An Ad Hoc Reconciliation of Global Temperature Anomaly Methodologies

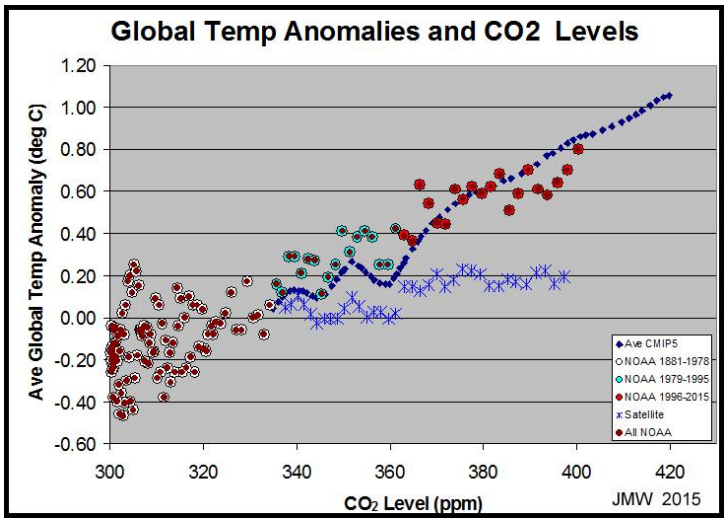
Joel M Williams ©2015

Abstract

The Global Temperature Anomalies (GTAs) of NOAA land-ocean data, RSS satellite data, and computer modeling give different answers to what might actually be or will be happening. This paper addresses the issue in a slightly different manner than usual: CO_2-scaled instead of time-scaled. Simple treatments needed to make them all coherent are examined. In short, the treatments indicate that the GTAs can be related to atmospheric CO_2 level without stipulating why. After the adjustments, GTAs are estimated to be neither as dire as models indicate nor as minor as published satellite data indicate. How much of the GTA variations are actually caused by CO_2 is left for the pro/con fractions to access.

Since there is so much division on the global warming issue and its relationship to atmospheric CO_2 levels, I thought I might look at the issue from the viewpoint that there should be some point at which there is commonality. Rather than look at the matter on a time-scale, I thought I would approach it on a CO_2-level-scale.

Global temperature anomalies (GTAs) from the land-ocean[1] and satellite[2] measurements, and computer models[3] were associated with the atmospheric CO_2 level[4] for the same calendar time. The GTAs from each are plotted in the figure on the right, as a function of atmospheric CO_2 level. The NOAA land-ocean data set is marked "All NOAA". It is also broken out into 3 groups: 1881-1978 (<335ppm CO_2), 1979-1995 (335-360ppm), and 1996-2015 (>360ppm) for reasons that will become clear.



Some observations:

1. Approximately ±0.3°C anomalies have occurred in the last 135 years for the same level of CO_2. The 1881-1978 data triangulate to about 335ppm as the population of annual datum for the rising CO_2 level decreases.
2. The baseline period where all of the data should come together is in the 1978-1995 (335-360ppm CO_2) time period. This is the starting "block".
3. There is significant difference between the NOAA and Satellite appraisals of the GTA.
4. The NOAA data from 1996-2015 (>360ppm CO_2) look like a good fit of the average of the CMIP5 models, but the data in the file do not fit the 1979-1995 (335-360ppm CO_2) span where they should be the most certain and when the modeling started.
5. The Satellite anomalies of the troposphere are lower than the NOAA land-ocean anomalies, but exhibit similar "character". Remote Sensing Systems (RSS) received support from NOAA and NASA.
6. GTAs in the 370-400 range: 0.61°C ±0.09 (NOAA), 0.19°C ±0.03 (Satellite); both are fairly flat in this range and above those in the 335-360 range; their mean is ~0.4°C.

---

[1] NOAA global land-ocean; Jun-May data from 1881-2015

[2] RSS Satellite data was digitized from a figure courtesy of John Christy, UAH. That figure is in the APPENDIX

[3] The "average of 32 modeling programs" was digitized from the figure listed in ref 2

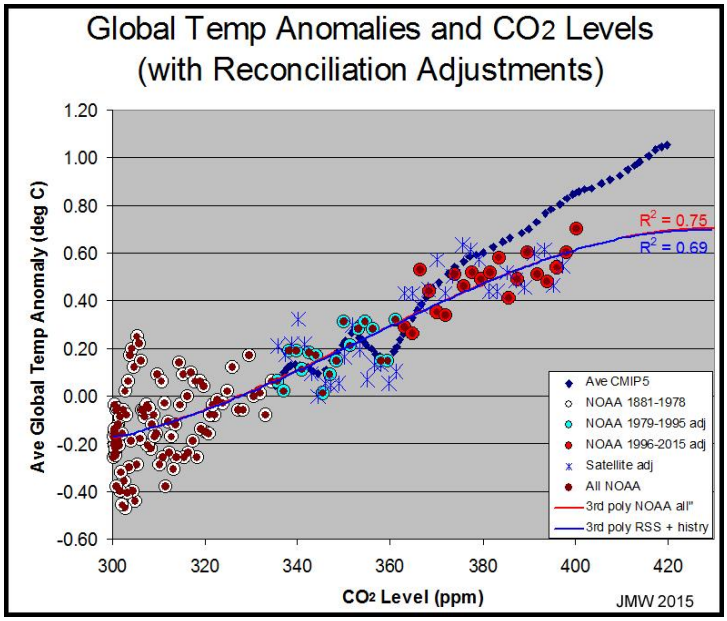
[4] CO2 Annual Mean - NOAA; eqn used: $CO_2 = 0.012*(yr-1959)^2 + 0.8473*(yr-1959) +315.22$

What can be done to reconcile these differences? I will address the NOAA and Satellite data and NOT the model curve. The CMIP5 ave in the 1978-1995 period will be the rallying point. The adjustments that I see are needed for a reconciliation will be presented. Then the previous plot will be shown with those adjustments made to the data.

