CO_2 and Climate Change

Exhaustive study establishes no
link between CO_2 and global temperature

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A recently published, exhaustive study by W. Jackson Davis of atmospheric CO_2 and global temperature over the last 425 million years has established no meaningful relationship (1). The paper cites that "the generally weak and or absent correlation between atmospheric CO_2 and temperature …implies that other unidentified variables cause most (>95%) of the variance in temperature across the Phanerozoic climate record [encompassing the last 425 million years]". Elsewhere, the study notes that "… in view of the diminishing returns in the marginal forcing [heating] by [increased] atmospheric CO_2 identified in the present study, changes in the concentration of contemporary atmospheric CO_2 [largely attributed to the use of fossil fuels], are expected to cause small or negligible changes in global temperatures. (for a graphic rendering of this study's findings see the Figure at the end of paper.)

As such, CO_2 produced from the burning of fossil fuels has little or role in global warming. This is underscored by the fact that consensus climate models are only correct if they remove increasing CO_2 levels, most of which is attributed to the use of fossil fuels (5). Otherwise these widely accepted climate models forecast temperature increases two to four times what has actually occurred over the forecast periods (6). Given this backdrop, the widespread efforts to reduce the use of fossil fuels, because of their generation of supposed climate warming CO_2, makes no sense, even without considering the massive dislocation of the global economy by doing so (9).

So why the accepted wisdom that the greenhouse warming effect of fossil fuel-generated atmospheric CO_2 is causing global warming? Both atmospheric CO_2, and to a lesser extent, global temperatures have been relatively easily measured over the last 150 or so years. This has established that both global temperature and CO_2 have been generally rising, the latter attributed largely due to the burning of fossil fuels. As CO_2 is a greenhouse gas, it has been therefore broadly assumed that this increase in fossil fuel-

generated CO_2 has caused the rise in global temperature. Yet the evidence from the Phanerozoic record of the last 425 million years, indicates that this is simply an incidental, spurious correlation, not a causal relationship. Simply put, coincidental, spurious correlation does not prove causation while the lack of correlation disproves causation (1). It is this lack of causation, exhaustively underscored by Davis's recent study, that has prevailed over most of the last 425 million years.

As for "other unidentified variables" not addressed in the Davis study, that "cause over 95% of the variance in global temperature," a bourgeoning body of research has established that variations in solar-related dynamics account for the bulk of climate change. A partial stumbling block to this realization of the sun's dominant role in climate change is that variations in solar heat (flux) radiating the earth, referred to as Total Solar Irradiance (TSI), is well short of explaining the changes in global temperature. Over the course of the typical eleven-year solar cycle of a rising and falling number of sun spots, TSI rises and falls in line with the amount of sun spots. However, the synchronized rising and falling of ocean temperature are of a far greater extent than can be explained by the modest change in TSI over a solar cycle of these rising and falling sun spot numbers (3). Something else associated with solar cycles, far more powerful than TSI, has been causing cyclic ocean temperature changes far greater than can be explained by the variations in TSI.

What, in fact, is going on here is that the sun's magnetic field, its strength rising and falling with the rise and fall of sunspot numbers, acts as a shield modulating the amount of galactic cosmic rays (ions of light elements), entering the solar system. Those galactic cosmic rays (GCR) that get through this solar magnetic shield, upon entering the lower atmosphere, stimulate the process of water vapor (gas molecules) coalescing into cloud-forming water droplets. This process is not much different from what happens in cloud chambers, an early nuclear physics research tool. Atomic particles, similar to GCRs, emitted in a cloud chamber filled with water vapor, leave thin white contrails of tiny water droplets. Essentially the only difference between what is happening in a cloud chamber and the water vapor-filled lower atmosphere is scale. Increases in sun spot activity and, in turn, increases in the strength of the GCR-blocking solar magnetic field leads to reduced amounts of GCRs entering the lower atmosphere to stimulate sun-

blocking cloud formation (4). Reverse this process with weak sun spot activity, and, in turn, a weak solar magnetic shield, leads to greater sun-blocking, climate cooling cloud cover.

