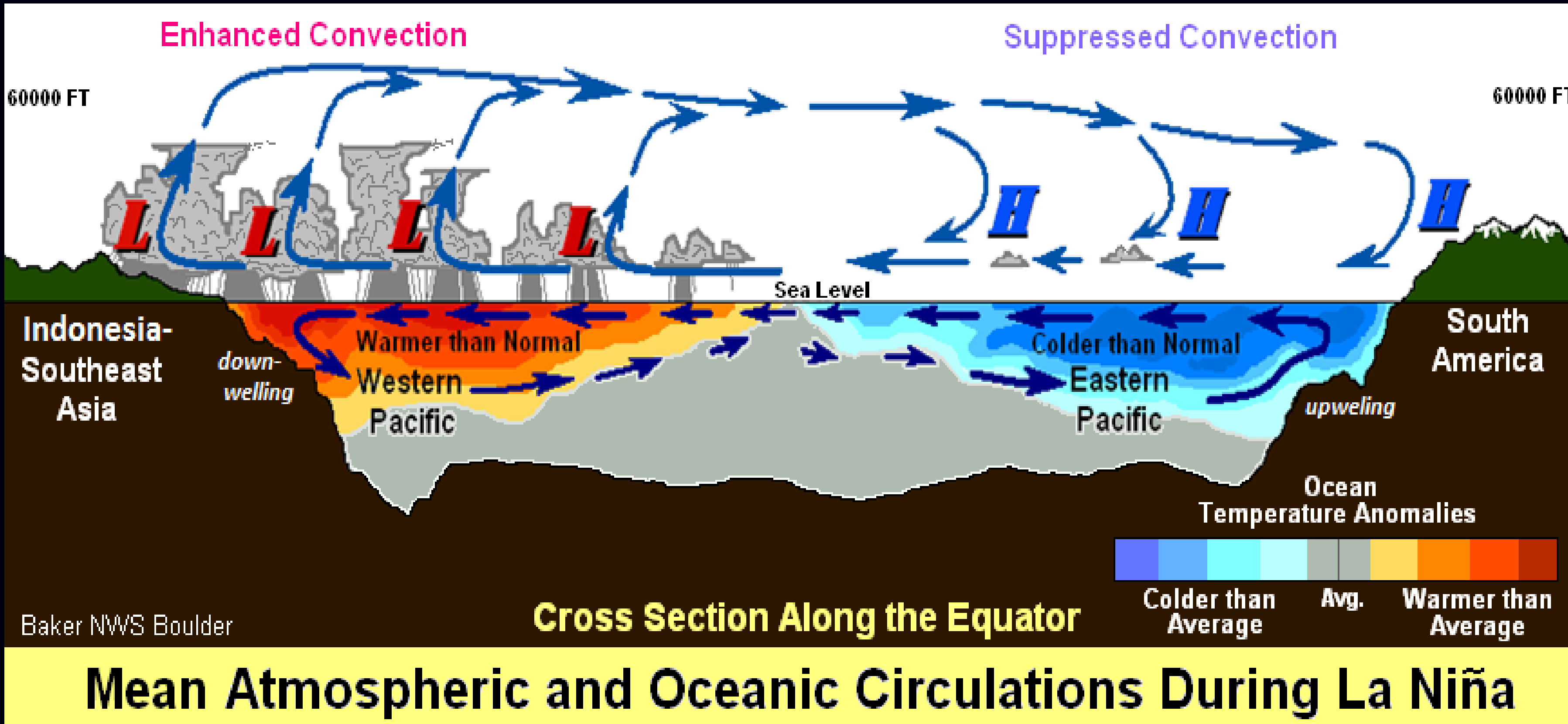
La Niña Update, Recent Weather Patterns and the February-April 2012 Outlook For Colorado

Mike Baker
National Weather Service
Boulder, Colorado

January 28, 2012
Revised

Baker - National Weather Service Boulder, Colorado



Large-scale oceanic and atmospheric circulations in the tropical Pacific Ocean continue to indicate the presence of a **weak to moderate** La Niña. These circulations include low-level easterly and upper-level westerly wind anomalies over the equatorial Pacific Ocean and an anomalously strong westerly sub-surface ocean current along the Equator. This coupled circulation enhances cold water upwelling off the west coast of South America which suppresses convection (thunderstorm development) over the eastern Pacific Ocean, and warm water downwelling in the western Pacific which enhances tropical thunderstorm development in this region. These tropical circulations, in turn, produce large scale temperature and pressure gradients that generate and sustain the jet streams that circle the globe.

The Oceanic Niño Index - ONI

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2000	-1.6	-1.4	-1.0	-0.8	-0.6	-0.5	-0.4	-0.4	-0.4	-0.5	-0.6	-0.7
2001	-0.6	-0.5	-0.4	-0.2	-0.1	0.1	0.2	0.2	0.1	0	-0.1	-0.1
2002	-0.1	0.1	0.2	0.4	0.7	0.8	0.9	1.0	1.1	1.3	1.5	1.4
2003	1.2	0.9	0.5	0.1	-0.1	0.1	0.4	0.5	0.6	0.5	0.6	0.4
2004	0.4	0.3	0.2	0.2	0.3	0.5	0.7	0.8	0.9	0.8	0.8	0.8
2005	0.7	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.2	-0.1	-0.4	-0.7
2006	-0.7	-0.6	-0.4	-0.1	0.1	0.2	0.3	0.5	0.6	0.9	1.1	1.1
2007	0.8	0.4	0.1	-0.1	-0.1	-0.1	-0.1	-0.4	-0.7	-1.0	-1.1	-1.3
2008	-1.4	-1.4	-1.1	-0.8	-0.6	-0.4	-0.1	0	0	0	-0.3	-0.6
2009	-0.8	-0.7	-0.5	-0.1	0.2	0.6	0.7	0.8	0.9	1.2	1.5	1.8
2010	1.7	1.5	1.2	0.8	0.3	-0.2	-0.6	-1.0	-1.3	-1.4	-1.4	-1.4
2011	-1.3	-1.2	-0.9	-0.6	-0.2	0	0	-0.2	-0.4	-0.7	-0.8	

El Niños (warm phase events): ONI of +0.5 and higher (red numbers)

La Niñas (cold phase events): ONI of -0.5 and lower (blue numbers)

ENSO-Neutral (near normal conditions): ONI below +0.5 and above -0.5 (black numbers)

An ONI of -0.8 indicates weak La Niña conditions in the tropical Pacific Ocean during the OCT-NOV-DEC climate season of 2011.

NOAA/CPC Jan 15 2011

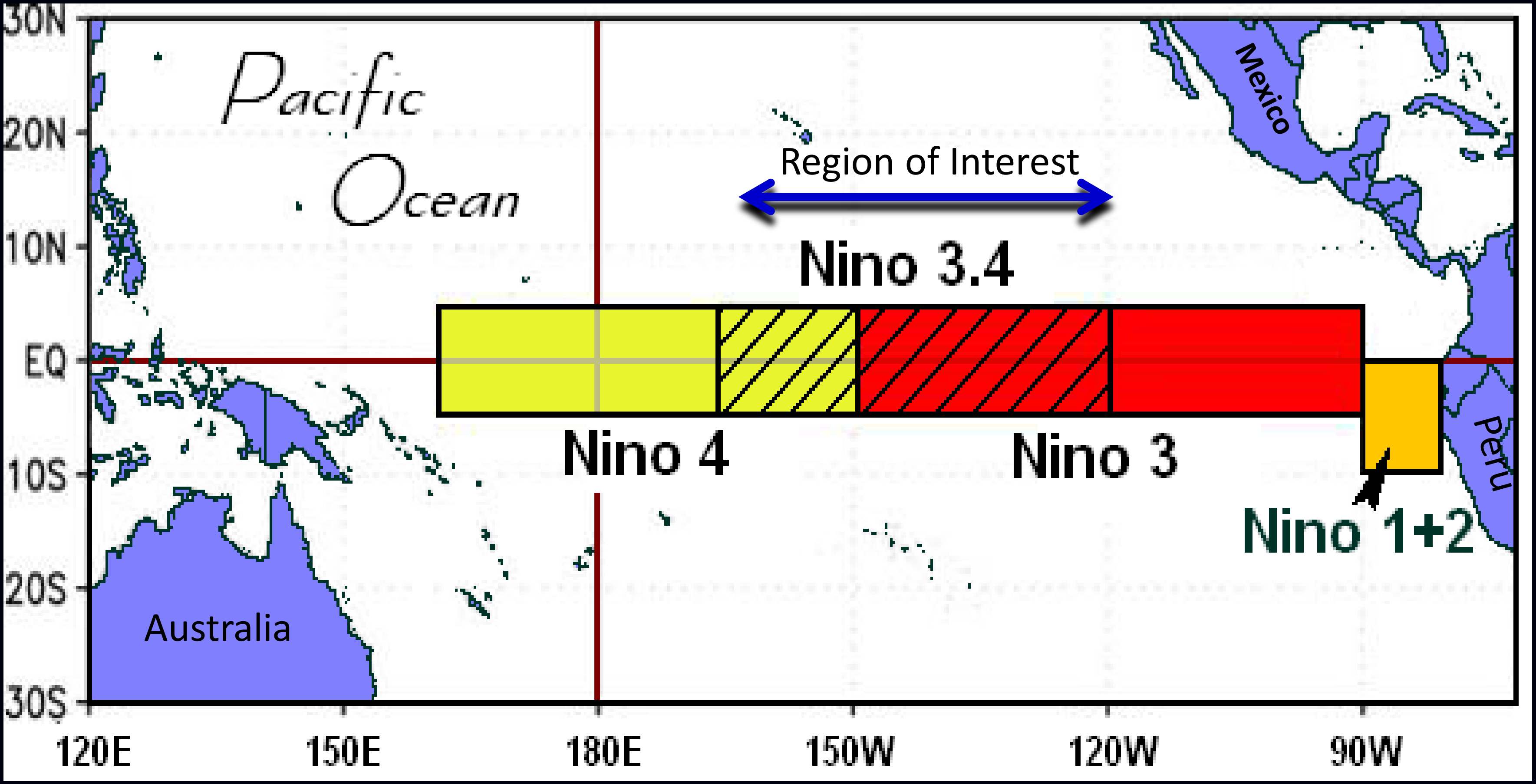
The ONI is based on sea surface temperature (SST) departures from average in the Niño 3.4 region of the eastern tropical Pacific Ocean. It is the principal measure used by NOAA's Climate Prediction Center (CPC) for monitoring, assessing and predicting El Niño/Southern Oscillation (ENSO.)

ONI is defined as the three-month running-mean SST departures in the Niño 3.4 region.

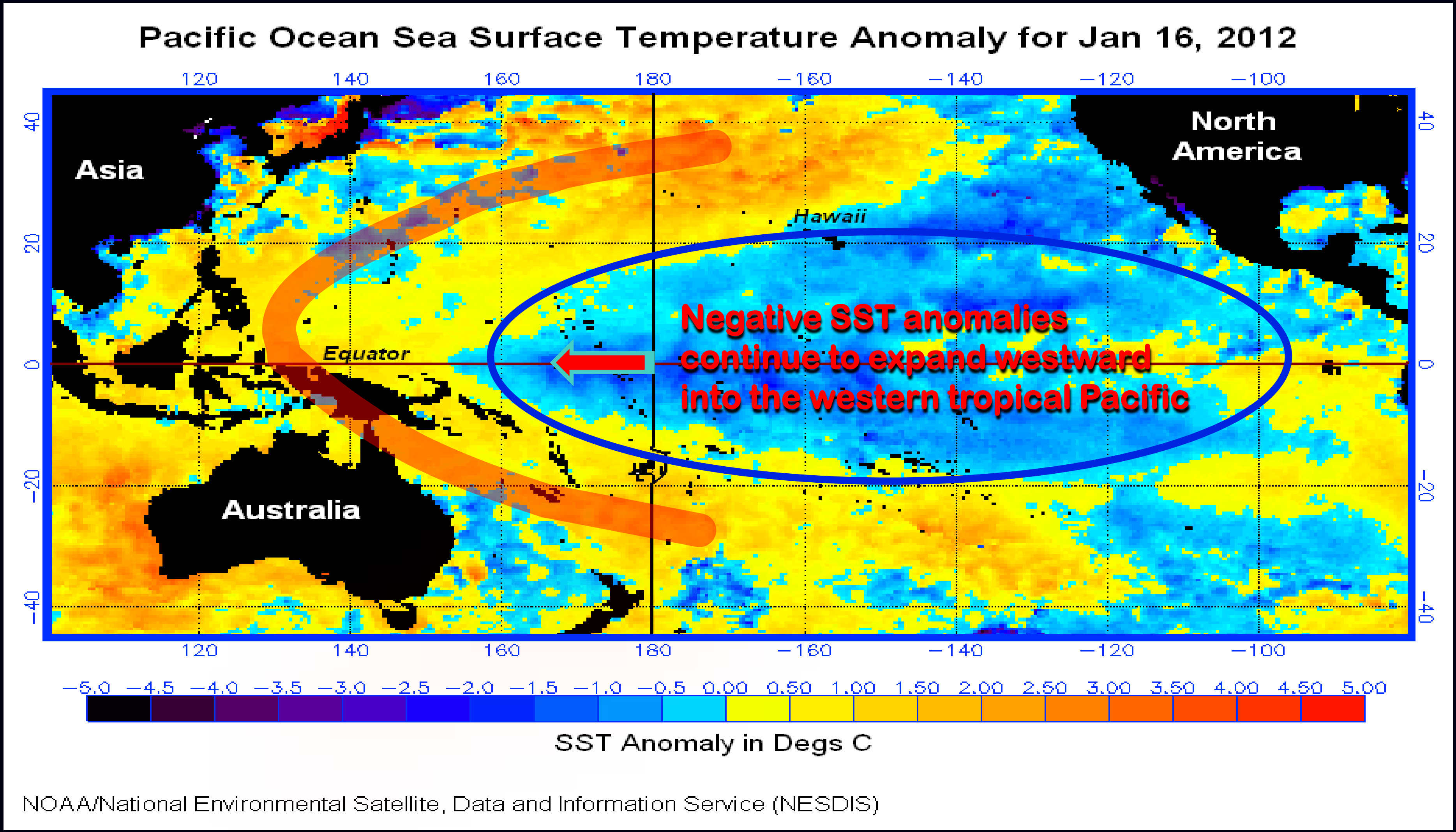
ONI is used to place current ENSO and non-ENSO events into a historical perspective.

CPC's operational definitions of El Niño and La Niña are keyed to the ONI index.

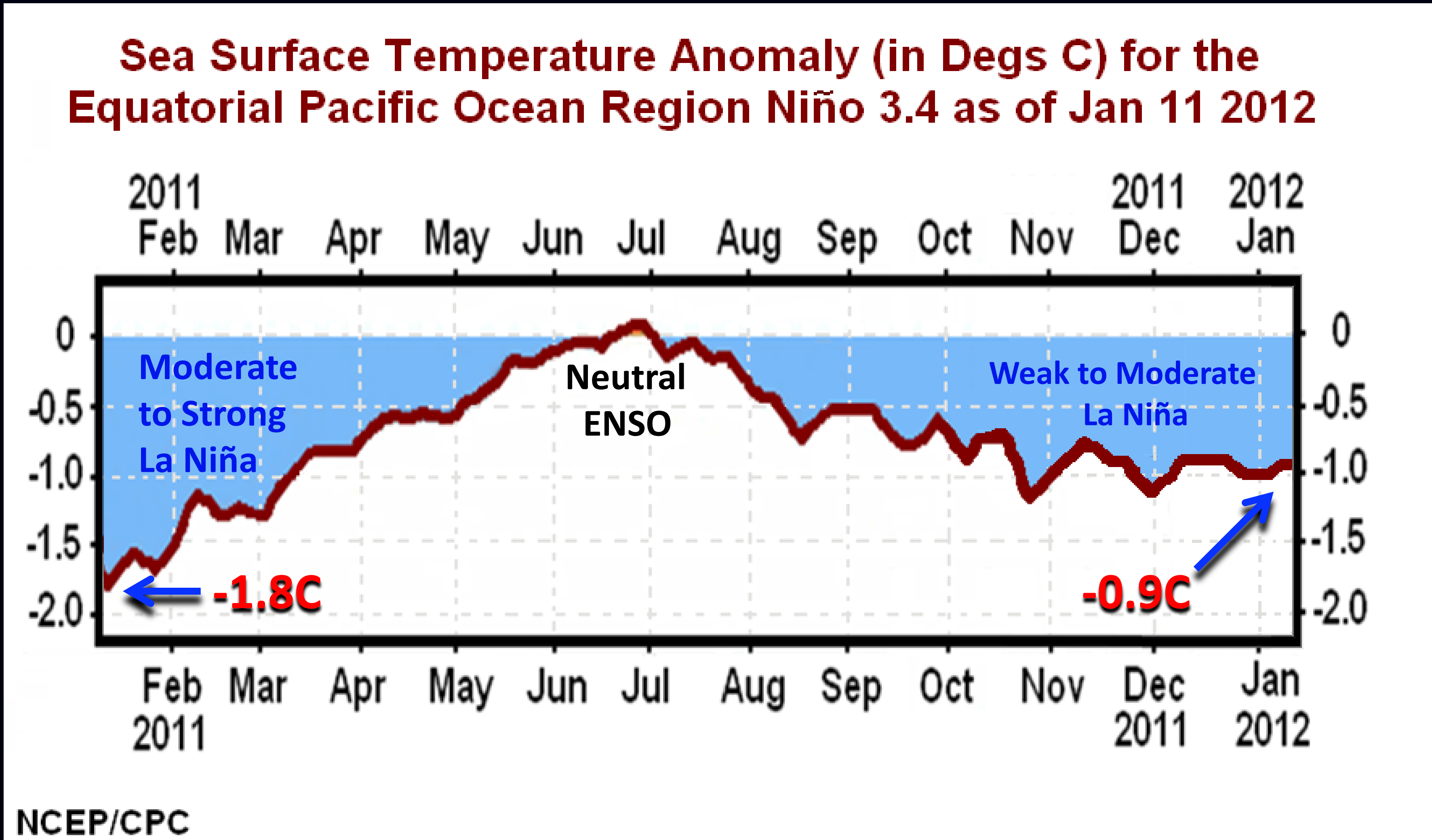
Niño Regions in the Equatorial Pacific Ocean



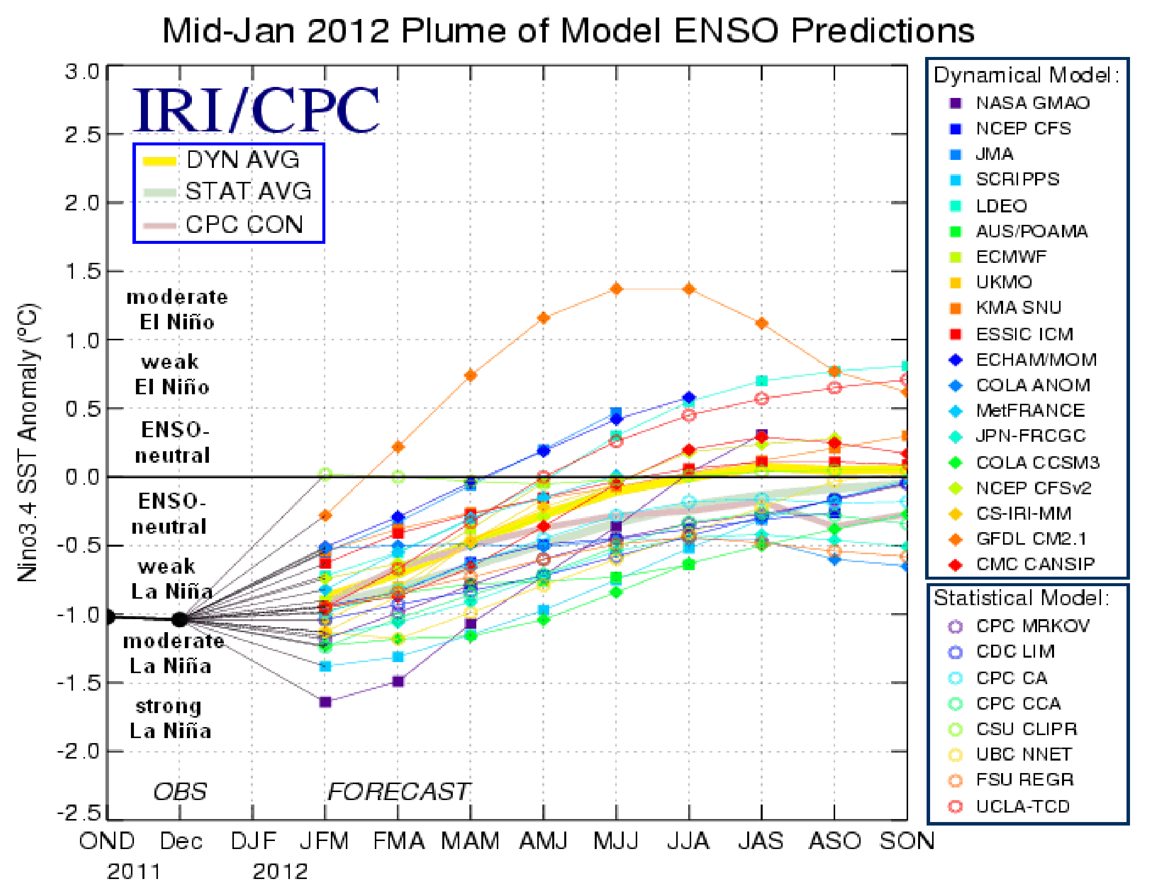
Niño 3.4 – The principal region in the eastern Equatorial Pacific Ocean used by the Climate Prediction Center (CPC) for monitoring, assessing and predicting ENSO (hatched region on the above map) .



