APPENDICES

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List of International Authors, Contributors, and Reviewers

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APPENDIX A

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APPENDIX B

MAJOR ACRONYMS AND ABBREVIATIONS

AAOE	Airborne Antarctic Ozone Experiment
AASE	Airborne Arctic Stratospheric Expedition
ABLE 2A	Amazon Boundary Layer Experiment 2A
ABLE 3B	Arctic Boundary Layer Expedition 3B
AEA	Atomic Energy Authority (United Kingdom)
AER	Atmospheric and Environmental Research, Inc. (United States)
AERONOX	Impact of NO_x Emissions from Aircraft upon the Atmosphere
AESA	Atmospheric Effects of Stratospheric Aircraft
AFEAS	Alternative Fluorocarbons Environmental Acceptability Study
AGU	American Geophysical Union
AGWP	Absolute Global Warming Potential
AL	Aeronomy Laboratory (NOAA)
ALE/GAGE	Atmospheric Lifetime Experiment/Global Atmospheric Gases Experiment
ANCAT	Abatement of Nuisance Caused by Air Traffic
ASL	above sea level
ATLAS	Atmospheric Laboratory for Applications and Science
ATMOS	Atmospheric Trace Molecule Spectroscopy
BEF	Bromine Efficiency Factor
BLP	Bromine Loading Potential
BM	Brewer-Mast (ozonesonde)
CADIC/COCINET	Austral Center of Scientific Research/National Council of Scientific and Technological Research (Argentina)
CCMS	Committee on the Challenges of Modern Society
CCN	cloud condensation nuclei
CEC	Commission of the European Communities
CHEMRAWN	Chemical Research Applied to World Needs
CFC	chlorofluorocarbon
CIAB	Coal Industry Advisory Board
CIAP	Climatic Impact Assessment Program
CIRES	Cooperative Institute for Research in Environmental Sciences (United States)
CITE	Chemical Instrumentation Test and Evaluation
CLAES	Cryogenic Limb Array Etalon Spectrometer
CLP	Chlorine Loading Potential
CMDL	Climate Monitoring and Diagnostics Laboratory (NOAA)
CN	condensation nuclei
CNRM	Centre National de Recherches Météorologiques (France)
CNRS	Centre National de la Recherche Scientifique (France)
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
CTM	chemistry transport model

ACRONYMS

DIAL	Differential Absorption Laser
DNA	deoxyribonucleic acid
DoY	Day-of-Year
DU	Dobson unit
EASOE	European Arctic Stratospheric Ozone Expedition
ECAC	European Civil Aviation Conference
ECC	electrochemical concentration cell (ozonesonde)
ECMWF	European Centre for Medium-Range Weather Forecasts (United Kingdom)
EESC	equivalent effective stratospheric chlorine
EI	Emissions Index
EMEP MSC-W	European Monitoring and Evaluation Programme, Meteorological Synthesizing Centre — West
EMEX	Equatorial Mesoscale Experiment
ENSO	El Niño-Southern Oscillation
EPA	Environmental Protection Agency (United States)
ESA	European Space Agency
ETBL	equivalent tropospheric bromine loading
ETCL	equivalent tropospheric chlorine loading
FDH	Fixed Dynamical Heating
FTIR	Fourier transform infrared spectrometer
GAGE	Global Atmospheric Gases Experiment
GCM	general circulation model
GFDL	Geophysical Fluid Dynamics Laboratory (NOAA)
GISS	Goddard Institute for Space Studies (United States)
GIT	Georgia Institute of Technology (United States)
GMT	Greenwich Mean Time
GSFC	Goddard Space Flight Center (NASA)
GWP	Global Warming Potential
HALOE	Halogen Occultation Experiment
HC	hydrocarbon
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
HSCT	High Speed Civil Transport
HSRP	High Speed Research Program
ICAO	International Civil Aviation Organization
IEA	International Energy Agency
IIT	Indian Institute of Technology
INPE	Instituto Nacional de Pesquisas Espaciais (Brazil)
IOTP	International Ozone Trends Panel
IPCC	Intergovernmental Panel on Climate Change
IR	infrared
ISAMS	Improved Stratospheric and Mesospheric Sounder
IUPAC	International Union of Pure and Applied Chemistry
IVIC	Instituto Venezolano de Investigaciones Cientificas (Venezuela)

