Weather and Climate Summary and Forecast
October 2021 Report

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October 3, 2021

Summary:

- Warmer than average for most in September[1] with the PNW seeing closer to average temperatures.
- September brought welcomed rain events from northern California into the PNW, continued dry elsewhere.
- Rain events slightly lowered drought levels in the PNW, which is also forecast to see continued improvement into the first half of the winter. From northern California south and inland, a pattern of high pressure/ridging is anticipated which unfortunately tilts the odds to dry conditions continuing into the first half of winter.
- October has started dry and cool, with the forecast for much of the west to be cooler than average for the month. Observations and models are showing a general circulation pattern shift to high pressure/ridging over the northeastern Pacific, which will let North Pacific storms into the PNW but block many from bringing rains southward.
- With the cool October forecast, significant heat accumulation is likely over for the 2021 vintage. The end result is moderately above GDD for most, coming in near the average of the last five vintages, although coastal zones in California ended up lower due to prolonged marine layer influences due to cool surface water temperatures for most of the year.
- The seasonal forecast calls for La Niña to emerge during Oct-Nov and persist through winter and early spring. If realized, models along with applied research would point to the PNW likely seeing a cooler/wetter winter, while California has fairly high odds to be drier during the upcoming winter with near-average temperatures.

Generally warm across the west in September, although frontal passages and rain events lowered temperatures to near average for portions of the PNW (Figure 1). Over the western US, temperatures were 1-4°F above average for the month, yet coastal zones in Washington, Oregon, the Bay Area, and southern California continued to experience near average temperatures due to enhanced marine layers from cooler SSTs. Rains events in Oregon and Washington were welcomed after 80+ days of no rain, with record-breaking amounts during September 17-19 for many, but unfortunately, the systems did not have enough punch to carry into California. During the month of September, the bulk of the central to eastern US was much warmer than average, with portions of the southeast closer to average (not shown). Dry conditions prevailed over the middle of the country while the Gulf Coast, southeast, and New England saw above-average precipitation for the month (not shown).

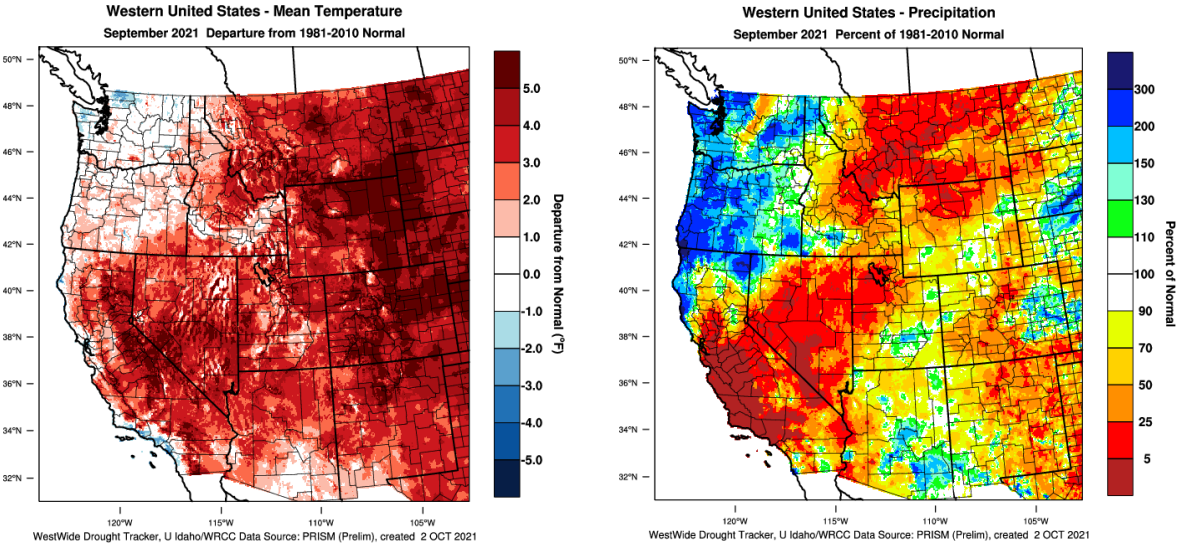

Figure 1 – Western US September 2021 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[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.

