Weather and Climate Summary and Forecast
November 2021 Report

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November 4, 2021

Summary:

- The western US experienced a cooler than average[1] October.
- An active storm track brought welcomed rains to many, with an extreme event bringing recording-breaking amounts over a few days leading to flooding and fire scar slides.
- Even with record-breaking rains, the drought is not over for most of the west. However, the first half of winter forecast is calling for drought conditions to improve for northern California into the PNW but remain in the southwest, Great Basin, and the Rockies.
- The November forecast favors a continuation of the cooler than average conditions seen in October. The storm track should keep precipitation events in play for the PNW and northern California, but little if any further south.
- Heat accumulation was minimal during the cool October. For most, the 2021 vintage ended up moderately above GDD, coming in near the average of the last five vintages. The exception was along the coast where cooler ocean temperatures kept temperatures near average or below average for most of the year.
- La Niña advisories are now in place and indicate that it will likely remain throughout the first half of winter, then transitioning back to neutral in spring. Forecast models run with La Niña conditions point to the PNW likely seeing a cooler/wetter winter, while California has high odds to be drier during the upcoming winter with near-average temperatures. The transition line is the unknown, with northern California being in between.

Ah, the rain. While the cool October was forecast, the pleasant surprise was the active storm track across the PNW and northern California which brought an end to the fire season. Temperatures were near average in the inland PNW and Rockies, but generally cooler than average elsewhere (Figure 1). Precipitation during the month clearly shows the storm track during October 21-25 with 300% or greater amounts in central California extending northeastward. While the rainfall was welcomed, it came as too much too fast for the ground to soak in resulting in flooding, especially in areas of fire scars. The PNW also saw a wetter than average month, while portions of Montana and the southwest remained dry. While the west was cool, the east was warm with the Great Lakes, Ohio River Valley, and New England seeing temperatures 4-7°F above average for the month. Precipitation amounts were mixed across the rest of the country with Texas, the southern Plains, the lower Mississippi, mid-Atlantic, and Maine being exceptionally dry, with the northern Plains, the Corn Belt, and the mid-south seeing wetter than average conditions (not shown).

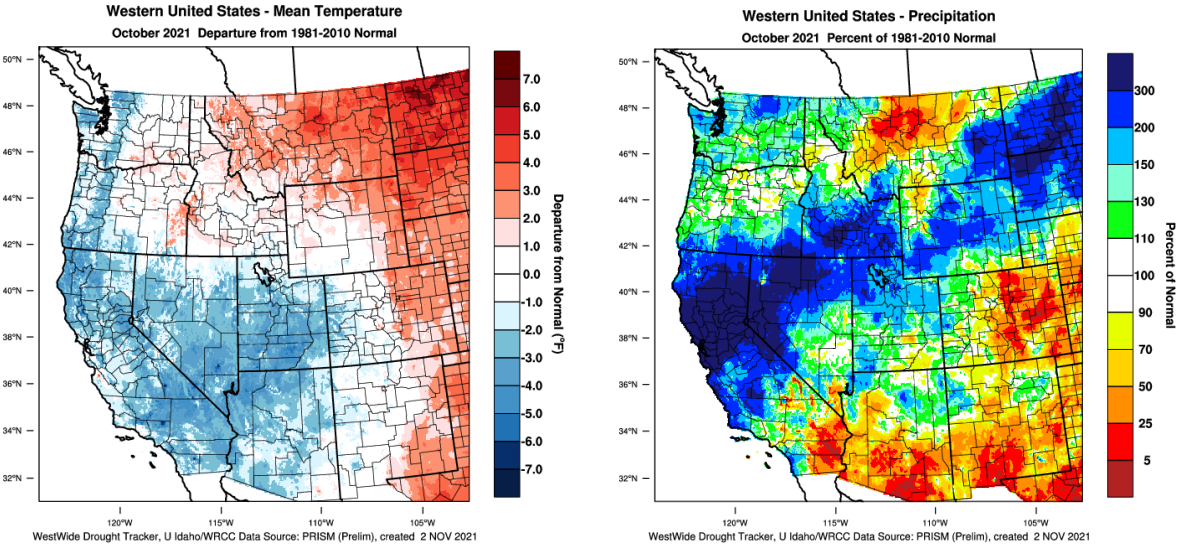

Figure 1 – Western US October 2021 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[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. Also, note that the 1991-2020 climate normals are starting to become available across reporting agencies and will be used in this report when possible.

