

Multi-fractal turbulence in the ionosphere – IMF clock angle control of intermittency.

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Abstract - Previous work [1] has shown, using a structure function analysis of data collected with the Halley SuperDARN radar, that the plasma velocity fluctuations in the polar ionosphere are consistent with models of intermittent Kraichnan-Iroshnikov turbulence. Furthermore, it has been shown [2] that the scaling of the first order structure function is different in the regions of the polar ionosphere on open and closed magnetic field lines. This suggesting that the character of the turbulence is affected when the ionosphere is coupled to the solar wind. In this study we present an analysis of 8-years of data from the Halley SuperDARN radar and investigate the effect of IMF clock angle on the scaling exponents of the first three order structure functions. Initial results suggest that the measured exponents are consistent with intermittent Kraichnan-Iroshnikov turbulence for all clock angles and that the intermittency decreases to zero under purely northward interplanetary magnetic field.

[1] Abel, G. A., Freeman, M. P., G. Chisham and Watkins, N. W.: Investigating turbulent structure of ionospheric plasma velocity using the Halley SuperDARN radar, *Nonlinear Pros. Geophys.* 14, 799–809, 2007.

[2] Abel, G. A., Freeman, M. P., and G. Chisham: Spatial structure of ionospheric convection velocities in regions of open and closed magnetic field topology, *Geophys. Res. Lett.*, 33, L24103, doi:10.1029/2006GL027919, 2006.