Year-to-date temperatures through September across the western US are running largely above average (Figure 2), although coastal zones remain closer to average due to cool SSTs offshore. 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 largely reflect the drought patterns (see Drought Watch) in the western US with mostly 90% or less of normal, but some areas at 45% or less year-to-date (Figure 2). PNW rains in September helped it recover somewhat, but dry conditions remain for 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).

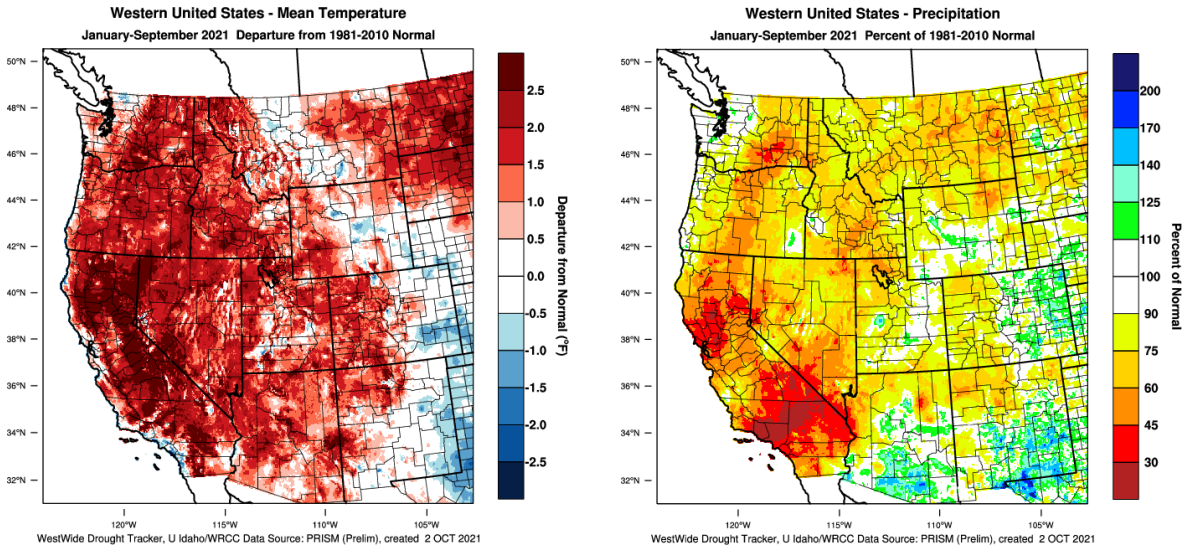

Figure 2 – Western US year to date (January-September 2021) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Given the forecast (see sections below) for a relatively cool October, growing degree-day accumulations (GDDs) for the western US may not add up to much more than what we have now. The March through September map 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 around the Bay Area southward in California remain closer to average or slightly below average due to cooler coastal ocean temperatures driving strong marine layers this year.

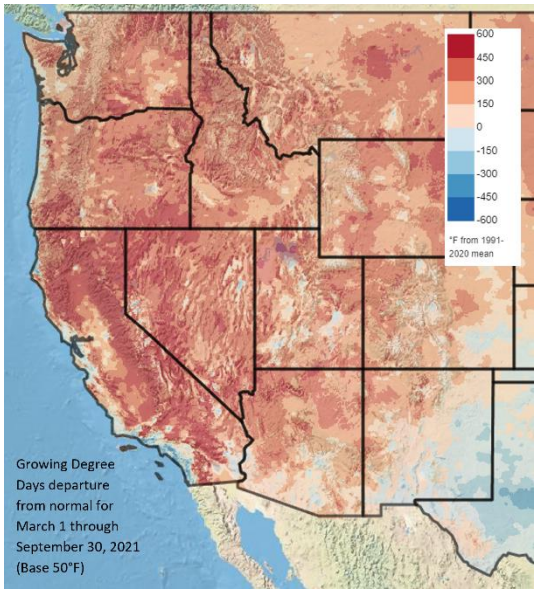

Figure 3 – Western US March through September 2021 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho). Note that this data is now referenced to the 1991-2020 climate normals.

For the four locations that I have tracked for many years in wine regions in Oregon, each is substantially above the 1981-2010 normals for growing degree-days at the end of September (16-30%). Even with the cool October forecast, these locations will likely end up near the average GDD of the 2014-2020 vintages. These same locations are now 7-15% above the average during 2004-2020. Compared to the 2015 vintage, one of the warmest years on record in Oregon, Medford remains above the 2015 vintage while Roseburg and McMinnville continue within a few percent of 2015, and Milton-Freewater remains approximately 8% below the GDD accumulated during the 2015 vintage (Figure 4). Compared to the 2020 vintage, the four locations are currently 3 to 13% above at this point.

