Scaling analysis of the observed global temperature data

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We use two methods of data analysis, the second-order detrended fluctuation analysis (DFA2) and the wavelet transformation (WT) approach, to analyze time series of global land-surface temperature anomalies taken from Hadley Centre HadCRUT4 and NASA GISS data sets. DFA2 and WT allow to estimate the level of and the changes in the persistence of a time series and to obtain a clear functional estimate of the spectral properties of its underlying process that identify the presence of periodic or non-periodic cycles.

In this contribution, we will illustrate the differences we found between the scaling characteristics of the two considered global temperature data sets. We will discuss possible causes for the observed difference, such as the variations in deriving global temperature data from the original sources, as well as the possible deficiencies and limitations of the analyzing methods. Finally, we will compare our results with the DFA2 and WT results from satellite-based temperature estimates and local station temperature anomalies.