Majority Of The Analogue Springs Point To A Cool Spring But Is That The Way To Go?

Winter Preliminary Review and Spring 2010 Outlook for Southeast Lower Michigan

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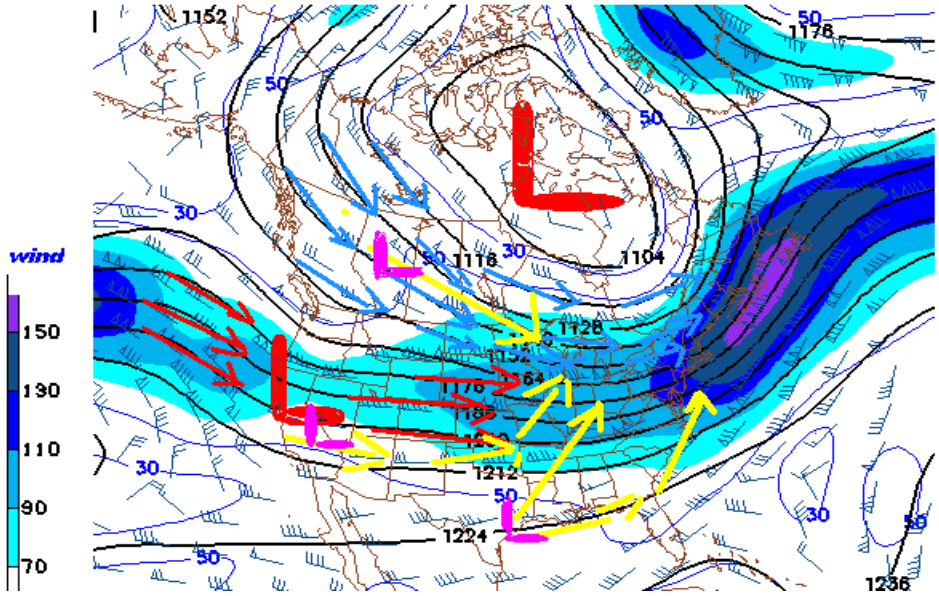
The two main weather influences on for the Winter 2009-10, almost exclusively, have been and will continue to be the key players into the spring. The potent El Nino and an ever aggressive negative North Atlantic Oscillation /NAO/ have certainly left their marks on this winter's weather across the country. Our readers of the Winter Outlook might remember the discussion about these two important features and how they were expected to play a role in this past winter.

From the Outlook:

"There are definitely a few wild cards in this season's outlook and just how strong El Nino becomes is one of the most important features of the winter and will have a marked influence on our winter weather. The other important wild card this winter is the trend of the North Atlantic Oscillation/Arctic Oscillation throughout the winter."

"This model projected 200 MB height/jet from a recent computer run I think demonstrates nicely the key upper air players I discussed about above for the upcoming winter."

Fig-1a



As it turned out, the above (Fig-1a) 500 MB height simulation (from a computer run in the autumn) that I thought demonstrated what we were up against for the winter, verified well. I indicated on the map the expected vibrant El Nino/subtropical flow off the Pacific along with a strongly negative NAO. A negative NAO encourages a large upper low in eastern Canada and associated dominant troughing over the eastern half of the country. The El Nino charged-up into the moderate category and thus, strongly influenced the southern jet stream across the country. Both of these northern hemispherical patterns worked in conjunction to create suppressed 500 MB heights across the country. The suppressed heights were responsible for the below normal temperatures in the Deep South and near normal here in Southeast Lower Michigan (since the cold was tempered by the El Nino).

Looking Ahead (and Back)

At this stage (very early in spring), winter-like weather with cold and snow has traditionally made an appearance well into April (and even May) in previous years. Historically, at least a few inches of snow are seen in April, especially the first half. Our recent spring history has re-enforced that historical fact (and then some) and has even extended its time period later into the season. And, it hasn't only been the snow, impressive late season cold shots have recently done their damage nationally (and locally, see April's Chill), too. With that being said, just what am I preparing you for in the Spring Outlook?

