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A Fokker-Planck model of the short-time fluctuations in the geomagnetic indices.

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The geomagnetic indices provide a global measure of magnetospheric output as a function of the variable solar wind driver. There is a considerable interest in understanding how predictable the response of these indices is to changing solar wind conditions. A complete statistical characterization of the indices time series and the ability to quantify their statistical properties, in comparison with the solar wind driver, is a main goal of our study. We present one possible approach to characterizing the time series in the context of scaling that does not rely on a specific model of multi-scale systems. We develop a Fokker-Planck model of the short time fluctuations in the AE geomagnetic indices, following recent reports of the approximate mono-scaling found in these quantities. We obtain a functional form of the probability density function and the transport coefficient for indices fluctuations. A Langevin equation is then derived that constitutes a dynamical stochastic model of AE indices fluctuations.