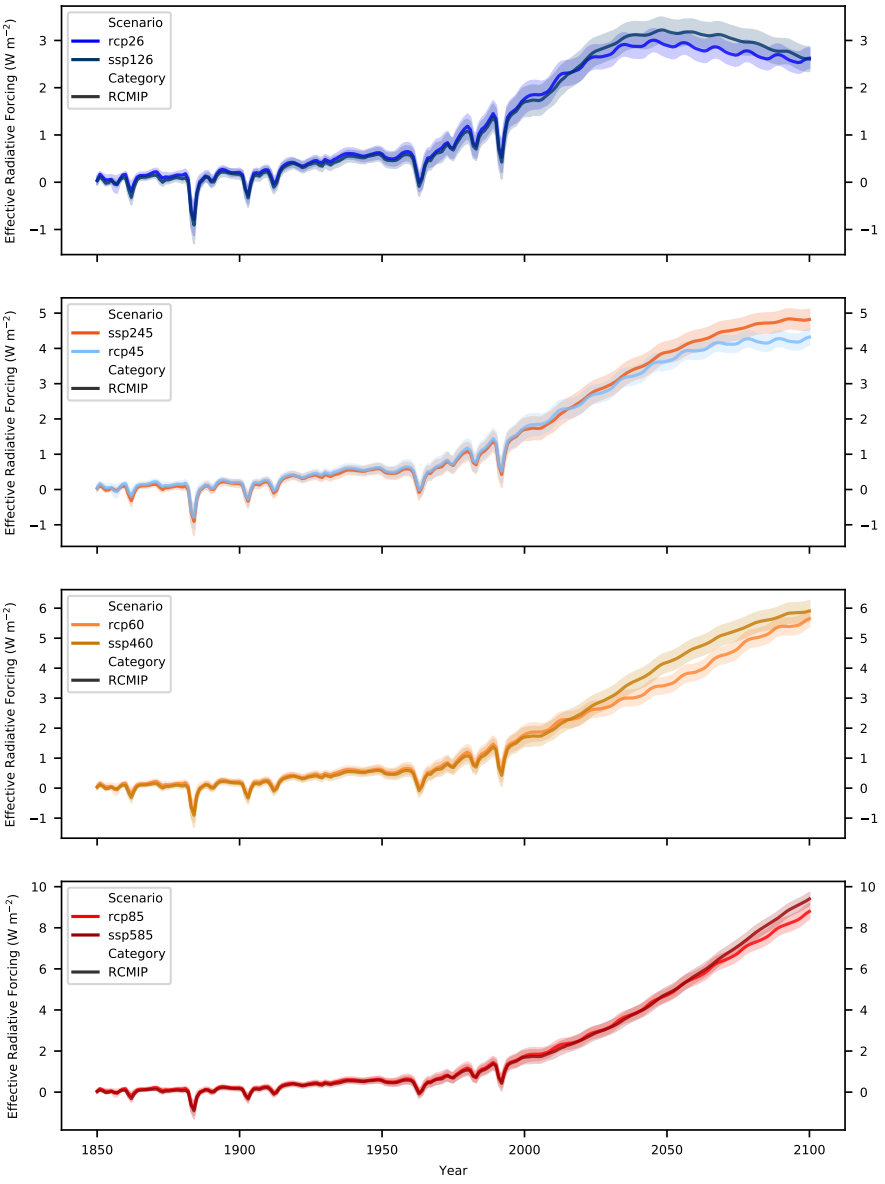

Figure S3. Comparison of effective radiative forcing projections under the RCPs and SSPs up until 2100. The coloured solid lines are RCMIP output where the RCP/SSP pair has been run with the same model in the same configuration. The plumes show the standard deviation of the available model results whilst the lines show the mean.

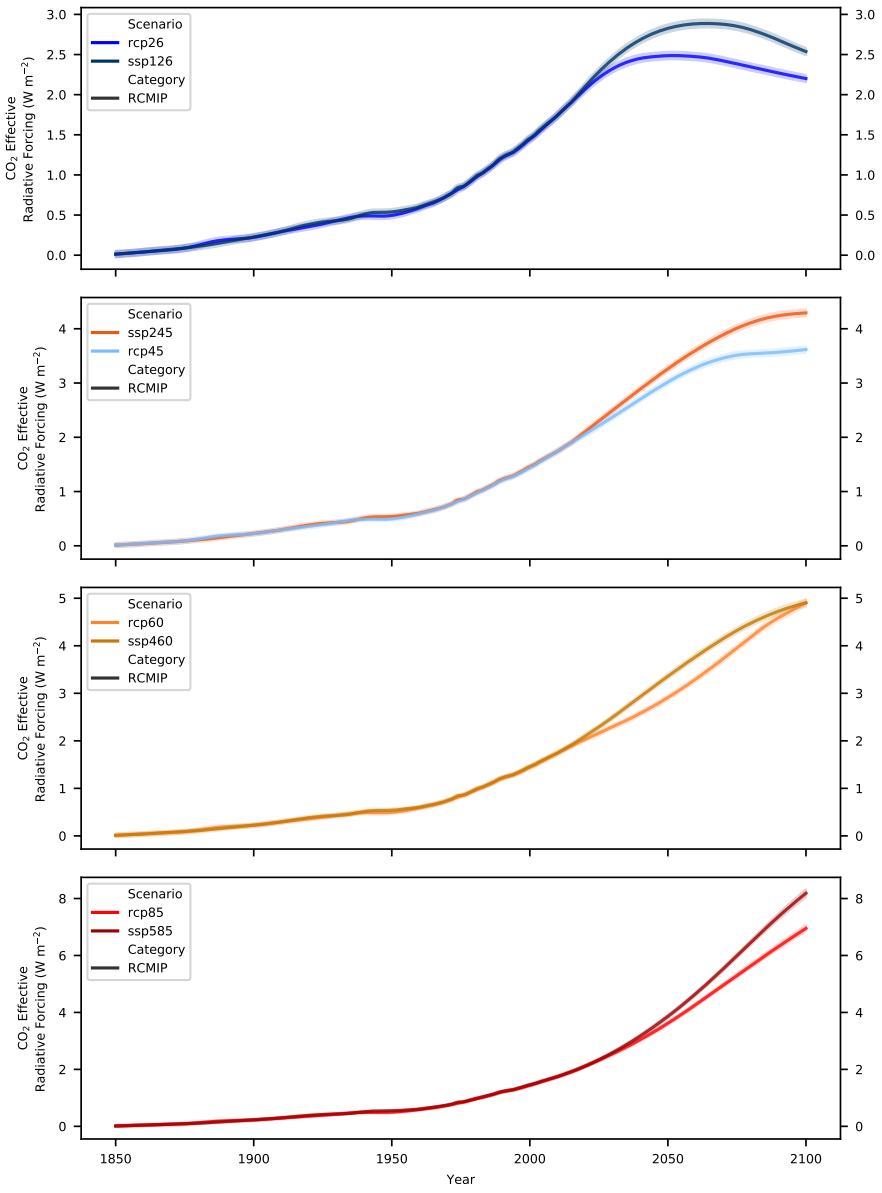

Figure S4. Comparison of CO_2 effective radiative forcing projections under the RCPs and SSPs up until 2100. The coloured solid lines are RCMIP output where the RCP/SSP pair has been run with the same model in the same configuration. The plumes show the standard deviation of the available model results whilst the lines show the mean.

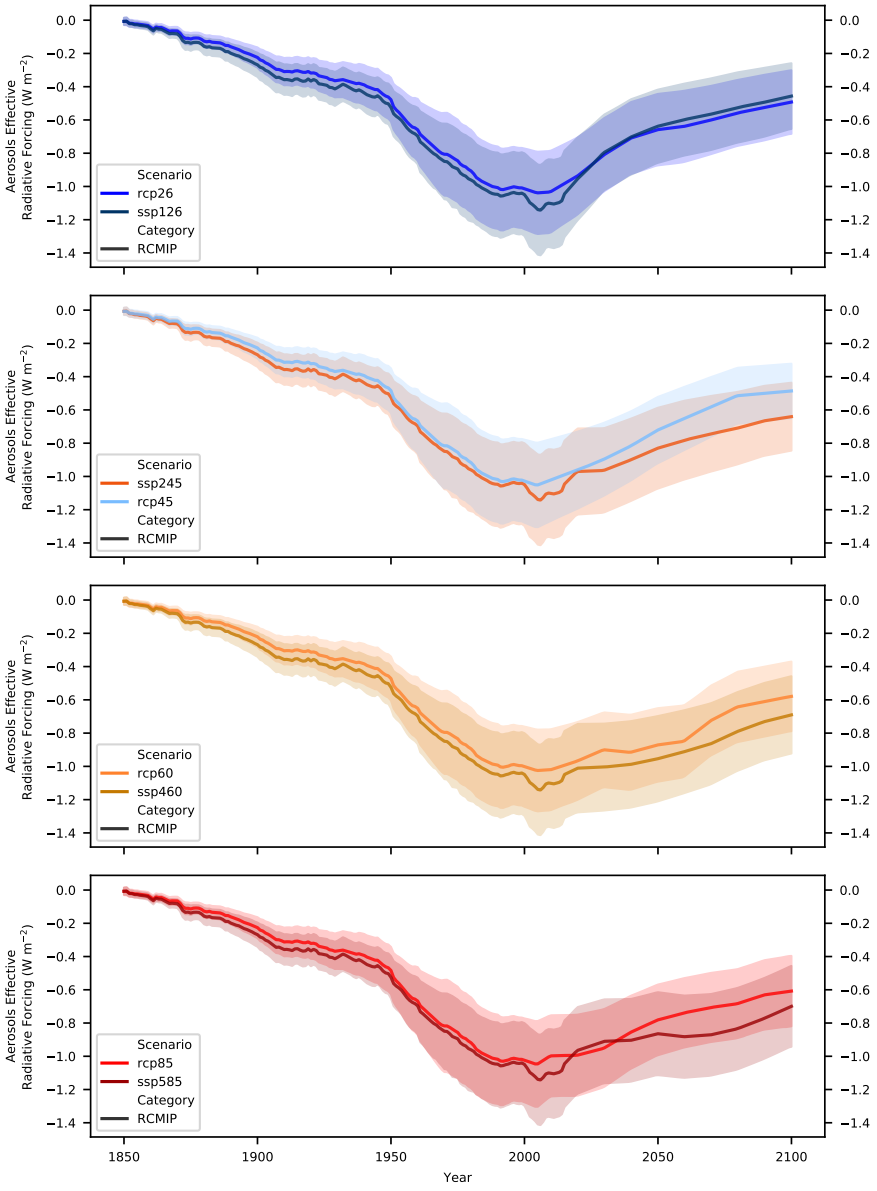

Figure S5. Comparison of aerosols effective radiative forcing projections under the RCPs and SSPs up until 2100. The coloured solid lines are RCMIP output where the RCP/SSP pair has been run with the same model in the same configuration. The plumes show the standard deviation of the available model results whilst the lines show the mean.

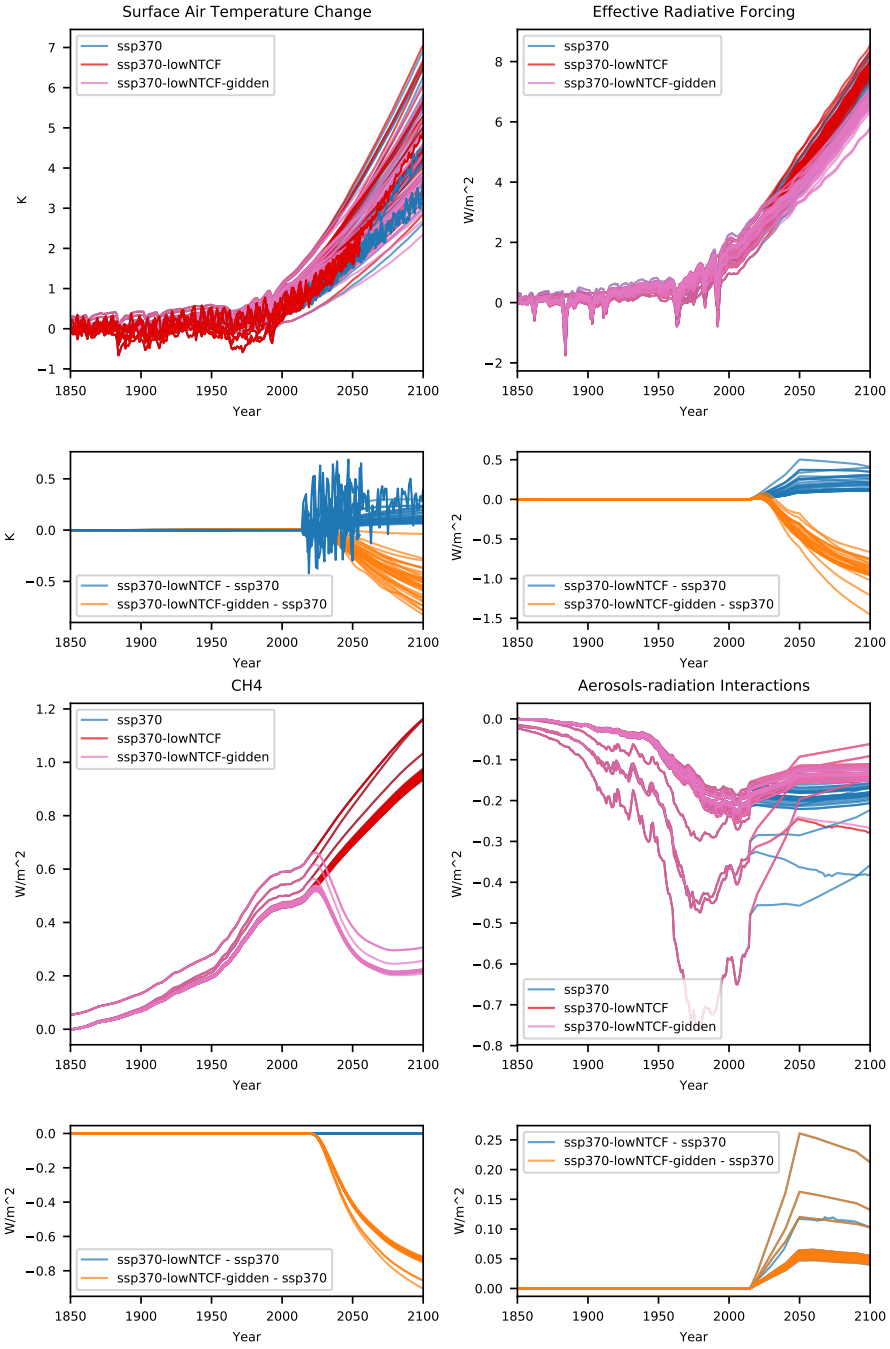

Figure S6. Response of RCMIP models to a reduction in near-term climate forcers. Results are from RCMIP models, except for temperature lines with natural variability which are CMIP6 results. The ssp370-lowNTCF scenario results in a small warming signal relative to ssp370, the magnitude of which varies by RCM. For comparison, we also include ssp370-lowNTCF as quantified by Gidden et al. (2019) (labelled 'ssp370-lowntcf-gidden'). This implementation also includes reductions in methane and so a strong cooling signal is seen instead.

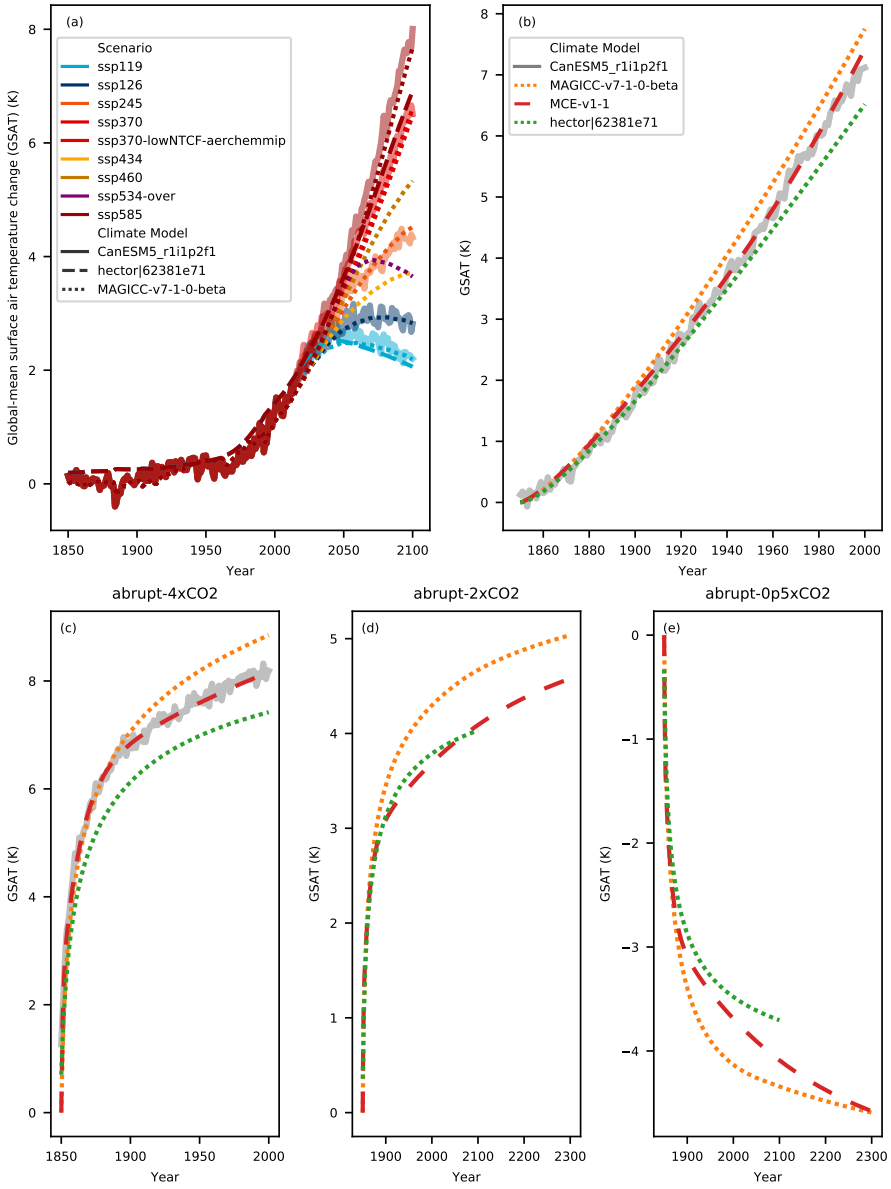

Figure S7. Emulation of CanESM5_r1i1p2f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CanESM5_r1i1p2f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

