

REFERENCES

EXECUTIVE SUMMARY REFERENCES

Fahey, D.W., 2007: Twenty questions and answers about the ozone layer: 2006 update. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, [50 pp.] Included as Appendix A of this report; also at <<http://www.esrl.noaa.gov/csd/assessments/2006/report.html>>

IPCC (Intergovernmental Panel on Climate Change), 2007: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, UK, and New York, 996 pp. <<http://www.ipcc.ch>>

WMO (World Meteorological Organization), 2003: *Scientific Assessment of Ozone Depletion: 2002*. Global Ozone Research and Monitoring Project report no. 47. World Meteorological Organization, Geneva, Switzerland, 498 pp.

WMO (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/>>

CHAPTER I REFERENCES

Fahey, D.W., 2007: Twenty questions and answers about the ozone layer: 2006 update. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, [50 pp.] Included as Appendix A of this report; also at <<http://www.esrl.noaa.gov/csd/assessments/2006/report.html>>

IPCC (Intergovernmental Panel on Climate Change), 2007: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 996 pp. <<http://www.ipcc.ch>>

IPCC/TEAP (Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel), 2005: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons*. [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 478 pp.

WMO (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/report.html>>

CHAPTER 2 REFERENCES

AFEAS (Alternative Fluorocarbons Environmental Acceptability Study), 2007: Data tables at <<http://www.afeas.org/>>

Campbell, N. and R. Shende (coordinating lead authors), M. Bennett, O. Blinova, R. Derwent, A. McCulloch, M. Yamabe, J. Shevlin, and T. Vink, 2005: HFCs and PFCs: current and future supply, demand and emissions, plus emissions of CFCs, HCFCs and halons. In: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons* [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, pp. 403-436.

Clerbaux, C. and D.M. Cunnold (lead authors), J. Anderson, A. Engel, P.J. Fraser, E. Mahieu, A. Manning, S.A. Montzka, R. Nassar, R. Prinn, S. Reimann, C.P. Rinsland, P. Simmonds, D. Verdonik, R. Weiss, D. Wuebbles, and Y. Yokouchi, 2007: Long-lived compounds. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, pp. 1.1-1.63.

Daniel, J.S. and G.J.M. Velders (lead authors), A.R. Douglass, P.M.D. Forster, D.A. Hauglustaine, I.S.A. Isaksen, L.J.M. Kuijpers, A. McCulloch, and T.J. Wallington, 2007: Halocarbon scenarios, ozone depletion potentials, and global warming potentials. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, pp. 8.1-8.39.

- Daniel**, J.S., S. Solomon, and D.L. Albritton, 1995: On the evaluation of halocarbon radiative forcing and global warming potentials. *Journal of Geophysical Research*, **100(D1)**, 1271-1285.
- Dorf**, M., J.H. Butler, A. Butz, C. Camy-Peyret, M.P. Chipperfield, L. Kritten, S. Montzka, B. Simmes, F. Weidner, and K. Pfeilsticker, 2006: Long-term observations of stratospheric bromine reveal slow down in growth. *Geophysical Research Letters*, **33**, L24803, doi:10.1029/2006GL027714.
- Forster**, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz, and R. Van Dorland, 2007: Changes in atmospheric constituents and in radiative forcing. In: *Climate Change 2007: The Physical Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, UK, and New York, pp. 129-234.
- IPCC** (Intergovernmental Panel on Climate Change), 2001: *Climate Change 2001: The Scientific Basis*. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 881 pp.
- IPCC** (Intergovernmental Panel on Climate Change), 2007: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, UK, and New York, 996 pp. <<http://www.ipcc.ch>>
- IPCC/TEAP** (Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel), 2005: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons*. [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 478 pp.
- Joshi**, M., K. Shine, M. Ponater, N. Stuber, R. Sausen, and L. Li, 2003: A comparison of climate response to different radiative forcings in three general circulation models: towards an improved metric of climate change. *Climate Dynamics*, **20(7-8)**, 843-854.
- Law**, K.S. and W.T. Sturges (lead authors), D.R. Blake, N.J. Blake, J.B. Burkholder, J.H. Butler, R.A. Cox, P.H. Haynes, K. Kreher, C. Mari, K. Pfeilsticker, J.M.C. Plane, R.J. Salawitch, C. Schiller, B.-M. Sinnhuber, R. von Glasow, N.J. Warwick, D.J. Wuebbles, and S.A. Yvon-Lewis, 2007: Halogenated and very short-lived substances. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, pp. 2.1-2.57.
- McCulloch**, A., P.M. Midgley, and D.A. Fisher, 1994: Distribution of emissions of chlorofluorocarbons (CFCs) 11, 12, 113, 114, and 115 among reporting and non-reporting countries in 1986. *Atmospheric Environment*, **28(16)**, 2567-2582.
- Midgley**, P.M. and A. McCulloch, 1999: Properties and applications of industrial halocarbons. In: *The Handbook of Environmental Chemistry Vol. 4. Part E, Reactive Halogen Compounds in the Atmosphere* [Fabian, P. and O.N. Singh (eds.)]. Springer-Verlag, Berlin and New York, chapter 5.
- Newman**, P.A., E.R. Nash, S.R. Kawa, S.A. Montzka, and S.M. Schauffler, 2006: When will the Antarctic ozone hole recover? *Geophysical Research Letters*, **33**, L12814, doi:10.1029/2005GL025232.
- Newman**, P.A., J.S. Daniel, D.W. Waugh, and E.R. Nash, 2007: A new formulation of equivalent effective stratospheric chlorine (EESC). *Atmospheric Chemistry and Physics*, **7(17)**, 4537-4552.
- Ramaswamy**, V., O. Boucher, J. Haigh, D. Hauglustaine, J. Haywood, G. Myhre, T. Nakajima, G.Y. Shi, and S. Solomon, 2001: Radiative forcing of climate change. In: *Climate Change 2001: The Scientific Basis*. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, UK, and New York, pp. 349-416.
- Rand**, S. and M. Yamabe (coordinating lead authors), N. Campbell, J. Hu, P. Lapin, A. McCulloch, A. Merchant, K. Mizuno, J. Owens, and P. Rollet, 2005: Non-medical aerosols, solvents, and HFC-23. In: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons* [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, pp. 379-402.
- Schauffler**, S.M., E.L. Atlas, S.G. Donnelly, A. Andrews, S.A. Montzka, J.W. Elkins, D.F. Hurst, P.A. Romashkin, G.S. Dutton, and V. Stroud, 2003: Chlorine budget and partitioning during SOLVE. *Journal of Geophysical Research*, **108(D5)**, 4173, doi:10.1029/2001JD002040.
- Shine**, K.P., L.K. Gohar, M.D. Hurley, G. Marston, D. Martin, P.G. Simmonds, T.J. Wallington, and M. Watkins, 2005:

Perfluorodecalin: global warming potential and first detection in the atmosphere. *Atmospheric Environment*, **39**(9), 1759-1763.

Solomon, S. and D.L. Albritton, 1992: Time-dependent ozone depletion potentials for short- and long-term forecasts. *Nature*, **357**(6373), 33-37.

Solomon, S., M. Mills, L.E. Heidt, W.H. Pollock, and A.F. Tuck, 1992: On the evaluation of ozone depletion potentials. *Journal of Geophysical Research*, **97**(D1), 825-842.

UNEP (United Nations Environment Programme), 2007: Ozone Secretariat ozone depleting substances production and consumption data tables on the web at <http://ozone.unep.org/Data_Report>

UNEP/CTOC (United Nations Environment Programme/Chemical Technical Options Committee), 2007: 2006 Report of the Chemical Technical Options Committee: 2006 Assessment. UN Ozone Secretariat, Nairobi, Kenya, 55 pp. <http://ozone.unep.org/teap/Reports/CTOC/ctoc_assessment_report06.pdf>

UNEP/MBTOC (United Nations Environment Programme/Methyl Bromide Technical Options Committee), 2007: 2006 Report of the Methyl Bromide Technical Options Committee: 2006 Assessment. UN Ozone Secretariat, Nairobi, Kenya, 453 pp. <<http://ozone.unep.org/teap/Reports/MBTOC/MBTOC-2006-Assessment%20Report.pdf>>

UNEP/TEAP (United Nations Environment Programme/Technology and Economic Assessment Panel), 2006: *Task Force on Emissions Discrepancies Report*. UN Ozone Secretariat, Nairobi, Kenya, 80 pp. <http://ozone.unep.org/teap/Reports/TEAP_Discrepancy-report.pdf>

U.S. EPA (Environmental Protection Agency), 2007: *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2005*. EPA #430-R-07-002. Environmental Protection Agency, Washington DC, 393 pp. <http://epa.gov/climatechange/emissions/usgginv_archive.html>

Velders, G.J.M., S.O. Andersen, J.S. Daniel, D.W. Fahey, and M. McFarland, 2007: The importance of the Montreal Protocol in protecting climate. *Proceedings of the National Academy of Sciences*, **104**(12), 4814-4819.

