Winter Outlook 2012-2013

Southeast Lower Michigan

Winter Outlook

December through February

2012-2013

Slides 2-7: Forecast Reasoning

Slide 8: Winter Outlook for SE Michigan

Background : 850mb temperature anomaly DJF 2011-2012

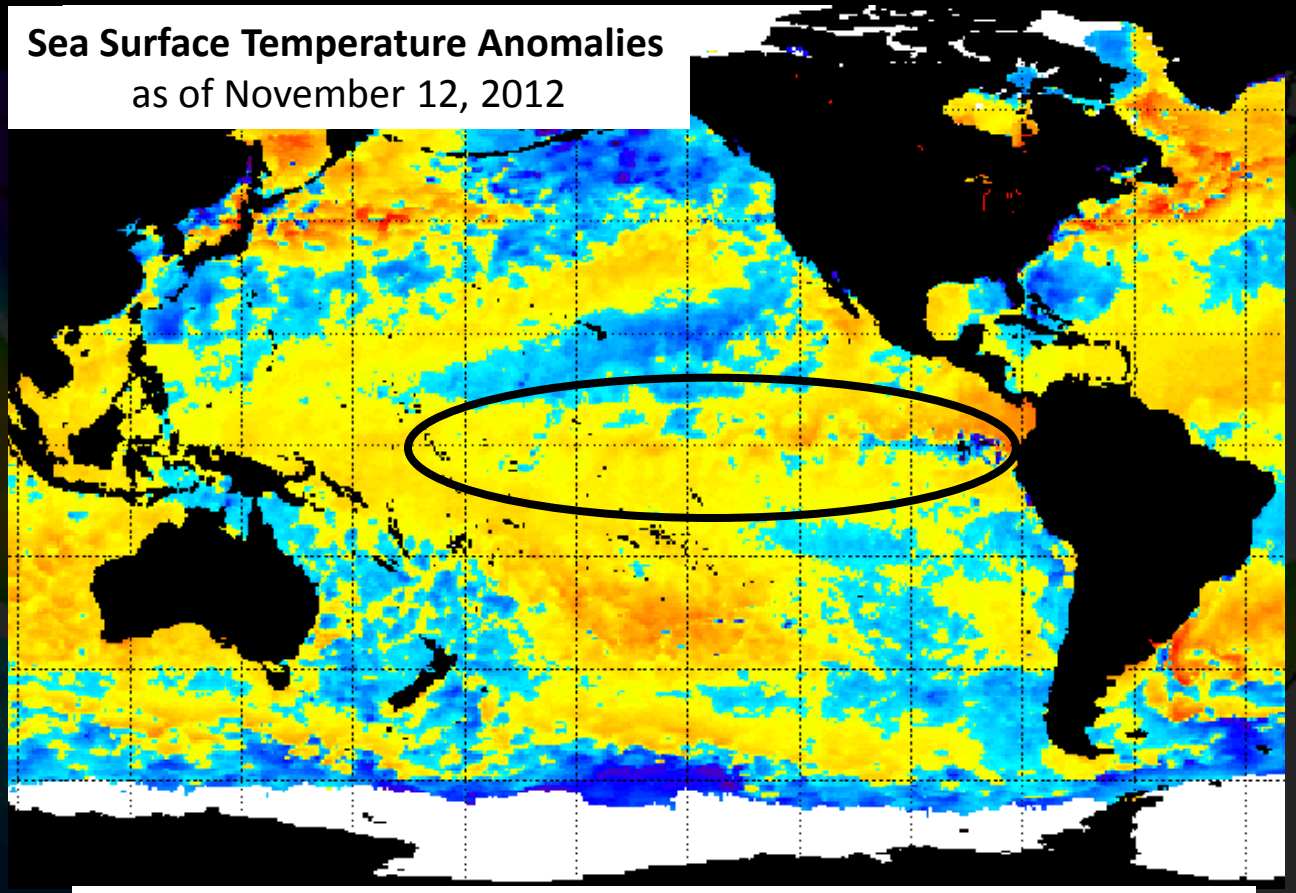
Current Conditions
SST Anomalies

There does not appear to be any dominant ENSO signal in the tropics this fall.

