

LONG-TERM LASER RADAR OBSERVATION OF SPORADIC SODIUM LAYERS AT
23°S: A CORRELATIVE AND STATISTICAL STUDY

by

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ABSTRACT

A search is made of the mesospheric sodium data obtained at São José dos Campos (23°S, 45°W) with a laser radar from 1975 to 1987, in order to identify the appearance of sporadic sodium layers (SSL). In this search, 65 events have been identified. This corresponds to nearly 11% of the total of the observations. The average height of the peak is 95.1 km. The ratio of the maximum peak density to the normal layer density is normally 2.5 to 3.0, but values as high as 10 have been observed in the most outstanding cases. The events last from a few minutes to several hours, although durations of 1-2 hours are more typical. The events occur more often during periods of large meteor showers, specifically, the largest number of events was observed in August when the number of meteoroids is larger. The diurnal variation shows a consistent increase in the number of observed peaks from 15:00 to midnight and remains almost constant from midnight to 6:00. The correlation between the occurrence of SSL and sporadic-E layers is confirmed. In 52 out of 54 days when sodium and ionosonde data are available there is an Es layer nearly coincident with the sodium cloud. Nevertheless, a more detailed analysis shows that for short-lived SSL the coincidence is good, but for long-lasting and broader SSL, the sodium enhancement is normally preceded by the occurrence of a substantial increase in f_{bE_s} and f_{oE_s} and continue

even after the disappearance of the Es layer. These results show that occurrence of SSL is a very complex phenomenon which can have more than one origin and that none of the proposed theories alone can explain all the observations.