THE CLIMATE SCIENCE ISN'T SETTLED

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by Richard S. Lindzen

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Is there a reason to be alarmed by the prospect of global warming? Consider that the measurement used, the globally averaged temperature anomaly (GATA), is always changing. Sometimes it goes up, sometimes down, and occasionally—such as for the last dozen years or so—it does little that can be discerned.

Claims that climate change is accelerating are bizarre. There is general support for the assertion that GATA has increased about 1.5 degrees Fahrenheit since the middle of the 19th century. The quality of the data is poor, though, and because the changes are small, it is easy to nudge such data a few tenths of a degree in any direction. Several of the emails from the University of East Anglia's Climate Research Unit (CRU) that have caused such a public ruckus dealt with how to do this so as to maximize apparent changes.

The general support for warming is based not so much on the quality of the data, but rather on the fact that there was a little ice age from about the 15th to the 19th century. Thus it is not surprising that temperatures should increase as we emerged from this episode. At the same time that we were emerging from the little ice age, the industrial era began, and this was accompanied by increasing emissions of greenhouse gases such as CO_2, methane and nitrous oxide. CO_2 is the most prominent of these, and it is again generally accepted that it has increased by about 30%.

The defining characteristic of a greenhouse gas is that it is relatively transparent to visible light from the sun but can absorb portions of thermal radiation. In general, the earth balances the incoming solar radiation by emitting thermal radiation, and the presence of greenhouse substances inhibits cooling by thermal radiation and leads to some warming.
That said, the main greenhouse substances in the earth's atmosphere are water vapor and high clouds. Let's refer to these as major greenhouse substances to distinguish them from the anthropogenic minor substances. Even a doubling of CO_2 would only upset the original balance between incoming and outgoing radiation by about 2%. This is essentially what is called "climate forcing."

There is general agreement on the above findings. At this point there is no basis for alarm regardless of whether any relation between the observed warming and the observed increase in minor greenhouse gases can be established. Nevertheless, the most publicized claims of the U.N.'s Intergovernmental Panel on Climate Change (IPCC) deal exactly with whether any relation can be discerned. The failure of the attempts to link the two over the past 20 years bespeaks the weakness of any case for concern.

The IPCC's Scientific Assessments generally consist of about 1,000 pages of text. The Summary for Policymakers is 20 pages. It is, of course, impossible to accurately summarize the 1,000-page assessment in just 20 pages; at the very least, nuances and caveats have to be omitted. However, it has been my experience that even the summary is hardly ever looked at. Rather, the whole report tends to be characterized by a single iconic claim.

The main statement publicized after the last IPCC Scientific Assessment two years ago was that it was likely that most of the warming since 1957 (a point of anomalous cold) was due to man. This claim was based on the weak argument that the current models used by the IPCC couldn't reproduce the warming from about 1978 to 1998 without some forcing, and that the only forcing that they could think of was man. Even this argument assumes that these models adequately deal with natural internal variability—that is, such naturally occurring cycles as El Nino, the Pacific Decadal Oscillation, the Atlantic Multidecadal Oscillation, etc.

Yet articles from major modeling centers acknowledged that the failure of these models to anticipate the absence of warming for the past dozen years was due to the failure of these models to account for this natural internal variability. Thus even the basis for the weak IPCC argument for anthropogenic climate change was shown to be false.

Of course, none of the articles stressed this. Rather they emphasized that according to models modified to account for the natural internal variability, warming would resume—in 2009, 2013 and 2030, respectively.

But even if the IPCC's iconic statement were correct, it still would not be cause for alarm. After all we are still talking about tenths of a degree for over 75% of the climate forcing associated with a doubling of CO_2. The potential (and only the potential) for alarm enters with the issue of climate sensitivity—which refers to the change that a doubling of CO_2 will produce in GATA. It is generally accepted that a doubling of CO_2 will only produce a change of about two degrees Fahrenheit if all else is held constant. This is unlikely to be much to worry about.

Yet current climate models predict much higher sensitivities. They do so because in these models, the main greenhouse substances (water vapor and clouds) act to amplify anything that CO_2 does. This is referred to as positive feedback. But as the IPCC notes, clouds continue to be a source of major uncertainty in current models. Since clouds and water vapor are intimately related, the IPCC claim that they are more confident about water vapor is quite implausible.

There is some evidence of a positive feedback effect for water vapor in cloud-free regions, but a major part of any water-vapor feedback would have to acknowledge that cloud-free areas are always changing, and this remains an unknown. At this point, few scientists would argue that the science is settled. In particular, the question remains as to whether water vapor and clouds have positive or negative feedbacks.

The notion that the earth's climate is dominated by positive feedbacks is intuitively implausible, and the history of the earth's climate offers some guidance on this matter. About 2.5 billion years ago, the sun was 20%-30% less bright than now (compare this with the 2% perturbation that a doubling of CO2 would produce), and yet the evidence is that the oceans were unfrozen at the time, and that temperatures might not have been very different from today's. Carl Sagan in the 1970s referred to this as the "Early Faint Sun Paradox."

For more than 30 years there have been attempts to resolve the paradox with greenhouse gases. Some have suggested CO2—but the amount needed was thousands of times greater than present levels and incompatible with geological evidence. Methane also proved unlikely. It turns out that increased thin cirrus cloud coverage in the tropics readily resolves the paradox—but only if the clouds constitute a negative feedback. In present terms this means that they would diminish rather than enhance the impact of CO2.

There are quite a few papers in the literature that also point to the absence of positive feedbacks. The implied low sensitivity is entirely compatible with the small warming that has been observed. So how do models with high sensitivity manage to simulate the currently small response to a forcing that is almost as large as a doubling of CO2? Jeff Kiehl notes in a 2007 article from the National Center for Atmospheric Research, the models use another quantity that the IPCC lists as poorly known (namely aerosols) to arbitrarily cancel as much greenhouse warming as needed to match the data, with each model choosing a different degree of cancellation according to the sensitivity of that model.

What does all this have to do with climate catastrophe? The answer brings us to a scandal that is, in my opinion, considerably greater than that implied in the hacked emails from the Climate Research Unit (though perhaps not as bad as their destruction of raw data): namely the suggestion that the very existence of warming or of the greenhouse effect is tantamount to catastrophe. This is the grossest of "bait and switch" scams. It is only such a scam that lends importance to the machinations in the emails designed to nudge temperatures a few tenths of a degree.

The notion that complex climate "catastrophes" are simply a matter of the response of a single number, GATA, to a single forcing, CO2 (or solar forcing for that matter), represents a gigantic step backward in the science of climate. Many disasters associated with warming are simply normal occurrences whose existence is falsely claimed to be evidence of warming. And all these examples involve phenomena that are dependent on the confluence of many factors.

Our perceptions of nature are similarly dragged back centuries so that the normal occasional occurrences of open water in summer over the North Pole, droughts, floods, hurricanes, sea-level variations, etc. are all taken as omens, portending doom due to our sinful ways (as epitomized by our carbon footprint). All of these phenomena depend on the confluence of multiple factors as well.

Consider the following example. Suppose that I leave a box on the floor, and my wife trips on it, falling against my son, who is carrying a carton of eggs, which then fall and break. Our present approach to emissions would be analogous to deciding that the best way to prevent the breakage of eggs would be to outlaw leaving boxes on the floor. The chief difference is that in the case of atmospheric CO_2 and climate catastrophe, the chain of inference is longer and less plausible than in my example.

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