This is confirmed by recent Autumn 2012 MEI values, a superior method of quantifying the tropical circulation, which have fallen to around neutral values.

Read more about the MEI here

Sea Surface Temperature Anomalies
as of November 12, 2012



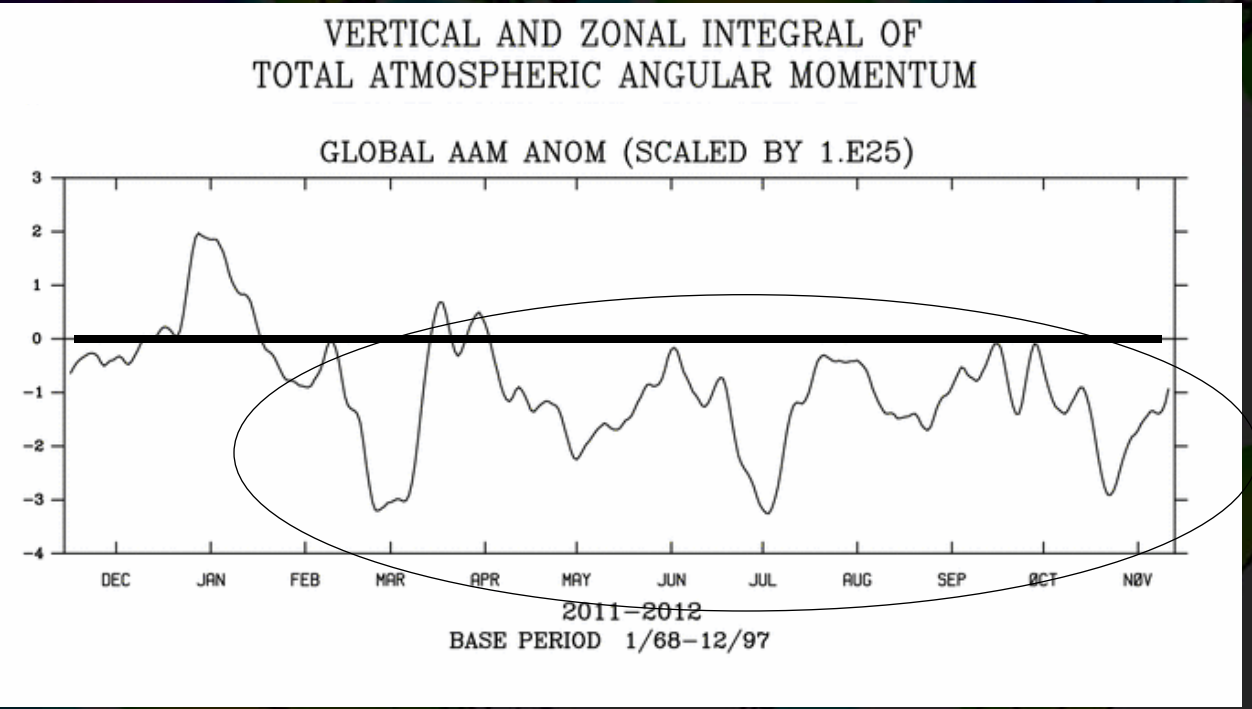
For the latest ENSO conditions, visit the Climate Prediction Center's (CPC) ENSO page

Current Conditions

Total Atmospheric Momentum (departure from normal)

Predominantly negative momentum anomalies indicate that the atmosphere has been in a relatively low energy state for most of the last year.

