

Glossary

Anthropogenic

Man-made or human induced.

Atmosphere

A mixture of gases surrounding the Earth. Earth's atmosphere consists of 79.1% nitrogen (by volume), 20.9% oxygen, 0.036% *carbon dioxide* and trace amounts of other gases. It can be divided into a number of layers according to thermal properties (temperature). The layer nearest the earth is the *troposphere* (up to about 10-15km above the surface), next is the *stratosphere* (up to about 50km). There is little mixing of gases between layers.

British Antarctic Survey (BAS)

A scientific body engaged in all aspects of research on the continent of Antarctica.

Carbon dioxide (CO₂)

A molecule formed from one atom of carbon and two of oxygen. Carbon dioxide (CO₂) is a greenhouse gas of major concern in the study of global warming. It is estimated that the amount in the air is increasing by 0.27% annually. *Anthropogenic* carbon dioxide is emitted mainly through the burning of fossil fuels and deforestation.

Chlorofluorocarbons (CFCs)

Synthetically produced compounds containing varying amounts of chlorine, fluorine and carbon. Used in industrial processes and as a propellant for gases and sprays. In the *atmosphere* they are responsible for the depletion of *ozone* and can destroy as many as 10,000 molecules of ozone in their long *lifetime*. Their use is now currently restricted under the *Montreal Protocol*.

Concentration

A measure of the atmospheric content of a gas, defined in terms of the proportion of the total volume that it accounts for. *Greenhouse gases* are trace gases in the *atmosphere* and are usually measured in parts per million by volume (ppmv), parts per billion by volume (ppbv) or parts per trillion (million million) by volume (pptv).

Copenhagen Amendment

A second amendment to the Montreal Protocol to speed up the phase out of chemicals that deplete the ozone layer.

DNA

Deoxyribonucleic acid, the basic unit of chromosomes which make up all living organisms

Dobson Unit (DU)

A unit measuring the total amount of ozone in a vertical column above the Earth's surface in the stratosphere. A value of less than 200DU is associated with the presence of an ozone hole.

Halocarbons

Man-made substances including the *chlorofluorocarbons* and *halons*.

Halons

These man-made substances are similar to *chlorofluorocarbons* but contain bromine. They also destroy the *ozone layer*.

Hydrochlorofluorocarbons (HCFCs)

Synthetically produced compounds containing varying amounts of hydrogen, chlorine, fluorine and carbon. Used as replacements for *chlorofluorocarbons*. They have large *global warming potentials* and current emissions are helping to enhance the natural *greenhouse effect*.

Hydrofluorocarbons (HFCs)

Synthetically produced compounds containing varying amounts of hydrogen, fluorine and carbon. Used as replacements for *chlorofluorocarbons*. They have large *global warming potentials* and current emissions are helping to enhance the natural *greenhouse effect*.

London Amendment

A first amendment to the Montreal Protocol to speed up the phase out of chemicals that deplete the ozone layer.

Montreal Protocol

The discovery of an ozone hole over Antarctica prompted action to control the use of gases which have a destructive effect on the *ozone layer*. From this concern emerged the Montreal Protocol on substances that deplete the ozone layer, signed by 24 countries in 1987. It came into force in 1989 and has since been ratified by 120 countries. The original agreement was to control and phase out the production and supply of ozone depleting chemicals, specifically CFCs (*chlorofluorocarbons*) and derivatives. A meeting in 1992 was held in Copenhagen to revise the Protocol. This meeting agreed to bring forward the phase out of *halons* to 1994, and CFCs and other *halocarbons* to 1996. These targets have since been met.

Nanometre

10^{-9} metre (or one billionth of a metre).

Nitrogen Oxides (NO_x)

Atmospheric pollutants consisting of one molecule of nitrogen and varying numbers of oxygen molecules. They are produced in the emissions of vehicle exhausts and from power stations.

Ozone hole

Stratospheric ozone depletion over the Antarctic. The hole appears every southern hemisphere spring (August to October) before disappearing during the summer months (December / January).

