Energetics of middle and upper mesospheric gravity waves determined from two Arctic lidar systems

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Atmospheric gravity waves are known to be major contributors in regard to energy transfer throughout the atmospheric system. In particular, short-period gravity waves play an essential role in transporting energy and momentum from the lower atmosphere to the upper atmospheric, where their forcing results in reversal of the mesospheric zonal jet system. While this major contribution is known, our understanding of gravity waves generated in the Arctic atmospheric is still rudimentary. A recent study by Triplett et al. (2017) utilized a Rayleigh lidar system situated in interior Alaska to study the ensemble energetics of atmospheric gravity waves and the role of wind filtering. In the study presented here, we investigate the energetics of individual gravity waves utilizing data from the Rayleigh lidar at Poker Flat, Alaska, and the Na resonance lidar system at Tromso, Norway. The goals are to characterize these individual wave energetics in terms of energy, momentum flux, seasonal, annual, and regional variabilities. Furthermore, where applicable, comparisons are made with airglow imaging results and source locations of the individual waves are determined.

References

Triplett, C.C.; Collins, R.L.; Nielsen, K.; Harvey, V.L.; Mizutani, K. Role of Wind Filtering and Unbalanced Flow Generation in Middle Atmosphere Gravity Wave Activity at Chatanika Alaska. *Atmosphere*, *8*, 27, 2017.