THE SUN'S EFFECT ON CLIMATE

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For some ten years now we have pointed out the blatant errors and outright fraud of the global warming alarmists. The effect of the solar cycle on climate is reflected in the coincidence of solar cycle and weather patterns, but the climate terrorists keep insisting that no correlation is possible simply because there is no theory that can explain the relationship between changes in weather with the number of sunspots. It turns out that there is a theory that explains the relationship between the number of sunspots and climate but that the politically motivated and funded meteorologists have simply chosen not to look into the theory. The global warming terrorists refusal to look at the theory is reminiscent of the priest who refused to look at the sun through Galileo's telescope to see the sunspots for himself on the grounds that even if he saw such spots they would have to be due to faults in the telescope or the eye because everyone *knows* that that great god, the sun, cannot be spotted.

Figure 1: E. W. Maunder

The Solar Cycle

In 1904, Edward Walter Maunder (1851-1928) published a paper that demonstrated that the number of sunspots on the sun's surface varied with an eleven-year cycle.[1] Figure 2 shows the monthly number of sunspots counted from 1610 through 2003. The tips of each successive

[1] Maunder, E. W., 1904. "Note on the Distribution of Sun-Spots in Heliographic Latitude, 1874-1902," *Monthly Notices of the Royal Astronomical Society*, **64**:747.

maximum and minimum average about eleven years apart. In the latter part of the Twentieth century it was discovered that the sun's magnetic north and south poles flip over every eleven years, returning to their original orientation every 22 years. This phenomenon is called the *solar cycle*.

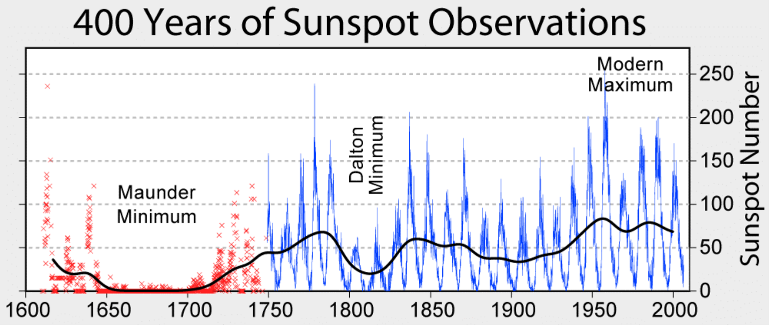

Figure 2: Monthly Sunspot Counts since 1610. Note the lack of sunspots between 1645 and 1715, a gap called the Maunder Minimum in honor of Edward Maunder. (Credit: Robert A. Rhode, Global Warming Art Project.)

Throughout the Twentieth century scientists tried to correlate the solar cycle, as the 22-year period is called, with weather or climate. It was known that during the Maunder Minimum, and to a lesser extent during the Dalton Minimum (named after British meteorologist John Dalton), the weather was significantly colder, resulting in famines and pestilence.[2] By the 1980s, despite the strong correlation in the data (see Figure 3), the correlation was dismissed as futile because the amount of solar heating during sunspot maxima and cooling during sunspot minima were insufficient to explain the correlation.

Nevertheless, there is a correlation between the number of sunspots we observe on the surface of the sun and the surface temperature of the earth; the question is: What causes the temperature to increase more than expected? Scientists started looking at other possibilities, including the connection between sunspots and cosmic rays (high-energy atoms, protons, neutrons, and electrons from deep space), which dependency threw carbon-14 dates out of whack if not corrected for the cosmic ray flux. Could cosmic rays and other such processes affect other weather-related processes as well?

[2] "Global Warming Will Improve Your Health," *B.A.*, **19**(127):5.