Abnormally cold sea surface temperatures (SST) persist in the central and eastern tropical Pacific Ocean, while anomalously warm sea waters are present across the southern Pacific westward to Indonesia and the Philippines in the western Pacific, and northward across the northern Pacific Ocean to the coast of Alaska (in the shape of a horseshoe.)



As of 11 January, 2012 the weekly SST anomaly for Niño 3.4 was -0.9C. One year ago, the SST anomaly for Niño 3.4 was -1.8C. Weekly SST anomalies in Niño 3.4 have remained nearly constant during the past four weeks.



Forecast SST Anomalies (deg C) in the Niño 3.4 Region

	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON
Average, dynamic models	-0.9	-0.7	-0.5	-0.3	-0.1	-0.1	-0	0.1	0
Average, statistical models	-0.9	-0.8	-0.7	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1
Average, for all models	-0.9	-0.7	-0.5	-0.3	-0.2	-0.1	-0	-0	0

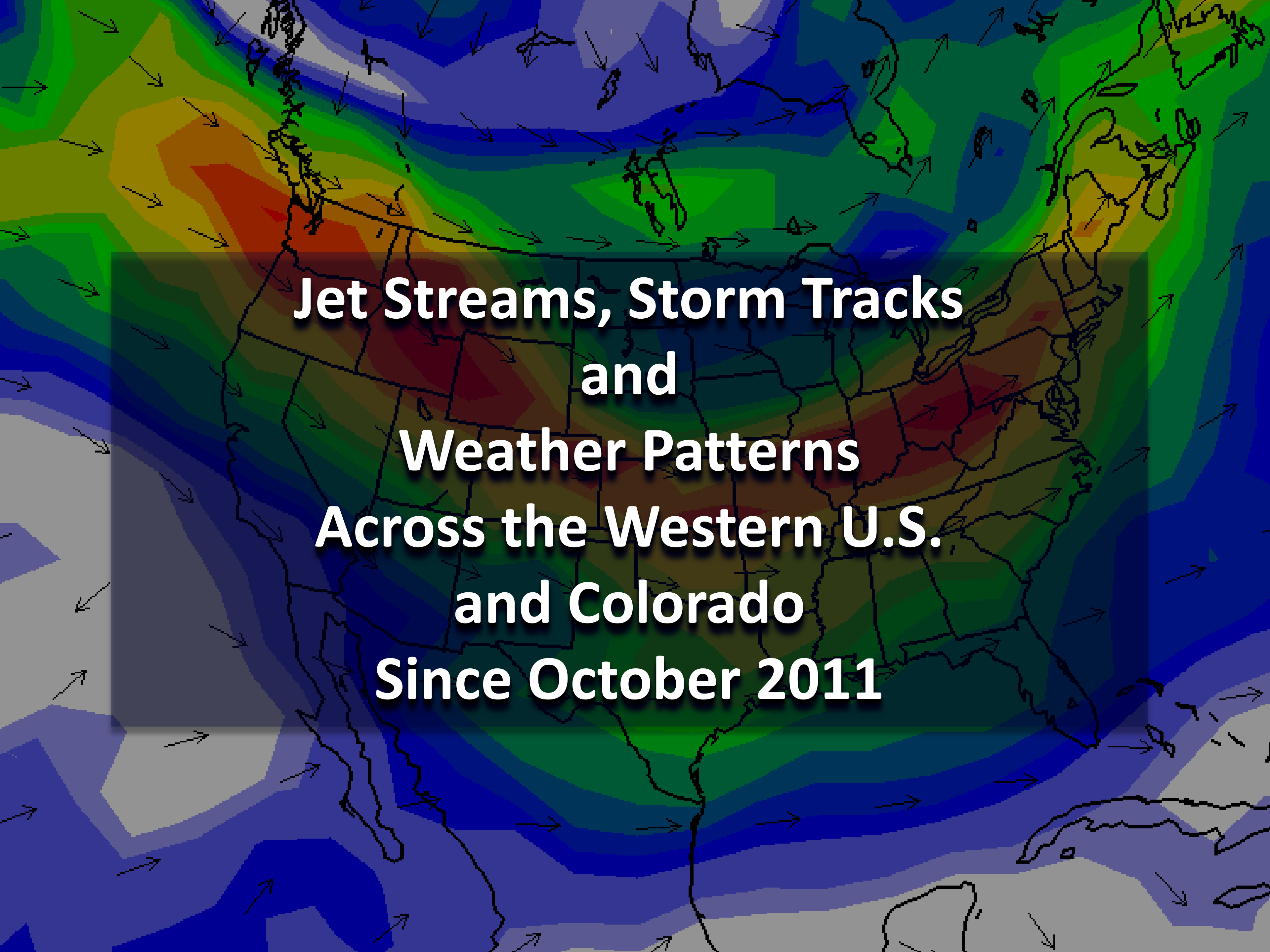
The International Research Institute for Climate and Society / Climate Prediction Center

updated 19 Jan 2012

A majority of the dynamical and statistical ENSO models predict a weak to moderate La Niña in the Pacific Ocean through the February-March-April climate season and a transition to ENSO-neutral conditions by the end of March-April-May climate period.

NCEP's Coupled System Forecast Model (CFS) predicts an end to La Niña but not until the end of the April-May-June climate season.

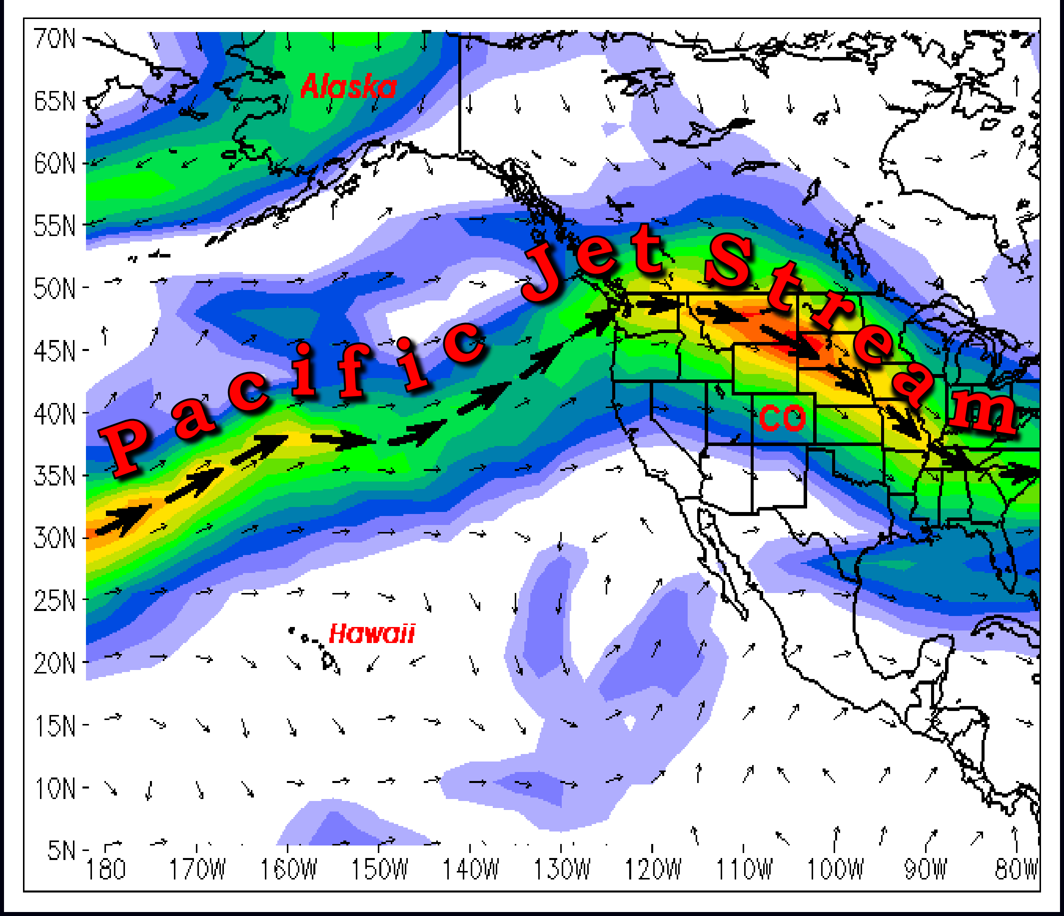
NASA's Global Modeling and Assimilation Office (GMAO) model goes so far as to predict a moderate to strong La Niña until the May-June-July climate season. However, current oceanic and atmospheric conditions do not support this model prognosis.



Jet Streams, Storm Tracks and Weather Patterns Across the Western U.S. and Colorado Since October 2011

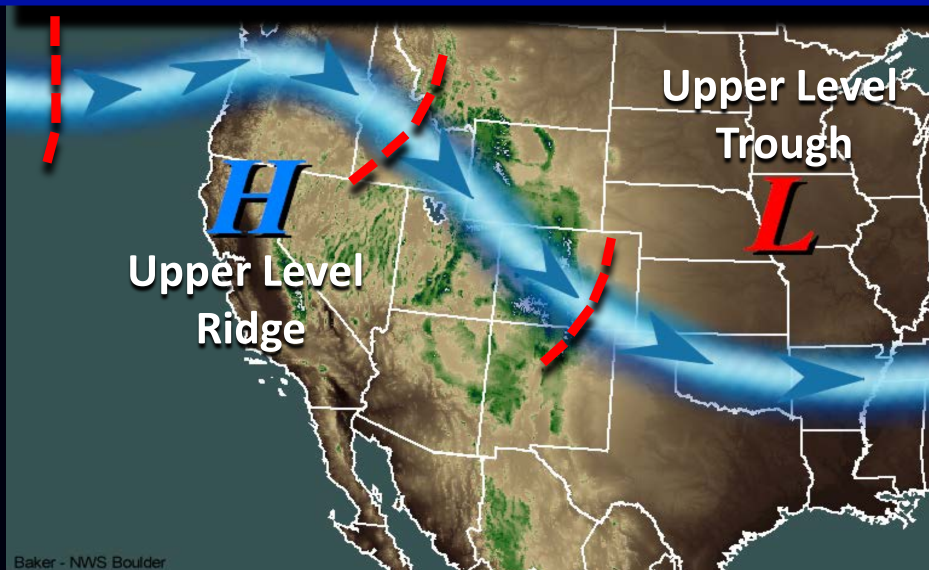
The Pacific Jet Stream

- A channel of strong winds within the Westerly Wind Belt (30-60˚ N latitude)
- Produced and sustained by large pressure and temperature gradients between the poles and the Equator
- May be thousands of miles in length, hundreds of miles wide, and thousands of feet deep
- Typically found between 25,000 and 40,000 feet above sea level and sometimes below 25,000 feet AGL during the winter season
- Wind speeds may exceed 180 mph
- Its position can vary significantly from week-to-week and even from day-to-day
- Much of the variability in precipitation, temperature, wind, and cloud cover we see during the winter and spring can be attributed to the jet stream.



1-Day 300mb Mean Wind Vectors

During La Niña Winters



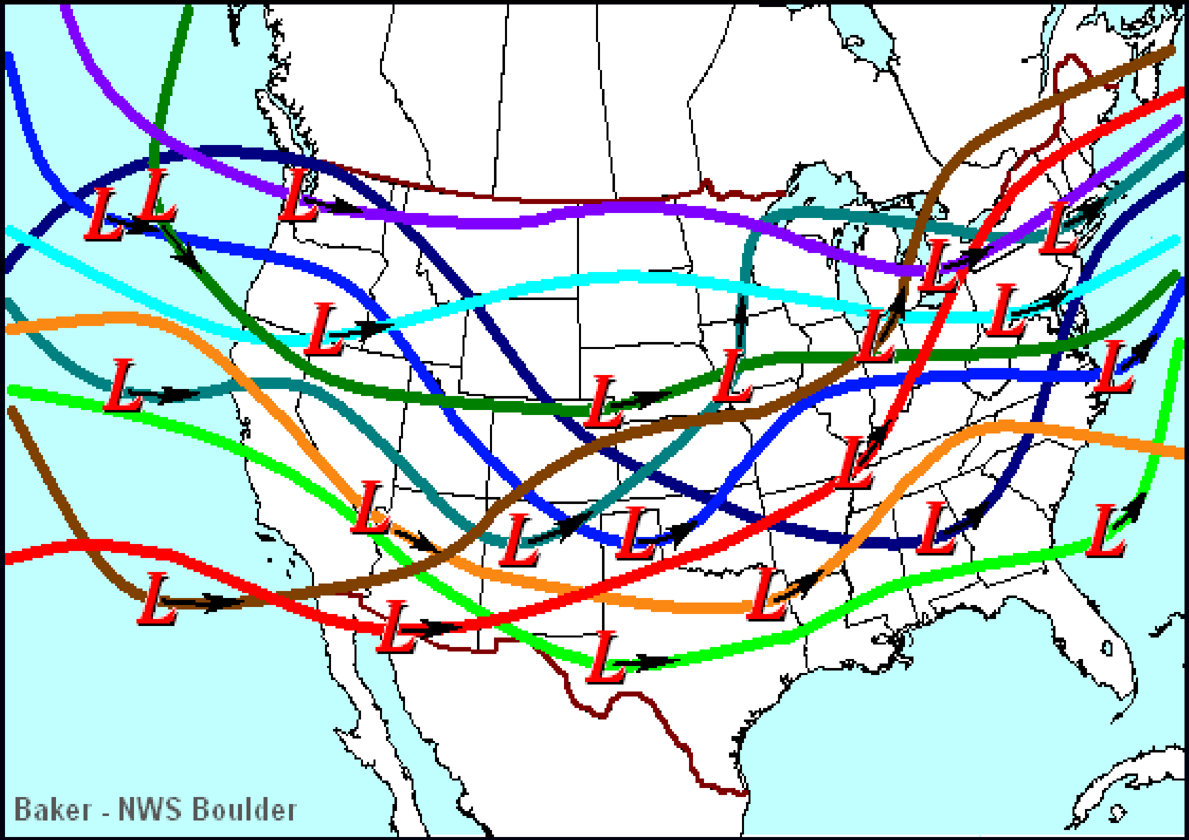
During La Niñas, principally moderate to strong events, an abnormally strong high pressure ridge will form along the west coast of the U.S. and persist for much of the winter season. The strong Pacific jet stream is diverted northward up over the Pacific northwest by this ridge, where then curves southeastward towards the heart of the country. Waves of thick clouds, precipitation and strong winds are periodically carried along by this strong jet stream flow over the Columbia River Basin and central Rocky Mountain region.

During El Niño Winters

During El Niños, mainly those of moderate to strong intensity, the Pacific jet stream will often deflect southward around the bottom on an anomalous upper level low pressure trough positioned over the western U.S. Once onshore in southern California, this powerful wintertime jet stream races east-ward across the desert southwest, the lower Great Basin and the southern Rocky Mountain region transporting waves of thick clouds, heavy precipitation and strong winds.

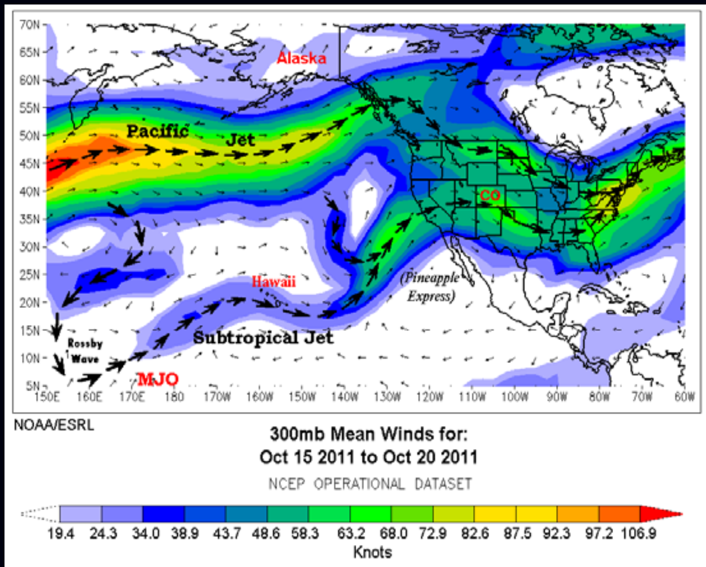
Baker - National Weather Service Boulder, Colorado

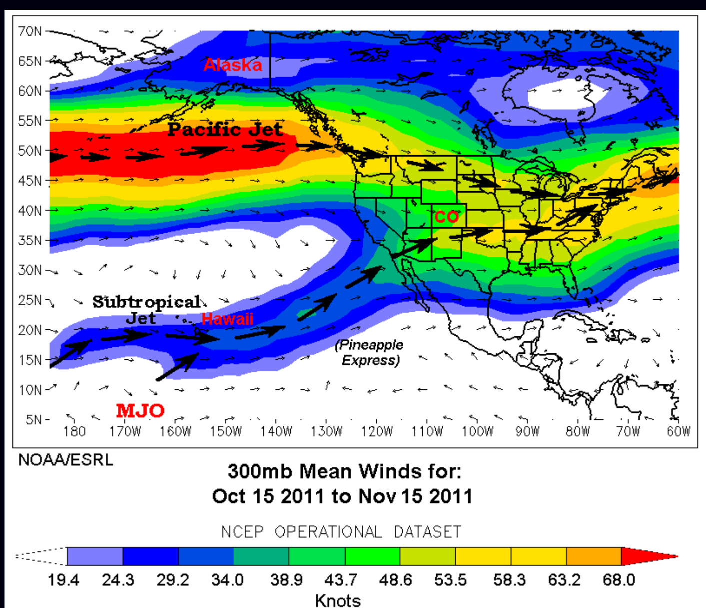
During Weak ENSO and ENSO-Neutral Winters



The jet stream and storm track pattern across the continental U.S. during the winter season of weak ENSO and ENSO-neutral conditions in the Pacific Ocean is characteristically more randomly distributed. Winter storms may still follow paths similar to those during moderate to strong La Niña and El Niño events, but with far less regularity. This greater variability in the storm track pattern can be attributed to greater latitudinal fluctuation in the Polar and Pacific jet streams. Because of this lack of consistency in the large scale circulation pattern, precipitation across Colorado tends to be more uniformly distributed and temperatures extremes less common.