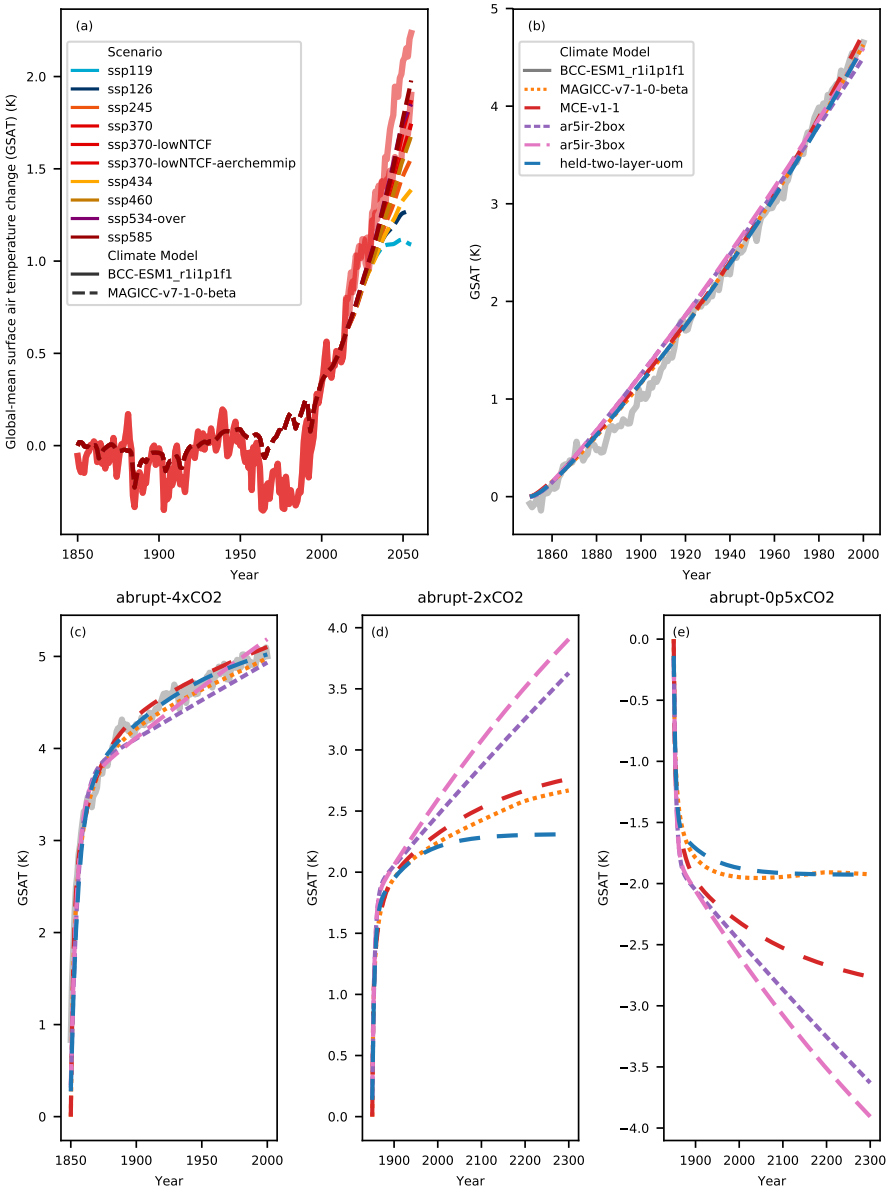

Figure S8. Emulation of BCC-ESM1_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from BCC-ESM1_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

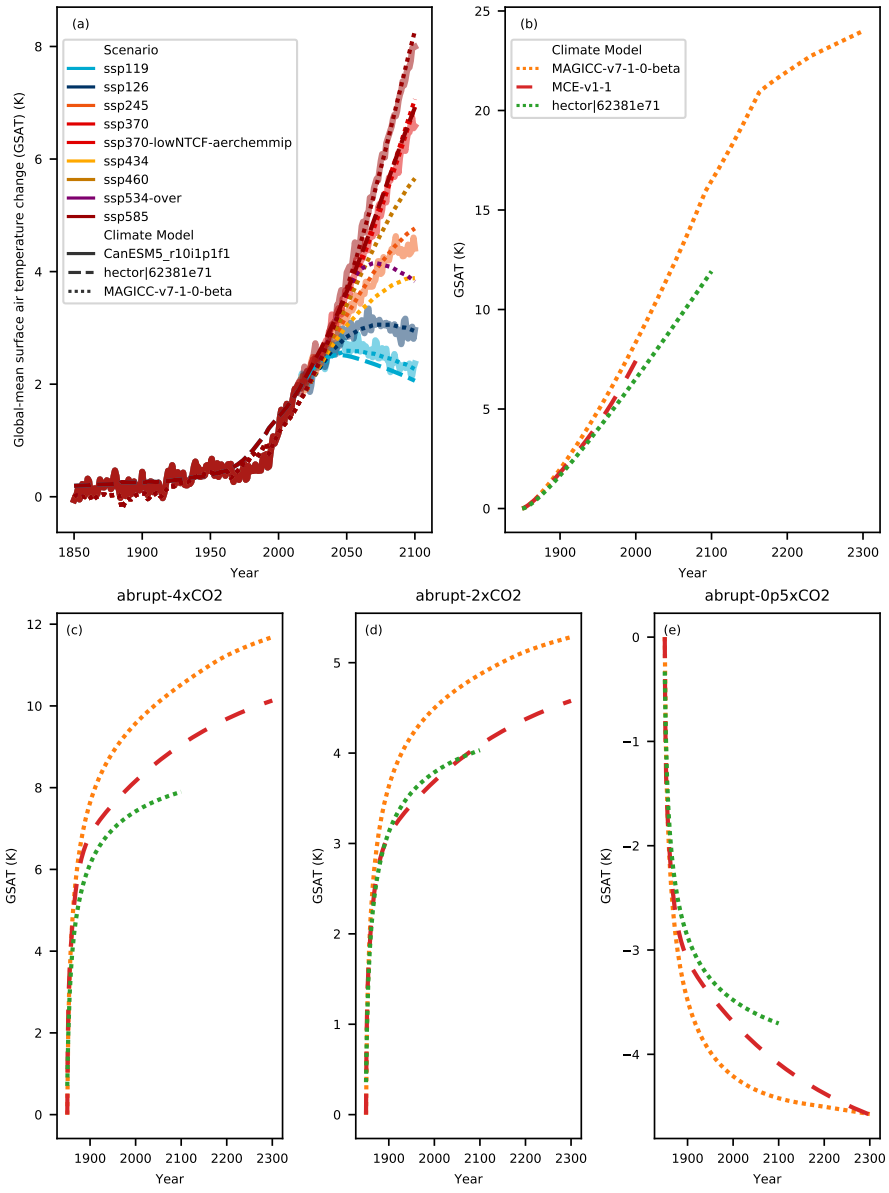

Figure S9. Emulation of CanESM5_r10i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CanESM5_r10i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

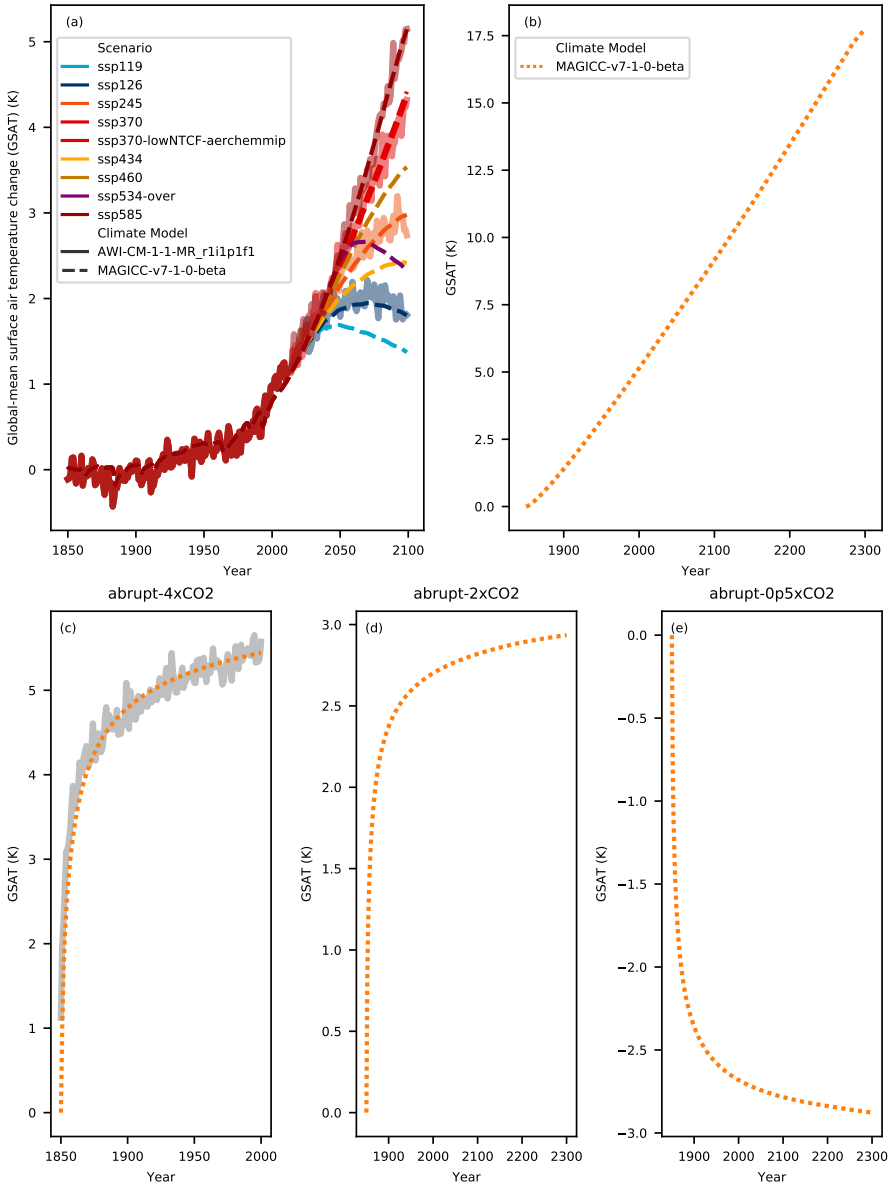

Figure S10. Emulation of generic by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from generic). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

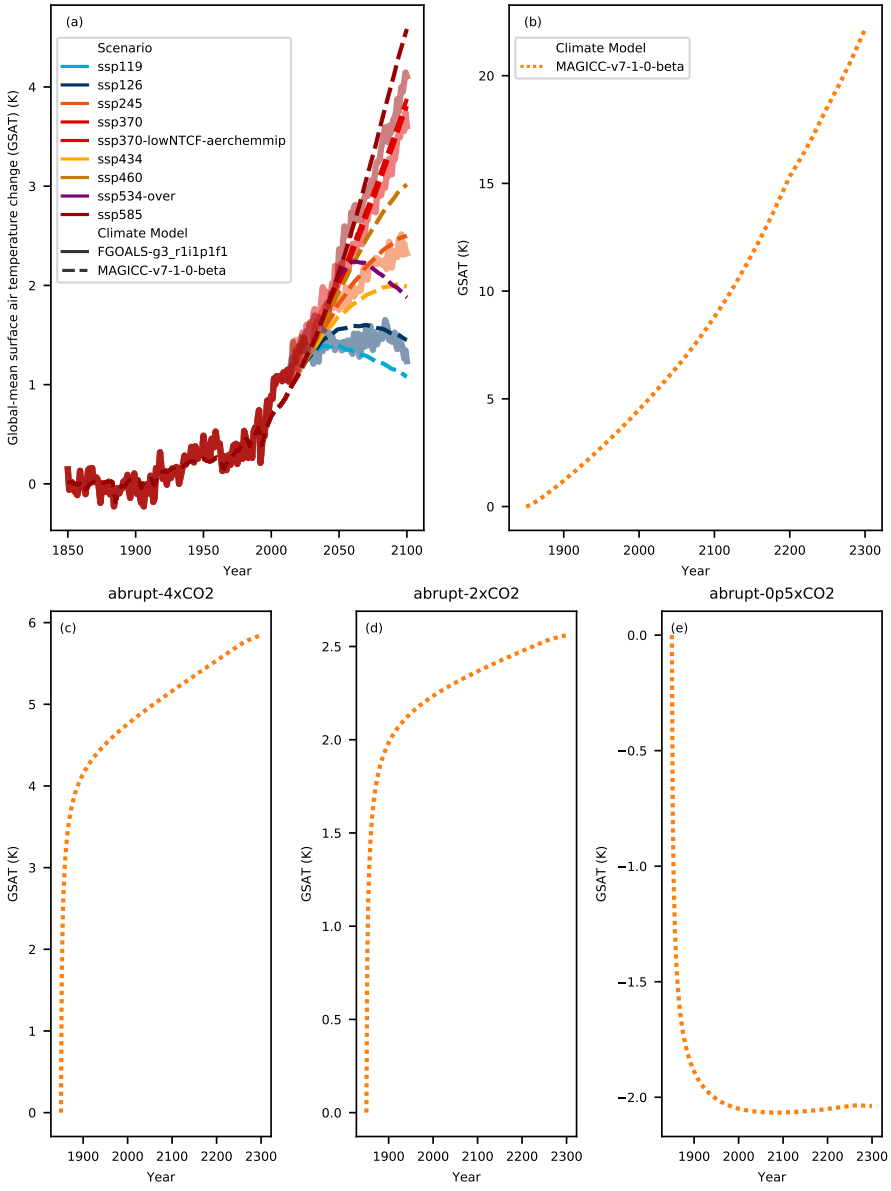

Figure S11. Emulation of FGOALS-g3_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from FGOALS-g3_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

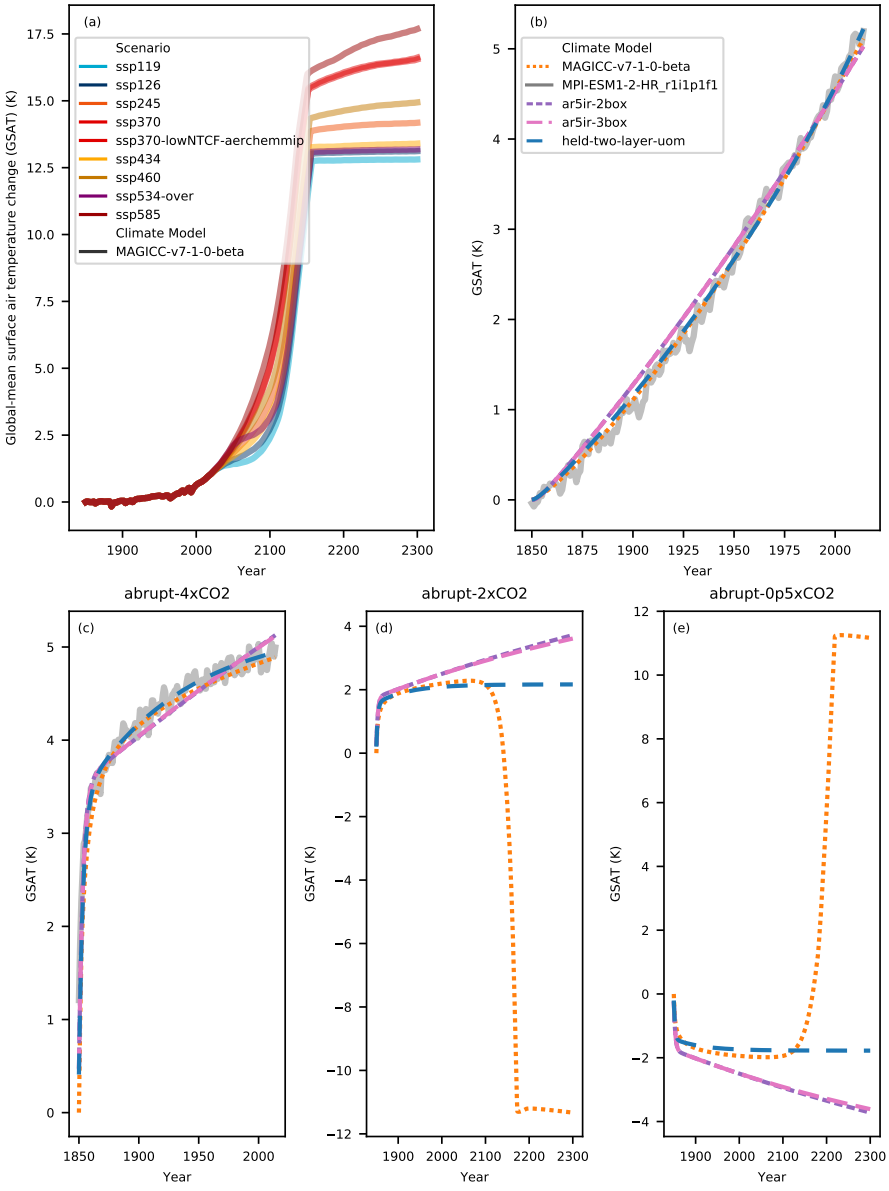

Figure S12. Emulation of MPI-ESM1-2-HR_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from MPI-ESM1-2-HR_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

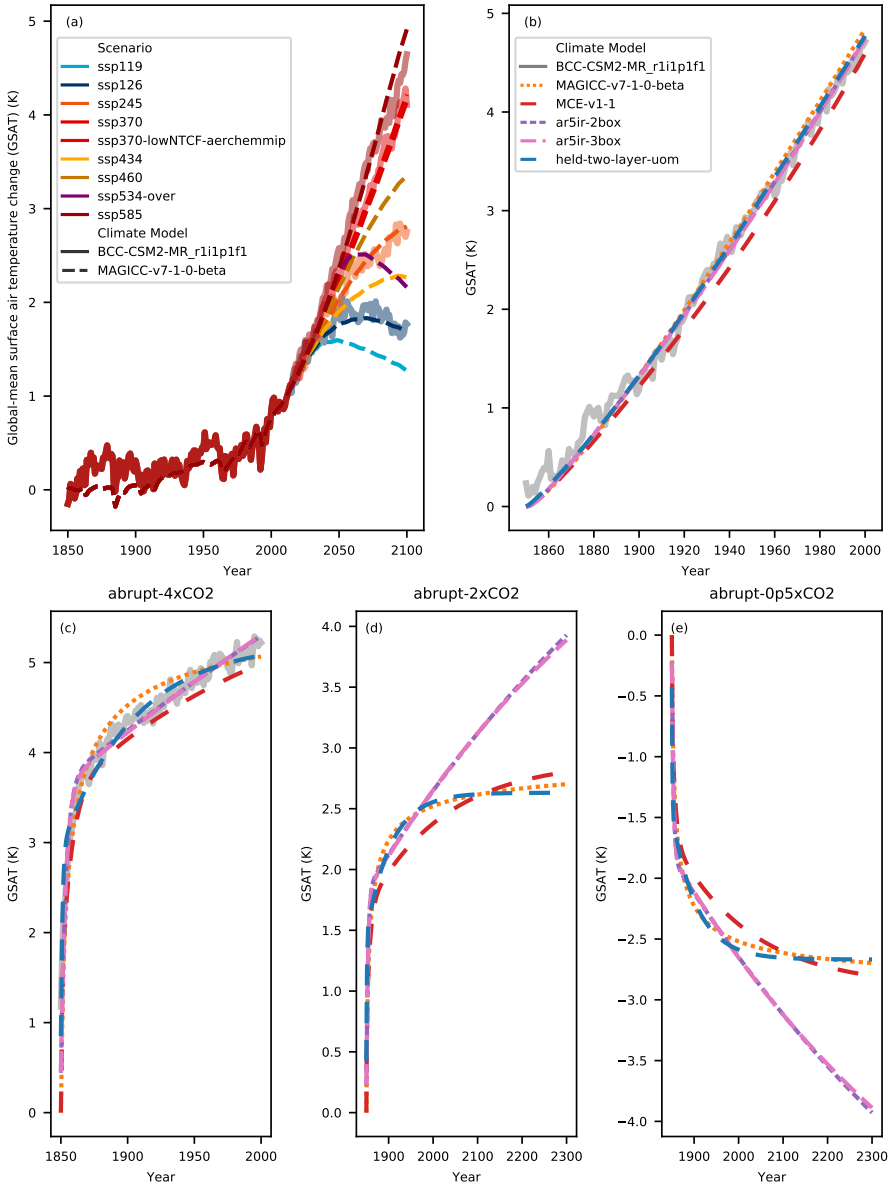

Figure S13. Emulation of BCC-CSM2-MR_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from BCC-CSM2-MR_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