1. **Adjustment of the NOAA land-ocean data.**
   - The data as they are now in the NOAA file were used without considering how they were produced or why they might have been altered.
   - The NOAA 1979-1995 (335-360ppm CO_2) data are 0.1°C too high. All of the data from 1979-2015 (335-400ppm CO_2) will be lowered by this amount.

2. **Adjustment of the Satellite data.**
   - The similar character of the Satellite and NOAA land-ocean data seem to indicate that the two simply differ by response factors and assemblage algorithms. Assuming that the computer models use NOAA land-ocean data, the satellite data need to be increased by 2.5x to be included with the land-ocean data. After the 2.5x change, the Satellite data are still a relatively flat constant at 0.5°C ±0.1°C in the 370-400 ppm range. As the Satellite data is low relative to the others in the 1979-1995 range, they are elevated +0.06°C.

The following figure reflects the adjustments that have been detailed above.

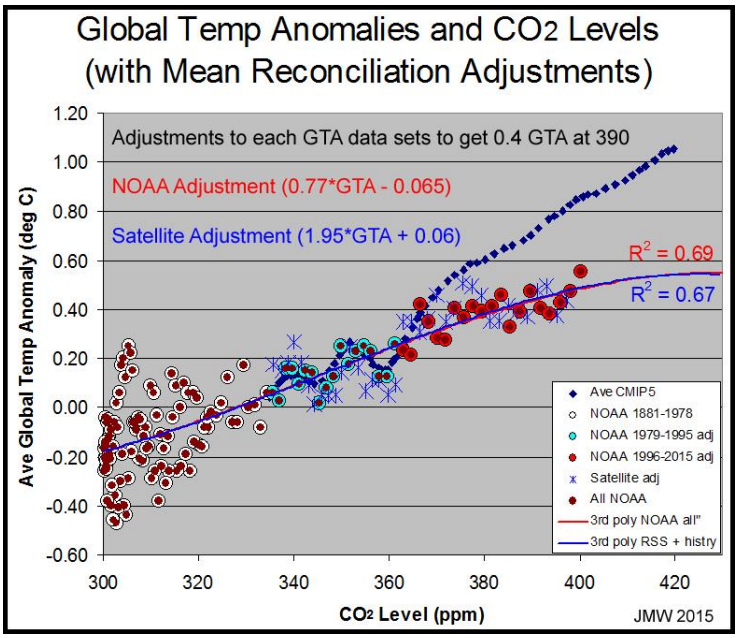


The adjustments lead to overlapping fits of 3rd degree polynomials. The Satellite data are slightly more scattered and thus give a lower R^2 than the NOAA data do. The 1881-1978 (<335ppm CO_2) historical data are included in each separate regression.

What is to be gathered from this?

1. An increase in global temperature anomaly can be correlated with a rise in CO_2 level. But, is the relationship due to CO_2 or just a coincidence related to non-CO_2 causes that can be modeled as if they were CO_2-induced? This uncertainty fuels the pro/con debate.
2. The adjusted measured data do NOT indicate that global temperature anomalies will be much above what it is now, regardless of what it is now!
3. The CMIP5 "average" computer model overstates the effect of higher levels of atmospheric CO_2. Many of the models (see the APPENDIX) are especially glaring in this respect. Modelers need to determined why and change their programs to reflect the "composited" measured data. A good start would be a mimicking of the non-CO_2 0.2°C "dip" around 380 ppm as the "dips" in the 340-360 ppm range were modeled. In fact, why aren't there any significant "dips" in the average model output after 370ppm CO_2?
4. One has to recognize that the time period during which the data are modeled is quite short relative to the 100,000 year cycles in which global temperature anomalies change from highs of +3°C to lows of -9°C. CO_2-driven models will breakdown as GTAs dip drastically because of natural (geo and cosmic) causes, even with the CO_2 level remaining high.

In deference to those who want the same adjustment concessions for both NOAA and Satellite methodologies, the following figure has been generated. Adjustments are made to both the NOAA land-ocean and Satellite data so that their reported GTA average in the 380-390 ppm CO_2 range both give the same mean: ~0.4°C GTA. This adjustment removes the abrupt increase in GTAs that the average of the models indicates in the 365-375ppm CO_2 range. In fact, why wouldn't a relatively smooth transition be expected? I presume that neither pro-CO_2 warming nor anti-CO_2 warming camps will be happy.



Weather (local/regional/continental) on planet earth will continue to be variable, and sometimes extreme, as it always has been. Glaciers will melt and eventually reform; seas will rise and eventually fall. Planet earth has gone through many "deep" and "minor" hot-cold cycles; even during mankind's existence. Of course, mankind has been polluting the environment for only a short period of geo-time, but with increasing vigor. Visible pollution is "filth" that does not disappear on land quickly and affects water environments when dumped into or seeps into aquifers, rivers, lakes and oceans. Atmospheric pollution of NOX, rocks, smog, etc are clear (sic) example of mankind's presence. If this middle ground with respect to GTAs is what the situation actually is now, however, then the mucho fusso about CO_2 driving global warming to disastrous extremes amounts to nothing compared to the problem of the mankind's accumulating "filth"; except, of course, that GTA modeling has gone drastically wrong!

APPENDIX

Figure courtesy of John Christy, UAH