34. CLIMATE (SUN) AND THE CONSTITUTION #7

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Former Senator Schmitt Summarizes the Sun's Central Role in Climate Change

Policy makers at the head of government in the United States and in many States want to believe, and to have others believe, that human use of fossil fuels accelerates natural global warming. They pursue this quest in order to impose ever greater and clearly unconstitutional control on the economy and personal liberty in the name of a hypothetically omnipotent and infallible government. There exists no true concern by the President or many in Congress about the true effects of climate change— only a poorly concealed, ideologically driven attempt to use conjured up threats of catastrophic consequences as a lever to gain more authoritarian control of society.

There has been a slow natural increase in global surface temperature of half a ºC per 100 years (0.9 ºF) over the last three and a half centuries **[1]**. Observational climate data and objective interpretations of those data strongly indicate that nature, not human activity, exerts the primary influence on this current long term warming and on all global climate variations. Human influence through use of fossil fuels has been and remains minor if even detectable **[2]**. Claims to the contrary only find support in highly questionable climate models that fail repeatedly when tested against the reality of nature. What, then, stimulates historically and geologically observed, sometimes slow and sometimes radical, changes in climate?

The primary alternative hypothesis to human-caused global warming is natural climate change driven by the variations in the activity of the Sun **[3]**. Unfortunately, the "human-caused global warming" or "carbon dioxide forcing" hypothesis has become embedded in the minds of otherwise strong teams of observational scientists and their publication outlets. They cannot entertain any other alternative to enhance and amplify variations in the natural heating of the Earth as a result of solar influences **[4]**— nor can they prove their own hypothesis of human-caused global warming **[5]**.

As many scientists have documented, the position and orientation of the Earth in its orbit around the sun, and the Sun's variable influence and activity, determine weather and climate **[6]**. Seasons vary because of changing solar energy input in annual response to the varying orientation of Earth's Northern and Southern Hemispheres. Indeed, the Earth's 23º inclination to the rays from the Sun and its annual orbit around that star guarantee large seasonal changes away from the equator. Further, variations in solar radiation received by the Earth correlate with short-term variations in Earth's weather, based on variations in the slow move-

ment of loops called "Rossby waves" [7] in atmospheric jet streams [8].

Observations by astronomers over the centuries, as well as studies of tree rings [9], stalagmite layers [10], ice cores [11], sea sediment cores [12], and other pre-historic and geological records [13], have defined a normally present 11-year sunspot cycle superposed on a number of longer climate cycles [14]. Much modern research documents that this sunspot cycle also correlates with variations in various natural phenomena, including stratospheric winds [15] and ozone production [16], geomagnetic storms [17], cosmic ray flux [18], ionosphere-troposphere interactions [19], and the global electrical circuit that exists between the ionosphere and the Earth's surface [20].

Further, correlations of records of seasonal changes, solar activity cycles, and local and regional rainfall oscillations all confirm that, through some means, solar activity correlates with changes in weather and climate [21]. The solar interplanetary magnetic field, whose polarity varies every 22 years or twice the sunspot cycle, may play an additional role as its strength varies directly with increases and decreases in numbers of sunspots [22]. Although their basic data collection appears to be useful, some researchers attribute increased cosmogenic nuclide production in the atmosphere to increased solar activity in support of models of El Niño conditions [23], whereas, "increased solar activity" actually correlates with decreased cosmogenic nuclide production. Solar maxima correspond with increased solar magnetic field strength, decreased cosmic ray interaction with the atmosphere, less cloud formation, and warmer terrestrial conditions [24].

As a further natural demonstration of the importance of the Sun in determining climate variation, the well-documented solar shielding effects of atmospheric ash and aerosols from volcanic eruptions document the tie between solar irradiance and at least short-term climate swings. Particularly illustrative historically have been eruptions such as Huaynaputina (1600) [25], Tambora (1815) [26], Krakatoa (1883) [27], and Pinatubo (1991) [28].

More broadly, geological and planetological observations show that major perturbations in climate relate to the position and orientation of the Earth in its orbit around the Sun. For example, as Serbian mathematician Milutin Milankovic pointed out in 1941 [29], and confirmed by many others since [30], initiation of the major ice ages on Earth correlate with a 23,000-year precession cycle [31], a 41,000-year obliquity cycle [32], and a 100,000-year eccentricity cycle [33] in the position of the Earth relative to the Sun. Cyclic global temperature variations measured in oxygen isotope ratios that correlate with the growth of ice sheets and biogeochemical responses closely reflect the 23,000-year precession cycle [34]. Also, the dynamics of the East African Equatorial monsoon appear related to a half-precession cycle [35]. In addition, the 41,000-year obliquity cycle shows strongly in North American marine depositional records [36].

