

WeatherWorks

Your Weather Experts

2015 - 2016 Winter Forecast



Courtesy @Zineson09 | Twitter

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Lead Long Range Meteorologist:

Brian Marmo

Contributing Meteorologists:

Sam DeAlba
 Ken Elliott
 Mike Mihalik
 Adrian Mitchell
 Rob Reale
 Christina Speciale

WeatherWorks was founded in 1986 in an effort to bring quality meteorological expertise to both the public and private sectors. WeatherWorks' objective has remained the same ever since: to provide the highest quality of weather consultation based on years of training, experience, and the scientific principles of Meteorology. Now in its thirtieth year of publication, the WeatherWorks Winter Forecast is a small part of that effort. Please direct any comments or suggestions about this winter forecast to mikemihalik@weatherworksinc.com.

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Final Pacific Update - El Niño is King

After starting with the Pacific Ocean in the two winter previews, let's take a final look at what is happening out in the Tropical Pacific and Gulf of Alaska. As we approach meteorological winter, we have only become more confident that El Niño will be the dominate player in the Pacific during the upcoming winter. With sea surface temperature (SST) anomalies around 2.5°C across the eastern and central Equatorial Pacific, El Niño continues to steadily strengthen. In fact, the current event is already the second strongest on record, only trailing the El Niño of 1997-98.

While a ridge of high pressure over the West Coast was a prominent feature of the last two winters, we expect a different outcome in 2015-16. A stormy pattern over the last two months (in-

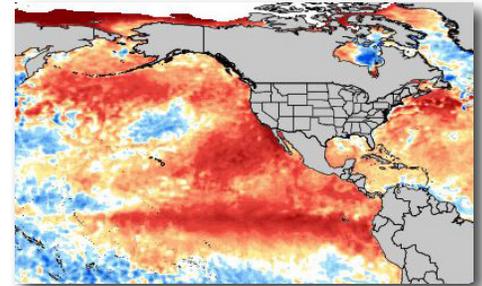


Fig. 1: Sea Surface Temperature anomalies continue to be very high (red = warm).

Via Levi Cowan | Tropical Tidbits

cluding a visit from the remnants of Hurricane Oho) has led to some cooling across the Northeastern Pacific. Thus, we anticipate that a typical strong El Niño pattern will be in control by early winter. This features a trough of low pressure over the Gulf of Alaska, and a ridge of high pressure over much of the northern tier of the US.

Below Normal Snowfall?...Not So Fast.

While strong El Niños are typically associated with mild winters, we caution that there are no guarantees when it comes to snowfall totals. Let's not forget that the Midwest is well removed from the Tropical Pacific. So, is there a scenario where the region could see above average snowfall? We think there is.

Even though snow amounts during strong El Niños average out below normal, a lot of this correlation hinges on

below average precipitation trends. While the favored storm track during these seasons is typically located to the south and east, there have been El Niño seasons where moisture has spilled over into the region. In addition, we want to emphasize that El Niño is not the only oscillation being considered this winter.

The Arctic Oscillation (AO) is also very much worth watching. Winter months with a negative AO are associated with frequent arctic outbreaks and an overall active weather pattern. Not surprisingly, this combination can result in above average snowfall. This can even be the case in a pattern that is otherwise not the most conducive for snow.

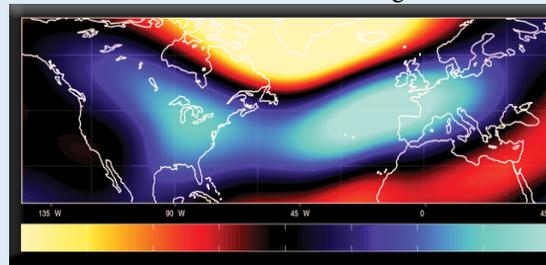


Fig. 2: Temperature Correlations associated with Negative AO Pattern (Blues=Cool Departures, Reds= Warm)

October and Trends in the Arctic Oscillation

As mentioned on the last page, the Arctic Oscillation can have major implications for our winter. Thus over the last few years we have taken into account two oscillations, the Snow Advance Index and October Pattern Index, that have had some success in predicting the prevailing state of the AO. There is also a correlation between the dominant phase of the AO during October and the phase during the winter months.

