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Weather and Climate Summary and Forecast: December 2020 Report

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Weather and Climate Summary and Forecast

December 2020 Report

Gregory V. Jones
Linfield University
December 3, 2020

Summary:

- Seasonal temperatures were seen across the vast majority of the west coast states in November, while the rest of the Great Basin, Southwest, and Rockies were warmer than average¹ for the month.
- While portions of the PNW saw near normal precipitation amounts in November, the bulk of the western US experienced a dry month.
- The western US drought footprint continues to hover around 90%, with over 60% in severe to exceptional drought. The December forecast is for much of the west to remain dry, with the exception of portions of the PNW which is forecast to closer to average or slightly above average precipitation.
- High pressure is in play at least for the first week to ten days of the month, bringing seasonal temperatures, dry conditions, and valley fog for the usual spots. The PNW will likely get some precipitation mid-month, but California and the rest of the west appears to likely see dry conditions continue.
- La Niña conditions in the Tropical Pacific dominant the 90 day forecast from December to February, with the PNW across the northern states forecast to be near average to slightly cool and wet, and California and the central to southern states forecast to be warm and dry.

November brought mostly seasonal temperatures to Washington, Oregon, and California, while inland areas of the Great Basin, Rockies, and Southwest saw warmer than average conditions (Figure 1). An interesting pattern played out in California where elevated areas in the coastal and Sierra Nevada mountains were warmer than average while the central valley was cooler than average. Stagnant air due to dominant high pressure produced this pattern with strong inversions in the valley. November was also dry over most of the western US, except for portions of eastern Oregon, Idaho, Nevada, and the Northern Rockies (Figure 1). Much of the rest of the country was also quite warm and moderately dry in November, except portions of the southeast (not shown).

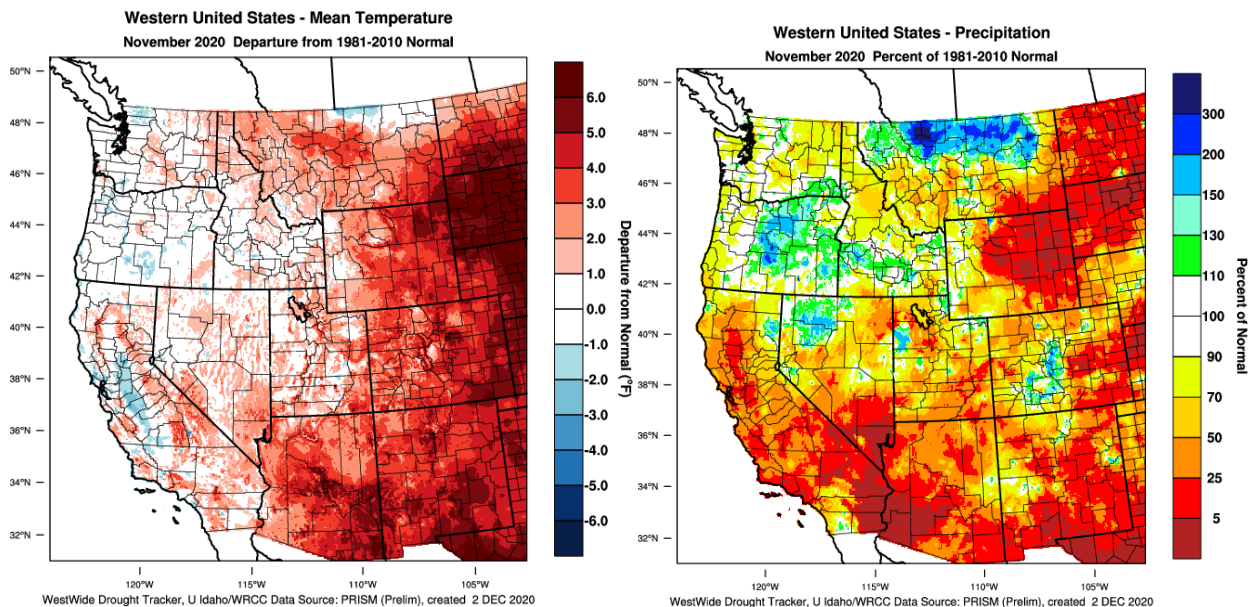


Figure 1 – Western US November 2020 temperature departure from normal (left) and percent of normal precipitation (right); images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

¹ Note that all references to normal or averages in this report are to the 1981-2010 climate normal for each weather/climate parameter unless stated otherwise.

