

Climate Change 2007



The Physical Science Basis

The Working Group I contribution to the IPCC Fourth Assessment Report

Errata

Note. The following is a list of errata and corrections to the above report. In some cases these only affect the version of the report provided on CD-ROM, which was finalised before the printed version of the report.

Please note that there are small colour differences between the CD-ROM and printed versions, and corresponding differences in colour descriptions given in the figure captions, which are not listed here.

	Page	Item	Correction
	ix	Table of Contents	Title of Chapter 1 should be: “Historical Overview of Climate Change Science”
	ix	Table of Contents	Title of Chapter 3 should be: “Observations: Surface and Atmospheric Climate Change”
	33	Technical Summary Table TS.2	A number of species were inadvertently omitted that should have been included in the original table {Table 2.14}. Minor typographical errors (unit, superscripts, and footnotes) have also been corrected. Please see end of this Errata for the complete table {Table 2.14 Errata}.
	38	Technical Summary Figure TS.7, Panel A	The bottom left label of the y-axis should read: -1.0 and not -0.1 as given.
	135	Chapter 2 FAQ 2.1, Figure 1	The red label on the graph should read: “Carbon Dioxide”
	197	Chapter 2 Figure 2.19	The “j” and “o” labels in the “Black Carbon: Direct” row should be reversed.
	208	Chapter 2 Figure 2.23	The caption should read: “...instantaneous all-sky RF (bottom panel) and surface forcing (top panel)...”
	212	Chapter 2 Table 2.14	A number of species were inadvertently omitted that should have been included in the original table. Minor typographical errors (unit, superscripts, and footnotes) have also been corrected. Please see end of this Errata for the complete table. {Table 2.14 Errata}
	223	Chapter 2 References	The following references should be added: IPCC, 1996: <i>Climate Change 1995: The Science of Climate Change</i> [Houghton, J. T., et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 572 pp.
	268	Chapter 3 Figure 3.17, Panel A	The bottom left label of the y-axis should read: -1.0 and not -0.1 as given.



Errata

Page	Item	Correction
319	Chapter 3 References	Reference: “Allan, R.P., et al., 2001 ...” should be: “Allan, R., et al., 2001: Is there an Indian Ocean dipole, and is it independent of the El Niño - Southern Oscillation? <i>CLIVAR Exchanges</i> , 6 , 18-22.”
425	Chapter 5 References	Reference: “Minami, H., Y. Kano, and K. Ogawa, 1998 ...” should be: “Minami, H., Y. Kano and K. Ogawa, 1999: Long-term variations of potential temperature and dissolved oxygen of the Japan Sea proper water. <i>J. Oceanogr.</i> , 55 , 197-205.”
513	Chapter 7 FAQ 7.1, Figure 1	In Panel (a) the “Land-Based Sink” and “Net Oceanic Sink” labels should be reversed.
523	Chapter 7 Figure 7.8	The caption should read: “...who used wind speeds taken at the 0.995 sigma level (about 40 m above the sea surface.”
546	Chapter 7 Table 7.7	The range given under the Column “NH ₃ ” for “AR4” for “Natural Sources” in “Oceans” should read: (3-16) and not (3-6) as given.
550	Chapter 7 Section 7.4.4.2.1	In paragraph 1, line 7, reference to Stevenson et al (2006) should be to: Stevenson et al (2005)
550	Chapter 7 Section 7.4.4.2.3	In paragraph 1, line 6, reference to Stevenson et al (2005) should be to: Stevenson et al (2006)
580	Chapter 7 References	The following reference should be added: “Oeschger, H., U. Siegenthaler, and M. Heimann, 1980: The carbon cycle and its perturbation by man. In: <i>Interactions of Energy and Climate</i> [W. Bach, J. Pankrath, and J. Williams (eds.)]. Reidel, Dordrecht, pp. 107-127.”
635	Chapter 8 Section 8.6.3.1.2	The heading for Section 8.6.3.1.2 should be: “ <i>Summary of water vapour and lapse rate feedbacks</i> ”
919	Chapter 11 Section 11.10.1.2	In paragraph 3, line 11, reference to Rowell, 2005 should be to: Rowell, 2006
925	Chapter 11 Section 11.10.2.2.5	In paragraph 2, line 3, reference to Rowell (2005) should be to: Rowell (2006)
936	Chapter 11 References	The following reference should be added: “Rowell, D. P., 2006: A demonstration of the uncertainty in projections of UK climate change resulting from regional model formulation. <i>Climatic Change</i> , 79 , 243-257
944	Glossary Dobson unit (DU)	The definition of Dobson unit should read: “... 2.69×10^{20} molecules per square metre”

