Monitoring ultraviolet radiation

Ultraviolet rays from the sun cause skin cancer and sunburn. However, only a very small proportion of the harmful radiation penetrates to the ground. Ozone in the upper atmosphere forms a very effective shield.

This ozone is vital to all life on earth. If it disappeared, the effects of the vast increase in ultraviolet radiation in the harmful wavelength range reaching the ground would be devastating. Even a relatively small increase in the radiation, resulting from a small but persistent decrease in ozone concentrations, could harm plants and animals. Also, changed heating patterns in the atmosphere could produce climatic changes.

In 1971, Professor Harold Johnston of the University of California suggested that exhaust fumes from supersonic passenger jets flying in the upper atmosphere could react with ozone there and greatly reduce concentrations of the gas. His theory has been widely disputed, but it has underlined the importance of monitoring ozone concentrations and the amounts of ultraviolet radiation reaching the ground.

In a report published in 1972, the Australian Academy of Science said it believed the effect of supersonic aircraft on the ozone layer was not likely to be serious, and there appeared to be no possibility of a rapid change occurring. However, among its recommendations, it said monitoring of ultraviolet radiation in the wavelength range responsible for skin cancer and sunburn would be desirable.

Recently some scientists have expressed concern that gases from aerosol spray cans could drift up to the ozone layer and set off reactions that would destroy significant quantities of ozone.

A monitoring program has recently begun, organized by the CSIRO Division of Atmospheric Physics at Aspendale, near Melbourne, and the Physics Department of the University of Queensland, Brisbane. Automatic measuring devices have been set up at Port Moresby, Townsville, Brisbane, and Aspendale. They operate unattended and print out half-hour radiation totals.

The ozone in the upper atmosphere is produced when oxygen absorbs solar ultraviolet radiation with wavelengths of less than 240 nanometres—a nanometre (nm) is a thousand-millionth of a metre. None of this radiation penetrates the atmosphere. A very small amount trickles through at wavelengths of about 290 nm, and the proportion reaching the ground then rises with increasing wavelength. It is the radiation with wavelengths up to about 320 nm that causes skin cancer and sunburn.

The monitoring instruments record radiation in the 290–330 nm range—covering and extending slightly beyond the harmful band.

Scientists at the Division are interested in detecting any long-term changes in radiation reaching the ground. They are also interested in the normal fluctuations and in variations with latitude; information on these can increase their knowledge of upper atmosphere circulation. The University of Queensland scientists are studying relations between radiation intensities and the incidence of sunburn and skin cancer.

Ozone comes down to earth. *Ecos* No. 2, 1974, 12–18.