- So far, October 2015 has featured a predominately negative AO (see image to the right) and is forecast to average out below normal overall for the month
- Of the previous Octobers that have experienced similar conditions, approximately 75% of them had a mean winter AO index below zero

- As stated on page 2, a -AO favors colder than normal temperatures and increases the chances of receiving snow

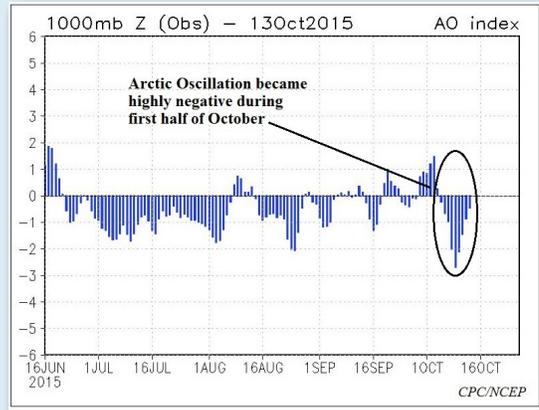


Fig. 3: AO index through mid-October 2015

Global Indices & Atmospheric Oscillations

Below is a summary of oscillations expected to impact the upcoming Winter of 2015-16. Even though our focus has primarily been on the very strong El Niño (and to a lesser extent the AO), other teleconnections such as the PDO and EPO

also need to be considered. While the positive phases of ENSO (El Niño), PDO and EPO all favor a warmer winter, a -AO could be the eastern US's ticket to a significant and likely late season snowstorm (see more on page 2).

Primary Oscillations with Impacts on Eastern U.S. Wintertime Weather Patterns

Name	El Niño - Southern Oscillation (ENSO)	Pacific Decadal Oscillation (PDO)	Arctic Oscillation (AO)	Eastern Pacific Oscillation (EPO)
Primary Geographic Area	Equatorial Pacific Ocean	Pacific Ocean: North of 20°	Arctic / North Atlantic Ocean	Gulf of Alaska / Northeastern Pacific
Eastern US Impacts (Positive Phase)	<i>Strong El Niño:</i> Mild temps & wet (East Coast) / Dry (Midwest)	Associated with El Niño Type Conditions	Milder than Normal / Less Frequent Cold Outbreaks	Warmer than Average
Eastern US Impacts (Negative Phase)	<i>Strong La Niña:</i> Variable Temps & Dry (East Coast) / Snowy (Midwest)	Associated with La Niña Type Conditions	Colder / More Active than Normal; Frequent Storms	Colder than Normal / Active Pattern
Likely Phase for Winter 2015-16	Strong El Niño	Positive	Trending Slightly Negative, Especially Late	Trending Positive

WeatherWorks 2015 - 2016 Winter Forecast

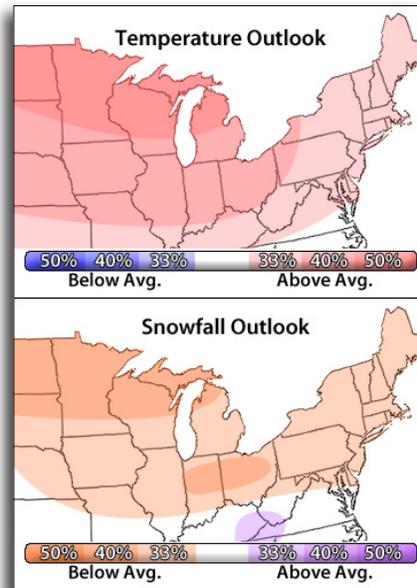
2015 - 2016 Winter Forecast Overview: A Slow Start, But A Busier Second Half

The next three pages will be dedicated to the overall seasonal temperature and snowfall forecast (see below-right), and a monthly breakdown for these variables across the entire forecast region. After the last few years featured some very cold conditions, a milder winter is anticipated across the Midwest, Ohio Valley and Northeast. As a result, below average snowfall amounts are also forecast for a majority of the region.

