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Different multi-fractal behaviors of daily wind speed records over China

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Variables of climate system often exhibit self-similar behavior over different time scales in time series, which also known as fractal characteristics. Multi-fractal behaviors of the long daily wind speed records over China were analyzed by using multi-fractal detrended fluctuation analysis (MF-DFA). The study results indicated that all these stations are characterized by long-range power-law correlations. But MF-DFA results showed non-universal multi-fractal behavior over China. We fitted generalized Hurst exponent h(q) via a modified generalized binomial multiplicative cascade model. And different width of the multi-fractal spectrum is estimated. We found that climate modes accompanied with abrupt strong wind show strongly asymmetry and singularity attribute to high frequency of extreme cyclone event. And accompanied intense multifractality which is due to a variety of long-range correlations for small and large scale fluctuations. We definitely approve of the key role of extreme wind event in intense multifractality, which contributes to the different statistical properties between large scale and small scale fluctuations, and finally leds to the distinct power-law scaling for small and large scale fluctuations.