A "NEUTRAL" WINTER IS ANYTHING BUT FOR 2008-09"

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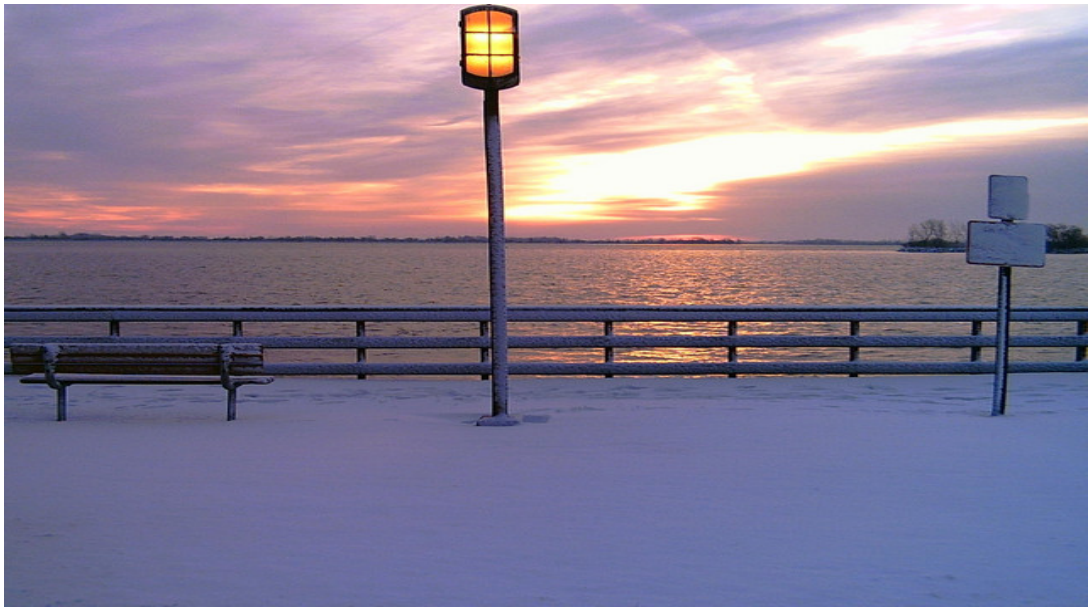
October 27th 2008



Local Data suggests:

Temperatures:

Look for temperatures during the winter to average around normal /-1.5 to +1.5/ compared to the 30 year normals (see charts for cities further down). While the trend of our winter analogues show mainly normal to below normal (very similar to our recent summer analogues), it is felt the coldest of analogues are too cold and thus skewing the average down. However, at the same time, some of the cold outbreaks seen this winter may rival some of the outbreaks seen in recent winters.

Expanding on this "normal" idea, it is interesting to note that the 100 year winter mean temperature for Detroit is approximately 26.7 degrees with a one standard deviation spread of 3.5 degrees either side of that 26.7. Statistically speaking, based on this data the temperatures could average as low 23.2 degrees or as high as 30.2 and still be considered within a "normal" range of the mean. Basically, this just supports the idea that winter temperatures in these parts, by nature, have a wide statistical range and this winter should be no exception!

Snowfall and Rainfall:

Snowfall and rainfall ranges in the analogue winters for 2008-09 are a little closer to normal over extreme Southeast Lower Michigan (when compared to last year) and normal to above over the remainder of the region. Therefore, while snowfalls last season were widespread above normal, this winter indications suggest the best snows (normal to above) will fall across the northern areas of the region…or from Detroit's northern suburbs across Flint and Port Huron and on into the Saginaw Valley and Thumb Region. Near normal snow is expected south of a line from Ann Arbor to Detroit. The analogue winters are strongly hinting toward a two-tier snowfall pattern this winter with the heaviest amounts to the north… along with a better chance for mixed precipitation the entire region. It will be interesting to see if these particulars bear out.
(See more in: Storm Tracks)

Broad Scale Discussion

As we move toward the winter of 2008-09...the La Nina sea surface temperatures /SST/ that dominated the past several seasons has all but disappeared from the Pacific waters. A brief recollect; La Nina refers to cooler than normal sea surface temperatures in the equatorial pacific (as opposed to El Nino, which indicates warmer than normal sea surface temperatures). While La Nina may be on the way out, the atmosphere still "remembers" and the autumn pattern has been behaving more like La Nina and may continue to do so at least into early winter. The Neutral pattern expected for the balance of this winter is a reflection of near normal Pacific sea surface temperatures. Unlike the last few winters, little if any influence is expected from the Pacific via La Nina or El Nino with an overall, a Neutral pattern. The region will be dominated by the phases of the North Atlantic/Arctic Oscillation /NOA, AO/, the Pacific Decadal Oscillation /PDO/ and the sub-tropical flow from the southwest and south.

Neutral ENSO

Checking out the Pacific water temperatures in Nino 1+2, 3 and 4 (Fig-1a, b), shows the gradual return to near normal reading but with a distinctive favoring of the south side of the zero line /ave -0.3C/. For scientific purposes, area Nino 3.4 is used to determine officially, whether or not a Neutral phase exists.

