After a remarkably mild winter, 2020 has been a year unlike any in recent memory. However, the calendar is steadily marching forward, and fall is quickly approaching with winter lurking around the corner. We are currently in the beginning stages of constructing our winter outlook, having assessed the most likely large-scale players in the pattern. Based on this, we have formulated a general idea of what the winter will bring. As we get closer, we will fine-tune these ideas and break down when colder, snowier weather is more or less likely.

**Part I: Preliminary Outlook for Winter 2020 - 2021**

The expectation of a “La Niña” winter (cooler waters in the Tropical Pacific), a warm Indian Ocean, oceanic temperature patterns in the northern Pacific, winds in the stratosphere, and “analogs” point to a generally mild winter across the country. In particular, the Southeast U.S. is expected to be quite mild, with the most persistent cold frequently dropping into the Northwest, northern Rockies, and upper Midwest.

Between the cold air potentially situated over the Pacific Northwest and the warmth over the Southeast, there will be a lot of ups and downs. Although the farther southeast you go, the more likely you are to average out warmer than normal for the winter as a whole. Does this mean there will be no cold in the Ohio Valley, Northeast, and Mid-Atlantic? No, there will be cold periods, but they’ll likely be “outweighed” by the milder periods.

These colder periods can still bring snow, especially to the Great Lakes, Appalachian, and into New England where average temperatures are quite cold during the winter. However, the frequent warm-ups will likely mean many rainy or mixed events to go along with any snow, especially in the Ohio Valley, Mid-Atlantic, and even southern New England. In La Niña winters, precipitation often runs above average in the Ohio Valley, near to a bit above average from Upstate NY into New England, near average in the northern Mid-Atlantic (PA, NJ), and near to drier than average farther south.

Can this forecast change? Yes; the most likely way the outlook shifts is by more “high-latitude blocking” occurring than what is currently expected. This blocking can buckle the jet stream and allow colder weather to push south more frequently. While we can get a feel on whether blocking will be more or less likely heading into the winter, it is better predicted at shorter time scales. So, for those hoping for a colder, snowier outcome, it is too early to truly rule it out. We will continue to monitor for any trends in blocking potential as winter approaches.
Part II: Current Ocean Conditions

Sea surface temperatures are always a good place to start in seasonal outlooks; they change much slower than air temperatures, and can develop into well-defined patterns that we can compare to previous years (called “analog”). They also drive tropical thunderstorms that influence the jet stream (and the global weather pattern).

Region 1 is the Tropical Pacific. The cooler waters in this region represent a developing La Niña that’s expected to be in place this winter.

Region 2 is the Indian Ocean and western Pacific. This region is rather warm right now, which focuses persistent clusters of thunderstorms. Whether thunderstorms stay positioned in this region through the winter or occasionally work east towards the International Dateline may have a lot to say about how often the U. S. sees colder intrusions east of the Rockies.

Region 3 is the North Pacific, where there is a neutral signal. Whether warmer waters end up focused closer to Asia or North America can help determine how often cold air spills into the eastern U.S. Warmer waters closer to the West Coast would point to increased “colder risks” in the central and eastern U.S.

Part III: El Niño, La Niña, or Neutral?

Last winter featured borderline “warm-neutral” to “weak El Niño” conditions, with waters somewhat warmer than average across the Tropical Pacific. A weak La Niña is expected to develop by this winter, with some potential to reach moderate La Niña status. In general, La Niña winters tend to feature more cold air over the northwestern U.S. and milder weather over the Southeast U.S. However, exactly how strong the La Niña gets and where the coolest waters are focused will determine how persistent this pattern will be this winter (cooler waters focused closer to South America may increase the potential for colder intrusions east of the Rockies).
Part IV: An Early Look at Analogs

One of our most powerful long range forecast tools is actually the past. We can look at years with similar large-scale patterns to what we’re seeing this year (from the ocean, to the lower atmosphere, all the way through the stratosphere), and see what pattern resulted in the winter. The analogs point towards a ridge in the jet stream off of the West Coast, towards Alaska, and the Aleutian Islands (shown by the oranges and reds). A resultant dip in the jet stream (called a trough and depicted in blues and purples) is shown over western and central Canada, which leaks into the northern U.S. This results in a “Southeast Ridge” cropping up along the East Coast, which typically creates mild conditions over the eastern U.S. in winter. There often is a weaker than normal sub-tropical jet stream in our analogs.

While this pattern isn’t very encouraging for East Coast snow lovers, especially outside of the northern tier from NY to New England, the implied cold intrusions and clash of air masses can result in an active pattern over parts of the Midwest and Great Lakes. For those farther east hoping for a colder, snowier winter, the main area to watch is the West Coast of North America into Alaska. If the ridge ends up more firmly focused closer to the West Coast and into Alaska (as opposed to farther off the coast), it can send cold intrusions farther southeast and push back the Southeast Ridge. The most likely way for this to occur is for the La Niña to remain weaker, and for thunderstorms to work east towards the International Dateline more frequently; we will watch for any sign of this over the upcoming months.

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