Wuebbles, D.J., 1983: Chlorocarbon emission scenarios: potential impact on stratospheric ozone. *Journal of Geophysical Research*, **88**(C2), 1433-1443.

WMO (World Meteorological Organization), 2003: *Scientific Assessment of Ozone Depletion: 2002*. Global Ozone Research and Monitoring Project report no. 47. World Meteorological Organization, Geneva, Switzerland, 498 pp.

WMO (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/>>

CHAPTER 3 REFERENCES

Allen, D.R., R.M. Bevilacqua, G.E. Nedoluha, C.E. Randall, and G.L. Manney, 2003: Unusual stratospheric transport and mixing during the 2002 Antarctic winter. *Geophysical Research Letters*, **30**(12), 1599, doi: 10.1029/2003GL017117.

Andrews, D.G., J.R. Holton, and C.B. Leovy, 1987: *Middle Atmosphere Dynamics*. Academic Press, Orlando, FL, 489 pp.

Bais, A. and D. Lubin (lead authors), A. Arola, G. Bernhard, M. Blumthaler, N. Chubarova, C. Erlick, H.P. Gies, N. Krotkov, K. Lantz, B. Mayer, R.L. McKenzie, R.D. Piacentini, G. Seckmeyer, J.R. Slusser, and C.S. Zerefos, 2007: Surface ultraviolet radiation: past, present, and future. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, pp. 7.1-7.54.

Brönnimann, S. and L.L. Hood, 2003: Frequency of low-ozone events over northwestern Europe in 1952-1963 and 1990-2000. *Geophysical Research Letters*, **30**(21), 2118, doi:10.1029/2003GL018431.

Canty, T., E.D. Rivière, R.J. Salawitch, G. Berthet, J.-B. Reinard, K. Pfeilsticker, M. Dorf, A. Butz, H. Bösch, R.M. Stimpfle, D.M. Wilmouth, E.C. Richard, D.W. Fahey, P.J. Popp, M.R. Schoeberl, L.R. Lait, and T.P. Bui, 2005: Nighttime OCIO in the winter Arctic vortex. *Journal of Geophysical Research*, **110**, D01301, doi:10.1029/2004JD005035.

Cede, A., M. Kowalewski, S. Kazadzis, A. Bais, N. Kouremeti, M. Blumthaler, and J. Herman, 2006: Solar zenith angle effect for direct-sun measurements of Brewer spectrophotometers due to polarization. *Geophysical Research Letters*, **33**, L02806, doi:10.1029/2005GL024860.

Crutzen, P.J. and F. Arnold, 1986: Nitric-acid cloud formation in the cold Antarctic stratosphere: A major cause for the springtime 'ozone hole.' *Nature*, **324**(6098), 651-655.

Dhomse, S., M. Weber, I. Wohltmann, M. Rex, and J.P. Burrows, 2006: On the possible causes of recent increases in northern hemisphere total ozone from a statistical analysis of satellite data from 1979 to 2003. *Atmospheric Chemistry and Physics*, **6**(5), 1165-1180.

- Díaz**, S., D. Nelson, G. Deferrari, and C. Camilión, 2003: Estimated and measured DNA, plant-chromosphere and erythemal-weighted irradiance at Barrow and South Pole (1979-2000). *Agricultural and Forest Meteorology*, **120(1-4)**, 69-82.
- Diffey**, B.L., 1991: Solar ultraviolet radiation effects on biological systems. *Review in Physics in Medicine and Biology*, **36(3)**, 299-328.
- Eyring**, V., N. Butchart, D.W. Waugh, H. Akiyoshi, J. Austin, S. Bekki, G.E. Bodeker, B.A. Boville, C. Brühl, M.P. Chipperfield, E. Cordero, M. Dameris, M. Deushi, V.E. Fioletov, S.M. Frith, R.R. Garcia, A. Gettelman, M.A. Giorgetta, V. Grewe, L. Jourdain, D.E. Kinnison, E. Mancini, E. Manzini, M. Marchand, D.R. Marsh, T. Nagashima, P.A. Newman, J.E. Nielsen, S. Pawson, G. Pitari, D.A. Plummer, E. Rozanov, M. Schraner, T.G. Shepherd, K. Shibata, R.S. Stolarski, H. Struthers, W. Tian, and M. Yoshiki, 2006: Assessment of temperature, trace species, and ozone in chemistry-climate model simulations of the recent past. *Journal of Geophysical Research*, **111**, D22308, doi:10.1029/2006JD007327.
- Fahey**, D.W., 2007: Twenty questions and answers about the ozone layer: 2006 update. In: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, [50 pp.] Included as Appendix A of this report; also at <<http://www.esrl.noaa.gov/csd/assessments/2006/report.html>>
- Feng**, W., M.P. Chipperfield, H.K. Roscoe, J.J. Remedios, A.M. Waterfall, G.P. Stiller, N. Glatthor, M. Höpfner, and D.-Y. Wang, 2005: Three-dimensional model study of the Antarctic ozone hole in 2002 and comparison with 2000. *Journal of the Atmospheric Sciences*, **62(3)**, 822-837.
- Feng**, W., M.P. Chipperfield, S. Davies, P. von der Gathen, E. Kyrö, C.M. Volk, A. Ulanovsky, and G. Belyaev, 2007a: Large chemical ozone loss in 2004/2005 Arctic winter/spring. *Geophysical Research Letters*, **34**, L09803, doi:10.1029/2006GL029098.
- Feng**, W., M.P. Chipperfield, M. Dorf, K. Pfeilsticker, and P. Ricaud, 2007b: Mid-latitude ozone changes: studies with a 3-D CTM forced by ERA-40 analyses. *Atmospheric Chemistry and Physics*, **7(9)**, 2357-2369.
- Fioletov**, V.E. and W.F.J. Evans, 1997: The influence of ozone and other factors on surface radiation. In: *Ozone Science: A Canadian Perspective on the Changing Ozone Layer* [Wardle, D.I., J.B. Kerr, C.T. McElroy, and D.R. Francis (eds.)]. University of Toronto Press, Toronto, pp. 73-79.
- Fioletov**, V.E., L.J.B. McArthur, J.B. Kerr, and D.I. Wardle, 2001: Long-term variations of UV-B irradiance over Canada estimated from Brewer observations and derived from ozone and pyranometer measurements. *Journal of Geophysical Research*, **106(D19)**, 23009-23027.
- Fioletov**, V.E., G.E. Bodeker, A.J. Miller, R.D. McPeters, and R. Stolarski, 2002: Global and zonal total ozone variations estimated from ground-based and satellite measurements: 1964-2000. *Journal of Geophysical Research*, **107(D22)**, 4647, doi:10.1029/2001JD001350.
- Fioletov**, V.E., M.G. Kimlin, N. Krotkov, L.J.B. McArthur, J.B. Kerr, D.I. Wardle, J.R. Herman, R. Meltzer, T.W. Mathews, and J. Kaurola, 2004: UV index climatology over North America from ground-based and satellite estimates. *Journal of Geophysical Research*, **109**, D22308, doi:10.1029/2004JD004820.
- Frieler**, K., M. Rex, R.J. Salawitch, T. Carty, M. Streibel, R.M. Stimpfle, K. Pfeilsticker, M. Dorf, D.K. Weisenstein, S. Godin-Beekmann, and P. von der Gathen, 2006: Toward a better quantitative understanding of polar stratospheric ozone loss. *Geophysical Research Letters*, **33**, L10812, doi:10.1029/2005GL025466.
- Fromm**, M., J. Alfred, and M. Pitts, 2003: A unified, long-term, high-latitude stratospheric aerosol and cloud database using SAM II, SAGE II, and POAM II/III data: algorithm description, database definition, and climatology. *Journal of Geophysical Research*, **108(D12)**, 4366, doi:10.1029/2002JD002772.
- Fusco**, A.C. and M.L. Salby, 1999: Interannual variations of total ozone and their relationship to variations of planetary wave activity. *Journal of Climate*, **12(6)**, 1619-1629.
- Ghetti**, F., G. Checcucci, and J. Bornman (eds.), 2006: *Environmental UV Radiation: Impact on Ecosystems and Human Health and Predictive Models*. NATO science series IV, earth and environmental sciences volume 57. Springer, Dordrecht, 288 pp.
- Goutail**, F., J.-P. Pommereau, F. Lefèvre, M. van Roozendael, S.B. Andersen, B.-A. Kåstad Høiskar, V. Dorokhov, E. Kyrö, M.P. Chipperfield, and W. Feng, 2005: Early unusual ozone loss during the Arctic winter 2002/2003 compared to other winters. *Atmospheric Chemistry and Physics*, **5(3)**, 665-677.
- Grant**, W.B., 2002: An estimate of premature cancer mortality in the U.S. due to inadequate doses of solar ultraviolet-B radiation. *Cancer*, **94(6)**, 1867-1875.
- Grooß**, J.-U., P. Konopka, and R. Müller, 2005: Ozone chemistry during the 2002 Antarctic vortex split. *Journal of the Atmospheric Sciences*, **62(3)**, 860-870.
- Hadjinicolaou**, P., J.A. Pyle, M.P. Chipperfield, and J.A. Kettleborough, 1997: Effect of interannual meteorological vari-