Fig-1a

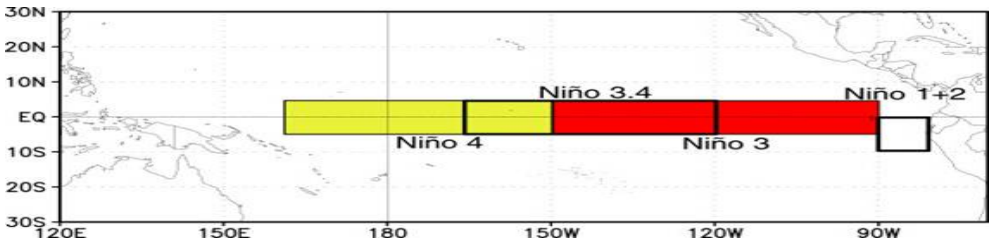


Fig-1b

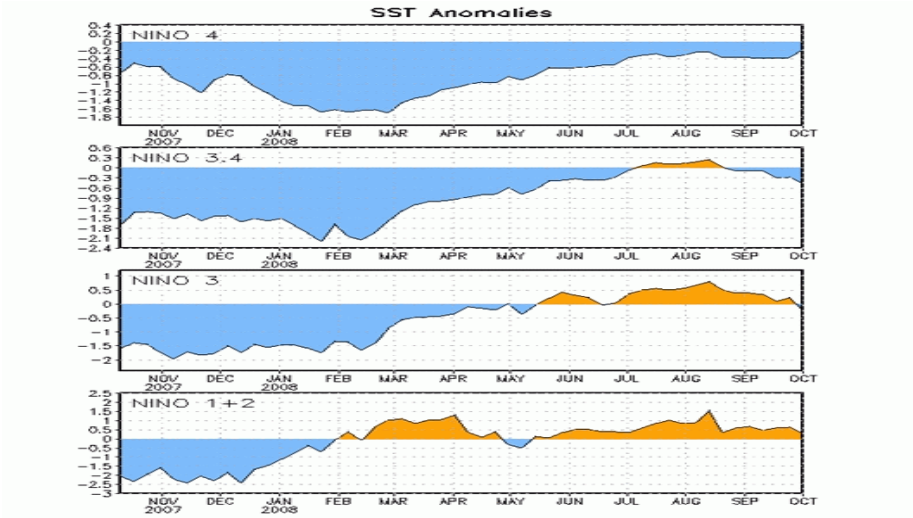
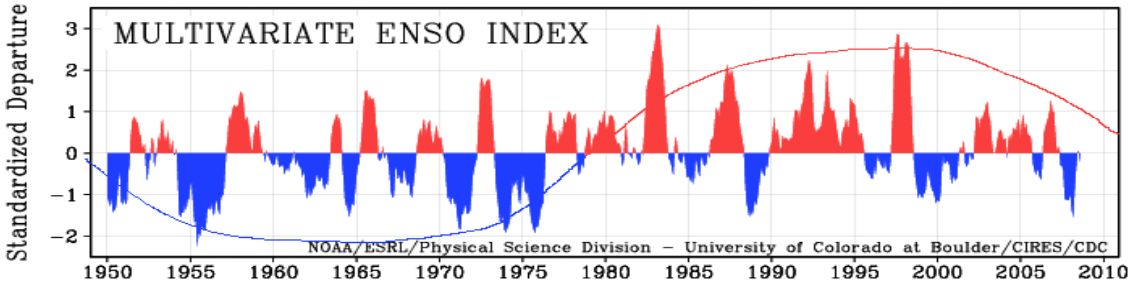


Figure 2. Time series of area-averaged sea surface temperature (SST) anomalies (°C) in the Niño regions [Niño-1+2 (0°-10°S, 90°W-80°W), Niño 3 (5°N-5°S, 150°W-90°W), Niño-3.4 (5°N-5°S, 170°W-120°W), Niño-4 (150°W-160°E and 5°N-5°S)]. SST anomalies are departures from the 1971-2000 base period weekly means (Xue et al. 2003, *J. Climate*, **16**, 1601-1612).

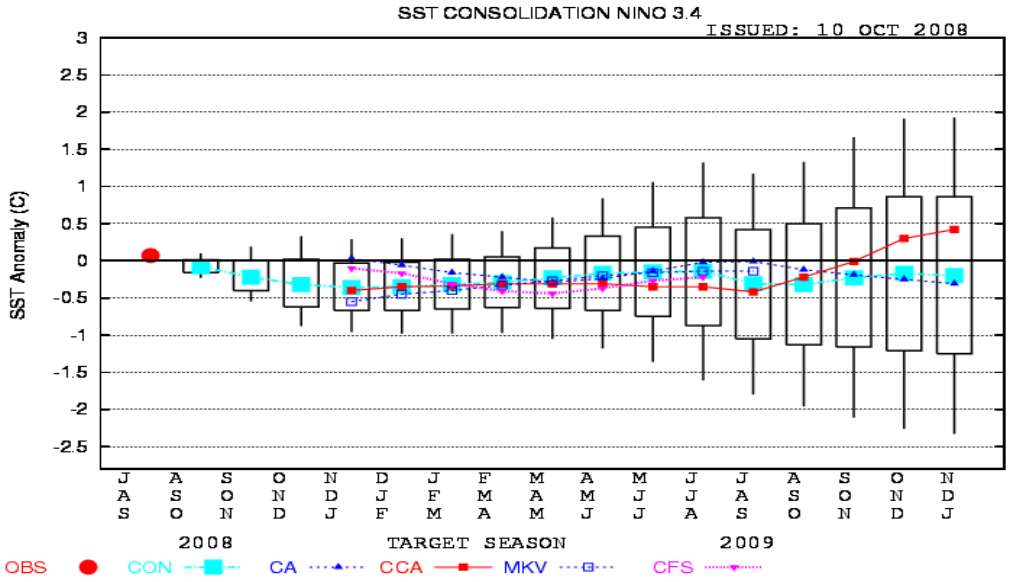
On a longer scale view, the oscillation of the ENSO is clearly displayed here (Fig-2). Also note that La Nina's dominated the picture from the 1950s into the mid 1970s. After, from the 1980s into the early 2000s, El Nino's have been the rule. If the past trend continues, it appears that in the next few decades, La Nina's will begin to become more commonplace.

Fig-2



The latest computer projections (as of October, Fig-3) shows that the SST's are expected to remain pretty much flat into the winter, just below the 0C anomaly line.

Fig-3



NAO/AO

The more important ingredient in this winter's weather (like most others) is the trend of the North Atlantic Oscillation/Arctic Oscillation throughout the winter. Of course, this is the biggest challenge to the forecast and potentially, has the biggest bust potential. While weather trends with La Ninas and El Ninos are seen (and even these aren't always consistent), the NAO pattern remains highly elusive and generally, trends are seen only a week or two out. Our colder winters in the study surely reflect a

predominately negative NAO/AO. The winter of 1976-77 from the analogue winters was one of our coldest on record and was one brutal winter. Another very cold winter in the study was back in 1904-05 and in a more recent time-frame, both winters of 1989-90 and 2000-01 stated out on a bitterly cold note but then modified nicely. These are just a few examples of the variability in the winters, which is also expected this winter. The long term trend of the NAO (Fig-4 a, b), clearly shows the oscillations (long and short term) from positive to negative to positive and just recently, settling toward neutral.