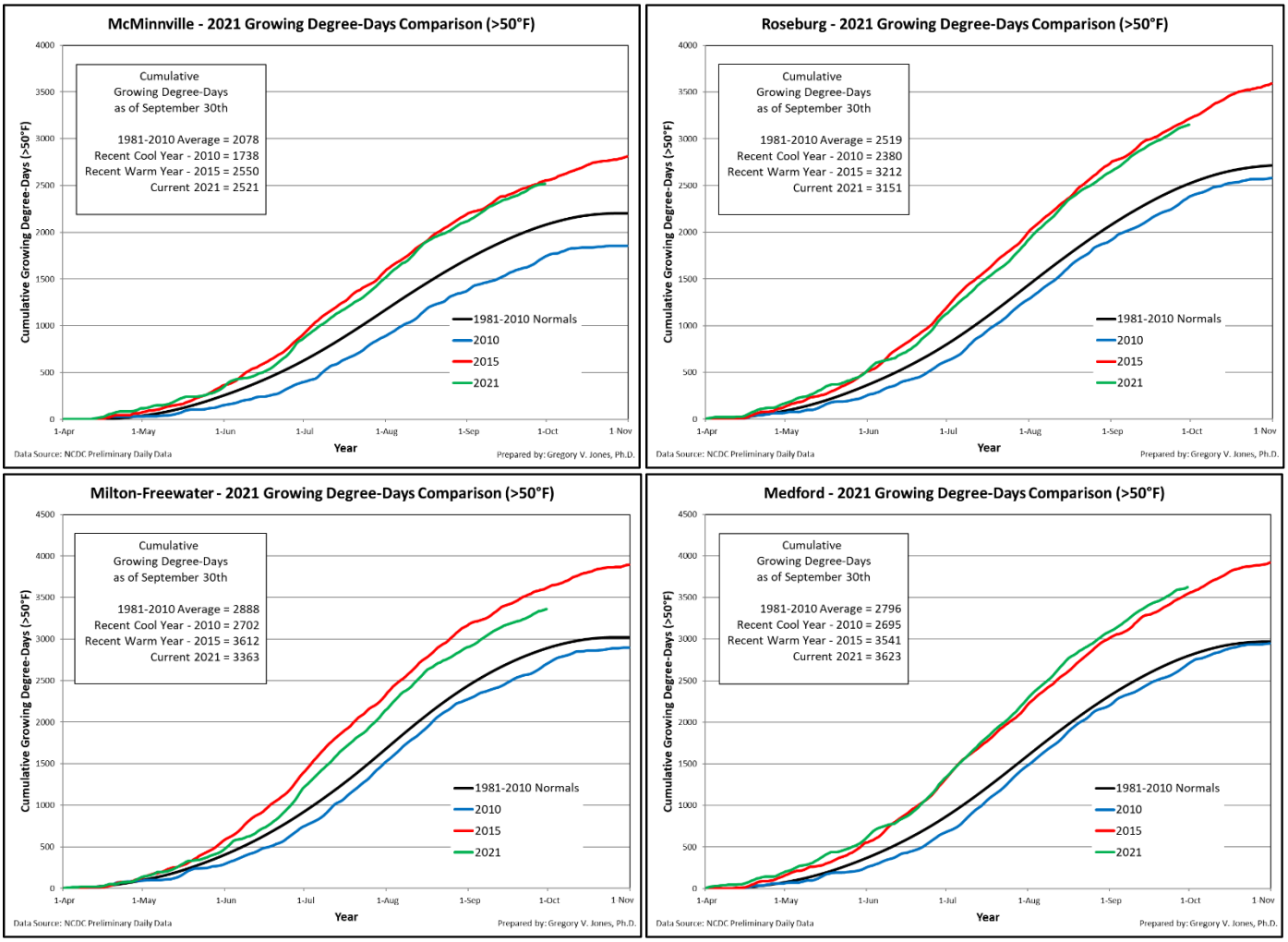

Figure 4 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2021) and a recent cool year (2010), a recent warm year (2015), and the 1981-2010 climate normals are shown (NCDC preliminary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

