

It's Wet & Cold, Good Thing Climate Change is Over!

Hi Everyone,

Lots of weird weather out there in recent months and years, and given that much of it across North America has consisted of record snowfalls, flooding, and cool temperatures, it again raises questions with some regarding whether anthropogenic climate change is real or imagined. This week, therefore, I thought I'd make a bit of a digression from the discussion regarding climate change & aquatic thermal regimes to discuss why global warming is still happening despite all the weirdness.

There are three things to consider at times like these when the question of "is it happening?" is raised. The first two have to deal with scale and how that affects the patterns we as humans perceive in the environment around us. Temporal scale, or the length & specific slice of time over which a system is viewed, matters because the climate, just like the weather, is variable. There always have been and will be times when it's warming or cooling more rapidly than others. The attached paper by Easterling & Wehner illustrates quite nicely how it's possible to come up with whatever answer you want by cherry picking the global climate models and observational record. To really see the underlying trends in the global climate system, therefore, you have to look at a sufficiently long period of decades.

Part of what drives periodic acceleration/deceleration of climate warming in some parts of the world also has to do with climate cycles like El Nino, the Pacific Decadal Oscillation, or the Atlantic Oscillation. The first two, in particular, often have dominant influences on annual climates across much of the western US, with things tending to be wet & cool in the Northwest while it's warm & dry in the Southwest or vice versa. Moreover, the PDO seems to be flipping to a negative phase the last several years (cool in Northwest, warm in Southwest; graphic below) & the latest version of the time-series can be seen here (<http://jisao.washington.edu/pdo/>).

Closely allied with the temporal scaling issue is that regarding spatial scale. Not all areas of the globe are warming at the same rate all the time due to those regional climate cycles and other factors that effect the heterogeneous distribution of heat energy. As such, even as the earth's average temperature continues to set or approximate new record highs each year, some regions can be anomalously cold. And in fact, a "cold spot" of sorts has been over much of North American during significant parts of the last few years (graphics below).

The final point to consider regarding climate change and sometimes anomalous or counterintuitive weather patterns is that there are two main predictions coming out of the global climate models. The first is the one we're all familiar with in terms of air temperature increases. The second, however, pertains to the amount of variation that's associated with temperature. That variation is predicted to increase relative to the mean so that as it warms, the climate is also expected to become more variable & more extreme extremes should result over time. This increased variation means that it's quite possible to simultaneously be setting new record *cold* temperatures even as we're setting new record warm temperatures. It's just that we're setting twice as many record highs as lows these days and the ratio is trending towards a greater proportion of record warm temperatures (see attached Meehl et al. 2009). With the rate at which

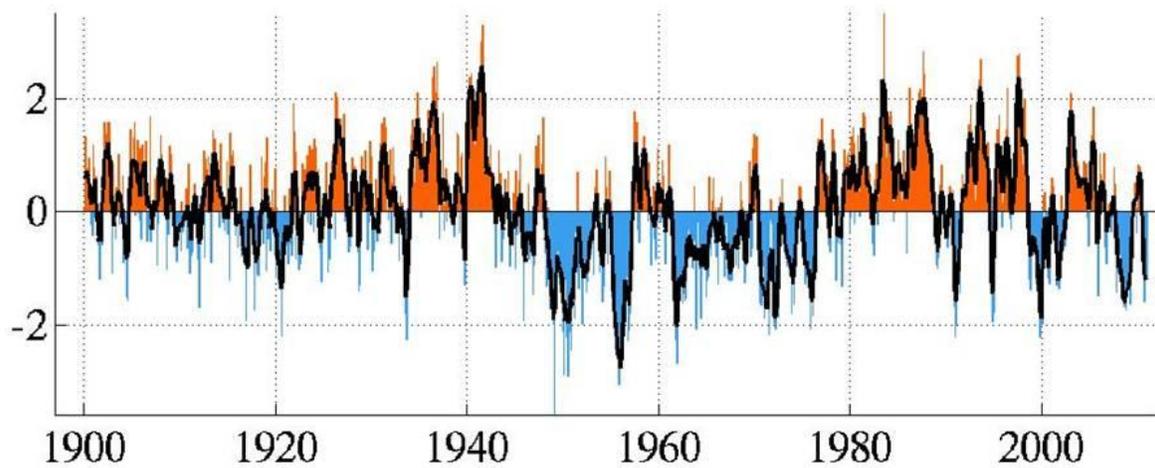
greenhouse gases are being poured into the atmosphere & the length of time over which those gases act on the climate system, there's almost certainly a lot more weirdness in our future.

Have a happy & cool 4th of July.