January through October temperatures across the western US are running largely above average (Figure 2), although coastal zones, portions of the Great Basin and Rockies, and the northern Cascades remain closer to average. The Front Range of the Rockies south into the southern Plains and Texas also remain cooler than average year-to-date (Figure 2), while the southeast has been near average and Florida, New England, the northern Plains, and the Great Lakes have been warmer than average (not shown). Precipitation amounts year-to-date still reflect the drought patterns (see Drought Watch) in the western US with mostly 90% or less of normal (Figure 2). The active storm track brought rains to the PNW and central California, providing some drought recovery, but dry conditions remain almost everywhere in the west. For the rest of the country, year-to-date dry conditions continue across the northern Plains, portions of the Great Lakes, and into extreme northern New England, while the central portion of the country and southeast has largely been near average to wetter than average for the year (not shown).

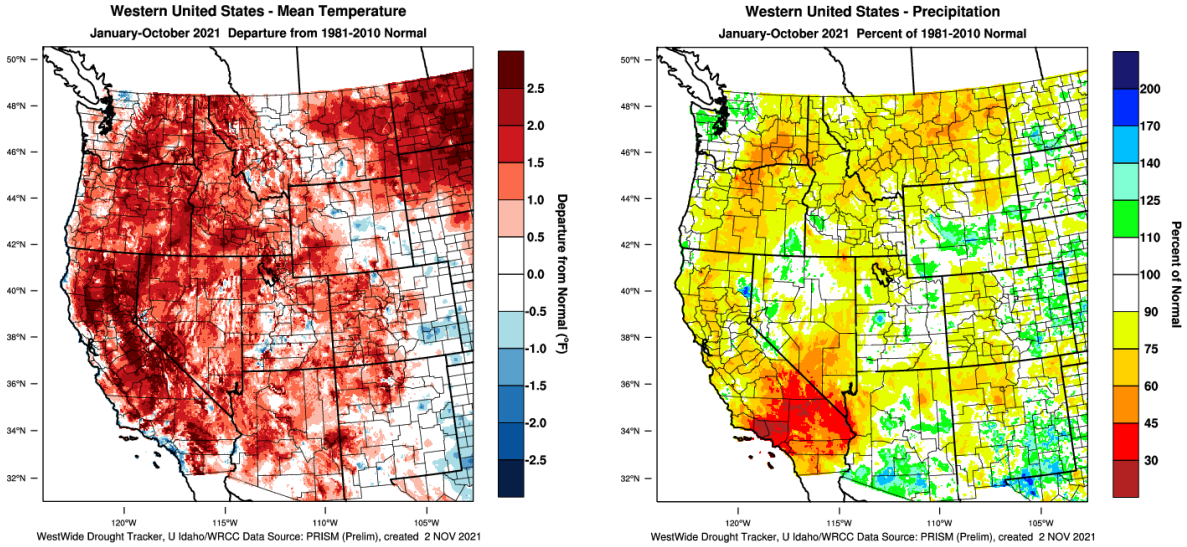

Figure 2 – Western US year to date (January-October 2021) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

As forecast last month, growing degree-day amounts (GDDs) for the western US in October added little to the vintage accumulation. The March through October map below shows accumulations moderately above average (100-600 units) in most of the western regions of California, Oregon, Washington, and Idaho (Figure 3; 1991-2020 climate normals). Coastal zones from central Oregon south to the Bay Area and into southern California saw near average to slightly below average heat accumulation due to persistent cooler coastal ocean temperatures keeping the coastal areas cooler via onshore flow and enhanced marine layers much of vintage.