- ability on mid-latitude O₃. *Geophysical Research Letters*, **24**(23), 2993-2996.
- Hadjinicolaou**, P., A. Jrrar, J.A. Pyle, and L. Bishop, 2002: The dynamically driven long-term trend in stratospheric ozone over northern middle latitudes. *Quarterly Journal of the Royal Meteorological Society*, **128**(583), 1393-1412.
- Hadjinicolaou**, P., J.A. Pyle, and N.R.P. Harris, 2005: The recent turnaround in stratospheric ozone over northern middle latitudes: a dynamical modeling perspective. *Geophysical Research Letters*, **32**, L12821, doi:10.1029/2005GL022476.
- Herman**, J.R. and E.A. Celarier, 1997: Earth surface reflectivity climatology at 340-380 nm from TOMS data. *Journal of Geophysical Research*, **102**(D23), 28003-28011.
- Herman**, J.R., P.A. Newman, R.D. McPeters, A.J. Krueger, P.K. Bhartia, C.J. Seftor, O. Torres, G. Jaross, R.P. Cebula, D. Larko, and C. Wellemeyer, 1995: Meteor 3/Total Ozone Mapping Spectrometer observations of the 1993 ozone hole. *Journal of Geophysical Research*, **100**(D2), 2973-2983.
- Herman**, J.R., S. McKenzie, S. Diaz, J. Kerr, S. Madronich, and G. Seckmeyer, 1999a: UV radiation at the Earth's surface. In: *Scientific Assessment of Ozone Depletion: 1998*. Global Ozone Research and Monitoring Project report no. 44. World Meteorological Organization, Geneva, Switzerland, chapter 9.
- Herman**, J.R., N.A. Krotkov, E.A. Celarier, D. Larko, and G. Labow, 1999b: The distribution of UV radiation at the Earth's surface from TOMS-measured UV-backscattered radiances. *Journal of Geophysical Research*, **104**(D10), 12059-12076.
- Herman**, J.R., E. Celarier, and D. Larko, 2001a: UV 380 nm reflectivity of the Earth's surface, clouds, and aerosols. *Journal of Geophysical Research*, **106**(D6), 5335-5351.
- Herman**, J.R., D. Larko, E. Celarier, and J. Ziemke, 2001b: Changes in the Earth's UV reflectivity from the surface, clouds and aerosols. *Journal of Geophysical Research*, **106**(D6), 5353-5368.
- Herman**, J.R., G. Labow, N.C. Hsu, and D. Larko, 2008: Changes in cloud cover derived from reflectivity time series using SeaWiFS, N7-TOMS, EP-TOMS, SBUV-2, and OMI radiance data. *Journal of Geophysical Research*, in press, doi:10.1029/2007JD009508.
- Hio**, Y. and S. Yoden, 2005: Interannual variations of the seasonal March in the Southern Hemisphere stratosphere for 1979-2002 and characterization of the unprecedented year 2002. *Journal of the Atmospheric Sciences*, **62**(3), 567-580.
- Hofmann**, D.J., S.J. Oltmans, J.M. Harris, B.J. Johnson, and J.A. Lathrop, 1997: Ten years of ozonesonde measurements at the south pole: implications for recovery of springtime Antarctic ozone. *Journal of Geophysical Research*, **102**(D7), 8931-8943.
- Holben**, B.N., D. Tanre, A. Smirnov, T.F. Eck, I. Slutsker, N. Abuhaman, W.W. Newcomb, J. Schafer, B. Chatenet, F. Lavenue, Y.J. Kaufman, J. Vande Castle, A. Setzer, B. Markham, D. Clark, R. Frouin, R. Halthore, A. Karnieli, N.T. O'Neill, C. Pietras, R.T. Pinker, K. Voss, and G. Zibordi, 2001: An emerging ground-based aerosol climatology: aerosol optical depth from AERONET. *Journal of Geophysical Research*, **106**(D11), 12067-12097.
- Holick**, M.F., 2004: Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *American Journal of Clinical Nutrition*, **80**(6), 1678S-1688S.
- Hood**, L.L. and B.E. Soukharev, 2005: Interannual variations of total ozone at northern midlatitudes correlated with stratospheric EP flux and potential vorticity. *Journal of the Atmospheric Sciences*, **62**(10), 3724-3740.
- Hood**, L.L., J.P. McCormack, and K. Labitzke, 1997: An investigation of dynamical contributions to midlatitude ozone trends in winter. *Journal of Geophysical Research*, **102**(D11), 13079-13093.
- Hood**, L.L., S. Rossi, and M. Beulen, 1999: Trends in lower stratospheric zonal winds, Rossby wave breaking behavior, and column ozone at northern midlatitudes. *Journal of Geophysical Research*, **104**(D20), 24321-24339.
- Hood**, L.L., B.E. Soukharev, M. Fromm, and J. McCormack, 2001: Origin of extreme ozone minima at middle to high northern latitudes. *Journal of Geophysical Research*, **106**(D18), 20925-20940.
- Hoppel**, K.H., R. Bevilacqua, G. Nedoluha, C. Deniel, F. Lefevre, J. Lumpe, M. Fromm, C. Randall, J. Rosenfield, and M. Rex, 2002: POAM III observations of Arctic ozone loss for the 1999/2000 winter. *Journal of Geophysical Research*, **107**(D20), 8262, doi:10.1029/2001JD000476.
- Hoppel**, K., R. Bevilacqua, D. Allen, and G. Nedoluha, 2003: POAM III observations of the anomalous 2002 Antarctic ozone hole. *Geophysical Research Letters*, **30**(7), 1394, doi:10.1029/2003GL016899.
- Hoppel**, K., G. Nedoluha, M. Fromm, A. Allen, R. Bevilacqua, J. Alfred, B. Johnson, and G. Konig-Langlo, 2005: Reduced ozone loss at the upper edge of the Antarctic ozone hole during 2001-2004. *Geophysical Research Letters*, **32**, L20816, doi:10.1029/2005GL023968.