Climate cycles related to internal solar activity are superposed on long-term orbital cycles. For example, the Medieval Warm Period (800-1300) and the Little Ice Age (1400-1900) correlate, respectively, with very active and very passive periods of recorded sunspot activity [37]. As a fairly recent example of solar influence on climate, the Little Ice Age occurred during a 500-year long sequence of three deep and prolonged reductions in sunspot frequency [38]. The coldest temperatures came during the

last of these minima, a 70-year period of exceptionally few sunspots (the Maunder Minimum) [39]. The Medieval Warm Period, (when the Vikings colonized Greenland as glaciers retreated and farmers could at least survive there) [40] also correlates with repeated, multi-century long intervals of high sunspot frequency [41]. Since the end of the early 1900s, peak values in sunspot activity rose steadily until 1960, leveling off at higher than normal values until apparently starting to fall about 2000 [42].

The 11-year sunspot cycle repetitions are superposed on a number of long-term cycles of past highs and lows in solar activity. For example, the Gleissberg cycle has imprecisely defined periods of 90±30 years in length [43]. More energetic sunspot activity in the Gleissberg cycle may correlate with temporary decades of warming, such as in the 1930s and 1990s with the reverse being true in the 1810s and 1910s. Analyses of tree rings, lake levels, cave deposits, tree ring recorded variations in cosmic ray-produced isotopes (14C and 10Be) [44], and oxygen isotope ratios record what appear to be other long period solar cycles, specifically, 2400, 1500, 200 years, as well as the Gleissberg cycle [45]. Clearly, cycles of activity in a variable sun have strongly affected the Earth's climate.

Many advocates of human-caused global warming agree that solar cycles show correlations with regional climate variations [46]; but, absent a proven amplification mechanism to enhance small solar energy (irradiance) variations, they reject nature in favor of human fossil fuel burning as an explanation for warming during the last 100 years. These reviews by solar influence skeptics all document broadly accepted relationships of weather and climate with many different repetition cycles in solar activity [47], ranging from the 11-year sunspot cycle [48] to the long-term Milankovic orbital repetitions discussed above.

Specifically with respect to the last 120 years, the correlation of measured solar energy input variations with global surface temperature and sea surface temperature is very strong [49]. The statistical correlation of solar irradiance with air temperature has been about 79% [50]. In contrast, during the last 50 years, the correlation of measured carbon dioxide increases with global surface temperature has been only about 22%. This directly contradicts the assumption that carbon dioxide has had a large influence on climate in the last 50 years [51].

Since the end of the last Ice Age 11,000 years ago, the increase in total energy from the Sun has been about 0.6 watts per square meter [52], an increase of less than 0.05% over an average total of about 1367 watts per square meter (equivalent to about 14 100-watt light bulbs per square yard). On shorter time scales, total variations reach about 3 watts per square meter, or 0.22% from the average [53]. Considering the actual amount of possible atmospheric heating (30% of incoming solar energy is reflected to space), this variation results in a third to a half a ºC (0.6 to 0.9 ºF) global temperature change, up or down, over seven years, that is, a half sunspot cycle [54].

Various natural mechanisms for water vapor feedback and visible, infrared, and UV light reflection, adsorption, emission determine the net direct solar heating or radiative forcing effect on the Earth [55]. Global atmospheric circulation moderates the ***short-term*** solar energy inputs, particularly by upward convection of oceanic heat and water vapor in the large scale equatorial Hadley Cells that span latitudes from 30ºS to 30ºN [56]. Ocean circulation overall

moderates the ***long-term*** transfer of solar energy around the globe **[57]**.

Evidence for the existence of a means for amplifying solar energy-solar magnetic field interactions with Earth comes from the oceans. Determination of the total contribution of the oceans to heating of the atmosphere, using three independent observational measures of oceanic heat flux, shows that the oceans' contribution to heating to be five to seven times larger than variations in total solar energy input **[58]** indicated the existence of a means for amplification.

Additional support that an amplification mechanism exists comes from recent observational data on variations in stratospheric water vapor concentrations over three decades. These data suggest that decreases in water vapor have contributed to amplified sea surface cooling since 2000 while increases between 1980 and 2000 accentuated surface warming **[59]**. This relationship since 2000 may correspond with stratospheric cooling and lower water retention due to lower than average solar energy input.

Climate change driven by the Sun constitutes a strongly competitive, purely scientific alternative to the climate modeling-political hypothesis of human-caused global warming advocated by climate modelers and their acolytes in the science, media, and political establishments. Solar influence ranges from significant but random solar flares and mass ejections affecting the thermosphere and jet stream tracks **[60]**, to the 11-year sunspot cycle **[61]**, to the 22-year magnetic polarity cycle, up to the long-term Milankovic orbital repetitions discussed above. The cold winters in the northern United States and Europe coincide with a relatively prolonged reduction in sunspot activity below even the norm for a minimum in the 11-year cycle **[62]**.

Actual observations show that climate varies almost entirely in response to natural forces and that human burning of fossil fuels has had negligible effect over the last 100 years **[63]**. Let us hope that State and national policy makers taking office in 2011 and in the future will understand the facts about natural climate change, and the lack of evidence of a significant human influence on change, before taking enormous constitutional and economic risks— and before liberty and incomes suffer further erosion.

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