

GLOSSARY

aerosol

A suspension of very fine particles (solid or liquid) in air.

anthropogenic

Human-caused.

bank

The amount of a chemical that has been produced but has not yet been emitted or chemically altered. They exist either in reserve storage or in current applications (*i.e.*, refrigerators, air conditioners, fire extinguishers, etc.).

catalytic reaction

Acceleration (increase in rate) of a chemical reaction by means of a substance, called a catalyst. Chlorine acts as a catalyst in the destruction of ozone in the stratosphere.

chlorofluorocarbons (CFCs)

Halocarbons containing only chlorine, fluorine, and carbon atoms. CFCs are ozone-depleting substances (ODSs).

climate forcing

Changes that affect the energy balance of the planet and that consequently “force” the climate to change (see also radiative forcing). Examples of climate forcing include changes in atmospheric carbon dioxide, or suspended particulates (see aerosols), or energy from the sun.

CO₂-equivalent

The amount of carbon dioxide (CO₂) that would cause the same amount of radiative forcing as a given amount of another greenhouse gas.

column ozone

The total amount of ozone in a vertical column above the Earth’s surface. Column ozone is measured in Dobson units (DU).

consumption

Used here as defined by the Montreal Protocol: The magnitude of an ozone-depleting substance produced or imported, minus the amount of that substance that is exported.

Equivalent Effective Chlorine (EECI)

An index used to approximately quantify overall changes in reactive halogen trends based on the measured mix of ODSs in the troposphere. It accounts for the number of halogen atoms in the ODS molecule, their relative efficiency at destroying ozone, and the rate at which the ODSs decompose in the stratosphere to release the halogen atoms.

Equivalent Effective Stratospheric Chlorine (EESC)

An index related to EECI that considers the time lags associated with transporting air from the troposphere to the stratosphere. EESC roughly estimates the effect of ODSs on stratospheric ozone. The EESC index is used to estimate the time evolution of ozone-depleting halogen (chlorine, bromine) in the atmosphere. It is often used to estimate when the cumulative effect of all ODSs on ozone will return to a level attained at some earlier time, or to evaluate the relative effects of potential policy scenarios.

Global Warming Potential

An index comparing the cumulative radiative forcing (*i.e.*, climate impact) of a unit mass of a greenhouse gas relative to the same quantity of a unit mass of a reference gas (usually CO₂) over some time period (usually 100 years).

100-year GWP

The Global Warming Potential of a chemical integrated over a 100-year time horizon relative to CO₂. When applied as a weighting factor to emissions or production of other chemicals, the resulting quantity provides a CO₂-equivalent emission or production.

greenhouse gases

Gases including water vapor, carbon dioxide, methane, nitrous oxide, and halocarbons that trap infrared heat, warming the air near the surface and in the lower levels of the atmosphere.

halocarbons

Chemical compounds containing carbon atoms, and one or more atoms of the halogens chlorine (Cl), bromine (Br), or iodine (I). Halocarbons include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and halons.

halogen

A member of the family of elements that includes fluorine, chlorine, bromine, and iodine. In the context of ozone depletion, chlorine (Cl), bromine (Br), and iodine (I) are the halogens of greatest relevance. “Halogenated” compounds are chemicals that contain one or more halogen atoms in their molecular structure. Fully halogenated halocarbons contain only carbon and halogen atoms, whereas partially halogenated halocarbons also contain hydrogen (H) atoms.

halon

Fully halogenated halocarbons that contain bromine and fluorine. Halons are used in fire-extinguishing applications.

mixing ratio (by mass)

The ratio of the mass of a specific substance in a volume of air to the total mass of that volume of air.

ozone-depleting substance (ODS)

A substance known to deplete the stratospheric ozone layer. This includes CFCs, halons, HCFCs, and other halocarbons. Most ODSs are regulated by the Montreal Protocol, though some with very short lifetimes (*e.g.*, CHBr_3) or small anthropogenic sources (*e.g.*, CH_3Cl) are not.

ozone depletion

Chemical destruction of the stratospheric ozone layer by substances produced by human activities.

Ozone Depletion Potential

An index comparing the amount of global ozone destroyed by a particular ozone-depleting substance per unit mass compared to the amount destroyed by a reference gas (CFC-11) per unit mass.

production

The magnitude of ODS or substitute chemical produced by industry.

radiative forcing

Broadly defined as the difference between the incoming radiation energy and the outgoing radiation energy in the climate system. If more energy is incoming than outgoing, it tends to warm the climate (and is a planetary energy imbalance). A source of radiative forcing might be more solar energy, or more greenhouse gases for example. (This term is used in a more specific manner in IPCC).

stratosphere

The highly stratified region of the atmosphere above the troposphere extending from about 10 km (ranging from 9 km in high latitudes to 16 km in the tropics on average) to about 50 km. In the stratosphere, temperatures increase with height.

substitutes for ozone-depleting substances

Chemicals that are used in place of the ozone-depleting substances that are regulated by the Montreal Protocol. These include hydrochlorofluorocarbons (HCFCs), which are ozone-depleting substances but not as potent as those they replace, and perfluorocarbons (PFCs), which do not deplete ozone but are greenhouse gases.

troposphere

The lowest part of the atmosphere from the surface to about 10 km in altitude in mid-latitudes (ranging from 9 km in high latitudes to 16 km in the tropics on average) where clouds and “weather” phenomena occur. In the troposphere, temperatures generally decrease with height.

