



The magnetosphere as a multiscale complex network

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The magnetosphere, driven by the turbulent solar wind, exhibits multiscale behavior which is not scale-free. This has important implications for dynamical and statistical modeling and predictability. Most studies of the interaction of the solar wind with the magnetosphere use data representing the global dynamics and yields predictive models based on reconstruction of dynamics using time series data. The spatio-temporal dynamics of the magnetosphere is modeled using data of magnetic field variations at more than 300 magnetometer stations around the globe, and this yields a model of the magnetosphere as a complex network. The characteristics of the network for different levels of geomagnetic activity are studied using different thresholds in the magnetic field variations and show multiscale features. The structure of the network corresponds to a case of positive degree correlation and its relationship with statistical variables are analyzed. Further, this provides a characterization of the dynamical evolution of the magnetosphere and a model for the nonlinear dynamics of complex networks.