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Correlation in air humidity time series

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The aim of this work is to quantify memory effects in time series of relative air humidity data. Hurst exponent (H), a measure of long-memory dependence, is obtained by applying DFA – Detrended Fluctuation Analysis, a well-established method for determining the scaling behavior of noisy data in the presence of trends without knowing their origin and shape. It becomes usefull to detect long-range correlations in time series and permits to obtain the exponents for local scale rules. From as a fluctuation function $F(\tau)$ scales with time windows τ it is possible to infer correlations in the data serie. For series with long-range correlation $F(\tau)$ behaves as a power-law in τ with characteristic exponent, just H. When H= 0.5 does not exist correlation, typical case of random sequences of values. When H is different of 0.5, the serie is correlationed and it presents memory effect in the data sequence. The advantage of the DFA method is that it can systematically eliminate trends of sazonal effects. In general, this analysis is applied in temperature and precipitation time series in the climatologic variables field. These ones can reveal universal properties of climate and represent a tool to predictions and model evaluation. On the other hand, air humidity is more relationed with local properties. Data series from 22 meteorologic stations longer than 7 years in the South of Brazil were analized. The results indicate a high correlation degree and persistent character, with Hurst exponent enclosed into 0,68 and 0,79 range. Furthermore, does not exist a specific correlation between the Hurst exponent and the local average humidity and nor with the altitude of meteorologic station as well. The fact of the time series studied present universal behavior enhance its role and enlarges the possibilities of the air humidity in localized climatologic models.