



The Character and Importance of Aperiodic Velocity Fluctuations in the Mesosphere

Gareth Chisham and Mervyn P. Freeman

British Antarctic Survey, Cambridge, United Kingdom (gchi@bas.ac.uk, +44 1223 221532)

Periodic velocity fluctuations in the Earth's mesosphere, such as those related to diurnal and semi-diurnal tides, have been extensively studied over the last 20 years. These periodic components of the velocity power spectrum have been shown to vary greatly with season and location. However, there has been little or no investigation of the character or importance of the background velocity spectrum, which is at times dominant. It is often dismissed as noise (e.g., when averaging mesospheric velocity data to determine the tidal components), but likely reflects important nonlinear dynamics such as turbulence. In this study we make use of one year's worth of near-range meteor echoes from the new Falkland Islands SuperDARN radar which allow the estimation of mesospheric winds through the measurement of the motion of ionised meteor trails. We use a resistant nonlinear filter to quantify the diurnal and semi-diurnal tidal components in the velocity data and remove these to leave a residual velocity data set that represents the aperiodic velocity fluctuations. We have investigated the relative power of the periodic and aperiodic velocity components and shown how this, and the character of the aperiodic component, varies with season (and hence, the solar input to the mesosphere), and with altitude (in the upper mesosphere/lower thermosphere).