Geophysical Research Abstracts
Vol. 21, EGU2019-10741, 2019
EGU General Assembly 2019

Dynamical System Approaches to Study the Earth's Magnetospheric Dynamics

Giuseppe Consolini (1), Tommaso Alberti (1), Paola De Michelis (2), Monica Laurenza (1), and Maria Federica Marcucci (1)

(1) Istituto Nazionale di Astrofisica, Istituto di Astrofisica e Planetologia Spaziali, Roma, Italy (giuseppe.consolini@inaf.it), (2) Istituto Nazionale di Geofisica e Vulanologia, Roma, Italy

The Earth's magnetospheric dynamics in response to interplanetary medium changes displays many features of a complex system, such as, for instance, scale-invariance, multiscale properties, criticality. On the other hand, in coincidence with geomagnetic storms and substorms, relevant dynamical changes, similar to those observed during non-equilibrium phase transitions, occur. Here, we present recent results describing some features of the Earth's magnetospheric dynamics in the framework of dynamical system theory. We discuss the different character of the scale-to-scale fluctuations of the geomagnetic indices AE and SYM-H, used as proxies of the dynamical changes of certain magnetospheric current systems, by estimating the correlation dimension D_2 and the Kolmogorov entropy K_2. Furthermore, we present the result of a Langevin/Fokker-Planck approach for the characterisation of the dynamical changes of short- and long-timescale fluctuations observed during geomagnetic storms via the associated state functions. The relevance of our results in the framework of Space Weather is outlined.