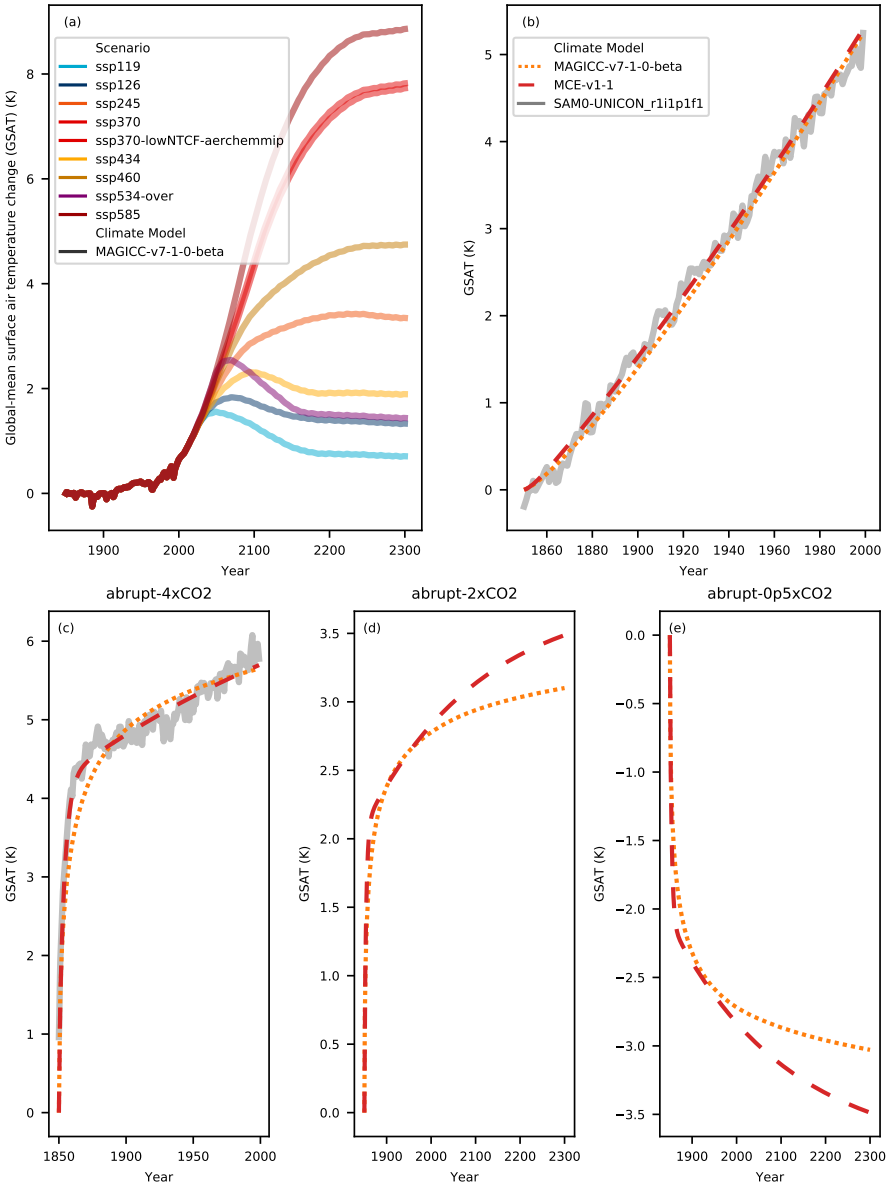

Figure S14. Emulation of SAM0-UNICON_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from SAM0-UNICON_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

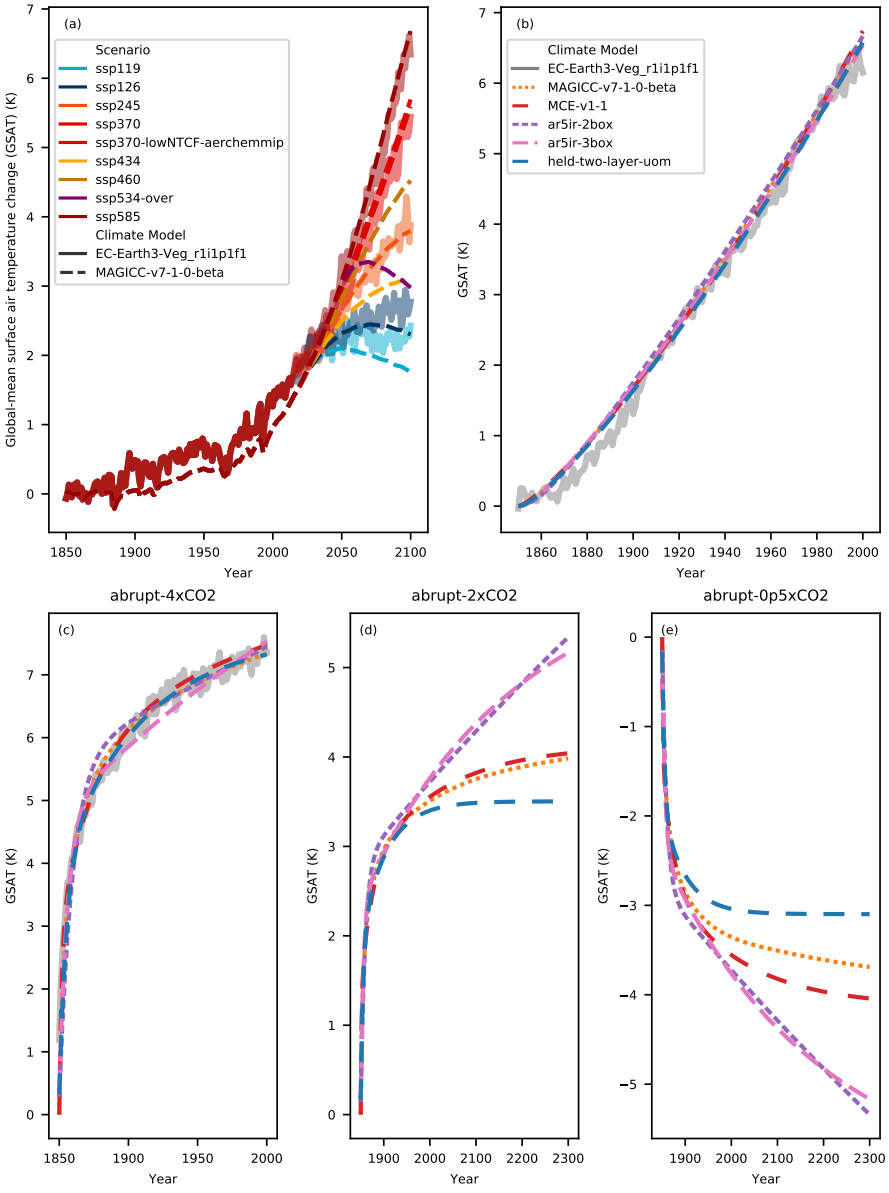

Figure S15. Emulation of EC-Earth3-Veg_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from EC-Earth3-Veg_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

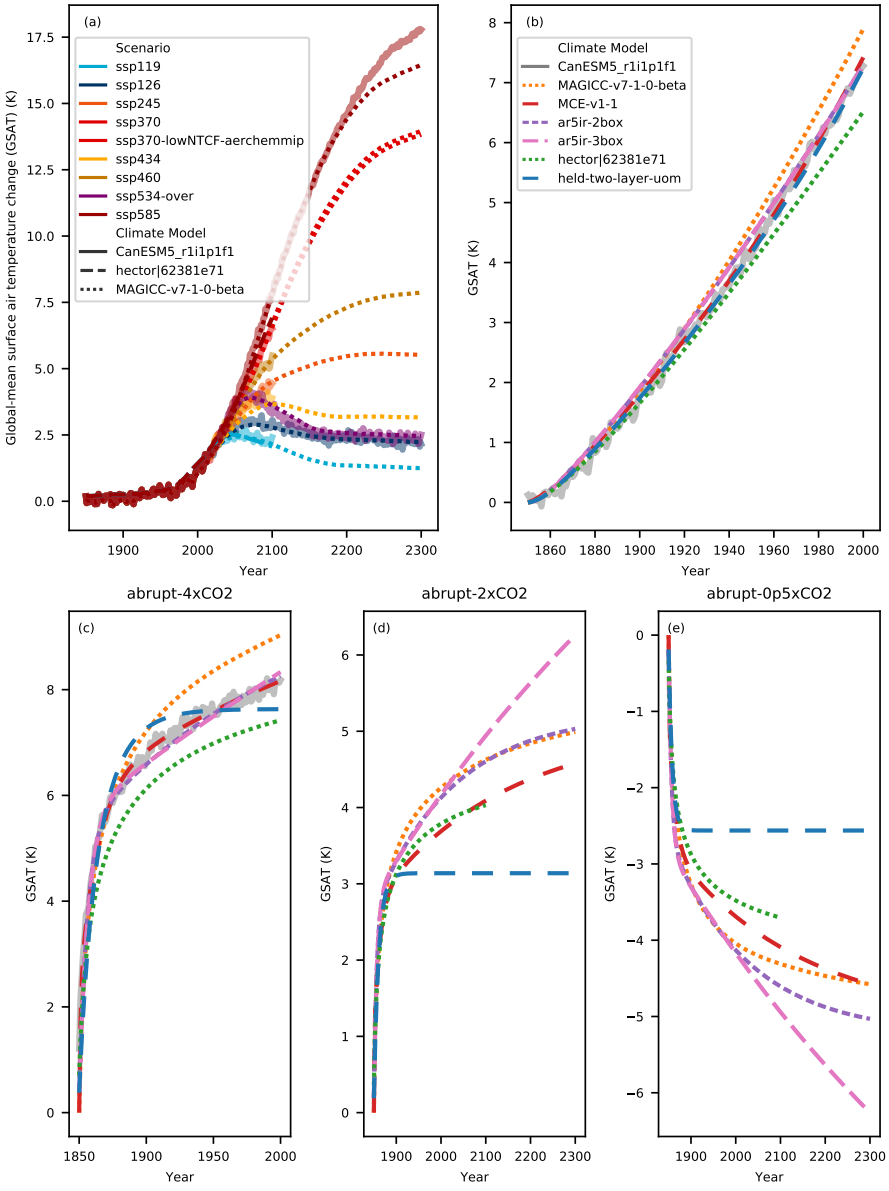

Figure S16. Emulation of CanESM5_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CanESM5_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

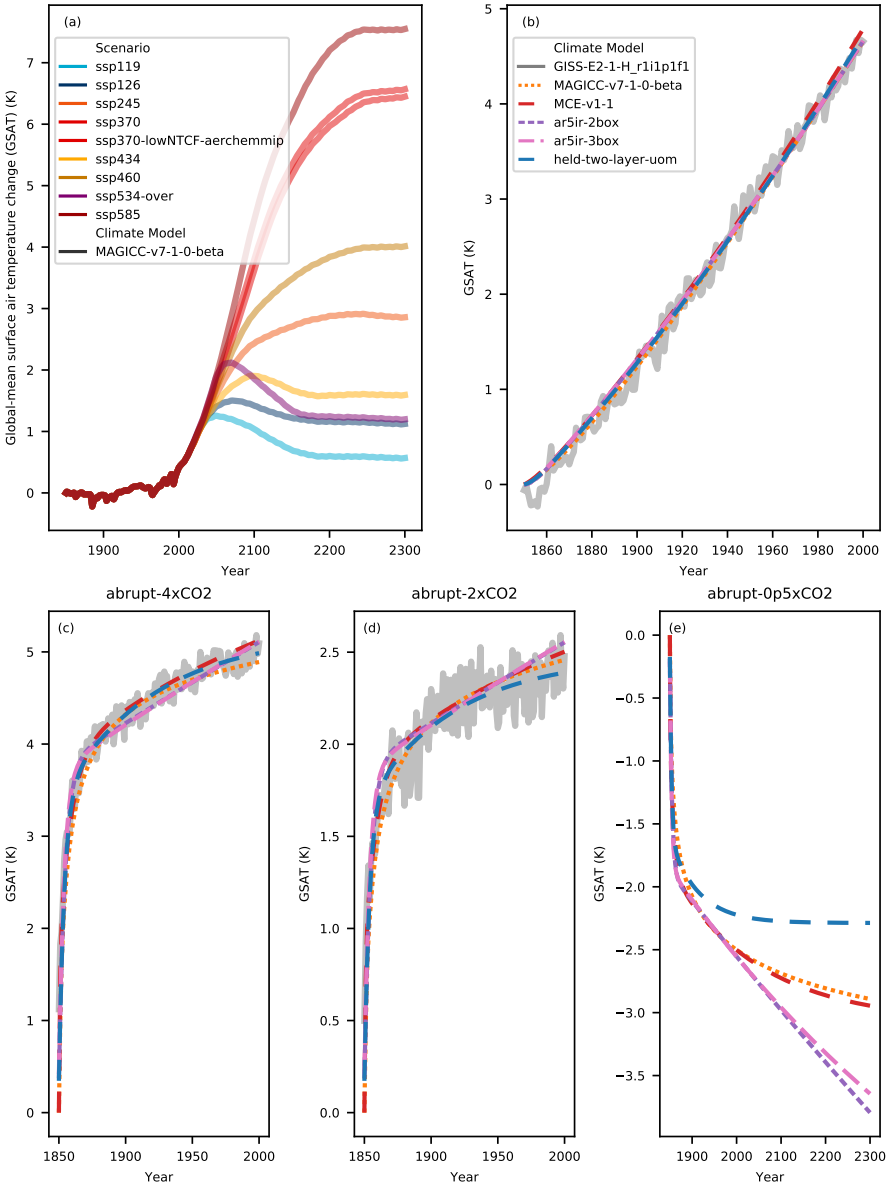

Figure S17. Emulation of GISS-E2-1-H_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from GISS-E2-1-H_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

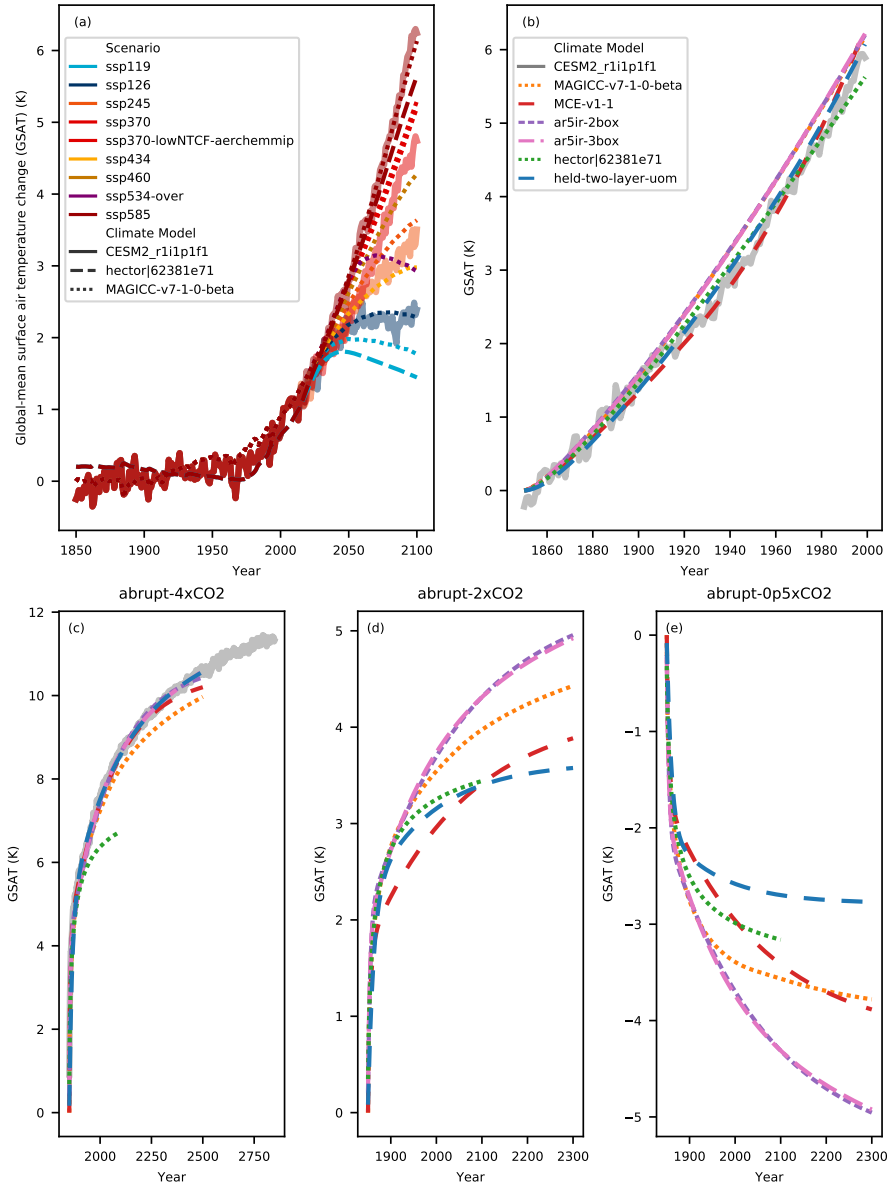

Figure S18. Emulation of CESM2_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CESM2_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

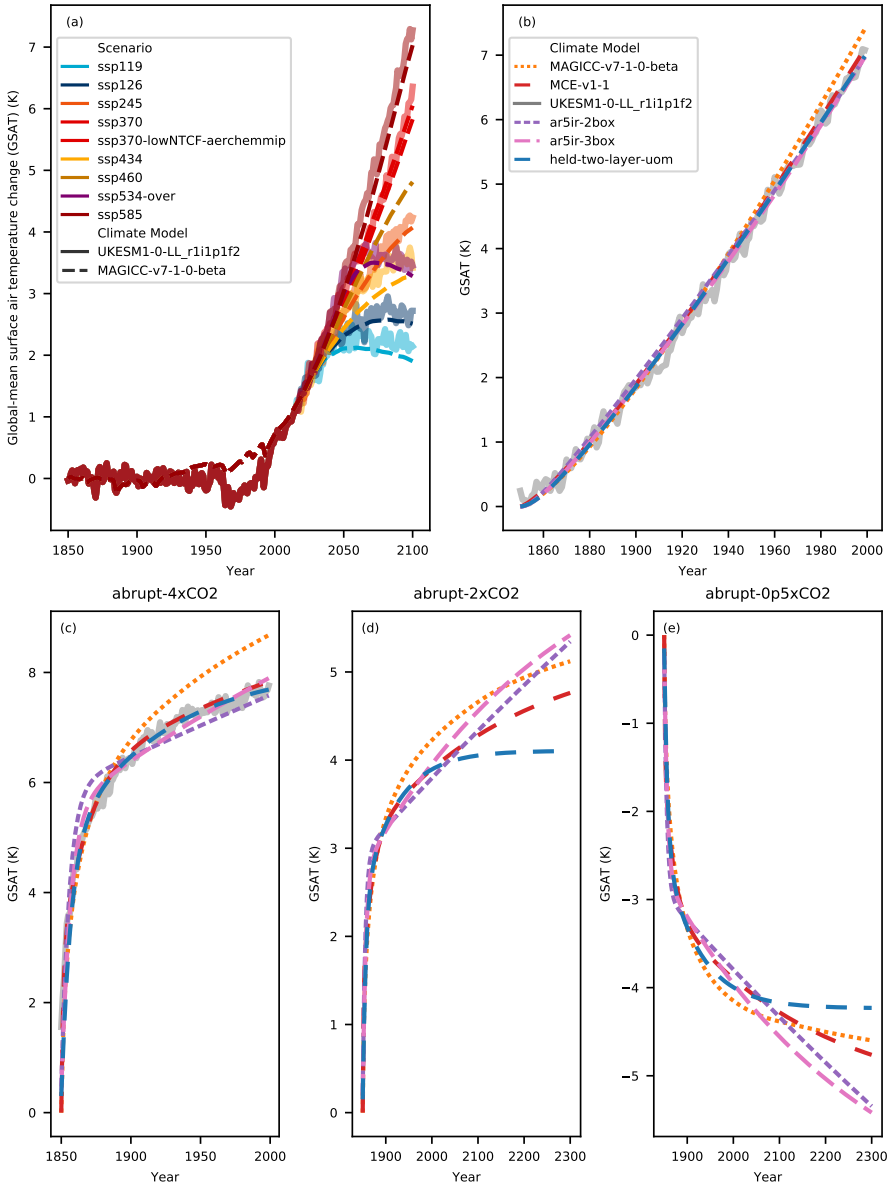

Figure S19. Emulation of UKESM1-0-LL_r1i1p1f2 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from UKESM1-0-LL_r1i1p1f2). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

