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Quantifying the turbulent scaling properties of the polar solar wind seen by Ulysses at solar minimum

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This study centres on Ulysses solar wind observations at solar minimum, in particular the 1994 south polar pass and the 1995 north polar pass. During these passes, Ulysses was located in the fast solar wind at high heliospheric latitude in the outflow region of polar coronal holes. These datasets are thus of particular interest because they relate to contiguous intervals of turbulent flow, free from large scale coherent structures. Having confirmed that the timeseries of magnetic field measurements is quasi-stationary, we compute the structure functions of fluctuations in the magnitude of the magnetic field, and of its vector components. This enables us to quantify the scaling exponents and the associated scaling properties of the fluctuation PDFs. In particular we apply a recently developed technique (K. Kiyani et al., Phys. Rev. E **74**, 051122 , 2006) to deal with the effect on structure functions of poorly resolved outliers in the PDF tail. We also examine the scaling behaviour of these outliers. The datasets show two distinct scaling ranges: one corresponds to the inertial range; the other, to larger scale structures. We discuss the quantitative scaling properties of both these ranges in relation to locally evolving turbulence and to nonlocal sources of fluctuations.

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