First, let's look back at the past several months to lay the ground work for the spring. Though the winter type weather may not be totally over, **the official winter season (Dec-Feb) temperatures** (Fig -2) **are in** across Southeast Lower Michigan. All temperature data indicates the Winter of 2009-10 was a normal (or typical) winter in regards to the cold weather experienced. In fact, temperatures across all of Southeast Lower Michigan during the winter months were "unusually" normal. Perusing the temperature data chart below shows just how normal it was. Temperature patterns, did ride their typical roller-coaster track at times, especially in January, but the pattern settled down remarkably in February and hung around normal much of the month.

Fig-2

WINTER 2009-2010 TEMPERATURES

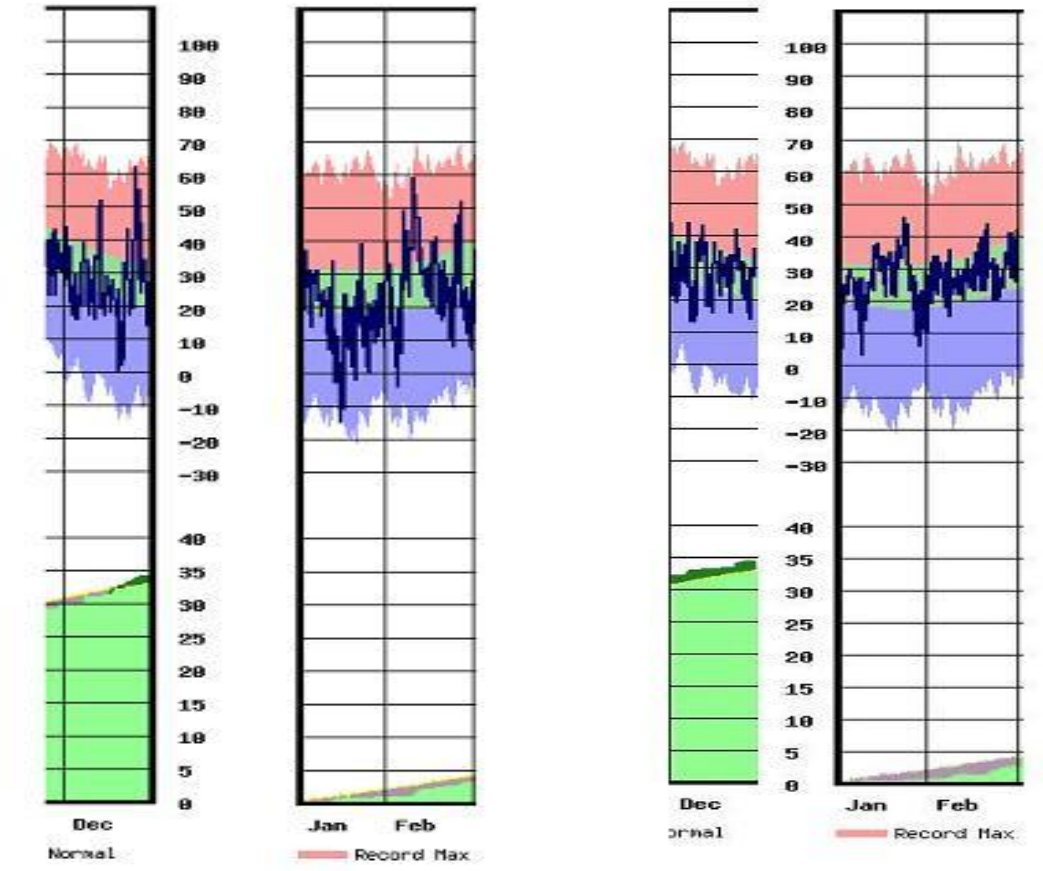
SITE	DEC	JAN	FEB	WINTER TEMP AVE DEP
DETROIT	29.3	25.1	27.8	27.4/ +0.3
FLINT	26.8	22.0	23.9	24.2/ +0.3
SAGINAW	26.9	22.5	25.2	24.9/+0.8
NWS WHITE LAKE	25.5	21.6	23.7	23.6
DEPART FROM NORM	*N*	*N-A*	*N*	*SE Michigan Winter Ave 25.5 / +0.5 Including DTX 25.0 / 0.0*

MA= Much Above A=Above N=Normal **B=Below MB=Much Below**

Examining this winter's lack of variability a little closer

When comparing the temperature trace of this winter (on the right (Fig -3, **navy blue trace)** to last winter (on the left (Fig-3, **navy blue trace**), we see that last winter's temperature trace was more classic of a typical winter's temperature pattern (quite variable). Now look at **this winter's trace**, the lack of variability is quite noticeable.