Ozone Layer

The *ozone* in the *stratosphere* is very diffuse, occupying a region many kilometres in thickness, but is conventionally described as a layer to aid understanding.

Ozone (O₃)

Ozone consists of three atoms of oxygen bonded together in contrast to normal atmospheric oxygen which consists of two atoms of oxygen. Ozone is formed in the *atmosphere* and is extremely reactive and thus has a short *lifetime*. In the *stratosphere* ozone is both an effective *greenhouse gas* (absorber of *infra-red radiation*) and a filter for solar *ultra-violet radiation*. Ozone in the *troposphere* can be dangerous since it is toxic to human beings and living matter. Elevated levels of ozone in the troposphere exist in some areas, especially large cities as a result of *photolytic* reactions of *hydrocarbons* and oxides of nitrogen, released from vehicle emissions and power stations.

Plankton

Aquatic and usually microscopic organisms that feed in the world's oceans. Phytoplankton feed by *photosynthesis* whilst zooplankton refers to animal life forms.

Photolysis

A chemical reaction involving sunlight in which molecules are split into their constituent atoms. Also known as photodissociation.

Photosynthesis

The process by which green plants use light to synthesise organic compounds from carbon dioxide and water. In the process oxygen and water are released. Increased levels of carbon dioxide can increase net photosynthesis in some plants. Plants create a very important sink for carbon dioxide. See also carbon cycle.

Polar Stratospheric Clouds (PSCs)

High altitude clouds that form in the stratosphere above Antarctica during the Southern Hemisphere winter. Their presence seems to initiate the ozone loss experienced during the ensuing Southern Hemisphere spring.

Polar Vortex

A circumpolar wind circulation which isolates the Antarctic continent during the cold Southern Hemisphere winter, heightening ozone depletion.

Pollutant

Strictly too much of any substance in the wrong place or at the wrong time is a pollutant. More specifically, atmospheric pollution may be defined as 'the presence of substances in the atmosphere, resulting from man-made activities or from natural processes, causing adverse effects to man and the environment'.

Radiation

Energy emitted in the form of electromagnetic waves. Radiation has differing characteristics depending upon the wavelength. Radiation from the Sun has a short wavelength (ultra-violet) whilst energy re-radiated from the Earth's surface and the atmosphere has a long wavelength (infra-red).

Spectrum

The range of wavelengths of electromagnetic radiation.

Stratosphere

A layer in the *atmosphere* above the *troposphere* extending upwards to about 50km. The stratosphere contains much of the total atmospheric *ozone*. The temperature in this region increases with height and can exceed 0°C in the summer. The air density here is much less than in the troposphere. It is not thought that the stratosphere has much influence on the weather on the Earth's surface.

Stratospheric ozone depletion

Loss of *ozone* in the *stratosphere* due to its *photolytic* destruction by the *chlorofluorocarbons* and *halons*. Most commonly associated with the annual appearance of an *ozone hole* over the Antarctic every southern hemisphere springtime.

Tropopause

The boundary between the *troposphere* and the *stratosphere*.

Troposphere

The lowest layer of the *atmosphere*. The altitude of the troposphere varies with latitude, from about 16km at the equator to only 8km at the poles. Normally there is a decrease in temperature with height. This layer contains 75% of the total gaseous mass of the atmosphere and virtually all the water vapour and *aerosols*. This zone is responsible for most of the weather phenomena experienced and where atmospheric turbulence is most marked.

Ultraviolet radiation (UV)

Electromagnetic *radiation* of higher frequencies and shorter wavelength than visible light. There are three categories of UV radiation: UV-A, between 320 and 400 nm; UV-B, between 280 and 320 nm; UV-C, between 200 and 280 nm.

Volatile organic compounds

These are an important class of air pollutant found in the atmosphere at ground level in urban and industrial centres. They are usually defined as carbon-containing organic compounds present in the atmosphere as gases, excluding elemental carbon, carbon monoxide, methane and *carbon dioxide*.

Wavelength

A measure of the length of electromagnetic radiation waves.