

# Fractal study of the SYM-H index

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**Abstract:** Complexity studies in space plasmas provide new insights and reveal universalities underlying various issues such as geomagnetic and solar activity. In particular, fractal and multifractal behavior has been found to be relevant to magnetospheric activity, solar wind dynamics, solar flare statistics, etc. In a previous work [1], we have studied the fractal features of the Dst time series, relating it to variations in geomagnetic activity. We found that the fractal dimension of the Dst index decreases during magnetic storms, suggesting that this metric is an interesting proxy for complexity in the Sun-Earth system. However, the Dst data has low resolution Dst data (1 point per hour), which may affect the fractality analysis, as suggested by other studies we have carried out for magnetic energy dissipation time series in an MHD shell model [2,3]. Thus, it is interesting to carry out a similar analysis to Ref. [1], based on observational data, but for higher resolutions. In this work, we do this by taking the SYM-H index, with resolution of 1 point per minute. We study the fractal dimension of the SYM-H time series for years in the 22<sup>nd</sup> and 23<sup>rd</sup> solar cycles. We analyze its possible correlation with the occurrence of geomagnetic events, and the dependence of the results on the time resolution of the data.

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## References:

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