Fig – 3



WINTER 2008-09 WINTER 2009-10

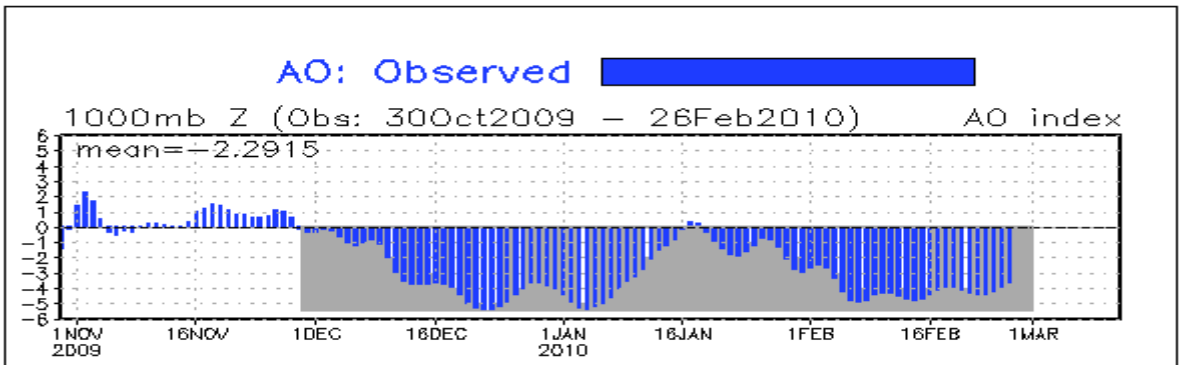
The predominant temperature projection of our analogue winters was very helpful at showing the resultant mean (or average) temperature of the winter.

What was interesting in this year's analogue winters was that the overall final winter temperature mainly hugged near the normal mean (within a few degrees). Look for temperatures to average -1.5 to +1.5 degrees of normal in the end for Winter 2009-10. The major challenge with this winter's outlook is how do we get to the near normal averages?

The El Nino with its energizing effect on the Pacific Jet Stream usually leads to a moderating effect on our temperatures but unfortunately, this was offset by a strongly negative NAO/AO (which was our major concern in the Outlook). Thus, these two patterns combined, led to a rather stable temperature regime for the most part. As mentioned above, the heights across the US were pushed well south of their normal position as an end result of these two climate patterns.

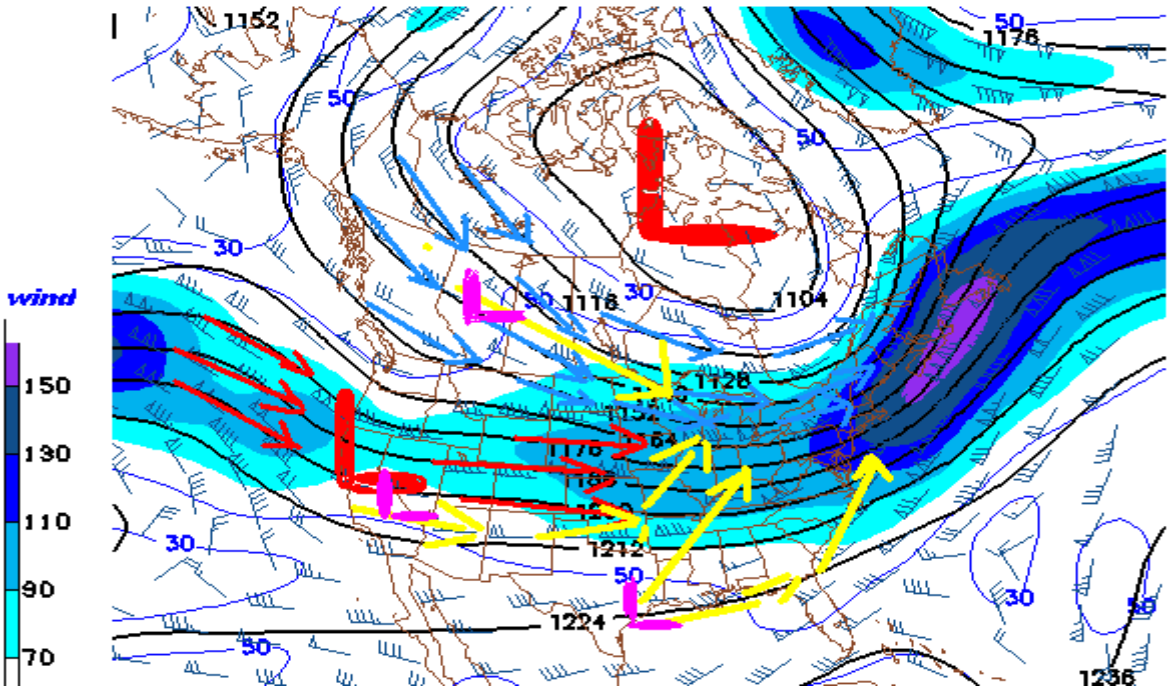
Since the Arctic Oscillation /AO/ (basically, a subset of the North Atlantic Oscillation) was almost exclusively negative much of the winter (not unlike last summer), any moderating effects of the El Nino were quite limited. Note (Fig-4), the mid-late January period of the AO where it was much less negative (or even neutral) which corresponded well with our January Thaw this winter.