With one month left in the year, the western US has seen temperatures in 2020 running largely near average to above-average (Figure 2). Portions of western Washington and Oregon, eastern Washington, and Idaho will likely end up slightly cooler than average or average for the year, while much of eastern and southern Oregon, California, the Great Basin, and Southwest will end up with a warmer than average 2020. The northern Rockies, the northern Cascades in Washington, and northern to central Plains have seen a year to date that is near average to colder than average (0-2°F below normal) while Texas, the Gulf Coast states, and the eastern third of the US have been seeing temperatures 1-3°F above normal (not shown). November did not change the year to date dry conditions over much of the western US with precipitation amounts in most of California, the eastside of the Cascades, and the bulk of the Great Basin and Four Corners region continuing to run 20-70% of average rainfall (Figure 2). Portions of western Oregon are closer to average year to date, while western and eastern Washington, the Blue Mountains of Oregon, portions of Idaho and Montana, and the California-Arizona border have seen 90-125% of average rainfall. The slow start to the winter precipitation season continues to add to longer-term drought concerns for much of this area (see Drought section below). Contrary to the drought in the west, the majority of the eastern third of the country has seen wetter than average conditions since the first of the year, while dry conditions continue from the Panhandle region into the Plains and in northern New England (not shown).

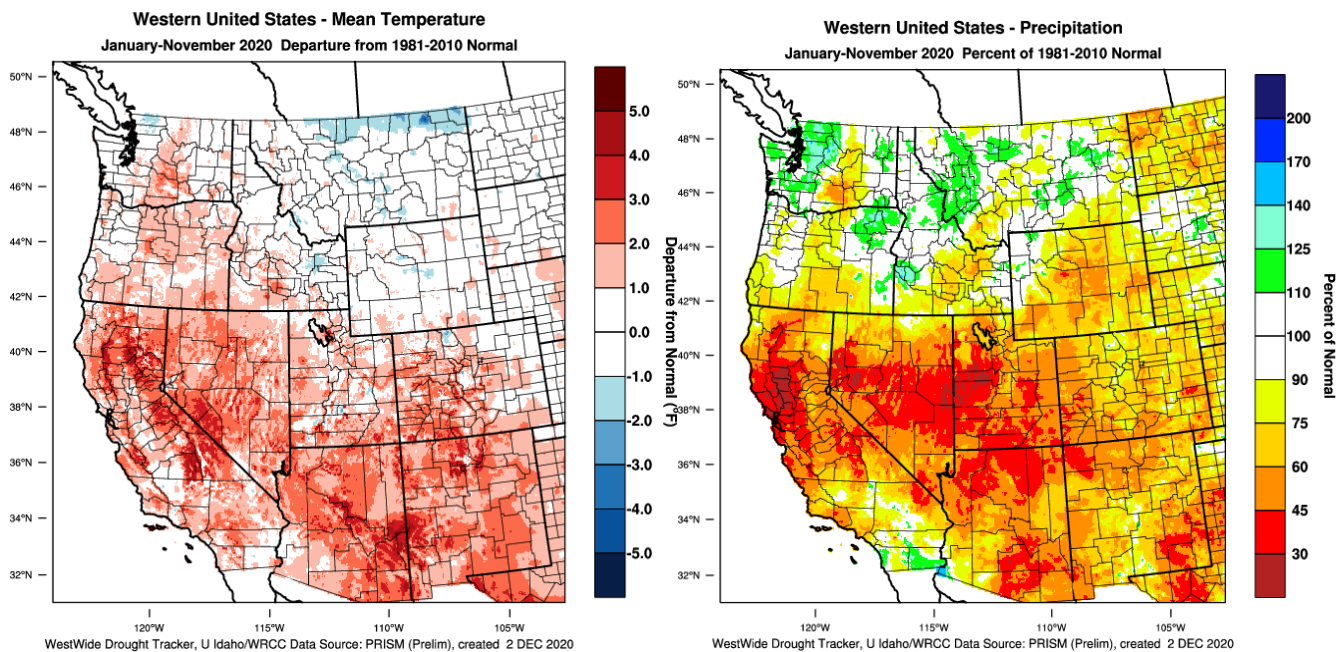


Figure 2 – Western US year to date (January-November) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Drought Watch – Unfortunately, the prolonged dry conditions have continued, even in the PNW and Northern California where near seasonally average precipitation amounts in November (Figure 1) have not alleviated drought concerns (Figure 3). Nearly 90% of the western US is in some category of drought with over 60% in severe to exceptional drought conditions. The only areas not exhibiting drought are western Washington, a small area of coastal Southern California, and scattered small areas in the