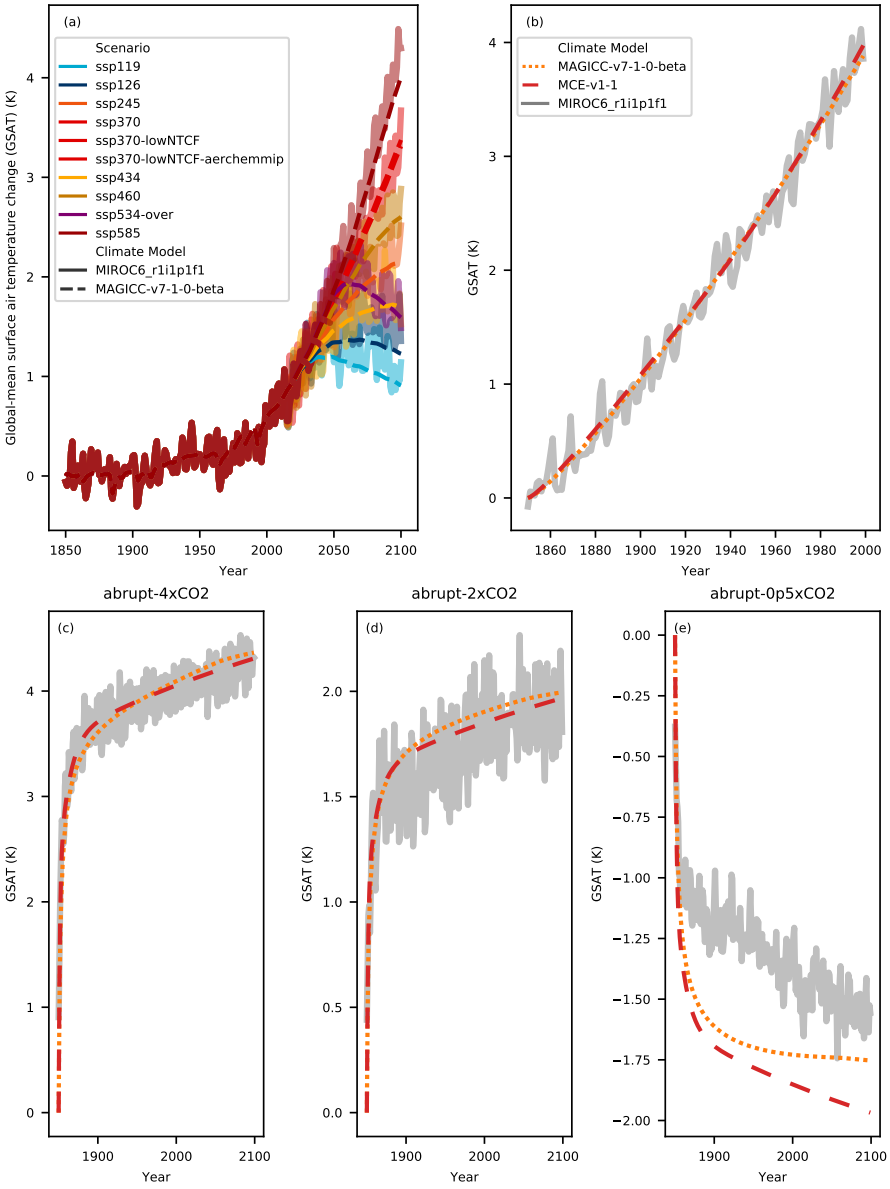

Figure S20. Emulation of MIROC6_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from MIROC6_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

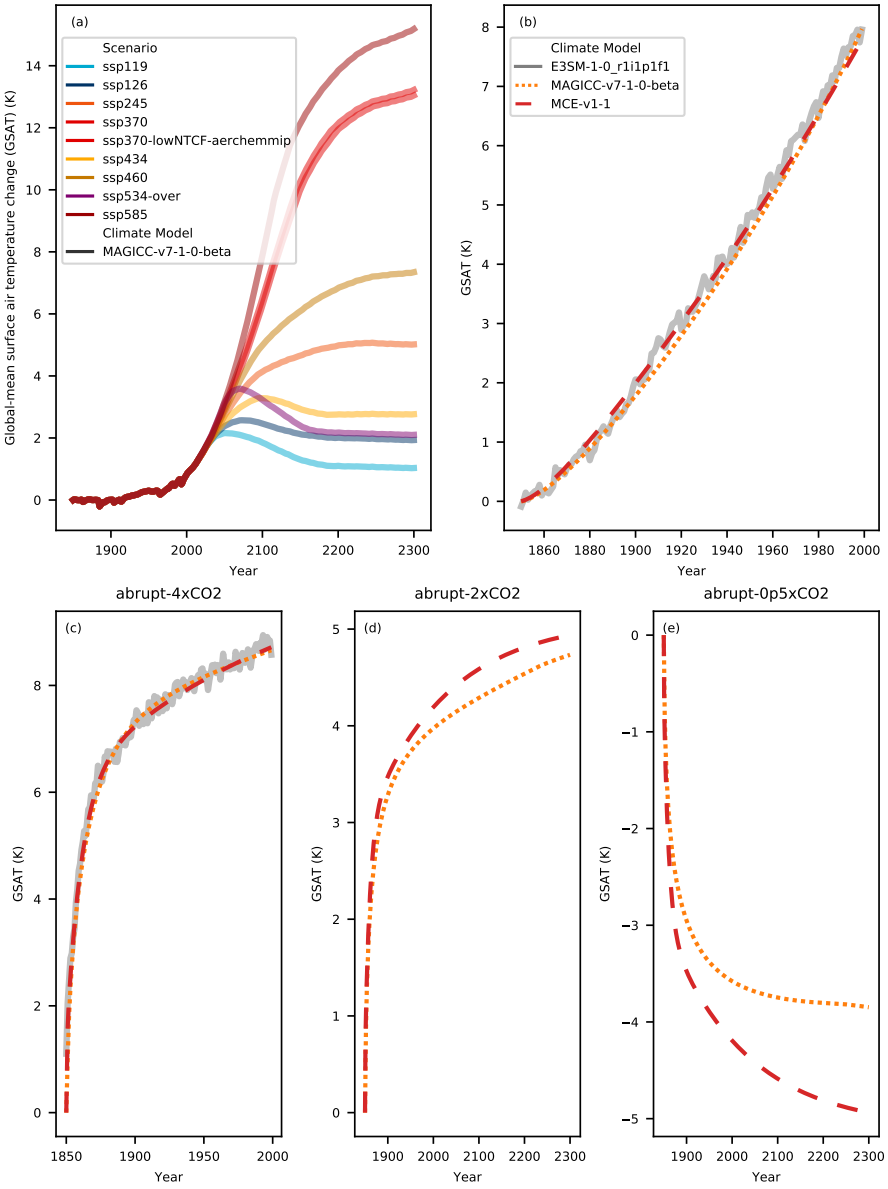

Figure S21. Emulation of E3SM-1-0_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from E3SM-1-0_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

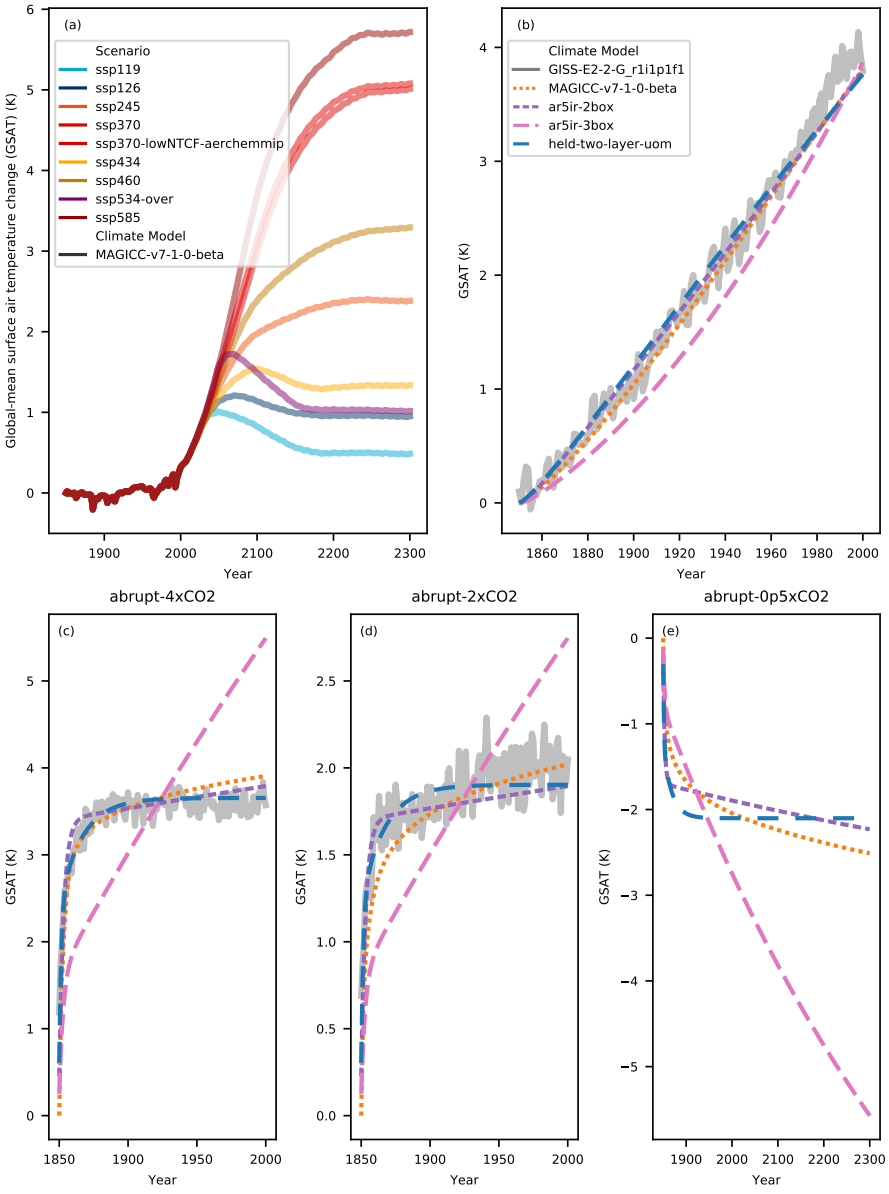

Figure S22. Emulation of GISS-E2-2-G_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from GISS-E2-2-G_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

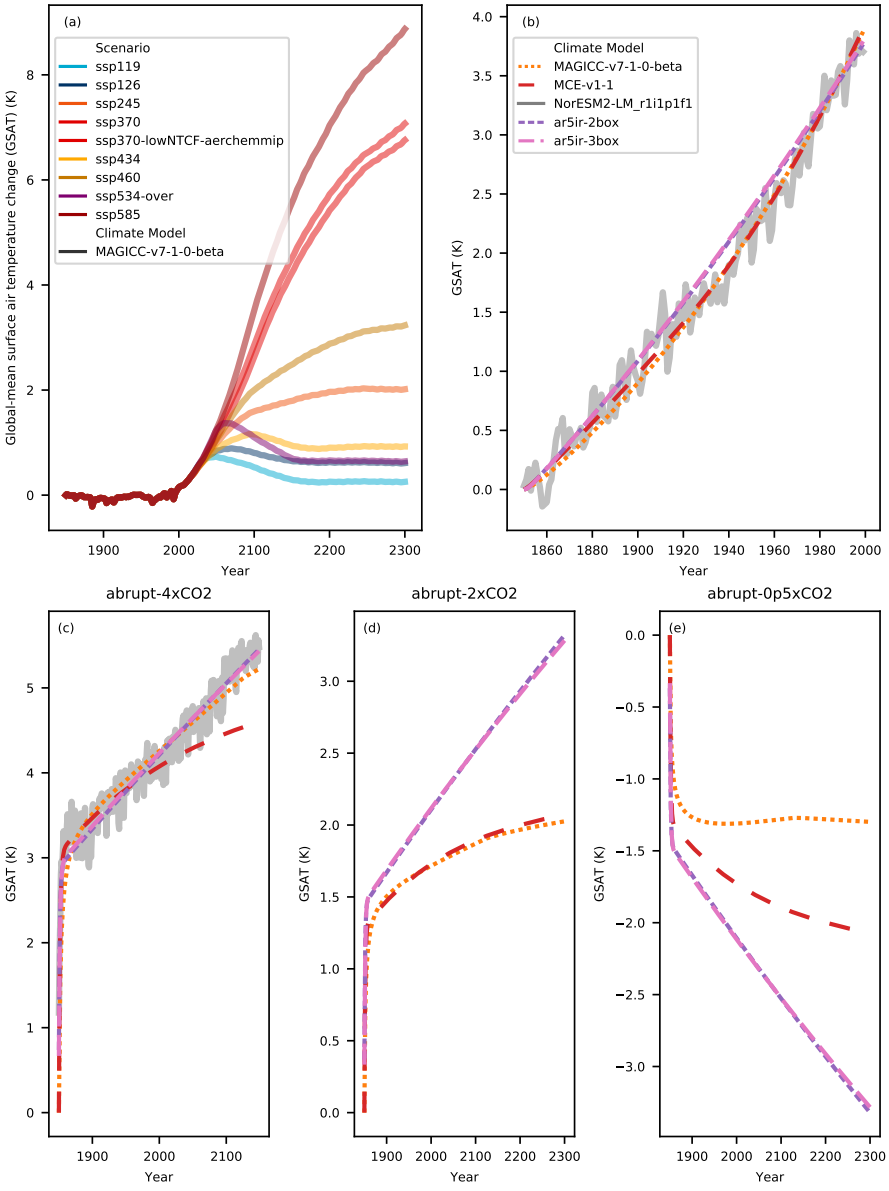

Figure S23. Emulation of NorESM2-LM_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from NorESM2-LM_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

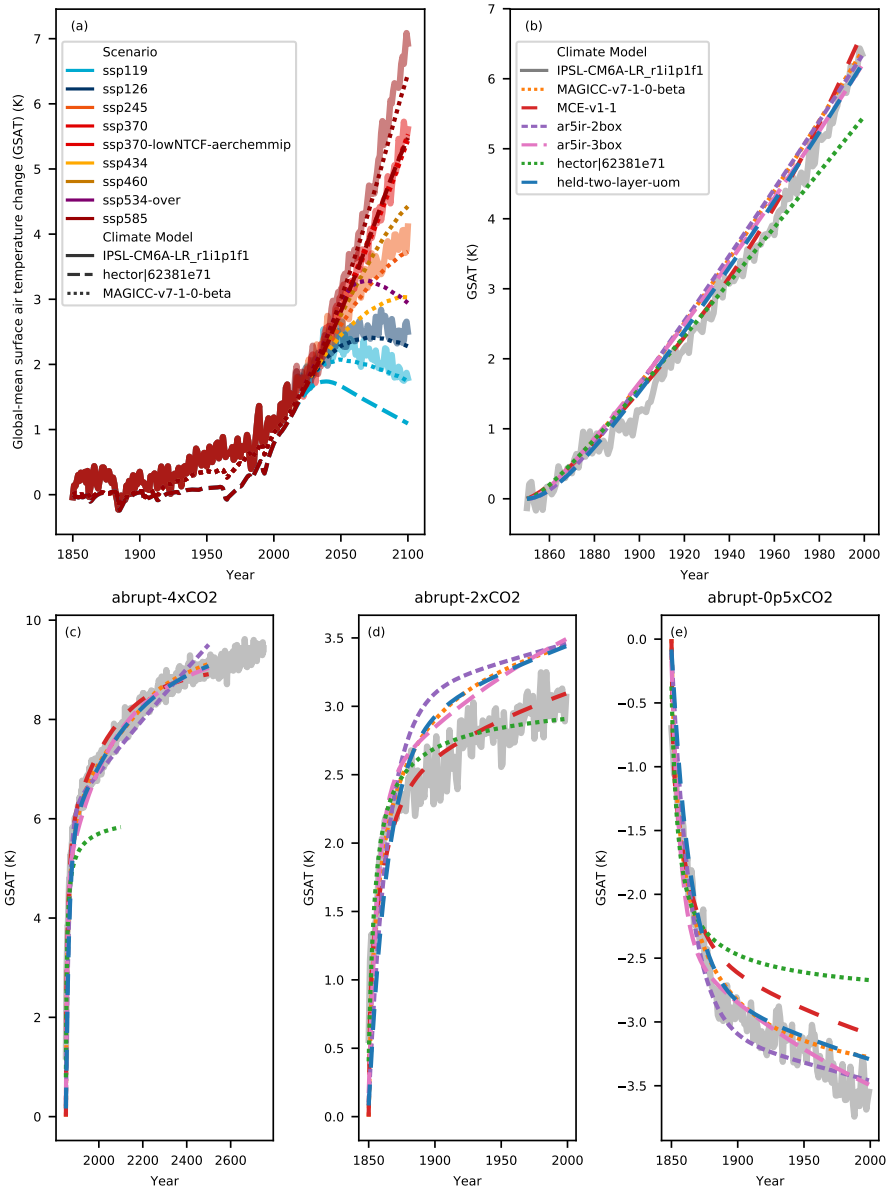

Figure S24. Emulation of IPSL-CM6A-LR_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from IPSL-CM6A-LR_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

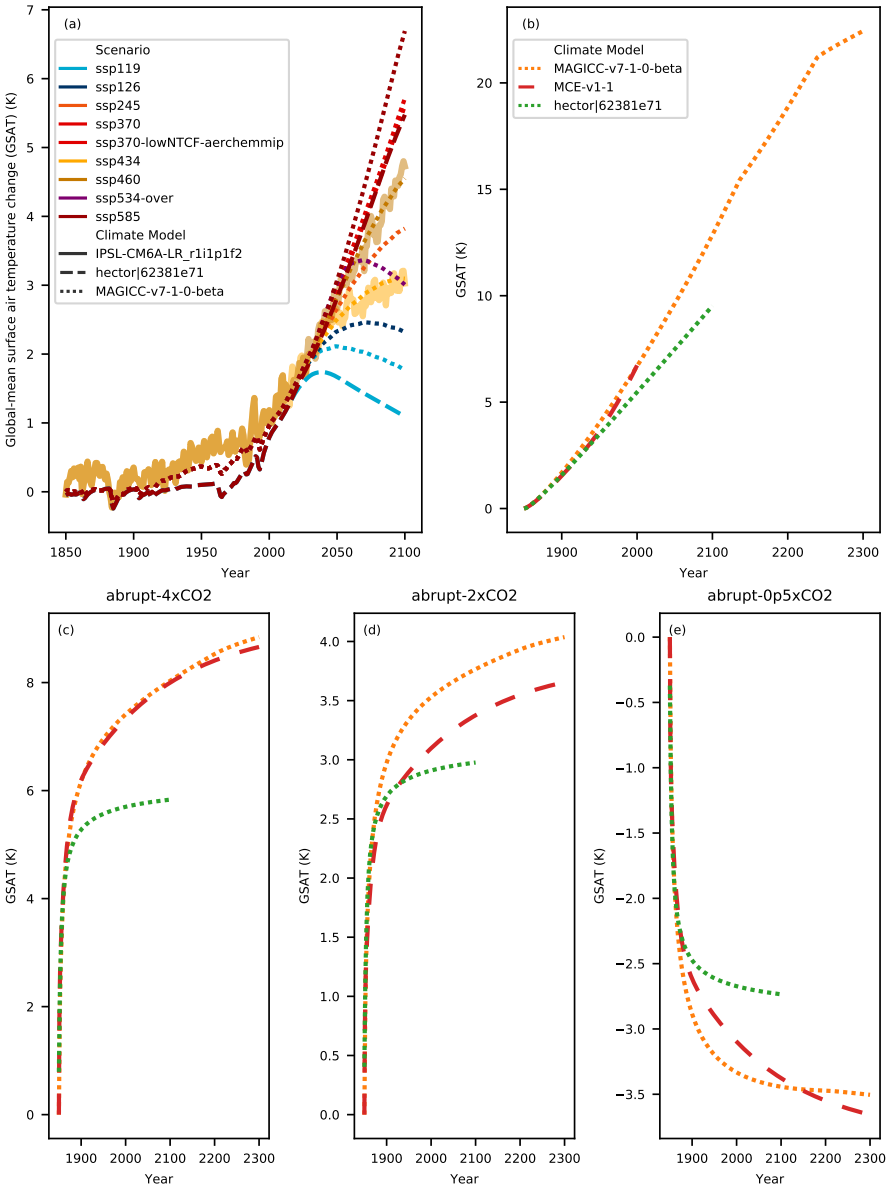

Figure S25. Emulation of IPSL-CM6A-LR_r1i1p1f2 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from IPSL-CM6A-LR_r1i1p1f2). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