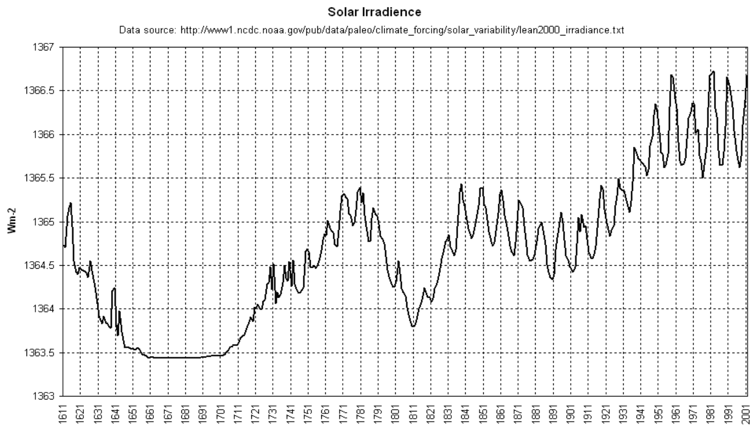

Figure 3: Solar Irradiance from 1611-2001. Irradiance is the amount of heat from the sun striking one square meter of the earth. The Maunder and Dalton minima show significantly less heat reaching the earth, but the earth's temperature records show that the earth cooled more than this chart would allow. (The measured units of the left axis are Watts per square meter.)

Correlations

That there is a correlation, a relationship, between solar irradiance and solar cycle is easy to see by comparing Figures 2 and 3, but as noted above, the increase of wattage in Figure 3 cannot account for the increase in global temperature. We will now examine some other correlations; but first let us look at one of the pitfalls (Figures 4 and 5) we can fall into while on such a quest.

Consider Figure 4 which plots the number of births as a function of the age of the moon, that is, how many days it has been since the last new moon. A man named Canton looked at some 70 million births in the USA from 1980 through 1999. If you look at the plot, you might think that there is a trend in the data, but consider this, the vertical axis runs in the range of 2.48 to 2.50, not from 0 to 2.50 **million**. If we were to draw the latter range, we would get Figure 5. In that figure it is hard to see anything but a straight line. In other words, the spikes and trends in Figure 4, that look so significant, are really not statistically distinguishable from noise, that is, random scatter in the full-scale picture we see in Figure 5. Figure 4 is now a common way of misrepresenting data in newspapers, stock market analyses, crime statistics, poll results, and so forth. Indeed, the red lines drawn from point to point are also deceptive. There should only be points in the plot.