JPL	Jet Propulsion Laboratory (California Institute of Technology; United States)
KNMI	Koninklijk Nederlands Meteorologisch Instituut
LIMS	Limb Infrared Monitor of the Stratosphere
LLNL	Lawrence Livermore National Laboratory (United States)
LRC	Langley Research Center (NASA)
LTO	Landing/Take-Off cycle
MIPAS	Michelson Interferometric Passive Atmosphere Sounder
MLOPEX	Mauna Loa Observatory Photochemistry Experiment
MLS	Microwave Limb Sounder
MOZAIC	Measurement of Ozone on Airbus In-service Aircraft
MPI	Max-Planck-Institute (Germany)
MPIA	Max-Planck-Institute for Aeronomy (Germany)
MPIC	Max-Planck-Institute for Chemistry (Germany)
MRI	Meteorological Research Institute (Japan)
MSU	Microwave Sounder Unit
NACNEMS	North American Cooperative Network of Enhanced Measurement Sites
NAD	nitric acid dihydrate
NASA	National Aeronautics and Space Administration (United States)
NAT	nitric acid trihydrate
NCAR	National Center for Atmospheric Research (United States)
NCSU	North Carolina State University (United States)
NESDIS	National Environmental Satellite, Data, and Information Service (NOAA)
NH	Northern Hemisphere
NILU	Norsk Institutt for Luftforskning (Oslo)
NIR	near infrared
NIST	National Institute of Standards and Technology (formerly NBS; United States)
NIWA	National Institute of Water and Atmospheric Research, Ltd. (New Zealand)
NMC	National Meteorological Center (United States)
NMHC	non-methane hydrocarbon
NOAA	National Oceanic and Atmospheric Administration (United States)
NPP	net primary productivity
NRC	National Research Council (United States)
NSF	National Science Foundation (United States)
NYU	New York University (United States)
ODP	Ozone Depletion Potential
ODW	Ozone Data for the World
OECD	Organization for Economic Cooperation and Development (Paris)
OSE	ozonesonde instrument used in former East Germany; similar to Brewer-Mast
OTP	Ozone Trends Panel

ACRONYMS

PAN	peroxyacetyl nitrate
PBL	planetary boundary layer
PFCs	perfluorocarbons
POLINAT	Pollution from Aircraft Emissions in the North Atlantic Flight Corridor
ppbm	parts per billion by mass
ppbv	parts per billion by volume
ppmv	parts per million by volume
pptv	parts per trillion by volume
PSCs	polar stratospheric clouds
PV	potential vorticity
QBO	quasi-biennial oscillation
RAF	Radiation Amplification Factor
RB	Robertson-Berger (UV irradiance meter)
SAGE	Stratospheric Aerosol and Gas Experiment
SAM II	Stratospheric Aerosol Measurement
SAMS	Stratospheric and Mesospheric Sounder
SAOZ	Système d'Analyse par Observation Zénithale
SAT	sulfuric acid tetrahydrate
SBUV	Solar Backscatter Ultraviolet spectrometer
SH	Southern Hemisphere
SOS/SONIA	Southern Oxidants Study/Southeast Oxidant and Nitrogen Intensive Analysis
SPADE	Stratospheric Photochemistry, Aerosols and Dynamics Expedition
SPEs	solar proton events
SSA	stratospheric sulfuric acid aerosol
SSBUV	Shuttle Solar Backscatter Ultraviolet spectrometer
STE	stratosphere-troposphere exchange
STEP	Stratosphere-Troposphere Exchange Project
STP	standard temperature and pressure
STRATOZ	Stratospheric Ozone expedition
SUNY	State University of New York (United States)
SUSIM	Solar Ultraviolet Spectral Irradiance Monitor
SZA	solar zenith angle
TFA	trifluoroacetic acid
TIROS	Television and Infrared Observation Satellite
TNO	Netherlands Organization for Applied Scientific Research
TOMS	Total Ozone Mapping Spectrometer
TOR	Tropospheric Ozone Research
TOVS	TIROS Operational Vertical Sounder
TROPOZ II	Tropospheric Ozone II expedition