Table 2.14 (Errata). Lifetimes, radiative efficiencies and direct (except for CH₄) GWPs relative to CO₂. For ozone-depleting substances and their replacements, data are taken from IPCC/TEAP (2005) unless otherwise stated. See IPCC AR4 (Forster et al., 2007; Section 2.10.2 and Table 2.14) for details. A number of species were inadvertently omitted that should have been included in the list, and the complete table appears below. Information on the GWPs of these species were included in IPCC TAR (Ramaswamy et al., 2001; Tables 6.7 and 6.8). These species are now included in this Errata to Table 2.14 of IPCC AR4 (Forster et al., 2007), following established procedures and precedents. CO₂ AGWP values from IPCC AR4 (Forster et al., 2007; Section 2.10.2), and estimates of the lifetimes and radiative efficiency of these species (based on TAR and updates from WMO (2002, Chapter 1)), are employed to obtain their GWPs. Estimates of GWPs from SAR* are also listed for reference. Minor typographical errors (unit, parenthesis, superscripts, and footnotes) have also been corrected in this Errata.

Industrial Designation or Common Name	Chemical Formula	Lifetime (years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	Global Warming Potential for Given Time Horizon			
				SAR* (100-yr)	20-yr	100-yr	500-yr
Carbon dioxide	CO ₂	See below ^a	^b 1.4x10 ⁻⁵	1	1	1	1
Methane ^c	CH ₄	12 ^c	3.7x10 ⁻⁴	21	72	25	7.6
Nitrous oxide	N ₂ O	114	3.03x10 ⁻³	310	289	298	153
Substances controlled by the Montreal Protocol							
CFC-11	CCl ₃ F	45	0.25	3,800	6,730	4,750	1,620
CFC-12	CCl ₂ F ₂	100	0.32	8,100	11,000	10,900	5,200
CFC-13	CClF ₃	640	0.25		10,800	14,400	16,400
CFC-113	CCl ₂ FCF ₂	85	0.3	4,800	6,540	6,130	2,700
CFC-114	CClF ₂ CClF ₂	300	0.31		8,040	10,000	8,730
CFC-115	CClF ₂ CF ₃	1,700	0.18		5,310	7,370	9,990
Halon-1301	CBrF ₃	65	0.32	5,400	8,480	7,140	2,760
Halon-1211	CBrClF ₂	16	0.3		4,750	1,890	575
Halon-2402	CBrF ₂ CBrF ₂	20	0.33		3,680	1,640	503
Carbon tetrachloride	CCl ₄	26	0.13	1,400	2,700	1,400	435
Methyl bromide	CH ₃ Br	0.7	0.01		17	5	1
Methyl chloroform	CH ₃ CCl ₃	5	0.06	100*	506	146	45
HCFC-21	CHCl ₂ F	1.7	0.14		530	151	46
HCFC-22	CHClF ₂	12	0.2	1,500	5,160	1,810	549
HCFC-123	CHCl ₂ CF ₃	1.3	0.14	90	273	77	24
HCFC-124	CHClFCF ₃	5.8	0.22	470	2,070	609	185
HCFC-141b	CH ₃ CCl ₂ F	9.3	0.14	600	2,250	725	220
HCFC-142b	CH ₃ CClF ₂	17.9	0.2	1,800	5,490	2,310	705
HCFC-225ca	CHCl ₂ CF ₂ CF ₃	1.9	0.2		429	122	37
HCFC-225cb	CHClFCF ₂ CClF ₂	5.8	0.32		2,030	595	181
Hydrofluorocarbons							
HFC-23	CHF ₃	270	0.19	11,700	12,000	14,800	12,200
HFC-32	CH ₂ F ₂	4.9	0.11	650	2,330	675	205
HFC-41	CH ₃ F	2.4	0.02	150	323	92	28
HFC-125	CHF ₂ CF ₃	29	0.23	2,800	6,350	3,500	1,100
HFC-134	CHF ₂ CHF ₂	9.6	0.18	1000	3,400	1,100	335
HFC-134a	CH ₂ FCF ₃	14	0.16	1,300	3,830	1,430	435
HFC-143	CH ₂ FCHF ₂	3.5	0.13	300	1,240	353	107
HFC-143a	CH ₃ CF ₃	52	0.13	3,800	5,890	4,470	1,590
HFC-152	CH ₂ FCH ₂ F	0.60	0.09		187	53	16
HFC-152a	CH ₃ CHF ₂	1.4	0.09	140	437	124	38
HFC-161	CH ₃ CH ₂ F	0.3	0.03		43	12	3.7
HFC-227ea	CF ₃ CHFCF ₃	34.2	0.26	2,900	5,310	3,220	1,040
HFC-236cb	CH ₂ FCF ₂ CF ₃	13.6	0.23		3,630	1,340	407
HFC-236ea	CHF ₂ CHFCF ₃	10.7	0.3		4,090	1,370	418
HFC-236fa	CF ₃ CH ₂ CF ₃	240	0.28	6,300	8,100	9,810	7,660
HFC-245ca	CH ₂ FCF ₂ CHF ₂	6.2	0.23	560	2,340	693	211
HFC-245fa	CHF ₂ CH ₂ CF ₃	7.6	0.28		3,380	1,030	314
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	8.6	0.21		2,520	794	241
HFC-43-10mee	CF ₃ CHFCHFCF ₂ CF ₃	15.9	0.4	1,300	4,140	1,640	500