Fig-4



Checking back on earlier map from the Outlook, note the storm tracks (denoted in yellow).

(Fig-1b)



Projected storm tracks forecast in the Winter Outlook

One of the main storm tracks expected for this winter was the East Coast storm track, either originating as a weak low which crossed the Upper Midwest, moved southeast across the Great Lakes to fully develop along the Mid Atlantic States, **or** a Gulf of Mexico Low, that rode up along the East Coast with explosive deepening. Both tracks have meant trouble for that region (from the Outlook, below)

"The Gulf of Mexico Low, which moves north northeast through the Ohio Valley and into the eastern Great Lakes...and/or develops along the East Coast. This storm track up the East Coast was noted more in El Nino patterns (especially in the 1970s) with a negative NAO and troughing was more prevalent in the eastern half of the county. It will be interesting to see whether or not more Gulf Lows make their appearance this season."

Mentioning storm tracks, how did we fare as far as precipitation and snowfall (Fig-5), thus far from these tracks? Precipitation for the winter months did come in below normal, while snowfall (thus far) was right around normal. In fact, if no more snow falls this season, all areas snow totals would be within a few inches of normal.

(Fig -5)

WINTER 2009-10 PRECIPITATION

SITE	DEC	JAN	FEB	WINTER TOTAL PRECIP/DEPART
DETROIT	2.90	0.76	1.90	5.56/-0.74
FLINT	1.41	0.83	1.37	3.61/-1.49
SAGINAW	1.47	1.00	1.21	3.68/-1.77
NWS WHITE LK	2.77	0.97	1.40	5.14/ B
DEPART FROM NORM	N	B	N -B	B