UARS	Upper Atmosphere Research Satellite
UCI	University of California at Irvine (United States)
UEA	University of East Anglia (United Kingdom)
UKMO	United Kingdom Meteorological Office
UNEP	United Nations Environment Programme
UV	ultraviolet
UV-A	ultraviolet-A
UV-B	ultraviolet-B
VOC	volatile organic compound
WCRP	World Climate Research Programme
WMO	World Meteorological Organization
WODC	World Ozone Data Center

APPENDIX C

CHEMICAL FORMULAE AND NOMENCLATURE

HALOGEN-CONTAINING SPECIES

Cl	atomic chlorine	Br	atomic bromine
ClO	chlorine monoxide	BrO	bromine monoxide
OClO	chlorine dioxide		
Cl_2O_2	dichlorine peroxide (ClO dimer)		
ClONO	chlorine nitrite	$BrNO_2$	bromine nitrite
$ClONO_2$	chlorine nitrate	$BrONO_2$	bromine nitrate
HCl	hydrogen chloride (hydrochloric acid)	HBr	hydrogen bromide
HOCl	hypochlorous acid	HOBr	hypobromous acid
F	atomic fluorine	I	atomic iodine
FO	fluorine monoxide	IO	iodine monoxide
HF	hydrogen fluoride (hydrofluoric acid)	HI	hydrogen iodide
SF_6	sulfur hexafluoride	$IONO_2$	iodine nitrate

HALOCARBONS

Chlorofluorocarbons (CFCs)

CFC-10	CCl_4
CFC-11	CCl_3F
CFC-12	CCl_2F_2
CFC-13	$CClF_3$
CFC-14	CF_4
CFC-113	CCl_2FCClF_2
CFC-114	$CClF_2CClF_2$
CFC-115	$CClF_2CF_3$
CFC-116	CF_3CF_3

Hydrochlorofluorocarbons (HCFCs)

HCFC-21	$CHCl_2F$
HCFC-22	CHF_2Cl
HCFC-30	CH_2Cl_2
HCFC-40	CH_3Cl
HCFC-123	CF_3CHCl_2
HCFC-124	CF_3CHFCl
HCFC-141b	$CFCl_2CH_3$
HCFC-142b	CF_2ClCH_3
HCFC-225ca	$CF_3CF_2CHCl_2$
HCFC-225cb	CF_2ClCF_2CHFCl

Hydrofluorocarbons (HFCs)

HFC-23	CHF_3	HFC-152a	CH_3CHF_2
HFC-32	CH_2F_2	HFC-227ea	CF_3CHFCF_3
HFC-41	CH_3F	HFC-236cb	$CF_3CF_2CH_2F$
HFC-125	CHF_2CF_3	HFC-236ea	$CF_3CHFCHF_2$
HFC-134	CHF_2CHF_2	HFC-236fa	$CF_3CH_2CF_3$
HFC-134a	CH_2FCF_3	HFC-245ca	$CHF_2CF_2CFH_2$
HFC-143	CHF_2CH_2F	HFC-43-10mee	$CF_3CHFCHFCF_2CF_3$
HFC-143a	CH_3CF_3		

