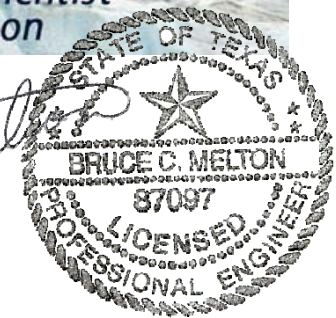


Bruce Melton



Climate Change: Worse Than We Understand It To Be October 2009

Climate change is worse than we understand it to be. Our climate is changing faster and with greater impacts than the computer models from the biggest climate change effort ever undertaken have predicted. The Intergovernmental Panel on Climate Change (IPCC) reviewed virtually every single piece of climate change science that has ever been written. The IPCC's report, their 4th since 1988, is considered the foremost piece of climate science that exists. This massive climate assessment is now unbelievable behind. The CO₂ emissions that the report assumed in the 2007 Assessment as the worst-case scenario are already here today. (The IPCC is represented by 130 countries, including more than 2500 scientific expert reviewers, more than 800 contributing authors, and more than 450 lead authors)

There are two main reasons why climate change is worse than we currently understand it to be. The first is that the industry of science is conservative. This is contrary to a popular myth that has been in circulation since the climate crisis was a true debate concerning hypotheses in the 1970s. The roots of the myth are numerous and of no importance any longer because the debate was settled long ago. The issue today is that the industry of science is conservative and this conservative tendency is affecting the understanding of climate change by society. This is important because it is this understanding that drives policy, and policy is what will bring the climate crisis under control. But policy will only bring the crisis under control *if* it is developed from an understanding of climate change that is appropriate for the task.

Why is the industry of science conservative? This is the single most basic tenant of the industry itself. Science must be as certain as is humanly possible. The best way to be as certain as possible, is to be conservative in risk taking. The fewer are the risks about inaccurate statements, the less often the scientist is wrong. So to encourage this type of conservativeness the industry has developed a mindset.

The old adage that a scientist must "publish or perish" is true. If a scientist is wrong or inaccurate in his published research findings too many times, the academic journals will no longer publish the "discoveries" of that scientist. If a scientist cannot publish his or her work, he or she basically perishes, just like the old saying goes. In this part of the discussion it must be understood how important the academic presses are to the professional life of a scientists. These forms of communication are the official language of the industry of science. Without the publishers and the peer review juries, the industry of science is impotent. It has no means for communication.

To keep from being wrong, to insure that their discoveries are correct and that their livelihoods can continue, scientists will only publish the parts of their work that represent their most confident findings. They have to be absolutely certain of their correctness because they want to continue to have the academic journals accept their work for publishing. No scientist wants to perish. These actions, in effect, create a world where the scientists findings are simply conservative. They do not make risky statements that could turn out to be proven inaccurate.

The second reason why climate change is worse than we understand it to be is the high likelihood that we have crossed or are crossing a climate threshold and our climate is changing faster than it was before. We (the scientists) will not really know this is happening for certain until they (the climate scientists) can collect enough years of data to look back in the past and say; yes, the rate that our climate is changing has quickened. Until those years pass, we can only use anecdotal evidence to gauge the pace of climate change.

The biggest evidence of this sort is Arctic sea ice and Greenland ice cap melt. Since the turn of the 21st century, both of these massive geologic features of planet Earth have shown marked increases in their rates of melting. This is important for two reasons. One - it makes conservative climate science, in reality, even more conservative because climate is changing faster than the scientists have calibrated their models to represent. These climate models are created around a series of equations and calculations that mimic our climate. Once the computer program is created, the scientists' load weather data from our past climate into the model, turn back the clock and then run the model forward from some point in the past to see how well it reproduces the climate that has already happened. They can adjust their model's fine-tuning so that it exactly mimics the climate changes that have actually happened. So their models are calibrated to predict future climate based on the speed that our climate has changed in the past. If the speed of our current climate has increased, the models will then predict the future climate conservatively.

There is another understanding about climate thresholds that needs to be a part of this discussion. They are important because the scientists have no idea how fast, truly, the climate will cross this threshold and how fast climate will change once one begins, or once they threshold, or tipping point is past. The state of climate knowledge is just not yet advanced enough to understand these things with enough insight to validly influence our understanding. The best way to "see" how climate thresholds can affect climate is to look at past abrupt climate changes and understand that we are changing our greenhouse gas concentrations today at a rate that dwarfs past changes.

