



## Climate Change Revisited

By Dr. Ray Weymann  
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In January 2010 I wrote an essay for CalCoastNews entitled “**The Climate Change Challenge**”. (<http://calcoastnews.com/2010/01/the-climate-change-challenge/>) It is interesting but sobering to see in what ways the picture has and has not changed since then.

A good portion of my 2010 article was in response to misinformation from a local office seeker who repeated some of the most common myths about climate change. In perhaps the most discouraging way in which the situation has *not* changed, these same myths are continually being regurgitated. This, despite the growing evidence for a warming planet, the consequences of this warming, and the dominant role that fossil fuel emissions are playing in this warming. In the following, I have provided references to sources I have used, but in order not to interrupt the flow of reading, I have referenced them in the text as R1, R2 etc. and at the end of this essay provided the links to them.

There have been two significant changes over these four ½ years. *First*, the signs of a changing climate and more extreme weather events are becoming ever clearer. So too are the causes of these signs: the insulating blanket of greenhouse gases we have thrown into the atmosphere, primarily as a result of our dependence on fossil fuels, grows unabated. *Second*, while it is still almost an article of faith for current conservative political office holders to deny the scientific consensus concerning the severe risks of continued heavy use of fossil fuels, a growing number of prominent businessmen, former administration officials, mainstream media, and the insurance industry are recognizing these risks and speaking out publicly.

Let me consider these two items in turn: Hardly a day goes by without some new sign of a changing climate accompanying a warming world. Here are news items *from just the past few weeks*:

### **Health Impacts**

Dr. Margaret Chan, director-general of the World Health Organization (WHO), said there is “*overwhelming evidence that climate change endangers health. “Climate change is already causing tens of thousands of deaths every year from shifting patterns of disease, from extreme weather events, such as heat-waves and floods, and from the degradation of water supplies, sanitation, and impacts on agriculture.”* (R1)

### **Food Supply**

The world is headed “*down a dangerous path*” with disruption of the food system possible within a decade as climate change undermines nations’ ability to feed themselves, according to a senior World Bank official. (R2)

### **Species Extinction**

The combination of climate change and destruction of habitat is already having a severe impact on wildlife and the situation will only get worse. A very recent report from the Audubon Society paints a grim picture for bird life in the U.S.

*The numbers are stark: Of the 588 species Audubon studied, 314 are likely to find themselves in dire straits by 2080. Unless, that is, the oil boomers in the Bakken—and everyone else—start to consider the future. Unless we begin to reduce the severity of global warming and buy birds more time to adapt to the changes coming their way.* (R3)

### **Floods**

*“In Indian-administered Kashmir, heavy monsoon rains led to surging floodwaters and the deaths of at least 175 people. Across the disputed border in Pakistani-administered Kashmir, the floods have claimed more than 60 lives, in addition to 131 in Punjab province. It is the mountainous region’s worst flooding in six decades...”* (R4)

But it isn't just India. Recent record floods have occurred in Detroit, the East Coast of the US, Japan and in Arizona and the incidence of such events in more than expected from natural variability.

### **Ice Sheet Melting and Sea Level Rise**

It is an *observed fact* that global sea levels are rising and at a rate that is now nearly twice what the historical average over the 130 years between 1870 and 2000 has been: **(R5)** The same link will show you the recent melting of the Greenland and Antarctic ice sheets. *Glaciologists have recently concluded that continued melting of portions of the Antarctic ice sheets is irreversible.* **(R6)** See also: **(R7)**

Commenting on this work, glaciologist Eric Rignot, who was lead author of one of the two ice sheet studies, said *"All these studies clearly point toward an increasing contribution of ice sheets to sea level. What the layperson should get out of the recent news, however, is that ice sheet melting is a serious thing, there is no red button to stop it, we can slow it down or get it as fast as we can. Right now, we have chosen the latter"*

### **Drought**

Readers of this column do not need to be told of the severe drought facing most of California. But, as emphasized in a recent excellent report, drought involves more than just the total amount of rainfall. When record heat is added to lack of rain, soil evaporation increases adding to the dryness and exacerbating the heat. As the report notes, the average California 2014 temperature for the period January-June *set an all-time record.* As in the case of floods, we are now seeing the human fingerprint of these events. From drought expert Jonathan Overpeck of the University of Arizona: *"We are fairly certain that the unusual warmth is mostly due to human-caused global warming."* **(R8)**

And, not coincidentally, the CO<sub>2</sub> level in the atmosphere continues to increase rapidly **(R9)**—*"The World Meteorological Organization's (WMO) annual [Greenhouse Gas Bulletin](#) showed that the increase of atmospheric CO<sub>2</sub> from 2012 to 2013 was 2.9 parts per million (ppm), the largest year-to-year increase in 30 years."*

The link between the increased CO<sub>2</sub> present in the atmosphere and a warming, and thus changing, climate is not mysterious. The basic physics has been understood for over a hundred years: CO<sub>2</sub> molecules intercept some of the infrared heat emitted by the Earth's surface and returns a portion of it back to the surface. The more CO<sub>2</sub> in the atmosphere, the larger the fraction of infrared heat returned to the surface. We have increased the amount of atmospheric CO<sub>2</sub> by 40% since the start of the industrial revolution, much of that increase in the last few decades.

