

Wind and temperature in the mesopause region derived from foil chaff experiments during the WAVE campaigns

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Foil chaff technique is one of the in-situ measurements of wind field around the mesopause with high height resolution. Foil chaff experiments were successfully carried out during WAVE 2000 and WAVE 2004 campaigns. These campaigns were to study the formation process of the waves in the airglow structures. In the WAVE2000, the velocity vectors of the neutral wind were obtained in the height range of 88.5-95 km. The prominent small-scale feature around the altitude of 90.5 km appeared in both zonal and vertical motions. In the WAVE2004, the results obtained in the height range of 85-96 km indicate a very strong northward wind above 89 km and an eastward wind below. These phenomena were observed only by the foil chaff technique.

Falling foil chaff is retarded by an air drag force. The atmospheric density can be determined from the observed descending speed. Temperature profile is calculated from the atmospheric density using the hydrostatic equation. We discuss the results of WAVE2000 and WAVE2004 from the aspect of atmospheric dynamics using the temperature gradient that provides a measure of the static stability.