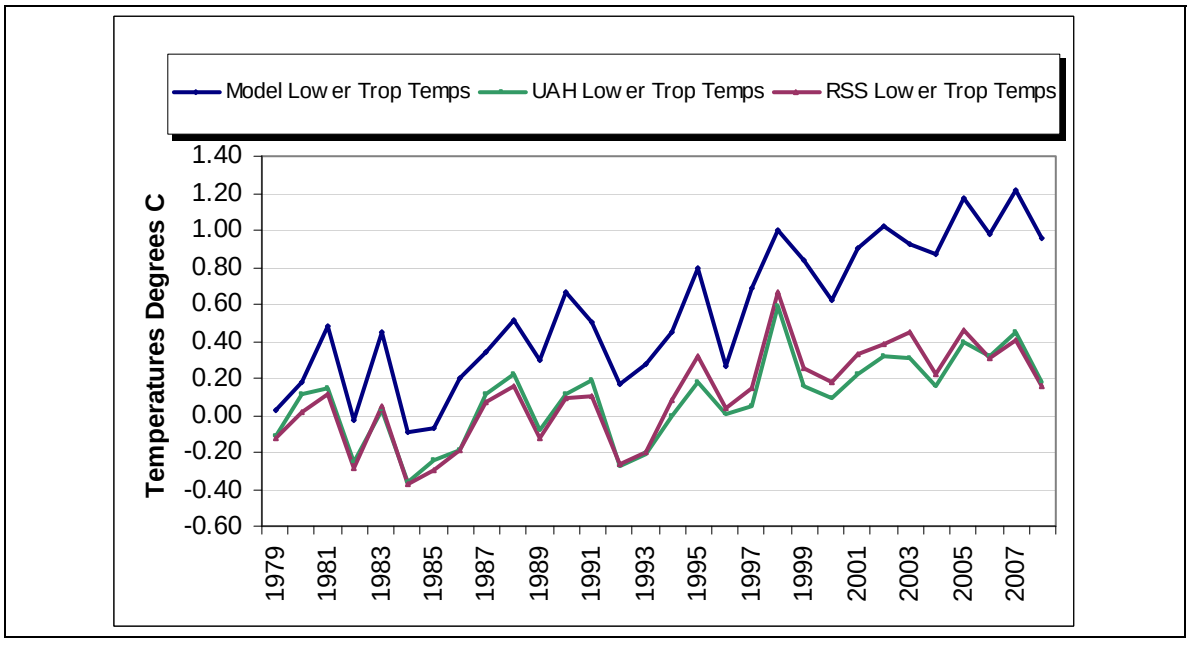
Klotzbach etal Paper – Further Explored

Our recent SPPI paper covered the many issues with the data including station dropout, missing data, bad siting (largely the result of the modernization), instrument biases, and then the adjustments which dozens of peer review papers show are important and many show could account for up to 50% of the claimed warming since 1900. See this response to NOAA and the EPA that includes that here.