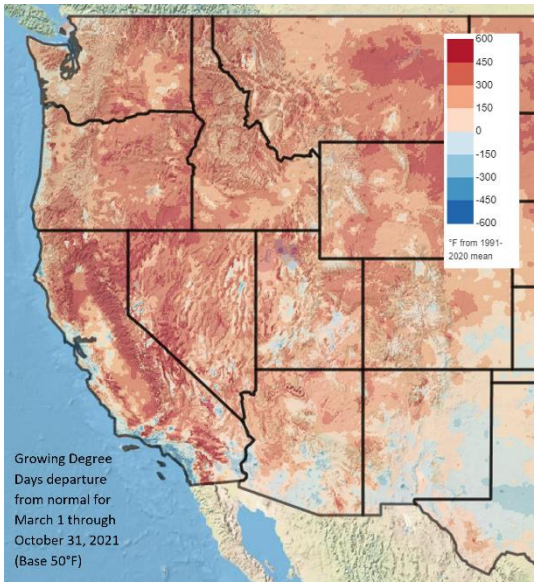

Figure 3 – Western US March through October 2021 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho). Note that this data is now referenced to the 1991-2020 climate normals.

Specifically for four locations that I have tracked for many years in wine regions in Oregon, the drop off in October accumulation is clear, especially compared to the 2015 vintage (Figure 4). The final 2021 vintage GDDs for these sites ended up at 2633 for McMinnville, 3324 for Roseburg, 3521 for Milton-Freewater, and 3802 for Medford. Each location ended up substantially above the 1981-2010 normals for growing degree-days for 2021 (17-28%). Even with the cool October, these locations ended up 7-12% above the average GDD of the 2014-2020 vintages. Compared to the 2020 vintage, the four locations ended up 1 to 10% above their respective GDD values.