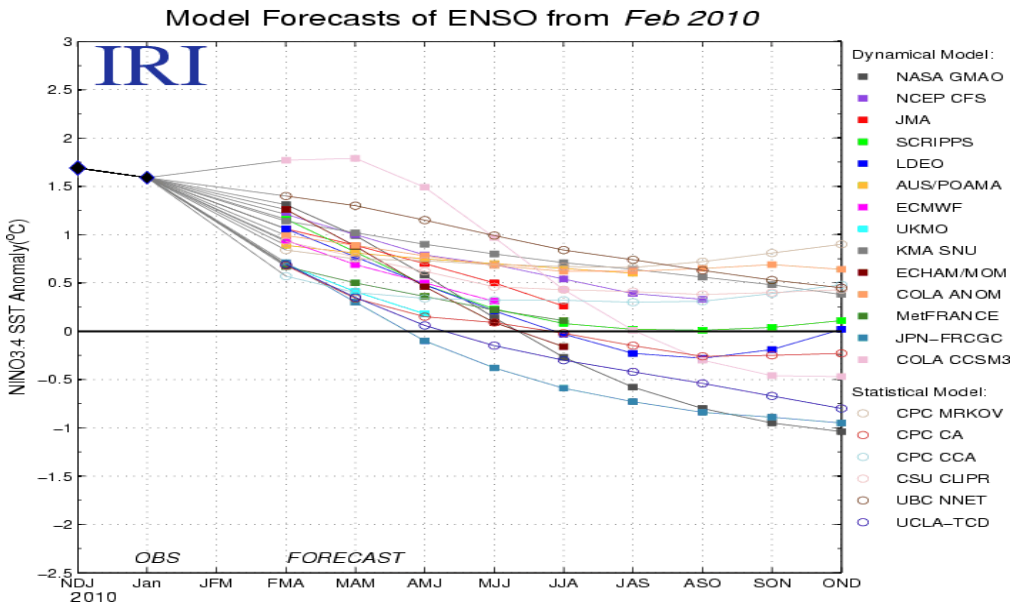
WINTER 2008-09 SNOWFALL THUS FAR…

SITE	OCT	NOV	DEC	JAN	FEB	MAR	APR	SEASON/DEP	LAST SEASON
DETROIT	0.0	0.0	7.8	8.9	27.0			43.7	57.3
FLINT	0.0	T	12.5	10.7	21.2			44.4	65.6
SAGINAW	0.0	T	11.9	14.4	18.3			44.6	76.2
NWS - WHITE LK	T	T	15.1	9.8	21.8			46.7	77.6
DEPART FROM NORM	B	B	N	N	MA			N	

Spring 2010 Outlook for Southeast Lower Michigan

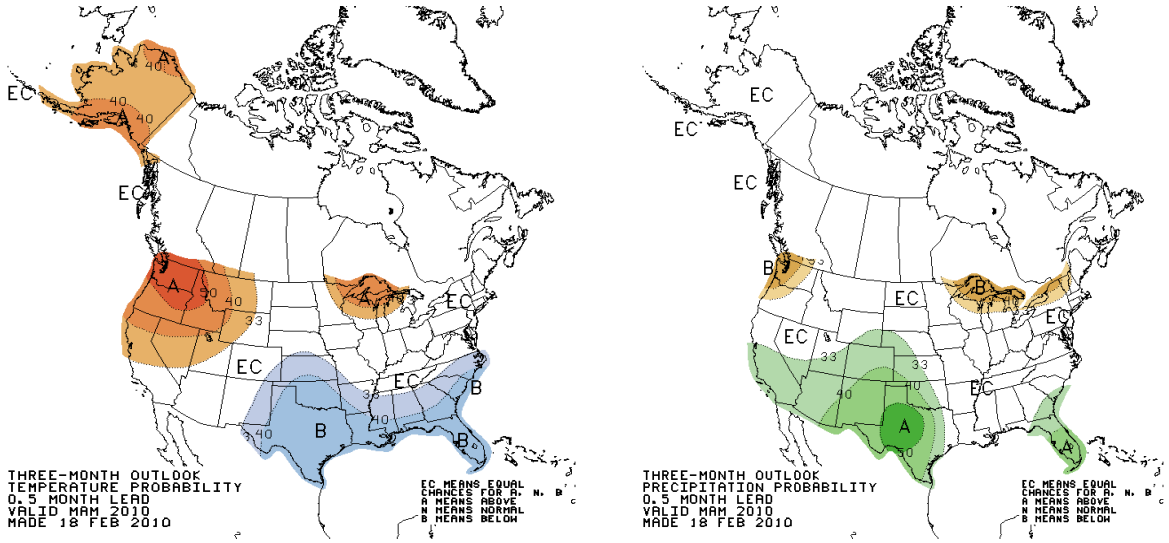
As seen by the projected Sea Surface Temperatures /SST/ below, the above normal SST'S /El Nino/ are expected to steadily fade throughout the spring, becoming normal (or Neutral) during the summer (see Fig-6 below).

(Fig – 6)



The CPC Official Seasonal Outlook for the region is calling for Equal Chances for Above, Below or Normal Temperatures and Precipitation this spring.

(Fig - 7)



El Nino Springs in Southeast Michigan

While El Nino is expected to weaken during the spring, its influence on the northern hemispheric pattern is expected to lag and thus, persist throughout spring. If the upper air pattern of El Nino does indeed maintain itself, this will continue to help energize the subtropical jet. As in the winter, the NAO phase will continue to be the elusive wild card and will be closely watched for its spring influence. Many of analogue temperature patterns suggest that the upper air dominant pattern this past winter will be hard to dislodge (but with a natural seasonal weakening).