- IPCC/TEAP** (Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel), 2005: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons* [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 478 pp.
- Kalliskota, S.J.**, J. Kaurola, P. Taalas, J.R. Herman, E. Celarier, and N. Krotkov, 2000: Comparison of daily UV doses estimated from Nimbus-7/TOMS measurements and ground-based spectroradiometric data. *Journal of Geophysical Research*, **105(D4)**, 5059-5067.
- Koch**, G., H. Wernli, C. Schwierz, J. Staehelin, and T. Peter, 2005: A composite study on the structure and formation of ozone miniholes and minihighs over central Europe. *Geophysical Research Letters*, **32**, L12810, doi:10.1029/2004GL022062.
- Konopka**, P., J.-U. Groß, K.W. Hoppel, H.-M. Steinhorst, and R. Müller, 2005: Mixing and chemical ozone loss during and after the Antarctic polar vortex major warming in September 2002. *Journal of the Atmospheric Sciences*, **62(3)**, 848-859.
- Krotkov**, N.A., P.K. Bhartia, J.R. Herman, V. Fioletov, and J. Kerr, 1998: Satellite estimation of spectral surface UV irradiance in the presence of tropospheric aerosols 1: cloud-free case. *Journal of Geophysical Research*, **103(D8)**, 8779-8793.
- Krotkov**, N.A., J.R. Herman, P.K. Bhartia, Z. Ahmad, and V. Fioletov, 2001: Satellite estimation of spectral surface UV irradiance 2: effects of homogeneous clouds and snow. *Journal of Geophysical Research*, **106(D11)**, 11743-11759.
- London**, J., 1963: The distribution of total ozone in the Northern Hemisphere. *Beiträge zur Physik der Atmosphäre*, **36(3/4)**, 254-263.
- Lucas**, R., T. McMichael, W. Smith, and B. Armstrong, 2006: *Solar Ultraviolet Radiation: Global Burden of Disease from Solar Ultraviolet Radiation*. Environmental burden of disease series, no. 13. World Health Organization, Geneva, Switzerland, 87 pp. <http://www.who.int/quantifying_ehimpacts/publications/ebd13/en/index.html>
- Madronich**, S., 1993: The atmosphere and UV-B radiation at ground level. In: *Environmental UV Photobiology* [Björn, L.O. and A.R. Young (eds.)]. Plenum Press, New York, pp. 1-39.
- Manney**, G.L., J.L. Sabutis, D.R. Allen, W.A. Lahoz, A.A. Scaife, C.E. Randall, S. Pawson, B. Naujokat, and R. Swinbank, 2005: Simulations of dynamics and transport during the September 2002 Antarctic major warming. *Journal of the Atmospheric Sciences*, **62(3)**, 690-707.
- Manney**, G.L., M.L. Santee, L. Froidevaux, K. Hoppel, N.J. Livesey, and J.W. Waters, 2006: EOS MLS observations of ozone loss in the 2004-2005 Arctic winter. *Geophysical Research Letters*, **33**, L04802, doi: 10.1029/2005GL024494.
- McKinlay**, A.F. and B.L. Diffey, 1987: A reference action spectrum for ultraviolet induced erythema in human skin. In: *Human Exposure to Ultraviolet Radiation: Risks and Regulations* [Passchier, W.R. and B.F.M. Bosnjakovic (eds.)]. Elsevier, Amsterdam, 580 pp.
- McPeters**, R.D., G.J. Labow, and J.A. Logan, 2007: Ozone climatological profiles for satellite retrieval algorithms. *Journal of Geophysical Research*, **112**, D05308, doi:10.1029/2005JD006823.
- Newman**, P.A. and E.R. Nash, 2005: The unusual Southern Hemisphere stratosphere winter of 2002. *Journal of the Atmospheric Sciences*, **62(3)**, 614-628.
- Newman**, P.A. and W.J. Randel, 1988: Coherent ozone-dynamical changes during the southern hemisphere spring, 1979-1986. *Journal of Geophysical Research*, **93(D10)**, 12585-12606.
- Newman**, P.A., S.R. Kawa, and E.R. Nash, 2004: On the size of the Antarctic ozone hole. *Geophysical Research Letters*, **31**, L21104, doi:10.1029/2004GL020596.
- Newman**, P.A., E.R. Nash, S.R. Kawa, S.A. Montzka, and S.M. Schauffler, 2006: When will the Antarctic hole recover? *Geophysical Research Letters*, **33**, L12814, doi:10.1029/2005GL025232.
- Newman**, P.A., J.S. Daniel, D.W. Waugh, and E.R. Nash, 2007: A new formulation of equivalent effective stratospheric chlorine (EESC). *Atmospheric Chemistry and Physics*, **7(17)**, 4537-4552.
- Orsolini**, Y.J. and V. Limpasuvan, 2001: The North Atlantic Oscillation and the occurrences of ozone miniholes. *Geophysical Research Letters*, **28(21)**, 4099-4102.
- Pope**, F.D., J.C. Hansen, K.D. Bayes, R.R. Friedl, and S.P. Sander, 2007: Ultraviolet absorption spectrum of chlorine peroxide, ClOOCl. *Journal of Physical Chemistry A*, **111(20)**, 4322-4332.
- Randel**, W.J., F. Wu, and R. Stolarski, 2002: Changes in column ozone correlated with EP flux. *Journal of the Meteorological Society of Japan*, **80(4B)**, 849-862.

Trends in Emissions of Ozone-Depleting Substances, Ozone Layer Recovery, and Implications for Ultraviolet Radiation Exposure

- Reed**, R.J., W.J. Campbell, L.A. Rasmussen, and D.G. Rogers, 1961: Evidence of a downward-propagating annual wind reversal in equatorial stratosphere. *Journal of Geophysical Research*, **66**(3), 813-818.
- Reid**, S.J., A.F. Tuck, and G. Kiladis, 2000: On the changing abundance of ozone minima at northern midlatitudes. *Journal of Geophysical Research*, **105**(D10), 12169-12180.
- Rex**, M., R.J. Salawitch, N.R.P. Harris, P. von der Gathen, G.O. Braathen, A. Schulz, H. Deckelmann, M. Chipperfield, B.M. Sinnhuber, E. Reimer, R. Alfier, R. Bevilacqua, K. Hoppel, M. Fromm, J. Lumpe, H. Küllmann, A. Kleinböhl, H. Bremer, M. von König, K. Künzi, D. Toohey, H. Vömel, E. Richard, K. Aikin, H. Jost, J.B. Greenblatt, M. Loewenstein, J.R. Podolske, C.R. Webster, G.J. Flesch, D.C. Scott, R.L. Herman, J.W. Elkins, E.A. Ray, F.L. Moore, D.F. Hurst, P. Romashkin, G.C. Toon, B. Sen, J.J. Margitan, P. Wennberg, R. Neuber, M. Allaart, B.R. Bojkov, H. Claude, J. Davies, W. Davies, H. De Backer, H. Dier, V. Dorokhov, H. Fast, Y. Kondo, E. Kyrö, Z. Litynska, I.S. Mikkelsen, M.J. Molyneux, E. Moran, T. Nagai, H. Nakane, C. Parrondo, F. Ravagnani, P. Skrivankova, P. Viatte, and V. Yushkov, 2002: Chemical depletion of Arctic ozone in winter 1999/2000. *Journal of Geophysical Research*, **107**(D20), 8276, doi:10.1029/2001JD000533.
- Rex**, M., R.J. Salawitch, P. von der Gathen, N.R.P. Harris, M.P. Chipperfield, and B. Naujokat, 2004: Arctic ozone loss and climate change. *Geophysical Research Letters*, **31**, L04116, doi: 10.1029/2003GL018844.
- Rex**, M., R.J. Salawitch, H. Deckelmann, P. von der Gathen, N.R.P. Harris, M.P. Chipperfield, B. Naujokat, E. Reimer, M. Allaart, S.B. Andersen, R. Bevilacqua, G.O. Braathen, H. Claude, J. Davies, H. De Backer, H. Dier, V. Dorokov, H. Fast, M. Gerding, S. Godin-Beekmann, K. Hoppel, B. Johnson, E. Kyrö, Z. Litynska, D. Moore, H. Nakane, M.C. Parrondo, A.D. Risley Jr., P. Skrivankova, R. Stübi, P. Viatte, V. Yushkov, and C. Zerefos, 2006: Arctic winter 2005: Implications for stratospheric ozone loss and climate change. *Geophysical Research Letters*, **33**, L23808, doi:10.1029/2006GL026731.
- Ricaud**, P., F. Lefèvre, G. Berthet, D. Murtagh, E.J. Llewellyn, G. Mégie, E. Kyrölä, G.W. Leppelmeier, H. Auvinen, C. Boone, S. Brohede, D.A. Degenstein, J. de La Noë, E. Dupuy, L. El Amraoui, P. Eriksson, W.F.J. Evans, U. Frisk, R.L. Gattinger, F. Girod, C.S. Haley, S. Hassinen, A. Hauchecorne, C. Jimenez, E. Kyrö, N. Lautié, E. Le Flochmoën, N.D. Lloyd, J.C. McConnell, I.C. McDade, L. Nordh, M. Olberg, A. Pazmiño, S.V. Petelina, A. Sandqvist, A. Seppälä, C.E. Sioris, B.H. Solheim, J. Stegman, K. Strong, P. Taalas, J. Urban, C. von Savigny, F. von Scheele, and G. Witt, 2005: Polar vortex evolution during the 2002 Antarctic major warming as observed by the Odin satellite. *Journal of Geophysical Research*, **110**, D05302, doi:10.1029/2004JD005018.
- Roscoe**, H.K., A.E. Jones, and A.M. Lee, 1997: Midwinter start to Antarctic ozone depletion: Evidence from observations and models. *Science*, **278**(5335), 93-96.
- Roscoe**, H.K., J.D. Shanklin, and S.R. Colwell, 2005: Has the Antarctic vortex split before 2002? *Journal of the Atmospheric Sciences*, **62**(3), 581-588.
- Salawitch**, R.J., D.K. Weisenstein, L.J. Kovalenko, C.E. Sioris, P.O. Wennberg, K. Chance, M.K.W. Ko, and C.A. McLinden, 2005: Sensitivity of ozone to bromine in the lower stratosphere. *Geophysical Research Letters*, **32**, L05811, doi:10.1029/2004GL021504.
- Salby**, M.L. and P.F. Callaghan, 2002: Interannual changes of the stratospheric circulation: Relationship to ozone and tropospheric structure. *Journal of Climate*, **15**(24), 3673-3685.
- Salby**, M.L. and P.F. Callaghan, 2004a: Systematic changes of northern hemisphere ozone and their relationship to random interannual changes. *Journal of Climate*, **17**(23), 4512-4521.
- Salby**, M.L. and P.F. Callaghan, 2004b: Interannual changes of the stratospheric circulation: influence on the tropics and southern hemisphere. *Journal of Climate*, **17**(5), 952-964.
- Shepherd**, T.G., 2007: Transport in the middle atmosphere. *Journal of the Meteorological Society of Japan*, **85**B, 165-191.
- Singleton**, C.S., C.E. Randall, V.L. Harvey, M.P. Chipperfield, W. Feng, G.L. Manney, L. Froidevaux, C.D. Boone, P.F. Bernath, K.A. Walker, C.T. McElroy, and K.W. Hoppel, 2007: Quantifying Arctic ozone loss during the 2004-2005 winter using satellite observations and a chemical transport model. *Journal of Geophysical Research*, **112**, D07304, doi:10.1029/2006JD007463.
- Sinnhuber**, B.-M., M. Weber, A. Amankwah, and J.P. Burrows, 2003: Total ozone during the unusual Antarctic winter of 2002. *Geophysical Research Letters*, **30**(11), 1580, doi:10.1029/2002GL016798.
- Smith**, R.C., B.B. Prezelin, K.S. Baker, R.R. Bidigare, N.P. Boucher, T. Coley, D. Karentz, S. MacIntyre, H.A. Matlick, D. Menzies, M. Ondrusk, Z. Wan, and K.J. Waters, 1992: Ozone depletion: ultraviolet radiation and phytoplankton biology in Antarctic waters. *Science*, **255**(5047), 952-959.
- Solomon**, S., R.R. Garcia, F.S. Rowland, and D.J. Wuebbles, 1986: On the depletion of Antarctic ozone. *Nature*, **321**(6072), 755-758.

