Year	CH_3CCl_3	CCl_4	CH_3Cl	CH_3Br	CH_2Cl_2	$CHCl_3$	Halon-1211	Halon-1301	Halon-2402
1940	0.00	14.1	457	5.66	7	5.3	0.00	0.00	0.00
1950	0.00	35.5	478	6.06	8	5.7	0.03	0.00	0.00
1960	1.70	53.2	512	6.50	11	6.4	0.02	0.00	0.00
1970	17.7	77.0	540	7.06	14	7.5	0.04	0.00	0.02
1980	85.9	93.8	549	7.77	18	8.8	0.71	0.38	0.15
1990	129.3	106.2	550	8.69	20	10.3	2.44	1.85	0.37
2000	45.4	98.1	547	9.09	20	7.5	4.12	2.82	0.48
2010	7.6	87.3	538	7.14	29	7.3	4.12	3.21	0.46
2015	3.1	81.6	547	6.68	35	8.6	3.66	3.31	0.42
2019	1.6	77.9	551	6.49	41	8.8	3.28	3.32	0.40
Unc.	*0.1*	*0.7*	*5*	*0.07*	*6*	*0.3*	*0.05*	*0.07*	*0.03*
ERF	0.1	12.9	0.4	0.0	1.0	0.3	1.0	1.0	0.1

Notes: 1750 from AR5; 1850–1970 from CMIP6 dataset in Meinshausen et al. (2017). 1980–2019 AGAGE or merged AGAGE and NOAA networks, depending on the date of availability. ERF (2019–1750) from Chapter 7.

Table AIII.2 | Future abundances of CO_2, CH_4 and N_2O for selected SSP scenarios (2020–2500).

	CO_2 (ppm)					CH_4 (ppb)					N_2O (ppb)				
2019[a]	410					1866					332				
Year/ Scenario	SSP1-1.9	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-1.9	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-1.9	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5
2020	414	414	414	415	415	1894	1888	1911	1921	1907	332	332	332	332	332
2030	434	440	444	451	452	1796	1810	2002	2099	2018	337	337	340	341	341
2040	440	458	475	493	500	1593	1663	2045	2289	2209	341	341	348	351	350
2050	438	469	507	541	563	1428	1519	2020	2472	2446	344	344	356	362	358
2060	431	474	537	593	643	1305	1402	1942	2655	2613	346	346	363	373	366
2070	424	473	564	652	744	1220	1299	1854	2840	2670	348	348	369	385	374
2080	415	467	585	716	864	1150	1197	1779	3028	2652	350	349	373	397	380
2090	405	457	598	787	998	1088	1112	1719	3208	2549	352	352	376	409	387
2100	394	446	603	867	1135	1036	1056	1683	3372	2415	354	354	377	422	392
2200	343	403	643	1457	2108	929	928	1255	2572	1516	364	363	376	497	414
2300	342	396	621	1483	2162	872	864	1001	1988	1068	361	360	367	511	411
2400	339	389	598	1424	2080	871	864	999	1959	1038	358	358	362	514	408
2500	337	384	579	1371	2010	871	864	997	1938	1019	357	356	360	516	407

Note: [a] Observed from Table AIII.1a. SSP GHG concentrations (Meinshausen et al., 2017, 2020) available at greenhousegases.science.unimelb.edu.au. Concentrations of halogenated compounds in electronic supplement. Major scenarios used in this report are selected.

Table AIII.3 | Effective radiative forcing (W m^{-2}) time series of all climate forcers from 1750–2019.