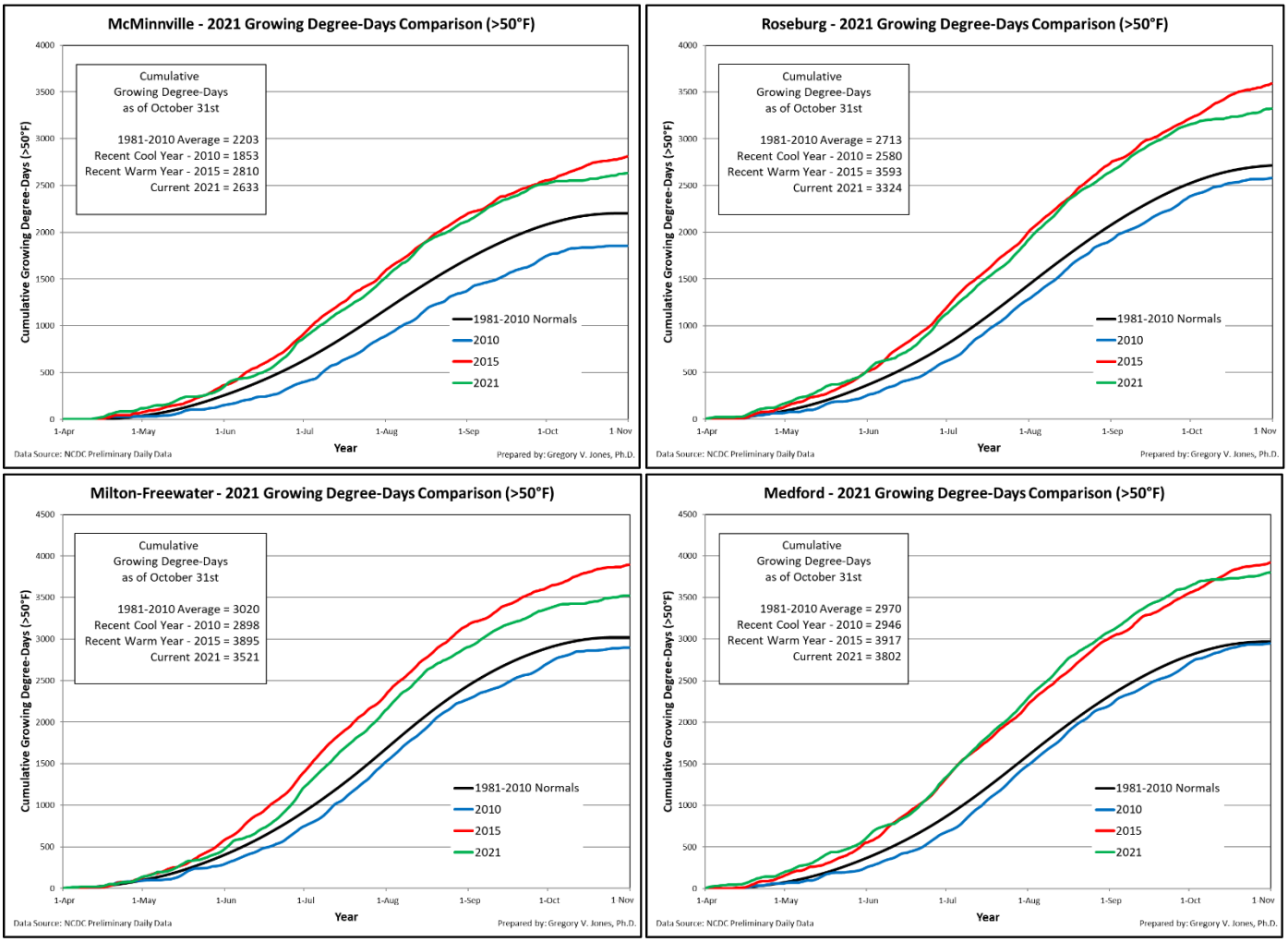

Figure 4 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2021) and a recent cool year (2010), a recent warm year (2015), and the 1981-2010 climate normals are shown (NCDC preliminary daily data).

Drought Watch – An active storm track, which included one major rain event which brought numerous 24-hour records for precipitation, has certainly helped the long-term drought conditions in the west (Figure 5). But the drought is nowhere near over yet. The overall pattern of drought in the west continues with over 97% of the region remaining in some level of drought, but the most extreme drought conditions (extreme and exceptional) have dropped to nearly 50% for the first time in over a year (Figure 5). Drought zones remain for much of the west and extend into the Rockies, northern Plains, and the western Great Lakes, while much of the US east of the Mississippi River is largely drought-free currently. The good news here is that both short- and long-term drought indicators along with the seasonal outlook (Figure 5, right panel) point to the PNW into northern California seeing continued improvement through the first half of the winter. However, the outlook continues to show the long-term drought in central to southern California, into the southwest, and up into the Rockies, while also indicating the likelihood of drought developing further in Texas and the southern Plains. From the Mississippi River eastward only the coastal zones of the mid-Atlantic and southern Florida are forecast to see drought conditions develop (Figure 5).