- Solomon**, S., R.W. Portmann, T. Sasaki, D.J. Hofmann, and D.W.J. Thompson, 2005: Four decades of ozonesonde measurements over Antarctica. *Journal of Geophysical Research*, **110(D7)**, doi: 10.1029/2005JD005917.
- Staples**, M., R. Marks, and G. Giles, 1998: Trends in the incidence of non-melanocytic skin cancer (NMSC) treated in Australia 1985-1995: are primary prevention programs starting to have an effect? *International Journal of Cancer*, **78(2)**, 144-148.
- Steele**, H.M., P. Hamill, M.P. McCormick, and T.J. Swissler, 1983: The formation of polar stratospheric clouds. *Journal of the Atmospheric Sciences*, **40(8)**, 2055-2068.
- Steinbrecht**, W., H. Claude, and U. Köhler, 1998: Correlations between tropopause height and total ozone: implications for long-term changes. *Journal of Geophysical Research*, **103(D15)**, 19183-19192.
- Steinbrecht**, W., H. Claude, F. Schönenborn, I.S. McDermid, T. Leblanc, S. Godin, T. Song, D.P.J. Swart, Y.J. Meijer, G.E. Bodeker, B.J. Connor, N. Kämpfer, K. Hocke, Y. Calisesi, N. Schneider, J. de la Noë, A.D. Parrish, I.S. Boyd, C. Brühl, B. Steil, M.A. Giorgetta, E. Manzini, L.W. Thomason, J.M. Zawodny, M.P. McCormick, J.M. Russell III, P.K. Bhartia, R.S. Stolarski, and S.M. Hollandsworth-Frith, 2006: Long-term evolution of upper stratospheric ozone at selected stations of the Network for the Detection of Stratospheric Change (NDSC). *Journal of Geophysical Research*, **111**, D10308, doi:10.1029/2005JD006454.
- Stimpfle**, R.M., D.M. Wilmouth, R.J. Salawitch, and J.G. Anderson, 2004: First measurements of ClOOCl in the stratosphere: the coupling of ClOOCl and ClO in the Arctic polar vortex. *Journal of Geophysical Research*, **109**, D03301, doi:10.1029/2003JD003811.
- Stolarski**, R.S. and S. Frith, 2006: Search for evidence of trend slow-down in the long-term TOMS/SBUV total ozone data record: the importance of instrument drift uncertainty. *Atmospheric Chemistry and Physics*, **6(12)**, 4057-4065.
- Stolarski**, R.S., R.D. McPeters, and P.A. Newman, 2005: The ozone hole of 2002 as measured by TOMS. *Journal of the Atmospheric Sciences*, **62(3)**, 716-720.
- Tanskanen**, A., A. Lindfors, A. Maatta, N. Krotkov, J. Herman, J. Kaurola, T. Koskela, K. Lakkala, V. Fioletov, G. Bernhard, R. McKenzie, Y. Kondo, M. O'Neill, H. Slaper, P. den Outer, A.F. Bais, and J. Tamminen, 2007: Validation of daily erythemal doses from Ozone Monitoring Instrument with ground-based UV measurement data. *Journal of Geophysical Research*, **112**, D24S44, doi:10.1029/2007JD008830.
- Taylor**, H.R., 1990: Cataracts and ultraviolet light. In: *Global Atmospheric Change and Public Health* [White, J.C. (ed.)]. Elsevier Science Publishing, New York, pp. 61-65.
- Tilmes**, S., R. Muller, A. Engel, M. Rex, and J.M. Russell, 2006: Chemical ozone loss in the Arctic and Antarctic stratosphere between 1992 and 2005. *Geophysical Research Letters*, **33**, L20812, doi:10.1029/2006GL026925.
- Toon**, O.B., P. Hamill, R.P. Turco, and J. Pinto, 1986: Condensation of HNO₃ and HCl in winter polar stratospheres. *Geophysical Research Letters*, **13(12)**, 1284-1287.
- Trepte**, C.R., R.E. Veiga, and M.P. McCormick, 1993: The poleward dispersal of Mount Pinatubo volcanic aerosol. *Journal of Geophysical Research*, **98(D10)**, 18563-18573.
- U.S. EPA** (Environmental Protection Agency), 1999: *The Benefits and Costs of the Clean Air Act 1990 to 2010, Appendix G: Stratospheric Ozone Assessment*. EPA-410-R-99-001. EPA Office of Air and Radiation, Washington, DC, pp. G.1-G.43. <<http://www.epa.gov/oar/sect812/1990-2010/fullrept.pdf>>
- Vermeer**, M., G.J. Schmieder, T. Yoshikawa, J-W. van den Berg, M.S. Metzman, J.R. Taylor, and J.W. Strelein, 1991: Effects of ultraviolet B light on cutaneous immune responses of humans with deeply pigmented skin. *Journal of Investigative Dermatology*, **97(4)**, 729-734.
- von Hobe**, M., R.J. Salawitch, T. Carty, H. Keller-Rudek, G.K. Moortgat, J.-U. Grooß, R. Müller, and F. Stroh, 2007: Understanding the kinetics of the ClO dimer cycle. *Atmospheric Chemistry and Physics*, **7(12)**, 3055-3069.
- Weber**, M., S. Dhomse, F. Wittrock, A. Richter, B.-M. Sinnhuber, and J.P. Burrows, 2003: Dynamical control of NH and SH winter/spring total ozone from GOME observations in 1995-2002. *Geophysical Research Letters*, **30(11)**, 1583, doi:10.1029/2002GL016799.
- WMO** (World Meteorological Organization), 1989: *Scientific Assessment of Stratospheric Ozone: 1989*. Global Ozone Research and Monitoring Project report no. 20. World Meteorological Organization, Geneva, Switzerland, 486 pp.
- WMO** (World Meteorological Organization), 1999: *Scientific Assessment of Ozone Depletion: 1998*. Global Ozone Research and Monitoring Project report no. 44. World Meteorological Organization, Geneva, Switzerland, 486 pp.
- WMO** (World Meteorological Organization), 2003: *Scientific Assessment of Ozone Depletion: 2002*. Global Ozone Research and Monitoring Project report no. 47. World Meteorological Organization, Geneva, Switzerland, 498 pp.
- WMO** (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/>>