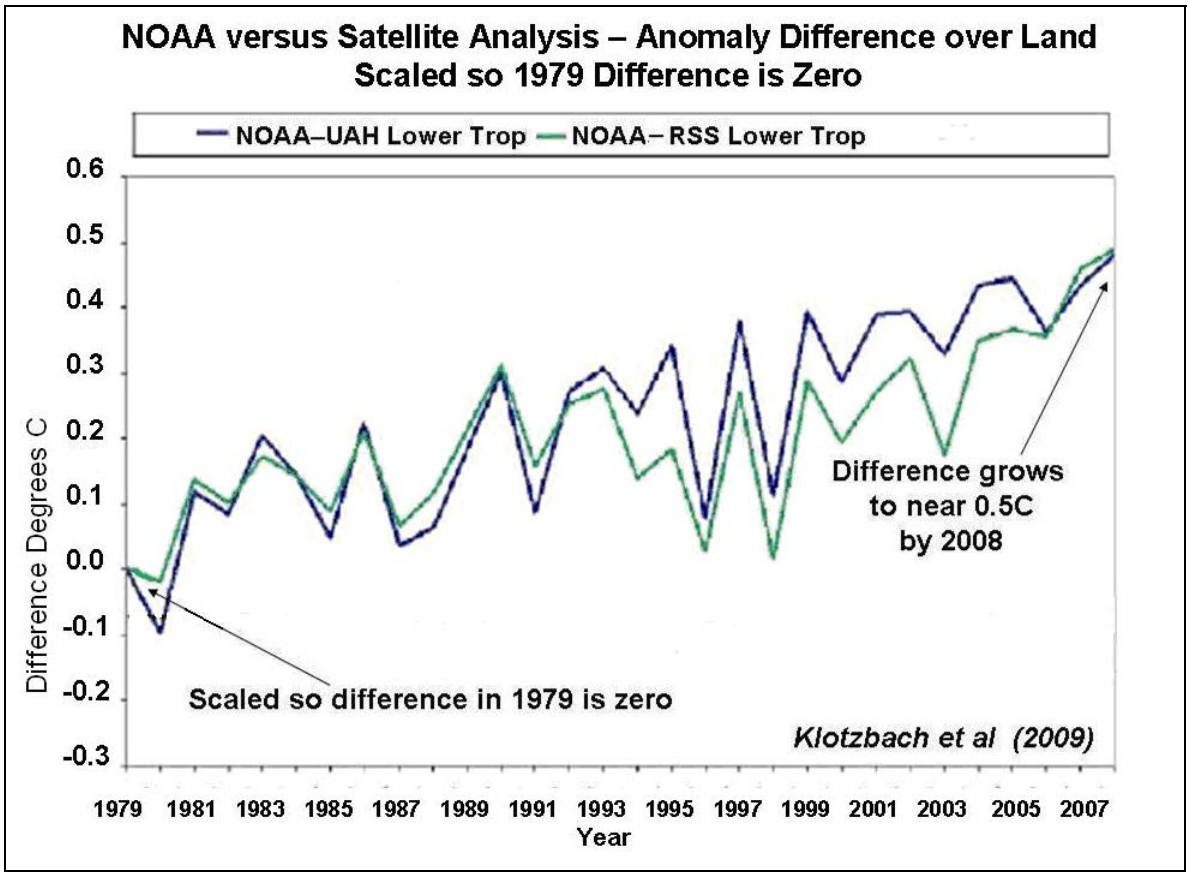
The station dropout issue is not new. I wrote about it in the 1990s in the first generation Intellicast blog and this story in 2001 by former NOAA, NASA scientist and later chief scientist at Raytheon, Dr. Doug Hoyt put it this way "support for this idea comes from the fact that 135 stations in the USSR ceased observing at the end of 1989. Subsequently there appeared to be a warming in the USSR but this warming is not supported by pressure observations. Thus, it appears half or more of the reported global warming from ground observations is arising from this change in station coverage. It is possible that as much as 0.2 C of the 0.25 C warming for 1979-1999 can be explained by this change in stations, although more study is required to refine this number."

PEER REVIEW SUPPORT FOR SURFACE DATA ISSUES

When the satellites were first launched, their temperature readings were in better agreement with the surface station data. There has been increasing divergence over time which can be seen below (derived from Klotzbach, et al 2009). In the first plot, we see the temperature anomalies as computed from the satellites and assessed by UAH and RSS and the station based land surface anomalies from NOAA/(NCDC). That increased divergence is clear from the figure below.



The Klotzbach paper finds that the divergence between surface and lower-tropospheric trends is consistent with evidence of a warm bias in the surface temperature record but not in the satellite data.