northern Rockies. During November, drought concerns further developed in many areas of the west and have also impacted the Great Lakes and New England over the short-term. The longer-term outlook for the US through February continues to show the forecasted dry conditions for much of the west with further development expected in Southern California, the southern Plains, Texas, and even the southeast. The PNW is expected to see some improvement in drought conditions with the winter precipitation forecast as detailed below. The Four Corners region continues to be the bullseye for the western drought, with the conditions being the result of a weak monsoon season, record-high temperatures year to date, and now what looks like a dry winter. Additional areas in the Rockies, Plains, and the panhandle region likely to see drought conditions develop further (Figure 3, right panel).

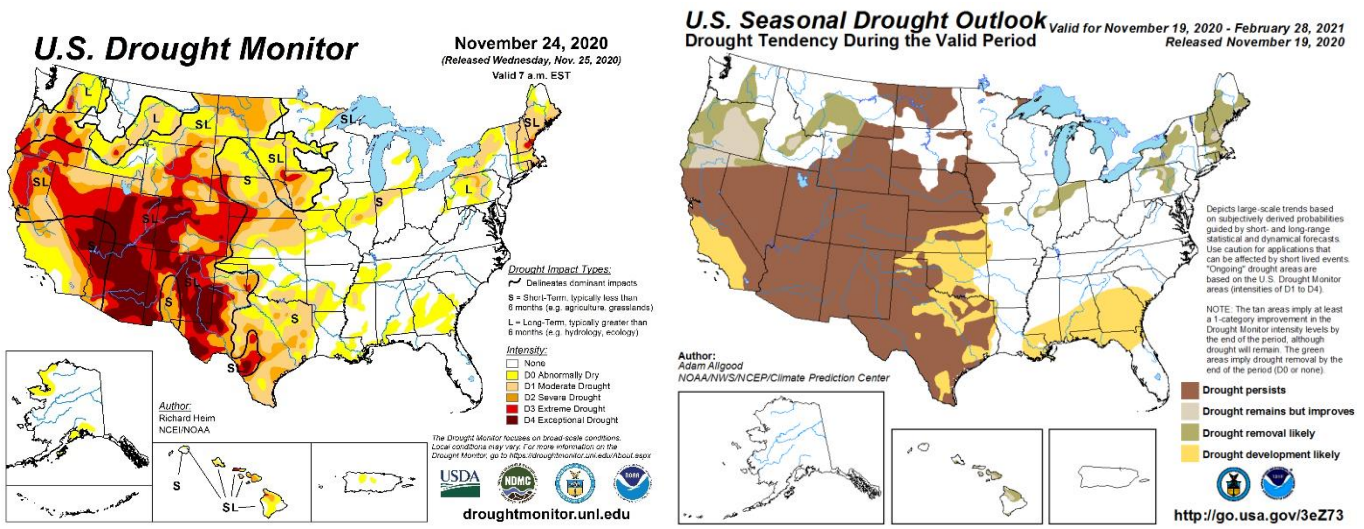


Figure 3 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – The Tropical Pacific has clearly strengthened further into La Niña conditions (Figure 4). In mid-November, the Climate Prediction Center (CPC) reported that SSTs in the east-central Pacific are now approximately 1°C below average, with patterns in all key atmospheric variables consistent with La Niña conditions. Most model forecasts point to the Tropics exceeding the threshold of La Niña SST conditions through winter and dissipating next spring. The official CPC/IRI outlook and other agency outlooks are consistent with these model forecasts, calling for an 95% chance of La Niña for winter. Therefore, a La Niña advisory is in effect. Now with meteorological winter in place and La Niña conditions, the forecast leads me to believe that we will likely see the pattern that is shown in the December and three-month forecasts in Appendix Figure 1 where the PNW has a greater chance of being wetter than average (roughly 70%), while California and the southwest have a greater chance to remain dry. Contrary to average La Niña conditions, which are typically much cooler than average over the entire west, the current forecast is calling for warmer than average to average conditions, except for the PNW and across the northern Rockies, which I think reflects more influence from the North Pacific (see below).

