

# APPENDIX A:

## CHEMICAL FORMULAE AND NOMENCLATURE

Reactive Halogen-Containing Species			
Cl	atomic chlorine	Br	atomic bromine
Cl <sub>y</sub>	total inorganic chlorine	Br <sub>y</sub>	total inorganic bromine
Cl <sub>2</sub>	molecular chlorine	Br <sub>2</sub>	molecular bromine
ClO	chlorine monoxide	BrO	bromine monoxide
ClO <sub>x</sub>	(ClO + 2 ClOOCl)	Br <sub>2</sub> O	dibromine monoxide
Cl <sub>2</sub> O <sub>2</sub> , ClOOCl	dichlorine peroxide (ClO dimer)	BrO <sub>x</sub>	(Br, BrO, BrONO <sub>2</sub> , HOBr, ...)
ClONO <sub>2</sub> , ClNO <sub>3</sub>	chlorine nitrate	BrONO <sub>2</sub> , BrNO <sub>3</sub>	bromine nitrate
HCl	hydrogen chloride (hydrochloric acid)	HBr	hydrogen bromine
HOCl	hypochlorous acid	HOBr	hypobromous acid
F	atomic fluorine	I	atomic iodine
F <sub>2</sub>	molecular fluorine	I <sub>2</sub>	molecular iodine
F <sub>y</sub>	total inorganic fluorine	I <sub>y</sub>	total inorganic iodine
HF	hydrogen fluoride (hydrofluoric acid)	IO	iodine monoxide
FO <sub>x</sub>	F + FO	IO <sub>x</sub>	iodine radicals
Other Reactive Species			
O	atomic oxygen	H	atomic hydrogen
O( <sup>3</sup> P)	atomic oxygen (ground state)	H <sub>2</sub>	molecular hydrogen
O( <sup>1</sup> D)	atomic oxygen (first excited state)	OH	hydroxyl radical
O <sub>2</sub>	molecular oxygen	HO <sub>2</sub>	hydroperoxyl radical
O <sub>3</sub>	ozone	H <sub>2</sub> O	water
O <sub>x</sub>	odd oxygen (O, O( <sup>1</sup> D), O <sub>3</sub> )	HO <sub>x</sub>	odd hydrogen (H, OH, HO <sub>2</sub> , H <sub>2</sub> O <sub>2</sub> )
N	atomic nitrogen	HNO <sub>2</sub> , HONO	nitrous acid
N <sub>2</sub>	molecular nitrogen	HOONO	pernitrous acid
N <sub>2</sub> O	nitrous oxide	HNO <sub>3</sub>	nitric acid
NO	nitric oxide	HNO <sub>4</sub> , HOONO <sub>2</sub>	peroxynitric acid
NO <sub>2</sub>	nitrogen dioxide	NH <sub>3</sub>	ammonia
NO <sub>3</sub>	nitrogen trioxide, nitrate radical	NH <sub>4</sub> NO <sub>3</sub>	ammonium nitrate
N <sub>2</sub> O <sub>5</sub>	dinitrogen pentoxide	NO <sub>x</sub>	nitrogen oxides (NO + NO <sub>2</sub> )
HNO <sub>3</sub> •3H <sub>2</sub> O	nitric acid trihydrate condensate (NAT)	NO <sub>y</sub>	total reactive nitrogen (NO, NO <sub>2</sub> , NO <sub>3</sub> , N <sub>2</sub> O <sub>5</sub> , ClONO <sub>2</sub> , HNO <sub>4</sub> , HNO <sub>3</sub> )
S	atomic sulfur	H <sub>2</sub> S	hydrogen sulfide
SO <sub>2</sub>	sulfur dioxide	CS <sub>2</sub>	carbon disulfide
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid	COS, OCS	carbonyl sulfide
CH <sub>3</sub> SCH <sub>3</sub>	dimethyl sulfide (DMS)		
C	carbon atom	CO <sub>2</sub>	carbon dioxide
CO	carbon monoxide	CH <sub>3</sub> CH <sub>3</sub>	ethane
CH <sub>3</sub>	methyl radical	CH <sub>3</sub> CH <sub>2</sub> CH <sub>3</sub>	propane
CH <sub>4</sub>	methane	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>	butane
CH <sub>3</sub> OH	methyl alcohol, methanol	CH <sub>2</sub> O	formaldehyde
CF <sub>3</sub> C(O)OH, CF <sub>3</sub> CO <sub>2</sub> H	trifluoroacetic acid (TFA)		
CaCO <sub>3</sub>	calcite, calcium carbonate		
TiO <sub>2</sub>	titanium dioxide		
Al <sub>2</sub> O <sub>3</sub>	aluminum oxide		

**Note:** Table A-5 in the Annex provides an extensive listing of chemical names and formulas, including many ozone depleting substances, their replacements, and other substances of interest to the Montreal Protocol.



