Planetary orbits' effect to the Northern Hemisphere climate, from solar corona formation to the Earth climate.

Poulos Dimitris, Civil Engineer NTUA, MSc Water Resourses NTUA
e-mail: dimispoulos@gmail.com

Abstract: The four planets that influence the most the solar surface through tidal forcing seem to affect the Earth climate. A simple two cosine model with periods 251 years, of the seasonality of the Earth – Venus syzygies, and 265.4 years, of the combined syzygies of Jupiter and Mercury with Earth when Earth is in synod with Venus, fits well the Northern Hemisphere temperatures of the last 1000 years as reconstructed by Jones et al (1998). Later reconstructions that give too much emphasis on multy-centenial variation are due to increased error. **The physical mechanism proposed is that planetary gravitational forces derange the Solar Corona that in turn deranges the planetary geomagnetic field causing temperature variations.**

Keywords: geomagnetism, solar activity, solar corona, solar wind, climate change, temperature reconstruction, climate model

Here we discuss the potential that planets that influence the solar surface through tidal forces, affect the climate of Earth.
Such tidal forces can physically affect Earth either through oscillating the Solar surface or Corona, and increasing Solar activity.
Since tides follow the inverse cube rule, we expect only Mercury, Venus, Earth and Jupiter, to have important effect.
This effect should be important if there is a cyclical pattern to produce forced oscillation to solar surface. Else the response would be chaotic and damped.
There are two key elements in this investigation: firstly we check Northern Hemisphere temperatures as the Southern Hemisphere of Earth is mainly sea covered and secondly we focus on the seasonality of solar wind as it's effect on Geomagnetic field reverses between epochs.

The Earth – Venus resonance is potentially the most important parameter of the investigated subject. With a synodic period of 583 days, 22 hours, 6 minutes, 49 seconds, Venus needs 251 years to complete a cycle of the synodic longitudes. Hence the seasonality of the Earth's synods with Venus is 251 years. In Figure 1 we plot the longitude of Earth when in synod with Venus, 500 synodic periods before and after 30/3/2001. Figure produced through Alcyone Ephemeris software.

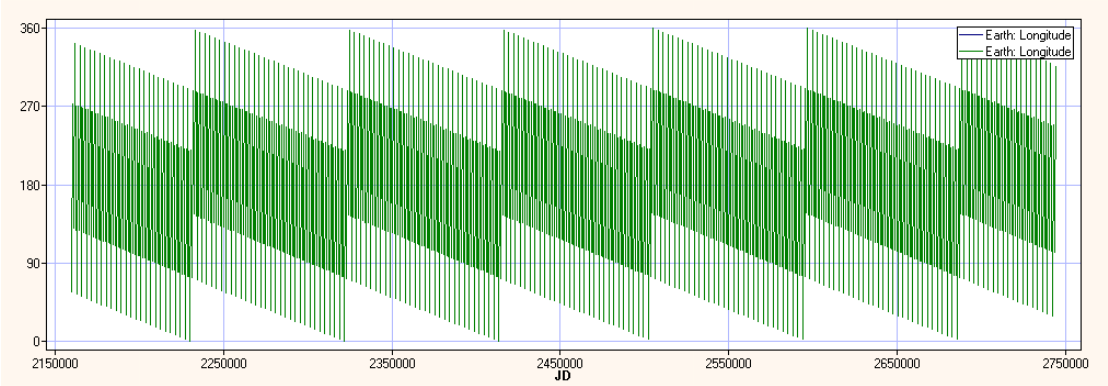

Figure 1. Longitude of Earth when in synod with Venus, 500 synodic periods before and after 30/3/2001.

The importance of the resonance is that the combined potential solar oscillation due to those two planets happens in a canonical way, cyclically at epochs, with a period of 251 years.

The investigation of the combined effect of the other two planets – Mercury and Jupiter – on this seasonality, reveals a 265.4 year cycle. In Figure 2 we plot the sum of the degrees of the Jupiter-Sun-Earth and Mercury-Sun-Earth angles, at the moments that Earth is in syzygy with Venus, for the years 1000 AD to 3000 AD.

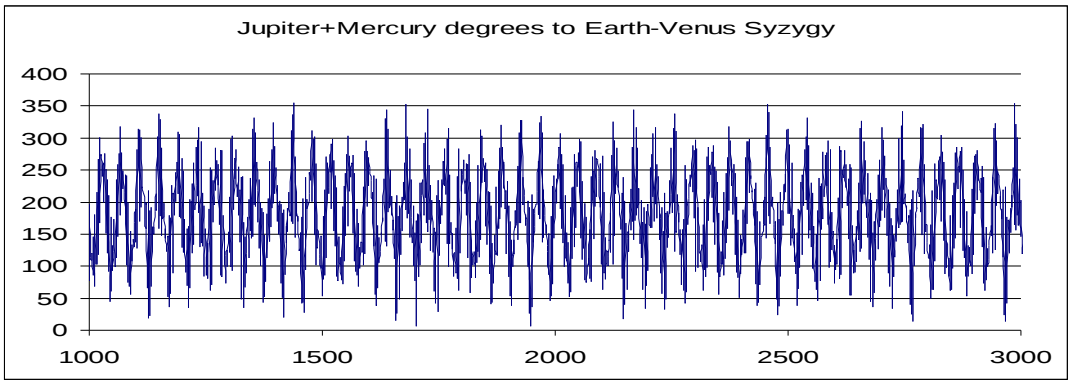

Figure 2. The sum of the degrees of the Jupiter-Sun-Earth and Mercury-Sun-Earth angles, at the moments that Earth is in syzygy with Venus, for the years 1000 AD to 3000 AD