Drought Watch – Even with some precipitation in September, the overall pattern of drought in the west continues with over 98% of the region remaining in some level of drought (Figure 5). The area in the highest levels of drought, extreme and exceptional, continues to show some improvement, dropping below 60% for the first time in a while. Drought zones remain extended across the northern Plains and across to the western Great Lakes, while much of the US east of the Mississippi River is largely drought-free currently. Both short- and long-term drought indicators along with the seasonal outlook (Figure 5, right panel) point to the western US being highly likely to continue dry conditions into fall and early winter. The big change in the outlook is that the bulk of the PNW is forecast to see some improvement with the expected onset of fall rains in that region (see ENSO and other sections below). Portions of the eastern Plains and western Great Lakes are forecast to see improvements, while the central to southern Plains and much of Texas as forecast to see drought develop into the first half of winter (Figure 5).

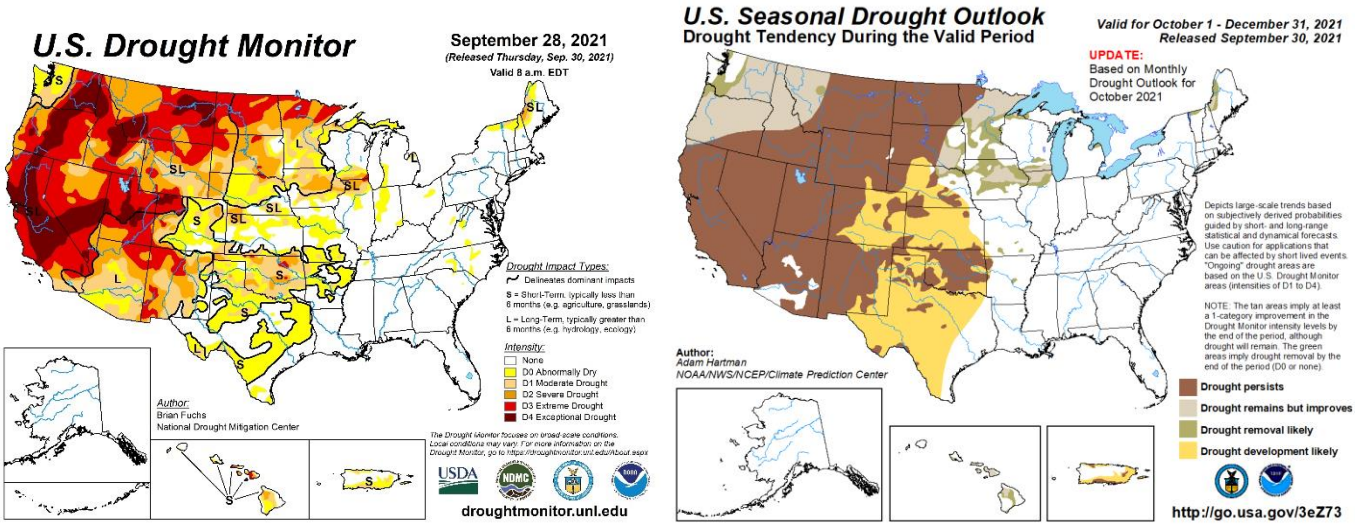

Figure 5 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – The Tropical Pacific continues in a neutral state (Figure 6). However, there continue to be some hints at a developing La Niña this fall and into winter. As of mid-September, the Climate Prediction Center (CPC) reported that SSTs in the east-central Pacific continue to run slightly below average but remaining within neutral ENSO conditions, and patterns in all key atmospheric variables are consistent with neutral ENSO conditions as well. But the model forecasts are pointing to a greater likelihood of La Niña developing over the next few months and continuing through winter and then moving to ENSO-neutral in the spring. The official CPC/IRI outlook also is holding to this forecast with the outlook calling for La Niña to emerge during Oct-Nov and persist through winter and early spring, with a return to ENSO-neutral in late spring and early summer of 2022. If La Niña conditions develop as expected in fall and winter, the models along with applied research examining these relationships would point to the PNW likely seeing cooler/wetter winter, while California has fairly high odds to be drier during the upcoming winter and near average for temperatures. 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 … right now some are calling for December to be the wettest month for the state this winter.

