The magnetosphere as a complex system

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The magnetosphere is a multi-scale spatio-temporal complex dynamical system. In this context, we have analyzed the multifractal behavior of the AL index, as a proxy for an energy dissipation rate, using discrete wavelet leaders. This technique allows the calculation of the spectrum for both positive and negative values of q, giving a robust peak at h?0.5. The same technique is applied to the dissipation rate of a simple 1D model of intermittent magnetic field annihilation, showing a clear multifractal behavior, but with a peak at h?0.2. Even though this intuitive 1D model, because of its simplicity, is not expected to reproduce all the complex dynamics that occur in the Earth's magnetotail, it suggests that the existence of a multifractal dissipation dynamics is necessary to the establishment of the self-organized state, as shown in a 2D simulation of intermittent plasma dynamics.