

Hotter, Faster, Worser

by John Atcheson

Over the past several months, the normally restrained voice of science has taken on a distinct note of panic when it comes to global warming.

How did we go from debating the "uncertainty" behind climate science to near hysterical warnings from normally sober scientists about irrevocable and catastrophic consequences? Two reasons.

First, there hasn't been any real uncertainty in the scientific community for more than a decade. An unholy alliance of key fossil fuel corporations and conservative politicians have waged a sophisticated and well-funded misinformation campaign to create doubt and controversy in the face of nearly universal scientific consensus. In this, they were aided and abetted by a press which loved controversy more than truth, and by the Bush administration, which has systematically tried to distort the science and silence and intimidate government scientists who sought to speak out on global warming.

But the second reason is that the scientific community failed to adequately anticipate and model several positive feedback loops that profoundly amplify the rate and extent of human-induced climate change. And in the case of global warming, positive feedback loops can have some very negative consequences. The plain fact is, we are fast approaching, and perhaps well past, several tipping points

which would make global warming irreversible.

In an editorial in the Baltimore Sun on December 15th, 2004 this author outlined one such tipping point: a self-reinforcing feedback loop in which higher temperatures caused methane, a powerful heat-trapping greenhouse gas (GHG) to escape from ice-like structures called clathrates, which raised the temperature which caused more methane to be released and so on. Even though there was strong evidence that this mechanism had contributed to at least two extreme warming events in the geologic past, the scientific community hadn't yet focused on methane ices in 2004. Even among the few pessimists who had, we believed, or hoped, that we had a decade or so before anything like it began happening again.

We were wrong.

In August of 2005 a team of scientists from Oxford and Tomsk University in Russia announced that a massive Siberian peat bog the size of Germany and France combined was melting, releasing billions of tons of methane as it did.

The last time it got warm enough to set off this feedback loop was 55 million years ago in a period known as the Paleocene-Eocene Thermal Maximum or PETM, when increased volcanic activity released enough GHGs to trigger a series of self-reinforcing methane burps. The resulting warming caused massive die-offs and it took more than 100,000 years for the earth to recover.

It looks like we're on the verge of triggering a far worse event. At a recent meeting of the American Academy for the Advancement of Sciences in St. Louis, James Zachos, foremost expert on the PETM reported that greenhouse gasses are accumulating in the atmosphere at thirty times the speed with which they did during the PETM.

We may have just witnessed the first salvo in what could prove to be an irreversible trip to hell on earth.

There are other positive feedback loops we've failed to anticipate. For example, the heat wave in Europe that killed 35,000 people in 2003 also damaged European woodlands, causing them to release more carbon dioxide, the main GHG, than they sequester, exactly the opposite of the assumptions built into our models, which treat forests as sponges that sop up excess carbon.

The same thing is happening to a number of other ecosystems that our models and scientists have treated as carbon sinks. The Amazon rainforest, the boreal forests (one of the largest terrestrial carbon sinks in the planet), and soils in temperate areas are all releasing more carbon than they are absorbing, due to global warming-induced droughts, diseases, pest activity, and metabolic changes. In short, many of the things we treat as carbon sponges in our models aren't sopping up excess carbon; they're being wrung out and releasing extra carbon.

The polar ice cap is also melting far faster than models predict, setting off another

feedback loop. Less ice means more open water, which absorbs more heat which means less ice, and so on.

Even worse, we've substantially underestimated the rate at which continental glaciers are melting.

Climate change models predicted that it would take more than 1,000 years for Greenland's ice sheet to melt. But at the AAAS meeting in St. Louis, NASA's Eric Rignot outlined the results of a study that shows Greenland's ice cover is breaking apart and flowing into the sea at rates far in excess of anything scientists predicted, and it's accelerating each year. If (or when) Greenland's ice cover melts, it will raise sea levels by 21 feet, enough to inundate nearly every sea port in America.

In the Antarctic seas, another potentially devastating feedback loop is taking place. Populations of krill have plummeted by 80% in the last few years due to loss of sea ice. Krill are the single most important species in the marine food chain, and they also extract massive amounts of carbon out of the atmosphere. No one predicted their demise, but the ramifications for both global warming and the health of marine ecosystems are disastrous. This, too, will likely feed on itself, as less krill means more carbon stays in the atmosphere, which means warmer seas, which means less ice, which means less krill and so on in a massive negative spiral.

One of our preeminent planetary scientists, James Lovelock, believes that in the not too distant future humans will be restricted to a relatively few breeding pairs in

Antarctica. It would be comfortable to dismiss Professor Lovelock as a doom and gloom crazy, but that would be a mistake. A little over a year ago at the conclusion of a global conference in Exeter England on Avoiding Dangerous Climate Change, scientists warned that if we allowed atmospheric concentrations of GHG to exceed 400 ppm, we could trigger serious and irreversible consequences. We passed that milestone in 2005 with little notice and no fanfare.

The scientific uncertainty in global warming isn't about whether it's occurring or whether it's caused by human activity, or even if it will "cost" us too much to deal with it now. That's all been settled. Scientists are now debating whether it's too late to prevent planetary devastation, or whether we have yet a small window to forestall the worst effects of global warming.

Our children may forgive us the debts we're passing on to them, they may forgive us if terrorism persists, they may forgive us for waging war instead of pursuing peace, they may even forgive us for squandering the opportunity to put the nuclear genie back in the bottle. But they will spit on our bones and curse our names if we pass on a world that is barely habitable when it was in our power to prevent it. And they will be right to do so.

John Atcheson's writing has appeared in the Washington Post, the Baltimore Sun, the San Jose Mercury News, the Memphis Commercial Appeal, as well as in several work journals.