The Mean Jet Stream Pattern over the Western U.S. Since October 2011

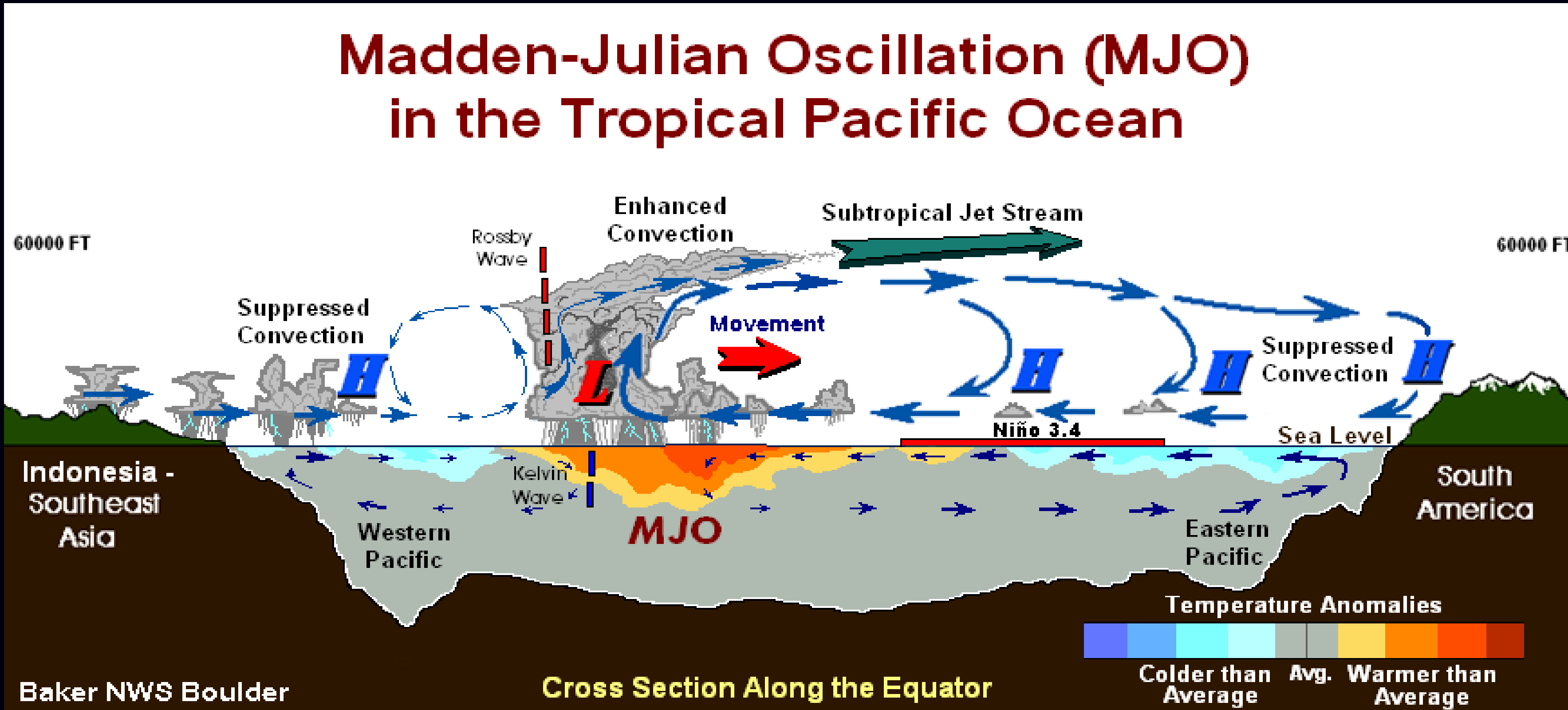




Last October an abnormally strong upper level high pressure ridge formed along the west coast of the U.S. This caused the Pacific jet stream to divert northward away from the Pacific northwest and over western Canada. This poleward shift in the Pacific jet coincided with the arrival of a subtropical jet stream (sometimes referred to as the "pineapple express") over the southwest U.S.

This southern jet stream originated over central tropical Pacific Ocean in a region of deep tropical convection (thunderstorms) associated with a strong Madden Julian Oscillation (MJO) that was slowly propagating eastward along the Equator. For days this subtropical jet stream conveyed a nearly continuous ribbon of moisture laden tropical air that was released by thunderstorms in the vicinity of the MJO northeastward towards the U.S. Its arrival was marked by a dramatic increase of precipitation, much of it heavy, for many parts of the southwest. Strong southwest winds also created blizzard conditions in the mountains of southwest Colorado and northwest New Mexico.

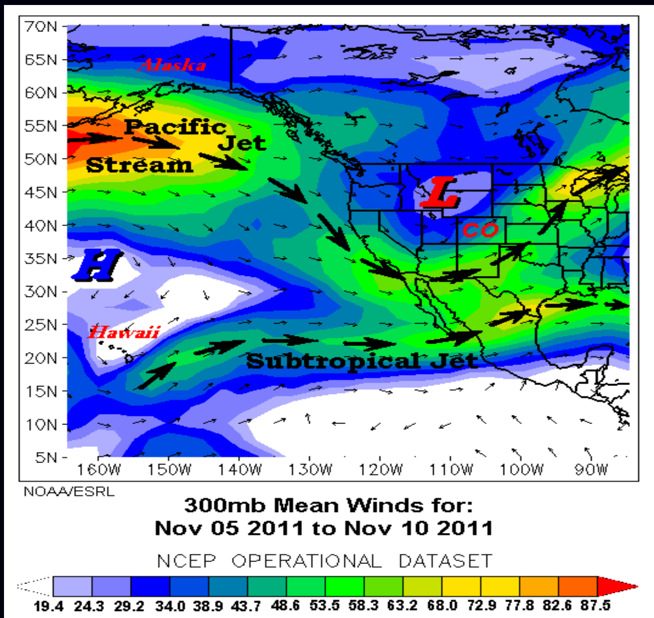
Even though weak to moderate La Niña conditions existed in the Pacific Ocean during this period, the abnormally wet, snowy and windy conditions attributed to this MJO and the subtropical jet stream, are more commonly observed during moderate to strong El Niños.



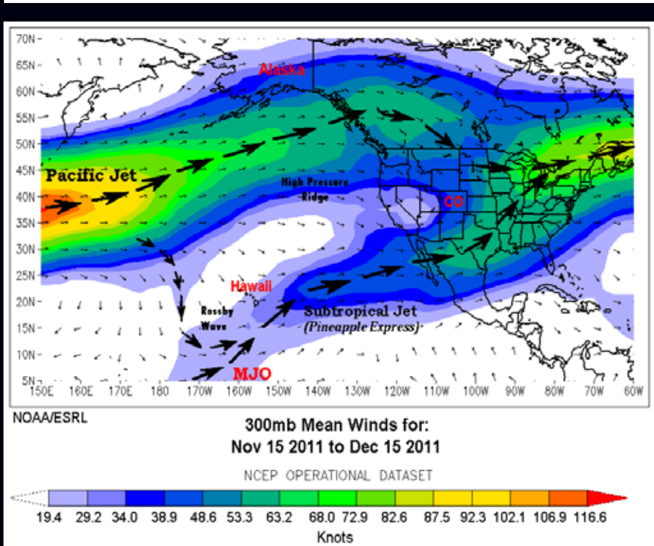
The Madden-Julian Oscillation (MJO), also known as the 30-60 Day Tropical Wave, is a large-scale coupling of tropical oceanic (Kelvin Wave) and atmospheric (Rossby Wave) circulations that circle the globe on an intraseasonal time scale ordinarily within a span of 30 to 60 days. MJOs are characterized as a large eastward propagating complex of enhanced and suppressed tropical convective rainfall, observed mainly over the Indian and Pacific Oceans. MJOs that manage to reach the eastern tropical Pacific Ocean (specifically the Niño 3.4 region of the Pacific) can significantly impact temperature, precipitation, and circulation patterns from Hawaii to the continental United States. These conditions are similar to those observed during El Niño events, although they appear for a much shorter duration. MJOs form most often during weak La Niñas and ENSO-neutral conditions, and are weakest or even absent during El Niño events.

Baker - National Weather Service Boulder, Colorado

The Mean Jet Stream Pattern over the Western U.S. Since October 2011

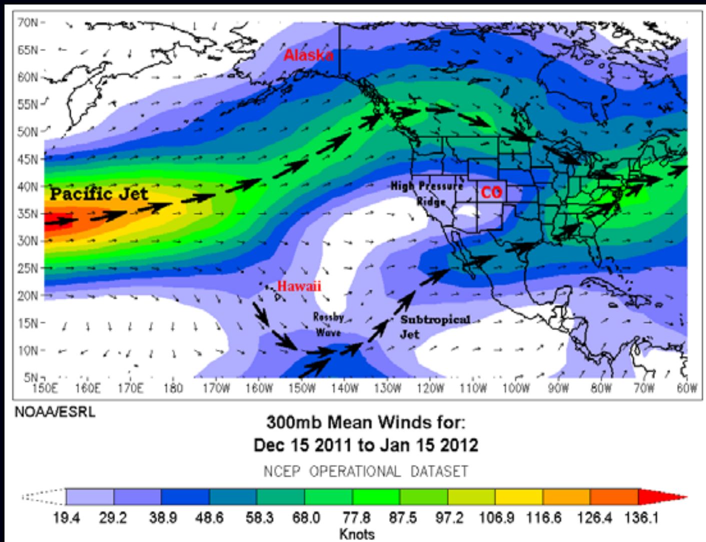


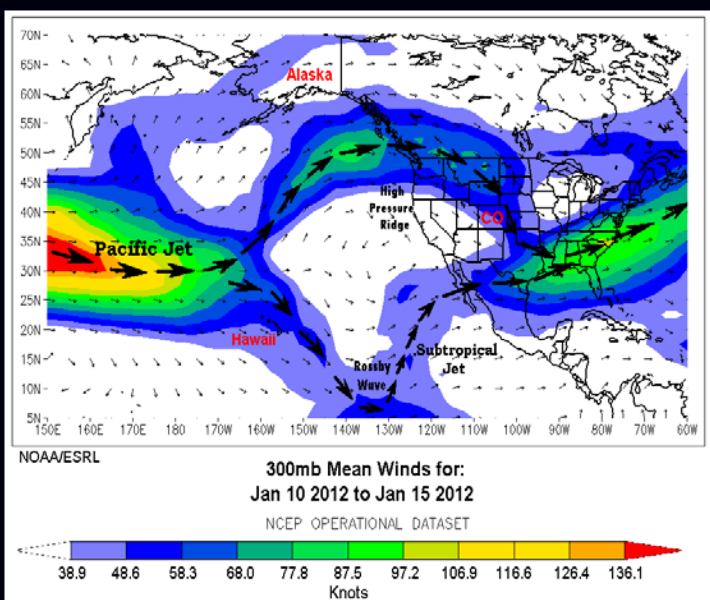
In early November, the large high pressure ridge along the west coast shifted westward over the eastern Pacific Ocean allowing an especially strong Pacific jet stream over the Gulf of Alaska to plunge southward over southern California and northern Mexico, where it merged with a subtropical jet stream in the region. The convergence resulted in several days of moderate to heavy precipitation, strong winds and even severe storms downstream across the southern and eastern U.S. This dive in the Pacific jet (i.e., storm track) also resulted in abnormally dry and cool conditions for the Pacific northwest, the northern and central Rocky Mountains and much of the Great Basin.



In late November, the Pacific jet stream returned to its former position over southwest Canada. Once again this placed the northern Rocky Mountains and Great Plains under strong northwest flow aloft which drove a series of Canadian cold fronts, referred to sometimes as "Alberta clippers", southward along the east face of the Rocky Mountains. Each one of these quick hitting frontal systems deposited several inches of snow along the Colorado Front Range. Many locations in eastern Colorado including Denver ended the month with above average snowfall.

The Mean Jet Stream Pattern over the Western U.S. Since October 2011

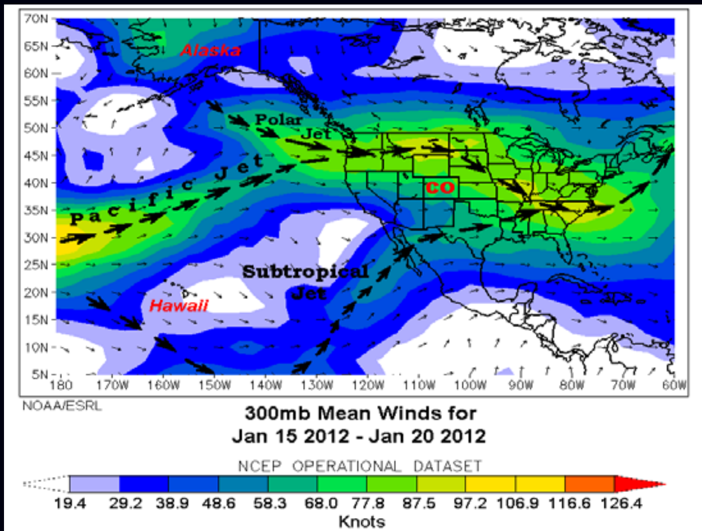


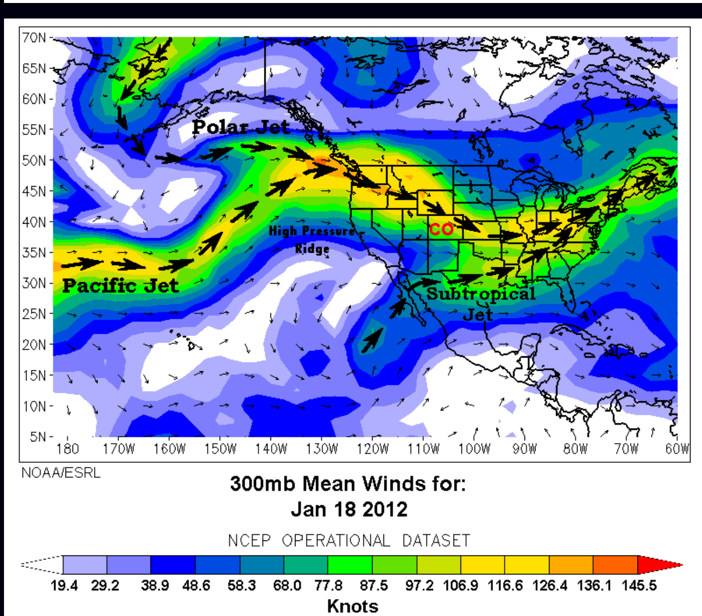


During December, the Pacific jet stream/storm track continued to bow northward over western Canada with strengthening of the west coast high pressure ridge. This essentially put an end to precipitation, temporarily, and produced unseasonably mild temperatures across Colorado and the western U.S.

During the first two weeks of January, the Pacific Jet stream over western Canada slowly migrated southward over the Pacific northwest and northern Rocky Mountains with the west coast high pressure ridge weakening as it slipped southward. This southward shift in the Pacific jet stream placed the Pacific northwest in a very stormy weather pattern that lasted for several days at a time. Heavy rainfall drenched the lowlands and gale force winds coupled with the pounding rainfall led to serious coastal flooding . Mountain ranges as far inland as Idaho and Montana also saw their share of heavy snowfall and strong winds.

The Mean Jet Stream Pattern over the Western U.S. Since October 2011

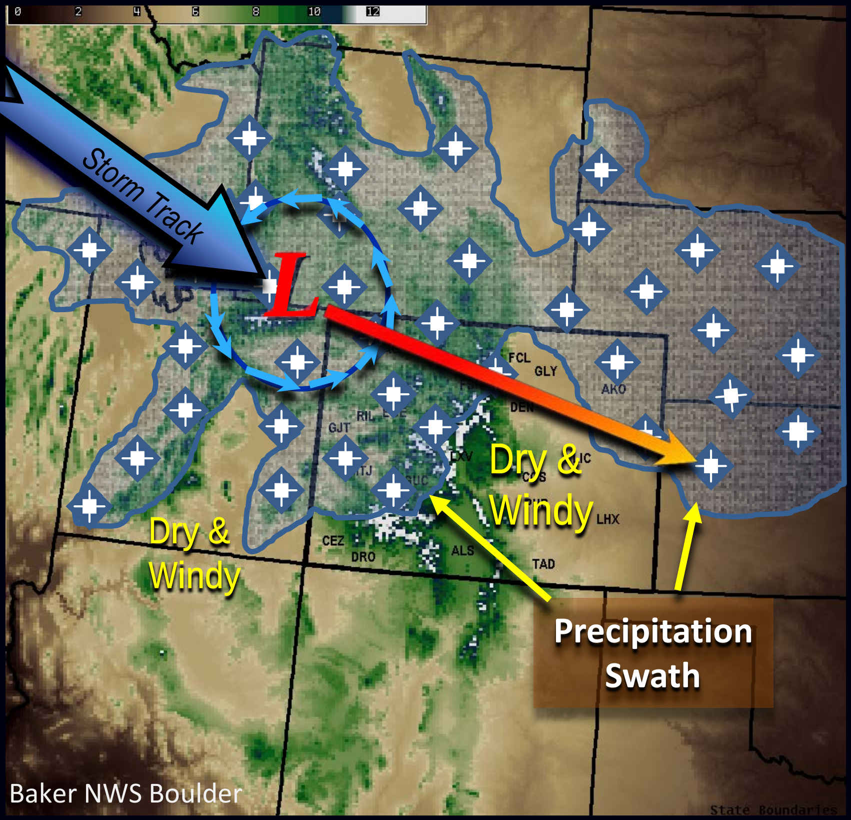




By the third week in January, the Pacific Jet stream and storm track had become nearly stationary over the Pacific northwest and northern Rocky Mountains with powerful storms frequenting the region about every other day. The snow level in Washington had now lowered to coast with the moisture laden Pacific jet stream merging with its colder counterpart, the Polar jet stream diving down from Alaska. Winds continued to grow stronger, with many mountain ridges as far east as Wyoming recording hurricane force wind speeds.

