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Solar signal in climatic records. Results of EMD and cross wavelet analysis

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Long-term climate time series and solar proxies are studied using wavelet transforms and Empirical Mode Decomposition. Cross wavelet technique is applied to examine coherence and phase relationships between various time-series on interannual scale and to find solar signal in climatic data. Time-frequency patterns reveal near synchronous periodicities and the global quasi-oscillations. Patterns display also transient correlations and nonlinear impact of solar activity on climate. Historic periods in the past and regions of significant solar influence on climate are found. The last 70 years since 1930's demonstrate unusual sensitivity of climate response to solar output. This result is discussed in conjunction with the problem of unprecedented level of sunspot activity and global warming in the late 20th century.