# APPENDIX B:

## 2022 OZONE ASSESSMENT ACRONYM DICTIONARY

### A

<b>A5</b>	Article 5 countries of the Montreal Protocol
<b>AAO</b>	Antarctic oscillation
<b>ACCESS</b>	Australian Community Climate and Earth System Simulator
<b>ACCMIP</b>	Atmospheric Chemistry and Climate Model Intercomparison Project
<b>ACE-FTS</b>	Fourier Transform Spectrometer instrument on the Atmospheric Chemistry Experiment satellite
<b>AEAP</b>	Atmospheric Effect of Aviation Project
<b>AerChemMIP</b>	Aerosol and Chemistry Model Intercomparison Project
<b>AGAGE</b>	Advanced Global Atmospheric Gases Experiment (atmospheric monitoring surface sites)
<b>AGTP</b>	absolute global temperature change potential
<b>AGWP</b>	absolute global warming potential
<b>AI</b>	artificial intelligence
<b>AIMS</b>	Atmospheric chemical Ionization Mass Spectrometer
<b>AMSU</b>	Advanced Microwave Sounding Unit (satellite-based instrument)
<b>ANY</b>	Australian New Year (fire event January 2020)
<b>AO</b>	Arctic oscillation
<b>AoA</b>	age of stratospheric air
<b>AOD</b>	aerosol optical depth
<b>APEEP</b>	Ap-driven energetic electron precipitation (model)
<b>AR5</b>	IPCC Fifth Assessment Report
<b>AR6</b>	IPCC Sixth Assessment Report
<b>ARISE</b>	Assessing Responses and Impacts of Solar climate intervention on the Earth system
<b>ASOPOS</b>	ASsessment of Operating Procedures for Ozone Sondes
<b>ATom</b>	Atmospheric Tomography Mission (aircraft-based field campaign)
<b>ATTREX</b>	Airborne Tropical Tropopause Experiment (aircraft-based field campaign)

### B

<b>BASIC</b>	BAyeSian Integrated and Consolidated composite ozone time-series (data product)
<b>BC</b>	black carbon aerosol
<b>BDC</b>	Brewer-Dobson circulation
<b>BECCS</b>	bioenergy with carbon capture and storage
<b>BNN</b>	Bayesian neural network
<b>BU</b>	bottom-up (estimate based on observations)
<b>BUV</b>	Backscatter Ultraviolet (satellite-based instrument)

### C

<b>CALIOP</b>	Cloud-Aerosol Lidar with Orthogonal Polarization (satellite-based instrument)
<b>CALIPSO</b>	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (satellite-based instrument)
<b>CAM-Chem</b>	Community Atmosphere Model with Chemistry (CAM-chem), a component of the NCAR Community Earth System Model (CESM)
<b>CanESM</b>	Canadian Earth System Model
<b>CAO</b>	cold air outbreak
<b>CARIBIC</b>	Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container (aircraft-based observational campaign)
<b>CAS RN</b>	Chemical Abstracts Service registry number
<b>CAST</b>	Coordinated Airborne Studies in the Tropics (aircraft-based field campaign)
<b>CAVA</b>	Central American Volcanic Arc
<b>CCI</b>	Climate Change Initiative of the European Space Agency
<b>CCM</b>	chemistry-climate model