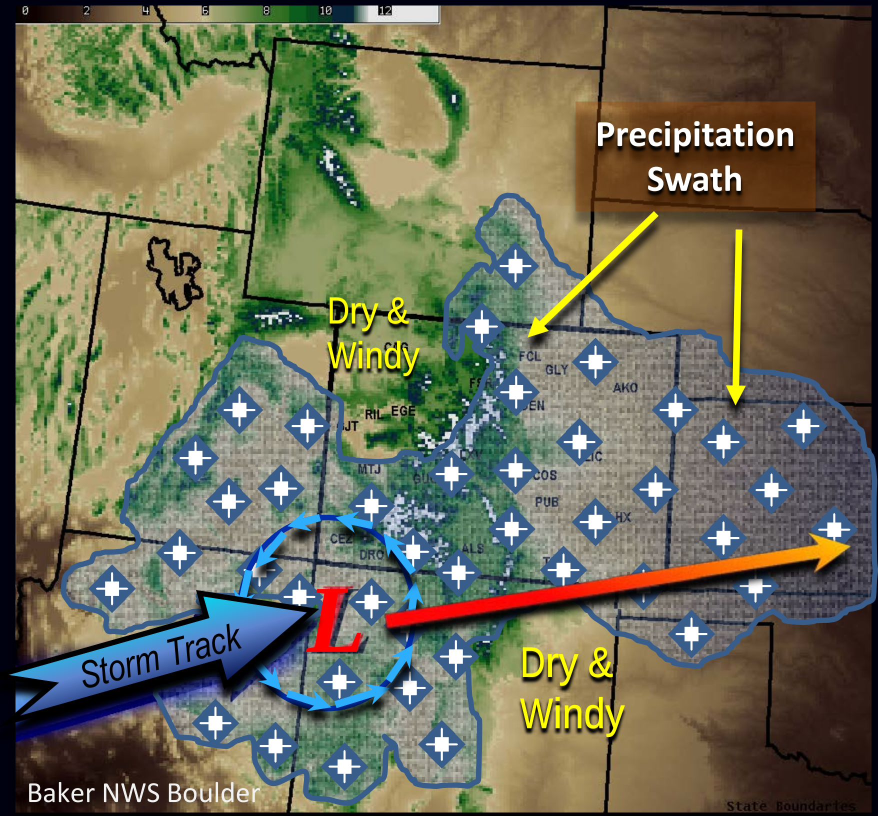
By January 18th, the two jet streams now merged into one powerful jet stream over southwest Wyoming and northern Colorado, reached speeds in excess of 190 mph. Its arrival ushered in waves of heavy snowfall to areas mainly west of the Continental Divide and produced gale to hurricane force winds that created blizzard conditions on many of the high mountain passes. Areas east of the Continental Divide saw little if any precipitation, but did not escape the strong winds. Higher elevations of the Front Range in Colorado recorded wind gusts in excess of 100 mph!

Winter Storms from the Northwest



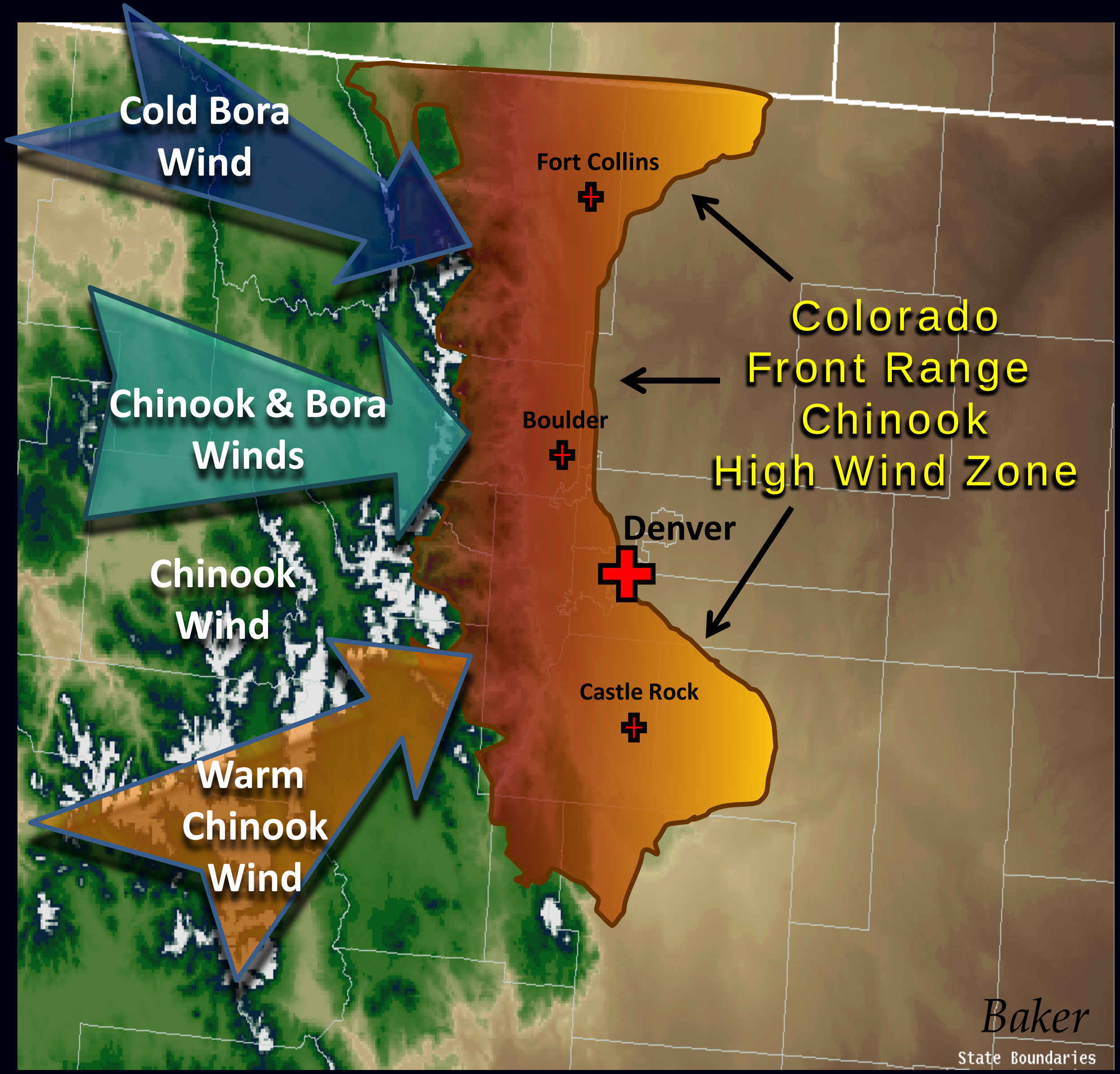
Pacific storm systems approaching Colorado from the northwest are more likely to deposit most of their precipitation (heavy snowfall) on west and northwest facing mountain slopes in northwest and west central Colorado, and in northern Utah. These fast moving winter storm systems are usually accompanied by strong winds capable of producing blizzard conditions on the high mountain ridges and passes.

Winter Storms from the Southwest



Pacific storms approaching Colorado from the southwest are more likely to deposit most of their precipitation (heavy snowfall) on south and southwest facing mountain slopes in southwest and south central Colorado, and in northwest New Mexico. These relatively fast moving storms are often accompanied by strong winds capable of blizzard conditions on the mountain ridges and passes. It is not uncommon for these storms to produce heavy snowfall and even blizzard conditions in eastern Colorado.

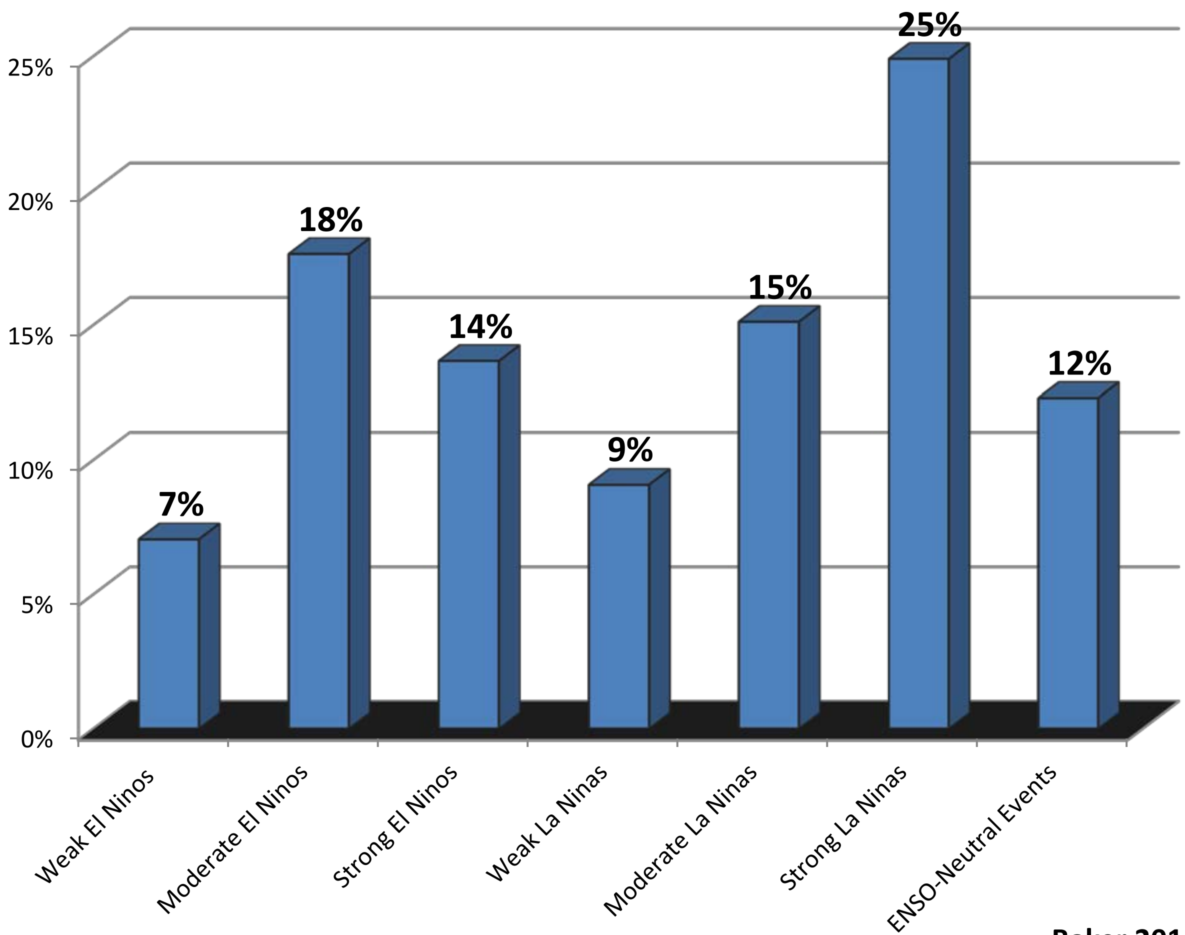
Gusty and potentially damaging downslope winds known by the names of **Chinook** and **Bora** are most common along the Colorado Front Range during late autumn, winter and early spring.



Chinook (a native American word meaning snow eater) is a warm and very dry wind that pulses down the east face of the Front Range and onto the nearby plains (rarely beyond 25 miles) of eastern Colorado. These gusty and erratic downslope winds can reach speeds in excess of 100 mph under favorable atmospheric conditions.

The Bora is a cold and often very dry wind that rushes down the east face of the Front Range and/or Cheyenne Ridge and out across the plains of northeast Colorado following the passage of a fast moving Pacific cold front. Bora winds are not as erratic as the Chinook. However, they can reach speeds well in excess of 60 mph. The Bora is typically at its strongest when a strong jet stream passes just to the north of Colorado.

Percentage of High Wind Days In the Boulder Area During ENSO and ENSO-Neutral Events, 1969-2010



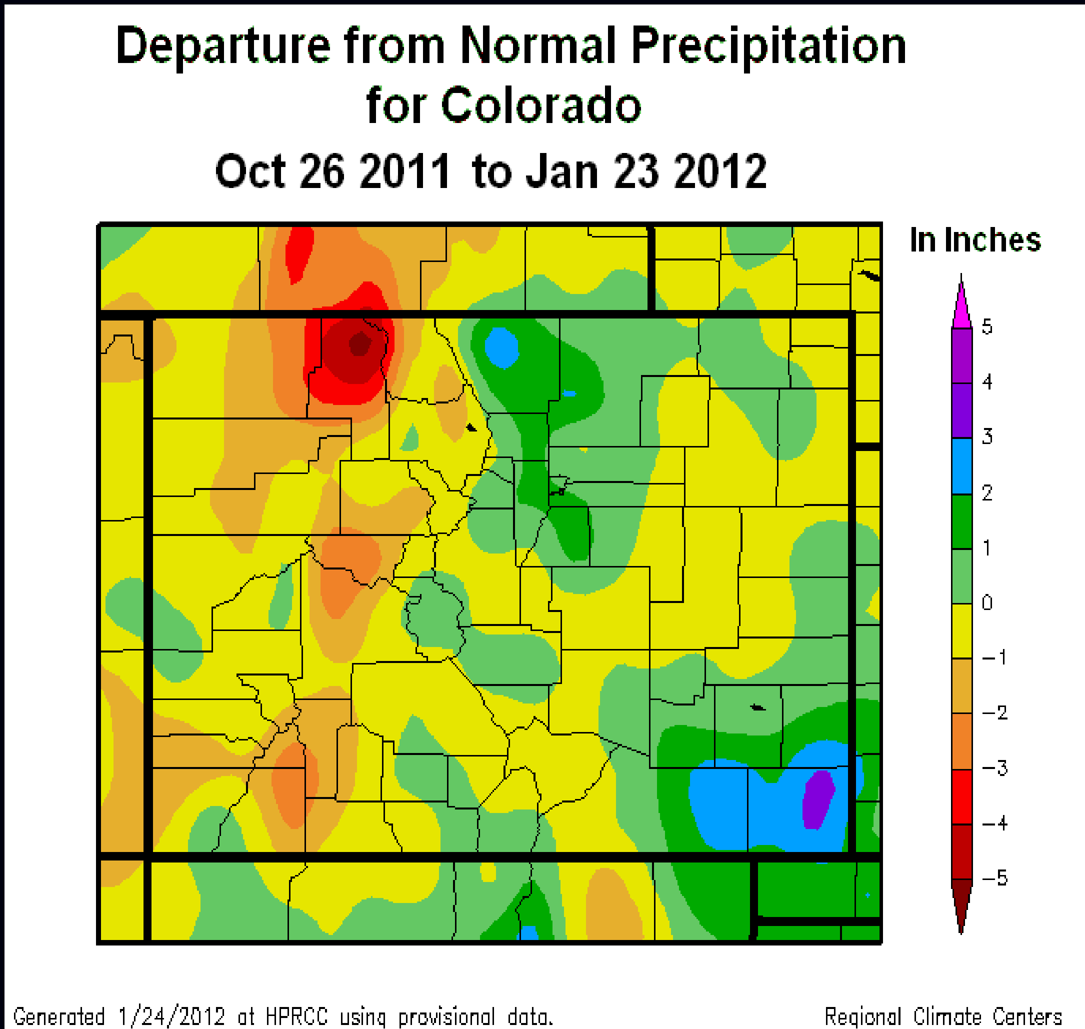
Baker 2011

High Wind Days – A day when the speed of a sustained wind or wind gust equals or exceeds 70 mph.

From 1969 to 2010, high winds (Chinook and Bora) in and around Boulder, Colorado, occurred most often during strong La Niñas (25 percent of the time) and moderate El Niño events (18 percent of the time), followed by moderate La Niña events (15 percent of the time).

High winds occurred least often during weak La Niña and weak El Niño events (9 percent and 7 percent of the time, respectively).

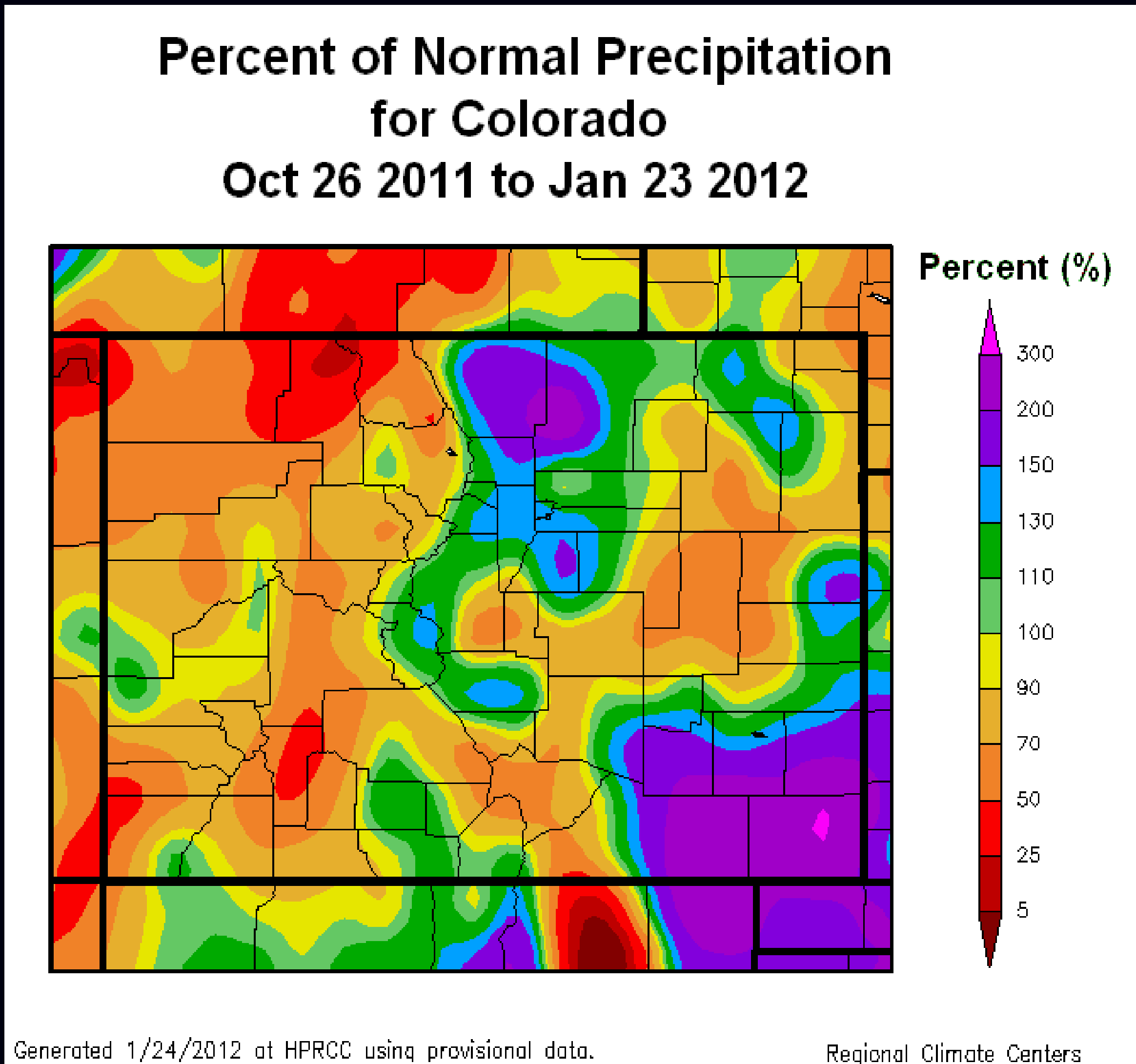
Temperature, Precipitation, and Drought Conditions Across Colorado During the 90-Day Period October 26, 2011 to January 23, 2012



During the 90-day period ending January 23, 2012 , the Upper Yampa River Basin in northwest Colorado had the greatest precipitation deficit in the state. Precipitation departures below normal for the rest of western Colorado were not as drastic, with totals ranging from 0.5 to 2.5 inches below normal.

