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Distribution of Gravity Wave Parameters over Eureka, Nunavut using the All Sky Imager

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This work will present the analysis approach developed to detect of gravity waves and the variation in gravity wave parameters deduced from the airglow images taken by the Polar Environment Atmospheric Research Laboratory (PEARL) All Sky Imager (PASI). PASI has been in operation since November 2007 at PEARL in Eureka, Nunavut with images being taken on average every minute during the winter seasons. An automated data analysis approach has been developed to diagnose the gravity wave parameters in a time efficient manner.

PASI is a CCD imaging system with six different spectral band narrow band filters. The filters of interest in this research isolate the following airglow emissions: atomic sodium (at 589.3 nm), atomic oxygen green line (at 557.7nm), and hydroxyl (at 720-910nm notched at 865nm due to the molecular oxygen). PASI cycles through the different filters with the hydroxyl filter interleaved between the other filters in the sequence.

The gravity wave parameters to be presented are the horizontal and vertical wavelength, intrinsic period and propagation direction. In each image occurrences of these waves are defined in terms of horizontal spatial wavenumber and phase. Temporal phase information is deduced from consecutive images which contain wave signatures with similar horizontal wavenumbers. The vertical wavelength is determined from consecutive images between the different airglow emissions using an approach similar to determining the temporal phase.

This work will present monthly variations of these parameters along with their uncertainties for several seasons. In particular, the daily variation in gravity wave occurrence during the January 2009 major stratospheric warming will be highlighted.

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