The combined effect of the 251 and 265.4 year periods describes well the Jones et al (1998) (1) reconstruction of the last 1000 years Northern Hemisphere temperatures, and predicts that NH temperatures have reached a maximum and climate is going to change downwards in near future [Poulos (2005)] (2)

In Figure 3 we plot the simple two cosine model with periods 251 and 265.4 years we fit on the reconstruction. We used the first 700 years to adjust the mean, amplitude and phase of the two cosines to fit the reconstructed temperatures. The model does a good prediction for the about 300 last years. The correlation of the model with the 10-year moving average is 0.56 for both the periods 1000-1700 and 1700-1991.

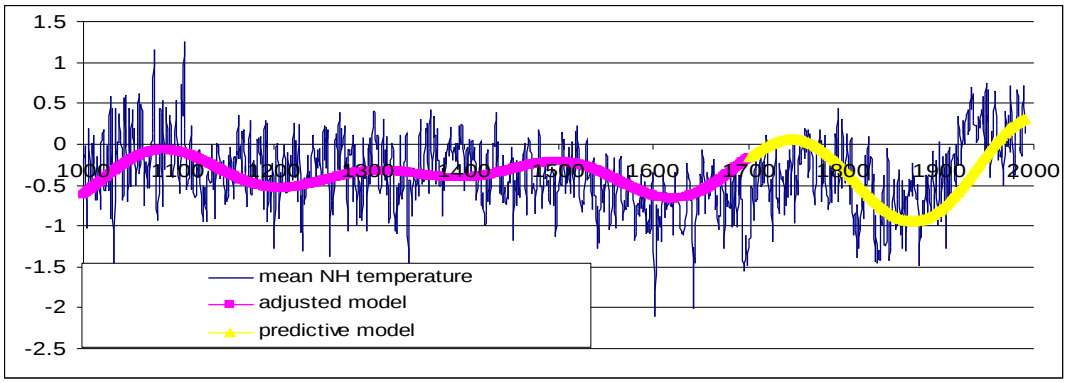

Figure 3. The simple two cosine model with periods 251 and 265.4 years and the Jones et al (1998) reconstruction

This model is a frequency beat of about 4600 years period. In Figure 4 we plot the two cosine constituents of the model. The 265.4 years constituent reaches it's maximum around 1950 AD when it was really the maximux of the syzygy cycle, saw in Figure 5. It is of interest that around 1950 AD we had a local maximum of the temperatures too.