<b>CCMI</b>	Chemistry-Climate Model Initiative
<b>CCMVal</b>	Chemistry-Climate Model Validation Activity (e.g. CCMVal-2 = Phase 2 of CCMVal)
<b>CCT</b>	cirrus cloud thinning
<b>CDM</b>	Clean Development Mechanism of the Kyoto Protocol
<b>CDR</b>	carbon dioxide removal
<b>CESM</b>	Community Earth System Model
<b>CFCs</b>	chlorofluorocarbons
<b>CFSR</b>	NCEP Climate Forecast System Reanalysis (data product)
<b>CGAA</b>	Cape Grim Air Archive (atmospheric monitoring surface sites)
<b>CGTP</b>	combined global temperature change potential
<b>CI</b>	climate intervention
<b>CLaMS</b>	Chemical Lagrangian Model of the Stratosphere
<b>CMEs</b>	coronal mass ejections
<b>CMIP</b>	Climate Model Intercomparison Project (e.g. CMIP6 = Phase 6 of CMIP)
<b>CNRM</b>	National Centre for Meteorological Research (France)
<b>CONTRAST</b>	Convective Transport of Active Species in the Tropics (aircraft-based field campaign)
<b>COP</b>	Conference Of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC)
<b>COS</b>	carbonyl sulfide
<b>CPT</b>	cold point tropopause
<b>CR-AVE</b>	Costa Rica Aura Validation Experiment (aircraft-based field campaign)
<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation (Australia)
<b>CTM</b>	chemistry transport model
<b>CUE</b>	critical use exemption

## D

<b>DJF</b>	December-January-February
<b>DLM</b>	dynamic linear model
<b>DMS</b>	dimethyl sulfide
<b>DOE</b>	Department of Energy (United States)
<b>DU</b>	Dobson Units

## E

<b>ECMWF</b>	European Centre for Medium-Range Weather Forecasts (forecast model)
<b>ECS</b>	equilibrium climate sensitivity
<b>EDC</b>	ethylene dichloride
<b>EECI</b>	equivalent effective chlorine
<b>EEMD</b>	ensemble empirical model decomposition
<b>EEP</b>	energetic electron precipitation
<b>EESBnC</b>	Equivalent Effective Stratospheric Benchmark-normalized Chlorine
<b>EESC</b>	equivalent effective stratospheric chlorine
<b>EHF</b>	eddy heat flux
<b>EMAC</b>	ECHAM/MESSy Atmospheric Chemistry
<b>ENSO</b>	El Niño-Southern Oscillation
<b>EOF</b>	empirical orthogonal function
<b>EPA</b>	Environmental Protection Agency (United States)
<b>EPP</b>	energetic particle precipitation
<b>ERA</b>	ECMWF Re-Analysis (a global atmospheric reanalysis data product)
<b>ERF</b>	effective radiative forcing
<b>ESM</b>	Earth system model
<b>EU</b>	European Union

## F

<b>FDH</b>	fixed dynamical heating
<b>FIREBIRD</b>	Focused Investigations of Relativistic Electron Burst Intensity, Range, and Dynamics (CubeSat dual satellite mission)
<b>FRF</b>	fractional release factor
<b>FTIR</b>	Fourier transform infrared
<b>FZH</b>	Forschungszentrum Jülich institute (Germany)

## G

<b>GAW</b>	Global Atmosphere Watch programme of WMO
<b>GC-ECD</b>	gas chromatography-electron capture detection (instrument)
<b>GCM</b>	global circulation model
<b>GDP</b>	gross domestic product
<b>GEISA</b>	Gestion et Etude des Informations Spectroscopiques Atmosphériques / Management and Study of Atmospheric Spectroscopic Information
<b>GeoMIP</b>	Geoengineering Model Intercomparison Project
<b>GEOSCCM</b>	Goddard Earth Observing System Chemistry Climate Model
<b>GFDL-EM</b>	Geophysical Fluid Dynamics Laboratory (of NOAA) Earth system Model
<b>GHG</b>	greenhouse gas
<b>GISSTEMP</b>	Goddard Institute for Space Studies (GISS) Surface Temperature Analysis (data product)
<b>GLENS</b>	Geoengineering Large ENsemble project
<b>GLORIA</b>	Global Limb Radiance Imager for the Atmosphere (satellite-based instrument)
<b>GloSSAC</b>	Global Space-based Stratospheric Aerosol Climatology (data product)
<b>GMI</b>	Global Modeling Initiative
<b>GOME</b>	Global Ozone Monitoring Experiment spectrometer (satellite-based instrument)
<b>GOMOS</b>	Global Ozone Monitoring by Occultation of Stars (satellite-based instrument)
<b>GOZCARDS</b>	Global OZone Chemistry And Related trace gas Data records for the Stratosphere
<b>GPS</b>	global positioning system
<b>GR</b>	growth rate
<b>GSFC2D</b>	Goddard Space Flight Center 2-D model
<b>GSG</b>	GOME-SCIAMACHY-GOME-2 merged dataset
<b>GtCO<sub>2</sub>-eq</b>	gigatonnes of carbon dioxide equivalent
<b>GTO</b>	GOME-type Total Ozone column ozone product
<b>GTP</b>	global temperature change potential
<b>GWP</b>	global warming potential

