Southeast Lower Michigan Autumn 2010 Outlook

An Overall Nice Autumn On Tap For The Region?

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Aug 30th, 2010

After a warm spring and hot summer, many inhabitants of Southeast Lower Michigan are looking forward to the change in the season and what it entails. The warmth, and especially its persistence, has been impressive as Southeast Lower Michigan had one of its warmest spring and summer seasons (see Summer Review). Looking into autumn for patterns that have yet to develop can be challenging, because past isn't *always* a good predictor of future. It has been my experience that forecasting transitory seasons (spring and fall) can be very difficult. Determining the **timing** of expectant trends seen in analogue years and how they unfold is the main reason for the difficulty. It's just the nature of the beast that transitory seasons have the most timing issues. This is logical given the typical large scale atmospheric changes and how they impact the local weather.

On the subject of timing, while the predicted dominant patterns in the past few seasons materialized, a few developed earlier than some analogues suggested. This may be related to the timing and accelerated development of the latest La Nina. In any event, past trends have more often than not served as reliable predictors of future trends. Let's explore the upcoming autumn season.

Temperatures:

Several analogue autumns along with our recent prevailing conditions suggest a warmer, or above average fall. Nearly all data indicates the likelihood of the fall's average temperature surpassing the Southeast Lower Michigan fall average of **50.3** (taking into account Detroit's, Flint's and Saginaw's norms). Just glancing back to our last La Nina fall in 2007 reveals how exceptionally warm that fall was with all three cities landing in the top ten warmest. The first half of that fall was unusually warm averaging a solid six degrees above average (it was like the typical weather for the first week of September lasted for six weeks into mid October) It is unlikely this autumn will as warm as 2007, but the analogues and recent trends at least support a warmer fall**. Even though most years did contain sharply colder polar air masses at times, they were more transitory in nature. An overwhelming number of analogue years displayed normal to above temperatures.**

Precipitation:

While the present above average temperature trend is expected to lag into autumn, many autumns actually reversed to a drier pattern from the dominant wetter pattern seen in the majority of locations since May. This pattern has already begun to emerge this August with drier weather observed across the entire region. The analogue that appears most closely correlated /1973/ also had a very similar precipitation pattern for several months. May through July was mainly wet across the metro Detroit area and points south with above average rains. Then in August, the rains came infrequently with only 1.67" falling. During the following Fall of '73, rainfall remained below average and totaled 7.04" compared to the average of 8.16".

Typically in fall, precipitation amounts diminish as the summer convective rains wane and the replacing stronger synoptic storms are still in the offing**. In this fall's set of analogue data, a notable drop in rainfall was seen in the majority of years (eight out of 11) at Detroit, six out of ten at Saginaw and equal chances at Flint (the smallest data sample) with four out of eight. Northern parts of Southeast Lower Michigan had a slightly better chance of having more rain rather than the south (which in fact, also follows the normal trends) with normal to below precipitation prevailing.**

Large Scale Synoptic Pattern

A healthy La Nina continues to evolve over the eastern and central Pacific (the most recent weekly Nino 3.4 SST (Fig - 1a, b) has already dropped to about -1.1C as of mid Aug). According to the Climate Prediction Center /CPC/, "most dynamical models generally predict a moderate-to-strong La Niña, while the majority of the statistical model forecasts indicate a weaker episode (Fig – 2). Given the strong cooling observed over the last several months and the apparent ocean-atmosphere coupling (positive feedback), the dynamical model outcome of a moderate-to-strong episode is favored at this time. Therefore, La Niña conditions are expected to strengthen and last through Northern Hemisphere Winter 2010-11". The CPC Fall Outlook can be found here.