CHAPTER 4 REFERENCES

- Brasseur**, G. and S. Solomon, 1986: *Aeronomy of the Middle Atmosphere*. D. Reidel, Dordrecht, Holland, and Boston, MA, 441 pp.
- Butchart**, N. and A.A. Scaife, 2001: Removal of chlorofluorocarbons by increased mass exchange between the stratosphere and the troposphere in a changing climate. *Nature*, **410**(6830), 799-802.
- Butchart**, N., A.A. Scaife, M. Bourqui, J. de Grandpré, S.H.E. Hare, J. Kettleborough, U. Langematz, E. Manzini, F. Sassi, K. Shibata, D. Shindell, and M. Sigmond, 2006: Simulations of anthropogenic change in the strength of the Brewer-Dobson circulation. *Climate Dynamics*, **27**(7-8), 727-741.
- CCSP** (Climate Change Science Program), 2006: *Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences*. [Karl, T., S.J. Hassol, C.D. Miller, and W.L. Murray (eds.)]. Synthesis and assessment product 1.1. U.S. Climate Change Science Program, Washington, DC, 164 pp.
- Coffey**, M.T., 1996: Observations of the impact of volcanic activity on stratospheric chemistry. *Journal of Geophysical Research*, **101**(D3), 6767-6780.
- Dameris**, M., V. Grewe, M. Ponater, R. Deckert, V. Eyring, F. Mager, S. Matthes, C. Schnadt, A. Stenke, B. Steil, C. Brühl, and M.A. Giorgetta, 2005: Long-term changes and variability in a transient simulation with a chemistry-climate model employing realistic forcing. *Atmospheric Chemistry and Physics*, **5**(6), 2121-2145.
- Daniel**, J.S., S. Solomon, and D.L. Albritton, 1995: On the evaluation of halocarbon radiative forcing and global warming potentials. *Journal of Geophysical Research*, **100**(D1), 1271-1285.
- Douglass**, A.R., R.S. Stolarski, S.E. Strahan, and B.C. Polansky, 2006: Sensitivity of Arctic ozone loss to polar stratospheric cloud volume and chlorine and bromine loading in a chemistry and transport model. *Geophysical Research Letters*, **33**, L17809, doi:10.1029/2006GL026492.
- Dvortsov**, V.L. and S. Solomon, 2001: Response of the stratospheric temperatures and ozone to past and future increases in stratospheric humidity. *Journal of Geophysical Research*, **106**(D7), 7505-7514.
- Eyring**, V., N.R.P. Harris, M. Rex, T.G. Shepherd, D.W. Fahey, G.T. Amanatidis, J. Austin, M.P. Chipperfield, M. Dameris, P.M. De F. Forster, A. Gettelman, H.F. Graf, T. Nagashima, P.A. Newman, S. Pawson, M.J. Prather, J.A. Pyle, R.J. Salawitch, B.D. Santer, and D.W. Waugh, 2005: A strategy for process-oriented validation of coupled-chemistry-climate models. *Bulletin of the American Meteorological Society*, **86**(8), 1117-1133.
- Eyring** V., N. Butchart, D.W. Waugh, H. Akiyoshi, J. Austin, S. Bekki, G.E. Bodeker, B.A. Boville, C. Brühl, M.P. Chipperfield, E. Cordero, M. Dameris, M. Deushi, V.E. Fioletov, S.M. Frith, R.R. Garcia, A. Gettelman, M.A. Giorgetta, V. Grewe, L. Jourdain, D.E. Kinnison, E. Mancini, E. Manzini, M. Marchand, D.R. Marsh, T. Nagashima, P.A. Newman, J.E. Nielsen, S. Pawson, G. Pitari, D.A. Plummer, E. Rozanov, M. Schraner, T.G. Shepherd, K. Shibata, R.S. Stolarski, H. Struthers, W. Tian, and M. Yoshiki, 2006: Assessment of temperature, trace species, and ozone in chemistry-climate model simulations of the recent past. *Journal of Geophysical Research*, **111**, D22308, doi:10.1029/2006JD007327.
- Forster**, P.M. and K.P. Shine, 1997: Radiative forcing and temperature trends from stratospheric ozone changes. *Journal of Geophysical Research*, **102**(D9), 10841-10855.
- Forster**, P.M., G. Bodeker, R. Schofield, S. Solomon, and D. Thompson, 2007: Effects of ozone cooling in the tropical lower stratosphere and upper troposphere. *Geophysical Research Letters*, **34**, L23813, doi:10.1029/2007GL031994.
- Gauss**, M., G. Myhre, I.S.A. Isaksen, V. Grewe, G. Pitari, O. Wild, W.J. Collins, F.J. Dentener, K. Ellingsen, L.K. Gohar, D.A. Hauglustaine, D. Iachetti, F. Lamarque, E. Mancini, L.J. Mickley, M.J. Prather, J.A. Pyle, M.G. Sanderson, K.P. Shine, D.S. Stevenson, K. Sudo, S. Szopa, and G. Zeng, 2006: Radiative forcing since preindustrial times due to ozone changes in the troposphere and the lower stratosphere. *Atmospheric Chemistry and Physics*, **6**(3), 575-599.
- Gillett**, N.P. and D.W.J. Thompson, 2003: Simulation of recent southern hemisphere climate change. *Science*, **302**(5643), 273-275.
- Hansen**, J., M. Sato, R. Ruedy, L. Nazarenko, A. Lacis, G.A. Schmidt, G. Russell, I. Aleinov, M. Bauer, S. Bauer, N. Bell, B. Cairns, V. Canuto, M. Chandler, Y. Cheng, A. Del Genio, G. Faluvegi, E. Fleming, A. Friend, T. Hall, C. Jackman, M. Kelley, N. Kiang, D. Koch, J. Lean, J. Lerner, K. Lo, S. Menon, R. Miller, P. Minnis, T. Novakov, V. Oinas, J. Perlitz, Ju. Perlitz, D. Rind, A. Romanou, D. Shindell, P. Stone, S. Sun, N. Tausnev, D. Thresher, B. Wielicki, T. Wong, M. Yao, and S. Zhang, 2005: Efficacy of climate forcings. *Journal of Geophysical Research*, **110**, D18104, doi:10.1029/2005JD005776.
- Holton**, J.R., P.H. Haynes, M.E. McIntyre, A.R. Douglass, R.B. Rood, and L. Pfister, 1995: Stratosphere-troposphere exchange. *Reviews of Geophysics*, **33**(4), 403-440.
- IPCC** (Intergovernmental Panel on Climate Change), 2001: *Climate Change 2001: The Scientific Basis*. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T.,

- Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 881 pp.
- IPCC** (Intergovernmental Panel on Climate Change), 2007: Summary for policymakers. In: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, UK, and New York, pp. 1-18.
- IPCC/TEAP** (Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel), 2005: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons* [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 478 pp.
- Isaksen, I.S.A.** (ed.), 2003: *Ozone-Climate Interactions*. Air pollution research report no. 81. European Commission, Directorate-General for Research, Luxembourg, 143 pp. <http://xweb.geos.ed.ac.uk/%7Edstevens/publications/isaksen_ozone_climate_ec03.pdf>
- Jonsson, A.I.**, J. de Grandpré, V.I. Fomichev, J.C. McConnell, and S.R. Beagley, 2004: Doubled CO₂-induced cooling in the middle atmosphere: photochemical analysis of the ozone radiative feedback. *Journal of Geophysical Research*, **109**, D24103, doi:10.1029/2004JD005093.
- Kiehl, J.T.** and K.E. Trenberth, 1997: Earth's annual global mean energy budget. *Bulletin of the American Meteorological Society*, **78**(2), 197-208.
- Langematz, U.**, M. Kunze, K. Krüger, K. Labitzke, and G.L. Roff, 2003: Thermal and dynamical changes of the stratosphere since 1979 and their link to ozone and CO₂ changes. *Journal of Geophysical Research*, **108**(D1), 4027, doi:10.1029/2002JD002069.
- McCormick, M.P.**, L.W. Thomason, and C.R. Trepte, 1995: Atmospheric effects of the Mount Pinatubo eruption. *Nature*, **373**(6513), 399-404.
- Mears, C.**, M. Schabel, and F. Wentz, 2003: A reanalysis of the MSU channel 2 tropospheric temperature record. *Journal of Climate*, **16**(22), 3650-3664.
- Myhre, G.**, J.S. Nilsen, L. Gulstad, K.P. Shine, B. Rognerud, and I.S.A. Isaksen, 2007: Radiative forcing due to stratospheric water vapour from CH₄ oxidation. *Geophysical Research Letters*, **34**, L01807, doi:10.1029/2006GL027472.
- Newman, P.A.**, S.R. Kawa, and E.R. Nash, 2004: On the size of the Antarctic ozone hole. *Geophysical Research Letters*, **31**, L21104, doi:10.1029/2004GL020596.
- Oltmans, S.J.**, H. Vömel, D.J. Hofmann, K.H. Rosenlof, and D. Kley, 2000: The increase in stratospheric water vapor from balloonborne frostpoint hygrometer measurements at Washington D.C., and Boulder, Colorado. *Geophysical Research Letters*, **27**(21), 3453-3456.
- Pawson, S.**, K. Labitzke, and S. Leder, 1998: Stepwise changes in stratospheric temperature. *Geophysical Research Letters*, **25**(12), 2157-2160.
- Portmann, R.W.** and S. Solomon, 2007: Indirect radiative forcing of the ozone layer during the 21st century. *Geophysical Research Letters*, **34**, L02813, doi:10.1029/2006GL028252.
- Pyle, J.**, T. Shepherd, G. Bodeker, P. Canziani, M. Dameris, P. Forster, A. Gruzdev, R. Müller, N.J. Muthama, G. Pitari, and W. Randel, 2005: Ozone and climate: a review of interconnections. In: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons* [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L.A. Meyer (eds.)]. Cambridge University Press, Cambridge, UK, and New York, pp. 83-132.
- Ramaswamy, V.** and M.D. Schwarzkopf, 2002: Effects of ozone and well-mixed gases on annual-mean stratospheric temperature trends. *Geophysical Research Letters*, **29**(22), 2064, doi:10.1029/2002GL015141.
- Ramaswamy, V.**, M.D. Schwarzkopf, W.J. Randel, B.D. Santer, B.J. Soden, and G.L. Stenchikov, 2006: Anthropogenic and natural influences in the evolution of lower stratospheric cooling. *Science*, **311**(5764), 1138-1141.
- Randel, W.J.**, F. Wu, S.J. Oltmans, K. Rosenlof, and G.E. Nedoluha, 2004: Interannual changes of stratospheric water vapor and correlations with tropical tropopause temperatures. *Journal of the Atmospheric Sciences*, **61**(17), 2133-2148.
- Randel, W.J.**, F. Wu, H. Vömel, G.E. Nedoluha, and P. Forster, 2006: Decreases in stratospheric water vapor after 2001: links to changes in the tropical tropopause and the Brewer-Dobson circulation. *Journal of Geophysical Research*, **112**, 10.1029/2006JD007339.
- Rex, M.**, R.J. Salawitch, P. von der Gathen, N.R.P. Harris, M.P. Chipperfield, and B. Naujokat, 2004: Arctic ozone loss and climate change. *Geophysical Research Letters*, **31**, L04116, doi: 10.1029/2003GL018844.
- Roscoe, H.K.**, 2001: The risk of large volcanic eruptions and the impact of this risk on future ozone depletion. *Natural Hazards*, **23**(2-3), 231-246.

- Rosenlof**, K.H., S.J. Oltmans, D. Kley, J.M. Russell III, E.-W. Chiou, W.P. Chu, D.G. Johnson, K.K. Kelly, H.A. Michelsen, G.E. Nedoluha, E.E. Remsberg, G.C. Toon, and M.P. McCormick, 2001: Stratospheric water vapor increases over the past half-century. *Geophysical Research Letters*, **28(7)**, 1195-1198.
- Santer**, B.D., J.E. Penner, and P.W. Thorne, 2006: How well can the observed vertical temperature changes be reconciled with our understanding of the causes of these changes? In: *Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences* [Karl, T., S.J. Hassol, C.D. Miller, and W.L. Murray (eds.)]. Synthesis and assessment product 1.1. U.S. Climate Change Science Program, Washington, DC, pp. 89-118.
- Scherer**, M., H. Vömel, S. Fueglistaler, S.J. Oltmans, and J. Staehlin, 2007: Trends and variability of midlatitude stratospheric water vapour deduced from the re-evaluated Boulder balloon series and HALOE. *Atmospheric Chemistry and Physics Discussions*, **7(5)**, 14511-14542.
- Schwarzkopf**, M.D. and V. Ramaswamy, 2002: Effects of changes in well-mixed gases and ozone on stratospheric seasonal temperatures. *Geophysical Research Letters*, **29(24)**, 2184, doi:10.1029/2002GL015759.
- Seidel**, D.J. and J.R. Lanzante, 2004: An assessment of three alternatives to linear trends for characterizing global atmospheric temperature changes. *Journal of Geophysical Research*, **109**, D14108, doi:10.1029/2003JD004414.
- Seidel**, D.J., R.J. Ross, J.K. Angell, and G.C. Reid, 2001: Climatological characteristics of the tropical tropopause as revealed by radiosondes. *Journal of Geophysical Research*, **106(D8)**, 7857-7878.
- Shine**, K.P., M.S. Bourqui, P.M.F. Forster, S.H.E. Hare, U. Langematz, P. Braesicke, V. Grewe, M. Ponater, C. Schnadt, C.A. Smith, J.D. Haigh, J. Austin, N. Butchart, D.T. Shindell, W.J. Randel, T. Nagashima, R.W. Portmann, S. Solomon, D.J. Seidel, J. Lanzante, S. Klein, V. Ramaswamy, and M.D. Schwarzkopf, 2003: A comparison of model-simulated trends in stratospheric temperatures. *Quarterly Journal of the Royal Meteorological Society*, **129(590)**, 1565-1588.
- Solomon**, S., R. Portmann, R. Garcia, W. Randel, F. Wu, R. Nagatani, J. Gleason, L. Thomason, L. Poole, and M. McCormick, 1998: Ozone depletion at mid-latitudes: coupling of volcanic aerosols and temperature variability to anthropogenic chlorine. *Geophysical Research Letters*, **25(11)**, 1871-1874.
- SPARC** (Stratospheric Processes and Their Role in Climate), 2000: *SPARC Assessment of Upper Tropospheric and Stratospheric Water Vapour*. [Kley, D., J.M. Russell III, and C. Phillips (eds.)]. SPARC report no. 2; WCRP no. 113; WMO/TD no. 1043. World Climate Research Programme, [Geneva, Switzerland], 312 pp. <http://www.aero.jussieu.fr/~sparc/WAVASFINAL_000206/WWW_wavas/Cover.html>
- Stenke**, A. and V. Grewe, 2005: Simulation of stratospheric water vapor trends: impact on stratospheric ozone chemistry. *Atmospheric Chemistry and Physics*, **5(5)**, 1257-1272.
- Tabazadeh**, A. and R.P. Turco, 1993: Stratospheric chlorine injection by volcanic eruptions: HCl scavenging and implications for ozone. *Science*, **260(5111)**, 1082-1086.
- Thompson**, D.W.J. and S. Solomon, 2002: Interpretation of recent Southern Hemisphere climate change. *Science*, **296(5569)**, 895-899.
- Tie**, X. and G. Brasseur, 1995: The response of stratospheric ozone to volcanic eruptions: sensitivity to atmospheric chlorine loading. *Geophysical Research Letters*, **22(22)**, 3035-3038.
- Tilmes**, S., R. Muller, A. Engel, M. Rex, and J. Russell III, 2006: Chemical ozone loss in the Arctic and Antarctic stratosphere between 1992 and 2005. *Geophysical Research Letters*, **33**, L20812, doi:10.1029/2006GL026925.
- UNFCCC** (United Nations Framework Convention on Climate Change), 1997: *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. United Nations, Geneva, Switzerland (and others). <<http://unfccc.int/resource/docs/convkp/kpeng.html>>
- Velders**, G.J.M., S.O. Andersen, J.S. Daniel, D.W. Fahey, and M. McFarland, 2007: The importance of the Montreal Protocol in protecting climate. *Proceedings of the National Academy of Sciences*, **104(12)**, 4814-4819.
- Wennberg**, P.O., R.C. Cohen, R.M. Stimpfle, J.P. Koplow, J.G. Anderson, R.J. Salawitch, D.W. Fahey, E.L. Woodbridge, E.R. Keim, R.S. Gao, C.R. Webster, R.D. May, D.W. Toohey, L.M. Avallone, M.H. Proffitt, M. Loewenstein, J.R. Podolske, K.R. Chan, and S.C. Wofsy, 1994: Removal of stratospheric O₃ by radicals: *in situ* measurements of OH, H₂O, NO, NO₂, ClO, and BrO. *Science*, **266(5184)**, 398-404.
- WMO** (World Meteorological Organization), 2003: *Scientific Assessment of Ozone Depletion: 2002*. Global Ozone Research and Monitoring Project report no. 47. World Meteorological Organization, Geneva, Switzerland, 498 pp.
- WMO** (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/>>

Zeng, G. and J.A. Pyle, 2003: Changes in tropospheric ozone between 2000 and 2100 modeled in a chemistry-climate model. *Geophysical Research Letters*, **30**(7), 1392, doi:10.1029/2002GL016708.

