

Typical La Niña Winter Pattern



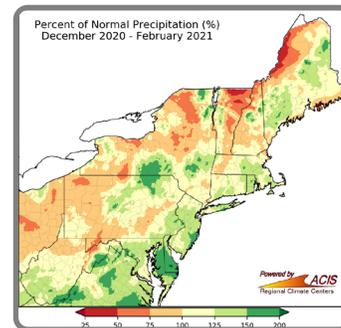
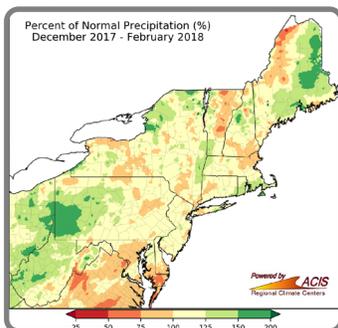
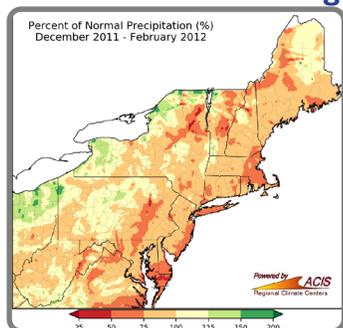
La Niña conditions are present for the **second consecutive winter**, [which is fairly common](#). A La Niña develops when **sea surface temperatures are cooler than average** in the equatorial Pacific for at least several months, altering tropical rainfall patterns and the global atmospheric circulation. This is important to North America because La Niña has an **impact on our weather patterns**, most predominantly in winter.

Although each La Niña is different, there are some general patterns that are predictable. The **jet stream flow** tends to be **very wave-like** (see figure to left). An area of high pressure over the eastern North Pacific leads to increased blocking. The jet stream strength is variable, but usually enters North America in the northwestern U.S. This pattern brings **increased storminess** and above-normal precipitation to the **Ohio Valley**, as the jet stream steers storms that direction. There is also an increased frequency of **cold air outbreaks** in the **central U.S.** Conversely, the **South** tends to experience **below-normal precipitation** and **warmer-than-normal** temperatures. A **moderate strength La Niña is favored**; however, **other atmospheric and oceanic factors** may also influence the Northeast's weather patterns this winter.

The image above shows the typical pattern during La Niña winters. High pressure over the eastern North Pacific leads to increased blocking. The polar and Pacific jet streams tend to split around this area of high pressure and join over the Northwest U.S. The jet stream tends to be wave-like, with the active storm track along the northern states. This increases the likelihood of cooler, stormier conditions. Across the southern U.S., conditions tend to be drier and warmer. It is important to note that this is a schematic diagram representing general patterns and is not created from actual data. For more information, please visit: <https://www.climate.gov/news-features/blogs/enso>.

Precipitation Implications

Winter Conditions During Past La Niñas



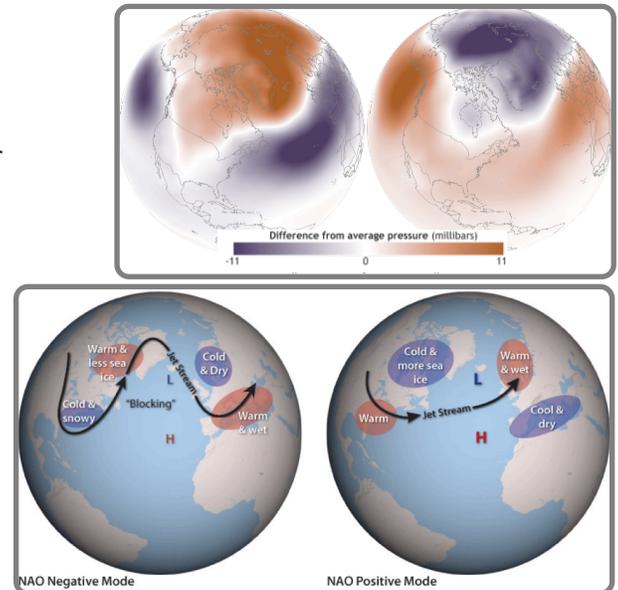
With **dryness persisting** in parts of northern New England, this winter's La Niña could have implications for **precipitation patterns** across the Northeast. The maps above illustrate the conditions during the La Niña winters of 2011–12, 2017–18, and 2020–21. During La Niña episodes, the **Ohio Valley** tends to be **wetter** and **southeastern areas** tend to be **drier**. This signal is most pronounced during the three-month period of [February through April](#). However, the precipitation pattern is less clear for the rest of the Northeast. As for snowfall, [preliminary research suggests](#) that weaker La Niña events are **snowier over the Northeast** on average, particularly in northern New England and portions of New York. La Niña winters also tend to be **snowier for lake-effect areas**. During strong La Niñas, the **Mid-Atlantic** tends to be **less snowy**.