Fig - 1a

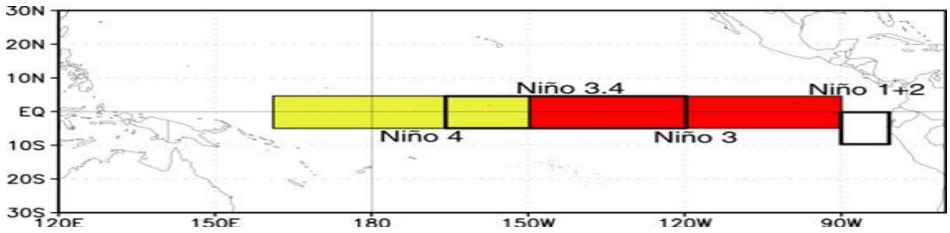


Fig - 1b

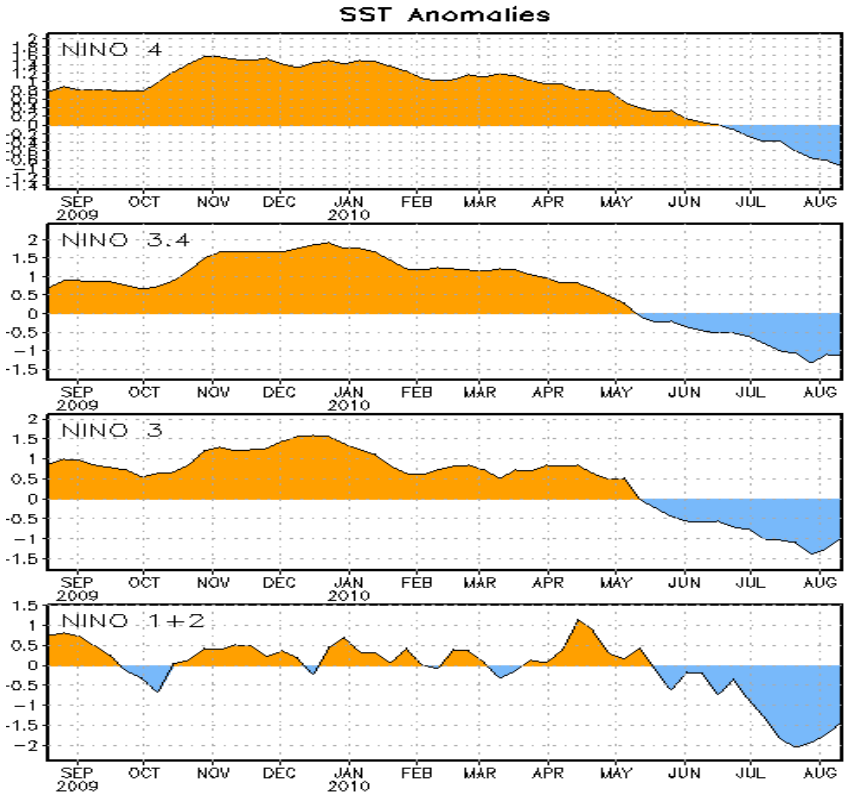
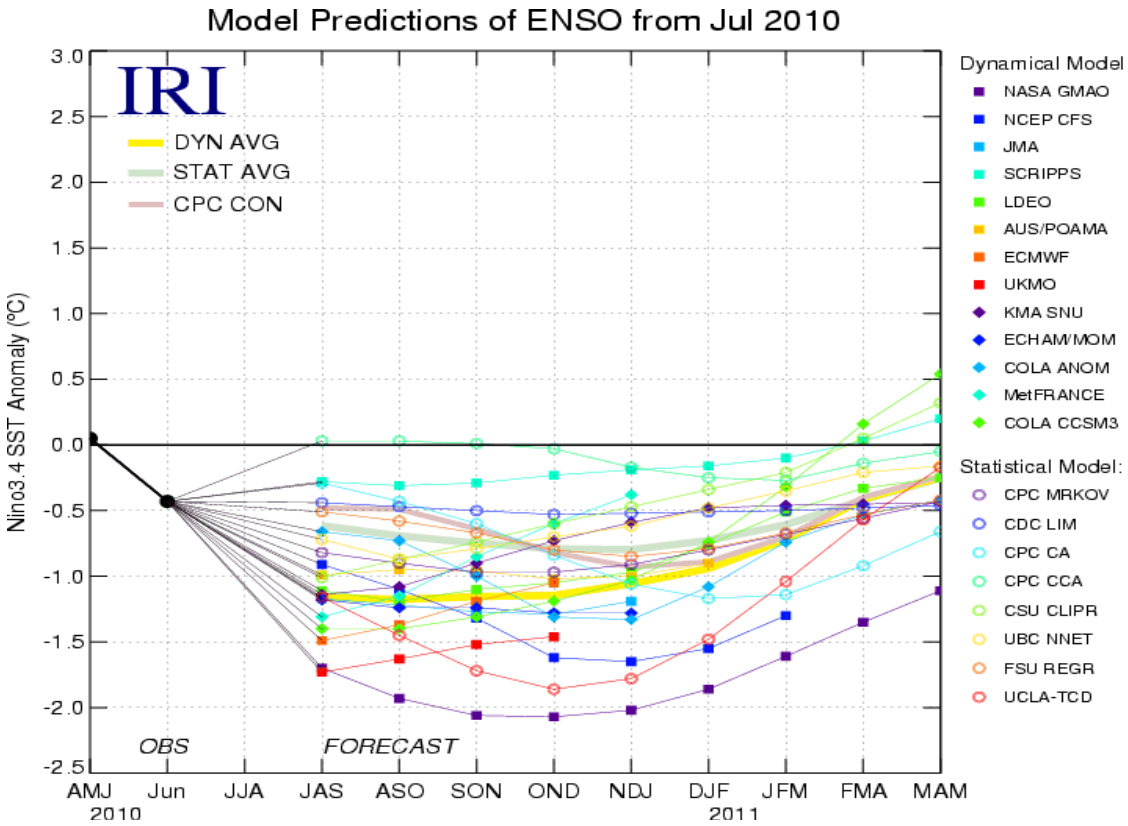