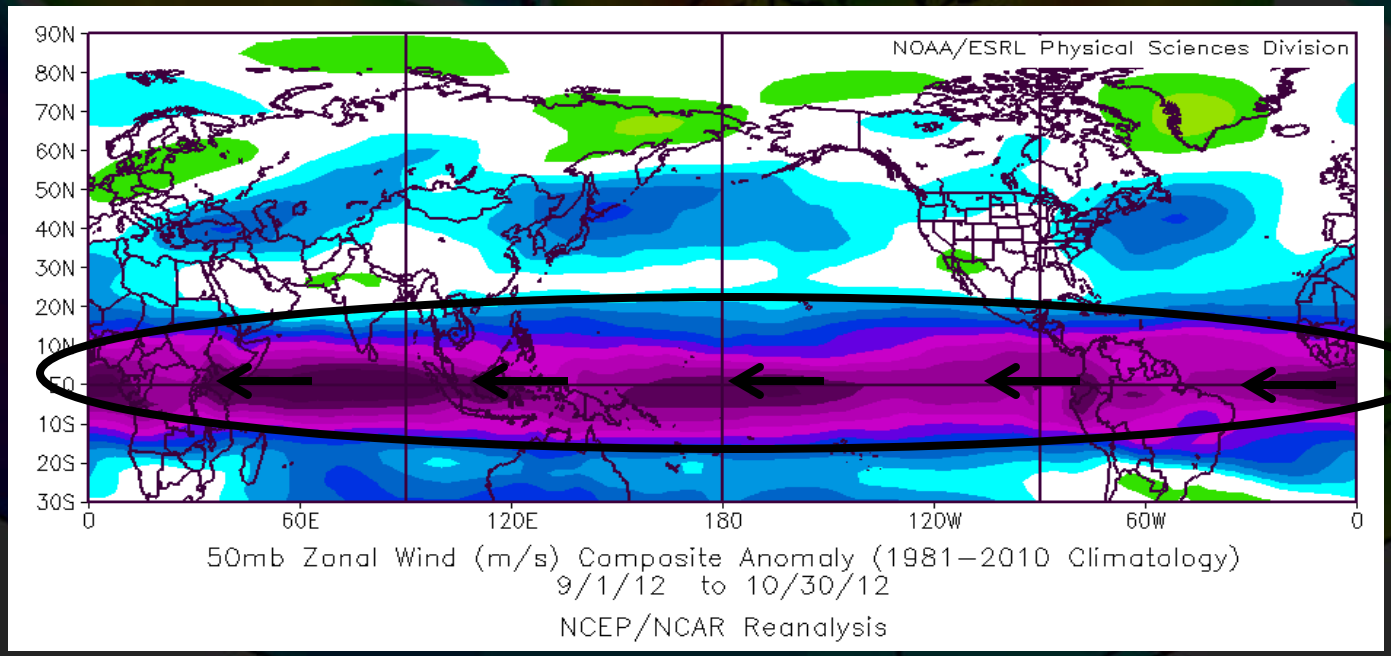
A true el Nino condition will result in positive anomalies (a "higher energy" state). Thus, despite some warmer waters in the tropics (last slide), we confirm here that there is no indication of any el Nino-like influences taking shape as we head into the early stages of winter.



Current Conditions

Strengthening easterlies in the tropical stratosphere

Winds in the lower stratosphere regularly oscillate between westerly and easterly, and their direction is generally predictable on a seasonal timescale. The *easterly* phase (*present*/below) can augment the atmosphere's lower energy state (last slide). It also favors a weaker polar vortex because it allows atmospheric wave energy to be directed poleward, which ultimately results in a net deceleration of the polar jet. For this reason, it also has physical ties to southward displacements of the jet stream, such as over the North Atlantic (e.g. negative NAO), which can favor colder patterns over the Great Lakes. This is in contrast to the westerly phase which was in place last year and is more prohibitive of such poleward direction of wave energy.



