



## **The spectra-temporal amplitude coherence using the normalized Morlet wavelet transform and the combination of the Fourier transform band pass filter with the Hilbert transform**

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The combination of the Fourier transform band pass filter with the Hilbert transform (FTBPF+HT) and normalized Morlet wavelet transform (NMWT) were used to compute the amplitude coherence functions between two real-valued time series. The spectra-temporal amplitude coherence function is defined as a correlation coefficient between amplitude variations in components of two time series as a function of time and frequency, and it changes from -1 to 1. Using the FTBPF+HT and NMWT methods it is possible to compute time variable amplitudes and phases of components/oscillations with different frequency bands in real-valued and complex-valued time series, respectively. If there is no phase agreement of oscillations with different frequencies present in two time series their spectra-temporal coherence or semblance functions can be very small or negligible. However, there could be an agreement in amplitude variations of such oscillations. Spectra-temporal coherence, semblance and amplitude coherence functions were computed for the x and y pole coordinates data for which the phase agreement is rather accidental, as well as for non-tidal length of day data and some solar activity time series, e.g. geomagnetic indices, total solar irradiance etc.