Fig - 2



A moderate to strong La Nina appears likely later this year and thus, the chances of influence become greater with time. It was only a few years ago that a La Nina grew to a moderate category and that was during the Winter of 2007-08. The preceding Fall of 2007 was warm and dry, while the winter was stormy and snowy with normal temperatures (but that was just one La Nina period out of many in our analogues).

Autumn 2010 Analogues

Nearly all of the La Nina analogue (Fig – 3) years were chosen for the Southeast Lower Michigan Outlook with the idea of La Nina developing fairly quickly after an existing El Nino the previous winter and spring. The quick transition from El Nino to La Nina was one of the main priorities for these La Nina's selections.

Autumn 2010 Analogues

Fig - 3

2010 ANALOGUE AUTUMN SEASONS

DETROIT

YEAR	Sep	Oct	Nov	Fall		YEAR	Sep	Oct	Nov	Fall	
1889	62.7	46.9	40.2	49.9	1	1889	0.56	1.05	2.36	3.97	1
1903	64.1	53.1	36.5	51.2	1	1903	2.78	1.67	1.18	5.63	2
1916	63.1	52.9	40.5	52.2	2	1916	2.74	2.48	1.21	6.43	3
1924	59.4	57.4	39.8	52.2	3	1924	2.61	0.47	0.60	3.68	4
1942	62.6	53.4	41.2	52.4	4	1942	2.95	4.00	2.92	9.87	1
1954	65.6	54.5	41.2	53.8	1	1954	2.38	7.80	1.41	11.59	2
1955	65.7	55.3	37.7	52.9	5	1955	1.82	4.45	2.38	8.65	1
1964	64.4	51.4	44.9	53.6	2	1964	2.12	0.50	0.81	3.43	5
1973	64.9	56.2	41.4	54.2	3	1973	1.82	2.01	3.21	7.04	6
1988	63.3	46.0	42.2	50.5	2	1988	3.65	3.57	4.29	11.51	3
1998	68.0	53.8	43.8	55.2	4	1998	1.50	1.34	1.36	4.20	7
2007	66.7	59.1	39.9	55.2	5	2007	1.44	2.00	1.77	5.21	8
Ave	64.1	53.3	40.8	52.7		Ave	2.20	2.61	1.96	6.77	
DEP	0.2	1.4	0.1	0.5		DEP	-1.07	0.38	-0.70	-1.39	
Norm	63.9	51.9	40.7	52.2		Norm	3.27	2.23	2.66	8.16	