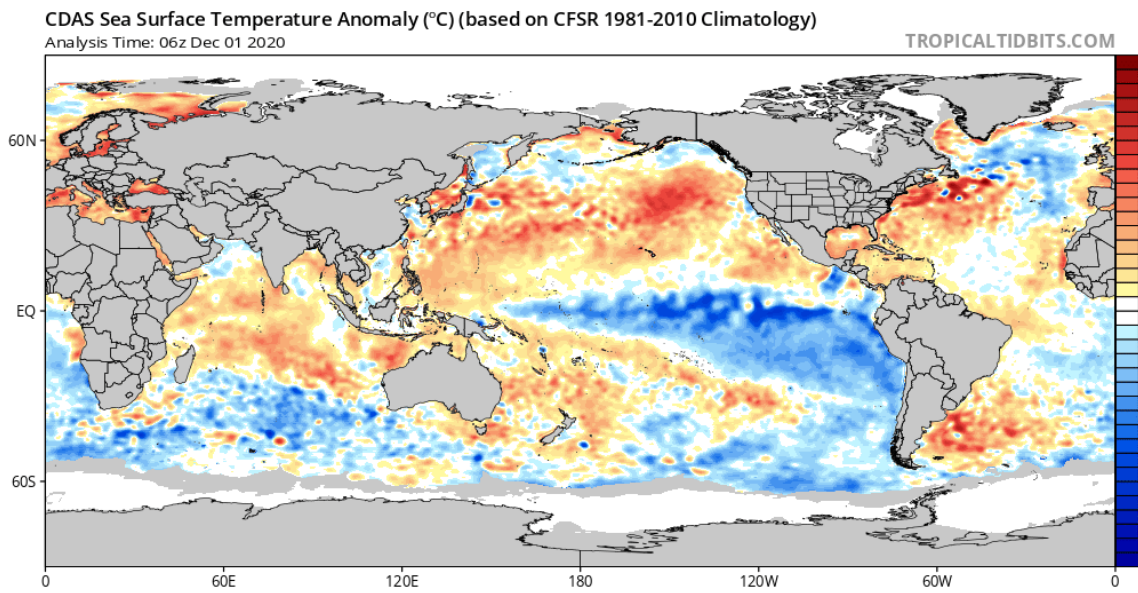


Figure 4 – Global sea surface temperatures (°C) for the period ending December 1, 2020 (image from Tropicaltidbits.com).

North Pacific Watch – The North Pacific continues to show a large area of anomalously warm water running 2-5°F above average (Figure 4). Although there has been some surface cooling in the last two weeks and some coastal cooling along the California coast, the North Pacific remains much warmer than average. The North Pacific is

currently closer to neutral or the warm phase of the Pacific Decadal Oscillation, which would put it out of phase with the Tropics (see above). The effect here is that the current warmth in the North Pacific will likely mute the La Niña effect, making the magnitude of the impact lower. The result is that the PNW will likely be in for slightly warmer winter than expected with a La Niña but is likely to stay wet over the course of the winter, while California would likely be warm and dry.

Forecast Periods:

Next 5 Days: High pressure will remain in control for most of the west bringing clear skies, fog in the valleys, and near average to slightly warmer than average temperatures for this time of year. The ridge of high pressure will break down slightly during the 6-8 December period with a chance of precipitation for western Washington and Oregon but not likely much into California or the rest of the western US.

6-10 Day (valid December 7-11): Continued dry for most of the west, with temperatures near average to slightly above average. The PNW has the greatest chance for some precipitation during this period, however the prolonged dry spell forecast for California and the southwest will add to already substantial deficits accumulated both during the autumn and over the calendar year (See Drought section). The central portion of the country is expected to be quite warm for this time of year while the southeast and eastern seaboard will likely see cooler than average temperatures. The bulk of the country is likely to be drier than expected for this time of year.

