



Trends in temperature time series: detection and uncertainties

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The trend detection in time series and the evaluation of their magnitude and statistical significance has ever been an important task of the scientific community. This importance has been amplified by the atmosphere enhancement of greenhouses gas and the consequent climate change. The climate change causes and impacts are nowadays globally recognized but some additional efforts have to carry out at local scale to better quantify the magnitude and the statistical significance of changes in existent time series. Recent studies have demonstrate that the stochastic behavior of the time series can sensibly change the statistical significance of a trend, especially if the time series is affected by long memory-long term persistency LTP. In the study the daily time series of average temperature are analyzed for 26 stations in the Tuscany region (Italy). The time series cover a period varying from 15 to 47 years located in the second half of the 20 century. A trend analysis has been led through the non-parametric Mann-Kendall test and the F-Fisher test in the 26 time series. Evidences of increasing trends have been founded in almost all the time series considered. The time series of temperature have been also analyzed to present long term persistence. The fractionally integrated autoregressive and moving average model ARFIMA has been identified for each time series and checked by means of tests on the residuals. When LTP has been founded the implications of this behavior in the significance of trend have been also discussed.