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Scale-dependent Detrended Fluctuation Analysis (DFA) for geophysical time series

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Geophysical time series often exhibit long memory. The persistent temporal behaviour of time series with slowly decaying autocorrelations can be described by the Hurst exponent (H). Detrended Fluctuation Analysis (DFA) is a widely used technique for the analysis of the long term behaviour of a time series and estimation of the corresponding exponent. This work addresses a generalisation of long range dependence analysis in which instead of characterising the long memory behaviour of a series by a single value H describing the global correlation structure of the time series, the exponent H is allowed to depend on both time (t) and scale (s). The scale (s) here is understood as the size of the time window studied and the time (t) is the mid-point of that window. The implementation of DFA for the estimation of H(s,t) is presented and applied to the analysis of satellite sea-level data.