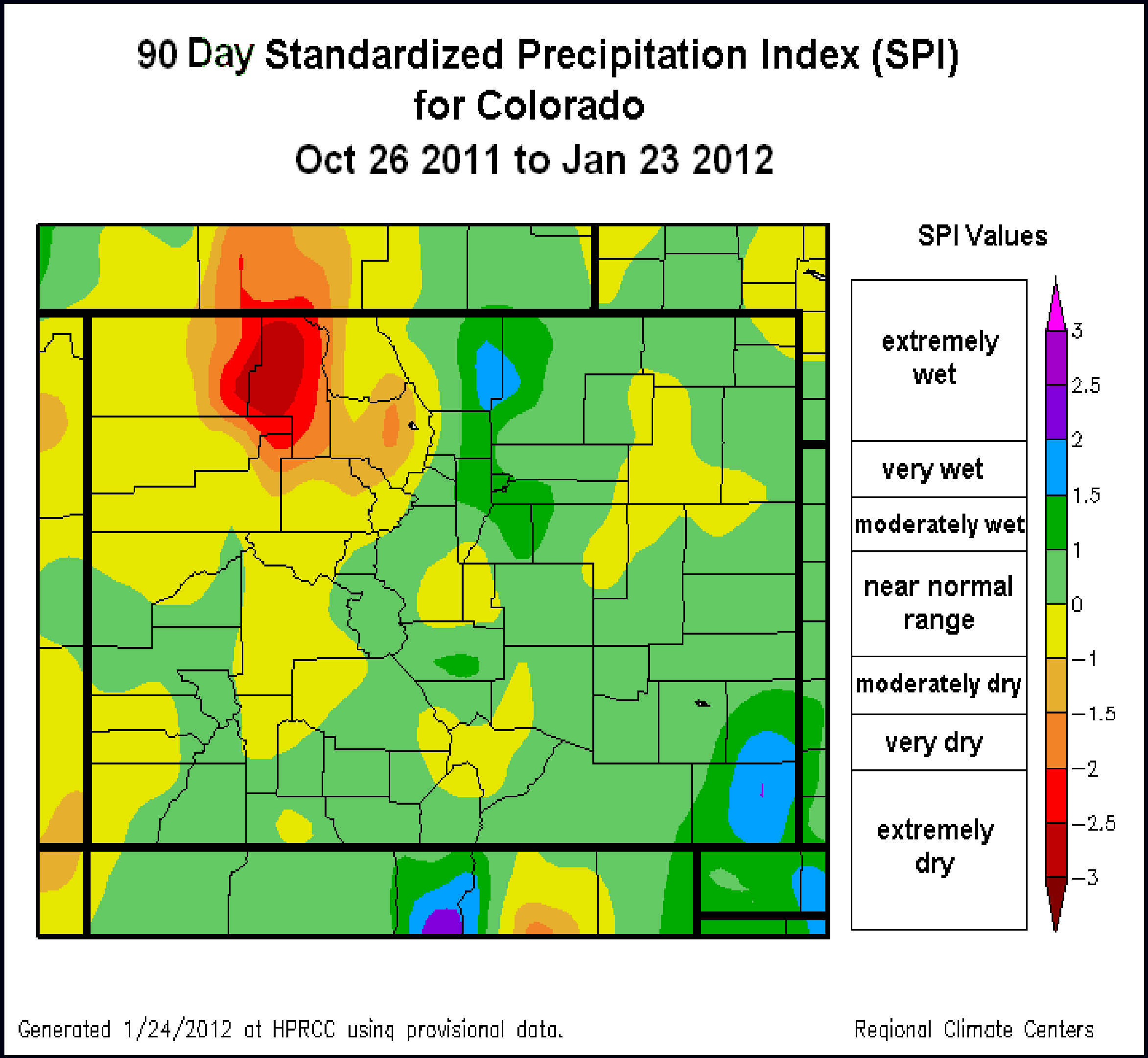
In contrast, southeast Colorado had the greatest precipitation surplus with a 90-day precipitation total nearly three inches above normal in Baca County.

Positive precipitation anomalies were also reported along the east face of the Front Range in northeast Colorado, the Upper Arkansas River Basin in central Colorado and portions the Upper Rio Grande Basin in south central Colorado.



During this same 90-day period, precipitation was as much as 200 percent above normal along the Front Range and in central portions of the South Platte River Basin in northeast Colorado, and as much as 150 percent o normal along the Mosquito and Rampart Ranges in central Colorado, and upwards of 300 percent of normal for portions of the southeast plains.

In western Colorado, precipitation was much less, with deficits ranging from 30 to 90 percent of normal. Some areas, such as up along the Wyoming border near Steamboat Springs recorded 90-day totals less than 20 percent of normal.

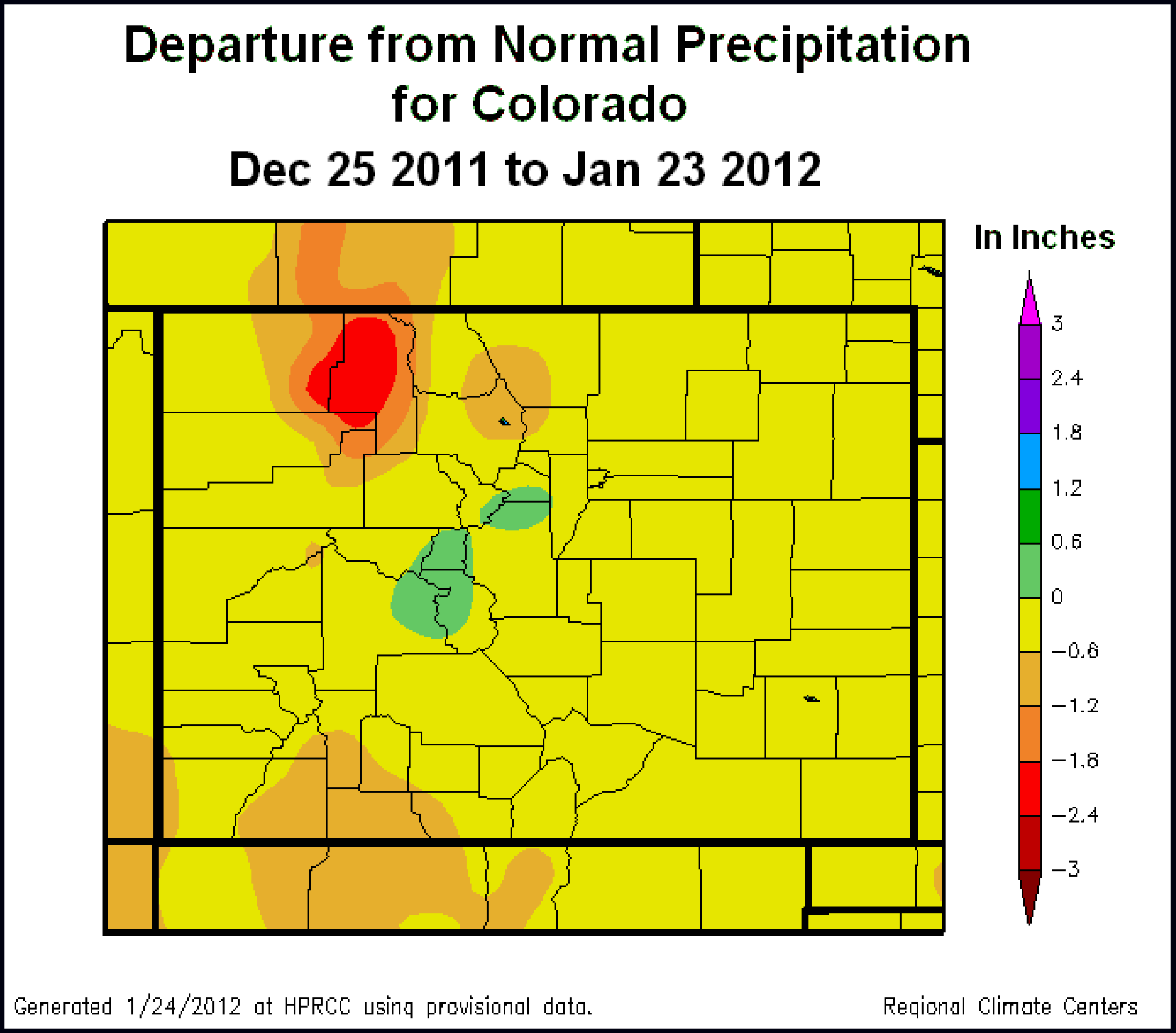


The Standardized Precipitation Index (SPI) for the 90-day period ending January 23, 2012 clearly reveals the extremely dry conditions that were seriously impacting the Upper Yampa River Basin around Steamboat Springs in northwest Colorado, and near normal to very dry conditions across the remainder of the northwest and west central portions of Colorado.

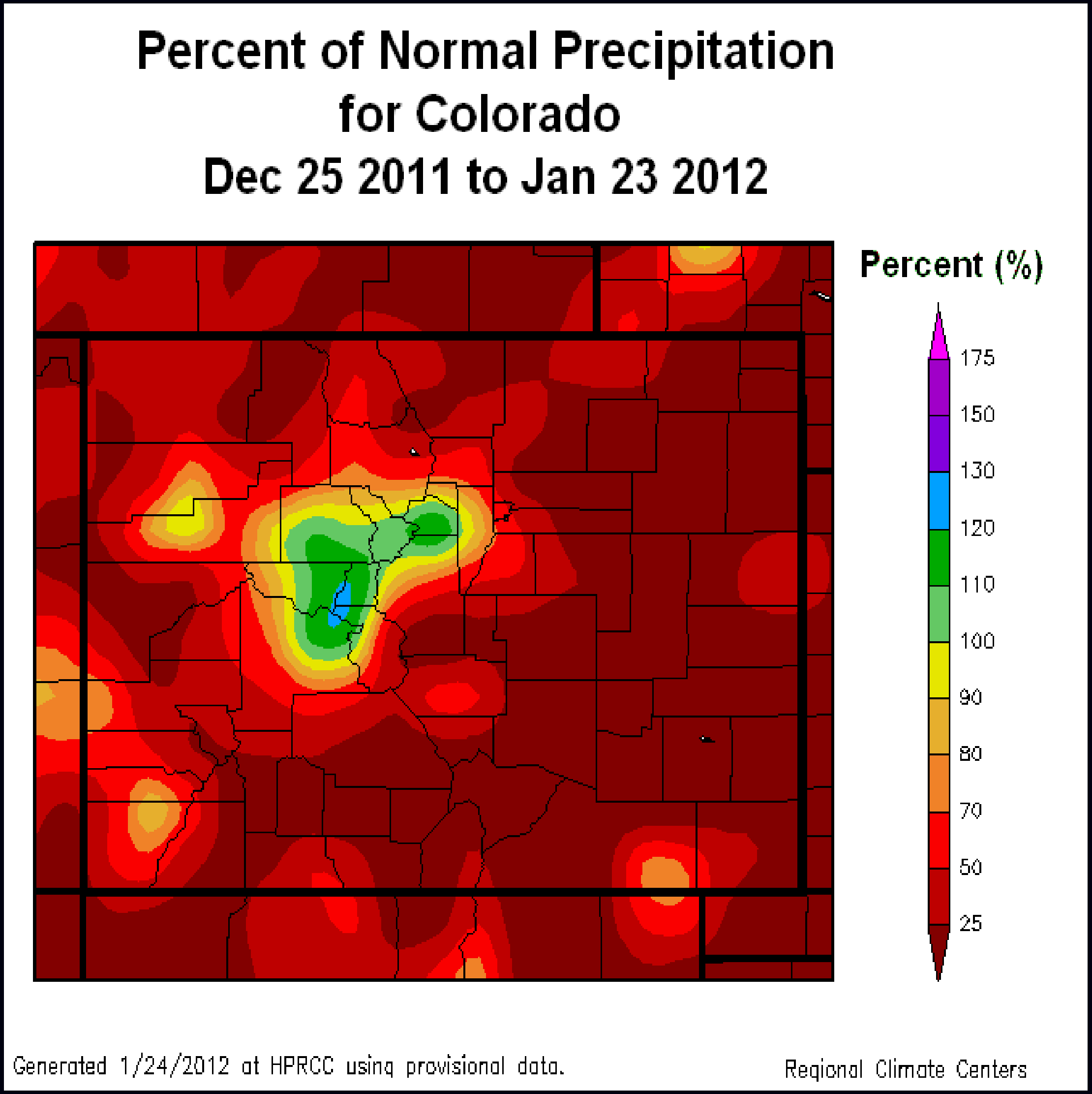
In southern and eastern Colorado, conditions varied from near normal to moderately wet, with pockets of very wet conditions along the northern Front Range and far southeast plains of the state.

The SPI was developed to monitor potential short term agricultural and long-term hydrological drought conditions. The SPI is a probability index that considers only precipitation.

Temperature,
Precipitation,
and Drought Conditions
Across Colorado During the
30-Day Period
December 25, 2011 to January 23, 2012

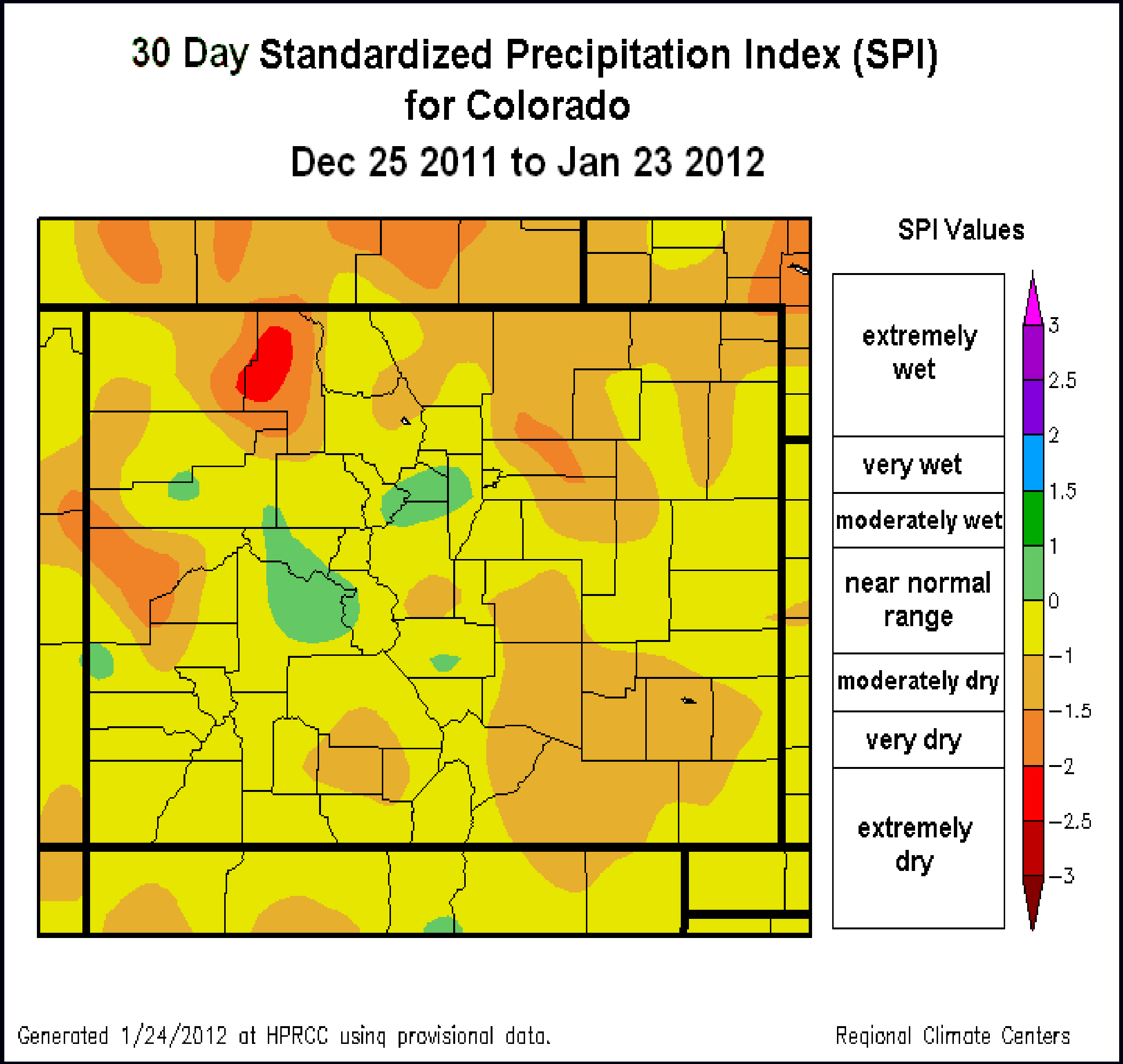


During the 30-day period ending January 23, 2012, precipitation in Colorado varied from near 2.4 inches below normal in northwest Colorado, to approximately 0.5 inch above normal in the head water region of the Arkansas River around Leadville in central Colorado.



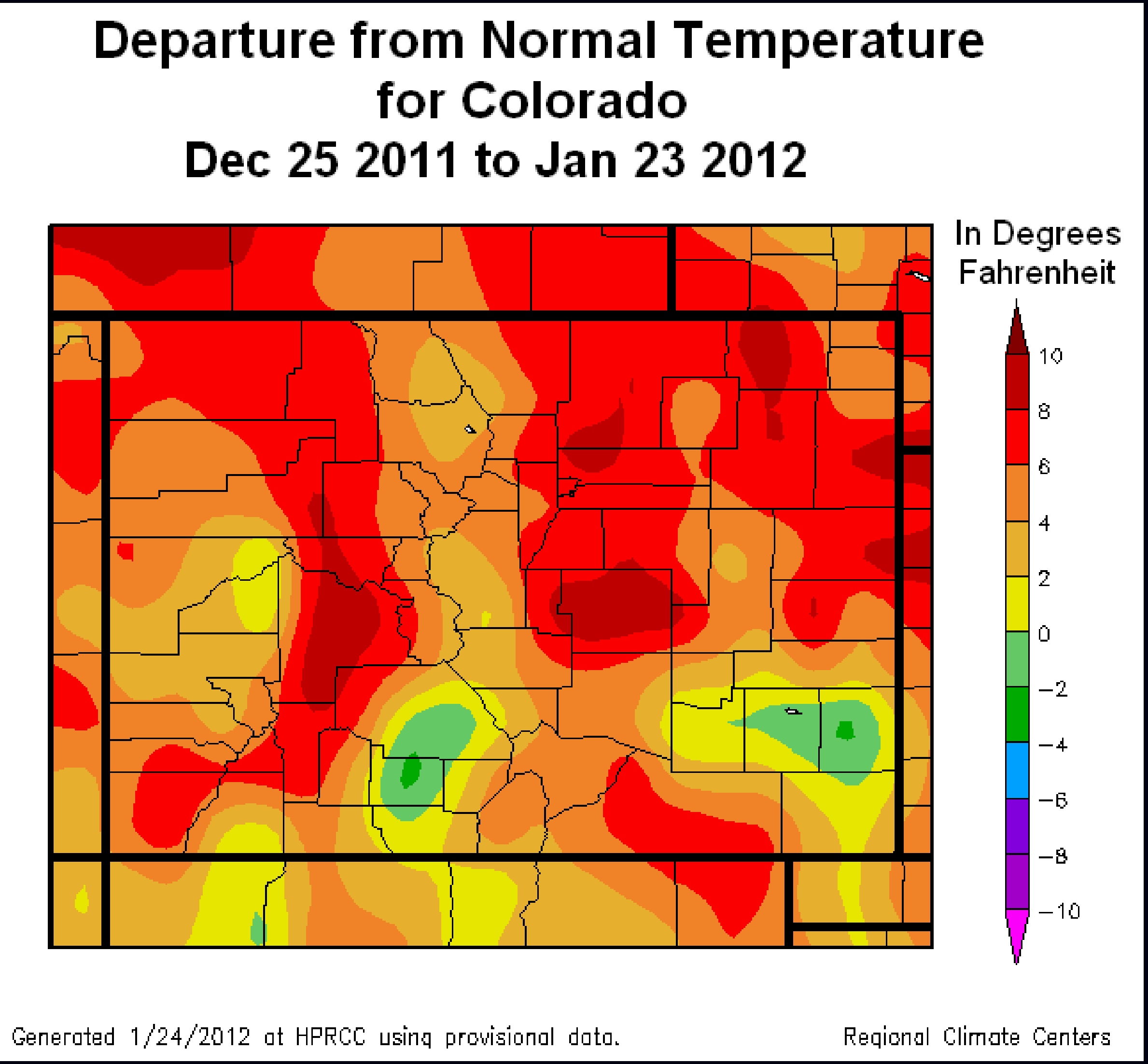
For the 30-day period ending January 23, 2012, there was a significant absence in precipitation across nearly all of Colorado.

