

## Complexity in the Solar Wind over multiple Solar Cycles

R. C. Healey, M. L. Parkinson, and P. L. Dyson

The solar wind exhibits characteristics of self-organised criticality including intermittency as well as scale free structure over a wide range of spatial and temporal scales. This self-organised critical state exhibits complex fractal behaviour. The ionospheric line of sight velocities measured with SuperDARN radars also shows evidence of self-organised criticality. These velocities are related to the electric fields in the magnetotail.

Solar wind and magnetometer data from the IMP-8 spacecraft has been analysed over the 27 years the magnetometer operated to examine variability in the scaling parameters for the solar wind speed, temperature, density of the solar wind as well as the epsilon parameter which controls energy coupling to the magnetosphere over many solar cycles. Peak Scaling of the probability density functions was performed along with a Generalised Structure Function analysis.

The analysis can also be extended in time using other spacecraft and the epsilon scaling parameters can be compared with the scaling parameter of SuperDARN radar observations to determine the degree to which activity in the magnetotail is self-organised or driven by the solar wind.