



## **Climatological analysis of planetary wave propagation in Northern Hemisphere winter**

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The frequency distribution of days per season with negative refractive index squared in a meridional plane is introduced as a simple but powerful method to evaluate the propagation of planetary waves. Northern winter (December, January and February (DJF)) frequency distributions of negative are produced by counting the number of days with negative at each grid point of the meridional plane over the whole length of the data set and diving it by the total number of days. Thus a two-dimensional probability distribution of refraction of planetary waves is obtained.

NCEP/NCAR daily mean reanalysis data (1958-2002) are analyzed in two regimes of northern hemisphere polar vortex - Weak Polar Vortex and Strong Polar Vortex (Perlwitz and Graf, 2001). This analysis can partly explain the mechanism of polar vortex regimes. And it also can help understand why models bias to too strong polar vortex.