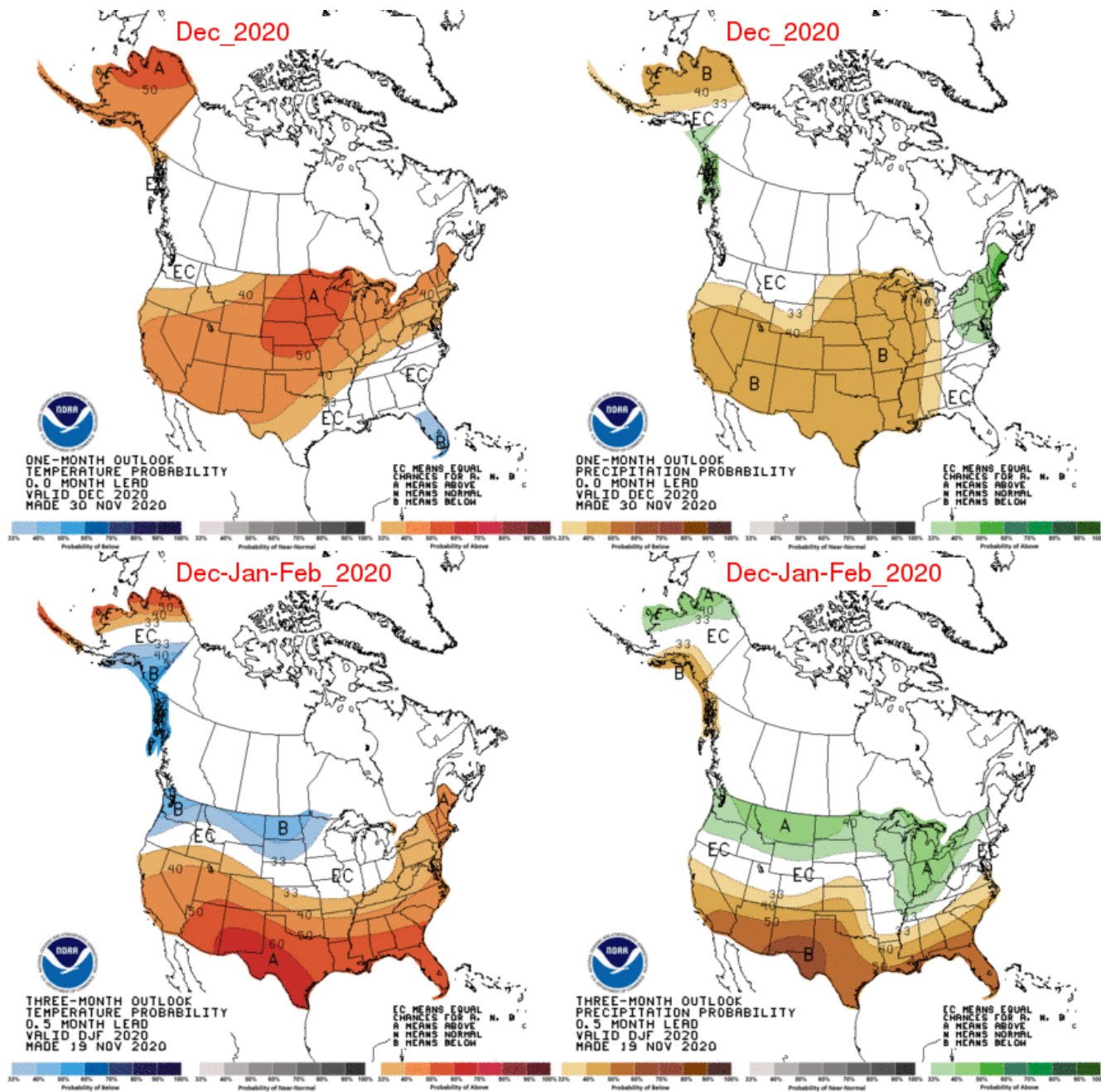
8-14 Day (valid December 9-15): The broad pattern from the first of the month will likely continue for most of the country with a relatively dry and near average to warmer than average first couple of weeks of December. The upper Midwest and Plains may get some precipitation through the second week, but otherwise dry elsewhere.

30 Day (valid December 1-31): The forecast for December is holding to a largely warm and dry month (see Appendix Figure 1). The bulk of the country is forecast to be warmer than average, with the exception of the PNW, the southeast, and Florida, which are forecast to see temperatures closer to average or slightly cooler. For precipitation, the majority of the country is expected to see drier than average conditions, while the PNW and the southeast is forecast to see closer to average precipitation for the month. New England is the only area of the country that is forecast to see above average precipitation for the month.

90 Day (valid December-January-February): The forecast continues to show the expected pattern for temperature and precipitation given the current La Niña (see Appendix Figure 1). As such the PNW, northern Rockies and Plains are forecast to see a cooler than average winter while the central to southern portion of the country are forecast to see above average temperatures. The precipitation pattern in the forecast also has a classic La Niña signature with the northern tier of states forecast for a wetter than average three-month period while the southern tier of states is forecast to see a dry period.

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Appendix Figure 1 – Temperature (left panel) and precipitation (right panel) outlooks for the month of November (top panel) and December, January, and February (bottom panel) (Climate Prediction Center, climate.gov).