Fig-4a

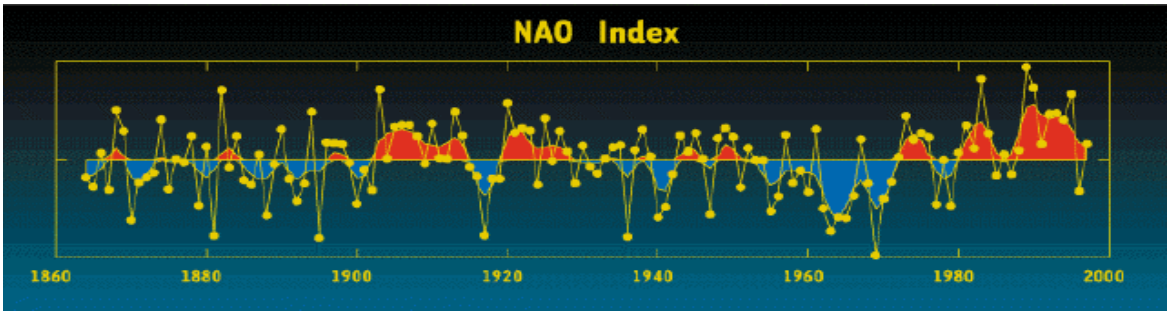
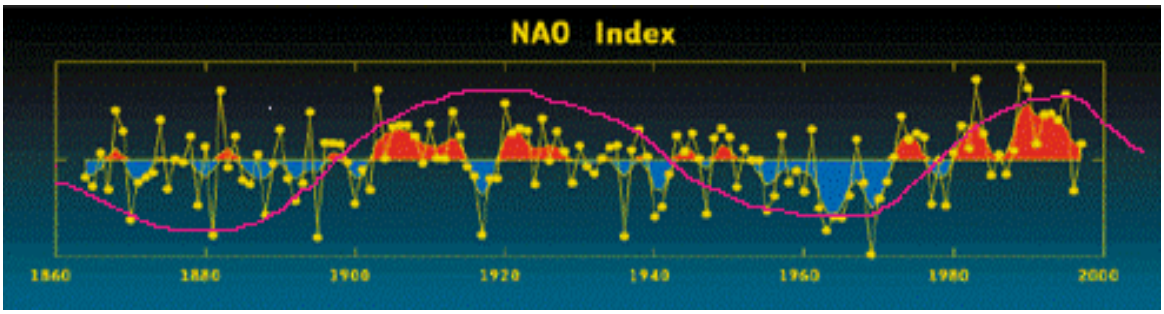
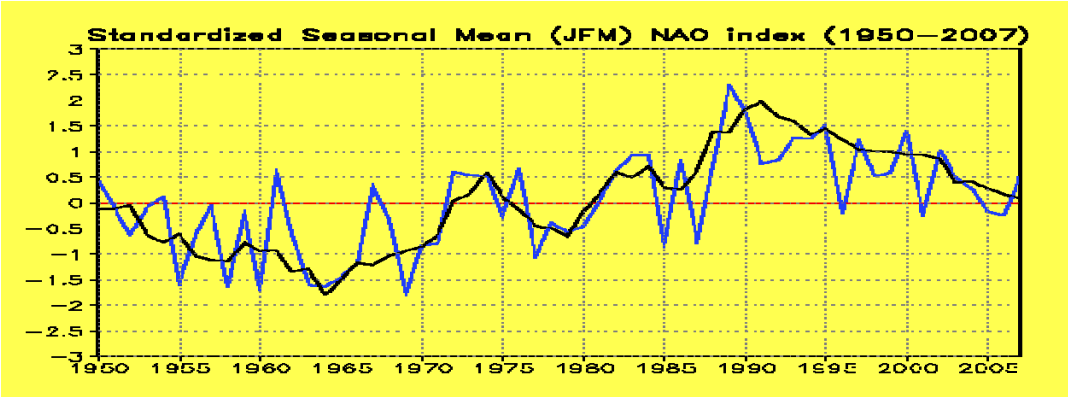


Fig-4b



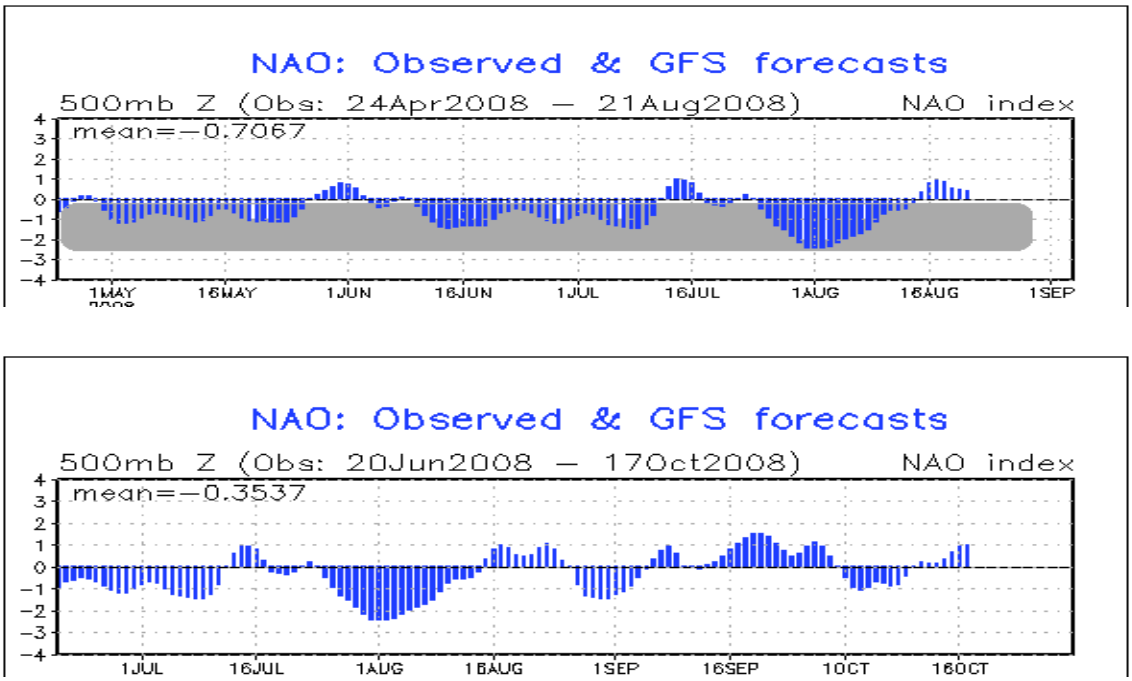
The shorter, winter time span /JFM/ of the NAO (Fig 4c, below) is seen since the 1950s. Note, the recent decline toward an overall, neutral phase (and possibly negative period in the upcoming years).

Fig-4c



The latest trace of the NAO (Fig-4d) reflects the pattern since May 2008. The late spring and summer period was primarily in the negative phase of the NAO (shaded) which aided us in our comfortable summer with very few and long lasting hot spells. Since the summer, the NAO oscillations have been more mixed this fall with the mean rising from -0.70 to -0.35, or half as negative of what it was. This trend change has benefited the region with some nice autumn weather through much of October while just intermittently, allowing the cold winds in from the north.