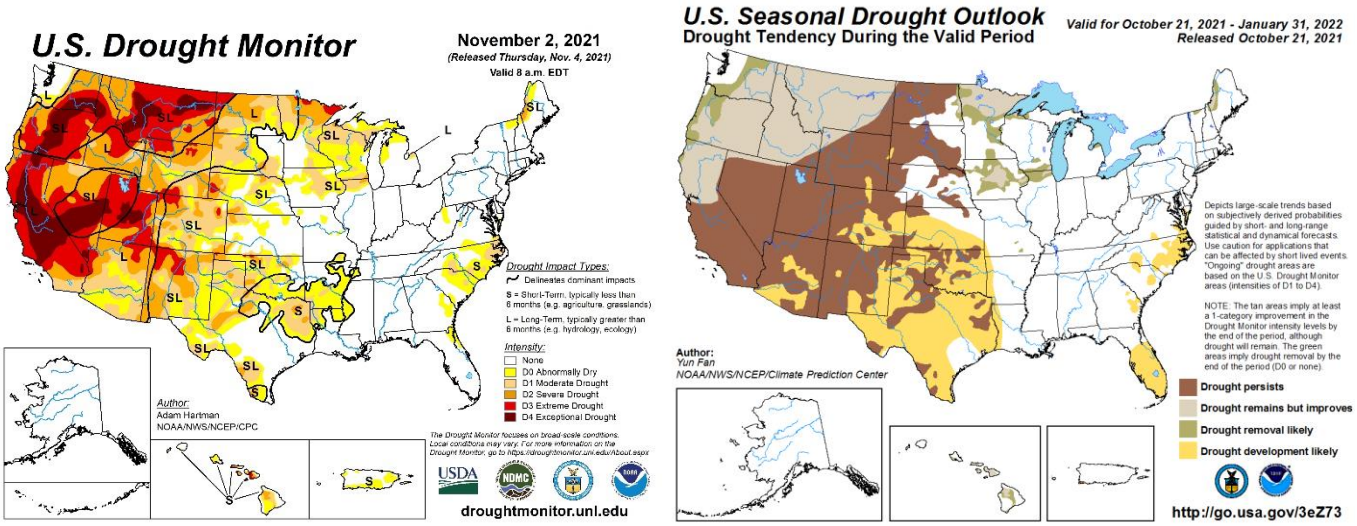

Figure 5 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – As of mid-October the SSTs in the central-eastern equatorial Pacific were -0.8°C below average (Figure 6). Along with the cooling of the SSTs, the evolution of other key oceanic and atmospheric variables is consistent with La Niña conditions. As such the Climate Prediction Center (CPC) has issued a La Niña Advisory. A large majority of the models predict SSTs to cool further through boreal autumn and winter, and then return to ENSO-neutral levels during the early to mid-spring. The official outlook from numerous agencies confirms this forecast with the outlook calling for La Niña to have a high probability during the Oct-Dec months and persisting until Jan-Mar 2022. With La Niña conditions now likely in place for the winter, models and applied research examining these relationships are pointing to the PNW likely seeing a cooler/wetter winter, while California has high odds to be drier during the upcoming winter and near average for temperatures (see the 90-day forecast below). This largely comes from multi-month ridging events in the northeastern Pacific which allow storms to transition over them and into the PNW but blocks most storms from California. However, remember these are seasonal predictions and don't necessarily indicate that we will not have wet periods in California … like the one just experienced from the one large storm in October.

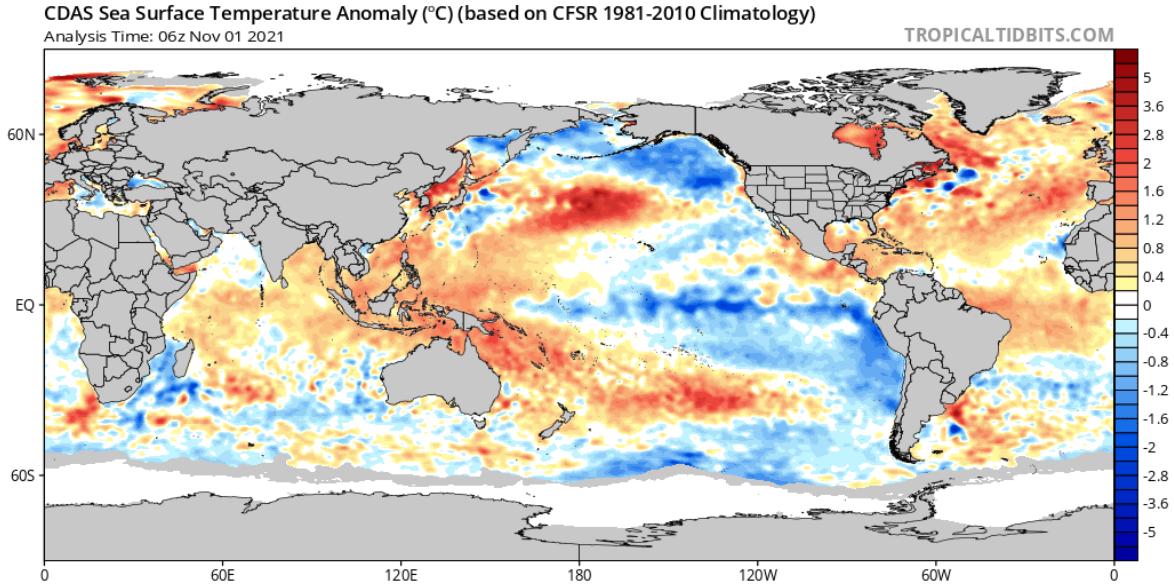

Figure 6 – Global sea surface temperatures (°C) for the period ending November 1, 2021 (image from Tropicaltibits.com).