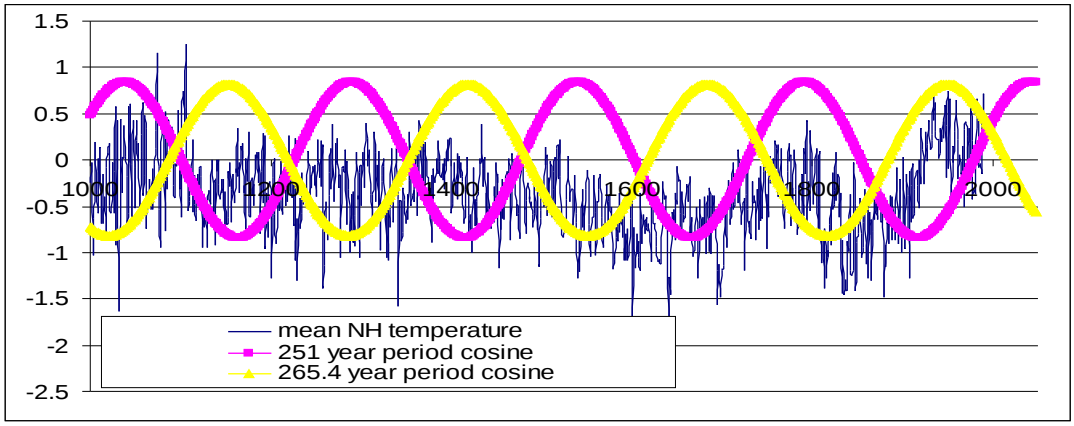

Figure 4.The two cosine constituents of the model

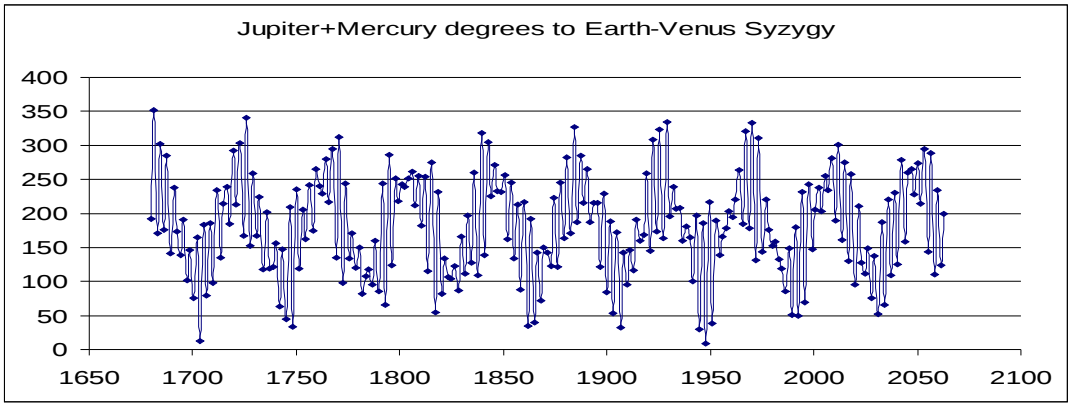

Figure 5. Jupiter + Mercury degrees to Earth – Venus syzygy 1680-2060 AD

This model as stated before is a frequency beat. In figure 6 it is superimposed on the last 10000 years of the Alley (2000) (3) temperature reconstruction of the Gisp2 from

Greenland (At the end of the last “Ice Age”). The comparison arises the idea that certain long proxies tend to fit to the extrema of the temperature variation. This implies that later Northern Hemisphere reconstructions that give too much emphasis on multi-centenial or millennial variation may in fact have increased error inserted.
The frequency beat duration changes over time due to orbital eccentricity variations that change the sidereal year duration of planets. The beginning of it's formation seems to match in time (as seen in the Alley reconstruction) with the end of the last glacial age. This implies that it's formation at about 12k years ago caused the beginning of solar oscillation that most probably led to the formation of solar corona that warmed the Earth since.

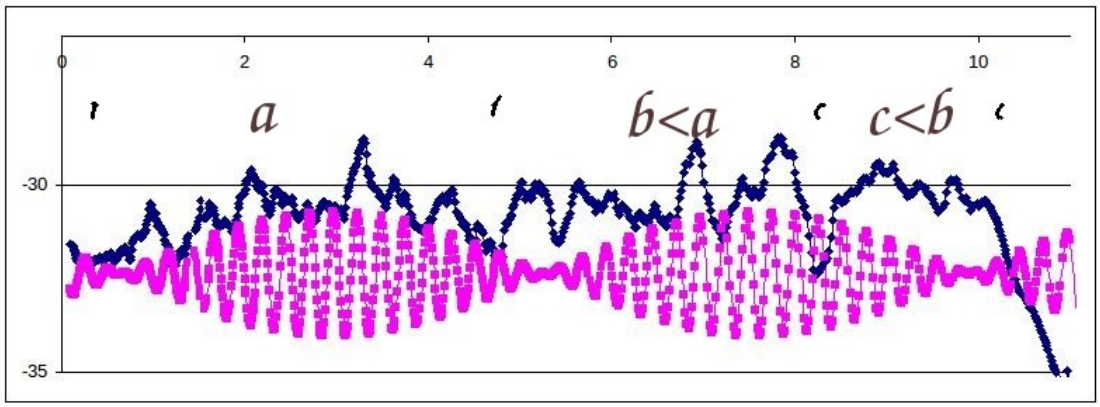

Figure 6. The NH temperature model superimposed on the last 10000 years of the Alley (2000) temperature reconstruction of the Gisp2 from Greenland. In fact the frequency beat duration changes over time due to orbital eccentricity variations that change the sidereal year duration of planets. The expected corrected duration intervals are noted with a, b, c.

To check the hypothesis that solar wind affects climate we checked Geomagnetism data from around the globe. Lerwick Northern Hemisphere Observatory (4) for example shows a constant Geomagnetism increase since the '30ies, and decrease before the 1930'ies. Indeed around 1930 the 251 years seasonal constituent of the model reaches it's minimum.
The published NGDC field models (5) of global geomagnetic intensity show the same thing too.

In conclusion the Earth-Venus resonance is a regularity that makes the Sun oscillate which probably leads to the formation of solar corona. This oscillation produces forced oscillation to geomagnetic field. Earth in turn absorbs energy from this oscillation and heats. The presented documentation equals to a probability greater than 95%. As such this phenomenon is a combined effect of solar wind affection to geomagnetic field and in turn geomagnetic field originated electricity conduction to the atmosphere.

A side effect of the Earth-Venus resonance is the interchange between Glacial Ages occurring every 100k years. As the orbital eccentricity of the planets changes, the Earth-Venus syzygy resonance is lost (because of the change of the sidereal year

duration). As a result of this the Sun stops oscillating (probably the solar corona disappears) and Earth freezes.

References

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