Exception to this was in central Colorado around the mountain cities of Aspen, Vail, Leadville, Breckenridge and Dillon in central Colorado where precipitation totals ranged from 110 to 130 percent of normal, thanks to a moist northwest flow and lift produced by the strong Pacific jet stream overlying the region.



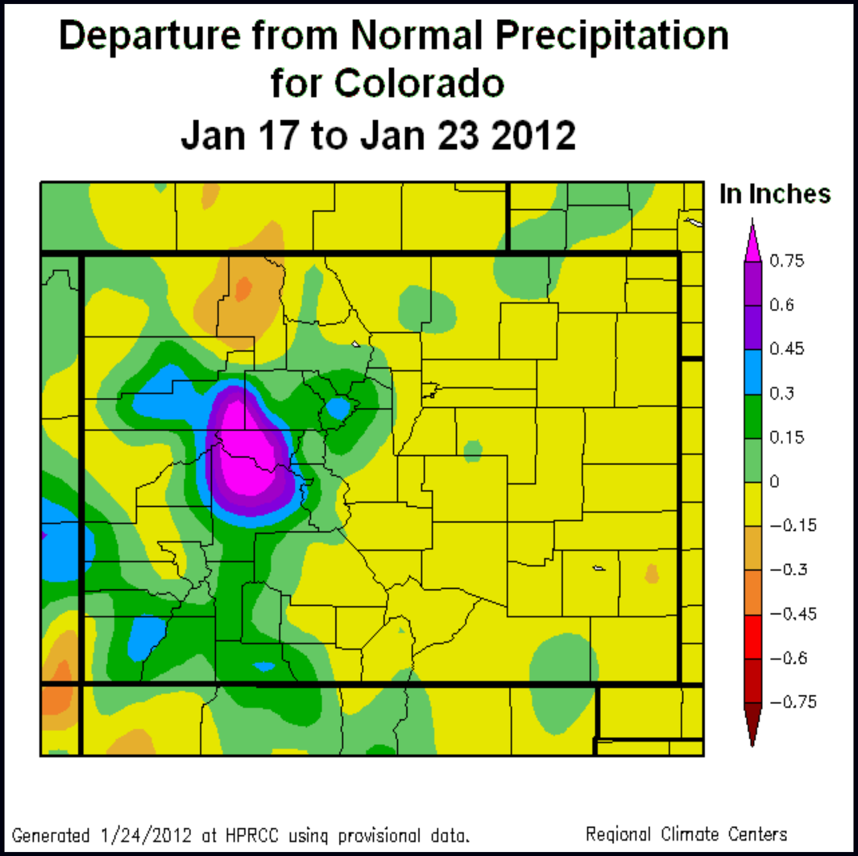
The Standardized Precipitation Index (SPI) for the 30-day period ending January 23, 2012 continues to draw attention to the extremely dry conditions plaguing the Upper Yampa River Basin in northwest Colorado. Very dry conditions were also indicated along lower sections of the Gunnison and Colorado River valleys in west central Colorado.

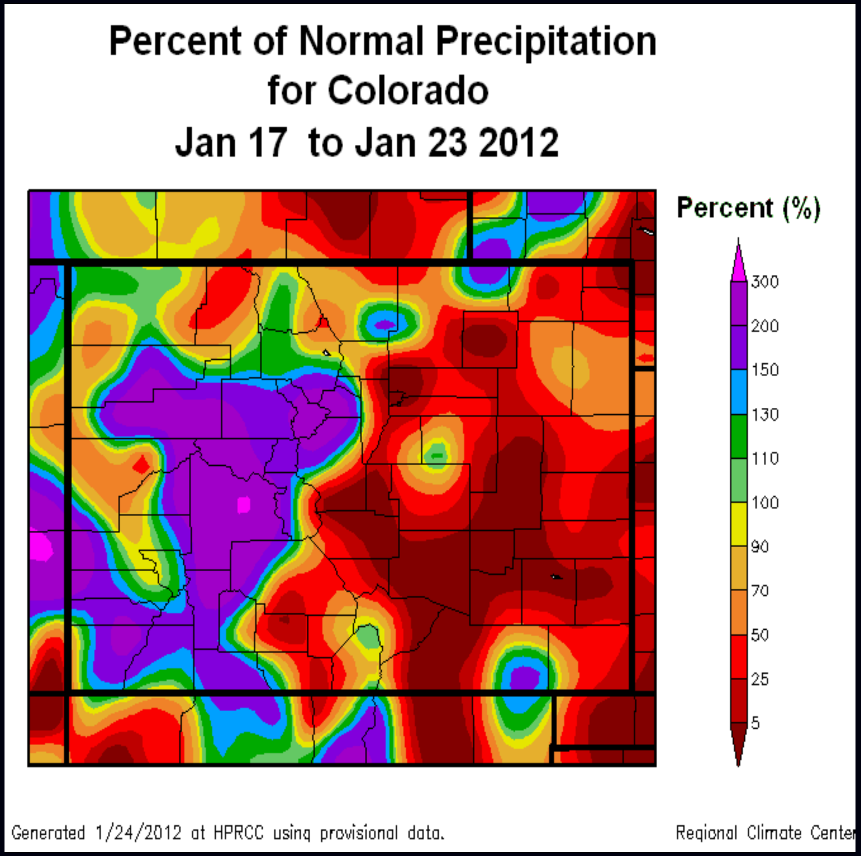
Moderate to very dry conditions were indicated for the rest of Colorado, except for pockets of near normal moisture conditions in the Elk and West Elk Mountain Ranges in west central Colorado and southern portions of the Front Range in east central Colorado.



Temperature departures across Colorado continued to trend upward during the 30-day period ending January 23, 2012. The greatest positive anomalies were indicated on the western slopes from the northern San Juan Mountains northern to the Wyoming border, and across most of northeast and east central Colorado.

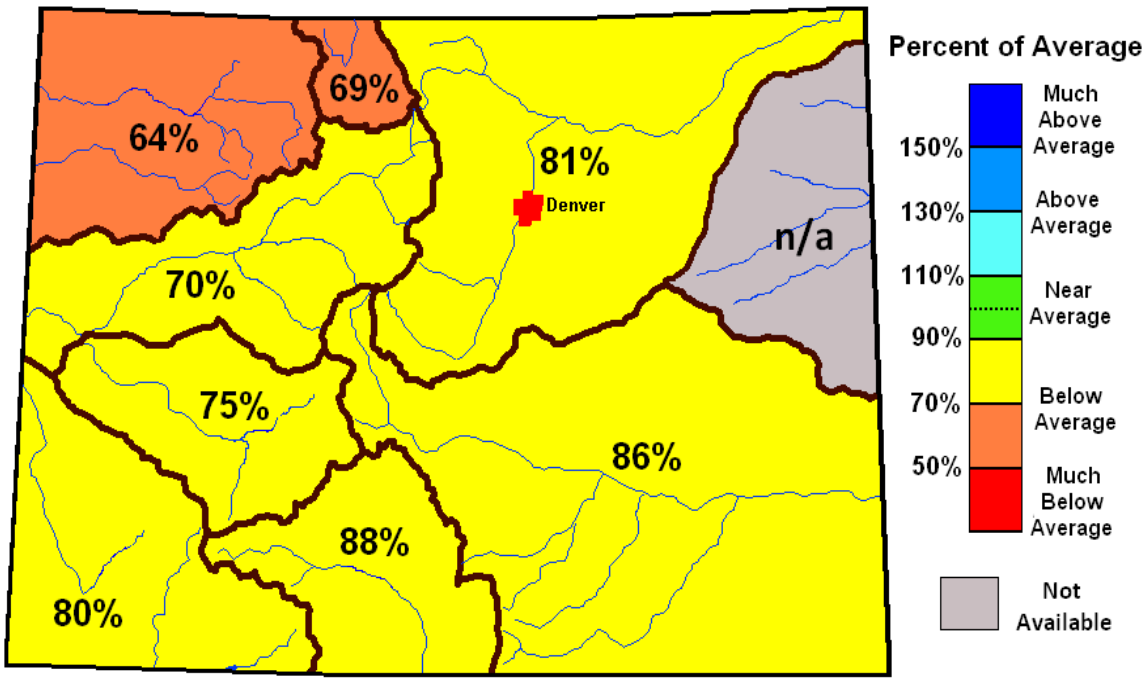
Pockets of colder than normal temperatures were observed in south central and southeast Colorado.





The arrival of the Pacific jet stream and a shift to strong northwest flow caused a dramatic reversal in the distribution of precipitation across Colorado during the middle of January. The very dry and mild conditions west of the Continental Divide during much of the fall and early winter suddenly turned colder, windy and snowy during the second and third weeks of January. Areas generally east of the Continental Divide saw little if any precipitation/snowfall during January due to a persist westerly wind that warm temperatures and lowered humidities.

Colorado SNOTEL Snowpack Update Map



Snow Water Equivalent as a Percent of Average (%)
for Colorado by River Basin as of Tuesday January 24, 2012

Basin Wide Percent of Average (%)

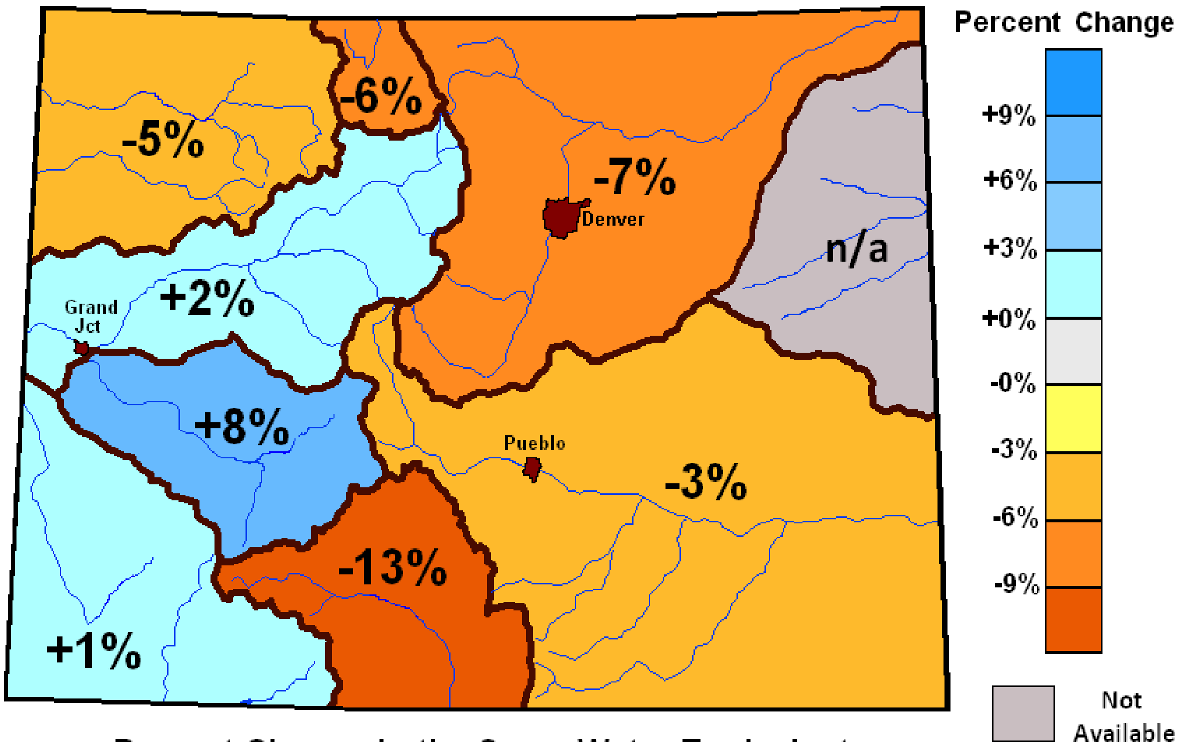
WEST SLOPE		EAST SLOPE	
Yampa and White River Basins	64%	Laramie & North Platte Basin	69%
Upper Colorado River Basin	70%	South Platte River Basin	81%
Gunnison River Basin	75%	Arkansas River Basin	86%
San Miguel, Dolores, Animas & San Juan River Basins	80%	**Statewide Avg.... 74%**	
Upper Rio Grande Basin	88%		

Source: USDA Natural Resources Conservation Service--Water and Climate, Portland, Oregon
provisional data, subject to revision

Snowpack in Colorado as of January 24, 2012 was below average overall, with the least snow water equivalent recorded in the Yampa and White River Basins in northwest Colorado, and the Laramie and North Platte River Basins in north central Colorado .

Statewide, the snow water equivalent averaged 74 percent of normal, and amount far below what was observed this time last year.

Colorado SNOTEL Snowpack Update Map



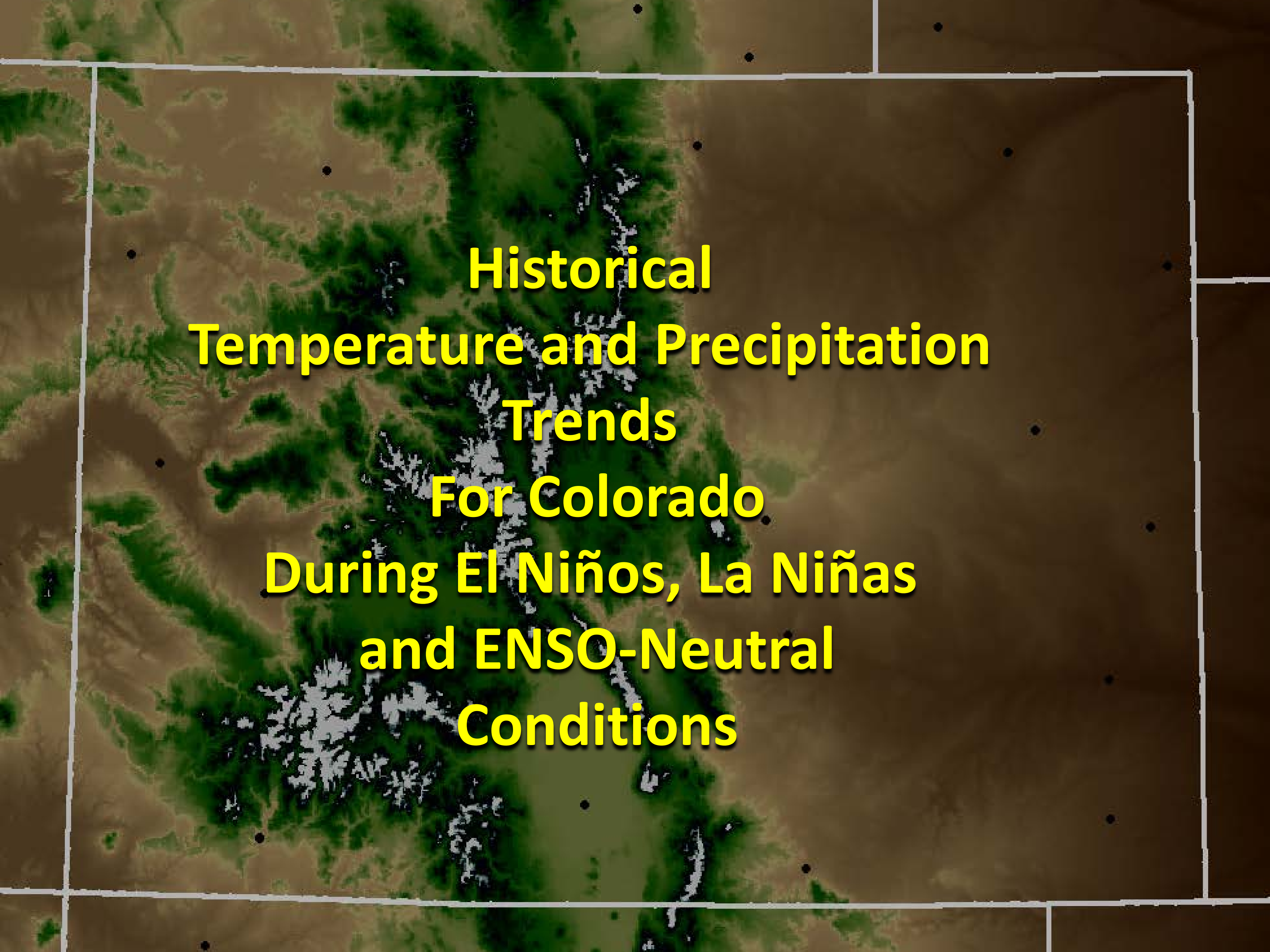
Percent Change in the Snow Water Equivalent
By River Basin from Dec 22 2011 to Jan 24 2012

WEST SLOPE		EAST SLOPE	
Yampa and White River Basins	-5%	Laramie & North Platte Basin	-6%
Upper Colorado River Basin	+2%	South Platte River Basin	-7%
Gunnison River Basin	+8%	Arkansas River Basin	-3%
San Miguel, Dolores, Animas & San Juan River Basins	+1%	**Statewide Avg.**	**-3%**
Upper Rio Grande Basin	-13%		

Based on SNOTEL data provided by USDA Natural Resources Conservation Service - Water and Climate, Portland, Oregon
provisional data, subject to revision

From December 22, 2011 to January 24, 2012, the overall change in snow water equivalent in Colorado's eight major river basins ranged from +8 percent in the Gunnison River Basin in west central Colorado to -13 percent for the Upper Rio Grand Basin in south central Colorado.

The Yampa and White River and the Laramie and North Platte Basins in northwest and north central Colorado, respectively, continued to lag well behind their normal seasonal snow pack numbers. The eastern plains also saw a reduction in snowpack water equivalency during this period.



Historical Temperature and Precipitation Trends For Colorado During El Niños, La Niñas and ENSO-Neutral Conditions

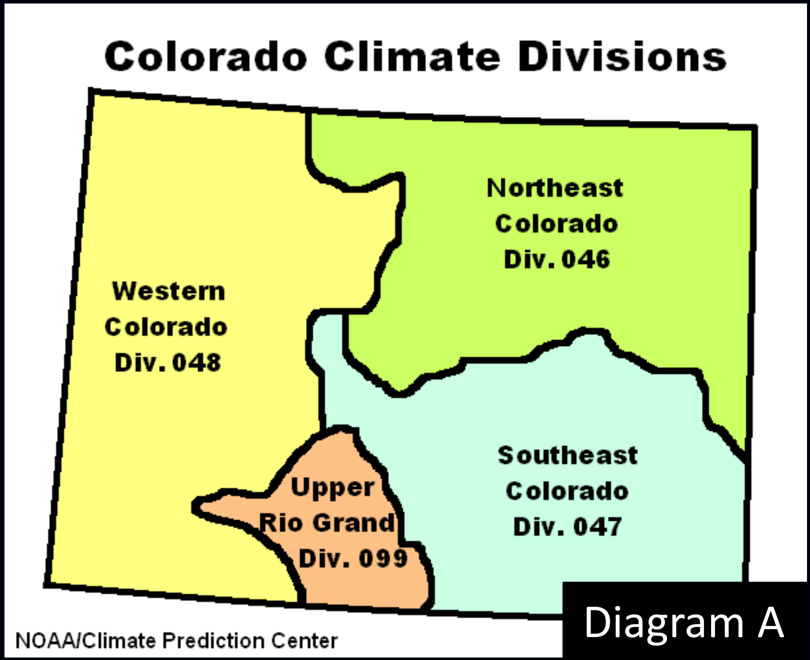


Diagram A depicts the four CPC climate mega-divisions in Colorado. Climate divisions 046, 047 and 099 are located on the east side of the Continental Divide, while division 048 is situated on the state's western slope.