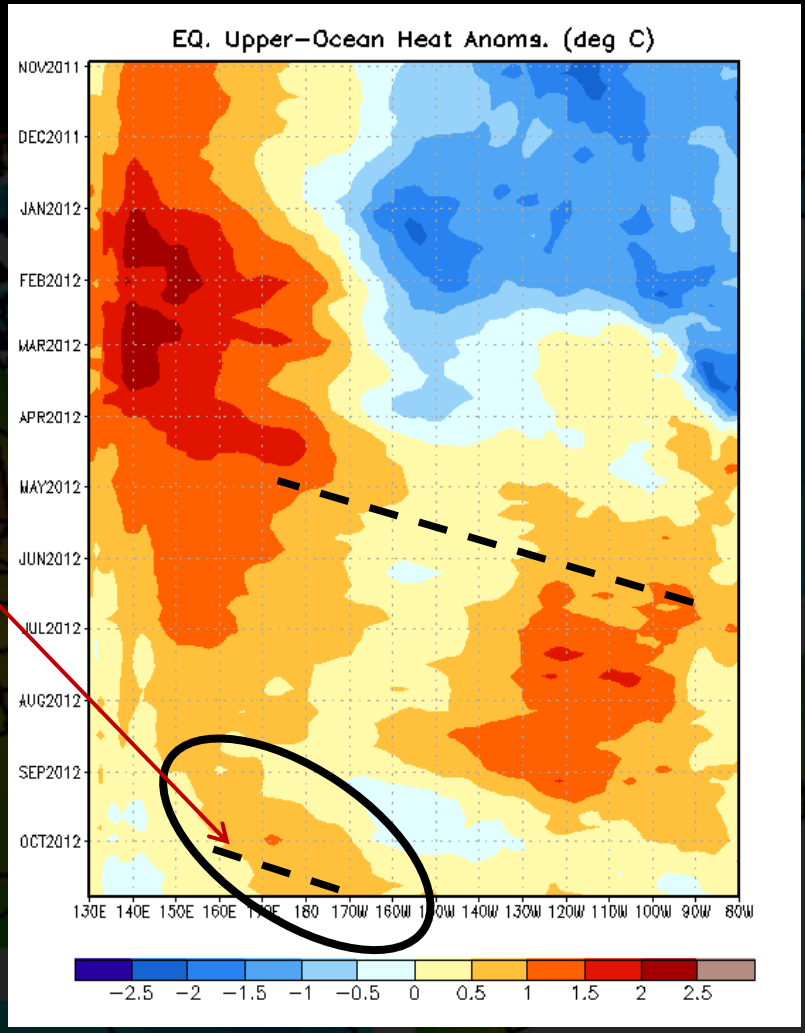
ENSO Outlook

Changes to expect

Revisiting the ENSO cycle, we note that warm sea surface temperatures have emerged once again near intl. dateline in association with the downwelling phase of a weak Kelvin wave.

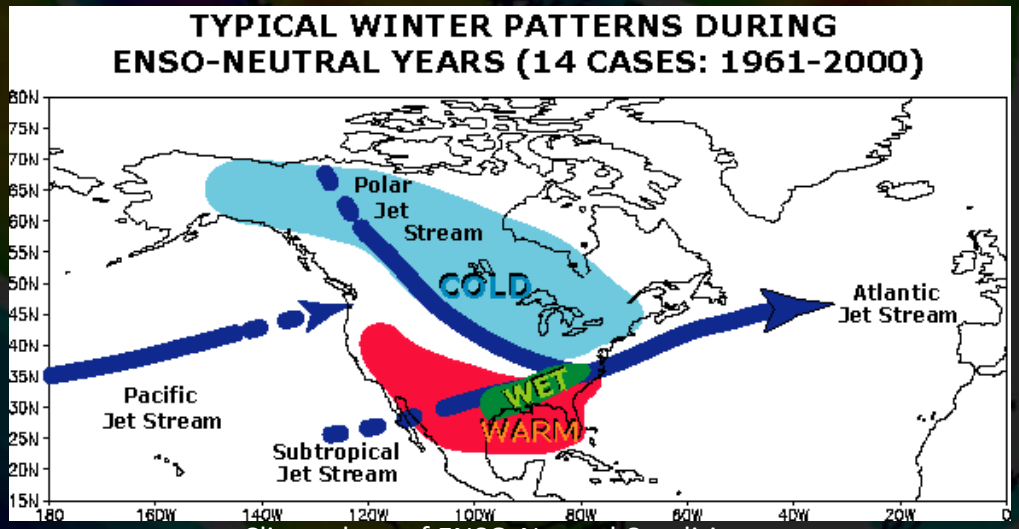
This wave is not very strong, and while it could cause additional warming of SSTs late this year, a fully coupled el Nino episode is not expected. The CPC has discontinued their el Nino Watch.