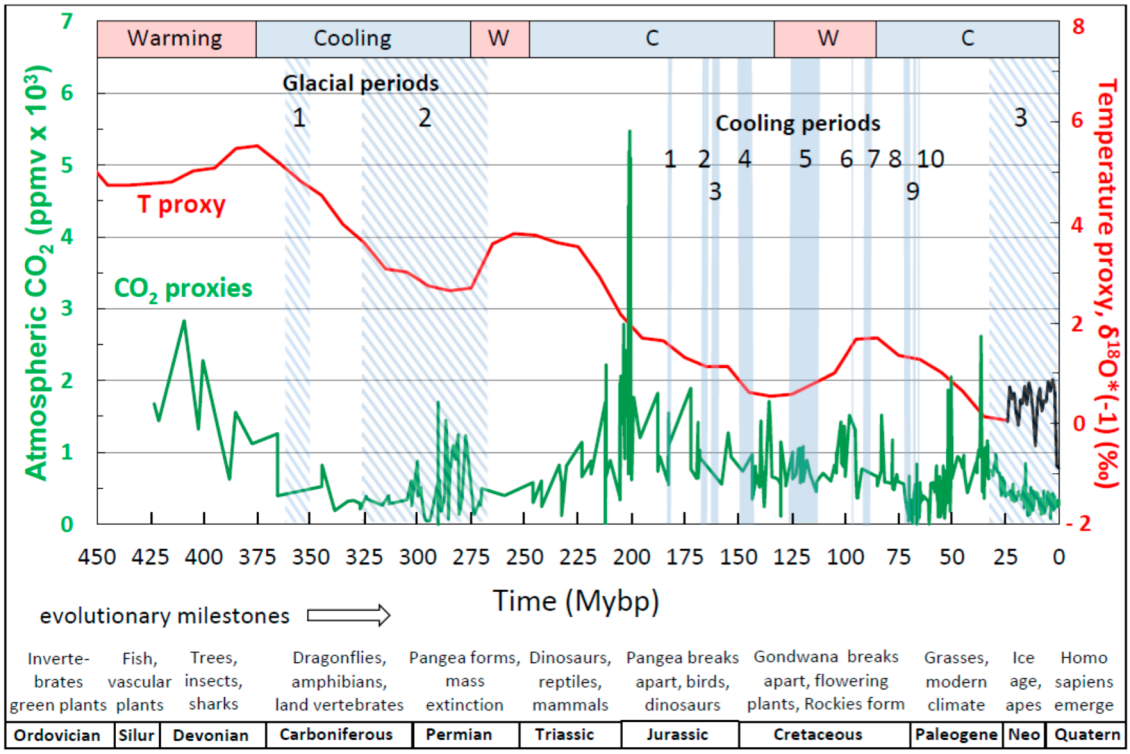
We can track this mechanism going back millions of years by measuring the signatures /proxies of both temperature and cloud-forming GCR activity. Measures of isotopes of oxygen and carbon at a particular time in the geological record can tell us about temperature as can the volume of fossilized phytoplankton. Measures of carbon 14, beryllium 10, and chlorine 36, all byproducts of GCR activity in the earth's atmosphere, track the extent of climate-cooling low cloud cover formation. These measures are variously captured in the geological record of ice cores, sedimentary rock formations, stalagmites and other geological and biosphere features (such as tree rings). All of these byproducts /proxies of temperature and GCRs are amenable to time calibration (dating). This is achieved by determining where these proxy measurements reside in a vertical column of, say, an ice core or age-derived rock strata etc. What we have learned from all of this, is that variations in the sun's modulation of GCR intensity varies with global temperature. This means that the greater the solar-controlled GCR activity in the lower atmosphere the greater the sun-blocking, climate-cooling cloud cover.

What can be concluded with reasonable certainty is that changes in atmospheric CO_2 levels do not cause changing global temperatures ….something else does. An emerging explanation for what causes much of global temperature change are solar cycle-based dynamics regulating/modulating the amount of earth-bound GCRs able to generate climate-cooling cloud cover. In addition, on multi-millennia time scales we also have to consider the solar impact on climate as a result of Milankovitch cycles. These entail variations in the degree of ellipticity in the earth's orbit, as well as the earth's inclination and degree of precession (axis wobble). Over multi-million-year time spans variations in the strength of GCR fields through which the solar system is passing have their own, sometimes cataclysmic impact on climate-cooling cloud cover generation(7).

As to what the future holds, we are likely to experience global cooling if the currently low sun spot activity continues over the next several decades. Similarly low sun spot activity of the Maunder and Dalton Minimums of 1645-1715 and 1790-1830, respectively

marked periods of global cooling. Subsequently both sun spot activity and global temperature have been trending upwards until the weakening of sun spot activity over the course of the last decade and a plateauing of global temperature. Clearly, given our inability to meaningfully predict sun spot activity, forecasting a pending Little Ice Age that the period of the Maunder Minimum was labeled , is at this stage a throw of the dice.

What we do know is that changes in atmospheric CO_2 account for less than 5% of global temperature changes whether or not we are entering a period of global cooling. It is also evident that this reality has major implications for the future of fossil fuels and their alternatives.



For detailed discussion of Figure see (i), page 11

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