Year	CO_2	CH_4	N_2O	Halogenated Compounds	O_3	Stratospheric Water Vapour	Contrail-cirrus	Aerosol–radiation Interactions	Aerosol–cloud Interactions	Black Carbon on Snow	Land Use	Volcanic	Solar	Total Anthropogenic	Total Natural	Total
1750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.10	0.00	0.30	0.30
1850	0.14	0.05	0.01	0.00	0.03	0.00	0.00	–0.01	–0.07	0.01	–0.03	0.19	0.01	0.13	0.20	0.33
1900	0.35	0.12	0.03	0.00	0.08	0.01	0.00	–0.06	–0.29	0.02	–0.08	0.20	–0.04	0.18	0.16	0.34
1910	0.41	0.15	0.04	0.00	0.09	0.01	0.00	–0.10	–0.42	0.03	–0.10	0.20	–0.02	0.12	0.18	0.30

Year	CO_2	CH_4	N_2O	Halogenated Compounds	O_3	Stratospheric Water Vapour	Contrail-cirrus	Aerosol–radiation Interactions	Aerosol–cloud Interactions	Black Carbon on Snow	Land Use	Volcanic	Solar	Total Anthropogenic	Total Natural	Total
1920	0.50	0.17	0.05	0.00	0.10	0.02	0.00	–0.10	–0.43	0.03	–0.11	0.19	0.01	0.23	0.20	0.43
1930	0.54	0.20	0.06	0.00	0.12	0.02	0.00	–0.11	–0.46	0.03	–0.13	0.19	0.02	0.26	0.21	0.48
1940	0.62	0.22	0.06	0.00	0.14	0.02	0.00	–0.15	–0.52	0.03	–0.14	0.19	0.04	0.29	0.23	0.52
1950	0.65	0.24	0.07	0.01	0.17	0.02	0.00	–0.15	–0.55	0.03	–0.14	0.18	0.06	0.35	0.24	0.59
1960	0.71	0.29	0.08	0.03	0.22	0.03	0.01	–0.25	–0.73	0.04	–0.17	0.18	0.09	0.26	0.27	0.54
1970	0.85	0.36	0.09	0.08	0.28	0.03	0.02	–0.38	–0.92	0.05	–0.18	0.05	0.08	0.29	0.13	0.42
1980	1.09	0.43	0.11	0.20	0.33	0.04	0.02	–0.41	–1.04	0.06	–0.18	0.09	0.11	0.66	0.19	0.86
1990	1.33	0.49	0.13	0.33	0.36	0.04	0.03	–0.38	–1.05	0.07	–0.19	0.14	0.11	1.17	0.24	1.42
2000	1.56	0.51	0.16	0.37	0.40	0.05	0.04	–0.30	–0.92	0.07	–0.19	0.18	0.11	1.74	0.29	2.02
2010	1.85	0.52	0.18	0.39	0.44	0.05	0.04	–0.27	–0.99	0.08	–0.20	0.14	–0.01	2.10	0.13	2.23
2015	2.01	0.53	0.20	0.40	0.47	0.05	0.05	–0.23	–0.89	0.08	–0.20	0.11	0.03	2.47	0.14	2.61
2019	2.16	0.54	0.21	0.41	0.47	0.05	0.06	–0.22	–0.84	0.08	–0.20	0.14	–0.02	2.72	0.12	2.84

Notes: O_3 includes tropospheric and stratospheric O_3, dominated by tropospheric O_3. Stratospheric water vapour from methane oxidation is a linear function of the methane ERF (Section 7.3.2.6). Contrail forcing is a linear scaling of aviation NO_x emissions, scaled to ERF in 2018 (Lee et al., 2021). Present-day aerosol forcing is assessed in Section 7.3.3 as –0.3 [–0.6 to 0.0] W m^{-2} for aerosol–radiation interactions and –1.0 [–1.7 to –0.3] W m^{-2} for aerosol–cloud interactions for the 2005–2014 mean relative to 1750. Land-use change considers albedo and irrigation effects (Section 7.3.4.1). BC on snow forcing is linear with emissions of BC (Section 7.3.4.3). Volcanic forcing is positive in years without large volcanic eruptions, such that the long-term pre-industrial (500 BCE to 1749 CE) mean volcanic forcing is zero. Solar forcing is derived from the ^{14}C reconstruction of total solar irradiance in the combined PMIP4/CMIP6 dataset (Jungclaus et al., 2017; Matthes et al., 2017). Present-day solar forcing is assessed in Section 7.3.4.4 as +0.01 [–0.06 to +0.08] W m^{-2}, based on the mean total solar irradiance from solar cycle 24 (2009–2019) compared a long pre-industrial baseline period (6754 BCE to 1744 CE); the 2019 ERF value differs from this as it represents a single year near the solar minimum. Natural is the sum of volcanic and solar forcing, while anthropogenic includes all others. Further details on methods for computing ERF are in Chapter 7 Supplementary Material 7.SM.1.3.