In terms of the last two slides, it seems safe to assume that the atmosphere, while possibly resembling a weak el Nino influence at times, is unlikely to develop into a long term el Nino-like state.



Similar Past Years

There are a number of years that featured an anomalously negative momentum state that also featured tropical easterlies in the lower stratosphere. Discounting those winters which featured a pronounced ENSO (el Nino/la Nina) circulation in the tropics (using MEI as the measuring stick), the resulting pattern over the *Great Lakes* is actually remarkably similar to the climatology of "ENSO-Neutral" winters below, courtesy of CPC:



Climatology of ENSO-Neutral Conditions

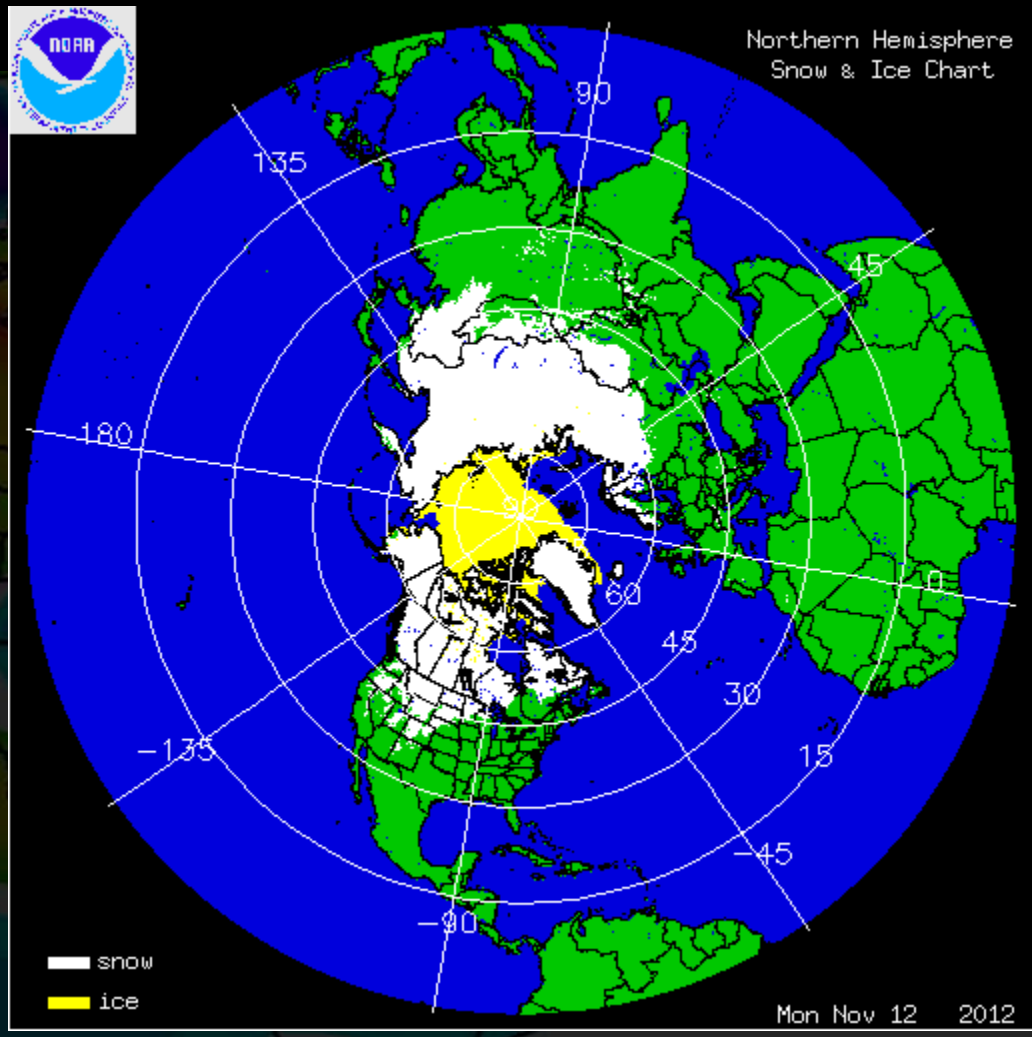
While the so-called "analog method" (comparison of this season to previous seasons) and climatologies (like above) are highly imperfect, they can sometimes provide valuable insight. This year, both yielded similar results and both are strongly supported by everything that has been discussed so far.