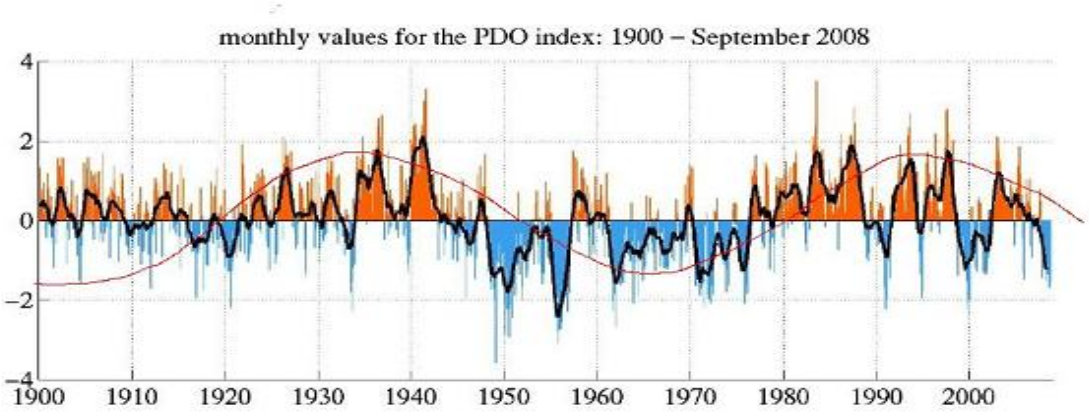
Fig-4d



The Pacific Decadal Oscillation

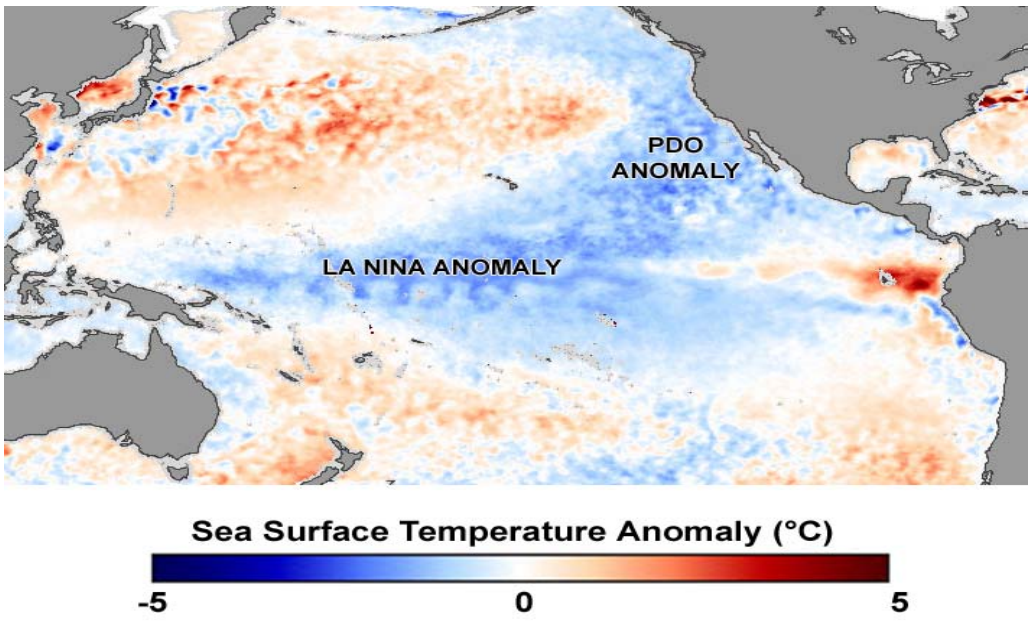
The Pacific Decadal Oscillation (PDO) is the long-term ocean fluctuation of the Pacific Ocean. The PDO waxes and wanes approximately every 20 to 30 years. Many scientists think we have just entered the "cool" phase (see Fig -5, below). The cool phase is characterized by a cool wedge of lower than normal sea-surface heights/ocean temperatures in the eastern Pacific and a warm horseshoe pattern of higher than normal sea-surface heights connecting the north. The last time the PDO trended into the negative phase was also in the early 1950s, lasting into the mid 1970s. There is evidence that during the cooler phase, La Nina's tend to be more commonplace and last longer (now compare the pattern likeness of the ENSO, NA decades resemble those of the 1950s-70s.O and NAO phases). It will be interesting to see how close our winter patterns of the next few decades resemble those of the 1950s-70s.

Fig - 5



The cool water anomaly in Fig-6 shows the lingering effect of the year old La Niña back in April 2008. The much broader area of cooler than normal water temperatures off the coast of North America from Alaska (top center) to the equator is a classic feature of the cool phase of the Pacific Decadal Oscillation /PDO/ talked about, above. The cooler waters wrap in a horseshoe shape around a core of warmer than normal water temperatures. (In the warm phase, the pattern is reversed - Image is courtesy of NASA).

Fig-6



2008-09 Analogue Winters

These selected analogue winters below, followed a similar sequence of events (though timing may vary a bit) that were recently observed over the Eastern Pacific during the past few seasons. La Nina prevailed during the previous winter, spring and into the summer. The second half of the year saw a gradual return to Neutral conditions.

DETROIT

ANALOGUE NEUTRAL 2008 I 09

DETROIT	T	E	M	P	S		P	C	P	N
SEASON	DEC	JAN	FEB	WNT AVE	WINTER	WINTERS	SEASON	DEC-FEB	WINTER	WIN TOT
1876-77	17.8	19.2	33.6	23.5	1		1876-77	3.23	1	
1887-88	23.9	23.0	28.2	25.0	2		1887-88	5.50	1	
1894-95	32.4	20.0	17.9	23.4	3		1894-95	4.54	2	
1904-05	25.8	17.9	17.9	20.5	4		1904-05	5.26	2	
1939-40	33.5	19.0	26.7	26.4	1		1939-40	3.72	3	
1951-52	28.4	29.3	29.3	29.0	1		1951-52	8.32	1	
1956-57	34.9	21.1	30.6	28.9	2	2	1956-57	6.03	3	
1976-77	21.5	12.8	25.2	19.8	5		1976-77	3.41	4	4
1985-86	22.2	23.9	24.6	23.6	6		1985-86	6.27	4	
1989-90	18.0	33.6	30.7	27.4	2	2	1989-90	8.06	2	2
2000-01	19.3	26.2	29.7	25.1	7	7	2000-01	4.37	5	5
Ave	25.2	22.4	26.8	24.8			Ave	5.34		
NORM 30Y	29.6	24.5	27.2	27.1	100YR -	26.7	Norm	6.30		
Dep	-4.4	-2.1	-0.4	-2.3		-1.9	Dep	-0.96		

