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Middle Atmosphere Ionisation During Solar Proton Events - a comparison of model and observations

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Energy dissipation by turbulence is an important factor in the energy balance of the middle atmosphere. However, there is a huge discrepancy between turbulent energy dissipation rates estimated by atmospheric radar techniques and from in situ measurements (sounding rockets), particularly for winter conditions. A key assumption in making estimates using atmospheric radar is that turbulence is the dominant factor affecting the radar returns, either their strength or their spectral broadening. Recent interferometric high resolution observations with the ESRAD (52 MHz) radar, together with new increased sensitivity measurements from the EISCAT (224 MHz) radar suggest that this is not the case. In the winter mesosphere, very thin layers of extremely high radar reflectivity are found rather to be associated with small scale propagating waves.