A Warm Month: A Comparison of March 2012 to December 1889

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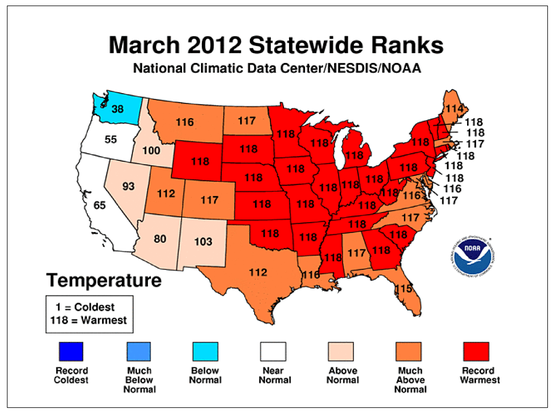
Introduction

This research started off mostly as curiosity. The above average month of March 2012, had the authors wondering if there was another month that was similar. The month that had a similar magnitude of above average conditions, was December 1889. Further motivation was driven by the constantly changing climate and the conservation surrounding the change.

Data and Methods

In order to compare the two months to one another a variety of parameters were examined. ENSO phases were determined based on sea surface temperatures. The sea surface data was obtained from Florida State's Center fro Ocean-Atmospheric Prediction Studies. We also used the NCEP Reanalysis page for sea surface temperatures as well as the March 2012 height data. The December 1889 height plots came from 20th Century Reanalysis site at NCEP. The blocking data came from Dr. Lupo and his Global Climate Change Group. Additional data sources were the Missouri Climate Center, HPC, and NCDC. The methodology is quite simple as it was just simply comparing the two events.

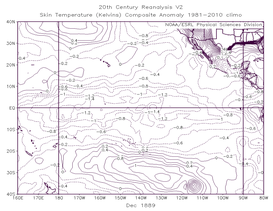


Mean SST Comparison

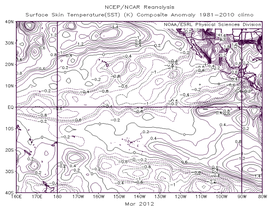
1889	Sept	Oct	Nov	Dec
	-0.7	-0.8	-0.9	-0.8
2011/12	Dec	Jan	Feb	Mar
	-0.4	-0.3	-0.1	0.1

Table 1. A comparison of Sea Surface Temperature departure from normal for 3 months prior to the months being compared. The departures from normal are in °C. *Source: FSU/COAPS*

December 1889 vs. March 2012 SST Anomalies



Sea surface temperature departure from Normal during December 1889. *Source: NCEP Reanalysis*



Sea surface temperature departure from Normal during March 2012. *Source: NCEP Reanalysis*

December 1889 vs. Normal Blocking

		September	October	November	December
Atl.	**Avg**	**1.0/9.3/2.56**	**1.3/10.7/3.27**	**1.1/10.7/3.56**	**1.4/13.2/3.86**
	1889	*1.0/7.0/2.67*	*2.0/18.0/3.51*	*1.0/29.0/3.71*	*4.0/36.0/3.99*
Pac.	**Avg**	**0.4/4.1/2.55**	**0.5/3.8/3.11**	**0.5/3.8/3.80**	**0.7/4.9/3.91**
	1889	*N/A*	*2.0/13.0/1.99*	*N/A*	*N/A*
Cont.	**Avg**	**0.6/4.5/2.55**	**0.3/2.2/2.91**	**0.3/2.2/3.14**	**0.4/3.4/3.39**
	1889	*N/A*	*1.0/10.0/3.52*	*1.0/7.0/3.03*	*N/A*
Total	**Avg**	**2.0/16.8/2.47**	**2.1/16.7/3.18**	**1.9/16.7/3.56**	**2.5/21.5/3.79**
	1889	*1.0/7.0/2.67*	*5.0/41.0/3.03*	*2.0/36.0/3.58*	*4.0/36.0/3.99*

# of blocking events/# of blocking days/avg. intensity for month

Comparing Dec 1889 to the normal (1968-2009) there was a lot of blocking but none in the month in question. Blocking over land was normal with 2 events. Blocking in the Atlantic was way above average with 8 events. The blocking in the Pacific was weak, which is not normal as Pacific blocking in a La Nina year is usually stronger and long lived.

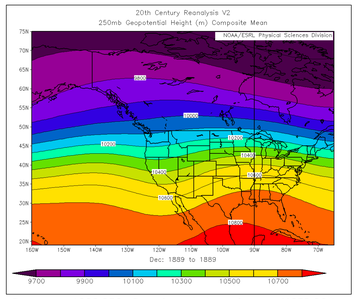
March 2012 vs. Normal Blocking

		December	January	February	March
Atl.	**Avg**	**1.0/9.3/2.56**	**1.3/10.7/3.27**	**1.1/10.7/3.56**	**1.4/13.2/3.86**
	2012	*N/A*	*1.0/7.0/3.55*	*1.0/9.0/3.77*	*2/16.5/4.57*
Pac.	**Avg**	**0.4/4.1/2.55**	**0.5/3.8/3.11**	**0.5/3.8/3.80**	**0.7/4.9/3.91**
	2012	*1.0/9.0/3.46*	*1.0/15.0/5.01*	*1.0/8.5/5.69*	*N/A*
Cont.	**Avg**	**0.6/4.5/2.55**	**0.3/2.2/2.91**	**0.3/2.2/3.14**	**0.4/3.4/3.39**
	2012	*N/A*	*2.0/17.0/3.64*	*2.0/18.0/3.80*	*N/A*
Total	**Avg**	**2.0/16.8/2.47**	**2.1/16.7/3.18**	**1.9/16.7/3.56**	**2.5/21.5/3.79**
	2012	*1.0/9.0/3.64*	*4.0/39.0/4.15*	*4.0/35.5/4.27*	*2.0/16.5/4.57*