The analogue winters years were also used for the spring (with the addition of 1978, since at times, the upper air pattern was reflective of that winter also). The best analogues, in varying degrees whether it be temperatures, snowfall, or upper and surface air patterns for the Winter of 2009-10 were (from the most recent); 2002-03, 1986-86, 1977-78, 1972-73 (one of the best; temperatures, snow pattern/amounts with a very similar “double” La Nina to El Nino pattern and1925-26.

Analogue Springs

ANALOGUE EL NINOS 2010

DETROIT	T	E	M	P	S				
SEASON	March	April	MAY	SPG AVE	SPRING	SPRINGS	SEASON		
1889	37.5	46.3	57.3	47.0	1		1889		
1897	34.7	45.2	54.8	44.9	2		1897		
1912	26.4	46.2	59.2	43.9	3		1912		
1919	36.3	46.0	56.6	46.3	4		1919		
1926	29.0	41.0	57.9	42.6	5		1926		
1958	36.4	49.6	58.4	48.1	1	1	1958		
1966	38.3	44.4	51.9	44.9	6		1966		
1973	43.3	48.8	55.5	49.2	2	2	1973		
1977	41.5	52.4	64.4	52.8	1		1977		
1978	30.0	45.5	59.3	44.9	7		1978		
1987	39.8	50.8	63.3	51.3	2	2	1987		
1992	35.5	46.3	58.3	46.7	8		1992		
2003	35.6	48.4	56.5	46.8	9	9	2003		
Ave	35.7	47.0	58.0	46.9					
NORM 30Y	36.9	48.1	59.8	48.3			Norm		
Dep	-0.8	-1.1	-1.8	-1.4			Dep		

DETROIT	SNOW			PCPN				SPRING	SEASON
SEASON	March	April	May	March	April	May			
1889	4.1	1.9	0.0	1.17	1.14	4.41	6.72	1	1889
1897	10.4	T	0.0	3.70	2.09	4.03	9.82	1	1897
1912	15.8	T	1.5	2.27	2.17	2.96	7.40	2	1912
1919	T	0.0	0.0	3.22	5.29	3.80	12.31	1	1919
1926	5.5	9.0	0.0	2.71	3.04	2.09	7.84	2	1926
1958	3.5	0.2	0.0	0.47	1.69	1.16	3.32	3	1958
1966	2.6	1.8	0.0	2.21	2.65	2.18	7.04	4	1966
1973	10.1	0.1	0.0	4.48	1.42	3.72	9.62	3	1973
1977	12.3	0.7	T	3.57	4.17	2.40	10.14	2	1977
1978	5.3	2.5	0.3	2.05	2.49	3.58	8.12	4	1987
1987	13.3	1.1	0.0	2.19	2.14	2.50	6.83	5	1978
1992	11.7	0.2	T	3.34	4.34	1.33	9.01	5	1992
2003	8.1	5.0	0.0	1.46	2.07	4.70	8.23	6	2003
Ave	9.2	2.0	T	2.53	2.67	2.99	8.18		
NORM 30Y	7.0	1.7	T	2.52	3.05	3.05	8.62		
Dep	2.2	0.3	T	-0.01	-0.38	-0.06	-0.44		

Color	Temps	Degrees		Rain	Inches		Snow	Inches
Legend	Below	1.0>		Below	1.00>		Below	
	Normal	0.0-1.0		Normal	0.00-1.00		Normal	
	Above	1.0>		Above	1.00>		Above	

Temperatures: Look for temperatures to average around normal (or within 1 ½ degrees below or above the normal mean)

Unfortunately, the dominant temperature pattern surfacing from the analogue springs is below normal (a substantial 9 out of 13 more than a degree below). In the past, when an overwhelming number of analogues have suggested a particular trend (example, last summer) most of the time, that dominant trend was the right way to go. Another disturbing item noted was the larger below normal departures occurred later in the season (April and/or May). Two negatives in any warm weather lover or gardeners book. **However**, even though below normal temperatures dominated, some of our better winter analogue years were more mixed in the spring with some considerable monthly variances.