## H

<b>HadGEM</b>	Hadley Centre Global Environment Model
<b>HadISST</b>	Hadley Centre Sea Ice and Sea Surface Temperature (data product)
<b>HALO</b>	High-Altitude and LOng range (research aircraft)
<b>HALOE</b>	HALogen Occultation Experiment (satellite-based instrument)
<b>HBFO</b>	hyrobromofluoroolefin
<b>HCFC</b>	hydrochlorofluorocarbon
<b>HCFO</b>	hydrochlorofluoroolefin
<b>HF</b>	hydrogen fluoride/hydrofluoric acid
<b>HFC</b>	hydrofluorocarbon
<b>HFE</b>	halogenated ether
<b>HFO</b>	hydrofluoroolefin
<b>HFP</b>	hexafluoropropylene
<b>HIAPER</b>	High-performance Instrumented Airborne Platform for Environmental Research
<b>HIPPO</b>	HIAPER Pole-to-Pole Observations (aircraft-based field campaign)
<b>HITRAN</b>	high-resolution transmission molecular absorption database
<b>HSCT</b>	High Speed Civil Transport (category of aircraft)
<b>HST</b>	hypersonic transport (category of aircraft)
<b>HTOC</b>	Halon Technical Options Committee

## I

<b>IAGOS</b>	In-service Aircraft for a Global Observing System
<b>IASI</b>	Infrared Atmospheric Sounding Interferometer (satellite-based instrument)
<b>ICR</b>	industrial and commercial refrigeration
<b>IEA</b>	International Energy Agency
<b>IGAC</b>	International Global Atmospheric Chemistry project
<b>IHD</b>	interhemispheric difference
<b>ILT</b>	independent linear trend
<b>IOD</b>	integrated ozone depletion
<b>IO3C</b>	International Ozone Commission
<b>IPCC</b>	Intergovernmental Panel on Climate Change

I

IRF	instantaneous radiative forcing
ISS	International Space Station
ITCZ	intertropical convergence zone

J

JJA	June-July-August
JRA-55	the 55-year Japanese ReAnalysis project conducted by the Japan Meteorological Agency (JMA)

L

LBL	line-by-line
LOTUS	Long-term Ozone Trends and Uncertainties in the Stratosphere (a SPARC activity)
LS	lower stratosphere
LW	longwave (radiation wavelength range)
LZRH	level of zero radiative heating

M

MAC	mobile air conditioner
MAGICC	Model for the Assessment of Greenhouse Gas Induced Climate Change
MAM	March-April-May
MBL	marine atmospheric boundary layer
MCB	marine cloud brightening
MEGRIDOP	MErged GRIdded Dataset of Ozone Profiles
MERRA	Modern Era Retrospective-analysis for Research and Applications (e.g. MERRA-2 = version 2 of MERRA)
MF	mole fraction
MIPAS	Michelson Interferometer for Passive Atmospheric Sounding
ML	machine learning
MLF	Montreal Protocol's Multilateral Fund
MLR	multiple linear regression
MLS	Microwave Limb Sounder (satellite-based instrument)
MMM	multi-model mean
MRI-ESM	Meteorological Research Institute (of Japan) Earth System Model
MSR	Multi-sensor reanalysis
MSU	Microwave Sounding Unit (satellite-based instrument)

N

NAM	northern annular mode
NAO	North Atlantic oscillation
NASA	National Aeronautics and Space Administration (United States)
NAT	nitric acid trihydrate
NCAR	National Center for Atmospheric Research (United States)
NCEP	National Centers for Environmental Prediction (United States)
NDACC	Network for the Detection of Atmospheric Composition Change
NH	Northern Hemisphere
NIES	National Institute for Environmental Studies (Japan)
NIWA-BS	National Institute of Water and Atmospheric Research - Bodeker Scientific (dataset)
NOAA	National Oceanic and Atmospheric Administration (United States)
NTCF	near-term climate forcer