I have illustrated some of the recent effects of climate change not to "alarm" but simply to point out that climate change is happening now—it is not some speculation concerning a distant future. I mentioned above that one change is the growing awareness of the need to deal with climate change on the part of many who, by no stretch of the imagination, could be called "tree-hugging environmentalists". Here are some examples, all quite recent:

Former Treasury Secretaries, Robert Rubin and Henry Paulson—one a Democrat, the other a Republican, have spoken forcefully on this issue: Rubin states that *"the costs of ignoring climate change are catastrophic"* and concludes that *"We do not face a choice between protecting our environment or protecting our economy. We face a choice between protecting our economy by protecting our environment – or allowing environmental havoc to create economic havoc."* **(R10)**

In a June 2014 opinion piece Secretary Paulson says: *"There is a time for weighing evidence and a time for acting. And if there's one thing I've learned throughout my work in finance, government and conservation, it is to act before problems become too big to manage... We're staring down a climate bubble that poses enormous risks to both our environment and economy. The warning signs are clear and growing more urgent as the risks go unchecked.* He goes on to advocate a tax on carbon. **(R11)**

Four previous Republican EPA administrators serving Republican Presidents have also spoken out on this issue: They *"have a message that transcends political affiliation: the United States must move now on substantive steps to curb climate change, at home and internationally..."* and go on to state that *"the costs of inaction are undeniable"*. They also suggest that *"A market-based approach, like a carbon tax, would be the best path to reducing greenhouse-gas emissions."* **(R12)**

Increasingly, the insurance industry, both at home and abroad is recognizing the seriousness of this issue: In an article headlined "For Insurers, No Doubts on Climate Change", we read *"Most insurers, including*

*the reinsurance companies that bear much of the ultimate risk in the industry, have little time for the arguments heard in some right-wing circles that climate change isn't happening, and are quite comfortable with the scientific consensus that burning fossil fuels is the main culprit of global warming. (R13)*

I want to close with comments about “expertise” and “opinion”. If a licensed electrician comes to my house and says that some wiring is unsafe and that opinion is confirmed by another licensed electrician, I give those opinions more weight on that subject than I would from my dentist. If this were an opinion piece about the dangers of smoking, the need for sunscreen when being outside in the sun, or the benefits of exercise and a healthy diet, it would attract little comment, pro or con. We acknowledge that there are people whose training in specific areas has given them expertise and whose opinions we should give more weight to than those without such training.

My experience though, is that this is seldom the case when talking about climate change—and especially on the part of those who deny that human-caused climate change is occurring. They all consider themselves “experts”. They troll through the more prominent denier websites and opine indignantly in the comments following the opinion piece. But they rarely understand the basic physical laws governing the climate, whether it is the laws of radiative transfer, thermodynamics or hydrodynamics. And they are rarely present when invited to come to talks by climate scientists who *do* have that expertise and where they can be shown the observations supporting the material I have described above.

We hear a lot of talk these days about “critical thinking”. That means discarding preconceptions based upon ideology, taking the time and making the effort to be exposed to the data and gaining some understanding of the basic science. For those who want an introduction to this topic by real climate scientists—with no ideological or financial axe to grind I recommend the booklet prepared under the auspices of the American Association for the Advancement of Science (R14). I especially recommend the excellent video with one of the authors, a past President of the American Meteorological Society (R15).

Links to references:

R1 <http://who.int/mediacentre/news/releases/2014/climate-health-risks-action/en/>

R2 <http://www.smh.com.au/environment/climate-change/climate-change-may-disrupt-global-food-system-within-a-decade-world-bank-says-20140827-108w8x.html> - ixzz3BhY10o86

R3 <http://climate.audubon.org/article/storm-gathers-north-american-birds>

R4 <http://www.washingtonpost.com/blogs/worldviews/wp/2014/09/08/kashmirs-epic-floods-link-india-and-pakistan-in-disaster/>

R5 [http://climate.nasa.gov/key\\_indicators/](http://climate.nasa.gov/key_indicators/)

R6 <http://www.scmp.com/news/world/article/1511468/melting-west-antarctic-glaciers-irreversible-two-grim-studies-find>

R7 <http://www.latimes.com/science/environment/la-sci-0513-antarctic-ice-sheet-20140513-story.html>)

R8 <http://www.usatoday.com/story/news/nation/2014/08/11/record-heat-extreme-drought-california/13904797/>

R9 <http://thinkprogress.org/climate/2014/09/09/3564900/wmo-climate-change-co2-report/>

R10 <http://www.rtcc.org/2014/08/04/robert-rubin-costs-of-ignoring-climate-change-are-catastrophic/>

R11 <http://www.nytimes.com/2014/06/22/opinion/sunday/lessons-for-climate-change-in-the-2008-recession.html?module=Search&mabReward=relbias&>

R12 [http://www.nytimes.com/2013/08/02/opinion/a-republican-case-for-climate-action.html?\\_r=0](http://www.nytimes.com/2013/08/02/opinion/a-republican-case-for-climate-action.html?_r=0)

R13 <http://www.nytimes.com/2013/05/15/business/insurers-stray-from-the-conservative-line-on-climate-change.html?pagewanted=all>

R14 <http://whatweknow.aaas.org/wp-content/uploads/2014/03/AAAS-What-We-Know.pdf>

R15 <http://whatweknow.aaas.org/marshall-shepherd/>

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