

Temporal evolution of fractality in the Earth's magnetosphere and the solar photosphere

Domínguez, MacArena

Muñoz, Víctor

Valdivia, Juan

The study of complexity in two aspects of the magnetic activity in the Sun-Earth system is presented. We compare the temporal evolution of the magnetic fluctuations in the Earth's magnetosphere and the spatial distribution of the magnetic field in the solar photosphere, by calculating fractal dimensions from the data. It is found that the fractal dimension of the Dst data decreases during magnetic storm states and is well correlated with other indexes of solar activity, such as the solar flare and coronal indexes. This correlation holds for individual storms, full-year data, and the complete 23rd solar cycle. The fractal dimension from solar magnetogram data also correlates well with both the Dst index and solar flare index, although the correlation is much more clear at the larger temporal scale of the 23rd solar cycle, showing a clear increase around solar maximum. Key Points Calculation of fractal dimension of Dst series and solar photosphere Evolution of fractal dimensions Correlat