Winter will likely get off to a slow start across the area. With overall mild temperatures projected to dominate through the end of 2015, the threat of a significant early wintry event is lower than it has been in prior years. While the storm track is likely to be active along the Eastern Seaboard, a lack of cold air east of the Mississippi will favor mixed precipitation and plain rain events over snowfall during December.

However, things are expected to pick up (especially the closer you are to the East Coast) during the second half of winter.

By the time we head into February, the Northeast and Mid-Atlantic will have to keep an eye out for a couple of “big snow” threats, while the Midwest may deal with lighter, but more numerous systems. Despite a forecast of slightly below average snowfall, remember that it only takes one potent storm to deliver a significant snowfall.



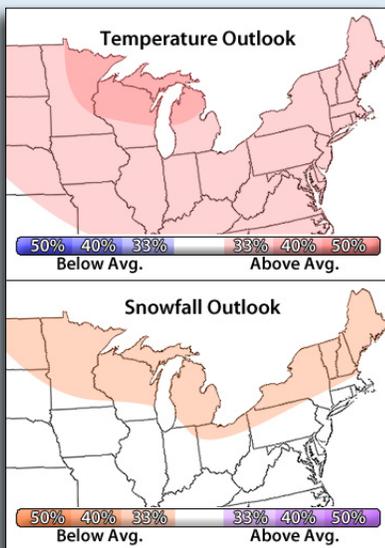
2015 - 2016 Overall Winter Forecast

Key To Understanding Seasonal Forecasts

In order to more effectively communicate the seasonal and monthly temperature and snowfall forecasts for 2015-16, the graphical layout will continue to be presented in a probabilistic format, similar to that of our long-range web page. As a result, instead of just using vague terms such as above or below average, etc., a probability of occurrence will also be given to augment the forecast.

For example, in the snowfall outlook map to the left, much of the forecast zone will see at least a 33% chance of below normal snowfall, with the greatest odds across the Northern Plains and Upper Great Lakes, where there is a 40 - 50% probability that those areas see below average snowfall during the season as a whole.

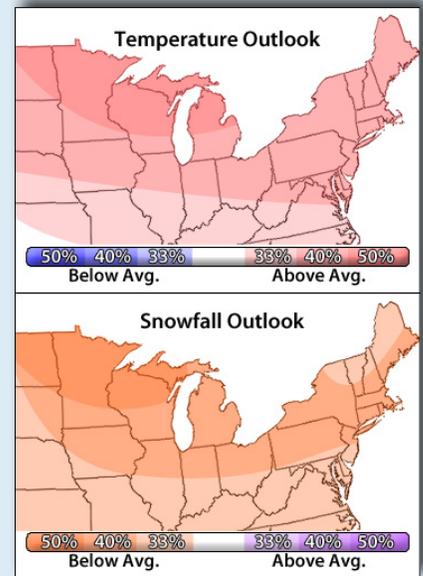
October / November 2015 Forecast



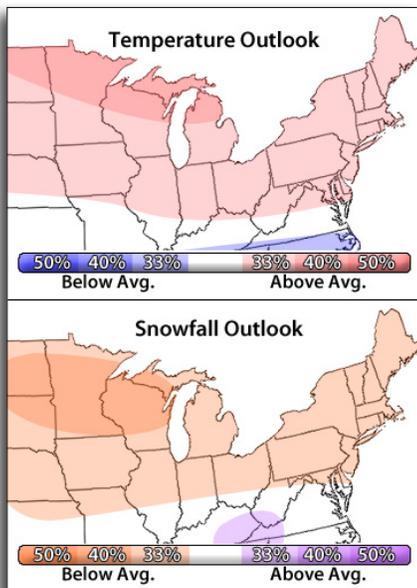
- After an early shot of cold air this weekend (10/16-/10/18) in the Midwest, and perhaps the first snow showers in the Upper Great Lakes, temperatures should return to normal (and eventually above normal) levels to close out the month
- As for November, the whole forecast region is trending milder than usual, with the highest confidence across the Upper Midwest
- With a warm start to the season, locations across the Great Lakes and Northern New England are favored to see below normal snowfall totals
- Meanwhile, the East Coast will see an increasingly active pattern in November
- The rest of the Northeast, Mid-Atlantic and Midwest will have a relatively low risk for snow, but we will avoid temptation to forecast below normal snowfall, mainly because averages are inherently so low

