



An Areawise Significance Test for Wavelet Spectral Analysis - including a Software Package

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During the last years, continuous wavelet spectral analysis has become a popular tool for the time-scale analysis of climate data. However, recently the awareness for intrinsic pitfalls has been raised: Besides the lacking of a thorough framework for the time series analysis aspects of continuous wavelet transformation, many findings appeared to be false positive: Even a white noise time series exhibits a wavelet sample spectrum that shows many (spuriously) significant patches. This rather anti-intuitive result emerges from a combination of multiple testing effects and intrinsic correlations of the wavelet transformation. In this contribution, we present a new theoretical framework for continuous wavelet spectral analysis. Based on this, we introduce a recently published areawise significance test that overcomes the problem discussed above. This test is implemented as a free and easy to use software package. To illustrate the advantages and the reliability of the test, applications to climatological time series are shown.