For Temperature Change Assessments, We Can't Ignore the Urban Factor

In the All About Climate paper on the Urban Heat Island or UHI, we discussed the importance of urban growth on local climate. Few could argue that urban areas are not warmer in the mean than surrounding rural areas. On many nights, especially in winter, in dry air and with light winds, the difference can easily be 10 degrees F or more.

The IPCC and NCDC with their GHCN and NASA with their GISS data bases admit the importance locally but suggest the effect or urbanization on the global data bases is small and can be neglected. This judgment is largely based on the comments in a paper in 2003 by Petersen that stated: ***"Contrary to generally accepted wisdom, no statistically significant impact of urbanization could be found in annual temperatures."***

In recent blogs here and here by Stephen McIntyre, Steve discusses Petersen's paper, his analysis and errors in the analysis and conclusion. The IPCC did not bother to dig deeper before discounting the urban heat island effect.

In these blogs you see Petersen's apparent cherry picking of data points and the mischaracterization of some urban areas as rural and rural as urban. Such sloppy work with regards to data gets by the reviewers too often today and should never get by the scientists charged with the important job of assessing the true degree and thus future threat of climate change.

Another paper surfaced this week in the *Journal of Geophysical Research-Atmospheres by Della-Marta et al.*, in which the authors blatantly admitted to cherry picking stations and adjusting data (downward) in the early warm part of the record allegedly because of changes in instrumentation. They said this suggested a warming of 1.6C instead of 1.3C since 1880 in Europe.

That kind of questionable research flies by the reviewers and gets national publicity while the many peer review studies that have shown 50% or more of the warming during this time may be due to the data issues such as urbanization, land use changes, station dropout and increasing missing data, is totally ignored by the IPCC and the media.

Too much of the meteorological community prefers to ignore the problems existing today with siting and land use changes despite all the hard work and evidence presented to the contrary by many authors listed in the reference list on the Urban Paper linked to at the top of this blog. We are told these local issues are either as indicated not unimportant and either are or will be taken care of by additional adjustments after homogeneity checks with surrounding stations. In the next version of the USHCN due out any day, we are told the UHI adjustment will no longer be needed. I believe it was the best part of the original version. Anyone want to bet the new version suddenly looks more like a stick used by the NHL?

A new paper by Pielke Sr et al in the latest BAMS called Documentation of uncertainties and biases associated with surface temperature measurement sites for climate change assessment has been published. It addresses these issues in detail.

THE ORIGINAL USHCN HAD THE BETTER APPROACH

Though the original NCDC USHCN data base issued in 1990 has issues with station siting, it did a lot of things right. In their original USHCN analysis, Karl used the work of Oke and the father of climatology, Helmut Landsberg on the urban heat island to make a sliding adjustment for population, an urban heat island adjustment. Recent tweaks since the original data set seemed to move away from the original approach as we showed in the New York City Central Park study we did. In that analysis we found both the raw data and the data had the adjustment remained past 1990 would have shown a similar trendless pattern though at significantly different levels. The unexplained change in the adjustment introduced a warming not in the raw data.

That is because NYC because a very long time ago and has changed little for many decades. After cities reach city status they stay warmer but the incremental warming slows or stops. The same trendless though wavy temperature curves can be seen in many rural areas that remain rural in the USHCN and even the GISS/GHCN global data bases.

It is the rural areas that become towns, small towns that become bigger towns, towns that become cites where the warming seen is the greatest. Also some sites have land use changes or see some siting changes that produce a sudden shift (most often a warming). These siting issues have been documented by Roger Pielke Sr. on Climate Science, Stephen McIntyre on Climate Audit and Anthony Watts et al.on Surface Stations. Those locations are what cause the global unadjusted data sets to show the warming it does.

As Doug Hoyt has noted, in 1900, world population is 1 billion and in 2000, it is 6 billion for an increase of a factor of six. If the surface measuring stations are randomly distributed and respond to this population increase, it would equal 2.2 log (6) or 1.7 C (Oke's equation for UHI with population change), a number already greater than the observed warming of 0.6 C. If however we note that UHIs occur only on land or 29% of the Earth's surface, than the net global warming would be 0.29*1.7 or 0.49 C which is close the observed warming. It is not out of the realm of possibility that most of the twentieth century warming was urban heat islands.