DETROIT	S	N	O	W	F	A	L	L		
SEASON	OCT	NOV	DEC	JAN	FEB	MAR	APR	SEA TOT	SEASON	SEA TOT
1876-77	*	*	*	*	*	*	*	*		
1887-88	T	0.3	6.6	15.6	5.8	10.1	T	38.4	1	
1894-95	0.0	6.9	0.4	21.5	1.5	13.2	0.1	43.6	1	
1904-05	0.0	0.8	7.5	13.5	15.1	0.2	0.3	37.4	2	
1939-40	T	T	1.9	5.9	11.7	9.3	3.4	32.2	3	3
1951-52	T	8.3	24.0	12.0	7.3	7.0	T	58.6	1	
1956-57	0.0	6.7	5.4	17.9	8.9	3.9	2.8	45.6	2	
1976-77	T	1.4	9.8	14.7	5.0	12.3	0.7	43.9	3	
1985-86	0.0	2.0	14.1	8.6	20.8	7.4	1.3	54.2	2	2
1989-90	2.7	2.4	11.8	4.0	11.1	7.8	2.0	41.8	4	
2000-01	T	1.3	25.1	3.4	2.9	5.4	0.9	39.0	5	5
Ave	0.5	3.3	10.7	11.7	9.0	7.7	1.4	43.5		
Norm	0.3	2.7	11.1	11.9	9.3	7.0	1.7	44.0		
Dep	0.2	0.6	-0.4	-0.2	-0.3	-0.7	-0.3	-0.5		

Color	Temps	Degrees		Rain	Inches		Snow	Inches
Legend	Below	1.0>		Below	1.00>		Below	>5.0
	Normal	0.0-1.0		Normal	0.00-1.00		Normal	>-5.0<5.0
	Above	1.0>		Above	1.00>		Above	>5.0

FLINT

ANALOGUE NEUTRAL 2008 I 09

FLINT	T	E	M	P	S		P	C	P	N
SEASON	DEC	JAN	FEB	WNT AVE	WINTER	WINTERS	SEASON	DEC-FEB	WINTER	WINTERS
1904-05	22.9	17.4	14.9	18.4	1		1904-05	3.33	1	
1939-40	32.8	19.2	25.7	25.9	2		1939-40	3.26	2	
1951-52	25.2	26.9	27.0	26.4	1		1951-52	6.80	1	
1956-57	31.6	17.6	27.2	25.5	2	2	1956-57	4.85	1	
1976-77	17.4	10.9	22.4	16.9	3		1976-77	2.19	3	3
1985-86	21.3	21.7	21.1	21.4	4		1985-86	4.18	2	2
1989-90	16.1	31.8	26.9	24.9	1	1	1989-90	5.43	3	
2000-01	16.6	20.6	29.3	22.2	5	5	2000-01	7.96	2	2
Ave	23.0	20.8	24.3	22.7			Ave	4.75		
NORM 30Y	26.7	21.3	23.8	23.9			Norm	5.10		
Dep	-3.0	-1.0	-0.6	-1.2			Dep	-0.35		

FLINT	S	N	O	W	F	A	L	L		
SEASON	OCT	NOV	DEC	JAN	FEB	MAR	APR	SEA TOT	SEASON	SEA TOT
1939-40	0.0	1.1	4.1	9.5	13.5	0.0	0.0	28.2	1	
1951-52	0.0	16.2	24.9	11.5	10.7	6.2	5.8	75.3	1	
1956-57	0.0	3.9	4.7	11.8	4.5	5.0	1.4	31.3	2	2
1976-77	T	2.4	17.6	15.6	3.8	5.1	0.3	44.8	1	
1985-86	0.0	3.4	13.2	11.2	20.6	4.3	0.6	53.3	2	2
1989-90	4.4	7.8	11.3	5.6	20.8	2.9	2.6	55.4	2	
2000-01	0.0	2.2	35.3	5.1	5.0	3.8	2.0	53.4	3	3
Ave	0.7	5.3	15.9	10.0	11.3	3.9	1.8	48.9		
Norm	0.3	3.5	11.6	13.2	9.4	7.7	2.6	48.3		
Dep	-0.4	1.8	4.3	-3.2	1.9	-3.8	0.0	0.6		

Color	Temps	Degrees		Rain	Inches		Snow	Inches
Legend	Below	1.0>		Below	1.00>		Below	>5.0
	Normal	0.0-1.0		Normal	0.00-1.00		Normal	>-5.0<5.0
	Above	1.0>		Above	1.00>		Above	>5.0

SAGINAW

ANALOGUE NEUTRAL 2008 I 09

SAGINAW	T	E	M	P	S		P	C	P	N
SEASON	DEC	JAN	FEB	WNT AVE	WINTER	WINTERS	SEASON	DEC-FEB	WINTER	WIN TOT
1904-05	23.0	18.2	15.8	19.0	1		1904-05	4.11	1	
1939-40	31.1	18.4	23.8	24.4	1		1939-40	2.84	2	
1951-52	24.4	24.5	26.0	25.0	2		1951-52	5.64	1	
1956-57	29.4	17.6	26.7	24.6	3		1956-57	5.13	2	
1976-77	18.9	12.8	23.4	18.4	2		1976-77	2.08	3	
1985-86	21.6	21.6	21.7	21.6	3		1985-86	4.19	4	4
1989-90	16.3	30.9	25.7	24.3	4	4	1989-90	7.16	1	
2000-01	17.2	24.7	25.5	22.5	4	4	2000-01	6.53	2	2
Ave	22.7	21.1	23.6	22.5			Ave	4.71		
NORM 30Y	27	21.4	23.8	24.1			Norm	5.45		
Dep	-4.3	-0.3	-0.2	-1.6				-0.74		

SAGINAW	S	N	O	W	F	A	L	L		
SEASON	OCT	NOV	DEC	JAN	FEB	MAR	APR	SEA TOT	SEASON	SEA TOT
1904-05	0.0	0.2	10.9	22.0	12.1	10.1	2.8	58.1	1	
1939-40	0.0	0.1	1.0	8.0	10.7	10.9	0.3	31.0	1	
1951-52	0.0	17.9	24.0	15.3	8.8	6.2	11.3	83.5	2	
1956-57	0.0	3.3	8.9	9.1	3.7	8.0	0.0	33.0	2	
1976-77	0.0	0.4	8.9	5.2	1.9	2.1	0.0	18.5	3	3
1985-86	0.0	11.0	10.7	8.7	12.0	8.2	0.0	50.6	3	
1989-90	0.2	1.7	36.7	3.4	18.4	0.2	1.1	61.5	4	
2000-01	0.0	6.4	40.3	7.0	8.0	5.5	0.6	67.8	6	
Ave	0.0	5.1	17.7	9.8	9.5	6.4	2.0	50.5		
Norm	0.2	3.8	10.2	11.8	8.3	8.0	2.2	44.5		
Dep	-0.2	1.3	7.5	-2.0	1.2	-1.6	-0.2	6.0		