O

OCS	carbonyl sulfide (also COS)
ODP	ozone depletion potential
ODS	ozone-depleting substance
OECD	the Organization for Economic Cooperation and Development
OHP	Observatoire de Haute-Provence (observatory in France)

<b>OLP</b>	ozone loss potential
<b>OMD</b>	ozone mass deficit
<b>OMI</b>	Ozone Monitoring Instrument (satellite-based instrument)
<b>OMPS</b>	Ozone Mapping Profiler Suite (satellite-based instrument)
<b>OMPS-LP</b>	OMPS Limb Profiler (satellite-based instrument)
<b>ORM</b>	Ozone Research Managers of the parties to the Vienna Convention
<b>OSIRIS</b>	Optical Spectrograph and InfraRed Imaging System (satellite-based instrument)

## P

<b>PAR</b>	photosynthetically active radiation
<b>PCE</b>	perchloroethylene, also known as tetrachloroethylene
<b>PFC</b>	perfluorocarbon
<b>PFP</b>	PSC formation potential
<b>PG</b>	product gas
<b>PGI</b>	product gas injection
<b>PNE</b>	Pacific Northwest Event (2017 wildfire event)
<b>POSIDON</b>	Pacific Oxidants, Sulfur, Ice, Dehydration, and cONvection (aircraft-based field campaign)
<b>Pre-AVE</b>	Pre-Aura Validation Experiment (aircraft-based field campaign)
<b>PSC</b>	polar stratospheric cloud
<b>PTFE</b>	polytetrafluoroethylene/polytetrafluoroethene
<b>PWT</b>	piecewise trend
<b>PWLT</b>	piecewise linear trend
<b>pyroCb</b>	pyrocumulonimbus cloud

## Q

<b>QBO</b>	Quasi-Biennial Oscillation
<b>QPS</b>	quarantine and pre-shipment

## R

<b>RAOBCORE</b>	RAdiosone OBservation COrrrection using REanalyses (data product)
<b>RCP</b>	Representative Concentration Pathway scenario (used by IPCC)
<b>RE</b>	radiative efficiency
<b>RF</b>	radiative forcing
<b>RICH</b>	Radiosonde Innovation Composite Homogenization reanalysis (data product)
<b>RSS</b>	Remote Sensing Systems reanalysis (data product)

## S

<b>S2S</b>	sub-seasonal to seasonal
<b>SABER</b>	Sounding of the Atmosphere using Broadband Emission Radiometry (satellite-based instrument)
<b>SAD</b>	aerosol surface area density
<b>SAGE</b>	Stratospheric Aerosol and Gas Experiment (satellite-based instrument)
<b>SAI</b>	stratospheric aerosol injection
<b>SAM</b>	southern annular mode
<b>SAOZ</b>	Système D'Analyse par Observations Zénithales (type of spectrometer instrument)
<b>SAP</b>	UNEP Scientific Assessment Panel to the Parties of the Montreal Protocol
<b>SARF</b>	stratospheric-temperature-adjusted radiative forcing
<b>SBUV</b>	Solar Backscatter Ultraviolet (satellite-based instrument)
<b>SBUV MOD</b>	SBUV Merged Ozone Data (MOD) product
<b>SBUV COH</b>	SBUV Cohesive dataset (COH)
<b>SCIAMACHY</b>	SCanning Imaging Absorption spectroMeter for Atmospheric CHartographY (satellite-based instrument)
<b>SCISAT</b>	SCience SATellite
<b>SEANY</b>	Southeast Australia New Year (2020 wildfire event)
<b>SG</b>	source gas
<b>SGI</b>	source gas injection
<b>SH</b>	Southern Hemisphere
<b>SHIVA</b>	Stratospheric ozone Halogen Impacts in a Varying Atmosphere (field campaign)
<b>SIC</b>	sea ice concentration

