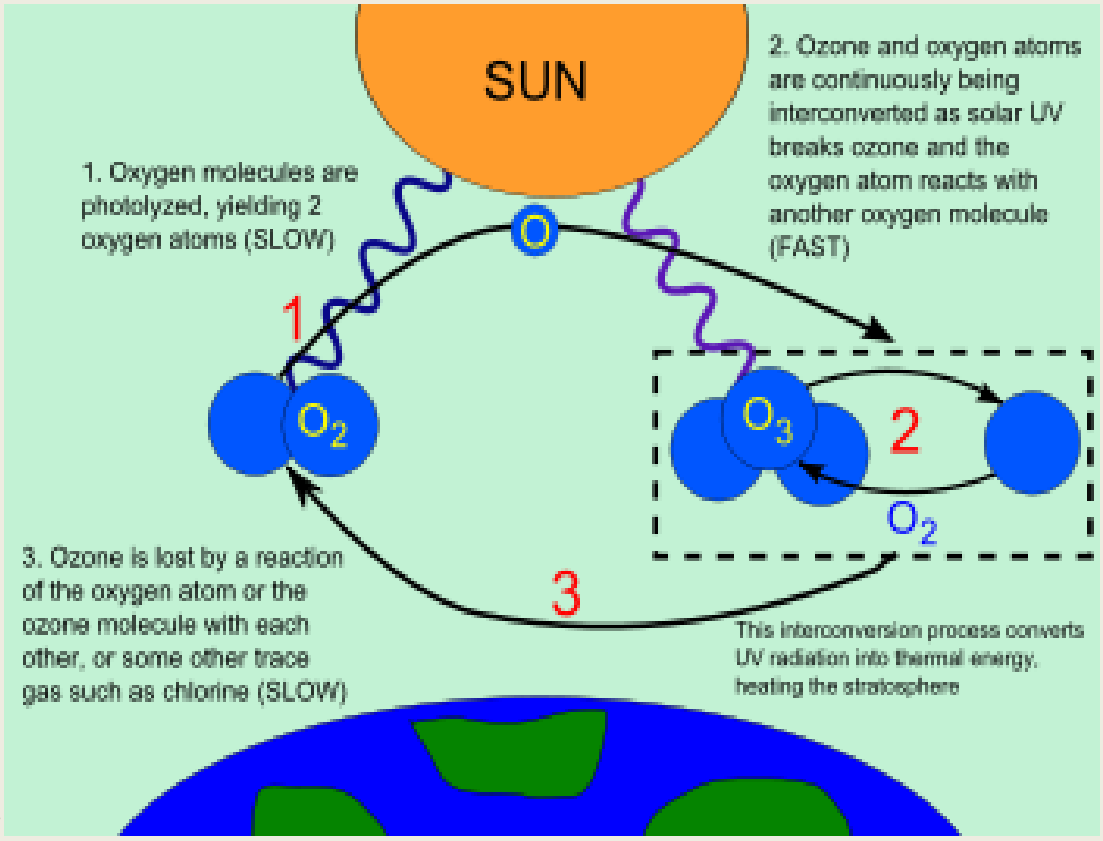
Ozone Layer

The **Ozone layer** or **ozone shield** is a region of Earth's stratosphere that absorbs most of the Sun's ultraviolet radiation. It contains high concentrations of ozone (O_3) in relation to other parts of the atmosphere, although still small in relation to other gases in the stratosphere. The ozone layer contains less than 10 parts per million of ozone, while the average ozone concentration in Earth's atmosphere as a whole is about 0.3 parts per million. The ozone layer is mainly found in the lower portion of the stratosphere, from approximately 20 to 30 kilometers (12 to 19 mi) above Earth, although its thickness varies seasonally and geographically.

The ozone layer was discovered in 1913 by the French physicists Charles Fabry and Henri Buisson.

Ozone-oxygen cycle in the ozone layer.



