A Tabulated Ratio of Record Highs to Record Lows: A Useful Marker for On-going Climate warming in the United States

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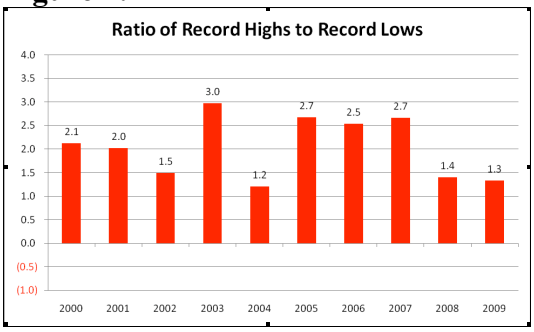
Introduction

During the late 1990's those of us looking at temperature trends at The Weather Channel noticed that more often than not more record highs were occurring than record lows. We began keeping track of the record highs vs. record low statistics in a tabulated file starting 1/1/2000. Starting in November 2006 NCDC began an automated site, which keeps track of all record temperature and precipitation events for all 50 states. After we combined our records with the NCDC records a pattern of a ratio of two to one of record highs to record lows emerged for this decade. Ties of record highs and record lows were incorporated into the raw counts. All ASOS and COOP stations are included in the counts in figure 1.

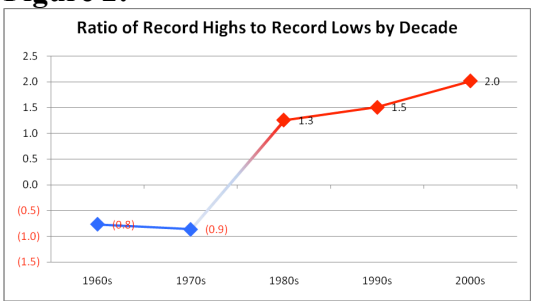
Figure 1:



	HIGHS	LOWS
2000	40055	18871
2001	28852	14234
2002	33693	22500
2003	35704	11985
2004	20698	17080
2005	34049	12708
2006	37465	14762
2007	36376	13656
2008	12858	9175
2009	14210	10626
2000s	**293960**	**145597**

The record statistics are emerging as a bridge between long term climatology statistics and short term average temperature statistics. As of this report, statistics have been compiled by NCDC well back into the 1950's. Figure 2 shows the ratio of highs to lows from January 1960 through December 2009 by decade.

Figure 2:



Methodology and Discussion of Results

One can compare the ratio of records to NCDC averages as shown in figures 3 and 4.

Figure 3:

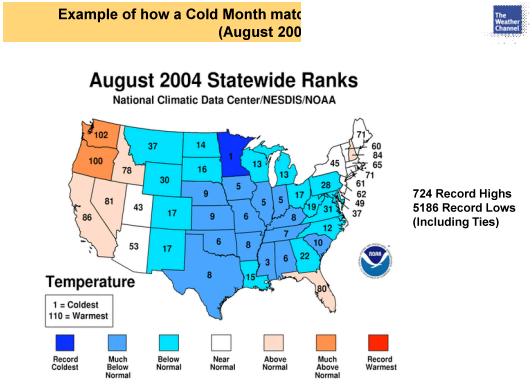
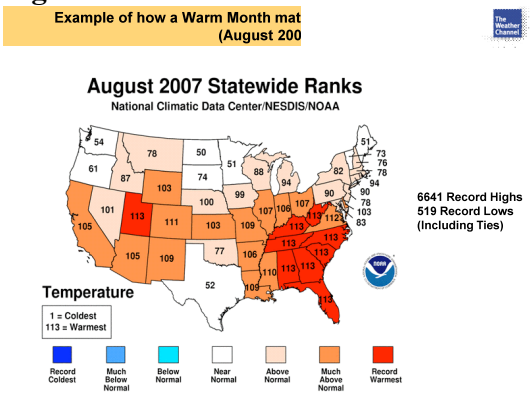
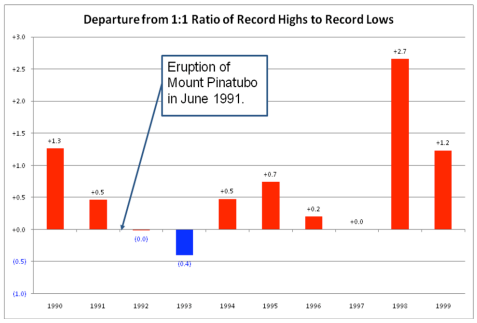


Figure4:



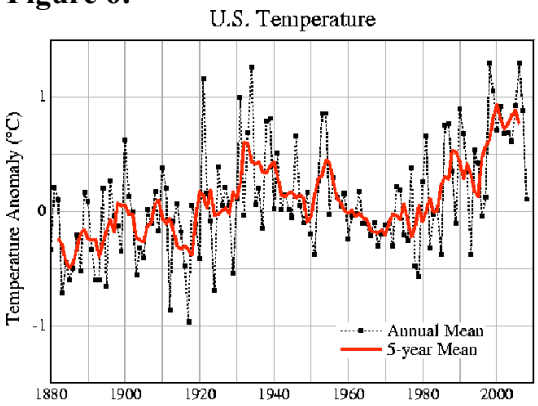
It can also be shown that there is a relationship between the record data that was affected by the eruption of Mt. Pinatubo during the early and mid 1990's shown in figure 5.

Figure 5:



There is a good correlation between the record data and NASA GISS data for the United States (figure 6).

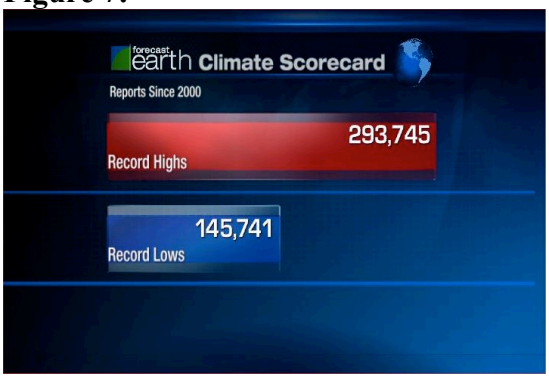
Figure 6:



Summary

The tabulation of record highs to lows has become a centerpiece of TWC's climate scorecard (figure 7).

Figure 7:



The medium range statistics cancel out the noise of week to week variability by showing trends lasting over several years. This data set can prove to be a good statistical link between long term climate averages and short term, monthly temperature averages. As discussed in Meehl et all 2009, the trends in surface record data fit well with those of long term climate projections.

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References

NOAA Records Site: http://www.ncdc.noaa.gov/extremes/records.php

NASA U.S. Averages Trend Chart: http://data.giss.nasa.gov/gistemp/graphs/Fig.D.lrg.gif

Meehl, G. A., C. Tebaldi, G. Walton, D. Easterling, and L. McDaniel (2009): Relative increase of record high maximum temperatures compared to record low minimum temperatures in the U.S., *Geophys. Res. Lett.*, 36, L23701.