Table 2.14 (continued)

Industrial Designation or Common Name	Chemical Formula	Lifetime (years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	Global Warming Potential for Given Time Horizon			
				SAR† (100-yr)	20-yr	100-yr	500-yr
Perfluorinated compounds							
Sulphur hexafluoride	SF ₆	3,200	0.52	23,900	16,300	22,800	32,600
Nitrogen trifluoride	NF ₃	740	0.21		12,300	17,200	20,700
PFC-14	CF ₄	50,000	0.10	6,500	5,210	7,390	11,200
PFC-116	C ₂ F ₆	10,000	0.26	9,200	8,630	12,200	18,200
PFC-218	C ₃ F ₈	2,600	0.26	7,000	6,310	8,830	12,500
PFC-318	c-C ₄ F ₈	3,200	0.32	8,700	7,310	10,300	14,700
PFC-3-1-10	C ₄ F ₁₀	2,600	0.33	7,000	6,330	8,860	12,500
PFC-4-1-12	C ₅ F ₁₂	4,100	0.41	7,500	6,510	9,160	13,300
PFC-5-1-14	C ₆ F ₁₄	3,200	0.49	7,400	6,600	9,300	13,300
PFC-9-1-18	C ₁₀ F ₁₈	>1,000 ^f	0.56		>5,500	>7,500	>9,500
trifluoromethyl sulphur pentafluoride	SF ₅ CF ₃	800	0.57		13,200	17,700	21,200
Perfluorocyclopropane	c-C ₃ F ₆	>1000	0.42		>12,700	>17,340	>21,800
Fluorinated ethers							
HFE-125	CHF ₂ OCF ₃	136	0.44		13,800	14,900	8,490
HFE-134	CHF ₂ OCHF ₂	26	0.45		12,200	6,320	1,960
HFE-143a	CH ₃ OCF ₃	4.3	0.27		2,630	756	230
HCFE-235da2	CHF ₂ OCHClCF ₃	2.6	0.38		1,230	350	106
HFE-245cb2	CH ₃ OCF ₂ CF ₃	5.1	0.32		2,440	708	215
HFE-245fa2	CHF ₂ OCH ₂ CF ₃	4.9	0.31		2,280	659	200
HFE-254cb2	CH ₃ OCF ₂ CHF ₂	2.6	0.28		1,260	359	109
HFE-347mcc3	CH ₃ OCF ₂ CF ₂ CF ₃	5.2	0.34		1,980	575	175
HFE-347pcf2	CHF ₂ CF ₂ OCH ₂ CF ₃	7.1	0.25		1,900	580	175
HFE-356pcc3	CH ₃ OCF ₂ CF ₂ CHF ₂	0.33	0.93		386	110	33
HFE-449sl (HFE-7100)	C ₄ F ₉ OCH ₃	3.8	0.31		1,040	297	90
HFE-569sf2 (HFE-7200)	C ₄ F ₉ OC ₂ H ₅	0.77	0.3		207	59	18
HFE-43-10pccc124 (H-Galden 1040x)	CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂	6.3	1.37		6,320	1,870	569
HFE-236ca12 (HG-10)	CHF ₂ OCF ₂ OCHF ₂	12.1	0.66		8,000	2,800	860
HFE-338pcc13 (HG-01)	CHF ₂ OCF ₂ CF ₂ OCHF ₂	6.2	0.87		5,100	1,500	460
	(CF ₃) ₂ CFOCH ₃	3.4	0.31		1204	343	104
	CF ₃ CF ₂ CH ₂ OH	0.4	0.24		147	42	13
	(CF ₃) ₂ CHOH	1.8	0.28		687	195	59
HFE-227ea	CF ₃ CHFOCF ₃	11	0.40		4,540	1,540	468
HFE-236ea2	CHF ₂ OCHF ₂ CF ₃	5.8	0.44		3,370	989	301
HFE-236fa	CF ₃ CH ₂ OCF ₃	3.7	0.34		1,710	487	148
HFE-245fa1	CHF ₂ CH ₂ OCF ₃	2.2	0.30		1,010	286	87
HFE 263fb2	CF ₃ CH ₂ OCH ₃	0.2	0.1		38	11	3
HFE-329mcc2	CHF ₂ CF ₂ OCF ₂ CF ₃	6.8	0.49		3,060	919	279
HFE-338mcf2	CF ₃ CH ₂ OCF ₂ CF ₃	4.3	0.43		1,920	552	168
HFE-347mcf2	CHF ₂ CH ₂ OCF ₂ CF ₃	2.8	0.41		1,310	374	114
HFE-356mec3	CH ₃ OCF ₂ CHFCF ₃	0.94	0.30		355	101	31
HFE-356pcf2	CHF ₂ CH ₂ OCF ₂ CHF ₂	2.0	0.37		931	265	80
HFE-356pcf3	CHF ₂ OCH ₂ CF ₂ CHF ₂	3.6	0.39		1,760	502	153
HFE 365mcf3	CF ₃ CF ₂ CH ₂ OCH ₃	0.27	0.11		41	11	4