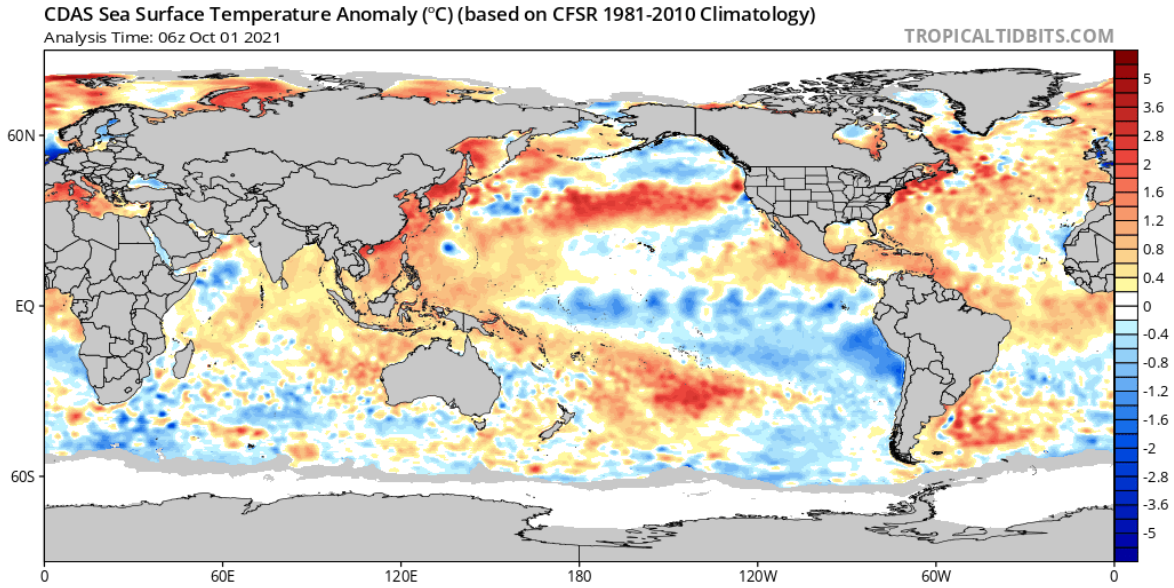

Figure 6 – Global sea surface temperatures (°C) for the period ending October 1, 2021 (image from Tropicaltibits.com).

North Pacific Watch – Some changes in sea surface temperatures in the North Pacific over the last month but the overall effect on west coast winter weather is likely to continue. While the Gulf of Alaska has cooled some and the waters to the west of Baja and Mexico have warmed some, the North Pacific continues to be dominated by overall warm surface waters (Figure 6). The warmer SSTs over the tropical West Pacific extending eastward across the ocean to the west coast adds to the potential for persistent high-pressure ridging over the northeastern Pacific (see ENSO discussion above). These conditions continue to place the Pacific Decadal Oscillation slightly more to the negative phase, but still close to the neutral range. The current situation in the Pacific would appear to provide continued support to the seasonal forecast of 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: Trending colder into the first week of October over most of the western US. Low stratus clouds and fog will be prevalent in the coastal and intermountain valleys with temperatures below average pretty much everywhere. A front will skim the west with rain likely from BC south to about coastal northern California, but little precipitation inland or south into California.

6-10 Day (valid October 8-12): Continued colder than average temperatures across the west with the lowest temperatures likely in the PNW with closer to average further south into California. A clear shift in 'fall-like' circulation will bring frontal passages out of the Gulf of Alaska with some indication of strong wind events through mid-month. The shift in circulation also opens the door for precipitation with the bulk of the west likely see above-average amounts with southern California across the southwest likely to miss out on the storms. As the west cools down, the eastern US is forecast to warm up to see near-record temperatures from the Great Lakes to New England, while the entire eastern US is expected to see near-average precipitation during this forecast period.

8-14 Day (valid October 10-16): 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, but 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 October 1-31): The outlook for October (Figure 7) largely reflects the cool start to the month with the western portions of Washington and Oregon likely to end up below average for the month, while the rest of the west has equal chances to be slightly below or above average. The forecast pattern for precipitation for October is the classic situation of the PNW getting in on the action early with lower odds the further south one goes. However, there are model indications that a few low-pressure events will pass far enough south to bring welcomed rains to northern California. The record warmth to start the month in the east will likely produce a warmer than average month of October (Figure 7) while the central US is forecast to see a wetter than average month and New England is forecast to be drier than average.