Table AIII.4a | Effective radiative forcing (W m^{-2}) time series of all climate forcers for SSP1-1.9.

Year	CO_2	CH_4	N_2O	Halogenated Compounds	O_3	Stratospheric Water Vapour	Contrail-cirrus	Aerosol–radiation Interactions	Aerosol–cloud Interactions	Black Carbon on Snow	Land use	Volcanic	Solar	Total Anthropogenic	Total Natural	Total
2020	2.22	0.55	0.21	0.40	0.42	0.05	0.05	–0.20	–0.81	0.08	–0.20	0.06	–0.02	2.77	0.04	2.81
2030	2.49	0.52	0.23	0.38	0.25	0.05	0.03	–0.16	–0.39	0.03	–0.21	0.00	–0.02	3.22	–0.02	3.20
2040	2.56	0.44	0.24	0.32	0.19	0.04	0.02	–0.16	–0.28	0.02	–0.21	0.00	–0.01	3.18	–0.01	3.18
2050	2.53	0.37	0.25	0.27	0.14	0.03	0.02	–0.17	–0.20	0.01	–0.21	0.00	0.01	3.04	0.01	3.05
2060	2.45	0.31	0.26	0.23	0.12	0.03	0.01	–0.17	–0.16	0.01	–0.21	0.00	0.01	2.87	0.01	2.88
2070	2.35	0.27	0.26	0.21	0.11	0.02	0.01	–0.16	–0.13	0.00	–0.20	0.00	0.02	2.74	0.02	2.76
2080	2.23	0.24	0.27	0.19	0.09	0.02	0.01	–0.15	–0.09	0.00	–0.19	0.00	0.02	2.62	0.02	2.64
2090	2.09	0.21	0.28	0.17	0.09	0.02	0.01	–0.14	–0.05	0.00	–0.19	0.00	0.01	2.48	0.01	2.48
2100	1.92	0.18	0.28	0.15	0.08	0.02	0.01	–0.13	–0.01	0.00	–0.18	0.00	0.00	2.33	0.00	2.33
2200	1.16	0.12	0.32	0.07	0.06	0.01	0.00	–0.10	0.08	–0.01	–0.17	0.00	0.03	1.55	0.03	1.58
2300	1.14	0.09	0.31	0.04	0.03	0.01	0.00	–0.09	0.14	–0.01	–0.17	0.00	0.00	1.49	0.00	1.49
2400	1.09	0.09	0.30	0.03	0.03	0.01	0.00	–0.09	0.14	–0.01	–0.17	0.00	0.00	1.42	0.00	1.42
2500	1.05	0.09	0.30	0.02	0.03	0.01	0.00	–0.09	0.14	–0.01	–0.17	0.00	0.00	1.38	0.00	1.38

Notes: ERF based on future abundancies of well-mixed greenhouse gases (WMGHGs) listed in AIII.2. See notes of AIII.3. Future ozone forcing uses projected emissions of carbon monoxide, volatile organic carbon, nitrogen oxides, and concentrations of methane, nitrous oxide and halogenated compounds with relationships to forcing derived from Thornhill et al. (2021a, b). Future contrail forcing is a linear scaling of future NO_x emissions (Smith et al., 2018) and scaled to year-2018 ERF (Lee et al., 2021). Future aerosol forcing is based on emissions of black carbon, organic carbon, sulphur dioxide and ammonia using a method described in Smith et al. (2018). Land-use forcing scales with cumulative emissions of future land-use CO_2 (Smith et al., 2018). Future volcanic forcing set to zero from a 10-year linear transition from the end of the historical period following Eyring et al. (2016). Solar forcing is set to zero from 2300 CE. Further details on methods for computing SSP-projection ERF are in Chapter 7 Supplementary Material 7.SM.1.4.