North Pacific Watch – Over the last month, the cooling of the sea surface temperatures in the North Pacific has continued (Figure 6). Much of the cooling has come in the Gulf of Alaska where strong low-pressure areas have mixed the ocean bringing cooler waters to the surface. Warm SSTs still exist over a large area in the central North Pacific.

Cooler SSTs are seen to the southwest from California and across the ENSO zone showing La Niña conditions (see above). These conditions have moved the Pacific Decadal Oscillation slightly closer to neutral. This shift to cooler North Pacific SSTs lends further evidence for the seasonal forecast showing the tendency for a cooler/wetter PNW, transitioning to cool and near average precipitation in northern California and to slightly cool and dry overall during the winter in most of California.

Forecast Periods:

Next 5 Days: Wind and rain off and on over the next few days with fronts passing from the NW. Rain reaches south to the Bay Area but amounts will decrease the further south as the fronts drape across northern California. Temperatures will remain on the cool side for the PNW and northern California, closer to average in central to southern California.

6-10 Day (valid November 9-13): Overall pattern of precipitation and temperatures continues from the start of the month. Continued colder than average temperatures over the PNW and extending into the northern portions of the Great Basin. Near-average temperatures are likely in northern to central California while southern California is likely to be a little warmer than average. Precipitation appears to stay in play for most across the west with frontal passages likely keeping the PNW wetter than average for this time of year. Some precipitation will make it far enough south to give northern to central California rain into mid-month, while southern California and the southwest are likely to remain dry. While the west is cooler than average the rest of the country is forecast to see a warmer than average period while much of the eastern US is forecast for above-average precipitation.

8-14 Day (valid November 11-17): The cool and wet pattern continues into this forecast period with continued chances for strong wind events coming off the North Pacific. Temperatures are likely to be below normal across the west, with the greatest departures in the inland PNW. Precipitation amounts will likely be highest in the PNW to northern California, then little to no rain south into California and the southwest. While the west remains seasonably cool, the east remains unseasonably warm into mid-month. The Midwest is forecast to be wetter than average through mid-month, while the eastern is likely to see below average-to-average precipitation for this time of the year.

30 Day (valid November 1-30): The November outlook (Figure 7) has the west likely to be near average along the coast in terms of temperatures while the southwest and Rockies are forecast to see warmer than normal conditions. For precipitation, the forecast for the month is calling above average amounts in the PNW across into the northern Plains and south into central California. From the Plains south to the Gulf Coast and southeast, the forecast is hinting at near-average temperature while showing that the Great Lakes to New England are likely to experience a warmer than average month. The precipitation forecast for the month has the southern states from the southwest across the Gulf and into the southeast likely seeing a dry November while the center portion of the country has equal chances of slightly above to slightly below. The Great Lakes to New England are forecast to see a wetter than average month (Figure 7). The pattern in expected precipitation across the US is following the generally expected La Niña influence (see above).

90 Day (valid November-December-January): The seasonal forecast for the first half of winter continues to hold from previous forecasts and reflects the expected influences of La Niña on precipitation and temperatures (Figure 7). Western Washington and portions of NW Oregon are forecast to see a cooler than average period while the rest of the PNW, across to the northern Plains and south into northern California will fall closer to average. The bulk of the rest of the country is forecast to be warmer than normal during this 90-day period with the southwest likely seeing the warmest conditions. For precipitation, the pattern of a drier southern tier of states, then equal chances of slightly above to slightly below for the central zone, then above average for the PNW and Great Lakes to New England holds from November through to January (Figure 7).

