

Temperature and wind tides in the upper mesosphere at 69°N obtained with meteor radar

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Meteor radars provide measurements of height-averaged temperature at about 90 km based on the height dependence of the meteor decay times and on an approximation of the mean temperature gradient at the peak altitude of the meteor layer usually given by an empirical model. An improved temperature-gradient model for mid-latitudes has been derived from potassium lidar observations at Kuehlungsborn (54.1°N) and OH* rotational temperatures measured at Wuppertal (51.3°N) in combination with meteor decay times obtained at Juliusruh (54.6°N) at the same time an. The mid-latitude gradient model has been adjusted to arctic latitudes. Temperatures are determined as daily averages, or even 2 or 3 day averages. Tides are extracted by superposed epoch analyses using data from time periods of typically 10 to 20 days.

We discuss the seasonal variability of meteor radar temperatures (89 - 90 km) and winds (82 to 98 km) obtained at Andenes (69°N) in 2001/2002 and at Juliusruh from November 1999 to August 2001, and the relation of the observed low temperatures in summer (~150 K) with the appearance of strong mesospheric radar echoes in the VHF range and of noctilucent clouds. The relationship between temperature tides and wind tides is considered. The results are compared with lidar observations, OH* temperatures, rocket measurements, and model outputs.

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