



Annual Variability of Fractal Dimensions and Spatio-Temporal Correlations in Japanese Air Temperature Records

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Fractal dimensions have already been extensively used to characterize the properties of long-term temperature records. In this study, we investigate whether different estimators can also be used for the detection of temporally varying features of such time series, in particular, interannual variations of the fractality. As a novel approach, we compute dimension estimates based on principal component analysis (PCA) as well as its univariate form, the singular system analysis (SSA), in order to quantify the variable strength of spatial and temporal correlations among a set of temperature records from Japan.

In order to decide whether or not there is a statistically significant relationship between the varying properties of the time series and large-scale climatological phenomena like anthropogenically amplified global warming or the El Nino / Southern Oscillation variability, we apply different linear as well as nonlinear methods of time series analysis. Our results are critically compared with those obtained for a similar data set of Central European records, yielding information about the potential sensitivity of both regions to the variability of environmental conditions.