

# NEW YORK POST

## NOT THAT SIMPLE

By ROY W. SPENCER

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February 26, 2007 -- REPORTS on the global-warming debate have now become part of our daily diet of news. Actors, musicians, politicians, columnists and even the occasional climate scientist all weigh in on how soon planetary disaster will strike, who's to blame and what we should do about it. With claims that manmade warming is anywhere from an undeniable fact to a hoax, anyone can be excused for feeling a little bit confused.

The media is, almost by definition, most interested in extreme views on the issue, so reporting seldom reveals that broad scientific uncertainty still exists. In fact, a silent majority of scientists still think that global warming could end up falling anywhere between a real problem and a minor nuisance: They can see reasons for it going either way. Call them the global-warming moderates.

How can different scientists look at the same atmosphere and yet come to such a wide variety of conclusions? It all depends on their level of faith in our understanding of the atmosphere. We put equations into a computer that describe the basics of how we *think* the atmosphere works, and then we expect the computer to predict how much warming we will get when we turn up the greenhouse gas "knob."

The Earth's natural "greenhouse effect" traps infrared (heat) radiation because of water vapor, clouds, carbon dioxide and methane. You have probably heard that the greenhouse effect keeps the Earth "habitably warm." So if burning of fossil fuels keeps adding more of a greenhouse gas like carbon dioxide (CO<sub>2</sub>), the Earth should keep on warming up, right?

Well . . . it's not that simple.

CO<sub>2</sub> concentrations - now running at 380 parts per million (ppm), up about 40 percent in the last century - are indeed one possible explanation for our current warmth. But we also know that our climate is a nonlinear, dynamic system - which can go through sizeable gyrations all by itself.

Contrary to popular accounts, very few scientists in the world - possibly none - have a sufficiently thorough, "big picture" understanding of the climate system to be relied upon for a prediction of the magnitude of global warming. To the public, we all might seem like experts, but the vast majority of us work on only a small portion of the problem.

Here, for example, is an insight that even many climate scientists are unaware of: The one atmospheric process that has the *greatest* control on the Earth's climate is the one we understand the least - precipitation.

Over most of the planet, water is continuously evaporating, humidifying the air to form the Earth's dominant greenhouse gas: water vapor. Climate scientists will tell you that the extra CO<sub>2</sub> we are putting in the atmosphere causes a "warming tendency" at the surface, which will evaporate even more water,

which will amplify the warming. This positive water vapor feedback, so the theory goes, ends up turning the relative benign direct warming effect of CO<sub>2</sub> - only 1 degree of warming late in this century - into a much more serious problem.

But surface evaporation is *not* what determines how much water vapor, on average, resides in the atmosphere - *precipitation* systems do. These not only control the water-vapor portion of the greenhouse effect, they directly or indirectly control most of the *next* most important greenhouse ingredient: clouds.

These systems continuously recycle the Earth's air, and so exert strong controls over the entire climate system. For instance, the rising air in precipitation systems is what causes the sinking, cloudless air over desert areas. Vast oceanic areas of stratus clouds form below a temperature inversion that is also caused by air being forced to sink by precipitation systems, usually thousands of miles away.

So, what does all this have to do with global warming? Unless we know how the greenhouse-*limiting* properties of precipitation systems change with warming, we don't know how much of our current warmth is due to mankind, and we can't estimate how much future warming there will be, either. To solve the global-warming puzzle, we first need to learn much more about the precipitation-system puzzle.

What little evidence we now have suggests that precipitation systems act as a natural thermostat to reduce warming. For instance, warm, tropical systems are more efficient at converting water vapor to precipitation than their cool high-latitude cousins. Hurricanes are believed to be the most efficient of all.

I believe that negative feedbacks such as this are the only way to explain the relative stability of our climate. Computerized models of our climate have had a habit of "drifting" too warm or too cold. This because they still don't contain all of the temperature-*stabilizing* processes that exist in nature. In fact, for the amount of solar energy available to it, our climate seems to have a "preferred" average temperature, damping out swings beyond 1 degree or so.

I believe that, through various negative feedback mechanisms, the atmosphere "decides" how much of the available sunlight will be allowed in, how much greenhouse effect it will generate in response, and what the average temperature will be.

Finally, remember that phrase, "the Earth's greenhouse effect keeps the Earth habitably warm?" I'll bet you never heard the phrase that is, quantitatively, more accurate: "Weather processes keep the Earth habitably cool."

Were it not for weather, the natural greenhouse effect would cause the surface of the Earth to average 140 degrees. Wonder why we never hear that fact stated?

I believe that when the stabilizing effects of precipitation systems are better understood and included into the models, predictions of global warming will be scaled back.

Despite current inadequacies, climate models are still our best tools for forecasting global warming. Those tools just aren't sharp enough yet.

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