# of blocking events/# of blocking days/avg. intensity for month

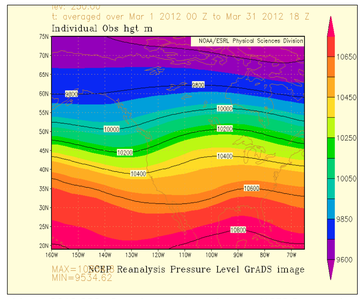
Comparing March 2012 to the normal (1968-2009) there was double the normal amount of continental blocking. While the prior months experienced blocking in the Pacific, during the actual month in question, there was none present. Overall the blocking signals were quite strong in the Pacific. The Atlantic has less than average blocking.

December 1889 Mean 250 hPa

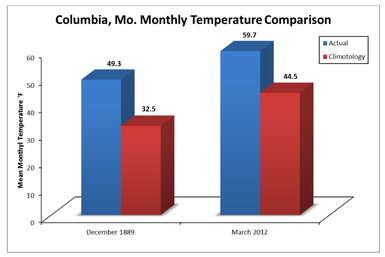


December 1889 250 hPa heights (m) provided by NCEP 20th Century Reanalysis. The contour interval is 100 dam.

March 2012 Mean 250 hPa

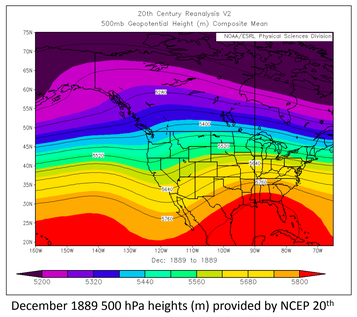


March 2012 250 hPa heights (m) provided by NCEP Reanalysis. The contour interval is 200 dam.



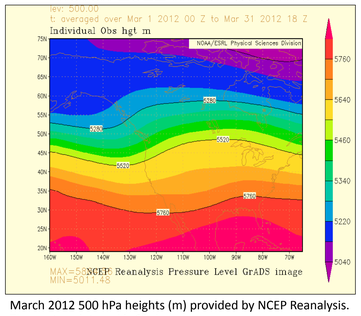
The above graphs shows a comparison of December 1889 and March 2012 average observed temperatures in Columbia, MO to climatology

December 1889 Mean 500 hPa

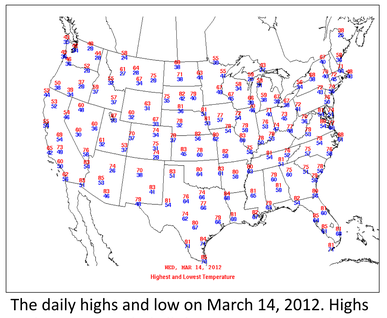


December 1889 500 hPa heights (m) provided by NCEP 20th Century Reanalysis. The contour interval is 60 dam.

March 2012 Mean 500 hPa

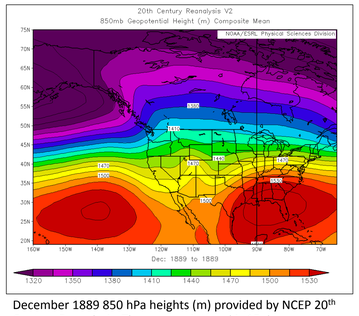


March 2012 500 hPa heights (m) provided by NCEP Reanalysis. The contour interval is 60 dam.



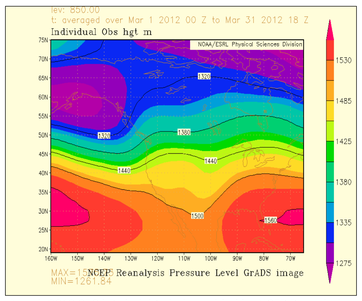
The daily highs and low on March 14, 2012. Highs in the 70s extended all the way up into North Dakota and Wyoming, while 80s were reported in South Dakota. *Source: HPC*

December 1889 Mean 850 hPa

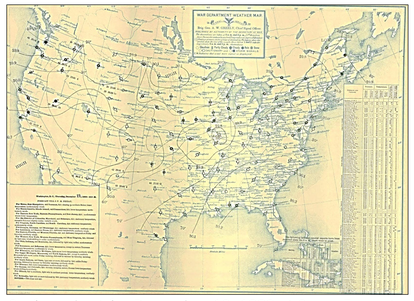


December 1889 850 hPa heights (m) provided by NCEP 20th Century Reanalysis. The contour interval is 15 dam.

March 2012Mean 850 hPa



March 2012 850 hPa heights (m) provided by NCEP Reanalysis. The contour interval is 30 dam.



Surface chart for December 19, 1889 at 8 pm. Even at the evening observations the 60 degree isotherm stretched north of. St. Louis, Mo. *Source: NCDC*

Conclusions

In summary, this study is a great example of how analog forecasting can be beneficially in looking for similarities. While there have been other warmer than average months on record, they were not as noticeable in the extreme category. However by comparing these more extreme months we were able to discover several things:

- Large-Scale Ridging over N. Amer.
- La Nina
- Minimal Blocking in the Pacific