

Abstract Submitted  
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**Self-organization and criticality of magnetotail plasma**<sup>1</sup> ALEXANDER MILOVANOV, Department of Physics and Technology, University of Tromso, 9037 Tromso, Norway, LEV ZELENYI, Department of Space Plasma Physics, Space Research Institute, 84/32 Profsoyuznaya, 117997 Moscow, Russia — There is a vast observational evidence that magnetic field and plasma fluctuations in the far geomagnetic tail show a power spectral density that is best modeled by power laws with kinks around some characteristic frequencies. In-situ satellite observations have shown that the fluctuations exhibit scale-free behavior in a range of intermediate and low frequencies but with diverse scaling characteristics. Here we propose a model in which those signatures of scale invariance and power laws are explained in terms of self-organization and criticality of space plasma. In this model the global stability of the tail is provided by the ion component of the plasma, while electrons are attributed the role of a charge-neutralizing background. We discuss the mechanisms of plasma heating and energization in the magnetotail and occurrence of power-law supra-thermal tails in the electron energy distribution. Our model predictions are well inside the range of observational evidence and former theoretical arguments.

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