CHAPTER 5 REFERENCES

AFEAS (Alternative Fluorocarbons Environmental Acceptability Study), 2007: Data tables at <<http://www.afeas.org/>>

Daniel, J.S., S. Solomon, and D.L. Albritton, 1995: On the evaluation of halocarbon radiative forcing and global warming potentials. *Journal of Geophysical Research*, **100**(D1), 1271-1285.

Eyring, V., N. Butchart, D.W. Waugh, H. Akiyoshi, J. Austin, S. Bekki, G.E. Bodeker, B.A. Boville, C. Brühl, M.P. Chipperfield, E. Cordero, M. Dameris, M. Deushi, V.E. Fioletov, S.M. Frith, R.R. Garcia, A. Gettelman, M.A. Giorgetta, V. Grewe, L. Jourdain, D.E. Kinnison, E. Mancini, E. Manzini, M. Marchand, D.R. Marsh, T. Nagashima, P.A. Newman, J.E. Nielsen, S. Pawson, G. Pitari, D.A. Plummer, E. Rozanov, M. Schraner, T.G. Shepherd, K. Shibata, R.S. Stolarski, H. Struthers, W. Tian, and M. Yoshiki, 2006: Assessment of temperature, trace species and ozone in chemistry-climate model simulations of the recent past. *Journal of Geophysical Research*, **111**, D22308, doi:10.1029/2006JD007327.

Eyring, V., D.W. Waugh, G.E. Bodeker, E. Cordero, H. Akiyoshi, J. Austin, S.R. Beagley, B.A. Boville, P. Braesicke, C. Brühl, N. Butchart, M.P. Chipperfield, M. Dameris, R. Deckert, M. Deushi, S.M. Frith, R.R. Garcia, A. Gettelman, M.A. Giorgetta, D.E. Kinnison, E. Mancini, E. Manzini, D.R. Marsh, S. Matthes, T. Nagashima, P.A. Newman, J.E. Nielsen, S. Pawson, G. Pitari, D.A. Plummer, E. Rozanov, M. Schraner, J.F. Scinocc, K. Semeniuk, T.G. Shepherd, K. Shibata, B. Steil, R.S. Stolarski, W. Tian, and M. Yoshiki, 2007: Multimodel projections of stratospheric ozone in the 21st century. *Journal of Geophysical Research*, **112**, D16303, doi:10.1029/2006JD008332.

Hadjinicolaou, P., J.A. Pyle, and N.R.P. Harris, 2005: The recent turnaround in stratospheric ozone over northern middle latitudes: a dynamical modeling perspective. *Geophysical Research Letters*, **32**, L12821, doi:10.1029/2005GL022476.

IPCC (Intergovernmental Panel on Climate Change), 1999: *Aviation and the Global Atmosphere*. Special report of Working Group I and Working Group III of IPCC. [Penner, J.E., D.H. Lister, D.J. Griggs, D.J. Dokken, and M. McFarland (eds.)]. Cambridge University Press, Cambridge, UK, 373 pp.

IPCC (Intergovernmental Panel on Climate Change), 2001: *Climate Change 2001: The Scientific Basis*. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change. [Houghton,

J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 881 pp.

IPCC (Intergovernmental Panel on Climate Change), 2007: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, UK, and New York, 996 pp. <<http://www.ipcc.ch>>

IPCC/TEAP (Intergovernmental Panel on Climate Change/Technology and Economic Assessment Panel), 2005: *IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons*. [Metz, B., L. Kuijpers, S. Solomon, S.O. Andersen, O. Davidson, J. Pons, D. de Jager, T. Kestin, M. Manning, and L. Meyer (eds.)]. Cambridge University Press, New York, 478 pp.

Joshi, M., K. Shine, M. Ponater, N. Stuber, R. Sausen, and L. Li, 2003: A comparison of climate response to different radiative forcings in three general circulation models: towards an improved metric of climate change. *Climate Dynamics*, **20**(7-8), 843-854.

Nakićenović, N. and R. Swart (eds.), 2000: *Special Report on Emissions Scenarios*. A special report of Working Group III of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, 599 pp.

Newman, P.A., E.R. Nash, S.R. Kawa, S.A. Montzka, and S.M. Schauffler, 2006: When will the Antarctic ozone hole recover? *Geophysical Research Letters*, **33**, L12814, doi:10.1029/2005GL025232.

UNEP (United Nations Environment Programme), 2007: Ozone Secretariat ozone depleting substances production and consumption data tables on the web at <http://ozone.unep.org/Data_Report>

UNEP/TEAP (United Nations Environment Programme/Technology and Economic Assessment Panel), 2007: *Report of the Task Force Response on HCFC Issues and Emissions Reduction Benefits Arising from Earlier HCFC Phase-Out and Other Practical Measures*. United Nations Environment Programme, Ozone Secretariat, Nairobi, Kenya, 132 pp. <http://ozone.unep.org/Assessment_Panels/TEAP/Reports/TEAP_Reports/index.shtml>

Weatherhead, E.C., G.C. Reinsel, G.C. Tiao, C.H. Jackman, L. Bishop, S.M.H. Frith, J. DeLuisi, T. Keller, S. Oltmans, E. Fleming, D. Wuebbles, J. Kerr, A. Miller, J. Herman, R. McPeters, R. Nagatani, and J. Frederick, 2000: Detecting the recovery of total column ozone. *Journal of Geophysical Research*, **105(D17)**, 22201-22210.

WMO (World Meteorological Organization), 1995: *Scientific Assessment of Ozone Depletion: 1994*. Global Ozone Research and Monitoring Project report no. 37. World Meteorological Organization, Geneva, Switzerland.

WMO (World Meteorological Organization), 1999: *Scientific Assessment of Ozone Depletion: 1998*. Global Ozone Research and Monitoring Project report no. 44. World Meteorological Organization, Geneva, Switzerland, 486 pp.

WMO (World Meteorological Organization), 2003: *Scientific Assessment of Ozone Depletion: 2002*. Global Ozone Research and Monitoring Project report no. 47. World Meteorological Organization, Geneva, Switzerland, 498 pp.

WMO (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/>>

Yang, E.S., D.M. Cunnold, R.J. Salawitch, M.P. McCormick, J. Russell III, J.M. Zawodny, S. Oltmans, and M.J. Newchurch, 2006: Attribution of recovery in lower-stratospheric ozone. *Journal of Geophysical Research*, **111**, D17309, doi:10.1029/2005JD006371.

WMO (World Meteorological Organization), 2007: *Scientific Assessment of Ozone Depletion: 2006*. Global Ozone Research and Monitoring Project report no. 50. World Meteorological Organization, Geneva, Switzerland, 572 pp. <<http://www.esrl.noaa.gov/csd/assessments/2006/>>

PHOTOGRAPHY CREDITS

Cover/Title Page/Table of Contents

Image for Chapter 1, page 23, (Ozone cartoon), Used with permission from D. W. Fahey and the World Meteorological Organization, Geneva, Switzerland, 2007.

Image for Chapter 2, page 29, (Visible light spectrum), Used with permission from the Scientific Assessment of Ozone Depletion, 2006.

Image for Chapter 3, page 79, (Ozone hole), Paul Newman, NASA's Goddard Space Flight Center.

Image for Chapter 4, page 111, (Polar stratospheric clouds), David J. Hofmann, NOAA.

Chapter 2

Page 72, (Polar stratospheric clouds), Lamont Poole, NASA's Langley Research Center.

CHAPTER 6 REFERENCES

IPCC (Intergovernmental Panel on Climate Change), 2007: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, UK, and New York, 996 pp. <<http://www.ipcc.ch>>

Nakićenović, N. and R. Swart (eds.), 2000: *Special Report on Emissions Scenarios*. A special report of Working Group III of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, 599 pp.

WMO (World Meteorological Organization), 2003: *Scientific Assessment of Ozone Depletion: 2002*. Global Ozone Research and Monitoring Project report no. 47. World Meteorological Organization, Geneva, Switzerland, 498 pp.