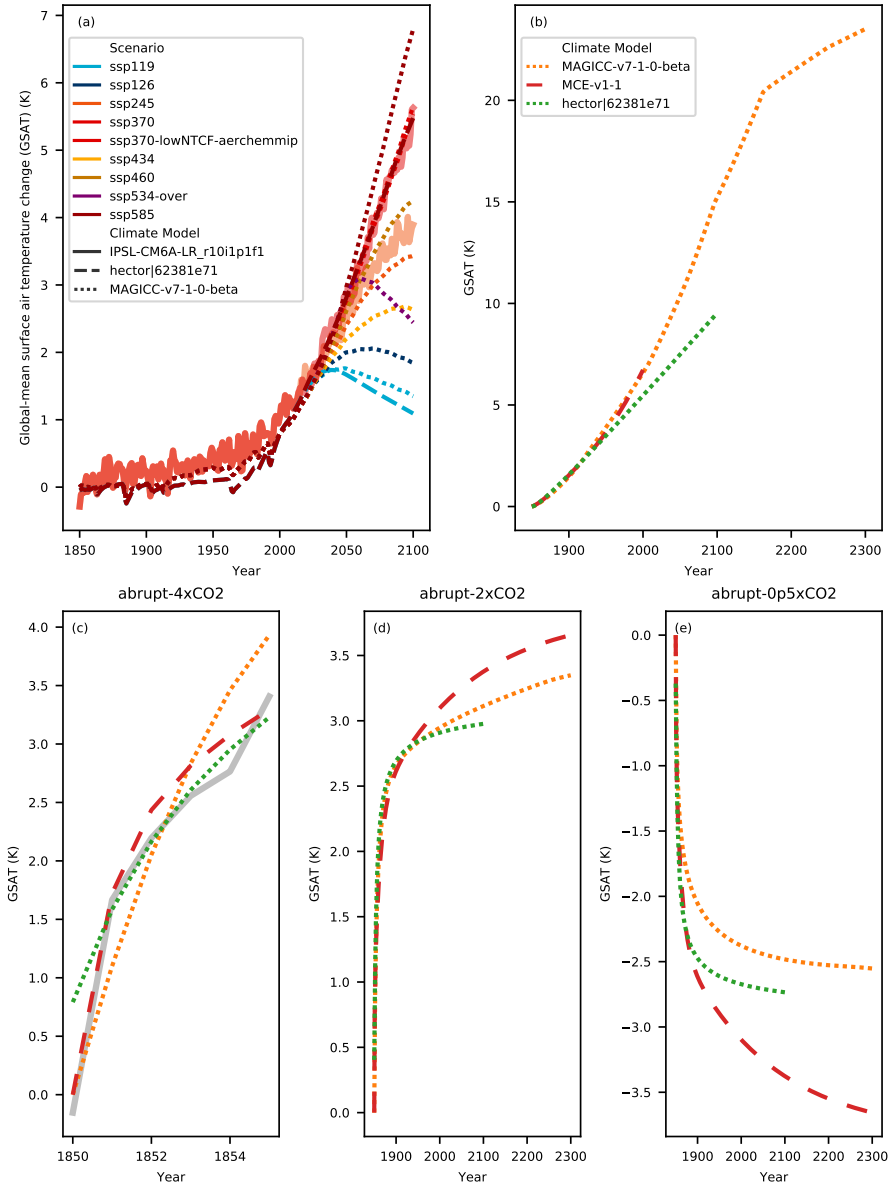

Figure S26. Emulation of IPSL-CM6A-LR_r10i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from IPSL-CM6A-LR_r10i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

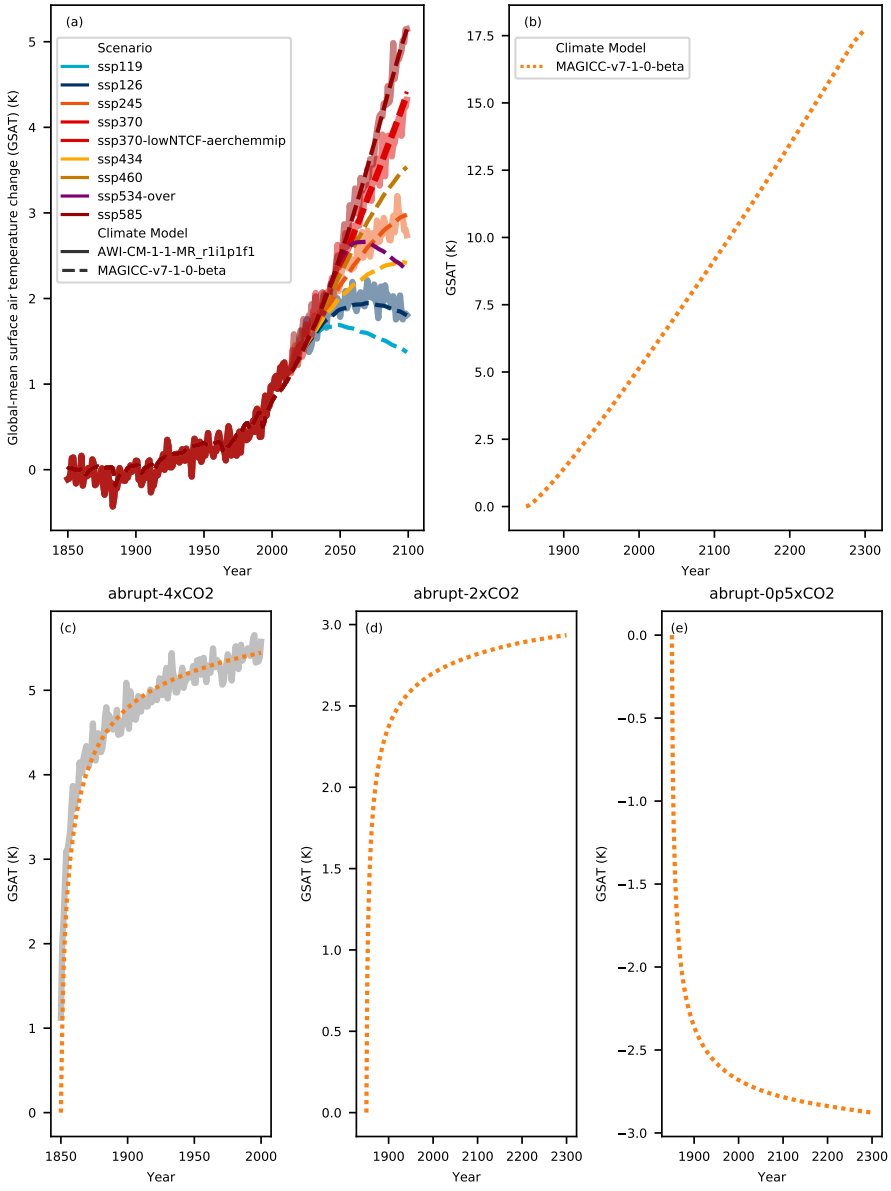

Figure S27. Emulation of AWI-CM-1-1-MR_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from AWI-CM-1-1-MR_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

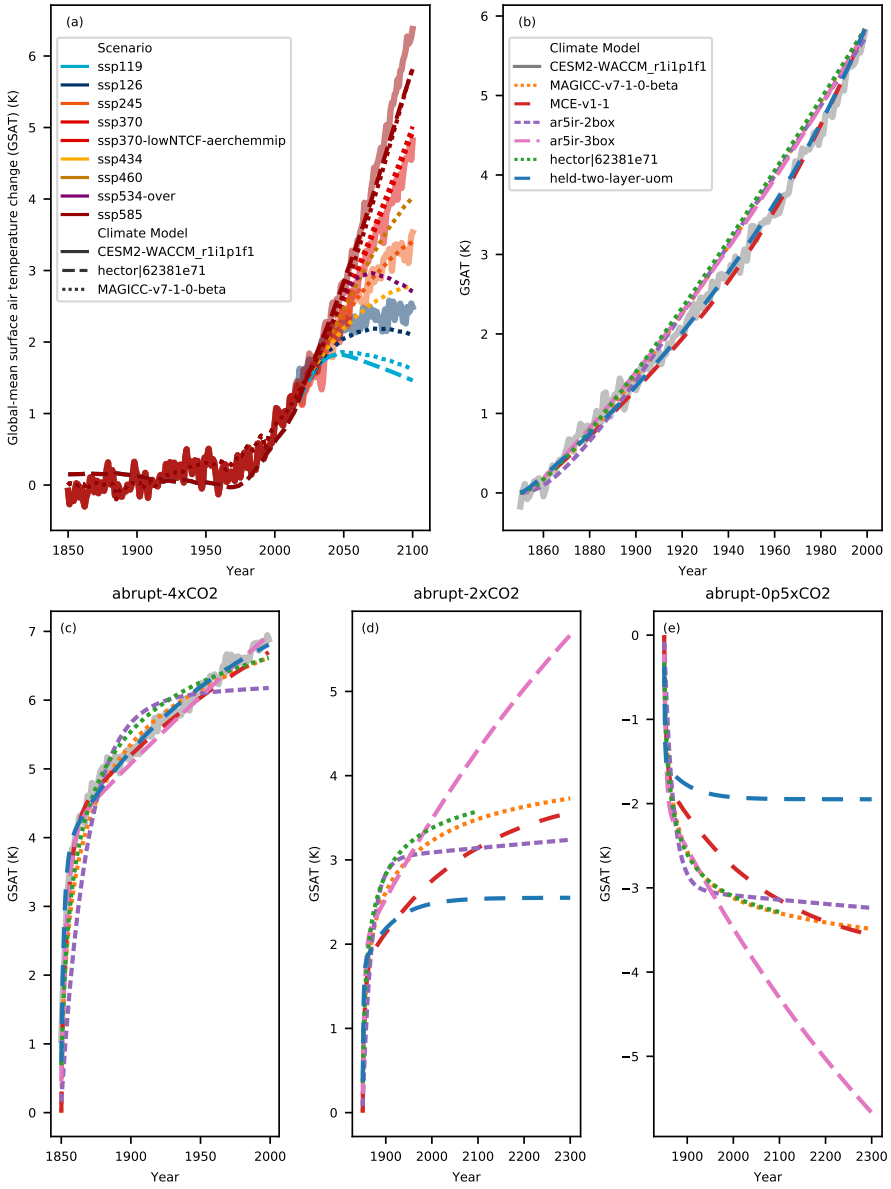

Figure S28. Emulation of CESM2-WACCM_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CESM2-WACCM_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

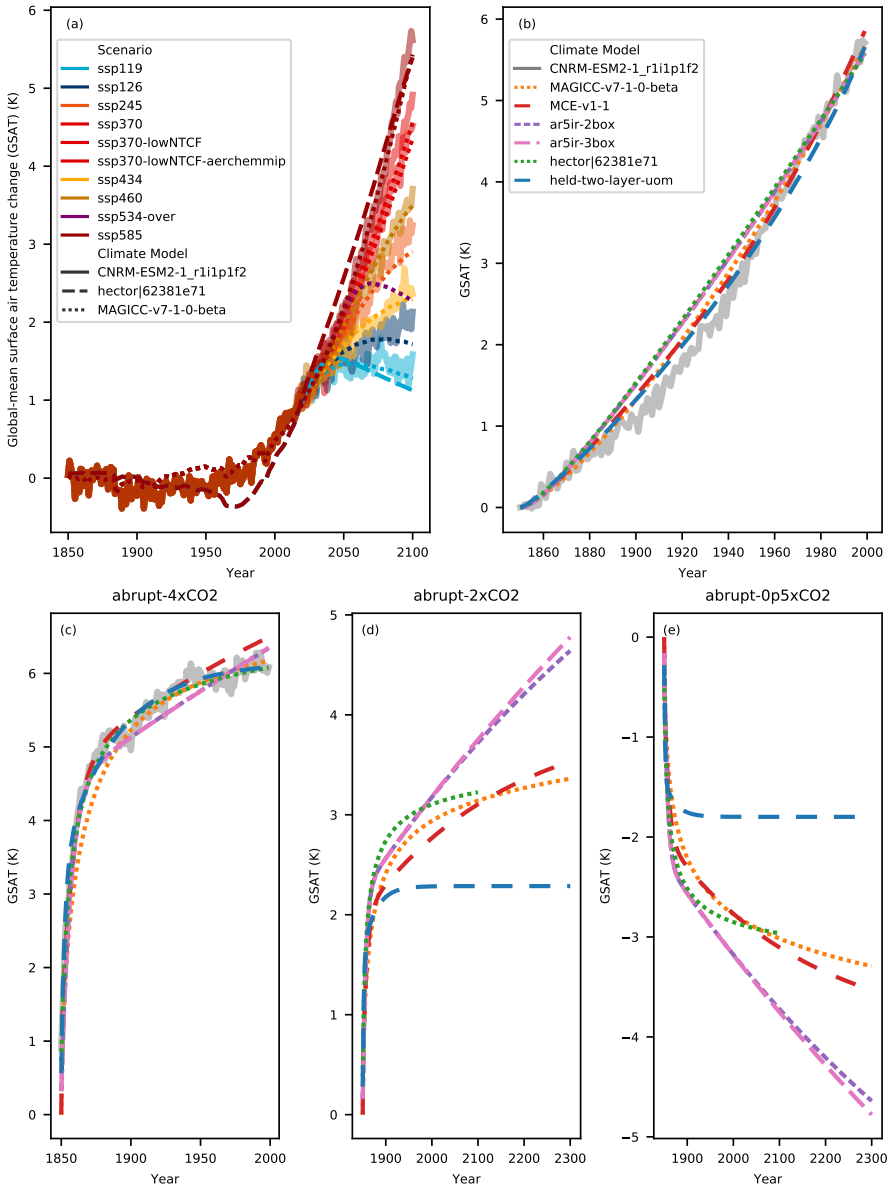

Figure S29. Emulation of CNRM-ESM2-1_r1i1p1f2 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CNRM-ESM2-1_r1i1p1f2). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

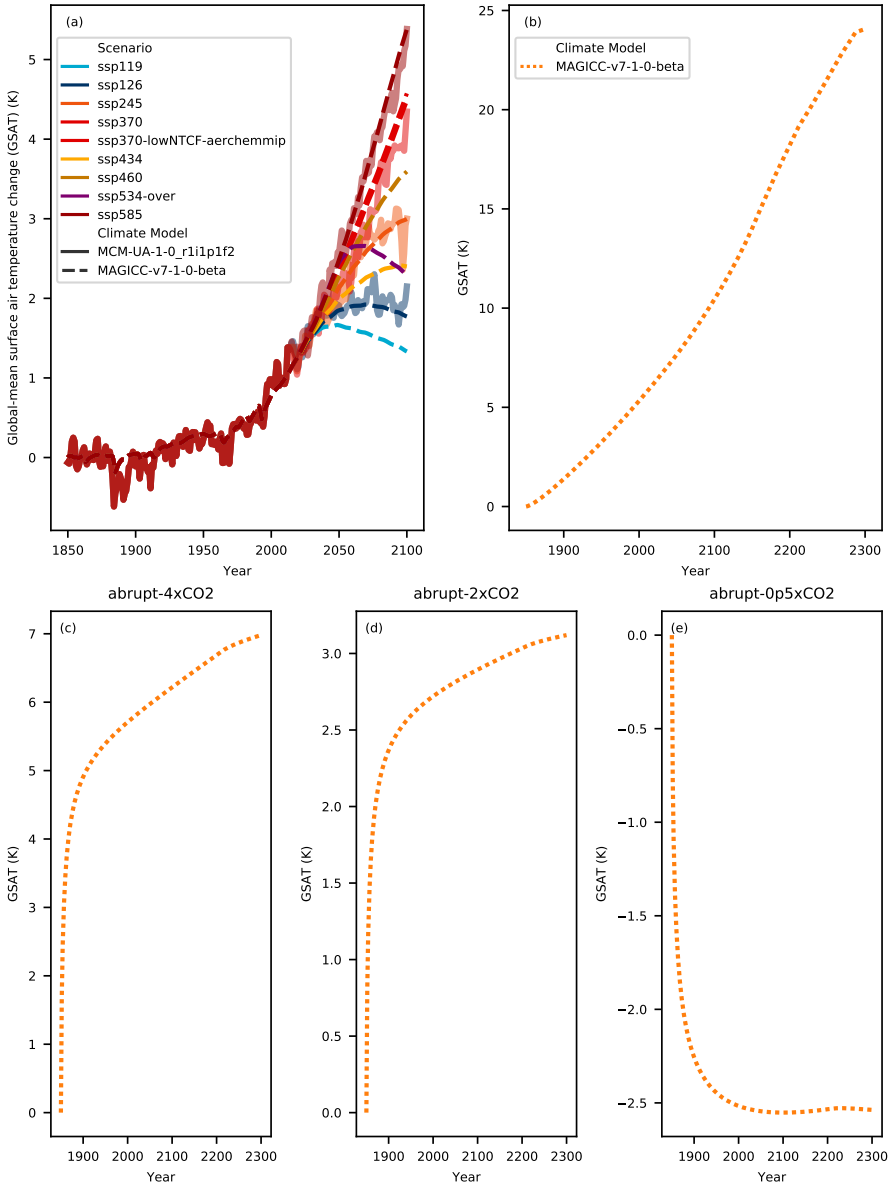

Figure S30. Emulation of MCM-UA-1-0_r1i1p1f2 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from MCM-UA-1-0_r1i1p1f2). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