Best regards,

Dan

monthly values for the PDO index: 1900-2010



<http://jisao.washington.edu/pdo/>

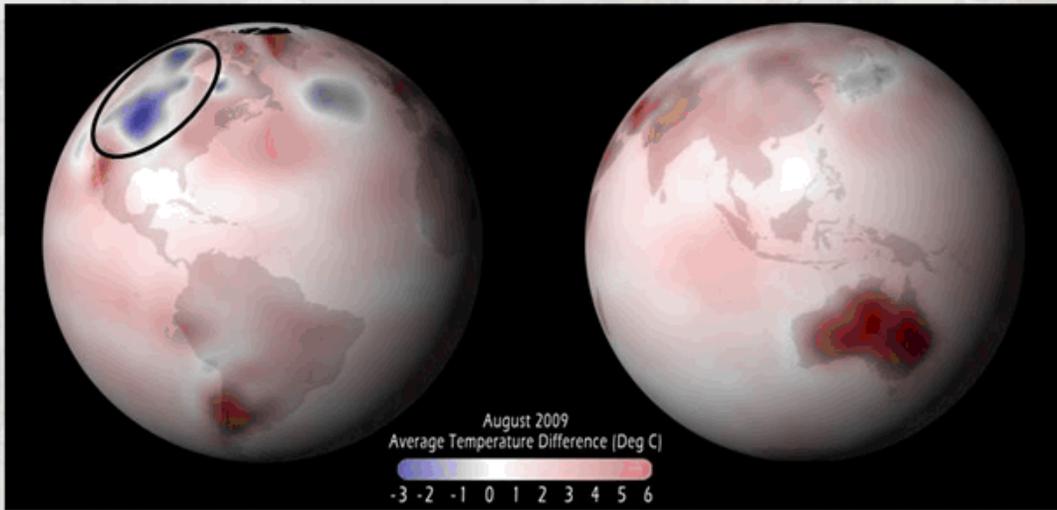
August 2009 temperatures relative to 1961-1990 average



NOAA

September 16, 2009, 2:23 PM

August Seas Warmest in at Least 120 Years



National Survey Finds Public Concern About Global Warming Drops Sharply

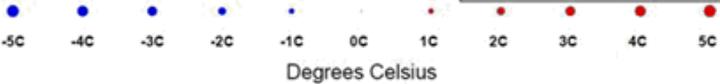
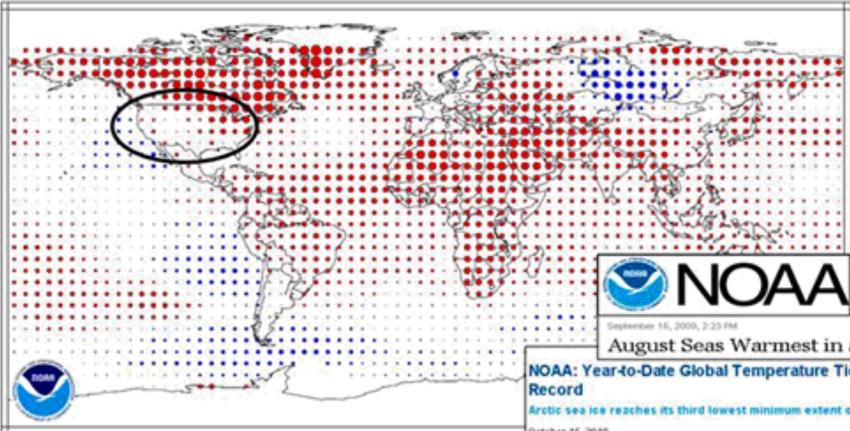
January 29, 2010, CBB



Temperature Anomalies Jan-Sep 2010

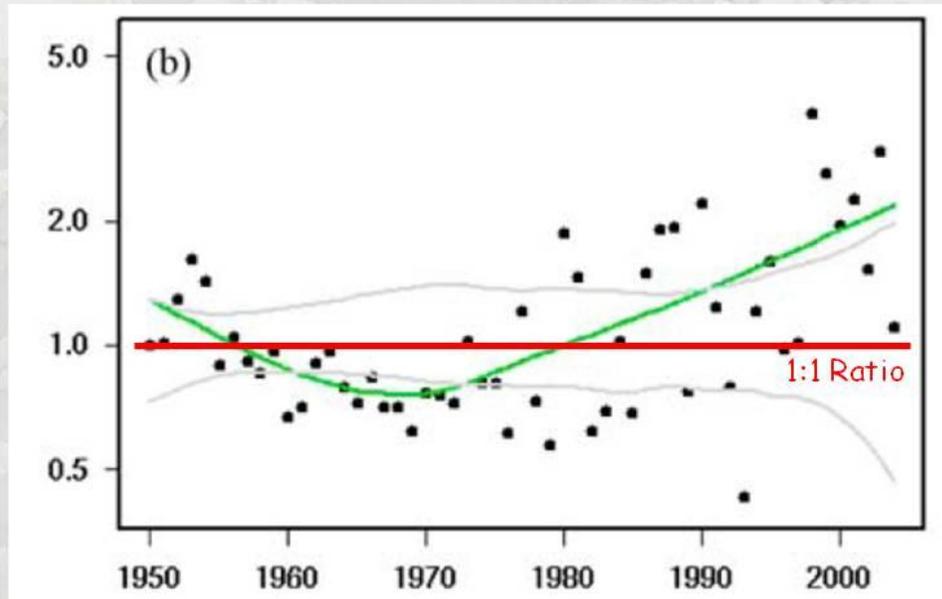
(with respect to a 1971-2000 base period)

National Climatic Data Center/NESDIS/NOAA





Ratio of Annual Tmax to Tmin Records for Historical Observations Across US



Meehl et al. 2009. *Geophysical Research Letters*, Vol. 36, L23701, Doi:10.1029/2009gl040736