Color	Temps	Degrees		Rain	Inches		Snow	Inches
Legend	Below	1.0>		Below	1.00>		Below	>5.0
	Normal	0.0-1.0		Normal	0.00-1.00		Normal	>-5.0<5.0
	Above	1.0>		Above	1.00>		Above	>5.0

Local Comparisons/Results:

Temperatures:

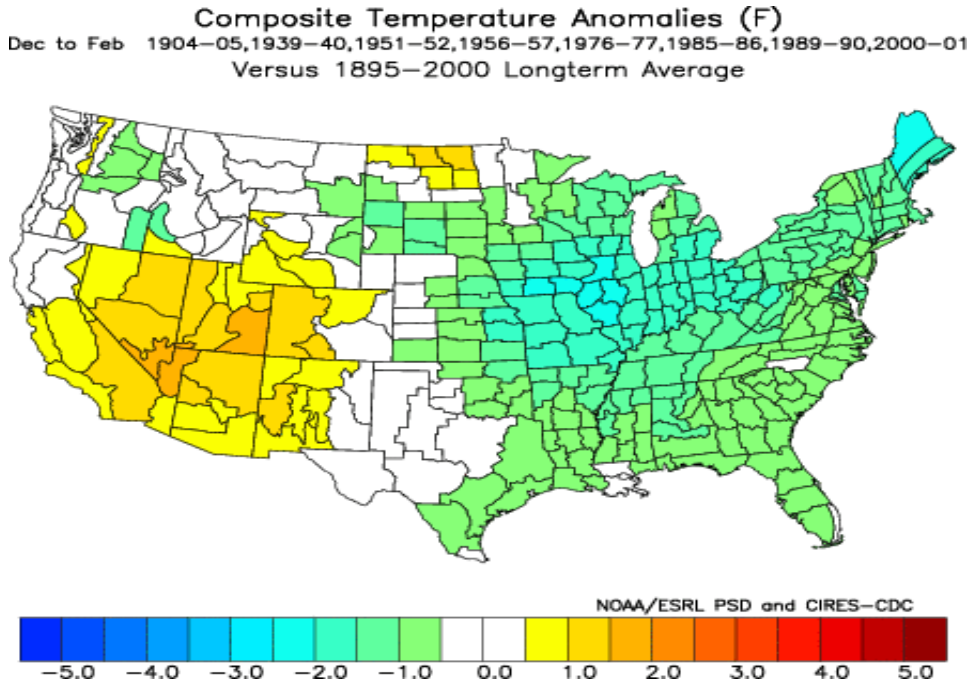
Clearly, the trend seen in this year's analogue winters is the dominance of normal to below normal temperatures…or at least colder than recent winters. As discussed above, it is thought the coldest of winters are too cold for our recent 10-15 year trend. Another trend seen during the winters may prove more helpful is that there tended to be a notable period of below normal temperatures with many of the seasons showing this more likely to occur during the first half of the winter (or first half of the cold season of mid Nov-mid Mar).

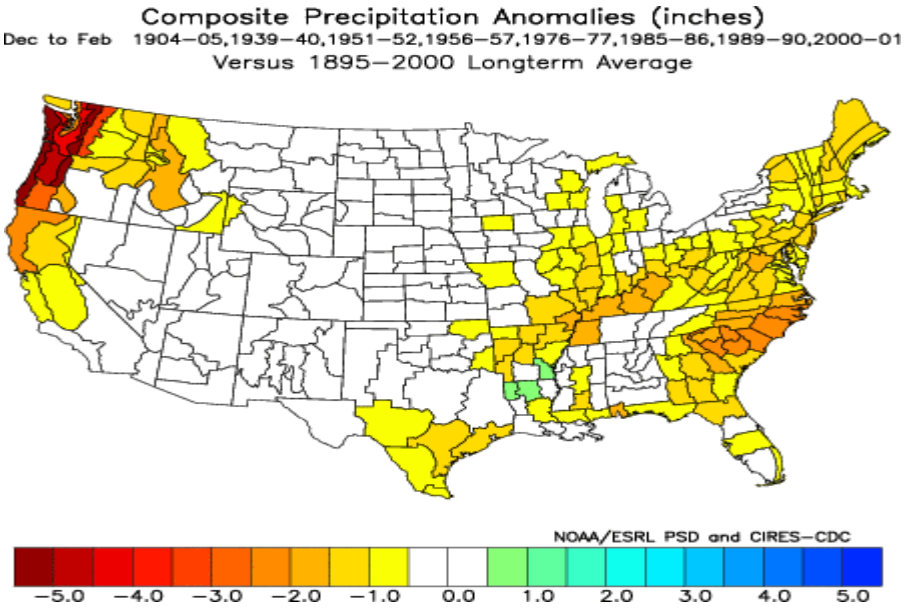
Snowfalls:

Season snowfall ranges tighten up a bit from last year with more of the winters closer to normal or above when averaged across the region. The most notable trend in the snow and precipitation this go around is location. Last year, above normal precipitation was indicated over the entire area while this year the central and northern areas of Southeast Lower Michigan point that way. Around normal snowfall and precipitation is suggested over extreme Southeast Lower Michigan (basically south of a Detroit – Ann Arbor line). Not surprising, it is thought one of the main storm tracks will be over this region and thus, heavier precipitation is slated to the north.

