

THREE YEARS OF CONTINUOUS MEASUREMENTS OF TURBULENCE IN THE MESOSPHERE AND LOWER THERMOSPHERE WITH A 3-MHZ DOPPLER RADAR AT 69°N

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Radar soundings of the atmosphere at 3 MHz allow continuous observations of wind and turbulence in an altitude range from 55 km up to about 90 km. Turbulent energy dissipation rates are derived from measurements of spectral width which are corrected for beam and shear broadening using simultaneously measured winds in combination with the antenna radiation pattern. The measurements are performed with a time resolution of nine minutes and a height resolution of 1.5 km. Results obtained between January 2006 and December 2008 are presented on the basis of hourly mean values.

The radar measurements provide reliable turbulence data in the absence of external interference which is mostly the case for solar zenith angles less than 90°. The radar data are in general agreement with simultaneously made insitu turbulence measurements by the CONE instrument during the ECOMA campaign 2008 (daylight flights ECOMA-04 and -06). In addition, the radar results are compared to co-located and simultaneously measured spectral width data with the ALWIN MST radar at 53.5 MHz.

The seasonal and diurnal variation of turbulence in the mesosphere/lower thermosphere is discussed in relation to the background wind field and the activity of gravity waves. Interannual differences are noted especially in winter which could be attributed to modified propagation conditions for gravity waves during the occurrence of stratospheric warming events.

Turbulence, winds, waves

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