Atmos. Meas. Tech. Discuss., 8, C3116–C3117, 2015
www.atmos-meas-tech-discuss.net/8/C3116/2015/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of methods for gravity wave extraction from middle atmospheric lidar temperature measurements" *by* B. Ehard et al.

RJ Sica

sica@uwo.ca

Received and published: 23 September 2015

1. FYI there are now more advanced methods to extract temperature from Rayleigh-lidar, ones that in principle do not require the assumption of hydrostatic equilibrium (e.g. Sica, R. J., and A. Haefele (2015), Retrieval of temperature from a multiple-channel Rayleigh-scatter lidar using an optimal estimation method, Appl. Opt., 54(8), 1872–1889, doi:10.1364/AO.54.001872.)

2. Careful using temperature for GW analysis! When you assume hydrostatic equilibrium the temperatures are correlated with height (see the lidar averaging kernels using

the assumption of hydrostatic equilibrium in the work above to get an idea of the magnitude of this effect). How do you account for these correlations? Consider in the future using the "purer" quantity, density fluctuations, which are uncorrelated.

3. You might be interested in several novel techniques we have used to investigate gravity waves from lidar measurements which involve parametric modelling (which in effect builds filters of different orders chosen using the noise of the measurement), e.g. Sica, R., and A. Russell (1999), Measurements of the effects of gravity waves in the middle atmosphere using parametric models of density fluctuations. Part I: Vertical wavenumber and temporal spectra, J Atmos Sci, 56(10), 1308–1329, Sica, R. (1999), Measurements of the effects of gravity waves is the middle atmosphere using parametric models of density fluctuations. Part II: Energy dissipation and eddy diffusion, J Atmos Sci, 56(10), 1330–1343 and Sica, R., and A. Russell (1999), How many waves are in the gravity wave spectrum? Geophys Res Lett, 26(24), 3617–3620.

There is interesting information in all regions of the intermittent spectrum of gravity waves. As a side note, you don't necessarily need a resonance lidar to measure temperature above 100 km, the Purple Crow Lidar routinely gets useful Rayleigh returns above this height.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 9045, 2015.