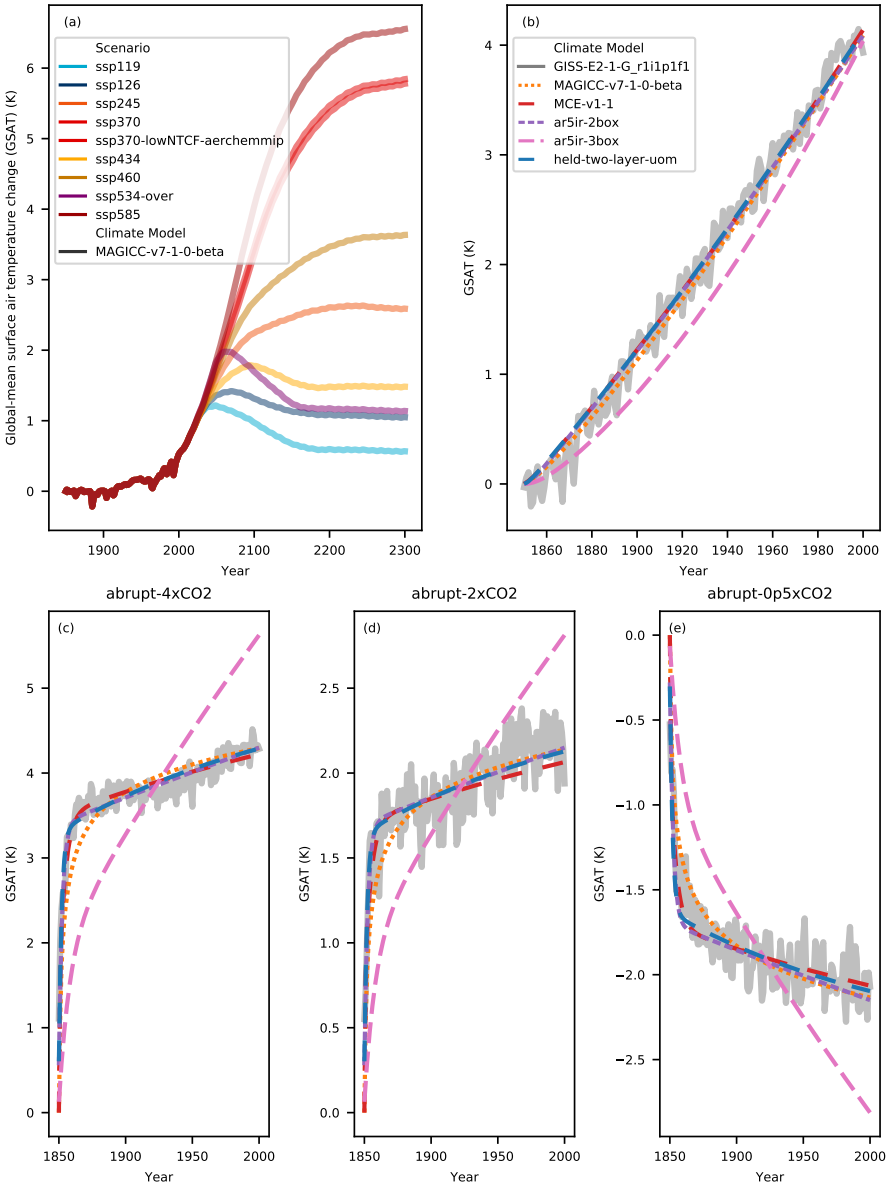

Figure S31. Emulation of GISS-E2-1-G_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from GISS-E2-1-G_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

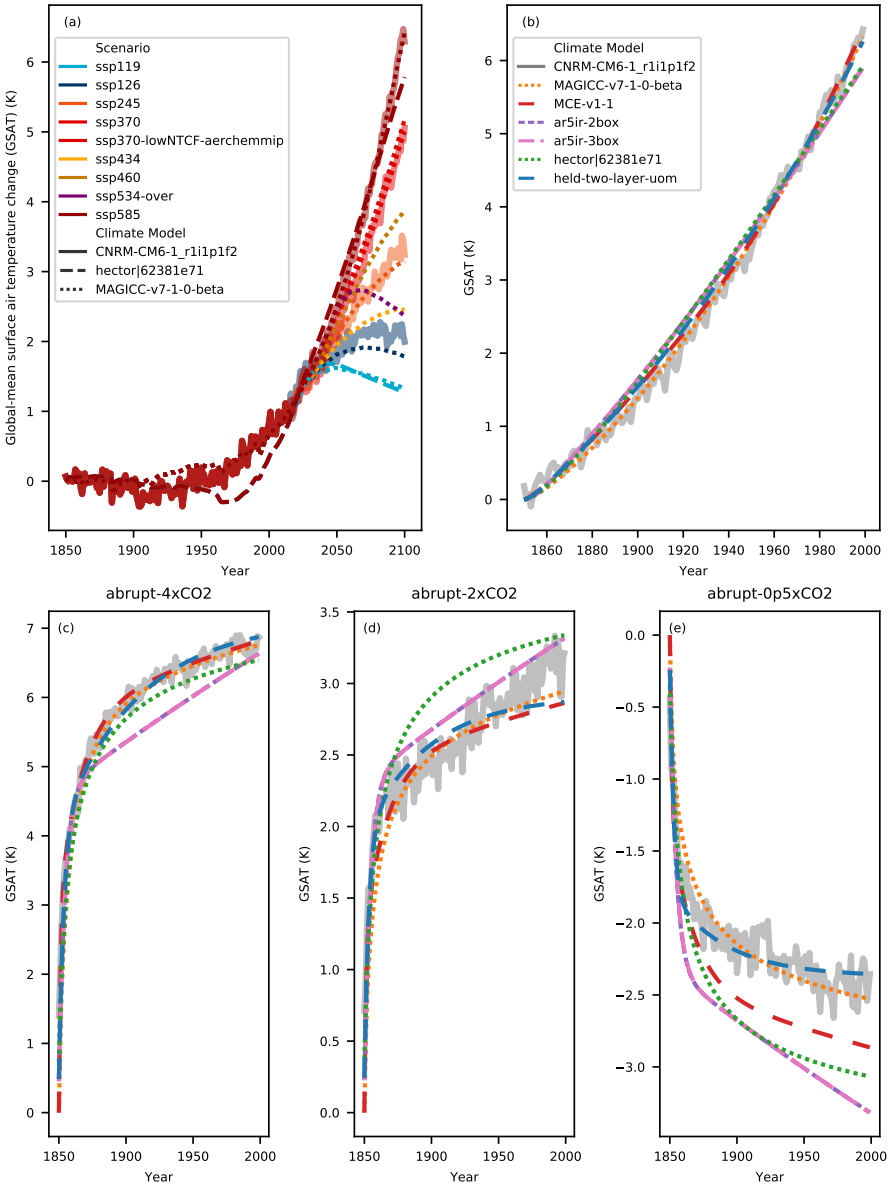

Figure S32. Emulation of CNRM-CM6-1_r1i1p1f2 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from CNRM-CM6-1_r1i1p1f2). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

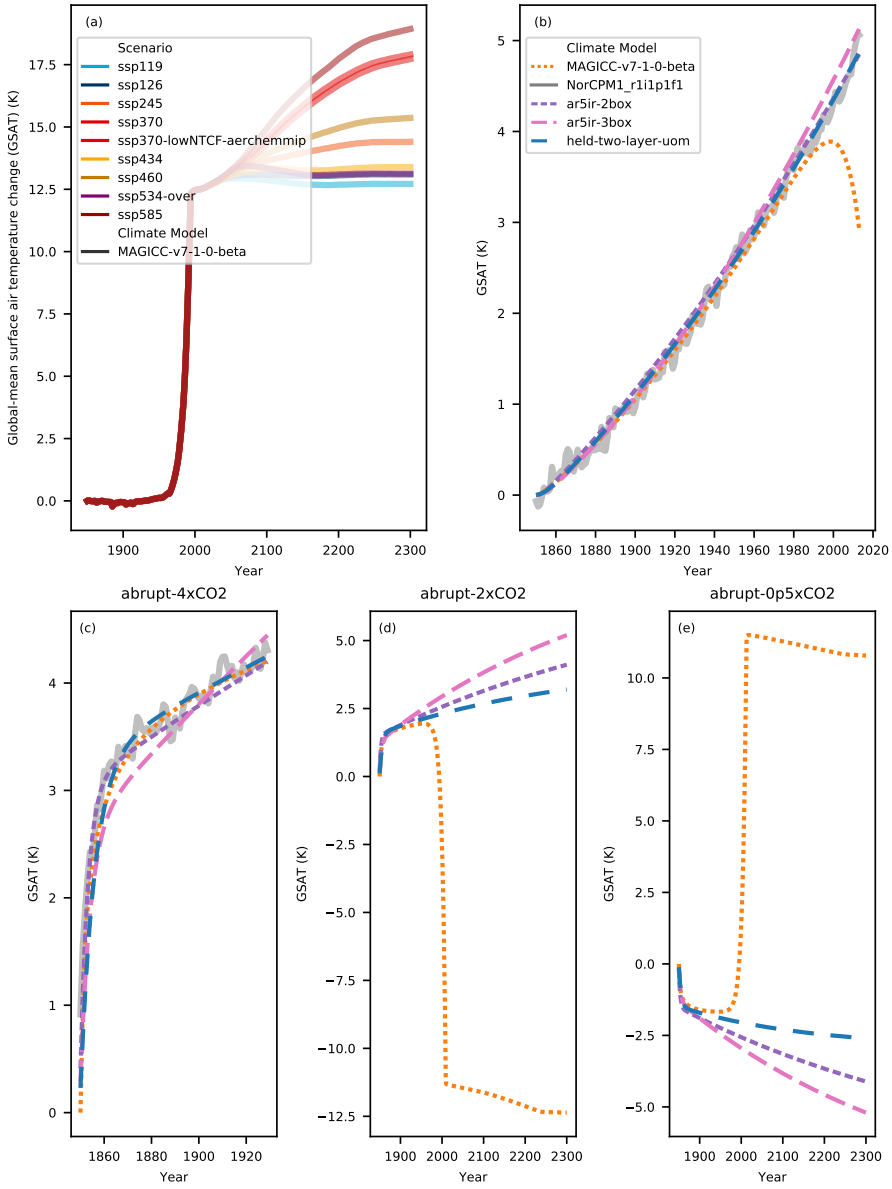

Figure S33. Emulation of NorCPM1_r1i1p1f1 by RCMs in RCMIP Phase 1. The thick transparent lines are the target CMIP6 model output (here from NorCPM1_r1i1p1f1). The thin lines are emulations from different RCMs. Panel (a) shows results for scenario based experiments while panels (b) - (e) show results for idealised CO2-only experiments (note that panels (b) - (e) share the same legend).

Table S3. RCMIP Phase 1 experiment overview (also available at rcmip.org). In the 'drivers' column, the acronyms show the inputs which are provided to the models in order to perform the run. CC: CO_2 concentrations; CO: non-CO_2 WMGHG concentrations; EC: CO_2 emissions; EO: non-CO_2 WMGHG emissions; A: aerosol emissions; S: solar effective radiative forcing; V: volcanic effective radiative forcing. ESDOC refers to the Earth System Documentation service (https://search.es-doc.org/).

ID	Drivers	Summary	Further information	Tier
piControl	CC, CO, A, S, V	Pre-industrial control simulation.	ESDOC	1
esm-piControl	EC, CO, A, S, V	Pre-industrial control simulation with zero anthropogenic perturbation to CO2 emissions.	ESDOC	1
esm-piControl-allGHG	EC, EO, A, S, V	Pre-industrial control simulation with zero anthropogenic perturbation to GHG emissions.	RCMIP specific experiment	2
1pctCO2	CC	1 % per year increase in atmospheric CO2 concentrations.	ESDOC	1
1pctCO2-4xext	CC	1 % per year increase in atmospheric CO2 concentrations until atmospheric CO2 concentrations quadruple, constant CO2 concentrations thereafter.	ESDOC	1
1pctCO2-cdr	CC	1 % per year increase in atmospheric CO2 concentrations until atmospheric CO2 concentrations quadruple and then 1% per year decrease in atmospheric CO2 concentrations until CO2 returns to pre-industrial levels, constant thereafter.	ESDOC	2
abrupt-4xCO2	CC	Abrupt quadrupling of atmospheric CO2 concentrations.	ESDOC	1
abrupt-2xCO2	CC	Abrupt doubling of atmospheric CO2 concentrations.	ESDOC	1
abrupt-0p5xCO2	CC	Abrupt halving of atmospheric CO2 concentrations.	ESDOC	1
esm-pi-cdr-pulse	EC	Removal of 100 GtC in a single year from pre-industrial atmosphere, zero CO2 emissions thereafter.	ESDOC	2

Table S3. Continued.

ID	Drivers	Summary	Further information	Tier
esm-pi-CO2pulse	EC	Addition of 100 GtC in a single year from pre-industrial atmosphere, zero CO2 emissions thereafter.	ESDOC	2
esm-bell-1000PgC	EC	Cumulative addition of 1000 PgC following a bell-curved shaped emissions timeseries.	ESDOC	3
esm-bell-2000PgC	EC	Cumulative addition of 2000 PgC following a bell-curved shaped emissions timeseries.	ESDOC	3
esm-bell-750PgC	EC	Cumulative addition of 750 PgC following a bell-curved shaped emissions timeseries.	ESDOC	3
historical	CC, CO, A, S, V	Simulation of 1850-2014.	ESDOC	1
historical-cmip5	CC, CO, A, S, V	Simulation of 1850-2004, matching forcings as estimated in CMIP5.	http://www.pik-potsdam.de/~mmalte/rcps/	2
hist-aer	A	Simulation of 1850-2014 with aerosol emissions only.	ESDOC	3
hist-CO2	CC	Simulation of 1850-2014 with changing CO2 concentrations only.	ESDOC	3
hist-GHG	CC, CO	Simulation of 1850-2014 with changing GHG concentrations only.	ESDOC	3
hist-nat	S, V	Simulation of 1850-2014 with changing natural forcings only.	ESDOC	3
hist-sol	S	Simulation of 1850-2014 with changing solar forcing only.	ESDOC	3
hist-volc	V	Simulation of 1850-2014 with changing volcanic forcing only.	ESDOC	3
ssp119	CC, CO, A, S, V	Low-end scenario reaching radiative forcing $\sim$1.9 Wm^{-2} in 2100 (using the SSP1 socioeconomic storyline).	ESDOC	1
esm-ssp119	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	1
esm-ssp119-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	2

Table S3. Continued.

ID	Drivers	Summary	Further information	Tier
ssp126	CC, CO, A, S, V	Update of RCP2.6 based on the SSP1 socioeconomic storyline.	ESDOC	2
esm-ssp126	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp126-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp245	CC, CO, A, S, V	Update of RCP4.5 based on the SSP2 socioeconomic storyline.	ESDOC	2
esm-ssp245	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp245-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp370	CC, CO, A, S, V	Gap-filling scenario reaching radiative forcing $\sim$7.0 Wm^{-2} in 2100 (using the SSP3 socioeconomic storyline).	ESDOC	2
esm-ssp370	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp370-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp370-lowNTCF	CC, CO, A, S, V	Gap-filling scenario reaching radiative forcing $\sim$7.0 Wm^{-2} in 2100 with low near-term climate forcers (using the SSP3 socioeconomic storyline).	ESDOC	2
esm-ssp370-lowNTCF	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp370-lowNTCF-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp370-lowNTCF-gidden	CC, CO, A, S, V	Comparison scenario, follows the ssp370-lowNTCF quantification presented in Gidden et al. (2019).	RCMIP specific	3

Table S3. Continued.

ID	Drivers	Summary	Further information	Tier
esm-ssp370-lowNTCF-gidden	EC, CO, A, S, V	As above except CO2 emissions driven.	RCMIP specific	3
esm-ssp370-lowNTCF-gidden-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	RCMIP specific	3
ssp434	CC, CO, A, S, V	Gap-filling scenario reaching radiative forcing $\sim$3.4 Wm^{-2} in 2100 with low near-term climate forcers (using the SSP4 socioeconomic storyline).	ESDOC	2
esm-ssp434	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp434-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp460	CC, CO, A, S, V	Update of RCP6.0 based on the SSP4 socioeconomic storyline.	ESDOC	2
esm-ssp460	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp460-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp534-over	CC, CO, A, S, V	Overshoot scenario reaching radiative forcing $\sim$3.4 Wm^{-2} in 2100 having followed the ssp585 pathway until 2030 (using the SSP5 socioeconomic storyline).	ESDOC	2
esm-ssp534-over	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	3
esm-ssp534-over-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	3
ssp585	CC, CO, A, S, V	Update of RCP8.5 based on the SSP5 socioeconomic storyline.	ESDOC	1
esm-ssp585	EC, CO, A, S, V	As above except CO2 emissions driven.	ESDOC	1

Table S3. Continued.

ID	Drivers	Summary	Further information	Tier
esm-ssp585-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	ESDOC	2
rcp26	CC, CO, A, S, V	RCP2.6 (from CMIP5).	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp26	EC, CO, A, S, V	As above except CO2 emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp26-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
rcp45	CC, CO, A, S, V	RCP4.5 (from CMIP5).	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp45	EC, CO, A, S, V	As above except CO2 emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp45-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
rcp60	CC, CO, A, S, V	RCP6.0 (from CMIP5).	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp60	EC, CO, A, S, V	As above except CO2 emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp60-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
rcp85	CC, CO, A, S, V	RCP8.5 (from CMIP5).	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp85	EC, CO, A, S, V	As above except CO2 emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3
esm-rcp85-allGHG	EC, EO, A, S, V	As above except all GHG emissions driven.	http://www.pik-potsdam.de/~mmalte/rcps/	3

Table S4. RCMIP Phase 1 variable overview (also available at rcmip.org).