Additional Considerations

High-latitude snow cover

High-latitude snow cover plays a key role in the manufacturing of cold arctic airmasses, and therefore has a direct influence on the intensity of cold air outbreaks in the Great Lakes. The image on the right shows Northern Hemisphere snow cover as of November 12, 2012.

The coverage of snow across the high-latitude northern hemisphere is near normal.



Winter Outlook for Southeast Michigan

Expect a fairly typical winter

Temperature Trends

The potential for a high amplitude pattern often spells increased potential for large swings between warm and cold periods, but because of the strong support for a weakened polar vortex and the subsequent likelihood for persistent troughing and cold air intrusions over the Great Lakes, SE Michigan can expect a return to more typical wintertime temperatures after last year's reprieve. Temperatures are forecast to average near to slightly below normal for the winter.

Days 1 – 90: Slightly below normal high temperatures, near normal low temperatures. Higher than normal potential for at least a couple of very cold periods, but not of the record-breaking variety.

Precipitation/Snowfall trends

The combination of an active clipper pattern and occasional chances for stronger systems emerging from the Ohio Valley during oscillations in the pattern or during active subtropical jet periods offer no reason to forecast a significant departure from typical SE Michigan snowfall patterns.

Days 1 – 90: Normal snowfall, mainly characterized by an active clipper pattern

Winter Trivia for Southeast Michigan

Coldest temperature: **Tri-Cities: -23F** (Feb 1918), **Flint: -25F** (Jan 1976), **Detroit: -21F** (Jan 1984)
Coldest month: **Tri-Cities**: **9.4F** (Jan 1912), **Flint: 10.9F** (Jan 1977), **Detroit: 12.2F** (Feb 1875)

Coldest winter: **Tri-Cities**: **15.7F** (1962-63), **Flint: 16.7F** (1976-77), **Detroit: 18.8F** (1903-04)
Warmest winter: **Tri-Cities: 33.3F** (1931-32), **Flint: 32.2F** (1982-83), **Detroit: 36.9F** (1881-82)

Snowiest month: **Tri-Cities: 39.3”** (Feb 1908), **Flint: 35.3”** (Dec 2000), **Detroit: 38.4”** (Dec 2000)
Snowiest year: **Tri-Cities: 87.2”** (1966-67), **Flint: 82.9”** (1974-75), **Detroit: 93.6”** (1880-81)
Least snowy year: **Tri-Cities: 7.8”** (1941-42), **Flint: 10.9”** (1921-22), **Detroit: 13.4”** (1936-37)

Heaviest snow storms: **Tri-Cities: 23.8**" (January 26-27, 1967), **Flint: 22.7**" (January 26-27, 1967), **Detroit: 24.5**" (April 6, 1886)

Average first measureable snowfall: **Tri-Cities:** Nov 15th , **Flint:** Nov 16th, **Detroit:** Nov 17th
Average first 1+”: **Tri-Cities:** Nov 26th , **Flint:** Nov 29th, **Detroit:** Nov 30th
Average first 3+” snowfall: **Tri-Cities:** Dec 27th , **Flint:** Dec 29th, **Detroit:** Dec 26th

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