Dynamical behaviors of meteorological variations using the multifractal detrended fluctuation analysis

S. K. Seo and K. Kim

Department of Physics, Pukyong National University, Busan 608-737, Republic Of Korea (ggaru79@korea.kr, kskim@pknu.ac.kr)

We investigate dynamical behaviors on rainfall, wind speed, and temperature, which is based on time series data of established observation stations. We select optimal installation sites among additional observation stations when the hydrometeorological network is constructed in a restricted Andong region of the Korean peninsula. From the Kriging interpolation method introduced, it is interpolated time series data of 63-by-63 stations according to distances and degrees of change. Our data are used time series data of rainfall, wind speed, and temperature in established AWS stations for five years, from January 2006 to December 2010. Using the multifractal detrended fluctuation analysis, we analyze time series data of observed stations calculated by the Kriging interpolation method. In this paper, we really find high-rank stations for the multifractal strength that indicates the difference between scaling exponents. It is finally ascertained that the multifractal strength for rainfall and temperature has a similar value as that in the Nakdong region, significantly differed from the value for wind speed. Therefore we report that the Nakdong region can be regarded as a good installation station as well. To grasp the meteorological distribution of high-rank stations for rainfall, wind speed, and temperature need further study. For the sake a more detailed investigation of multifractalities, we need to extend to regions of other nations in future. Finally, the multifractal detrended fluctuation analysis can be extended to both discrimination and characterization for various meteorological factors of other nations.

───