Each La Niña is different and other factors can affect weather conditions. A few of these factors include **pre-existing global snow cover patterns** or **climate variability** associated with the [Arctic Oscillation](#) and the [North Atlantic Oscillation](#). These patterns are less able to be forecasted far in advance compared to La Niña, meaning that it is uncertain how they will affect the upcoming winter season. For more information, see the monthly synoptic discussion from NOAA's National Centers for Environmental Information at <https://www.ncdc.noaa.gov/sotc>. Another factor is **long-term climate trends**, which can overshadow the La Niña signal. In the Northeast, there is a trend toward wetter and [warmer conditions](#).

Other Factors

North Atlantic Oscillation

The [North Atlantic Oscillation \(NAO\)](#), which is often influenced by the [Arctic Oscillation](#), is a prominent **pattern of climate variability** that can have a strong influence on weather in the Northeast. In the **positive phase**, lower-than-average pressure over the Arctic and higher-than-average pressure over the surrounding region tends to keep **cold air locked up** within the polar region. When conditions flip to the **negative phase**, air pressure is higher than average over the Arctic and lower than average over the surrounding regions. This allows **cold, dense air** from the Arctic to **push southward** to locations in the middle latitudes. These patterns affect weather all around the Atlantic by influencing the **intensity and location of the jet stream** and the storm tracks that follow it. During the **positive phase**, the eastern U.S. tends to be **warmer and drier** than average, while during the **negative phase, cold and wetter (or snowier) conditions** are observed. The North Atlantic Oscillation is less predictable far in advance, so there is considerable uncertainty as to how much it will impact a given winter season.

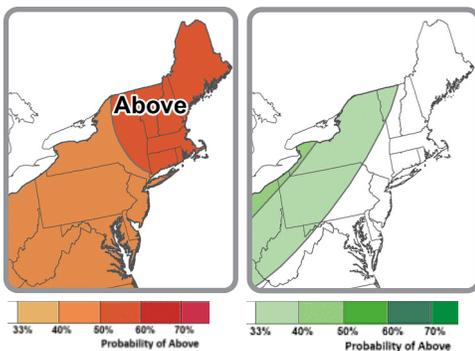


Madden-Julian Oscillation

The [Madden-Julian Oscillation \(MJO\)](#) is a tropical disturbance that results in **changes in clouds, rainfall, winds, and pressure** across much of the global tropics. The Madden-Julian Oscillation can be an important factor during the winter months as it often results in **changes in the jet stream**. This can impact the storm track, which affects precipitation including snowfall, and often can lead to **cold air outbreaks**. One way to view the Madden-Julian Oscillation influence on the higher latitudes is to understand that it **can produce impacts similar to those of El Niño-Southern Oscillation (ENSO)**, but typically only for 1–2 weeks before changing.

Winter Outlooks

Temperature and Precipitation

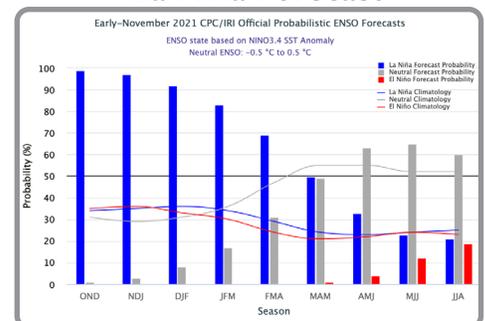


The [Climate Prediction Center's temperature outlook](#) for winter 2021–22 indicates that the Northeast is more likely to experience **above-normal temperatures**, with the greatest likelihood in New England and parts of northern and eastern New York (map far left). This forecast is based on factors such as La Niña, long-term climate trends, warmer-than-average sea surface temperatures, and computer forecast models.

For precipitation, the [ENSO composites](#) show that during a La Niña winter, the Ohio Valley, including parts of **West Virginia** and **Pennsylvania**, tend to be **wetter than normal**. The winter 2021–22 precipitation outlook resembles La Niña precipitation anomaly patterns for the region (map above right). In addition, warmer-than-normal Great Lakes water temperatures **enhance the likelihood of lake-effect precipitation**. **Equal chances** were forecast in areas where climate signals are not as strong or historically reliable. These areas have a 33.3% chance each of above-, near-, or below-normal seasonal total precipitation.

During La Niña winters, **northern New England** and portions of **New York** can be **snowier than usual**, while the **Mid-Atlantic** tends to be **less snowy**.

La Niña Forecast



During October, La Niña conditions strengthened in the equatorial Pacific Ocean. NOAA's [Climate Prediction Center](#) [indicates](#) there is a 90% chance **La Niña** conditions will **continue through winter 2021–22** and a 50% chance of it continuing into spring 2022.

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