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Turbulent kinetic energy dissipation rates in the mesosphere measured by a 3 (MHz Doppler radar

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A new narrow beam Doppler radar operating at 3.17 MHz was installed close to the Andøya Rocket Range in Andenes, Norway in summer 2002 in order to improve the ground based capabilities for measurements of turbulence in the mesosphere. The main feature of the radar is it's transmitting/receiving antenna consisting of 29 crossed half-wave dipoles arranged as a Mills Cross what results in a minimum beam width of $\theta = 6.6^\circ$ (Half-Power-Full-Width, one way). In combination with a modular transceiver system this provides high flexibility in beam pointing as well as beam forming. Turbulence intensities have been estimated from the width of the observed signal spectra using an exact correction method which requires precise knowledge of the antenna radiation pattern and real-time measurements of the wind field in all determinations. Turbulent kinetic energy dissipation rates based on radar observations are presented and compared with corresponding climatologically summer and winter profiles from rocket measurements, as well as with single profiles from model runs for selected periods from September 2003 to Summer 2004. The mean turbulent kinetic energy dissipation rates based on these radar measurements are about 5 mW/kg at 60 km altitude and about 20 mW/kg at 80 km, in reasonable agreement with mean turbulence intensities obtained from previous rocket soundings at Andenes.