NOAA annual land temperatures minus annual UAH lower troposphere (blue line) and NOAA annual land temperatures minus annual RSS lower troposphere (green line) differences over the period from 1979 to 2008

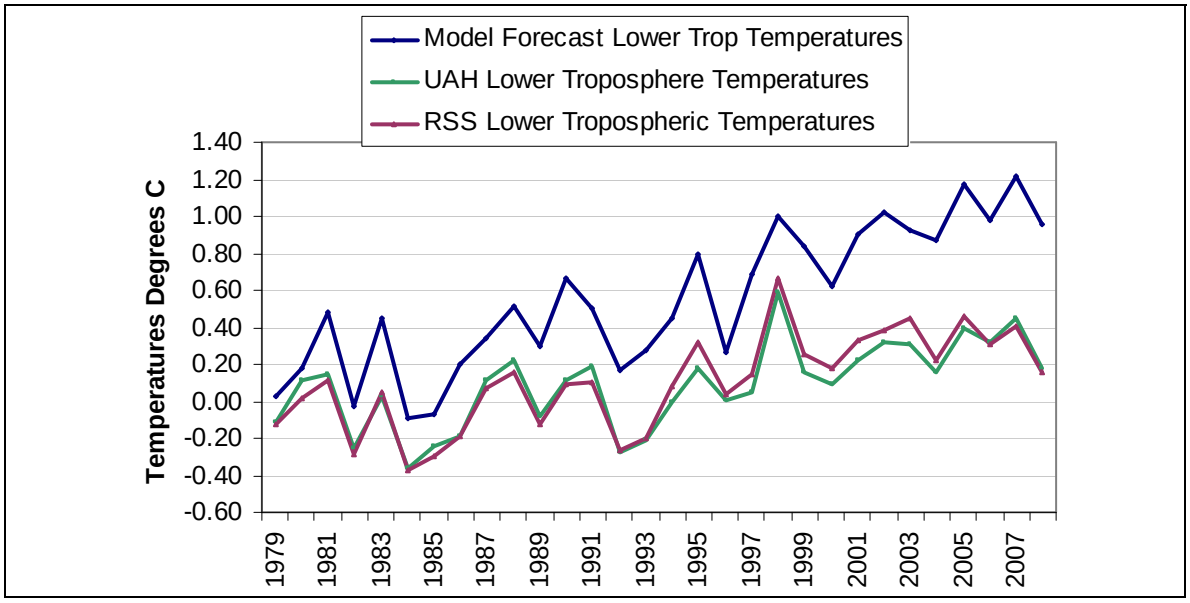
Klotzbach et al described an 'amplification' factor for the lower troposphere as suggested by Santer et al (2005) and Santer et al (2008) due to greenhouse gas trapping relative to the warming at the surface. Santer refers to the effect as "tropospheric amplification of surface warming". This effect is a characteristic of all of the models used in the UNIPCC and the USGRCP "ensemble" of models by Karl, et.al. (2006) which was the source for Karl et al (2009) which in turn was relied upon by EPA in its recent Endangerment Finding.(Federal Register / Vol. 74, No. 239 / Tuesday, December 15, 2009 / Rules and Regulations at 66510 **)**

As John Christy describes it "The amplification factor is a direct calculation from model simulations that show over 30 year periods that the upper air warms at a faster rate than the surface - generally 1.2 times faster for global averages. This is the so-called "lapse rate feedback" in which the lapse rate seeks to move toward the moist adiabat as the

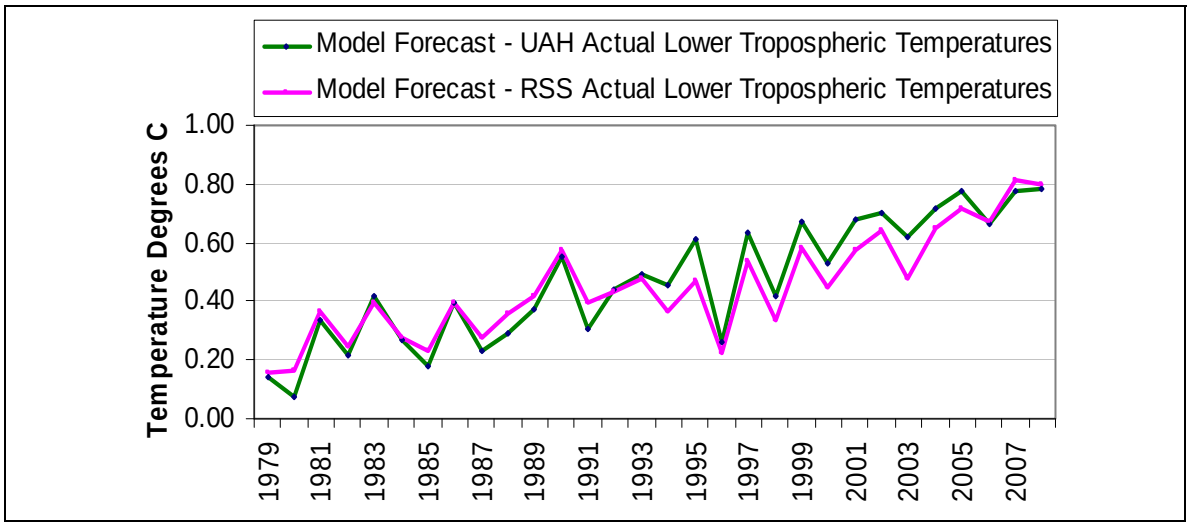
surface temperature rises. In models, the convective adjustment is quite rigid, so this vertical response in models is forced to happen. The real world is much less rigid and has ways to allow heat to escape rather than be retained as models show." This latter effect has been documented by Chou and Lindzen (2005) and Lindzen and Choi (2009) .