COMPOSITE MAPS OF ANALOGUE WINTER YEARS

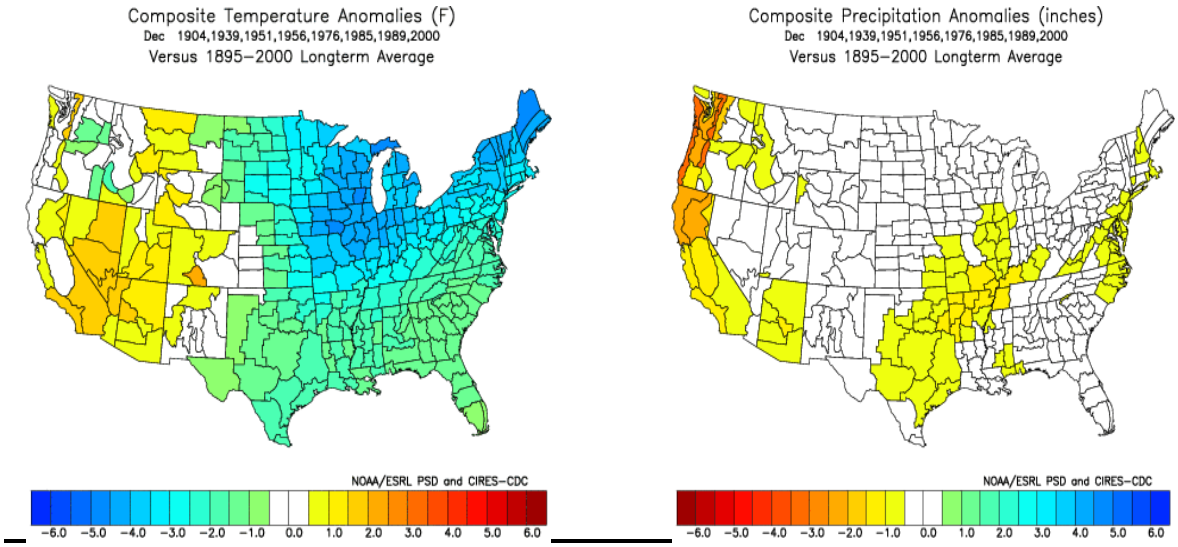
Below are the composite maps for the analogue years in the local study. Remember these maps are composites what happened over the region and do not take into account any recent trend observed over the region. They are only a "guidance tool" to past analogue Neutral winters that followed a moderate to strong La Nina. One must also remember that these maps are just composites of the years blended together; therefore to get a better idea of the winters as a whole, it is better to look at the analogue winters locally. Note that the earlier winters at Detroit are not included in the maps since the composite data set only goes back to 1895.



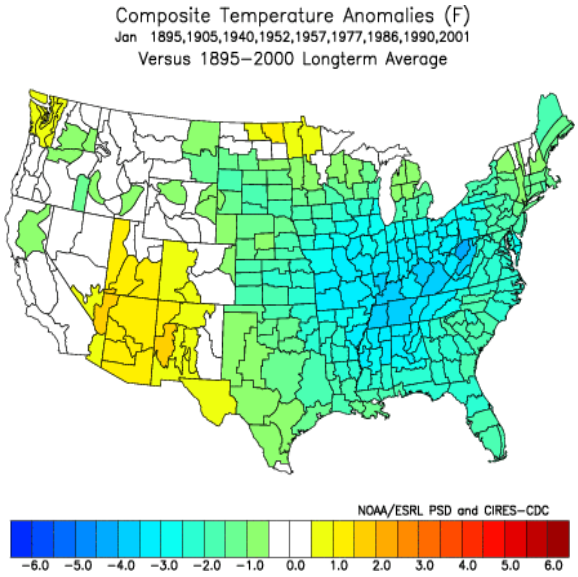


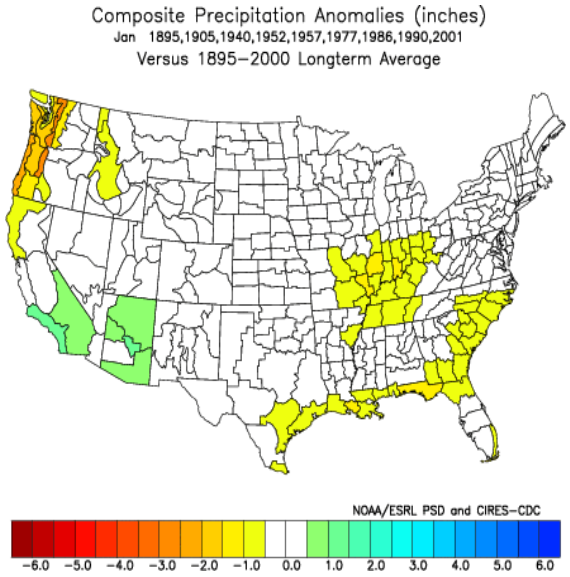
Month by Month

Dec

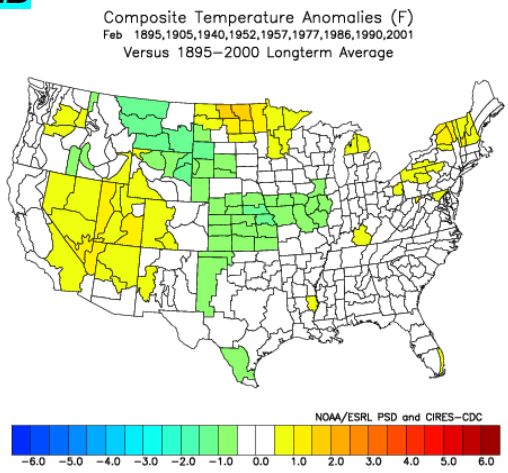


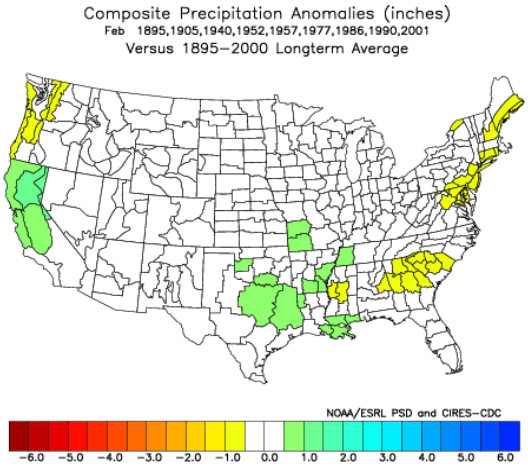
JAN





FEB





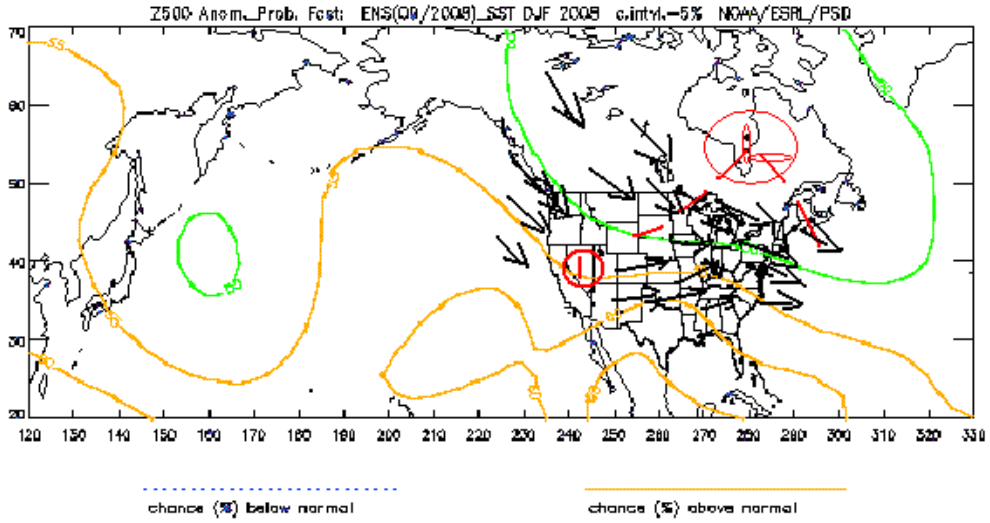
UPPER WIND PATTERNS/ STORM TRACKS

The most dominant of the storm tracks expected this winter are:

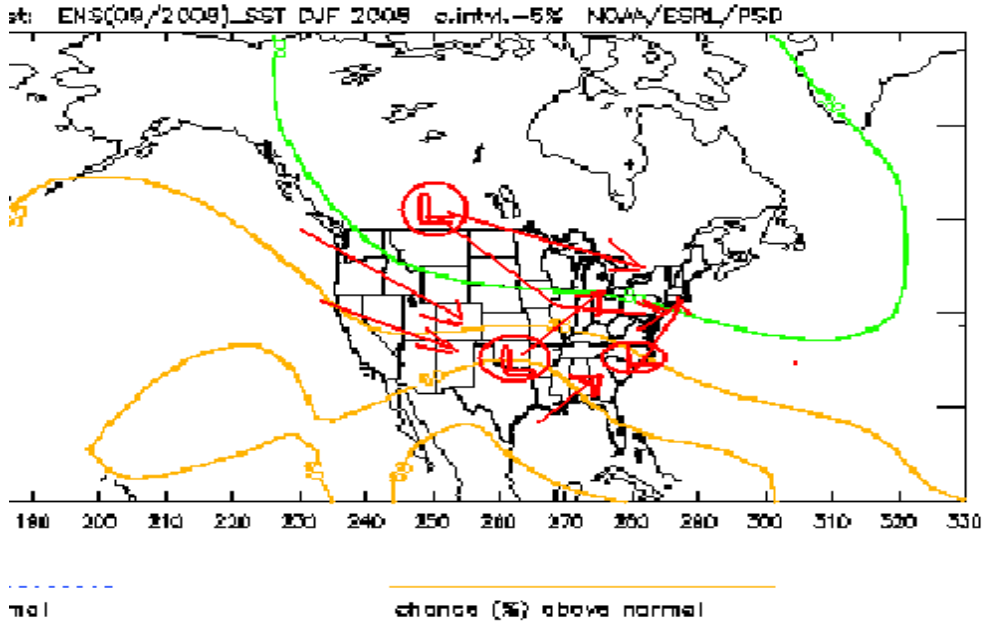
- Alberta Clippers which usher in polar or arctic air originating from western Canada or the Arctic.

- Two other tracks should share the spotlight this season which are: the Southern Plains/ Texas Low which hooks northeast through the Midwest and into the Great Lakes… and 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 the Neutral winters than La Nina's (especially in the 1970s) with a negative NAO and troughing was more prevalent in the eastern half of the country. The analogues suggest mixed precipitation may occur more often than last year with a track nearer or over the region.

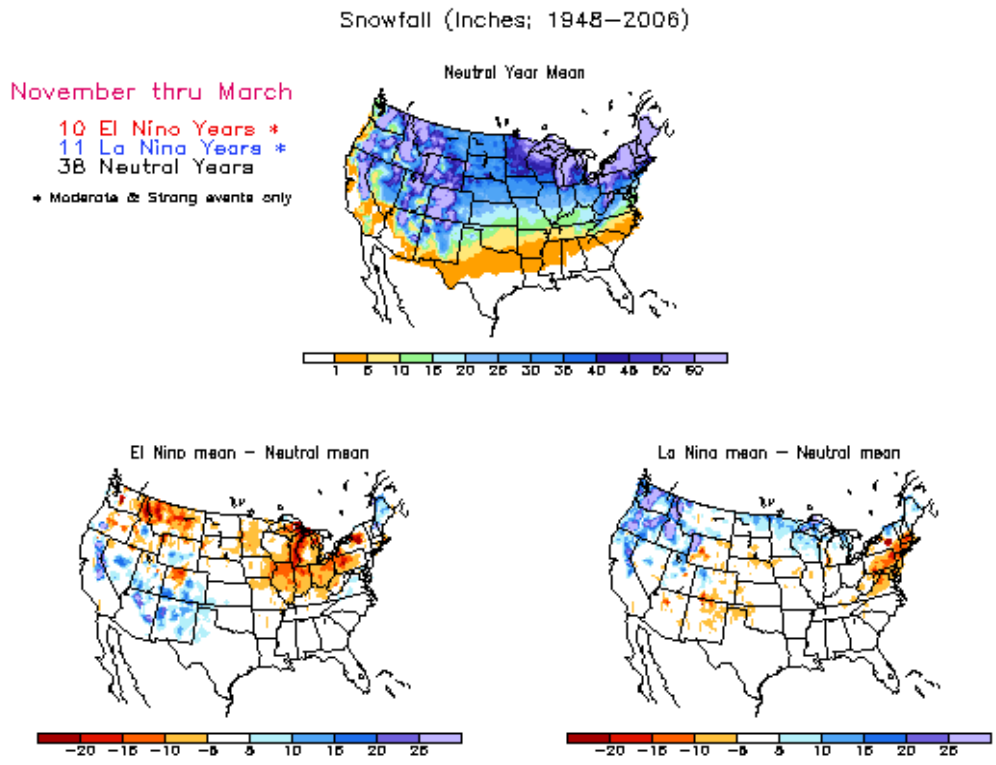
Here is the mean (or average 500 MB flow) projected by six experimental models (below) from for this winter from the Climate Diagnostics Center /CDC/ available as of September. I have annotated the mean wind flow and pressure patterns. The six individual models that make up this general pattern a much more diverse than last year. In this year's group, a suggestion of an <u>occasional split flow is stronger</u>. The main dominant Polar/Arctic Jet and the subtropical jet moving in from the Pacific across the West Coast. Last year, the experimental models had a strong consensus of a rather tight north-south temperature gradient (or baroclinic zone) and strong jet stream over the mid part of the country while this year, the projections are more variable (and thus, more difficult to peg).



The potential storm tracks (Fig-10) could be quite interesting, especially when phasing occurs east of the Rockies.



To check out snowfall during La Nina's, El Nino's and Neutral periods like below, see:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/us_impacts/ustp_impacts.shtml



Some Winter Dates:

Winter Begins early on December 21st, 2008 at 704 AM EST
Holiday Full Moon: Friday December 12th, 2008
Holiday New Moon: Saturday December 27th, 2008
Christmas: Thursday December 25th2008
New Years: Thursday January 1st 2008
Ground Hogs Day: Monday February 2nd, 2009
Valentine's Day: Saturday February 14th, 2009