Category	Variable	Unit	Definition	Tier
Atmospheric Concentrations	Atmospheric Concentrations|CH4	ppb	atmospheric concentrations of CH_4	1
Atmospheric Concentrations	Atmospheric Concentrations|CO2	ppm	atmospheric concentrations of CO_2	1
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases	ppm	equivalent species atmospheric concentrations of F-gases, expressed as CO_2-equivalent	3
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC	ppm	equivalent species atmospheric concentrations of hydrofluorocarbons (HFCs and HCFCs), provided as aggregate CO_2-equivalent	3
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC125	ppt	atmospheric concentrations of HFC125	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC134a	ppt	atmospheric concentrations of HFC134a	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC143a	ppt	atmospheric concentrations of HFC143a	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC152a	ppt	atmospheric concentrations of HFC152a	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC227ea	ppt	atmospheric concentrations of HFC227ea	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC23	ppt	atmospheric concentrations of HFC23	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC236fa	ppt	atmospheric concentrations of HFC236fa	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC245fa	ppt	atmospheric concentrations of HFC245fa	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC32	ppt	atmospheric concentrations of HFC32	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC365mfc	ppt	atmospheric concentrations of HFC365mfc	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|HFC|HFC4310mee	ppt	atmospheric concentrations of HFC43-10mee	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|NF3	ppt	atmospheric concentrations of nitrogen trifluoride (NF_3)	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC	ppt	equivalent species atmospheric concentrations of perfluorocarbons (PFCs, as defined by Table 8.A.1 of AR5), provided as aggregate CO_2-equivalents	3
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C2F6	ppt	atmospheric concentrations of C_2F_6	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C3F8	ppt	atmospheric concentrations of C_3F_8	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C4F10	ppt	atmospheric concentrations of C_4F_10	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C5F12	ppt	atmospheric concentrations of C_5F_12	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C6F14	ppt	atmospheric concentrations of C_6F_14	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C7F16	ppt	atmospheric concentrations of C_7F_16	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|C8F18	ppt	atmospheric concentrations of C_8F_18	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|cC4F8	ppt	atmospheric concentrations of $c-C_4F_8$	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|PFC|CF4	ppt	atmospheric concentrations of CF_4	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|SF6	ppt	atmospheric concentrations of sulfur hexafluoride (SF_6)	2
Atmospheric Concentrations	Atmospheric Concentrations|F-Gases|SO2F2	ppt	atmospheric concentrations of sulfuryl fluoride (SO_2F_2)	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases	ppm	equivalent species atmospheric concentrations of Montreal gases, expressed as CO_2 equivalent	3
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CCl4	ppt	atmospheric concentrations of CCl_4	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CFC	ppm	atmospheric concentrations of CFC gases, expressed as CO_2 equivalent	3
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CFC|CFC11	ppt	atmospheric concentrations of CFC11	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CFC|CFC113	ppt	atmospheric concentrations of CFC113	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CFC|CFC114	ppt	atmospheric concentrations of CFC114	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CFC|CFC115	ppt	atmospheric concentrations of CFC115	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CFC|CFC12	ppt	atmospheric concentrations of CFC12	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CH2Cl2	ppt	atmospheric concentrations of CH_2Cl_2	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CH3Br	ppt	atmospheric concentrations of CH_3Br	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CH3CCl3	ppt	atmospheric concentrations of CH_3CCl_3	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CH3Cl	ppt	atmospheric concentrations of CH_3Cl	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|CHCl3	ppt	atmospheric concentrations of $CHCl_3$	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|Halon1202	ppt	atmospheric concentrations of Halon-1202	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|Halon1211	ppt	atmospheric concentrations of Halon-1211	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|Halon1301	ppt	atmospheric concentrations of Halon-1301	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|Halon2402	ppt	atmospheric concentrations of Halon-2402	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|HCFC141b	ppt	atmospheric concentrations of HCFC141b	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|HCFC142b	ppt	atmospheric concentrations of HCFC22	2
Atmospheric Concentrations	Atmospheric Concentrations|Montreal Gases|HCFC22	ppt	atmospheric concentrations of HCFC22	2
Atmospheric Concentrations	Atmospheric Concentrations|N2O	ppb	atmospheric concentrations of N_2O	2
Carbon Cycle	Net Land to Atmosphere Flux|CH4	$MtCH_4yr^{-1}$	net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions). A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Net Land to Atmosphere Flux|CH4|Earth System Feedbacks	$MtCH_4yr^{-1}$	net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to Earth System Feedbacks. A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Net Land to Atmosphere Flux|CH4|Earth System Feedbacks|Other	$MtCH_4yr^{-1}$	net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to non-permafrost feedbacks. A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake. Please specify in a comment on the comments sheet, which feedbacks are included here.	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Carbon Cycle	Net Land to Atmosphere Flux|CH4|Earth System Feedbacks|Permafrost	$\mathrm{MtCH_4yr^{-1}}$	net flux of $\mathrm{CH_4}$ from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to the permafrost feedback. A positive value indicates release of $\mathrm{CH_4}$ from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Net Land to Atmosphere Flux|CO2	$\mathrm{MtCO_2yr^{-1}}$	net flux of $\mathrm{CO_2}$ from the land to the atmosphere (not including AFOLU and other anthropogenic emissions). A positive value indicates release of $\mathrm{CO_2}$ from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Net Land to Atmosphere Flux|CO2|Earth System Feedbacks	$\mathrm{MtCO_2yr^{-1}}$	net flux of $\mathrm{CO_2}$ from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to Earth System Feedbacks. A positive value indicates release of $\mathrm{CO_2}$ from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Net Land to Atmosphere Flux|CO2|Earth System Feedbacks|Other	$\mathrm{MtCO_2yr^{-1}}$	net flux of $\mathrm{CO_2}$ from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to non-permafrost feedbacks. A positive value indicates release of $\mathrm{CO_2}$ from the land, a negative value indicates a net land uptake. Please specify in a comment on the comments sheet, which feedbacks are included here.	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Carbon Cycle	Net Land to Atmosphere Flux|CO2|Earth System Feedbacks|Permafrost	$\mathrm{MtCO_2yr^{-1}}$	net flux of CO_2 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to the permafrost feedback. A positive value indicates release of CO_2 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Net Ocean to Atmosphere Flux|CH4	$\mathrm{MtCH_4yr^{-1}}$	net flux of CH_4 from the ocean to the atmosphere (not including anthropogenic emissions). A positive value indicates release of CH_4 from the ocean, a negative value indicates a net ocean uptake.	2
Carbon Cycle	Net Ocean to Atmosphere Flux|CO2	$\mathrm{MtCO_2yr^{-1}}$	cumulative net flux of CO_2 from the ocean to the atmosphere (not including anthropogenic emissions). A positive value indicates release of CO_2 from the ocean, a negative value indicates a net ocean uptake.	2
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CH4	$\mathrm{MtCH_4}$	cumulative net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions). A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CH4|Earth System Feedbacks	$\mathrm{MtCH_4}$	cumulative net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to Earth System Feedbacks. A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake.	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CH4|Earth System Feedbacks|Other	$MtCH_4$	cumulative net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to non-permafrost feedbacks. A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake. Please specify in a comment on the comments sheet, which feedbacks are included here.	2
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CH4|Earth System Feedbacks|Permafrost	$MtCH_4$	cumulative net flux of CH_4 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to the permafrost feedback. A positive value indicates release of CH_4 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CO2	$MtCO_2$	cumulative net flux of CO_2 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions). A positive value indicates release of CO_2 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CO2|Earth System Feedbacks	$MtCO_2$	cumulative net flux of CO_2 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to Earth System Feedbacks. A positive value indicates release of CO_2 from the land, a negative value indicates a net land uptake.	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CO2|Earth System Feedbacks|Other	$MtCO_2$	cumulative net flux of CO_2 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to non-permafrost feedbacks. A positive value indicates release of CO_2 from the land, a negative value indicates a net land uptake. Please specify in a comment on the comments sheet, which feedbacks are included here.	2
Carbon Cycle	Cumulative Net Land to Atmosphere Flux|CO2|Earth System Feedbacks|Permafrost	$MtCO_2$	cumulative net flux of CO_2 from the land to the atmosphere (not including AFOLU and other anthropogenic emissions) due to the permafrost feedback. A positive value indicates release of CO_2 from the land, a negative value indicates a net land uptake.	2
Carbon Cycle	Cumulative Net Ocean to Atmosphere Flux|CH4	$MtCH_4$	cumulative net flux of CH_4 from the ocean to the atmosphere (not including anthropogenic emissions). A positive value indicates release of CH_4 from the ocean, a negative value indicates a net ocean uptake.	2
Carbon Cycle	Cumulative Net Ocean to Atmosphere Flux|CO2	$MtCO_2$	cumulative net flux of CO_2 from the ocean to the atmosphere (not including anthropogenic emissions). A positive value indicates release of CO_2 from the ocean, a negative value indicates a net ocean uptake.	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Carbon Cycle	Carbon Pool|Atmosphere	$\mathrm{MtCO_2}$	total amount of $\mathrm{CO_2}$ in the atmospheric carbon pool	2
Carbon Cycle	Carbon Pool|Soil	$\mathrm{MtCO_2}$	total amount of $\mathrm{CO_2}$ in the soil carbon pool	2
Carbon Cycle	Carbon Pool|Detritus	$\mathrm{MtCO_2}$	total amount of $\mathrm{CO_2}$ in the detritus carbon pool	2
Carbon Cycle	Carbon Pool|Plant	$\mathrm{MtCO_2}$	total amount of $\mathrm{CO_2}$ in the plant carbon pool	2
Carbon Cycle	Net Primary Productivity	$\mathrm{MtCO_2 yr^{-1}}$	global total net primary productivity	2
CCS	Carbon Sequestration	$\mathrm{MtCO_2 yr^{-1}}$	total carbon dioxide emissions captured and stored	1
CCS	Carbon Sequestration|CCS	$\mathrm{MtCO_2 yr^{-1}}$	total carbon dioxide emissions captured and stored in geological deposits (e.g. in depleted oil and gas fields, unmined coal seams, saline aquifers) and the deep ocean, stored amounts should be reported as positive numbers	2
CCS	Carbon Sequestration|CCS|Biomass	$\mathrm{MtCO_2 yr^{-1}}$	total carbon dioxide emissions captured from bioenergy use and stored in geological deposits (e.g. in depleted oil and gas fields, unmined coal seams, saline aquifers) and the deep ocean, stored amounts should be reported as positive numbers	2
CCS	Carbon Sequestration|CCS|Fossil	$\mathrm{MtCO_2 yr^{-1}}$	total carbon dioxide emissions captured from fossil fuel use and stored in geological deposits (e.g. in depleted oil and gas fields, unmined coal seams, saline aquifers) and the deep ocean, stored amounts should be reported as positive numbers	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
CCS	Carbon Sequestration|Direct Air Capture	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through direct air capture	2
CCS	Carbon Sequestration|Enhanced Weathering	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through enhanced weathering	2
CCS	Carbon Sequestration|Feedstocks	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered in feedstocks (e.g., lubricants, asphalt, plastics)	2
CCS	Carbon Sequestration|Land Use	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through land-based sinks (e.g., afforestation, soil carbon enhancement, biochar)	2
CCS	Carbon Sequestration|Land Use|Afforestation	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through afforestation	2
CCS	Carbon Sequestration|Land Use|Biochar	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through biochar	2
CCS	Carbon Sequestration|Land Use|Other	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through other land-based mitigation techniques	2
CCS	Carbon Sequestration|Land Use|Soil Carbon Management	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through soil carbon management techniques	2
CCS	Carbon Sequestration|Other	$\mathrm{MtCO_2yr^{-1}}$	total carbon dioxide sequestered through other techniques (please provide a definition of other sources in this category in the 'comments' tab)	2
Climate	Airborne Fraction|CO2	Dimensionless	fraction of (cumulative) emitted $\mathrm{CO_2}$ which is still in the atmosphere	2
Climate	Effective Climate Sensitivity	K	effective climate sensitivity over time, here defined as ECS_eff(t) = Delta T(t) * RF2x / (RF(t) - dH/dt) where ECS_eff is effective climate sensitivity, Delta T(t) is Surface Air Temperature Change, RF2x is radiative forcing due to a doubling of atmospheric $\mathrm{CO_2}$ concentrations, RF(t) is radiative forcing and dH/dt is the energy imbalance at the top of the atmosphere (likely equal to ocean heat uptake in most of our reduced complexity models)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Climate	Effective Climate Feedback	$\mathrm{Wm^{-2}K^{-1}}$	effective climate feedback over time, here defined as lambda_eff(t) = (RF(t) - dH/dt) / Delta T(t) where lambda_eff is effective climate feedback, Delta T(t) is Surface Air Temperature Change, RF(t) is radiative forcing and dH/dt is the energy imbalance at the top of the atmosphere (likely equal to ocean heat uptake in most of our reduced complexity models)	2
Climate	Heat Uptake	$\mathrm{ZJyr^{-1}}$	total Heat Uptake of the Earth System (ZJ is zetta joules i.e. 10^{21} J), equivalent to the the energy imbalance at the top of the atmosphere.	1
Climate	Heat Uptake|Ice	$\mathrm{ZJyr^{-1}}$	ice Heat Uptake (ZJ is zetta joules i.e. 10^{21} J)	2
Climate	Heat Uptake|Land	$\mathrm{ZJyr^{-1}}$	land Heat Uptake (ZJ is zetta joules i.e. 10^{21} J)	2
Climate	Heat Uptake|Ocean	$\mathrm{ZJyr^{-1}}$	ocean Heat Uptake through surface layer of the ocean (ZJ is zetta joules i.e. 10^{21} J)	1
Climate	Heat Uptake|Other	$\mathrm{ZJyr^{-1}}$	other Heat Uptake (ZJ is zetta joules i.e. 10^{21} J). Please specify what "other" is in the Comments sheet.	2
Climate	Heat Content|Ocean	ZJ	total ocean heat content	2
Climate	Heat Content|Ocean|0-700m	ZJ	ocean heat content between 0 and 700m	2
Climate	Heat Content|Ocean|700-2000m	ZJ	ocean heat content between 700 and 2000m	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Climate	Instantaneous TCRE	$K/MtCO_2$	warming per unit cumulative CO_2 (this should simply be your 'Surface Air Temperature Change' divided by 'Cumulative Emissions|CO_2')	2
Climate	Surface Air Ocean Blended Temperature Change	K	change in blended surface air/ocean tempertaure (i.e. quantity which is directly comparable with observational datasets e.g. HadCRUT4 or best proxy thereof). Please note reference period in comment sheet.	2
Climate	Surface Air Temperature Change	K	change in surface air tempertaure (i.e. 2m air temperature or best proxy thereof). Please note reference period in comment sheet.	1
Climate	Surface Ocean Temperature Change	K	change in surface layer ocean tempertaure. Please note reference period in comment sheet.	1
Cumulative Emissions	Cumulative Emissions|CO2	$MtCO_2$	cumulative carbon dioxide emissions	1
Cumulative Emissions	Cumulative Emissions|CO2|MAGICC AFOLU	$MtCO_2$	cumulative carbon dioxide emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Cumulative Emissions	Cumulative Emissions|CO2|MAGICC Fossil and Industrial	$MtCO_2$	cumulative carbon dioxide emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Cumulative Emissions	Cumulative Emissions|CO2|Other	$MtCO_2$	cumulative carbon dioxide emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing	Wm^{-2}	effective radiative forcing from all anthropogenic and natural sources (after stratospheric temperature adjustments and rapid adjustments)	1
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic	Wm^{-2}	effective radiative forcing from all anthropogenic sources (after stratospheric temperature adjustments and rapid adjustments)	1
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols	Wm^{-2}	effective radiative forcing from aerosols (after stratospheric temperature adjustments and rapid adjustments)	1
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosol-cloud Interactions	Wm^{-2}	effective radiative forcing from indirect effects of aerosols on clouds (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosol-radiation Interactions	Wm^{-2}	effective radiative forcing from aerosol-radiative effects (after stratospheric temperature adjustments and rapid adjustments), note that the breakdown of this variable can come in multiple different forms	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosol-radiation Interactions|BC and OC|BC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black carbon emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosol-radiation Interactions|BC and OC|BC|Biomass Burning	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black carbon biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|BC|Fossil and Industrial	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black carbon fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|OC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from organic carbon emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|OC|Biomass Burning	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from organic carbon biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|OC|Fossil and Industrial	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from organic carbon fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|BC and OC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black and organic carbon biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|BC and OC|BC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black carbon biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|BC and OC|OC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from organic carbon biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|NH3	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from ammonia biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|Nitrate	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from nitrate precursor biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|Sulfate	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from sulfate precursor biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|BC and OC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black and organic carbon fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|BC and OC|BC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from black carbon fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|BC and OC|OC	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from organic carbon fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|NH3	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from ammonia fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|Nitrate	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from nitrate precursor fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|Sulfate	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from sulfate precursor fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Mineral Dust	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from mineral dust emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|NH3	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from ammonia emissions (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|NH3|Biomass Burning	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from ammonia biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|NH3|Fossil and Industrial	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from ammonia fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Nitrate	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from nitrate precursor emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Nitrate|Biomass Burning	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from nitrate precursor biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Nitrate|Fossil and Industrial	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from nitrate fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Other	Wm^{-2}	effective radiative forcing from aerosol-radiative effects not covered in the other categories (after stratospheric temperature adjustments and rapid adjustments) (please specify in comments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Sulfate	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from sulfate precursor emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Sulfate|Biomass Burning	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from sulfate precursor biomass burning emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Sulfate|Fossil and Industrial	Wm^{-2}	effective radiative forcing from aerosol-radiative effects from sulfate precursor fossil and industrial emissions (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Albedo Change	Wm^{-2}	effective radiative forcing from albedo change (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|CH4	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CH_4}$	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|CO2	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CO_2}$	1
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of F-gases	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of hydrofluorocarbons (HFCs, as defined by Table 8.A.1 of AR5) not controlled under the Montreal protocol	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC125	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC125	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC134a	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC134a	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC143a	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC143a	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC152a	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC152a	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC227ea	$\mathrm{Wm^{-2}}$	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC227ea	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC23	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC23	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC236fa	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC236fa	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC245fa	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC245fa	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC32	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC32	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC365mfc	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC365mfc	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC4310mee	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HFC43-10mee	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|NF3	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of nitrogen trifluoride (NF_3)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|PFC	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of perfluorocarbons (PFCs, as defined by Table 8.A.1 of AR5)	2

Table S4. Continued.

Category	Variable		Unit	Definition	Tier
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C2F6	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_2F_6}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C3F8	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_3F_8}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C4F10	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_4F_10}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C5F12	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_5F_12}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C6F14	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_6F_14}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C7F16	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_7F_16}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|C8F18	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{C_8F_18}$	2
Effective Radiative Forcing	Effective Forcing|Anthropogenic|F-Gases|PFC|cC4F8	Radiative	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{c-C_4F_8}$	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|PFC|CF4	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CF_4	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|SF6	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of sulfur hexafluoride (SF_6)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|F-Gases|SO2F2	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of sulfuryl fluoride ($\mathrm{SO}_2\mathrm{F}_2$)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of Montreal gases	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CCl4	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CCl_4	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CFC	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CFC gases (as defined by Table 8.A.1 of AR5)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC11	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CFC11	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC113	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CFC113	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC114	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CFC114	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC115	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CFC115	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC12	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of CFC12	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CH2Cl2	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CH_2Cl_2}$	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CH3Br	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CH_3Br}$	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CH3CCl3	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CH_3CCl_3}$	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CH3Cl	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CH_3Cl}$	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|CHCl3	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{CHCl_3}$	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|Halon1202	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of Halon-1202	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|Halon1211	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of Halon-1211	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|Halon1301	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of Halon-1301	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|Halon2402	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of Halon-2402	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|HCFC141b	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HCFC141b	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|HCFC142b	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HCFC22	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Montreal Gases|HCFC22	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of HCFC22	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|N2O	Wm^{-2}	effective radiative forcing (after stratospheric temperature adjustments and rapid adjustments) of $\mathrm{N_2O}$	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Other	Wm^{-2}	effective radiative forcing from factors not covered in other categories (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Other|BC on Snow	Wm^{-2}	effective radiative forcing from black carbon on snow (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Other|Contrails and Contrail-induced Cirrus	Wm^{-2}	effective radiative forcing from contrails and contrail-induced cirrus (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Other|CH4 Oxidation Stratospheric H2O	Wm^{-2}	effective radiative forcing from methane oxidation of stratospheric H2O (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Other|Other WMGHGs	Wm^{-2}	effective radiative forcing from WMGHG not covered in other categories (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Stratospheric Ozone	Wm^{-2}	effective radiative forcing from stratospheric ozone (after stratospheric temperature adjustments and rapid adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Effective Radiative Forcing	Effective Radiative Forcing|Anthropogenic|Tropospheric Ozone	Wm^{-2}	effective radiative forcing from tropospheric ozone (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Natural	Wm^{-2}	effective radiative forcing from all natural drivers, i.e. solar and volcanic forcing (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Natural|Solar	Wm^{-2}	effective radiative forcing from variations in solar irradience (after stratospheric temperature adjustments and rapid adjustments)	2
Effective Radiative Forcing	Effective Radiative Forcing|Natural|Volcanic	Wm^{-2}	effective radiative forcing due to volcanic eruptions (after stratospheric temperature adjustments and rapid adjustments)	2
Emissions	Emissions|BC	MtBCyr^{-1}	total black carbon emissions	1
Emissions	Emissions|BC|MAGICC AFOLU	MtBCyr^{-1}	black carbon emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|BC|MAGICC Fossil and Industrial	MtBCyr^{-1}	black carbon emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|BC|Other	MtBCyr^{-1}	black carbon emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|CH4	$\mathrm{MtCH_4yr}^{-1}$	total methane emissions	1
Emissions	Emissions|CH4|MAGICC AFOLU	$\mathrm{MtCH_4yr}^{-1}$	methane emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|CH4|MAGICC Fossil and Industrial	$\mathrm{MtCH_4 yr^{-1}}$	methane emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|CH4|Other	$\mathrm{MtCH_4 yr^{-1}}$	methane emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|CO	$\mathrm{MtCO yr^{-1}}$	total carbon monoxide emissions	1
Emissions	Emissions|CO|MAGICC AFOLU	$\mathrm{MtCO yr^{-1}}$	carbon monoxide emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|CO|MAGICC Fossil and Industrial	$\mathrm{MtCO yr^{-1}}$	carbon monoxide emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|CO|Other	$\mathrm{MtCO yr^{-1}}$	carbon monoxide emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|CO2	$\mathrm{MtCO_2 yr^{-1}}$	total carbon dioxide emissions	1
Emissions	Emissions|CO2|MAGICC AFOLU	$\mathrm{MtCO_2 yr^{-1}}$	carbon dioxide emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|CO2|MAGICC Fossil and Industrial	$\mathrm{MtCO_2yr^{-1}}$	carbon dioxide emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|CO2|Other	$\mathrm{MtCO_2yr^{-1}}$	carbon dioxide emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|F-Gases	$\mathrm{MtCO_2yr^{-1}}$	total F-gas emissions, including sulfur hexafluoride ($\mathrm{SF_6}$), nitrogen trifluoride ($\mathrm{NF_3}$), sulfuryl fluoride ($\mathrm{SO_2F_2}$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs)	3
Emissions	Emissions|F-Gases|HFC	$\mathrm{MtCO_2yr^{-1}}$	equivalent species total emissions of hydrofluorocarbons (HFCs and HCFCs), provided as aggregate $\mathrm{CO_2}$-equivalents	3
Emissions	Emissions|F-Gases|HFC|HFC125	$\mathrm{ktHFC125yr^{-1}}$	total emissions of HFC125	2
Emissions	Emissions|F-Gases|HFC|HFC134a	$\mathrm{ktHFC134ayr^{-1}}$	total emissions of HFC134a	2
Emissions	Emissions|F-Gases|HFC|HFC143a	$\mathrm{ktHFC143ayr^{-1}}$	total emissions of HFC143a	2
Emissions	Emissions|F-Gases|HFC|HFC152a	$\mathrm{ktHFC152ayr^{-1}}$	total emissions of HFC152a	2
Emissions	Emissions|F-Gases|HFC|HFC227ea	$\mathrm{ktHFC227eayr^{-1}}$	total emissions of HFC227ea	2
Emissions	Emissions|F-Gases|HFC|HFC23	$\mathrm{ktHFC23yr^{-1}}$	total emissions of HFC23	2
Emissions	Emissions|F-Gases|HFC|HFC236fa	$\mathrm{ktHFC236fayr^{-1}}$	total emissions of HFC236fa	2
Emissions	Emissions|F-Gases|HFC|HFC245fa	$\mathrm{ktHFC245fayr^{-1}}$	total emissions of HFC245fa	2
Emissions	Emissions|F-Gases|HFC|HFC32	$\mathrm{ktHFC32yr^{-1}}$	total emissions of HFC32	2
Emissions	Emissions|F-Gases|HFC|HFC365mfc	$\mathrm{ktHFC365mfcyr^{-1}}$	total emissions of HFC365mfc	2
Emissions	Emissions|F-Gases|HFC|HFC4310mee	$\mathrm{ktHFC4310meeyr^{-1}}$	total emissions of HFC43-10mee	2
Emissions	Emissions|F-Gases|NF3	$\mathrm{ktNF_3yr^{-1}}$	total emissions of nitrogen trifluoride ($\mathrm{NF_3}$)	2
Emissions	Emissions|F-Gases|PFC	$\mathrm{ktCF_4yr^{-1}}$	equivalent species total emissions of perfluorocarbons (PFCs, as defined by Table 8.A.1 of AR5), provided as aggregate $\mathrm{CF_4}$-equivalents	3

