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Characteristics of gravity waves observed by an all-sky Imager in Alaska

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All-sky images of an airglow emission have been analyzed in order to study gravity waves which occur in the Arctic region. In the polar regions because of occurrence of aurora, it is difficult to observe airglow emissions which often have the identical wavelength as aurora. Therefore, we used all-sky images of Na airglow of which the peak altitude is 92km and wavelengths are 589.0 and 589.6nm. Na airglow is chosen, because it is relatively less contaminated by aurora than other major airglow emissions. The data were obtained by the all-sky imager (ASI) located at Poker Flat, Alaska (65.1N, 147.5S) between October, 2000 and March, 2007. Firstly the weather conditions when the image data were obtained were checked and animations of all-sky images were made for clear nights. Secondly the data after necessary corrections were projected to the geographical coordinate, and plotted as a keogram. Then the east-west and north-south keograms are filtered with a band-pass filter to clearly visualize gravity waves with a particular period. From the filtered keogram horizontal phase speed and propagation direction of gravity waves were obtained. Finally, periods of the gravity waves were estimated by a power spectrum of emission intensity around the zenith. The numbers of events is 73. The average and range of horizontal phase speed, period and horizontal wavelength are 58m/s and 16-104m/s, 48min and 30-73min, and 165km and 32-342km, respectively. The observed gravity waves are distinguished into two groups: one propagated predominantly southeastward with a horizontal phase speed of 71 m/s and the other propagated northwestward with 43m/s.