Summer 2010: Perception vs. Reality

Early in 2010, all signs pointed toward a warmer summer in the middle Mississippi region [1], and this would be related to the weakening El Niño [2],[3]. The forecast, however, did not go far enough because we did not anticipate how quickly La Niña conditions would take hold [4]. When asked about the possibility of a warm summer, I reminded people that the last few summers have been relatively cool, so even a normal summer may seem warm.

As the summer moves into late August, I have heard many in the media and in the local general public wonder aloud about this summer being the consequences of anthropogenic global warming, and that this summer has been the hottest in recent decades [5]. Putting this summer into context locally* would demonstrate that while it is the hottest summer of the decade, and the warmest since 1980, it is only the 11th warmest overall in 120 years. Of the ten warmest summers nine of them occurred before 1960. Summers as of late have been cooler in our region.

While the years 2005-2007 were warmer than normal, these summers did not rank in among the top 20 for our region. This current summer follows a stretch of summers that have been cooler overall as four of the last eight have been below normal, some of these by quite a bit. The summer of 2004 and 2009 ranked as the 3rd and 9th coolest overall in our region, respectively.

Adding to the woes of this summer locally have been the relatively high dew points brought on by excessive precipitation in our region in the early part of the summer. Additionally, it has not been the maximum temperatures that have been the problem (we have failed to reach 100 degrees for the third consecutive year), it has been the consistently high minimum temperatures. While it is too early to tell what has happened nationwide, my guess is the story is much the same in other regions as well.

Globally, we have heard about the heat in Russia and the Middle East, and flooding in Pakistan. While this may seem like it is a consequence of climate change, this summer season is not unlike another recent summer, that of 2003. That year, it was warm summer that followed the relatively cold winter of 2002-2003. That year, like this one followed a weak El Niño event.

This El Niño that was different from others in that main sea surface temperature anomaly was located over the central tropical Pacific rather than the over the eastern Tropical Pacific. We [2], [3] have found that these type of weak El Niños could be associated with colder winters over the eastern USA rather than warmer winters which are routinely forecast to occur. Additionally, we have found that as El Niño transitions back toward La Niña, a warm summer over North America is generally the result [2][3].

In 2003, as a warm summer set in, a strong heat wave also occurred over western Europe and many in France perished. This year, we have seen a repeat of these type of conditions as the Northern Hemisphere has been relatively warm. The excessive heat became established over Russia instead during this summer due to a phenomenon called blocking [6]. Blocking causes large-scale weather patterns to stagnate, and if a ridge is established over a continent during the summer, it will be hot. We have seen this type of activity over Europe in 2003, Alaska in 2004 [7], and now Russia in 2010[8].

Is this really the hottest summer globally? While some have reported that it is [8], an examination of the global weather as a whole would suggest it is not [9]. Lost in much of the noise has been the fact that in the Southern Hemisphere, especially South America, conditions have been much colder during their winter with unprecedented snows in many areas not used to them. There is also some speculation that this summer's global warmth has been exaggerated by those with an agenda.

So, while this summer has seemed to be miserable compared to the last few, it has been much worse in the past, is due to natural phenomenon (not anthropogenic climate change), and thankfully the heat should be winding down as August wears on and September comes in. Additionally, it is hoped that the Russian heat wave will draw more attention to the weather phenomenon of blocking that is difficult to forecast [6], [7] but largely overlooked.

*Here we used the Columbia, MO temperatures, which are representative of much of central Missouri. The story has been similar elsewhere across the state. These summer temperatures are only complete as of 1 June to August 18.

[1] http://solberg.snr.missouri.edu/gcc/

[2] Lupo, A.R., Kelsey, E.P., D.K. Weitlich, I.I. Mokhov, F.A. Akyuz, Guinan, P.E., J.E. Woolard, 2007: Interannual and interdecadal variability in the predominant Pacific Region SST anomaly patterns and their impact on a local climate. *Atmosfera*, **20,** 171- 196

[3] Lupo, A.R., E. P. Kelsey, D.K. Weitlich, N.A. Davis, and P.S. Market, 2008: Using the Monthly classification of global SSTs and 500 hPa height anomalies to predict temperature and precipitation regimes one to two seasons in advance for the mid-Mississippi region. *Nat. Wea. Dig.*, **32:1,** 11-33

[4] http://www.cpc.noaa.gov/products/analysis_monitoring/lanina/

[5] http://www.noaanews.noaa.gov/stories2010/20100813_globalstats.html

[6] Wiedenmann, J.M., A.R. Lupo, I.I. Mokhov, and E. Tikhonova, 2002: The Climatology of Blocking Anticyclones for the Northern and Southern Hemisphere: Block Intensity as a Diagnostic. *J. Clim.,* **15,** 3459-3473.

[7] Hussain, A., and A.R. Lupo, 2010: Scale and stability analysis of blocking events from 2002 to 2004: A case study of an unusually persistent blocking event leading to a heat wave in the Gulf of Alaska during August 2004. *Advances in Meteorology, in press.* *http://www.hindawi.com/journals/amet/aip.html*

[8] http://www.economist.com/blogs/newsbook/2010/08/extreme_weather

[9] http://wattsupwiththat.com/2010/07/20/cold-snap-freezes-south-america-beaches-whitened-some-areas-experience-snow-for-the-first-time-in-living-memory/