90 Day (valid October-November-December): Moving into fall, the general forecast is holding to a broadly warmer than average three-month period for the west and most of the rest of the country (Figure 7). Areas from the PNW to the western Great Lakes along the northern border with Canada are forecast to have an equal chance of seeing slightly above to slightly below temperatures through OND. For the 90-day period, the precipitation forecast is also hinting at equal chances for much of the country, except for the forecast for a drier start to the fall over the Four Corners region and the likely wetter start to the winter in the far western PNW and along the coast of British Columbia. This is largely derived from the expected patterns of moving into a La Niña winter (see section above).

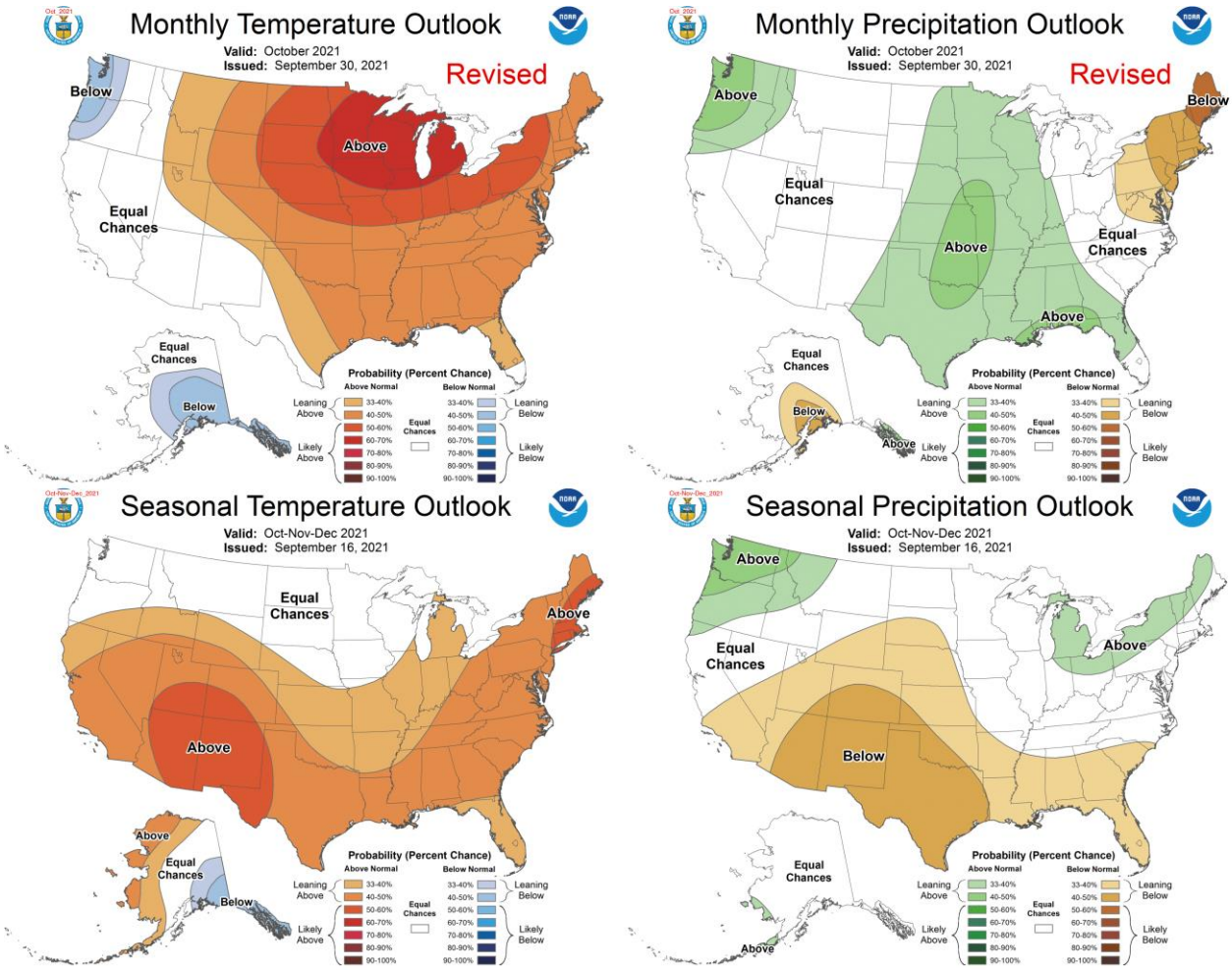

Figure 7 – Temperature (left panel) and precipitation (right panel) outlooks for the month of October (top panel) and October, November, and December (bottom panel) (Climate Prediction Center, climate.gov).