



Phase correlation between the 20 and 60 year modulations of global temperatures and the equivalent harmonic components of the Sun velocity about the barycenter of the planetary system.

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Using Fourier cascade filtering based on residual evaluation of multiple significant spectral peaks we de-trended the global surface temperature records from 1850-2015 and show that it is characterized by a major modulation of 60 years and a smaller one of 20 years. Using the same Fourier cascade filtering we compared these temperature oscillations to the periodicities that characterize the motion of the Sun about the barycenter of the solar system in the 1850-2015 period. The 60-year temperature modulation appears phase correlated with the equivalent harmonic components of solar velocity and angular momentum though with a time delay of about 10 years. Maxima of the 60-year modulation of the temperature record occur in 1880, 1940 and 2000. Except the first peak (where data are uncertain) all the temperature peaks of the 20 year component correspond to maxima of the solar velocity and angular momentum modulations thus indicating good phase correlations. The 60 year temperature modulation is quite larger than the 20 year one, whereas the 20 year harmonic velocity and angular momentum components of the solar motion are much larger than those of 60 year: this suggests that if the found spectral coherence is physical, alternative mechanisms of gravitational or electromagnetic origin may be involved in the process. We conjecture that the global temperature is partially modulated by astronomical harmonics that may also influence solar activity. The period from 2000 to 2030 should be characterized by a descending phase of the 60-year temperature oscillation that could imply a synchronized cooling phase of the sun indicating that solar activity is approaching a hibernation stage that could last a few decades. The global surface temperature data are those prepared by the Climatic Research Unit (HadCRUT4) and the positions of the Sun around the Solar System barycenter and the orbital data have been calculated by using a new program which implements the files DE430 and DE431 of the Jet Propulsion Laboratory.