The abrupt changes from the past happened routinely. The teeny climate change that we have seen this century pales in comparison in both amount of change and time frame that the change took place. In the last 100,000 years, our climate has experienced 28 abrupt change events where temperature increased or decreased ten to twenty times more than it has in the last century. These changes occurred in less than a lifetime, sometimes less than a decade and on occasion less than a few years.

All of this has happened naturally, with relatively minor changes in greenhouse gas concentrations. Mankind today is changing the greenhouse gas concentration of our atmosphere faster than greenhouses gases changed naturally after the giant asteroid hit the Yucatan Peninsula and all the dinosaurs went extinct 65 million years ago. This is significant considering that the newest theories consider that the extinction was significantly caused by climate change during the centuries and millenia following the asteroid impact. The global firestorm and dust induced winter cataclysms following the impact do not appear to have been strong enough to wipe out 70% of life on land and

90% of life in the oceans. The rapid carbonization of the planet with greenhouse gases also supports the much greater extinction rate in the oceans vs. that on land. A global firestorm and dust and smoke induced winter would have had a greater effect on land creatures than ocean creatures, not the other way around.

The excess CO₂ that caused the climate change and ocean acidification was added to the atmosphere by the fires and oxidation of rocks in the blast zone. The jolt of CO₂ from the asteroid blast caused a carbon dioxide feedback that created the climate change that caused the extinction event. Ocean acidification over time killed the sea creatures. Climate change killed the land creatures.

So, climate change is worse than we understand because we have the conservative nature of the industry of science creating conservative climate models; We have climate changing faster than before, make the models fall further behind because they are not calibrated for the new speed of climate change, and we have the understanding that today we are changing the climate faster than it has naturally changed in 65 million years *AND*, the last time that CO₂ increased as fast as it is increasing today, 70% to 90% of all of the life on the planet went extinct.

They told us there would be more insect infestations on a warmer planet:

This August I spent 18 days on a 5,000 mile filming expedition in the heart of the US Rockies. The expedition was part of my new film on the Great North American Pine Beetle Pandemic that is killing the forests of the Rocky Mountains. I made 13 different campsites between New Mexico and Montana, crossed the Continental Divide 11 times and found dead and dying forests everywhere I went. Five of the campsites where I stayed had to be clear cut of virtually every single tree because of falling hazards to campers.

The pandemic increased 50% from 2007 to 2008, from 34 million to 52 million acres. The Colorado and Wyoming State Forest Services, the Canadian Forest Service, fourteen other governmental agencies, 17 private organizations and eleven non-governmental organizations, in a report by the Rocky Mountain Climate Organization, say that this pandemic is primarily caused by climate change. This outbreak is 30 times larger than the last greatest beetle infestation to ever occur, which took place on the Kenai Peninsula of Alaska. This outbreak killed 3 million acres and ended just after the turn of the 21st century. The US Forest Service, just this year, has finally begun to admit that some of the blame should be placed on a warming world after doggedly refusing to admit that the pandemic was other than a natural cycle.

For scale, the great fires in Yellowstone national park in 1988 burned only 1 million acres. Vermont, New Hampshire and Alabama are roughly equal in size, combined, to 52 million acres. The only thing that can kill the beetle is 40 below zero temperatures for a week or more. These temperatures were common in the Rockies a couple of decades ago, but are not anticipated to return, ever, or at least in time frames that matter.

The Western U.S., on average, has warmed just two and half degrees, which is almost double the world average. Most of the warming has come in winter and this is apparently enough to disrupt the relatively delicate ecosystem of a forest.

The Canadian Forest Service has published a report about the new carbon balance of these dead forests. The report was published in 2006 when 20 million acres were dead in British Columbia. The report found that those 20 million acres of dead trees would emit carbon dioxide, as they decayed, equal to half of the entire CO2 emissions of the entire transportation fleet in Canada,. These emissions would continue for twenty years until the decay was overwhelmed by the new growth of the recovering forests. In 2008, just two years later, there are 37 million acres of dead trees in British Columbia. This pretty much assures that today, the dead trees in BC are emitting as much CO2 as all of Canada's transportation, a these emissions will continue every year, for twenty years. One hundred times this many trees are at risk in Canada alone.