ACRONYMS AND ABBREVIATIONS

A1	baseline halocarbon scenario	Gg	gigagram, or one billion grams
ACE	Atmospheric Chemistry Experiment	GHG	greenhouse gas
AFEAS	Alternative Fluorocarbons	GMD	Global Monitoring Division (NOAA/ESRL)
	Environmental Acceptability Study	GOMOS	Global Ozone Monitoring by Occultation of Stars
AGAGE	Advanced Global Atmospheric Gases Experiment	Gt	gigaton, or one billion metric tons
AMTRAC	Atmospheric Model with Transport and Chemistry	GtCO₂	gigatons of carbon dioxide
ATMOS	Atmospheric Trace Molecule Spectroscopy	GWP	Global Warming Potential
Br	atomic bromine	H	hydrogen
BrO	bromine monoxide	HALOE	Halogen Occultation Experiment
BrO_x	reactive bromine	HCFC	hydrochlorofluorocarbon
BrONO₂	bromine nitrate	HCl	hydrogen chloride (or hydrochloric acid)
Br_y	inorganic bromine	HFC	hydrofluorocarbon
C	carbon	H₂	hydrogen gas
°C	degree celsius	H₂O	water
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation	HO_x	reactive hydrogen
CCl₄	carbon tetrachloride	hPa	hectopascal
C₂Cl₄	tetrachloroethene	ILAS	Improved Limb Atmospheric Spectrometer
CCM	Chemistry Climate Model	IPCC	Intergovernmental Panel on Climate Change
CCSP	Climate Change Science Program	IR	infrared
CFC	chlorofluorocarbon	K	kelvin (unit of temperature)
CFC-11	trichlorofluoromethane	kJ/m²	kilojoules per meter squared
CFC-12	dichlorodifluoromethane	km	kilometer, or one thousand meters
CH₄	methane	Kt	kiloton, or one thousand metric tons
CHBr₃	tribromomethane	LOSU	level of scientific understanding
CHCl₃	trichloromethane (chloroform)	MAM	March-April-May
CH₂Br₂	dibromomethane	MBTOC	Methyl Bromide Technical Options Committee
CH₂Cl₂	dichloromethane or methylene chloride	MLS	Microwave Limb Sounder
CH₃Br	methyl bromide	MSU	Microwave Sounding Unit
CH₃Cl	methyl chloride	Mt	megaton, or one million metric tons
CH₃CCl₃	methyl chloroform	N	nitrogen
Cl	chlorine	NASA	National Aeronautics and Space Administration
ClO	chlorine monoxide	NIH	National Institutes of Health
ClO_x	reactive chlorine	NH	Northern Hemisphere
ClONO₂	chlorine nitrate	NRL	Naval Research Laboratory
ClOOCl	chlorine monoxide dimer	NO	nitric oxide
CMDL	Climate Monitoring and Diagnostics Laboratory (NOAA)	NO_x	reactive nitrogen
CO₂	carbon dioxide	NO₂	nitrogen dioxide
CTM	chemical transport model	N₂O	nitrous oxide
CUE	Critical Use Exemption	NOAA	National Oceanic and Atmospheric Administration
DU	Dobson units	NOCAR	NOAA and NCAR model
EECl	Equivalent Effective Chlorine	O	oxygen atom
EESC	Equivalent Effective Stratospheric Chlorine	O₂	molecular oxygen
EP	Earth-Probe TOMS	O₃	ozone
EPA	U.S. Environmental Protection Agency	O_x	odd oxygen
ESRL	Earth System Research Laboratory (NOAA)	ODP	Ozone Depletion Potential
		ODS	ozone-depleting substance

OH	hydroxyl radical
OMI	Ozone Monitoring Instrument
ppb	parts per billion
ppmv	parts per million by volume
ppt	parts per trillion
PSC	polar stratospheric cloud
POAM	Polar Ozone and Aerosol Measurement
QBO	quasi-biennial oscillation
QPS	quarantine and pre-shipment
RAF	radiation amplification factor
RF	radiative forcing
SAGE	Stratospheric Aerosol and Gas Experiment
SAM	Stratospheric Aerosol Monitor
SBUV	Solar Backscatter Ultraviolet
SH	Southern Hemisphere
SLIMCAT	Single-Layer Isentropic Model of Chemistry and Transport
SO₂	sulfur dioxide
SPARC	Stratospheric Processes and their Role in Climate (WCRP)
SRES	Special Report on Emissions Scenarios (IPCC)
SROC	Special Report on Ozone and Climate (IPCC)
2-D	two-dimensional
3-D	three-dimensional
TEAP	Technology and Economic Assessment Panel (UNEP)
TOMS	Total Ozone Mapping Spectrometer
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UV	ultraviolet radiation
UV-vis	ultraviolet/visible camera
UVA	ultraviolet–A radiation
UVB	ultraviolet–B radiation
UVC	ultraviolet–C radiation
V_{PSC}	volume of polar stratospheric clouds
VSL	very short-lived
VSLs	very short-lived substances
WCRP	World Climate Research Programme
WG1-AR4	Working Group I–Fourth Assessment Report (IPCC)
W per m²	watts per meter squared
WMGHG	well-mixed greenhouse gases
WMO	World Meteorological Organization