FLINT

YEAR	Sep	Oct	Nov	Fall		YEAR	Sep	Oct	Nov	Fall	
1924	54.9	55.4	42.2	50.8	1	1924	3.60	0.95	0.93	5.48	1
1942	60.0	50.8	38.6	49.8	1	1942	3.33	3.53	3.58	10.44	1
1954	62.5	51.5	39.1	51.0	2	1954	1.97	4.21	2.08	8.26	1
1955	66.7	52.6	34.8	51.4	3	1955	0.54	2.92	3.22	6.68	2
1964	60.1	46.1	41.5	49.2	2	1964	2.23	0.61	1.20	4.04	3
1973	62.6	55.3	40.3	52.7	4	1973	2.80	2.73	4.93	10.46	2
1988	61.2	44.8	41.4	49.1	3	1988	3.03	2.76	4.94	10.73	3
1998	65.4	51.5	41.8	52.9	5	1998	1.28	2.23	1.58	5.09	4
2007	64.2	57.3	37.1	52.9	6	2007	1.46	3.20	1.42	6.08	5
Ave	61.7	51.7	39.6	51.0		Ave	2.25	2.57	2.65	7.47	
DEP	1.0	2.5	1.5	1.7		DEP	-1.51	0.23	0.00	-1.28	
Norm	60.7	49.2	38.1	49.3		Norm	3.76	2.34	2.65	8.75	

SAGINAW

YEAR	Sep	Oct	Nov	Fall		YEAR	Sep	Oct	Nov	Fall	
1903	61.9	51.8	35.6	49.8	1	1903	5.60	3.19	1.32	10.11	1
1916	60.8	50.0	38.5	49.8	2	1916	1.51	2.69	1.58	5.78	1
1924	56.4	54.1	38.1	49.5	3	1924	3.15	0.38	0.61	4.14	2
1942	59.6	50.5	37.6	49.2	4	1942	4.80	4.28	2.73	11.81	2
1954	61.1	51.1	39.3	50.5	1	1954	3.40	7.78	1.99	13.17	3
1955	62.1	53.1	33.9	49.7	5	1955	1.24	3.26	2.32	6.82	3
1964	60.2	47.3	41.6	49.7	6	1964	3.45	0.99	1.92	6.36	4
1973	62.0	55.1	39.3	52.1	2	1973	1.78	2.36	2.69	6.83	5
1988	60.3	44.0	39.9	48.1	1	1988	4.87	2.82	5.81	13.50	4
1998	66.0	52.3	41.4	53.2	3	1998	1.89	3.99	2.05	7.93	6
2007	64.0	56.8	37.0	52.6	4	2007	2.15	2.26	0.81	5.22	7
Ave	61.3	51.5	38.4	50.4		Ave	3.08	3.09	2.17	8.33	
DEP	0.6	2.0	0.4	1.0		DEP	-0.87	0.60	-0.48	-0.75	
Norm	60.7	49.5	38.0	49.4		Norm	3.95	2.49	2.65	9.09	

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

Trends of the Analogues

Temperatures

Out of the twelve analogues at Detroit, the majority were average to above with five warmer than average and five near average (within a degree of the norm). Only two posted below average results and both times it was primarily the result of a much colder October (interesting and something to watch). On the flip side, it was also October's data set (and even with those two cold Octobers) that revealed October had the best chance to be above average and by the largest departure. Talk about contradictory patterns, this suggests a pronounced amplified pattern may emerge and strengthen with time. **Much of the time upper air ridging prevailed but with a change commencing later October or in November (this would also follow the ahead of schedule pattern seen since the spring). Of all the three months, while still averaging above normal, November does show more of a mixed pattern (especially in Detroit's analogue).**

Precipitation

In this set of analogue data, average to below average precipitation was the overall trend with a minority wetter than average, the most recent in 1988, and this after a hot and drier than normal summer. An interesting and subtle change was noted from the prevailing summer patterns. The summer analogues (along with the actual outcome this past summer) strongly suggest the wettest weather would occur mainly from the Ann Arbor area to Detroit and south to the Ohio border. In the fall analogues; it is reversed to the extent that the northern parts of Southeast Lower Michigan had a slightly better chance of having more rain rather than the south (which in fact, also follows the normal trends).

Bonus: The six month warmth lag effect???

Checking back over the top five warmest six month /Mar-Aug/ averages at Detroit (Fig -4) shows the following (as of late Aug, 2010 is in first place). In the top five warmest "spring-summer years", all the following autumns had average to above average temperatures. The average of the five years /53.1/ is +0.9 degrees.

