



Simultaneous MLT and Thermospheric F-region Observations

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Abstract: Simultaneous MLT and thermospheric F region (thermosphere and ionosphere together) observations conducted using the MU radar (35°N, 136°E) in alternate meteor and incoherent scatter modes in the equinoctial months of October 2000 and March 2001 are presented. The continuous observations, each lasting more than a week, provide simultaneous zonal and meridional wind velocities at MLT altitudes (80-95 km), meridional wind velocity in the upper thermosphere (220-450 km), and electron density and peak height in the ionosphere with a time resolution of 1.5 hours. The data seem to suggest that the upper atmospheric regions could be dynamically coupled through mean winds, tides and waves. Diurnal (24-hour) and semi-diurnal (12-hour) tides and waves of periods 16-20 hours and 35-55 hours coexist at MLT and upper thermosphere altitudes, and the waves become stronger than tides at mesopause (≈ 88 km) at both equinoxes. The data also show large equinoctial differences in mean winds, tides and waves in the MLT region. The amplitudes and phases of the 24-hour and 12-hour tides at MLT altitudes are compared with those predicted by the Global Scale Wave Model (GSWM). The model qualitatively predicts the observed growth of the tides with altitude but does not predict the 12-hour tide becoming stronger than the 24-hour tide at altitudes above mesopause in October. The simultaneous MLT and thermospheric F region data are also being compared with those modelled using a non-linear Coupled Mesosphere Thermosphere Ionosphere model.