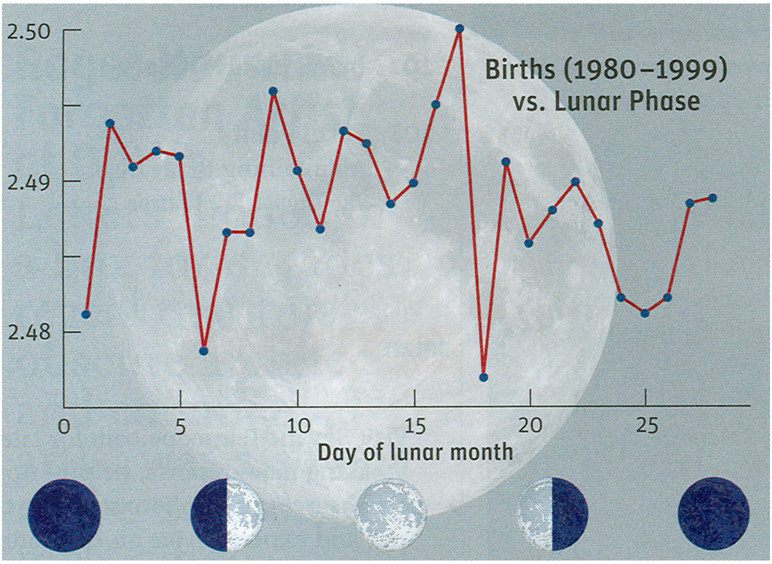

Figure 4: Canton's Birth Data as a Function of the Day of the Month

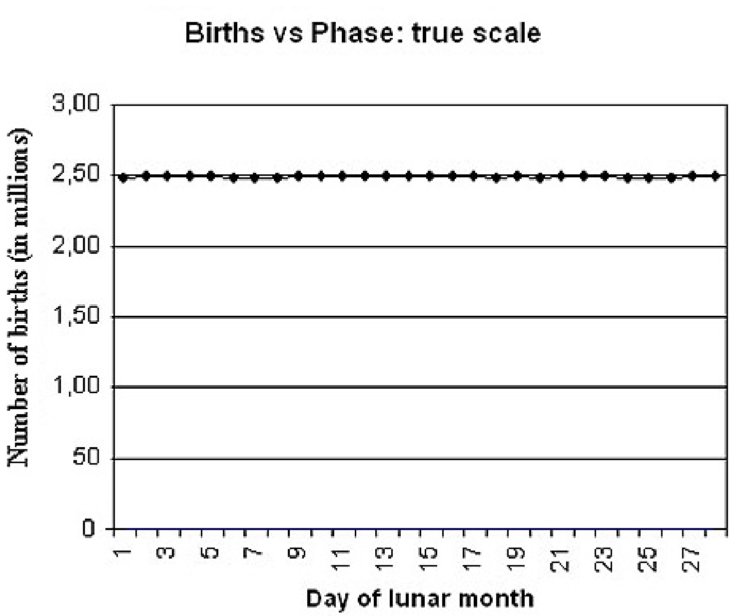

Figure 5: Births vs. Lunar Phase. The same data as Figure 4 in real scale.

However, there are times where a narrow range of values is appropriate. Most life is restricted to a narrow range of temperatures so our thermometers use scales, *e.g.* Celsius, which has a zero point at the melting point of water, 273 degrees above absolute zero. In cases like that, relative scales are appropriate for proper understanding.

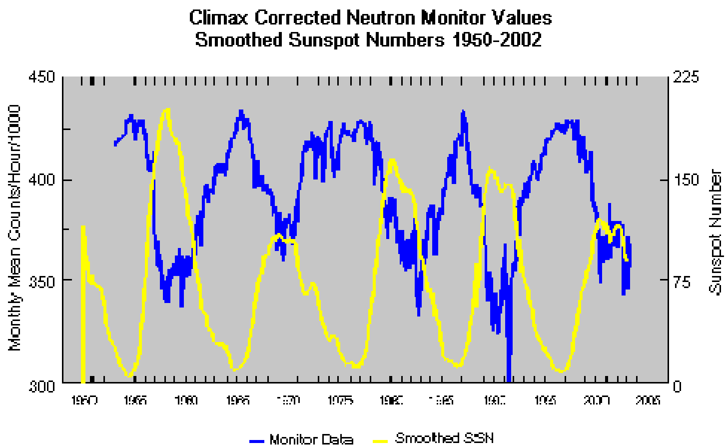

Figure 6: Smoothed Sunspot Numbers and Neutron Counts. The Inverse Correlation of Sunspot Counts (lower, yellow) and Cosmic Rays Counts (blue).

Figure 6 is an example of an inverse correlation. In an inverse correlation, one number goes up when the other goes down and vice versa. When the sunspot numbers go up, the cosmic ray count goes down, and when the sunspot numbers go down the cosmic ray count goes up. This relationship is not surprising because when the sunspot count is high, magnetic storms on the sun are also more numerous and more intense. Since most cosmic rays are electrically charged, their paths are altered by magnetic fields. In particular, the magnetic fields of the sun and earth act like mirrors, sending the cosmic rays back, away from the earth. Thus when the sunspot number goes up, fewer cosmic rays reach the earth.

The classic apparatus to detect cosmic rays is called a cloud chamber. A cloud chamber looks like a glass box with supersaturated water vapor inside it. As a cosmic ray passes through the chamber, it ionizes the water molecules it passes by which, in turn, form a water vapor trail. It turns out that cosmic rays do something similar when passing through the earth's atmosphere. Can cosmic ray showers hitting the earth's atmosphere produce clouds?

Cosmic Ray Showers and Clouds

In 1995 Henrik Svensmark discovered an unexpected correlation between the cosmic ray flux from outer space and cloud cover in the earth's atmosphere within the first two miles above sea level.[3] Svensmark discovered that cosmic ray abundance and cloud cover were directly related (Figure 7).

