



Filamentary and inhomogeneous structures in the high-latitude field-aligned currents

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Recent findings about the nature of magnetic field fluctuations at the high-latitude ionospheric regions have led to recognize the existence of scaling features in these signals, which are compatible with the occurrence of turbulence phenomena. These features mainly characterize the magnetic field fluctuations during geomagnetically active periods in those regions interested by particle precipitations and heating and where field-aligned currents flow. In this study, using high-resolution (50 Hz) magnetic measurements from the low Earth orbiting Swarm constellation, we show that these magnetic fluctuations are characterized by anomalous scaling features (multifractal properties) instead of simple ones. This finding suggests a highly complex structure of the field-aligned currents which manifests in filamentary and inhomogeneous structures. Our results may have interesting implications for the comprehension of the physical processes responsible of the magnetospheric-ionospheric coupling and ionospheric heating.