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|F-Gases|PFC|C2F6	$\mathrm{kt C_2F_6 yr^{-1}}$	total emissions of $\mathrm{C_2F_6}$	2
Emissions	Emissions|F-Gases|PFC|C3F8	$\mathrm{kt C_3F_8 yr^{-1}}$	total emissions of $\mathrm{C_3F_8}$	2
Emissions	Emissions|F-Gases|PFC|C4F10	$\mathrm{kt C_4F_10 yr^{-1}}$	total emissions of $\mathrm{C_4F_10}$	2
Emissions	Emissions|F-Gases|PFC|C5F12	$\mathrm{kt C_5F_12 yr^{-1}}$	total emissions of $\mathrm{C_5F_12}$	2
Emissions	Emissions|F-Gases|PFC|C6F14	$\mathrm{kt C_6F_14 yr^{-1}}$	total emissions of $\mathrm{C_6F_14}$	2
Emissions	Emissions|F-Gases|PFC|C7F16	$\mathrm{kt C_7F_16 yr^{-1}}$	total emissions of $\mathrm{C_7F_16}$	2
Emissions	Emissions|F-Gases|PFC|C8F18	$\mathrm{kt C_8F_18 yr^{-1}}$	total emissions of $\mathrm{C_8F_18}$	2
Emissions	Emissions|F-Gases|PFC|cC4F8	$\mathrm{kt cC4F8 yr^{-1}}$	total emissions of $\mathrm{c-C_4F_8}$	2
Emissions	Emissions|F-Gases|PFC|CF4	$\mathrm{kt CF_4 yr^{-1}}$	total emissions of $\mathrm{CF_4}$	2
Emissions	Emissions|F-Gases|SF6	$\mathrm{kt SF_6 yr^{-1}}$	total emissions of sulfur hexafluoride ($\mathrm{SF_6}$)	2
Emissions	Emissions|F-Gases|SO2F2	$\mathrm{kt SO_2F_2 yr^{-1}}$	total emissions of sulfuryl fluoride ($\mathrm{SO_2F_2}$)	2
Emissions	Emissions|Montreal Gases	$\mathrm{Mt CO_2 yr^{-1}}$	equivalent species total Montreal gas emissions, provided as CFC-11 equivalents	3
Emissions	Emissions|Montreal Gases|CCl4	$\mathrm{kt CCl_4 yr^{-1}}$	total emissions of $\mathrm{CCl_4}$	2
Emissions	Emissions|Montreal Gases|CFC	$\mathrm{Mt CO_2 yr^{-1}}$	equivalent species total CFC emissions, provided as CFC-11 equivalents	3
Emissions	Emissions|Montreal Gases|CFC|CFC11	$\mathrm{kt CFC11 yr^{-1}}$	total emissions of CFC11	2
Emissions	Emissions|Montreal Gases|CFC|CFC113	$\mathrm{kt CFC113 yr^{-1}}$	total emissions of CFC113	2
Emissions	Emissions|Montreal Gases|CFC|CFC114	$\mathrm{kt CFC114 yr^{-1}}$	total emissions of CFC114	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|Montreal Gases|CFC|CFC115	$\mathrm{kt CFC115 yr^{-1}}$	total emissions of CFC115	2
Emissions	Emissions|Montreal Gases|CFC|CFC12	$\mathrm{kt CFC12 yr^{-1}}$	total emissions of CFC12	2
Emissions	Emissions|Montreal Gases|CH2Cl2	$\mathrm{kt CH_2Cl_2 yr^{-1}}$	total emissions of $\mathrm{CH_2Cl_2}$	2
Emissions	Emissions|Montreal Gases|CH3Br	$\mathrm{kt CH_3Br yr^{-1}}$	total emissions of $\mathrm{CH_3Br}$	2
Emissions	Emissions|Montreal Gases|CH3CCl3	$\mathrm{kt CH_3CCl_3 yr^{-1}}$	total emissions of $\mathrm{CH_3CCl_3}$	2
Emissions	Emissions|Montreal Gases|CH3Cl	$\mathrm{kt CH_3Cl yr^{-1}}$	total emissions of $\mathrm{CH_3Cl}$	2
Emissions	Emissions|Montreal Gases|CHCl3	$\mathrm{kt CHCl_3 yr^{-1}}$	total emissions of $\mathrm{CHCl_3}$	2
Emissions	Emissions|Montreal Gases|Halon1202	$\mathrm{kt Halon1202 yr^{-1}}$	total emissions of Halon-1202	2
Emissions	Emissions|Montreal Gases|Halon1211	$\mathrm{kt Halon1211 yr^{-1}}$	total emissions of Halon-1211	2
Emissions	Emissions|Montreal Gases|Halon1301	$\mathrm{kt Halon1301 yr^{-1}}$	total emissions of Halon-1301	2
Emissions	Emissions|Montreal Gases|Halon2402	$\mathrm{kt Halon2402 yr^{-1}}$	total emissions of Halon-2402	2
Emissions	Emissions|Montreal Gases|HCFC141b	$\mathrm{kt HCFC141b yr^{-1}}$	total emissions of HCFC141b	2
Emissions	Emissions|Montreal Gases|HCFC142b	$\mathrm{kt HCFC142b yr^{-1}}$	total emissions of HCFC22	2
Emissions	Emissions|Montreal Gases|HCFC22	$\mathrm{kt HCFC22 yr^{-1}}$	total emissions of HCFC22	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|N2O	$\mathrm{kt N_2O yr^{-1}}$	total nitrogen emissions	1
Emissions	Emissions|N2O|MAGICC AFOLU	$\mathrm{kt N_2O yr^{-1}}$	nitrogen emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|N2O|MAGICC Fossil and Industrial	$\mathrm{kt N_2O yr^{-1}}$	nitrogen emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|N2O|Other	$\mathrm{kt N_2O yr^{-1}}$	nitrogen emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|NH3	$\mathrm{Mt NH3 yr^{-1}}$	total ammonia emissions	1
Emissions	Emissions|NH3|MAGICC AFOLU	$\mathrm{Mt NH3 yr^{-1}}$	ammonia emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|NH3|MAGICC Fossil and Industrial	$\mathrm{Mt NH3 yr^{-1}}$	ammonia emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|NH3|Other	$\mathrm{Mt NH3 yr^{-1}}$	ammonia emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|NOx	$\mathrm{MtNOxyr}^{-1}$	total nitrous oxide emissions	1
Emissions	Emissions|NOx|MAGICC AFOLU	$\mathrm{MtNOxyr}^{-1}$	nitrous oxide emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|NOx|MAGICC Fossil and Industrial	$\mathrm{MtNOxyr}^{-1}$	nitrous oxide emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|NOx|Other	$\mathrm{MtNOxyr}^{-1}$	nitrous oxide emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|OC	MtOCyr^{-1}	total organic carbon emissions	1
Emissions	Emissions|OC|MAGICC AFOLU	MtOCyr^{-1}	organic carbon emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|OC|MAGICC Fossil and Industrial	MtOCyr^{-1}	organic carbon emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|OC|Other	MtOCyr^{-1}	organic carbon emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|Sulfur	$\mathrm{Mt SO_2 yr^{-1}}$	total sulfur (as a precursor for sulfates) emissions	1
Emissions	Emissions|Sulfur|MAGICC AFOLU	$\mathrm{Mt SO_2 yr^{-1}}$	sulfur (as a precursor for sulfates) emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|Sulfur|MAGICC Fossil and Industrial	$\mathrm{Mt SO_2 yr^{-1}}$	sulfur (as a precursor for sulfates) emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2
Emissions	Emissions|Sulfur|Other	$\mathrm{Mt SO_2 yr^{-1}}$	sulfur (as a precursor for sulfates) emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Emissions	Emissions|VOC	$\mathrm{Mt VOC yr^{-1}}$	total (non-methane) volatile organic compounds emissions	1
Emissions	Emissions|VOC|MAGICC AFOLU	$\mathrm{Mt VOC yr^{-1}}$	(non-methane) volatile organic compounds emissions from agriculture, forestry and other land use (IPCC category 3), excluding any fossil-fuel based emissions in the Agricultural sector (hence not identical to WG3 AFOLU)	2
Emissions	Emissions|VOC|MAGICC Fossil and Industrial	$\mathrm{Mt VOC yr^{-1}}$	(non-methane) volatile organic compounds emissions from energy use on supply and demand side (IPCC category 1A, 1B), industrial processes (IPCC category 2), waste (IPCC category 4) and other (IPCC category 5)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Emissions	Emissions|VOC|Other	$\mathrm{MtVOCyr}^{-1}$	(non-methane) volatile organic compounds emissions from other sources (please provide a definition of other sources in this category in the 'comments' tab)	2
Methane Cycle	Atmospheric Lifetime|CH4	yr	total atmospheric lifetime of methane	3
Nitrogen Cycle	Atmospheric Lifetime|N2O	yr	total atmospheric lifetime of nitrogen	3
Ocean	Ocean pH	$\mathrm{Dimensionless}$	pH of the ocean's surface layer	3
Radiative Forcing	Radiative Forcing	Wm^{-2}	radiative forcing from all anthropogenic and natural sources (after stratospheric temperature adjustments)	1
Radiative Forcing	Radiative Forcing|Anthropogenic	Wm^{-2}	radiative forcing from all anthropogenic sources (after stratospheric temperature adjustments)	1
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols	Wm^{-2}	radiative forcing from aerosols (after stratospheric temperature adjustments)	1
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-cloud Interactions	Wm^{-2}	radiative forcing from indirect effects of aerosols on clouds (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions	Wm^{-2}	radiative forcing from aerosol-radiative effects (after stratospheric temperature adjustments), note that the breakdown of this variable can come in multiple different forms	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|BC	Wm^{-2}	radiative forcing from aerosol-radiative effects from black carbon emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|BC|Biomass Burning	Wm^{-2}	radiative forcing from aerosol-radiative effects from black carbon biomass burning emissions (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|BC|Fossil and Industrial	Wm^{-2}	radiative forcing from aerosol-radiative effects from black carbon fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|OC	Wm^{-2}	radiative forcing from aerosol-radiative effects from organic carbon emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|OC|Biomass Burning	Wm^{-2}	radiative forcing from aerosol-radiative effects from organic carbon biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|BC and OC|OC|Fossil and Industrial	Wm^{-2}	radiative forcing from aerosol-radiative effects from organic carbon fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning	Wm^{-2}	radiative forcing from aerosol-radiative effects from biomass burning emissions (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|BC and OC	Wm^{-2}	radiative forcing from aerosol-radiative effects from black and organic carbon biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|BC and OC|BC	Wm^{-2}	radiative forcing from aerosol-radiative effects from black carbon biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|BC and OC|OC	Wm^{-2}	radiative forcing from aerosol-radiative effects from organic carbon biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|NH3	Wm^{-2}	radiative forcing from aerosol-radiative effects from ammonia biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|Nitrate	Wm^{-2}	radiative forcing from aerosol-radiative effects from nitrate biomass burning emissions (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Biomass Burning|Sulfate	Wm^{-2}	radiative forcing from aerosol-radiative effects from sulfate biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial	Wm^{-2}	radiative forcing from aerosol-radiative effects from fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|BC and OC	Wm^{-2}	radiative forcing from aerosol-radiative effects from black and organic carbon fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|BC and OC|BC	Wm^{-2}	radiative forcing from aerosol-radiative effects from black carbon fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|BC and OC|OC	Wm^{-2}	radiative forcing from aerosol-radiative effects from organic carbon fossil and industrial emissions (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|NH3	Wm^{-2}	radiative forcing from aerosol-radiative effects from ammonia fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|Nitrate	Wm^{-2}	radiative forcing from aerosol-radiative effects from nitrate fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Fossil and Industrial|Sulfate	Wm^{-2}	radiative forcing from aerosol-radiative effects from sulfate fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Mineral Dust	Wm^{-2}	radiative forcing from aerosol-radiative effects from mineral dust emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|NH3	Wm^{-2}	radiative forcing from aerosol-radiative effects from ammonia emissions (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|NH3|Biomass Burning	Wm^{-2}	radiative forcing from aerosol-radiative effects from ammonia biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|NH3|Fossil and Industrial	Wm^{-2}	radiative forcing from aerosol-radiative effects from ammonia fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Nitrate	Wm^{-2}	radiative forcing from aerosol-radiative effects from nitrate emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Nitrate|Biomass Burning	Wm^{-2}	radiative forcing from aerosol-radiative effects from nitrate biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Nitrate|Fossil and Industrial	Wm^{-2}	radiative forcing from aerosol-radiative effects from nitrate fossil and industrial emissions (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Other	Wm^{-2}	radiative forcing from aerosol-radiative effects not covered in the other categories (after stratospheric temperature adjustments) (please specify in comments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Sulfate	Wm^{-2}	radiative forcing from aerosol-radiative effects from sulfate emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Sulfate|Biomass Burning	Wm^{-2}	radiative forcing from aerosol-radiative effects from sulfate biomass burning emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Aerosols|Aerosols-radiation Interactions|Sulfate|Fossil and Industrial	Wm^{-2}	radiative forcing from aerosol-radiative effects from sulfate fossil and industrial emissions (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Albedo Change	Wm^{-2}	radiative forcing from albedo change (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|CH4	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of CH_4	2
Radiative Forcing	Radiative Forcing|Anthropogenic|CO2	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of CO_2	1

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of F-gases	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of hydrofluorocarbons (HFCs, as defined by Table 8.A.1 of AR5) not controlled under the Montreal protocol	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC125	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC125	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC134a	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC134a	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC143a	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC143a	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC152a	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC152a	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC227ea	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC227ea	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC23	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC23	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC236fa	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC236fa	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC245fa	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC245fa	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC32	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC32	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC365mfc	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC365mfc	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|HFC|HFC4310mee	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HFC43-10mee	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|NF3	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of nitrogen trifluoride ($\mathrm{NF_3}$)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of perfluorocarbons (PFCs, as defined by Table 8.A.1 of AR5)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C2F6	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_2F_6}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C3F8	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_3F_8}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C4F10	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_4F_10}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C5F12	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_5F_12}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C6F14	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_6F_14}$	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C7F16	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_7F_16}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|C8F18	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{C_8F_18}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|cC4F8	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{c-C_4F_8}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|PFC|CF4	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CF_4}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|SF6	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of sulfur hexafluoride ($\mathrm{SF_6}$)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|F-Gases|SO2F2	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of sulfuryl fluoride ($\mathrm{SO_2F_2}$)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of Montreal gases	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CCl4	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CCl_4}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CFC	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of CFC gases (as defined by Table 8.A.1 of AR5)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC11	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of CFC11	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC113	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of CFC113	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC114	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of CFC114	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC115	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of CFC115	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CFC|CFC12	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of CFC12	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CH2Cl2	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CH_2Cl_2}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CH3Br	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CH_3Br}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CH3CCl3	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CH_3CCl_3}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CH3Cl	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CH_3Cl}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|CHCl3	$\mathrm{Wm^{-2}}$	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{CHCl_3}$	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|Halon1202	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of Halon-1202	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|Halon1211	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of Halon-1211	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|Halon1301	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of Halon-1301	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|Halon2402	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of Halon-2402	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|HCFC141b	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HCFC141b	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|HCFC142b	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HCFC22	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Montreal Gases|HCFC22	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of HCFC22	2
Radiative Forcing	Radiative Forcing|Anthropogenic|N2O	Wm^{-2}	radiative forcing (after stratospheric temperature adjustments) of $\mathrm{N_2O}$	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Other	Wm^{-2}	radiative forcing from factors not covered in other categories (after stratospheric temperature adjustments)	2

Table S4. Continued.

Category	Variable	Unit	Definition	Tier
Radiative Forcing	Radiative Forcing|Anthropogenic|Stratospheric Ozone	Wm^{-2}	radiative forcing from stratospheric ozone (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Anthropogenic|Tropospheric Ozone	Wm^{-2}	radiative forcing from tropospheric ozone (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Natural	Wm^{-2}	radiative forcing from all natural drivers, i.e. solar and volcanic forcing (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Natural|Solar	Wm^{-2}	radiative forcing from variations in solar irradience (after stratospheric temperature adjustments)	2
Radiative Forcing	Radiative Forcing|Natural|Volcanic	Wm^{-2}	radiative forcing due to volcanic eruptions (after stratospheric temperature adjustments)	2

References

Gidden, M. J., Riahi, K., Smith, S. J., Fujimori, S., Luderer, G., Kriegler, E., van Vuuren, D. P., van den Berg, M., Feng, L., Klein, D., Calvin, K., Doelman, J. C., Frank, S., Fricko, O., Harmsen, M., Hasegawa, T., Havlik, P., Hilaire, J., Hoesly, R., Horing, J., Popp, A., Stehfest, E., and Takahashi, K.: Global emissions pathways under different socioeconomic scenarios for use in CMIP6: a dataset of harmonized emissions trajectories through the end of the century, Geoscientific Model Development, 12, 1443–1475, https://doi.org/10.5194/gmd-12-1443-2019, 2019.