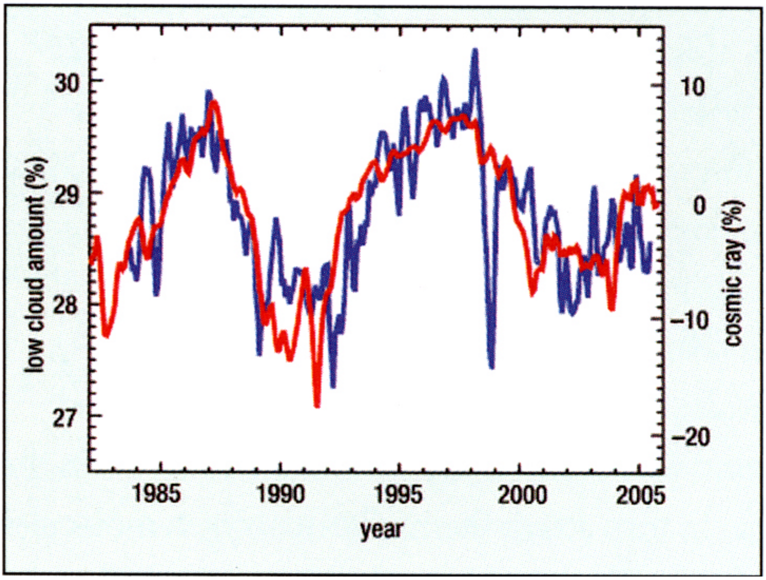

Figure 7: Global Cloud Coverage and Cosmic Ray Variance. The blue line represents the percentage of cloud coverage over the face of the earth and the red line plots the departure from average of cosmic rays hitting the cosmic ray detector at Climax, Colorado. The sudden, unexplained drop in cloud cover in late 1998 made that the hottest year since 1932.

Figure 7 shows the relationship between cosmic rays (red) and percentage of cloud cover (blue). The zero on the right scale is the average cosmic ray flux. The scale marks percentages above and below that flux. A decrease in the number of cosmic rays hitting the earth's atmosphere is accompanied by a decrease in cloud cover. Svensmark proposed that the global warming we have observed over the past 150 years is due to increased solar activity. A change in cloud

[3] Svensmark, H., & E. Friis-Christensen, 1997. "Variations of cosmic ray flux and global cloud coverage: A missing link in solar climate relations," *J. of Atmos. Solar Terr. Phys.*, **59**, 1225-1232.

cover of only three to four percent can account for the observed global temperatures.

Initially, Svenmark's theory encountered many objections. Most of those have now been accounted for by his complete theory. Svenmark calls his theory, *Cosmoclimatology*. The theory starts with cosmic rays emitted by exploding stars. Cosmic rays can be amplified by colliding with hydrogen clouds in space. As they approach earth, many are deflected from hitting the earth by the van Allen belts as well as by the electromagnetic activity of the sun. When the sun is active, the wind from the sun (solar wind) sweeps the particles around the earth instead of allowing them to hit the atmosphere straight on. When the sun is inactive, more of the cosmic rays hit the atmosphere.

Upon reaching the lower atmosphere, cosmic rays encounter sulfur dioxide (the stuff that is produced by rotten eggs and is also found in well water, not to mention its primary producer, volcanoes), water vapor, and ozone. The cosmic rays ionize the air, releasing electrons (just as they do in a cloud chamber) that help form cloud condensation nuclei (CCN) which produce more and denser clouds. The increase in low-level clouds (under 10,000 feet) reflects the heat from the sun back into space, thus cooling the earth. Changes in the sun's electromagnetic activities, such as sun spots, solar flares, and solar wind, and the consequent variations in cosmic ray activity that reaches the atmosphere, result in the warming and cooling periods of the earth.

Global warming alarmists blame the warming on man-made carbon dioxide. But the prime producer of carbon dioxide is not man but the oceans of the earth. As the ocean warms, it releases CO_2 just like a soda does when warmed. It takes a while for the release to start since it takes time to warm the water, so the increase of CO_2 follows some time after the warming occurs. This lag is observed. When the atmosphere cools, the ocean reabsorbs the CO_2. As the atmospheres of Mars and Venus show, as a greenhouse gas, CO_2 is grossly overrated. Both of these planets have significantly more CO_2 than does earth. The atmospheres of both Venus and Mars are 98% carbon dioxide. Yet on Mars, the temperature rarely gets above zero degrees Fahrenheit. On Venus under the most optimistic, even unrealistic greenhouse gas theory, the CO_2 can only bring the Venerian temperature up to about 210 degrees Fahrenheit, about the boiling point of water.[4]

Svenmark's theory of Cosmoclimatology neatly explains all the global temperature patterns observed. Man's carbon emissions are negligible compared to what is released by natural means. President Obama's insistence on combating global warming will end in disaster.

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[4] For a detailed look at the Venerian greenhouse theories see G. Bouw, 2001. "The Morning Stars," *B.A.*, **11**(97):69.