Fig - 4

YEAR	DETROIT 6-MONTH AVE	NORM 52.2 AUTUMN	DEPART
1991	63.2	52.1	-0.1
1921	63.1	53.6	1.4
1955	62.6	52.9	0.7
1987	62.1	51.6	-0.6
1998	61.9	55.2	4.0

Frost and Freeze Trends:

Just because our "guidance" indicates a warm or mild fall, it doesn't necessarily mean our frosts and freezes will be later than average. Checking back on the years in our study reveals some interesting frost/freeze statistics. Using just data from Detroit it was estimated a frost and possible freeze occurred in most areas when overnight lows fell in the lower to mid 30s for the first time. While this is just an estimate, it does show a wide range of dates. The earliest date temperatures fell into that zone was Sep 29, 1942. While the latest was in early November on the 3rd back in 1924. The average time period of killing frosts across the entire region was the second to third week of October, or within the typical time period. The overall temperature trend of the fall can have little to do with when the frosts and freezes occur, especially where an amplified, flow regime dominated. Even though most years did contain sharply colder polar air masses at times, they were more transitory in nature.

Indian Summer this Fall?

Reflecting on the available data above, the likelihood of a period or two of Indian Summer weather during the fall looks promising. Note the temperature and precipitation patterns for October (the prime month for Indian Summers) from our analogue years. It should also be mentioned that Indian Summer weather can occur into late fall (or even early winter). Check out the article on Indian Summer and its origins.

All Analogue Composites (except 1889)

These maps (5a, b) reflect previous La Nina analogues used in the local study. They represent past Autumns when similar type of La Ninas dominated.

Fig -5a

Temp

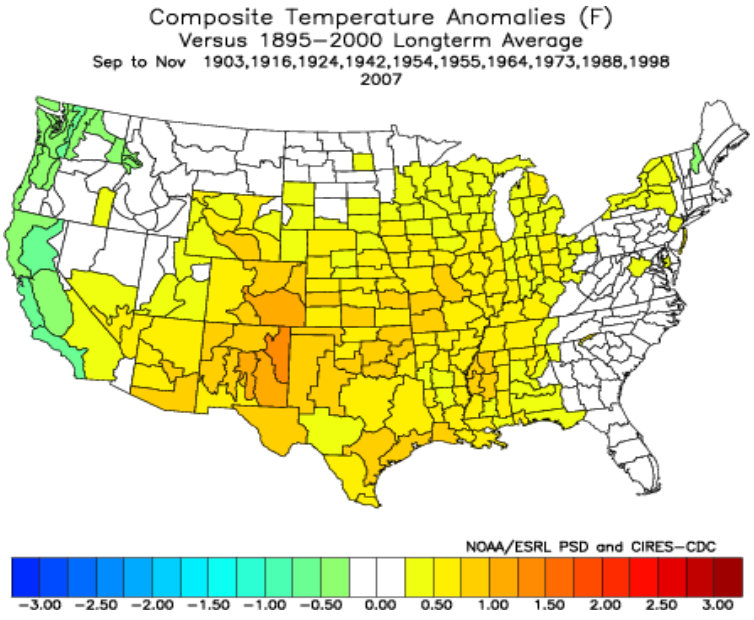
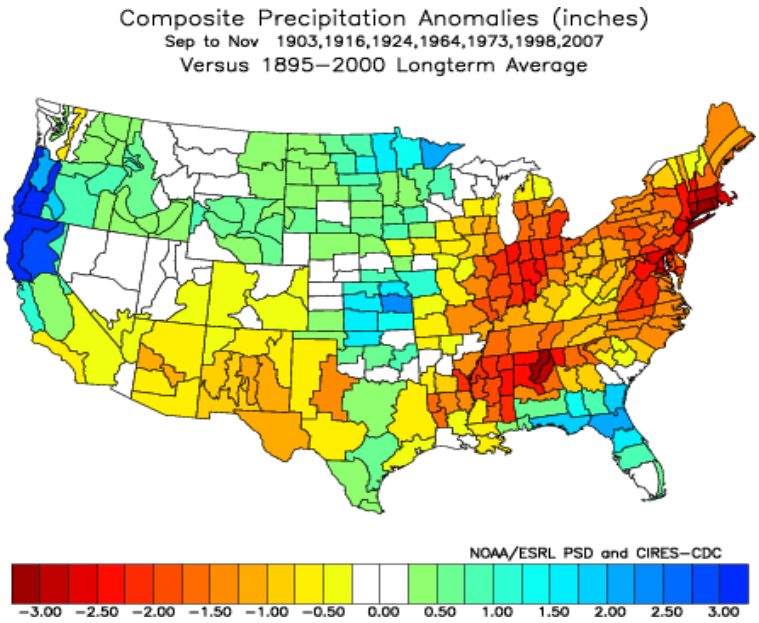


