Events occurring in the outer atmosphere

Powerful eruptions on the surface of the Sun, called solar flares, cause huge amounts of electrons and protons to be ejected into space, where they interfere with radio transmissions and create a very impressive visual effect.

We restrict ourselves to events that occur close to us, i.e., in the stratosphere.

The presence of ozone in the stratosphere protects the Earth's surface from solar radiation. The formation of ozone in this zone occurs due to the photodissociation of oxygen molecules under the influence of solar radiation with a wavelength of less than 240 nm.

The formation and destruction of ozone by natural processes is a dynamic equilibrium that maintains a constant concentration of ozone in the atmosphere. Scientists are increasingly concerned about the harmful effects of some chlorofluorocarbons, particularly freons, on the ozone layer. Freon is easily liquefied, relatively inert, non-toxic, non-flammable and volatile. Freon can be used as a refrigerant in refrigerators and air conditioners instead of the highly toxic liquid sulphur dioxide (SO_2) and ammonia (NH_3). Large quantity of chlorofluorocarbons are used in the manufacture of disposable foam products such as plates and cups and aerosol cans. Chlorofluorocarbons are also used as solvents for cleaning freshly soldered electronic circuits. Most of them produced for commercial and industrial use are eventually released into the atmosphere.

Volcanic eruptions also cause atmospheric pollution. A volcanic eruption is the most spectacular natural manifestation of energy on Earth. It results in the formation of a large part of the Earth's crust. A powerful volcanic eruption causes large amounts of gas to be released into the stratosphere. There, SO_2 is oxidised to SO_3, which is eventually converted into sulphuric acid aerosol through a series of complex processes.

In addition to depleting the stratospheric ozone layer, these aerosols can also affect the climate. Because the stratosphere is higher, the aerosol cloud often persists for almost a year. They absorb solar radiation and thereby cause a lowering of the Earth's temperature. However, the cooling effect is local rather than global, as it depends on the location and speed of the volcanic eruption.

Other sources of air pollution include smog, carbon dioxide, carbon monoxide and formaldehyde.

The word ”smog” was coined to describe the mixture of smoke and soot that surrounded London in the 1950s. The main source of this noxious cloud is sulphur dioxide. However, more is now known about photochemical smog, which is formed from car exhaust fumes when exposed to sunlight.

Formaldehyde (CH_2O) is a liquid with an unpleasant odour. It is used as a preservative for laboratory samples. In industry, formaldehyde resins are used as a binder for materials used in construction and furniture manufacturing (plywood, pressed wood boards). In addition, urea formaldehyde-based insulating foams are used to fill cavities in walls. Resins and foams decompose slowly, releasing formaldehyde, especially in acidic and humid environments. Low concentrations of formaldehyde in the air cause drowsiness, nausea, headaches, and other respiratory problems. Laboratory studies show that inhalation of high concentrations of formaldehyde can cause cancer in animals, but it is not known if a similar effect is observed in humans. The safe limit for formaldehyde in indoor air is set at 0.1 ppm by volume.