Observations of the Polar Cap Mesopause Region from Eureka, Nu, Canada

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The Polar Environment Atmospheric Research Laboratory was established in 2005 at Eureka, Nunavut, Canada on Ellesmere Island (80N 85W) and is collocated with the pre-existing Eureka weather station. Instrumentation was installed over the following two years to provide observations of the polar atmosphere from the ground to the lower thermosphere. Instruments providing observations of the polar mesopause region include an all-sky imager (PASI, irradiance images), a meteor radar (MR, wind), a Spectral Airglow Temperature Imager (SATI, temperature and irradiance) and a field-widened Michelson interferometer (E-Region Wind Interferometer (ERWIN) - wind and irradiance). Analysis of the past 12 years of observations are providing insights in the character of the dynamics of this region of the atmosphere.

In this paper, results from three of these instruments (PASI, MR, and ERWIN) are presented. First, the character of the variability of the airglow and winds is described. Horizontal wind amplitude spectra peak in the 6 – 12 hour period region but this peak is not seen in the vertical and airglow brightness spectra. There is significant intermittency in the horizontal wind. Wind comparisons between the MR and ERWIN horizontal winds are in reasonable agreement though the meteor wind variations are generally a little larger. Annual and solar cycle variability of airglow examined. Some solar cycle dependence appears present. Analysis of individual gravity wave events are discussed. The vertical wind variations and airglow irradiance are generally found to be in quadrature although there are exceptions. These results point to the complexity of this region of the atmosphere.

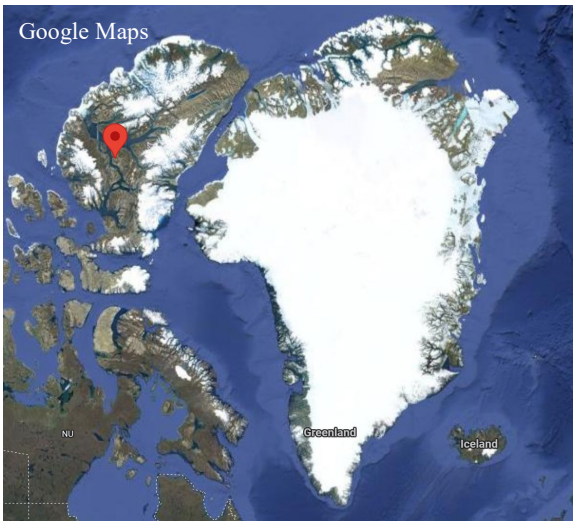

Figure 1. Location of PEARL at Eureka, Nu, Canada.

Figure 2: The Ridge Lab of PEARL in October
(Photo Credit: WEW)