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Sinchronizations of the geophysical processes and asymmetries in the solar motion about the Solar System's barycentre

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It is well known that many geophysical processes vary on inter-annual to decadal timescales. These variations are usually attributed to terrestrial causes that include: the Earth's core-mantle coupling; the effects of internal driven stochastic oscillations in the climatic system; the effects of the global conveyer belt upon ocean surface temperatures etc. However, we contend that the empirical evidences and facts demand that this generally accepted assumption should be revised and modified.

We find that the observed changes in the specific mass of the Antarctic and Greenland ice sheets closely correspond to the specific mass variations that are needed to explain the "decadal-long" fluctuations in LOD (Sidorenkov, 2009). Since the mass of the Antarctic and Greenland ice sheets depend on long-term climate variations, it is reasonable to assume that the decadal fluctuations in the Earth's rotation may also correlate with the variations in the major climatic indices. Following this line of reasoning, we have found that the atmospheric circulation regimes and the ten-year running mean of the Northern Hemisphere air temperature anomalies are well correlated with the changes in the Earth's rotation rate. In addition, Stanislav Perov and Nikolay Sidorenkov (2009), have found a significant correlation between fluctuations in the Earth's rotational rate and activity of the India monsoon through Rupa Kumar's data (2004). This correlation is supported by the relationship that Ian Wilson has found between the deviation of the Earth's LOD from its long–term trend and the Pacific Decadal Oscillation (PDO). Wilson finds that whenever there is a large deviation in the Earth's LOD from its long--term trend, the PDO index transitions to its positive phase. It is important to note that the observed changes in the LOD precede those in the anomalies of the precipitation in India monsoon and in the PDO by about eight years.

Ian Wilson has found that the times when Solar/Lunar tides had their greatest impact upon the Earth are closely synchronized with the times of greatest asymmetry in the Solar Inertial Motion (SIM). Over the last 800 years, the Earth has experience exceptionally strong tidal forces in the years 1247, 1433, 1610, 1787 and 1974 (Keeling and Whorf, 1997). Wilson shows that these exceptionally strong tidal forces closely correspond in time to the first peak in the asymmetry of the SIM that occurs just after a period low asymmetry. These first peaks in asymmetry in the SIM occur in the years 1251, 1432, 1611, 1791, and 1971, closely correspond the years of peak tidal force.

Thus, there appear to be periodic alignments between the lunar apsides, syzygies and lunar nodes that occur at almost exactly the same times that the SIM becomes most asymmetric for the first time after a period of low asymmetry in the SIM. It means that precession and stretching of the Lunar orbit (i.e. the factors that control the long-term variation of the lunar tides that are experienced here on Earth) are almost perfectly synchronized with the SIM.

If the Solar system just consisted of Jupiter and the Sun, the barycentre of the Solar System would move in an almost circular orbit located just above the surface of the Sun (i.e. about 1.08 solar radii), called the sub-Jupiter point. Hence, the actual motion of the barycentre about the centre of the Sun (or equivalently the Sun about the barycentre) can be considered as a combination of the smooth symmetrical motion produced by Jupiter, combined with an additional, often asymmetric motion, caused by the other three Jovan planets (principally, Saturn and Neptune). The distance of the centre-of-mass from the Sub-Jupiter point is an excellent indicator of the level of asymmetry of the Sun's orbital motion, at any given time.

A.I.Khlystov et al., (1995) showed that the Earth and the other planets move in ellipses with the Sun at one foci, while at the same time they (effectively) share in the motion of the Sun around barycenter of the solar system (Figure 7). From the above results two important conclusions follows:

1) The movement of each planet is transferred to the Sun, and then back from it to all of the other planets. In other words, the Sun acts as a re-transmitter of gravitational motion over all of the solar system.

2) Activization of similar physical processes should take place simultaneously on all bodies in the solar system.

Support for the last conclusion comes from the investigation of link between the most severe droughts on the Earth and powerful dust storms on Mars (Khlystov, 1995).

Ian Wilson et al. (2008) presented evidence that claimed that changes in the Sun's equatorial rotation rate are synchronized with changes in the Sun's orbital motion about the barycentre of the Solar System. This paper showed that the recent maximum asymmetries in the Solar motion about the barycentre have occurred in the years 1865, 1900, 1934, 1970 and 2007. These years closely match the points of inflection in the Earth's LOD.

In addition, Ian Wilson (Sidorenkov and Wilson 2009) shows that, from 1700 to 2000 A.D., on every occasion where the Sun has experienced a maximum in the asymmetry of its motion about the centre-of-mass of the Solar System, the Earth has also experienced a significant deviation in its rotation rate (i.e. LOD) from that expected from the long-term trends. This fact indicates that the changes in the Earth's rotation rate are synchronized with a phenomenon that is linked to the changes in the solar motion about the barycentre of the Solar System.

Thus from the empirical data, we argue that there is compelling evidence to support the idea that these correlations are due to the shared motion of the Sun and Earth about the barycentre of the Solar System. We show that asymmetries in this shared motion lead to the decadal fluctuations in the climatologically and geophysical processes, including long term changes in the Earth's rotation rate.

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