

OBSERVATIONS OF STRATOSPHERIC AEROSOLS BY TWO-WAVELENGTH
LASER RADAR

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ABSTRACT

Optical probing of the upper atmosphere has been carried out at Fukuoka (33°N), south-west Japan, using laser radar. This paper describes the results of the observations of aerosols in the stratosphere. The observations have been made since October 1972 using a ruby laser of the wavelength 6943 Å. Data obtained show that the layer of enhanced optical back-scattering due to aerosols appeared every night throughout the period of observation at about 20 km height. The layer, what is called "20 km sulfate layer", varies to some extent in its height, structure, and peak value of the scattering, day to day and month to month.

Height profiles of non-Rayleigh backscattering cross section are calculated for each night and each month of observation and are compared with the temperature, wind velocity, and ozone concentration in the stratosphere. The individual nightly profile of scattering is most likely controlled by the large scale structure of the temperature profile of the night.

Comparison is also made with the geometrical cross section of the aerosols deduced from the small ion density data. The result suggests that a large fraction of the aerosol mass is involved in the range of Aitken particles. Observations have also been made using a dye laser of the wavelength 5889 Å, recently, to provide more accurate information about the size distribution of the aerosols. The data obtained will be presented and discussed.