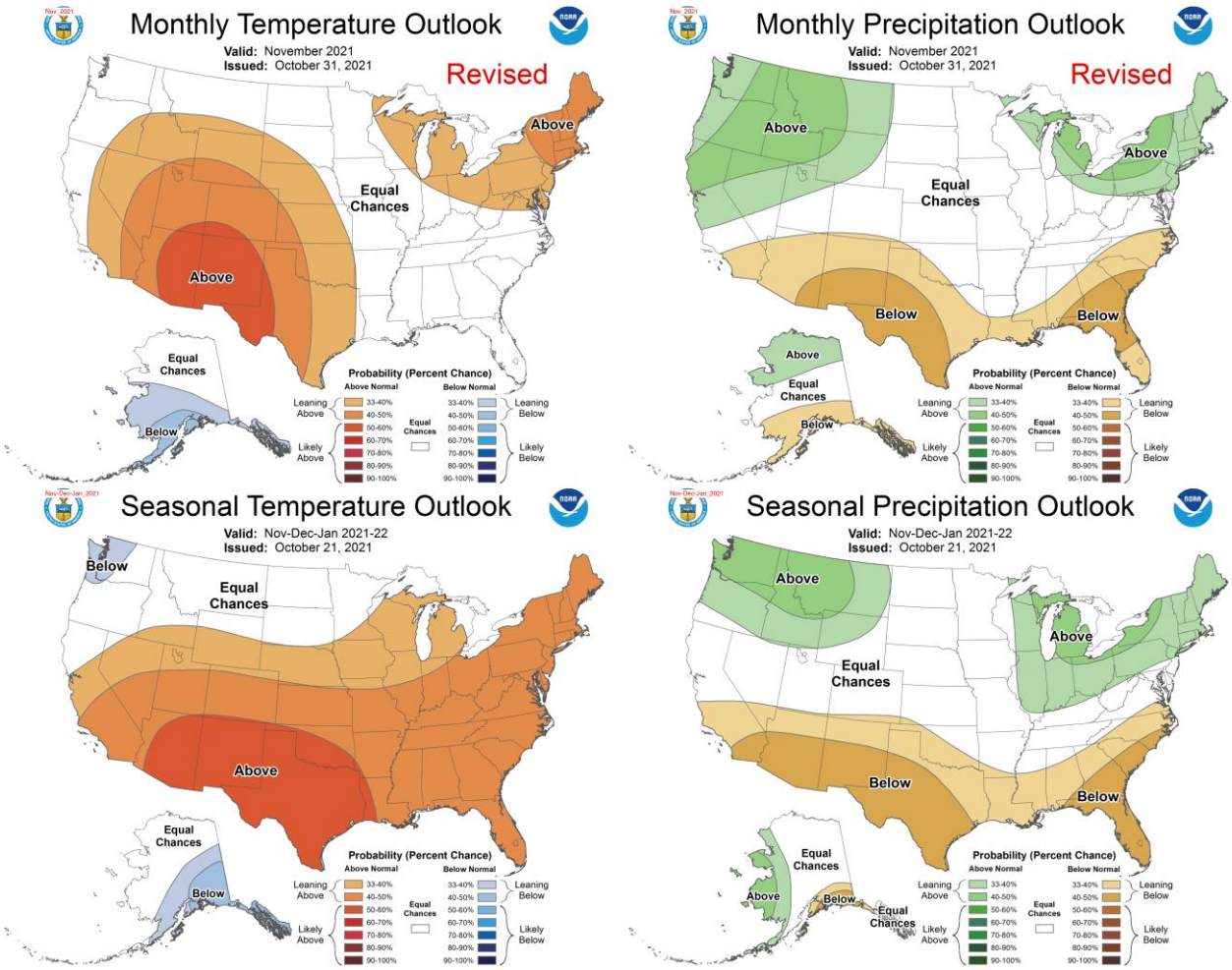

Figure 7 – Temperature (left panel) and precipitation (right panel) outlooks for the month of November (top panel) and November, December, and January (bottom panel) (Climate Prediction Center, climate.gov).