December 2015 Forecast

- While December ushers in the beginning of meteorological winter, it will probably feel more like November, as locations from the Northern Plains to the Mid-Atlantic are forecast to see above normal temperatures
- A “zonal” (west to east) flow will allow milder Pacific air to spill all the way across the country, while frigid polar air stays bottled up in the Arctic
- Despite the anticipation of a busy pattern, the primary storm track is likely to be displaced to the south which will make larger, moisture rich storms hard pressed to move north of the Ohio River
- Mild conditions will increase the confidence in snowfall deficits across the Midwest and Ohio Valley
- In addition, there will also be a reduced threat for a significant East Coast/Appalachian snow storm during the last month of 2015

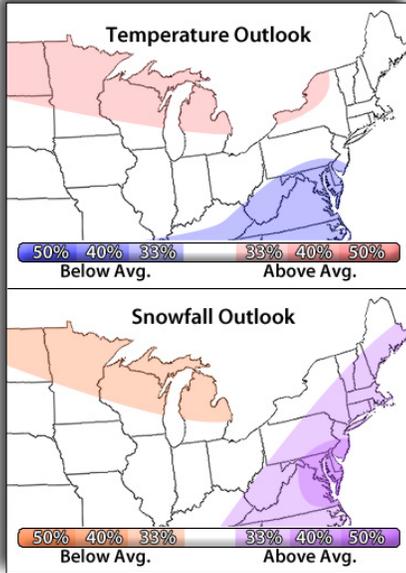


January 2016 Forecast



- Overall, the early winter warmth is expected to continue at least into the first two weeks of January
- Milder than normal conditions are anticipated to retreat to the north and west of the forecast region during the second half of January
- With an active pattern enduring along the Eastern Seaboard, an increase in the number of wintry mix events is expected especially in the Ohio Valley and Mid-Atlantic during the first month of 2016
- With the projected storm track well to the east, locations in the Midwest will probably struggle to reach normal snow amounts during January, with the Ohio Valley having the best chance to approach or exceed average levels
- Locations further north in the Northeast and New England will finally be favored to see snow (though they likely will finish just short of their overall January average)
- Additionally, the “big snow” potential along the East Coast/Appalachians will build as we head towards the end of month

February 2016 Forecast



- The forecast region is expected to be entrenched in a more “winter-like” pattern as we move into February
- Any positive temperature anomalies are predicted to be confined to the Upper Midwest and Great Lakes, with much of the Midwest and Northeast trending near normal
- The Midwest and Ohio Valley are anticipated to finish February with their snowiest month of the winter
- However, with the greatest available moisture well to the east, Illinois, Indiana and Ohio are favored to receive their snowfall from clipper type systems or snow showers, as opposed to bigger storms
- Locations around and south of the Mason-Dixon line are even projected to experience seasonably chilly conditions
- With colder air in place and an active southern branch of the jet stream, February will feature the best opportunity for significant snowfall across the Eastern Seaboard (perhaps another “Megalopolitan Snowstorm” like in February of 1983)

March / April 2016 Forecast

- A sharp “north to south” contrast in temperature anomalies is projected as the 2015-16 seasons comes to a close
- Positive departures are predicted in New England, Upstate New York and the Great Lakes Region
- In contrast, the Southern Ohio Valley and Mid-Atlantic are trending colder than normal during March and April
- Low confidence in sustained cold air will curb the overall threat for a coastal storm, as mixed precipitation and rain events will become increasingly favored
- Northern locations, which average the most snowfall, are projected to have a relatively quick end to the winter
- With the effects of El Niño expected to wane by early meteorological spring, we can’t rule out a late season event impacting the Ohio Valley or Mid-Atlantic

