

## Scaling features of cosmic rays, solar, heliospheric and geomagnetic data

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### Abstract

Hurst exponent states one of the time series descriptors, allowing for the quantitative consideration of the state of the randomness, persistence or anti-persistence mode. This parameter has been used, in various types of real dynamical systems e.g., in financial analyses, solar physics or astrophysical processes. In our work we apply Hurst exponent to the revealing of the scaling features of cosmic ray intensity and anisotropy measurements over the solar cycle 24 (years 2007-2019). More precisely, using two different approaches: structure function and detrended fluctuation analysis methods we perform systematic calculation of Hurst exponent for selected physical parameters. Additionally solar, heliospheric and geomagnetic data are considered. Conducted analysis allows to identify periods with randomness and to obtain more complete picture of cosmic rays transport in the heliosphere and Earth magnetosphere throughout the solar cycle.

**Keywords:** scaling properties of time series, Hurst exponent, structure function, detrended fluctuation analysis