CHEMICAL FORMULAE

Halons

halon-1211	CF_2ClBr
halon-1301	CF_3Br
halon-2402	$C_2F_4Br_2$

Others

CH_3Cl	methyl chloride	CH_3Br	methyl bromide
CH_2Cl_2	methylene chloride, dichloromethane	CH_2Br_2	methylene bromide, dibromomethane
$CHCl_3$	chloroform, trichloromethane	$CHBr_3$	bromoform, tribromomethane
CCl_4	carbon tetrachloride	$C_2H_4Br_2$	ethylene dibromide; 1,2 dibromoethane
CH_3CCl_3	methyl chloroform		
C_2HCl_3	trichloroethylene		
C_2Cl_4	tetrachloroethylene		
$COCl_2$	phosgene, carbonyl chloride		
CF_4	perfluoromethane	CH_3I	methyl iodide
C_2F_6	perfluoroethane		
C_3F_8	perfluoropropane		
c-C_4F_8	perfluorocyclobutane		
C_6F_{14}	perfluorohexane		
CHF_3	fluoroform, trifluoromethane		
TFA	trifluoroacetic acid ($CF_3C(O)OH$)		
$CHClBr_2$	dibromochloromethane	COFCl	fluorophosgene
CF_3Br	trifluorobromomethane (halon-1301)		
CH_2ClI	chloroiodomethane		
CF_3I	trifluoromethyl iodide		
C_2F_5I	iodopentafluoroethane		

OTHER CHEMICAL SPECIES

O	atomic oxygen	H	atomic hydrogen
O_2	molecular oxygen	H_2	molecular hydrogen
O_3	ozone	OH	hydroxyl radical
$O(^1D)$	atomic oxygen (first excited state)	HO_2	hydroperoxyl radical
O_x	odd oxygen (O, $O(^1D)$, O_3)	H_2O	water
		H_2O_2	hydrogen peroxide
		HO_x	odd hydrogen (H, OH, HO_2, H_2O_2)

N	atomic nitrogen
N_2	molecular nitrogen
N_2O	nitrous oxide
NO	nitric oxide
NO_2	nitrogen dioxide
NO_3	nitrogen trioxide, nitrate radical
N_2O_5	dinitrogen pentoxide
$ClONO_2$	chlorine nitrate
HNO_2, HONO	nitrous acid
HNO_3	nitric acid
$RONO_2$	alkyl nitrates
NO_3^-	nitrate ion
S	atomic sulfur
SO_2	sulfur dioxide
SO_x	sulfur oxides
H_2SO_4	sulfuric acid
SAT	sulfuric acid tetrahydrate ($H_2SO_4 \cdot 4H_2O$)
$SO_4^=$	sulfate ion
Be	beryllium
Pb	lead
Sr	strontium
C	carbon
CO	carbon monoxide
CO_2	carbon dioxide
HC	hydrocarbon
NMHC	non-methane hydrocarbon
VOC	volatile organic compound
CH_4	methane
C_2H_6	ethane
C_3H_8	propane
C_2H_4	ethylene, ethene
C_2H_2	acetylene, ethyne
C_5H_8	isoprene (2-methyl 1,3 butadiene)
C_6H_6	benzene
CFCs	chlorofluorocarbons*
HCFCs	hydrochlorofluorocarbons*
HFCs	hydrofluorocarbons*

HO_2NO_2	peroxynitric acid
$ROONO_2$	peroxynitrates
PAN	peroxyacetylnitrate ($CH_3C(O)OONO_2$)
NO_y	odd nitrogen (usually including NO, NO_2, NO_3, N_2O_5, $ClONO_2$, HNO_4, HNO_3)
NO_x	oxides of nitrogen (NO + NO_2)
NAD	nitric acid dihydrate ($HNO_3 \cdot 2H_2O$)
NAT	nitric acid trihydrate ($HNO_3 \cdot 3H_2O$)
SF_6	sulfur hexafluoride
CS_2	carbon disulfide
COS, OCS	carbonyl sulfide
Kr	krypton
Rn	radon
CH_2O	formaldehyde
CH_3OH	methanol
RO	alkoxy radicals
CH_3OOH	methyl hydroperoxide
CH_3COO	methyl peroxy radical
RO_2	organic peroxy radical
$CH_3C(O)OO$	acetyl peroxy radical

* Family of compounds; see above for individual species

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