CPC has produced historical 3-month temperature and precipitation distributions associated with three different ENSO categories –El Niño, La Niña and neutral (non-ENSO) conditions – for each climate division in the United States.

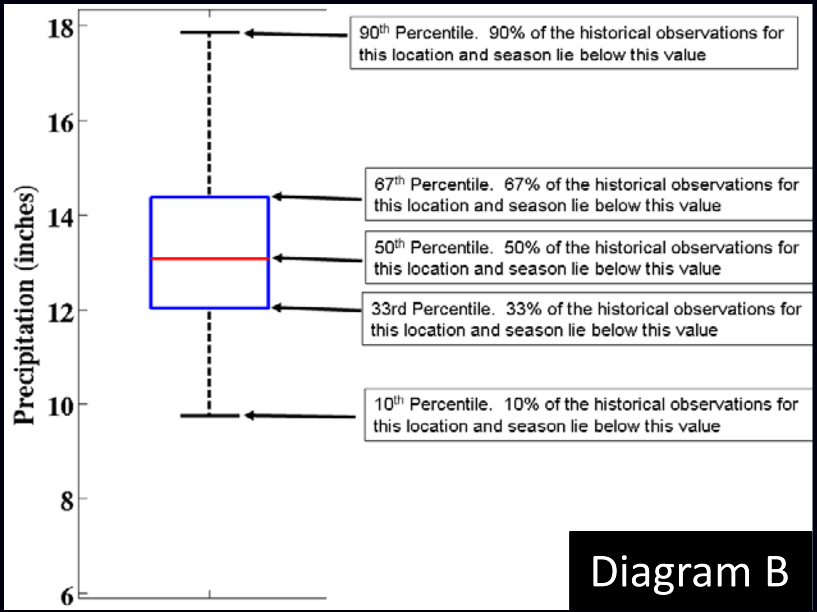
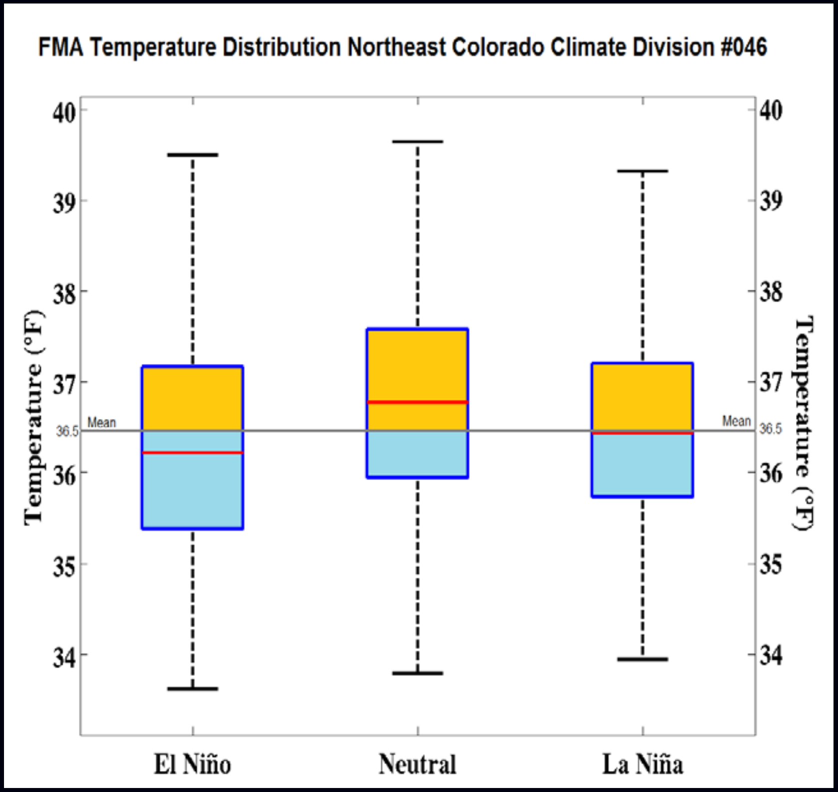
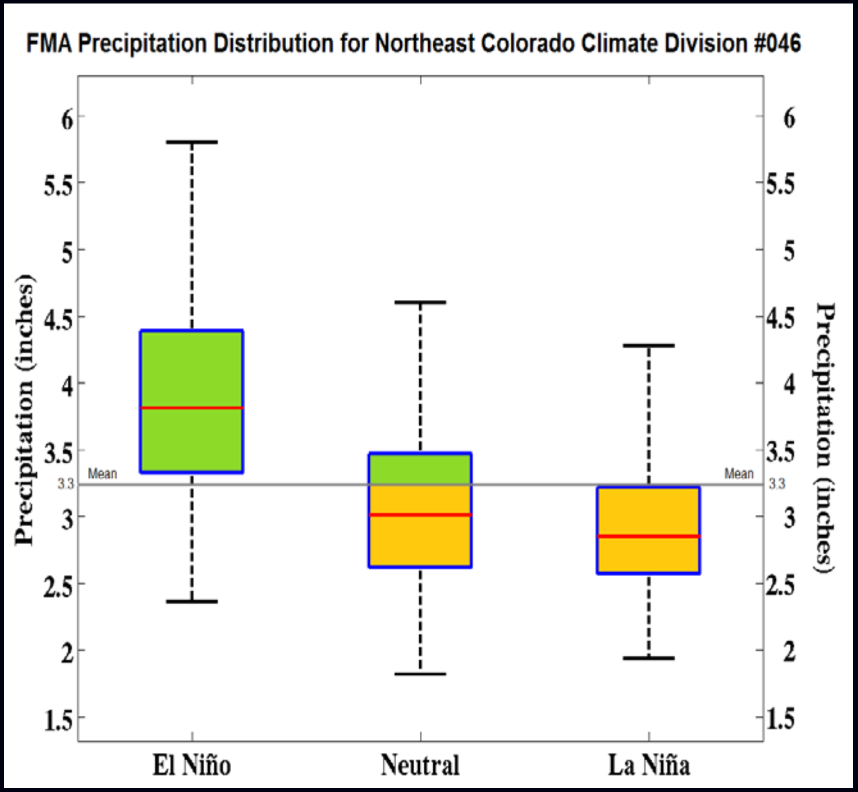


Diagram B depicts and describes the ENSO box and whisker analysis plots used by CPC to present these historical temperature and precipitation distributions.

The red line inside the ENSO box represents the mean or 50th percentile of the data (temperature or precipitation) distribution for each climate division. Approximately 34% of the total observations exist within the ENSO box, and the remaining observations (about 66%) lie outside of the box along the whiskers extending above and below the box.

ENSO Box and Whisker Analysis Plots for the Northeast Colorado Climate Division #046 for the 3-Month Season February-April

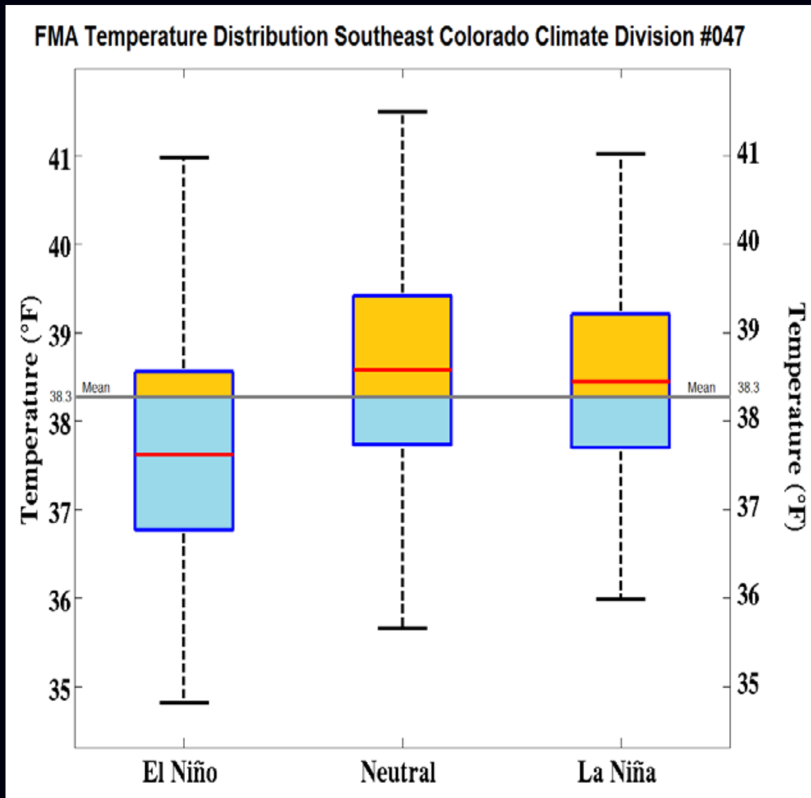


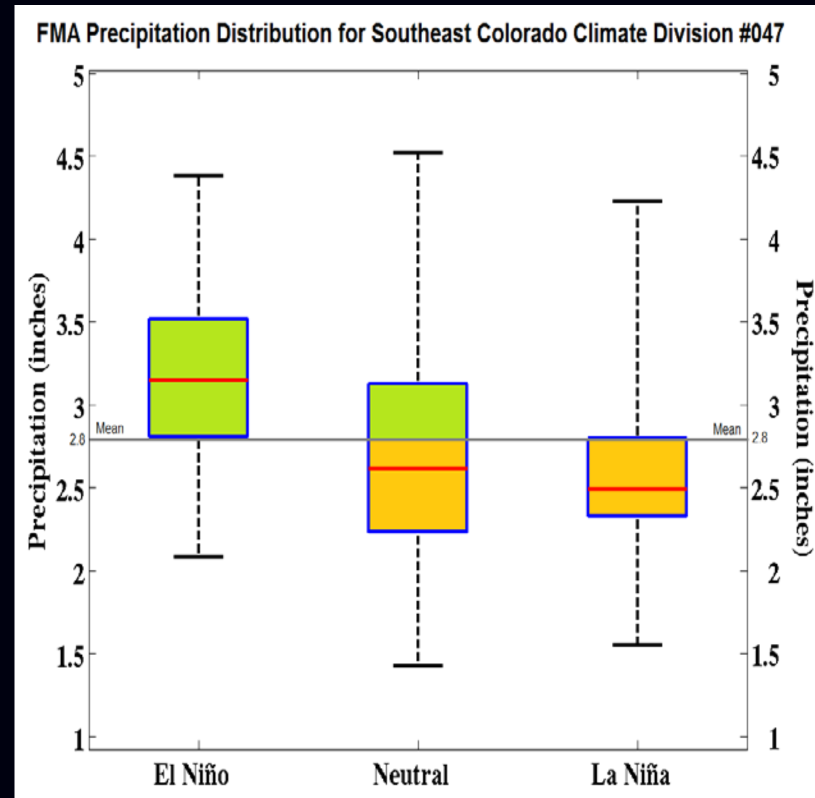


Historically, temperatures for northeast Colorado during the months of February-April were slightly below average during El Niños, slightly above average during ENSO-neutral periods, and average during La Niña events.

Precipitation for the same three month period was above average during El Niños, slightly below average during ENSO-neutral periods, and below average during La Niñas.

ENSO Box and Whisker Analysis Plots for the Southeast Colorado Climate Division #047 for the 3-Month Season of February-April

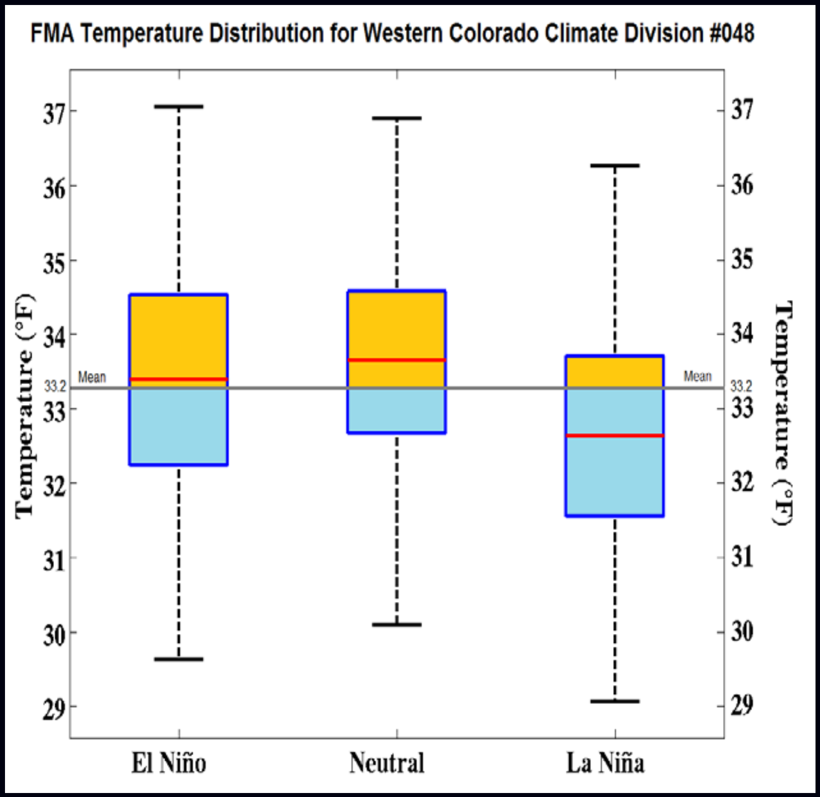


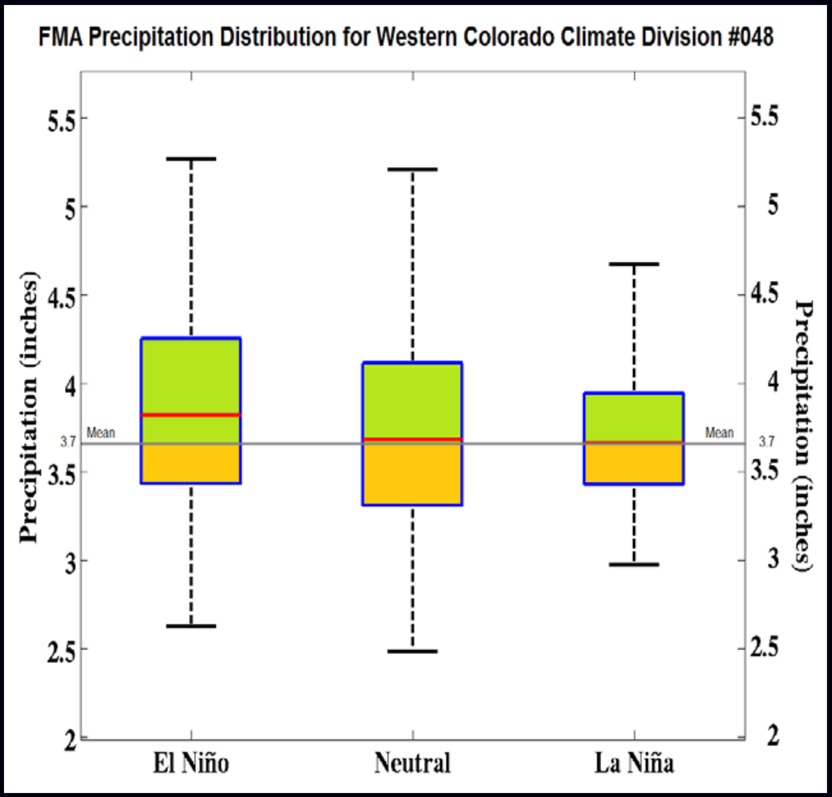


Temperatures in southeast Colorado during February-April have historically been below average during El Niños, and slightly above average during ENSO-neutral periods and La Niña events.

Precipitation for the same period was above average during El Niño events, slightly below average for ENSO-neutral periods, and below average during La Niña events.

ENSO Box and Whisker Analysis Plots for the Western Colorado Climate Division #048 for the 3-Month Season of February-April





Temperatures for western Colorado during February-April were near average during El Niño events, slightly above average during ENSO-neutral conditions, and slightly below average during La Niña events.

Precipitation during the same period was slightly above average during El Nino events, and near average for ENSO-neutral conditions and La Niña events.

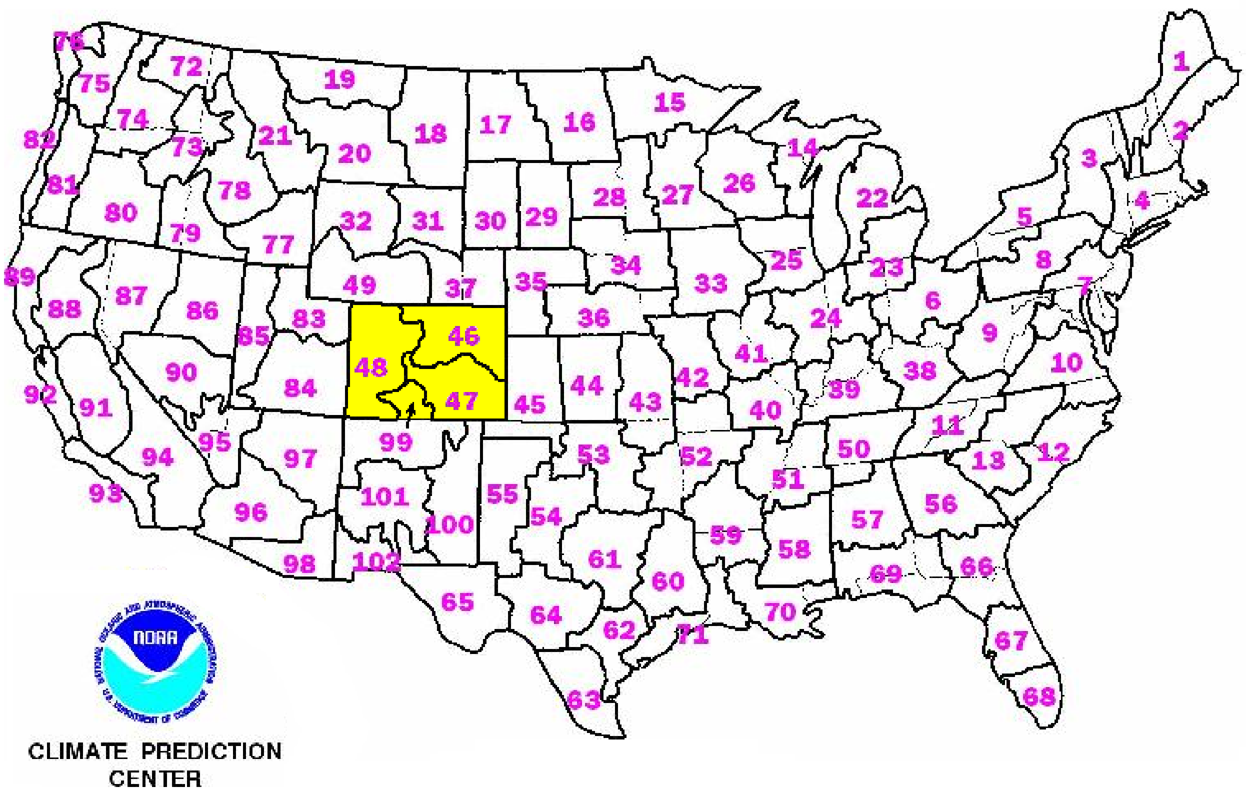
February- April 2012
Temperature and Precipitation Outlook for Colorado
Issued by NOAA's Climate Prediction Center

