Correlation patterns and seasonal scaling behaviors of $PM_{2.5}$ concentration in China

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Recently China has been suffering from air pollution. Aerosols or particulate matters are an important component of the atmosphere, transporting under complex meteorological conditions. Here the data of $PM_{2.5}$ observations provided by the ministry of environmental protection, is first studied by a complex networks approach. We calculate the cross-correlation function for different seasons. The seasonal scaling behaviour of the probability distribution function of correlation can be observed. We report the two types of correlations, which correspond to the local and long-range interactions respectively. The local interaction is mainly caused by free expansion or transmission by wind. And a whole picture about the direction of transmission of $PM_{2.5}$ is given in China for different seasons. The long-range interaction is correlated with atmospheric waves.