The amplification factor was calculated from the mean and median of the 19 GCMs that were in the CCSP SAP 1.1 report (Karl et al, 2006). A fuller discussion of how the amplification factor was calculated is available in the Klotzbach paper here.

The ensemble model forecast curve (upper curve) in Figure 3 below was calculated by multiplying the NOAA NCDC surface temperature for each year by the amplification factor, since this would yield the model projected tropospheric temperature. The lower curves are the actual UAH and RSS lower tropospheric satellite temperatures.



The total divergence of the observed NOAA temperature and satellite temperature difference from the model forecast trends is depicted in the figure below.



These figures strongly suggest that instead of atmospheric warming from greenhouse effects dominating, surface based warming due to factors such as urbanization and land use changes are driving the observed changes. Since these surface changes are not adjusted for, neither trends from the surface networks nor forecasts from the models can be considered reliable.

This is why the NOAA and NASA press releases should be ignored. The surface based data sets have become seriously flawed and they and the climate models can no longer be trusted for climate trend assessment.

References:

Chou and Lindzen (2005), Comments on "Examination of the Decadal Tropical Mean ERBS Nonscanner Radiation Data for the Iris Hypothesis", J. Climate, 18, 2123-2127)

Karl, T.R., Hassol, S.J., Miller, C.D., Murray, W.L., Editors, SAP 1.1" Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences." 2006. A Report by the Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC.

Karl, T., J. Melillo, and T. Peterson (Eds.) (June 2009)Global Climate Change Impacts in the United States. Cambridge University Press, Cambridge United Kingdom. This is the CCSP Unified Synthesis Product.
http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts

Klotzbach, P. J., R. A. Pielke Sr., R. A. Pielke Jr., J. R. Christy, and R. T. McNider (2009), An alternative explanation for differential temperature trends at the surface and in the lower troposphere, J. Geophys. Res., 114, D21102, doi:10.1029/2009JD011841.

Lindzen, R. S., and Y.-S.Choi (2009), On the determination of climate feedbacks from

ERBE data, Geophys. Res. Lett., 36, L16705, doi:10.1029/2009GL039628.

Santer, B.D., Wigley, T.M.L., Mears, C., Wentz, F.J., Klein, S.A., Seidel, D.J., Taylor, K.E., Thorne, P.W., Wehner, M.F., Gleckler, P.J., Boyle, J.S., Collins, W.D., Dixon, K.W., Doutriaux, C., Free, M., Fu, Q., Hansen, J.E., Jones, G.S., Ruedy, R., Karl, T.R., Lanzante, J.R., Meehl, G.A., Ramaswamy, V., Russell, G. and Schmidt, G.A. 2005. Amplification of surface temperature trends and variability in the tropical atmosphere. Science ***309****: 1551-1556.*

Santer, B. D., et al. (2008), Consistency of modeled and observed temperature trends in the tropical troposphere, Int. J. Climatol., 28, 1703– 1722, doi:10.1002/joc.1756.