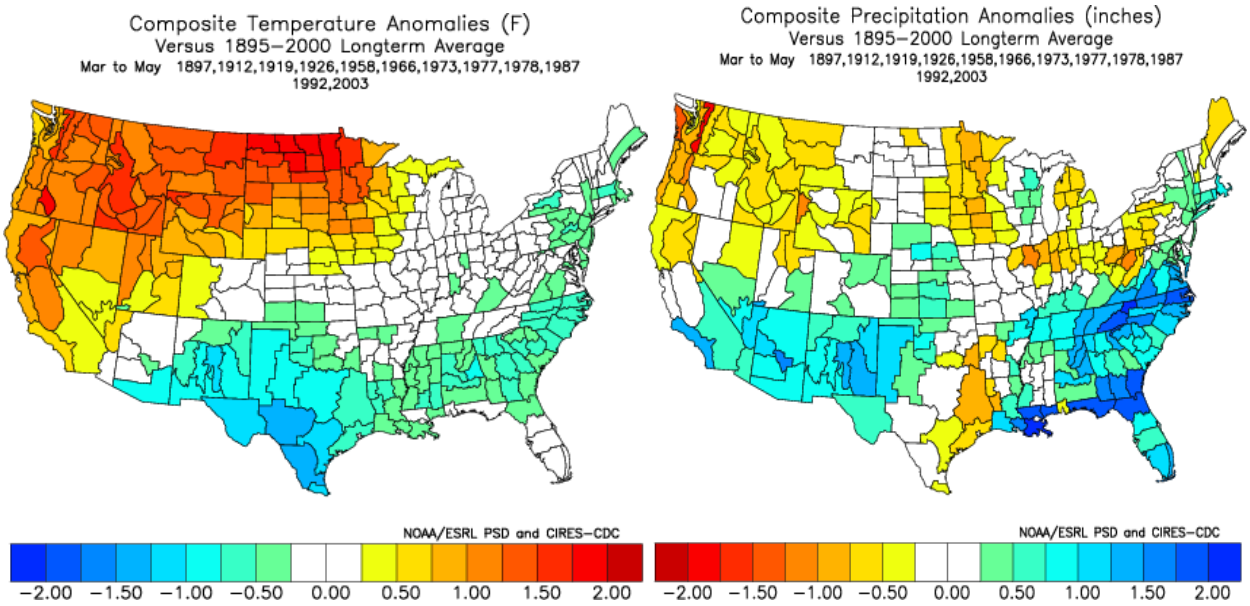
March's average temperatures ranged wildly (what it's known for) from a cold 26.4'' in 1912 to a mild 43.3 in 1973 (and 1972-73 was one of the best analogues). April and May's temperatures naturally varied less but with an overwhelming lean toward below normal departures. Therefore, March seems to have the best chance to average normal to above with the April and May normal to below.

If we were to extend into the spring, the analogues years from this past winter that verified the best, is there any different trend noted? Well in 2003, there was a cool spring with around normal rainfall but 1987, a warmer and somewhat drier spring made for a pleasant time. The spring of 1978 was a cool spring (particularly March) with normal rainfall, while our better analogue year 1973 averaged on the high side of normal with both temperatures and rainfall. The spring of 1926 was very cool (remember though, a much snowier winter and early spring, proceeded that spring) with the low side of normal rainfall.

Precipitation: Look for precipitation to average normal to below

Nearly all the springtime precipitation averaged normal to below with just two above normal. Basically, this dominant normal to below normal pattern follows very favorably to our winter pattern. And, since the El Nino influenced upper air pattern is slated to only slowly weaken, this too looks reasonable**.**

Temperature and Precipitation Composites from Analogue Springs



Severe Weather during El Niño Springs

Past experience has shown that El Nino springs tend to run about average for the risk of severe weather across the Great Lakes. See below from NOAA:

What impacts do El Niño and La Niña have on tornadic activity across the country?

Since a strong jet stream is an important ingredient for severe weather, the position of the jet stream determines the regions more likely to have severe weather.

Contrasting El Niño and La Niña winters, the jet stream over the United States is considerably different. ***During El Niño the jet stream is oriented from west to east over the northern Gulf of Mexico and northern Florida. Thus this region is most susceptible to severe weather.*** *During La Niña the jet stream extends from the central Rockies east - northeastward to the eastern Great Lakes. Thus severe weather is likely to be further north and west during La Niña than El Niño.*

It is interesting to note that even with last year's weakening La Nina, notable severe weather activity was limited to one of the season's best events (April). The remainder of the season had just a few events and thus, the season's activity was below average.

Check in later in the spring season for the final tally of snowfall in the Winter Review along with how the analogues also performed in that regard.