Table 2.14 (continued)

Industrial Designation or Common Name	Chemical Formula	Lifetime (years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	Global Warming Potential for Given Time Horizon			
				SAR‡ (100-yr)	20-yr	100-yr	500-yr
<i>Fluorinated ethers (continued)</i>							
HFE-374pc2	CHF ₂ CF ₂ OCH ₂ CH ₃	5.0	0.25		1,930	557	169
	- (CF ₂) ₄ CH (OH) -	0.3	0.85		258	73	23
	(CF ₃) ₂ CHOCHF ₂	3.1	0.41		1,330	380	115
	(CF ₃) ₂ CHOCH ₃	0.25	0.30		94	27	8.2
<i>Perfluoropolyethers</i>							
PFPME	CF ₃ OCF(CF ₃)CF ₂ OCF ₂ OCF ₃	800	0.65		7,620	10,300	12,400
<i>Hydrocarbons and other compounds – Direct Effects</i>							
Dimethylether	CH ₃ OCH ₃	0.015	0.02		1	1	<<1
Chloroform	CHCl ₃	0.51	0.11	4	108	31	9.3
Methylene chloride	CH ₂ Cl ₂	0.38	0.03	9	31	8.7	2.7
Methyl chloride	CH ₃ Cl	1.0	0.01		45	13	4
	CH ₂ Br ₂	0.41	0.01		5.4	1.54	0.47
Halon-1201	CHBrF ₂	5.8	0.14		1,380	404	123
Trifluoroiodomethane	CF ₃ I	0.005	0.23	<1	1	0.4	0.1

Notes:

^a The CO₂ response function used in this report is based on the revised version of the Bern Carbon cycle model used in Chapter 10 of this report (Bern2.5CC; Joos et al. 2001) using a background CO₂ concentration value of 378 ppm. The decay of a pulse of CO₂ with time t is given by

$$a_0 + \sum_{i=1}^3 a_i \cdot e^{-t/\tau_i}$$

Where $a_0 = 0.217$, $a_1 = 0.259$, $a_2 = 0.338$, $a_3 = 0.186$, $\tau_1 = 172.9$ years, $\tau_2 = 18.51$ years, and $\tau_3 = 1.186$ years.

^b The radiative efficiency of CO₂ is calculated using the IPCC (1990) simplified expression as revised in the TAR, with an updated background concentration value of 378 ppm and a perturbation of +1 ppm (see Section 2.10.2).

^c The perturbation lifetime for methane is 12 years as in the TAR (see also Section 7.4). The GWP for methane includes indirect effects from enhancements of ozone and stratospheric water vapour (see Section 2.10.3.1).

^d Robson et al. (2006)

^e Hurley et al. (2005)

^f Shine et al. (2005c), updated by the revised AGWP for CO₂. The assumed lifetime of 1,000 years is a lower limit.

[‡] Second Assessment Report (IPCC, 1996)

* Compound in SAR (Table 2.8) was erroneously listed as CH₃Cl₃.