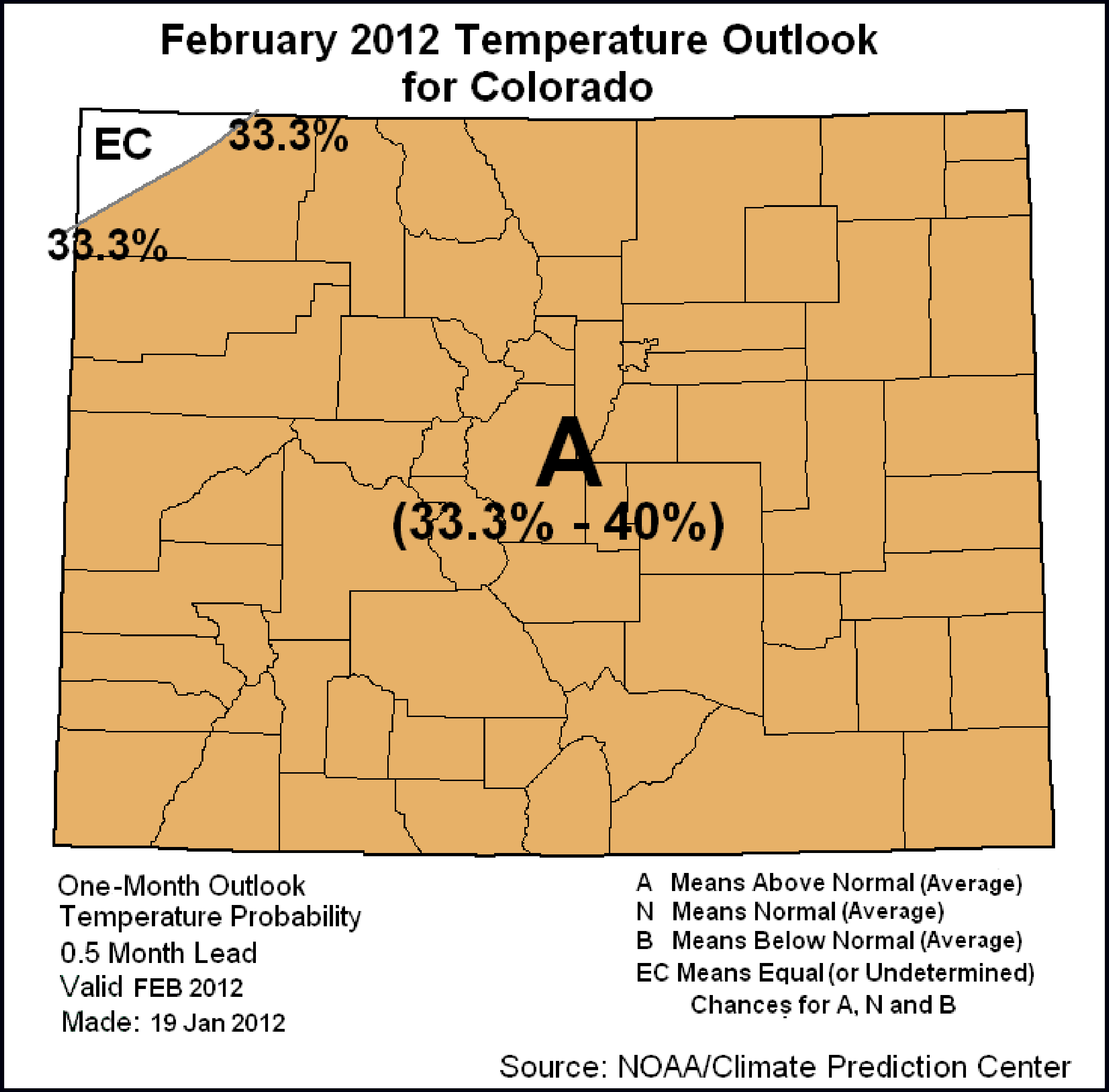
Climate Prediction Center Seasonal Outlooks

The National Weather Service Seasonal Climate Outlooks predict the probability of conditions being among the warmest/coldest or wettest/driest terciles of years compared to the period of record 1981-2010.

The outlooks indicate probability of being in three specific categories in reference to the 30-year climatology from 1981-2010. They are above, below and average.

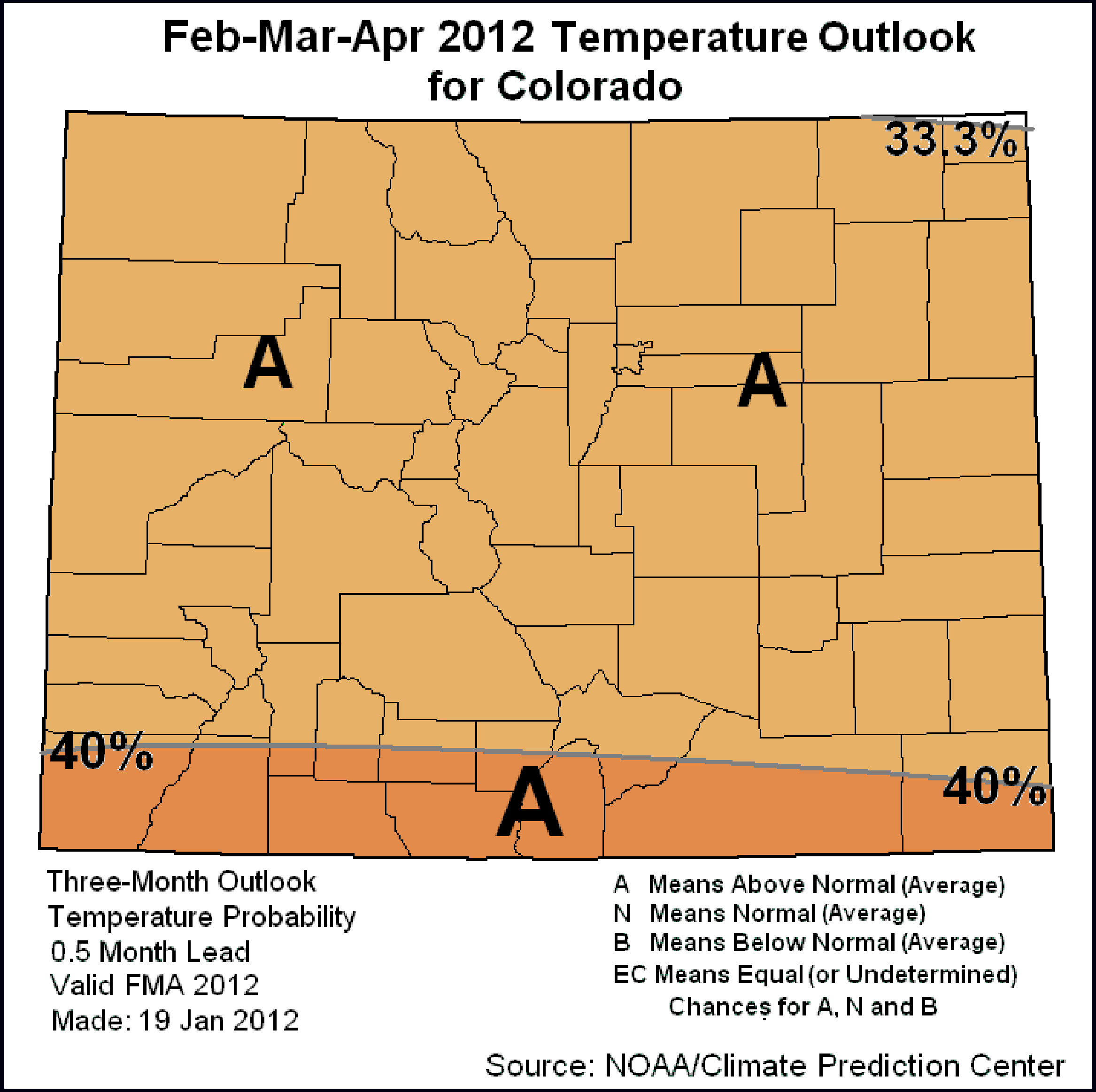
Remember, Climate Predicition Center (CPC) outlooks are made at the scale of the climate megadividions (see the map below).





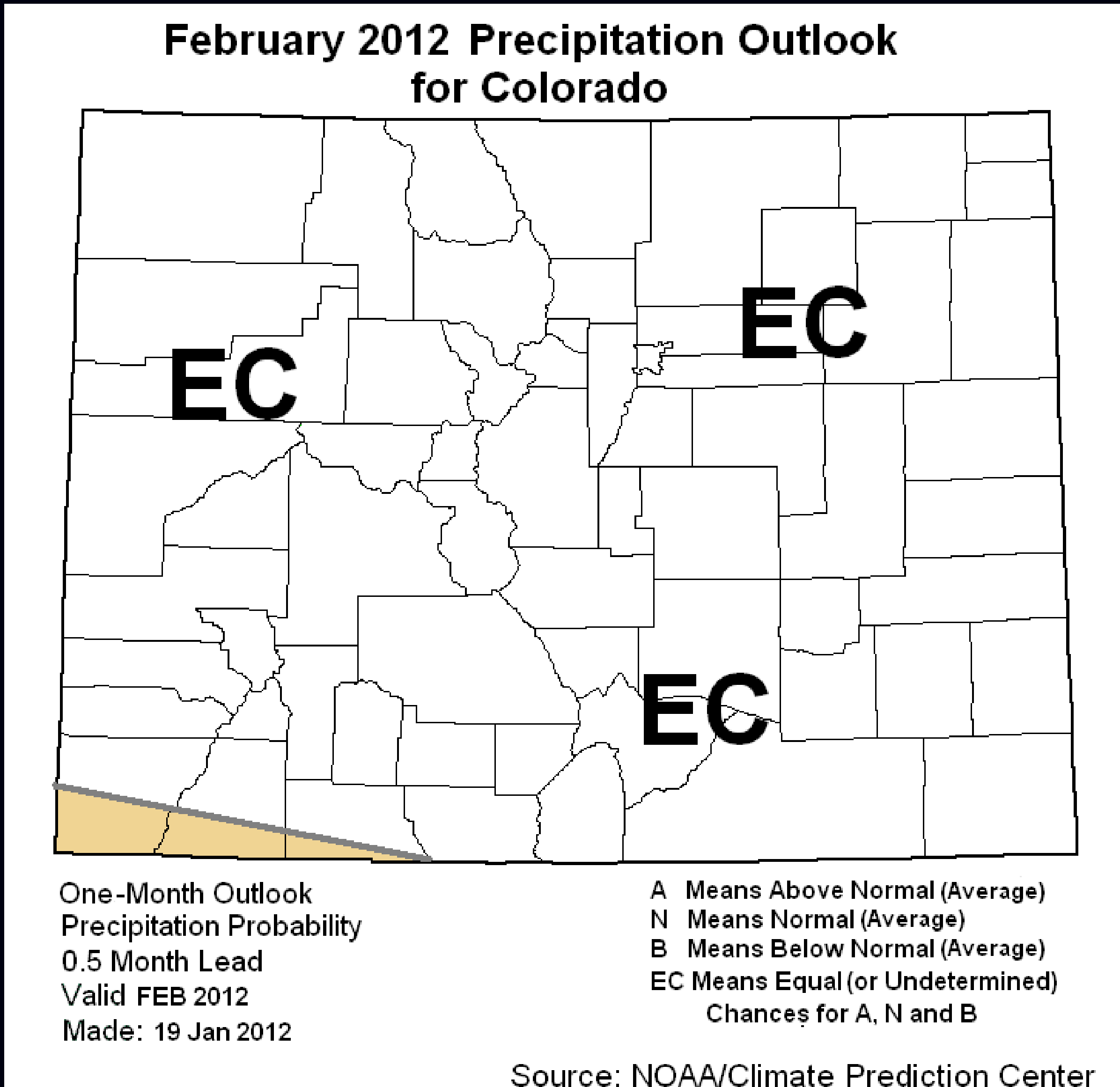
February 2012 Temperature Outlook for Colorado

The latest one-month temperature outlook from NOAA's Climate Prediction Center (CPC) calls for a 33.3 to 40 percent chance of above average temperature for nearly all of Colorado for the month of February.



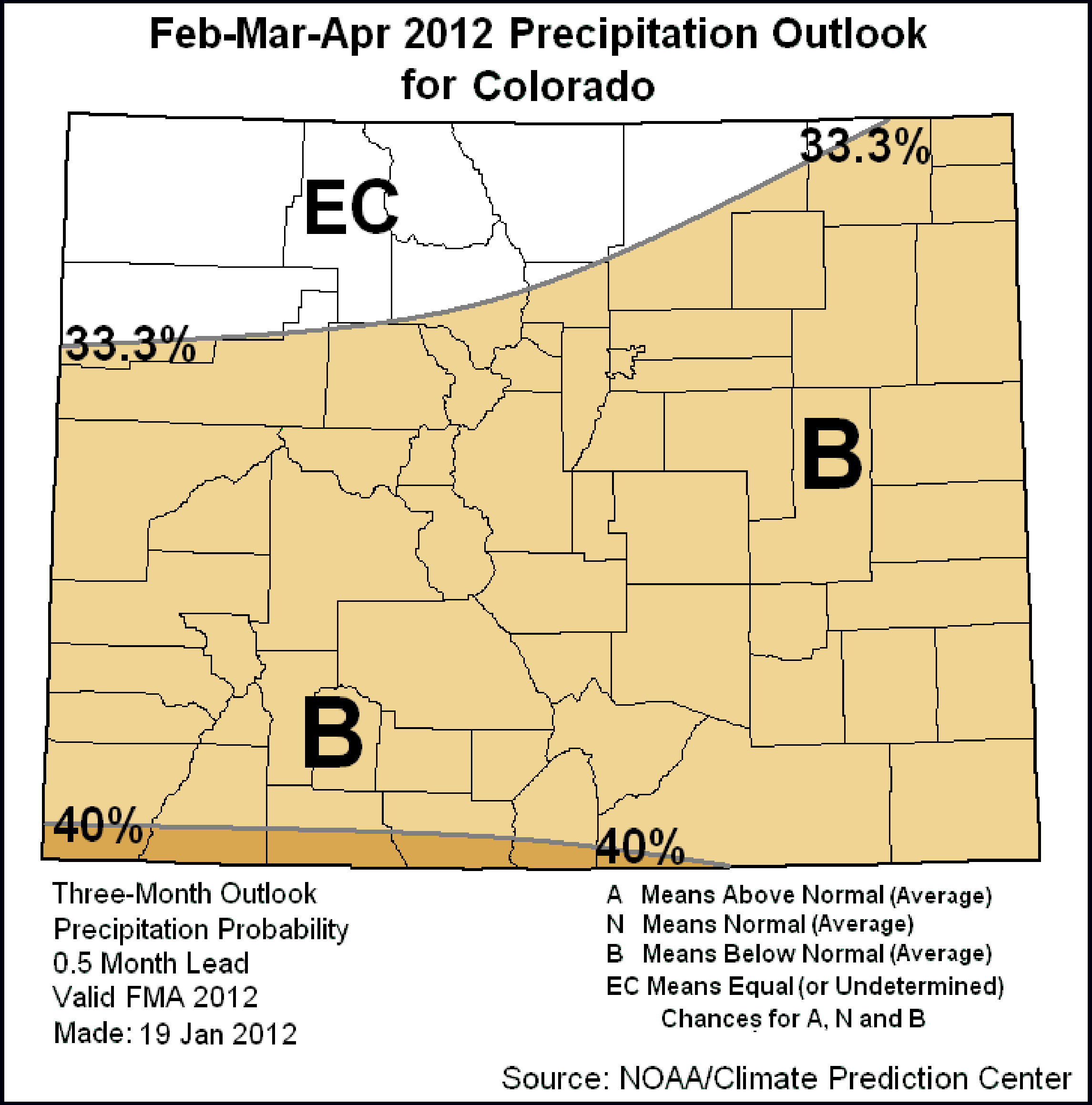
February-April 2012 Temperature Outlook for Colorado

The temperature outlook for February-April from CPC calls for a 33.3 to 40 percent chance of above average temperature for all except the southern one-sixth of Colorado, where there is a better chance to see warmer than average temperatures.



February 2012 Precipitation Outlook for Colorado

The February outlook from CPC calls for an equal (or undeterminable) chance of above, below and near average precipitation for essentially all of Colorado, as indicated by the EC symbol.



February-April 2012 Precipitation Outlook for Colorado

Finally, the latest precipitation outlook from CPC calls for a 33.3 to 40 percent chance of below average precipitation for the lower 80 percent of the state. For the remainder of the state, the outlook is for an equal (or undeterminable) chance of above, below and near average precipitation during this three month period—as indicated by the EC symbol.

With the ongoing La Niña, odds favor above average precipitation across the northwest corner of Colorado, at least during the months of February and March.

Summing It All Up

- A majority of the ENSO-climate models indicate weak to moderate La Niña conditions in the Pacific Ocean through the February-April 2012 climate season, and a transition to ENSO-neutral conditions by the end of the 2012 spring season.

- The distribution of precipitation across Colorado has varied widely since last fall. In October and early November, an active storm track across the desert southwest and southern Rocky Mountain region brought snow, heavy at times, and strong winds to southern and eastern portions of Colorado. A moist subtropical jet stream and a strong Madden-Julian Oscillation (MJO) in the eastern tropical Pacific Ocean apparently contributed significantly to the above and much above normal precipitation that fell in these areas.

- During the latter half of November and throughout December, the subtropical jet stream was no longer a factor as it had shifted well east of the Colorado, while a powerful Pacific jet stream remained up over southwest Canada. With the storm track associated with the Pacific jet stream well north of Colorado, weather conditions across Colorado had become much drier as temperatures varied from near average to well above average. In early January, the powerful Pacific jet stream and an very active storm track up over southwest Canada and the Pacific northwest began to migrate southward. By the middle of January both of these features had moved over northern and central Colorado. The result was heavy snowfall and strong winds in the mountains and high valleys of northwest and western central Colorado, and strong and gusty downslope winds, unseasonably warm temperatures and dry conditions for areas east of the Continental Divide.

Summing It All Up - Continued

- The latest outlook issued by the Climate Prediction Center (CPC) calls for above average temperatures (at least a 33.3 percent chance) for nearly all of Colorado during February and an equal (or undeterminable) chance for above, near and below average temperatures across Colorado during the period February-April. As for precipitation, CPC is calling for an equal (or undeterminable) chance for above, near and below average precipitation during February, and at least a 33.3 percent chance for below average precipitation for nearly all of Colorado during the 3-month climate period February-April.

- The distribution of precipitation across Colorado so far this winter during this weak to moderate La Niña has vaguely resembled the very consistent distribution pattern observed last winter during a moderate to strong La Niña event. It was not until January that the classic La Niña precipitation pattern appeared, e.g., above to much above average precipitation and below average temperatures for northwest and west central Colorado, and below to much below average precipitation and above average temperatures for the remainder of the state. Due to the late arrival of this stormy weather pattern, snow water equivalents across Colorado were still below average as of the middle of January.

- With La Niña on the decline, the weather outlook for Colorado for the next three months is somewhat less certain. A return to the so-called "normal" late winter/early spring storm track pattern would involve periods of strong and gusty winds, wide swings in temperature and relative humidity, and the possibility of a few sizable snow storms anywhere within the state.