<b>SLIMCAT</b>	Single-Layer Isentropic Model of Chemistry and Transport
<b>SLP</b>	sea level pressure
<b>SMR</b>	Sub-Millimetre Radiometer (satellite-based instrument)
<b>SODP</b>	stratospheric ozone depletion potential
<b>SON</b>	September-October-November
<b>SORCE</b>	SOlar Radiation and Climate Experiment
<b>SPARC</b>	Stratospheric Processes And their Role in Climate (project of WCRP)
<b>SPE</b>	solar proton event
<b>SRES</b>	Special Report on Emissions Scenarios (used by IPCC)
<b>S-RIP</b>	SPARC Reanalysis Intercomparison Project
<b>SRM</b>	solar radiation modification
<b>SSA</b>	stratospheric sulfuric acid aerosols
<b>SSI</b>	solar spectral irradiance
<b>SSP</b>	Shared Socioeconomic Pathway scenarios (used by IPCC)
<b>SST</b>	sea surface temperature or supersonic transport (aircraft)
<b>SSTA</b>	SST anomaly
<b>SSU</b>	Stratospheric Sounding Unit (satellite-based instrument)
<b>SSW</b>	sudden stratospheric warming
<b>STAR</b>	The NOAA Center for Satellite Applications and Research
<b>STE</b>	stratosphere-troposphere exchange
<b>STS</b>	supercooled ternary solution
<b>STT</b>	stratosphere-to-troposphere transport
<b>Suomi NPP</b>	Suomi National Polar-orbiting Partnership (satellite)
<b>SW</b>	shortwave (radiation wavelength range)
<b>SWOOSH</b>	Stratospheric Water and OzOne Satellite Homogenized (merged data record)
<b>SWV</b>	stratospheric water vapor

## T

<b>TACTS</b>	Transport and Composition in the UT/LMS (aircraft-based field experiment)
<b>TC4</b>	Tropical Composition, Cloud and Climate Coupling (aircraft-based field experiment)
<b>TCE</b>	trichloroethene
<b>TCO</b>	total column ozone
<b>TEAP</b>	UNEP Technology and Economic Assessment Panel to the Parties of the Montreal Protocol
<b>TFA</b>	trifluoroacetic acid
<b>TFE</b>	tetrafluoroethylene/ tetrafluoroethene
<b>TOA</b>	top of the atmosphere
<b>TOAR</b>	Tropospheric Ozone Assessment Report
<b>TOMCAT</b>	Toulouse Off-line Model of Chemistry and Transport
<b>TOMS</b>	Total Ozone Mapping Spectrometer (satellite-based instrument)
<b>TORERO</b>	Tropical Ocean tRoposphere Exchange of Reactive halogen species and Oxygenated VOC (aircraft-based field experiment)
<b>TOVS/ATOVS</b>	TIROS Operational Vertical Sounder / Advanced TOVS (satellite-based instrument)
<b>TP</b>	tropopause pressure
<b>TROPOMI</b>	TROPOspheric Monitoring Instrument (satellite-based instrument)
<b>TSI</b>	total solar irradiance
<b>TTL</b>	tropical tropopause layer

## U

<b>UAH</b>	University of Alabama Huntsville
<b>UARS</b>	Upper Atmosphere Research Satellite
<b>UBDC</b>	upper branch of the Brewer-Dobson Circulation (BDC)
<b>UCI</b>	University of California Irvine
<b>UEA</b>	University of East Anglia
<b>UKCA</b>	United Kingdom Chemistry and Aerosols model
<b>UKESM</b>	United Kingdom Earth System Model
<b>UNEP</b>	United Nations Environment Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>USA</b>	United States of America
<b>UT</b>	upper troposphere



**UTLS** upper troposphere/lower stratosphere  
**UV** ultraviolet (wavelength range)

## V

**VCM** vinyl chloride/vinyl chloride monomer  
**VDC** 1,1-dichloroethene  
**VIRGAS** Volcano-plume Investigation Readiness and Gas-phase and Aerosol Sulfur (field campaign)  
**VIS/Vis** visible-wavelength radiation  
**VolMIP** Volcanic Forcings Model Intercomparison Project  
**VSL SG** very short-lived source gas  
**VSLs** very short-lived substance

## W

**WACCM** Whole Atmosphere Community Climate Model  
**WCRP** World Climate Research Programme  
**WDCGG** World Data Centre for Greenhouse Gases (a World Data Centre (WDC) operated by the Japan Meteorological Agency (JMA) under WMO-GAW)  
**WISE** Wave-driven Inter-tropical Exchange (aircraft-based field campaign)  
**WMO** World Meteorological Organization  
**WOUDC** World Ozone and Ultraviolet Radiation Data Centre of WMO/GAW