Climate Change and Global Warming

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The geographer Harm de Blij points out, in his book Why Geography Matters, that we are in an ice age, which is a long-term climate condition that been in effect for about a 100 million years. Within this ice age there have been numerous glacial and interglacial periods. We are currently reaching the apogee of one of the interglacial periods. The last interglacial period ended around 80,000 years ago. At that time, the temperature peaked at above current levels and sea level was 15 feet above current levels. In that most recent peak, there can be little doubt that humans had very little if any impact on the climate cycle. Further, there also appears to be a shorter term cycle of approximately 1500 years, which is also currently moving toward its apogee. The bottom of this cycle was the little ice age experienced a few hundred years ago. In short, our current conditions are probably mostly due to the unfolding of natural cycles that have been going on for a very long time. If anything, human activity may speed the cycles up somewhat or even slow them down somewhat. It is, however, very unlikely that we can stabilize the climate. Of course, we should exercise caution in activities likely to affect climate. Unfortunately, natural variations in climate are often catastrophic and largely beyond our control.

Anyone who thinks we can stop global warming is operating from a static conception of climate and is ignorant of the dynamic nature of climate throughout the history of this planet. We might be able to marginally slow down the rate of warming provided everyone, including developing countries like India and China, got on board with the program. A really concerted effort by everyone to employ methods currently advocated to slow global warming (Kyoto Protocol) would have an almost imperceptible effect. An atmospheric physicist, S. Fred Singer (Professor Emeritus of Environmental Sciences at the University of Virginia and former director of the U.S. Weather Satellite Service) estimates that such an effort would decrease the average global temperature by .083 (1/12th) of a degree by mid-century. The natural cycle seems to be that the warming phase triggers the events that contribute to the next cooling phase. One factor in this process may be the melting of the polar ice, which puts cold water into the oceans that change ocean currents and water temperature. Change in water temperature and currents are believed to affect weather cycles. The next glacial period in the climate cycle will make surviving global warming look like a picnic. Slowing down the rate of global warming buys a little time but doesn't change the longer-term outcome. Even if the entire effect of human activity could be subtracted from the long-term cycle, it would only slow, not stop the increase in temperature and rise in sea level. This cycle has been rising and falling for millions of years and human activity has only been a factor in the last couple of hundred years. To think that humans are the prime movers in this cycle is nothing but hubris.

Recently there have been two criticisms of the computer models used to predict global climate. The first is that the algorithms used to estimate the effects of atmospheric carbon on temperature were borrowed from astrophysicists. These algorithms were developed to estimate processes going on inside of stars, which are so different from conditions on a

planet that they don't apply. The fact of the matter is we have no empirical data about the actual effects of atmospheric carbon on global temperature. What we have is an hypothesis in search of supporting data. While there is reason to believe that carbon may be a greenhouse gas, the amount of atmospheric carbon that can be accounted for by human activity is under 4% of the total. The global climate would have to be very sensitive to changes in its composition for a small increase in one of the atmospheric components to produce some of the extreme predictions being bandied about.

The second criticism relates to the water vapor problem. Water vapor is the most significant greenhouse gas of all (see table below). Water vapor is not usually factored into the computer models used to predict global climate at all because it is too poorly understood and represents a very complex variable to model. It is roughly like trying to predict the peak price of wheat without taking into account the supply likely to be available when demand peaks. The principle way in which water vapor comes into play is through cloud formation. The more cloud cover there is the more sunlight is reflected back into space and the cooler the global temperature. Conversely, the less cloud cover the more sunlight reaches the surface of the earth and the higher the global temperature. Recent research has shown that a significant factor in cloud formation is the interaction of cosmic rays with particles of water vapor. Thus, fluctuations in the amount of cosmic rays reaching the earth will have significant effects on cloud formation and cover. The largest source of cosmic rays is our sun and other suns in our galaxy. Short-term cosmic ray fluctuations are related to cyclic activity in the sun, which is affected by other planetary bodies in the solar system such as Jupiter. When large bodies of mass approach and recede from the near vicinity of the sun its activity is affected. Long-term cosmic ray fluctuations are believed to be related to the movement of our solar system through its orbit in our galaxy. In the course of moving through this orbit, we enter regions where stars are more densely concentrated and where they are less densely concentrated. Since other stars like our sun are major producers of cosmic rays, one would expect that cosmic ray bombardment of the earth would increase in regions where star concentrations are more dense and decrease when they are less dense. There is some speculation that this may be a major contributor to long-term climate cycles mentioned earlier that have been going on for millions of years and can be measured in tens of thousands of years.

Anthropogenic Contribution to the "Greenhouse effect," expressed as % of Total

Based on concentrations (ppb) adjusted for heat retention characteristics	% of Greenhouse Effect	% Natural	% Man-made
Water vapor	95.000%	94.999%	**0.001%**
Carbon Dioxide (CO2)	3.618%	3.502%	**0.117%**
Methane (CH4)	0.360%	0.294%	**0.066%**
Nitrous Oxide (N2O)	0.950%	0.903%	**0.047%**
Misc. gases (CFC's, etc.)	0.072%	0.025%	**0.047%**
Total	100.00%	**99.72**	**0.28%**

There are numerous other factors that should be taken into account when considering influences on our present climate. Just briefly, I'll mention two such influences. First, underground coal fires. There are hundreds of these unintentional fires burning around the globe. These fires can last for decades to hundreds of years before they consume all the available fuel. One of these has been estimated to have been burning for 6000 years. These fires are virtually impossible to put out once they start burning. It has been estimated by one environmental group that such fires contribute approximately 2-3% of all the carbon emissions in China where around 20 million tons of coal is consumed by such fires each year. Second, is desertification. It is well known that desert areas are increasing around the world. When foliage dies off and large areas become deserts a huge carbon capture process is destroyed. One researcher (http://savory.global/) has argued that if we could regain the carbon capture lost through desertification then atmospheric carbon levels could be reduced to pre-industrial levels without doing anything else.

In conclusion, I would say that yes we are experiencing climate change related to a warming trend but there isn't anything new about that. Is it caused solely by human activity? It seems very unlikely to me. Is human activity contributing to it? It seem likely that it is a contributing factor. Trying to protect the environment from degradation seems like a reasonable goal but one whose impact on climate is unknown. Controlling the climate seems to me to be a pipe dream. Minimizing our impact on climate may be possible. There are always unintended consequences and they aren't always good.