Fig – 5b

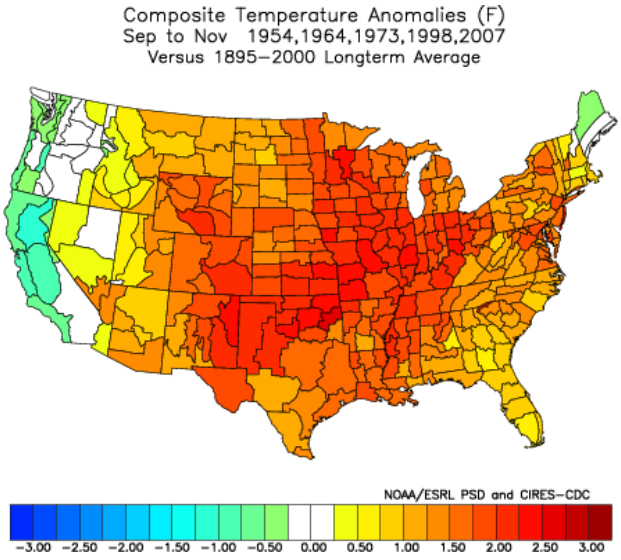


Warmest of Falls

These composts (6a, b) reflect the averages of the warmest of falls for both temperatures and precipitation.

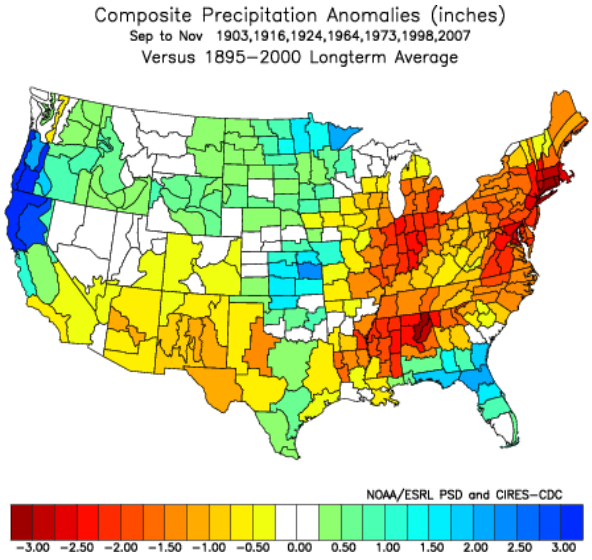
6a

Temp



6b

Pcpn

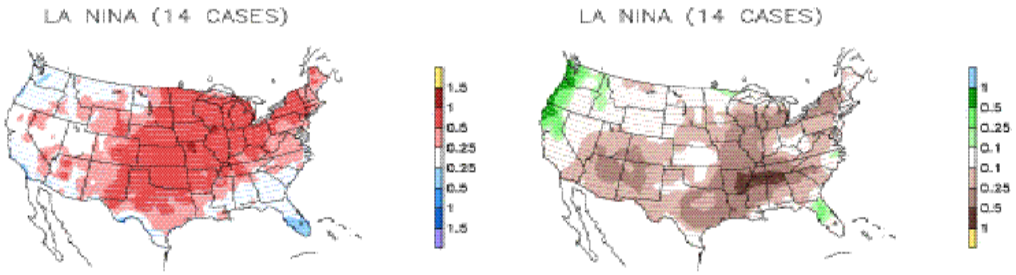


Autumn Trends in 14 La Nina cases since 1950

Our particular set of La Nina data (Figs – 3, 5a, b) mimics well the La Nina cases studied since 1950 (maps below) with generally above normal temperatures and below normal precipitation. Therefore, both our fall analogue data and La Nina case study maps agree on this autumn.

(Fig – 5)

TEMPS **AUTUMN** **PRECIPITATION**



Some notable Autumn Dates:

Autumn begins: 1109PM EDT, Sep 22, 2010 **Harvest Moon: also Sep 24, 2010**
Halloween: Sunday Oct 31, 2010 **Thanksgiving: Nov 25, 2010**

Enjoy the fall, and take advantage of the Indian Summer(s) (which look likely). Look for the Winter 2010-11 Outlook in late October or early November.