

CHARACTERISTICS OF THE SODIUM LAYER  
OBSERVED AT MT. ZAO

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ABSTRACT

Characteristics of the upper atmospheric sodium layer will be discussed on the basis of the results from observations made at the Mt. Zao Observatory by a laser radar system employing a wavelength tunable dye laser. Observations were scheduled mostly in fall, 1972, because the Giacobini-Zinner meteor shower was anticipated to be observable with eyes in the early morning on October 9.

A dye laser system was devised in our laboratory for observations of the sodium layer on the basis of the resonant scattering theory. Rhodamine 6G in ethanol is used as a dye for oscillating Na D-lines. Narrowing of the band width and tuning of the wavelength are achieved by employing a diffraction grating and a Fabry-Perot filter. Thus, a dye laser pulse having a maximum output power of about 2mJ is tuned and adjusted to be suitable for the observation by referring to the sodium lamp D-lines.

The observation was first successful on June 14, 1972 night. In October and November, the observation was scheduled much more continuously in order to detect any effect of the Giacobini-Zinner meteor shower. Although no visual meteor shower has been reported in contrast with the

anticipation, some characteristic differences can be pointed out between the sodium layer structures observed before and after Oct. 9. In a normal condition before Oct. 9, a single peak in the sodium atom density is stable at an altitude ranging from 90 km to 95 km. After Oct. 9, however, the sodium layer is characterized by an enhancement of the sodium abundance in the normal layer (90-95km) and the existence of the second layer in the region above 100 km. The persistency of the upper layer is so poor that only a statistical analysis of the records leads to a layer-like structure. The enhancement of the upper region seems to be much more pronounced after the midnight than before the midnight.