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Ultraviolet light

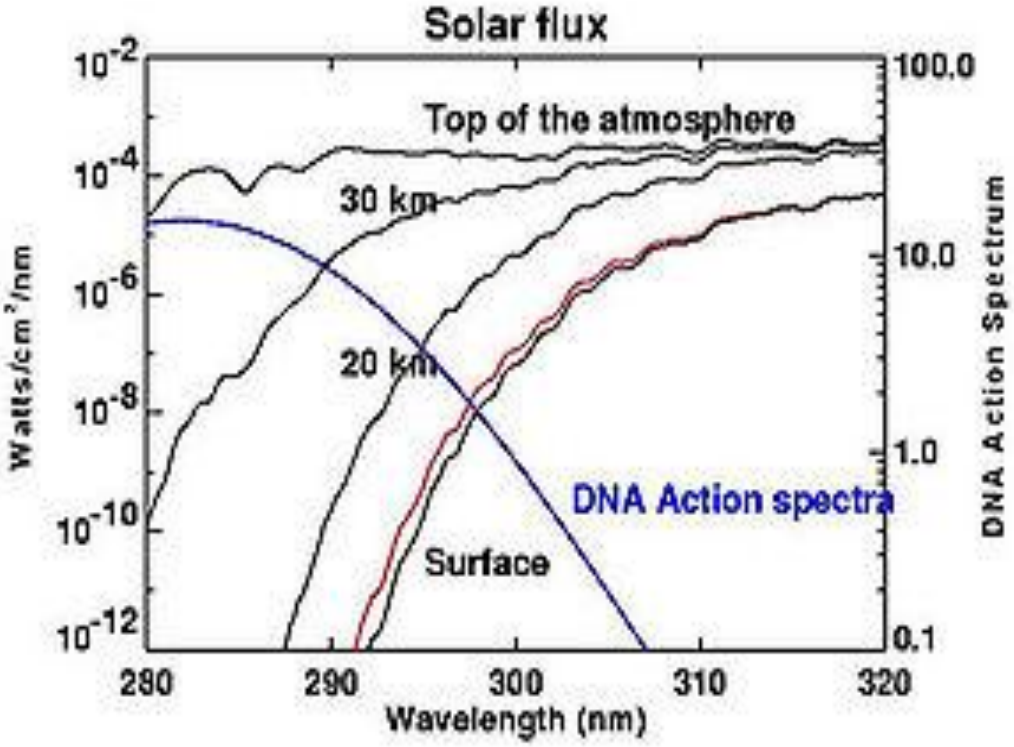
UV-B energy levels at several altitudes. Blue line shows DNA sensitivity. Red line shows surface energy level with 10 percent decrease in ozone

Levels of ozone at various altitudes and blocking of different bands of ultraviolet radiation. Essentially all UVC (100–280 nm) is blocked by dioxygen (from 100–200 nm) or else by ozone (200–280 nm) in the atmosphere. The shorter portion of the UV-C band and the more energetic UV above this band causes the formation of the ozone layer, when single oxygen atoms produced by UV photolysis of dioxygen (below 240 nm) react with more dioxygen. The ozone layer also blocks most, but not quite all, of the sunburn-producing UV-B (280–315 nm) band, which lies in the wavelengths longer than UV-C. The band of UV closest to visible light, UV-A (315–400 nm), is hardly affected by ozone, and most of it reaches the ground. UV-A does not primarily cause skin reddening, but there is evidence that it causes long-term skin damage.

Although the concentration of the ozone in the ozone layer is very small, it is vitally important to life because it absorbs biologically harmful ultraviolet (UV) radiation coming from the sun. Extremely short or vacuum UV (10–100 nm) is screened out by nitrogen. UV radiation capable of penetrating nitrogen is divided into three categories, based on its wavelength; these are referred to as UV-A (400–315 nm), UV-B (315–280 nm), and UV-C (280–100 nm).

UV-C, which is very harmful to all living things, is entirely screened out by a combination of dioxygen (< 200 nm) and ozone (> about 200 nm) by around 35 kilometres (115,000 ft) altitude. UV-B radiation can be harmful to the skin and is the main cause of sunburn; excessive exposure can also cause cataracts, immune system suppression, and genetic damage, resulting in problems such as skin cancer. The ozone layer (which absorbs from about 200 nm to 310 nm with a maximal absorption at about 250 nm)[7] is very effective at screening out UV-B; for radiation with a wavelength of 290 nm, the intensity at the top of the atmosphere is 350 million times stronger than at the Earth's surface. Nevertheless, some UV-B, particularly at its longest wavelengths, reaches the surface, and is important for the skin's production of vitamin D.

Ozone is transparent to most UV-A, so most of this longer-wavelength UV radiation reaches the surface, and it constitutes most of the UV reaching the Earth. This type of UV radiation is significantly less harmful to DNA, although it may still potentially cause physical damage, premature aging of the skin, indirect genetic damage, and skin cancer.



https://en.wikipedia.org/wiki/Ozone_layer

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