In 2006 the scientists did not think that the beetle would jump host species, or cross the continental divide. Today, both have happened. And today, scientists are concerned that the pandemic may become a continent wide infestation within a generation or less.

But the most dangerous part of this infestation, this increased insect infestation that the climate scientists have been warning us about in a warmer world, is that the forest professional have not been talking with the climate professionals. The U.S. Forest Service is calling this a new beginning. They say that the forest will not be the same for 100 years. This is the time it takes to regrow a mature forest. At the same time, climate scientists are predicting somewhere around ten times more warming than has already occurred. These scientists are using the conservative climate models as their basis for prediction. The Yellowstone National Park Ranger's Reference Manual says that the IPCC climate models predict that the American West will experience up to 13 degrees of warming this century, more in the mountains. The conservative climate models then are predicting what will quite likely be at least 14 degrees of warming this century, in the mountains, which is where most of the forests in the West exist.

The miscommunication goes like this: There is a very definite and linear relationship between altitude and temperature. For every 1,000 vertical feet, temperature drops by 3.5 degrees F. So 14 degrees is equal to 4,000 feet of elevation. Any forester knows that the lowest elevation that trees grow in the Rockies is about 7,000 feet and in many places it is 8,000 or even 9,000 feet. Below these elevations, it is just too dry to grow trees. The dryness is created by warmth. Without the heat, less water would evaporate and more trees, or any trees at all, would grow. So if we warm the temperatures in the Rockies by 14 degrees, it will be like we are pushing the forest zone 4,000 feet up the mountain. At the end of the century the climate at 11,000 feet will be similar to what it is today at 7,000 feet. This basically means that at the end of the century trees will not be able to grow below 11,000 feet.

Now for the good news:

The most recent news from science is that in order to fix the planet, we have to stop emitting greenhouse gases and start removing some the gases in our atmosphere that we have been putting there for two hundred years. Most of the CO2 ever emitted is still in our atmosphere because of its two-century half-life. Compounding this long life of CO2 in the atmosphere is the 30-year climate lag. Today's climate is reacting to the CO2 concentration in our atmosphere 30 years ago. This "lag" is happening because of the great thermal inertia of the oceans, and the long time frames that occur because of the carbon sink of the forests. The carbon dioxide concentration of our atmosphere today will not be reflected in climate change for another thirty years.

But our society is catching on. We are beginning to act. This great challenge will lead us into the next economic era across the planet. The author of the greatest economic treatise ever written on the effects of climate change, sponsored by the British Government, Lord Nicholas Stern of the London School of Economics, says that the new energy economy will reinvent the world like it was reinvented with the invention of the transistor, the automobile, electricity, the computer or the discovery of bacteria or radio waves. The revolution has already begun and it will only continue to grow. It will create a sustainable way of life based on renewable energy and sustainable technologies that will greatly benefit all life on planet Earth.

I have more good news: You might be wondering where in the world we are going to find the money to fund the new energy economy? You might be thinking that we have just about used up any spare cash lying around with the recent economic relief and bailouts.

The economic relief of the Great Depression and the cost of World War II combined were about \$5.5 trillion adjusted for inflation. This amount of money represented deficit spending that is orders of magnitude greater than anything that had ever occurred before. If we scale that \$5.5 trillion by the amount that our economy has increased since the 30s, by the amount that our gross domestic product has increased, we see that this great deficit spending is equal today to about 96 times what it was then. This is somewhere north of \$500 trillion. So in essence, if the risk is high enough, if we are threatened by the total annihilation of the world from a threat such as we had during WWII, we can spend a whole lot more money than we have spent in the recent economic conundrum and still survive.

Economic relief and bailouts total \$2 to 3 trillion now. Even given the fact that our debt to GNP ratio is two to three times higher, we still can spend 100 times more than we have already spent and not do anything different than was done in the Great Depression and World War II.

That's good news. To understand this type of spending I offer one example: A scientist named Lackner has come up with a proven method of removing carbon dioxide from the atmosphere. A device large enough to remove half of our CO₂ emissions every year would cost about five trillion dollars. Can we afford this type of cost? Are the risks great enough? This is good news!