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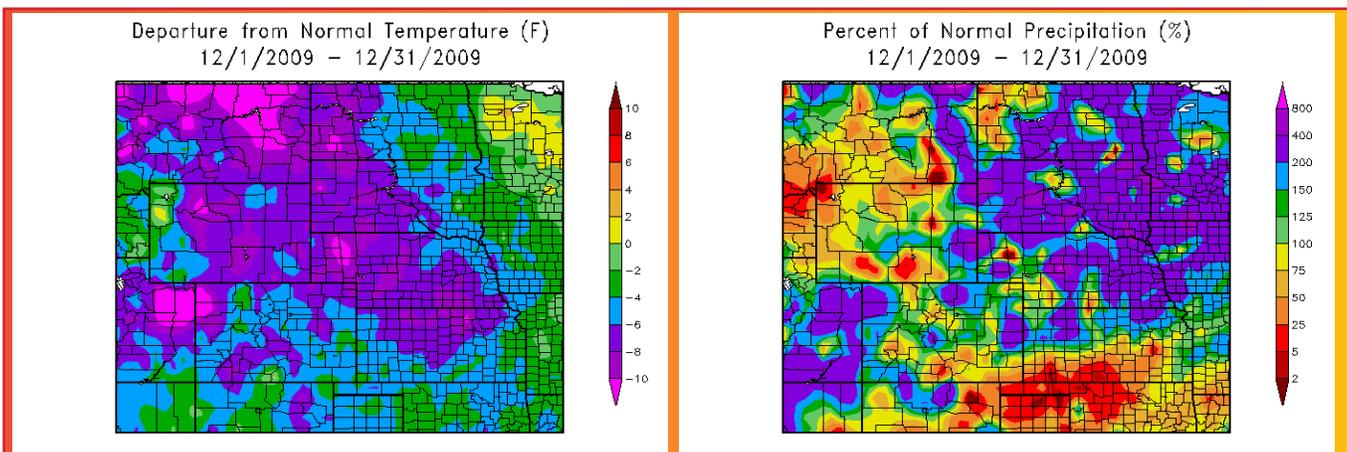
A sunny but cold winter day in western Nebraska - Photo by Ken Dewey
<http://www.nebraskaweatherphotos.org>

December 2009 Climate Summary

Region Breakdown

December 2009 was cold and wet across the much of the High Plains Region. Moisture was variable across the Region this month as precipitation totals of 25% of normal or less were common across areas of southern Kansas, western Wyoming, and western North Dakota while locations such as Nebraska and South Dakota received over 400% of normal precipitation. Meanwhile, each state in the Region had monthly average temperature departures as low as 8°F to 10°F (4.4°C to 5.5°C) below normal. There were also isolated pockets greater than 10°F (5.5°C) below normal.

This month's cold location was Lodgepole, NE which had its second coldest December on record with an average temperature of 18.5°F (-7.5°C). While the average temperature for the month was 11°F (6.1°C) below normal it was not enough to beat the old record that occurred in 1983 when Lodgepole had an average temperature of only 13.8°F (-10.1°C).



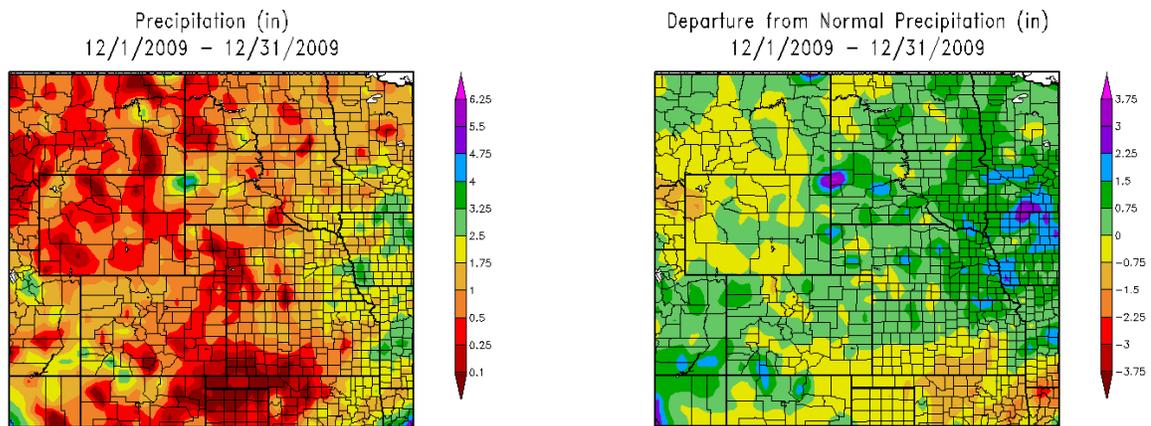
Departure from 1971-2000 Normal Average Temperature (left) and Percent of Normal Precipitation (right) for December 2009 in the High Plains Region. Maps produced by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

Precipitation Summary

December 2009 was extremely wet across the Region as areas of Kansas, Nebraska, and South Dakota received record breaking snowfall. Two major snowstorms hit the Region this month. The first occurred December 7-9 and the second occurred December 23-26. Not only did each storm drop over a foot of snow in locations across Kansas, Nebraska, North Dakota, and South Dakota, but high winds coupled with the snowfall created blizzard and white out conditions. In addition, these storms caused school closures, highway closures, power outages, and travel delays.

While many monthly records were broken this month (see table below), there was one location which crushed the old December records, Norfolk, NE. In addition to breaking several daily snowfall totals, Norfolk broke its December snowfall and snow depth records. Norfolk received 30.4 inches (77.22 cm) of snow which beat out the old record of 19.1 inches (48.51 cm) received in 1968. The snow depth record of 17 inches (43.18 cm), also recorded in 1968, was broken when the snow depth was 19 inches (48.26 cm) from December 27-31.

In contrast to the record breaking snow, areas including southern Kansas, portions of Wyoming, and western North Dakota were dry. Liberal, KS, which received no precipitation this month, tied for the driest December on record (1893-2009). These dry conditions have led to the development of abnormally dry conditions in western North Dakota and western Wyoming.



Above: Total precipitation (inches) (left) and Departure from Normal Precipitation (inches) (right) for December 2009 in the High Plains Region. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

December 2009 Records - Highlights

Monthly Records			
Precipitation in inches			
Snowiest	New Record	Old Record/Year	Period of Record
Topeka, KS	19.2	18.8/1983	1887-2009
Grand Island, NE	26.5	26.0/1973	1895-2009
Lincoln, NE	23.7	19.8/1973	1948-2009
Norfolk, NE	30.4	19.1/1968	1893-2009
Omaha, NE	24.6	19.9/1969	1948-2009
Huron, SD	26.0	tied/1968	1893-2009

All Data are Preliminary and Subject to Change.

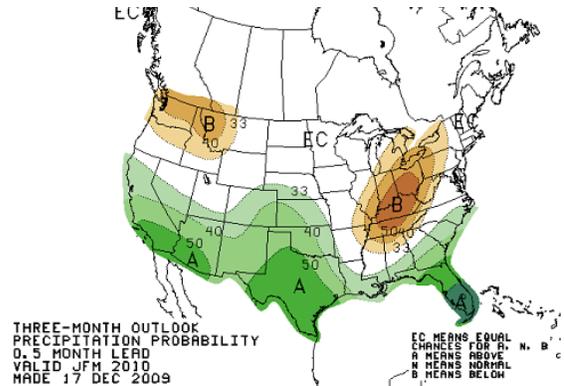
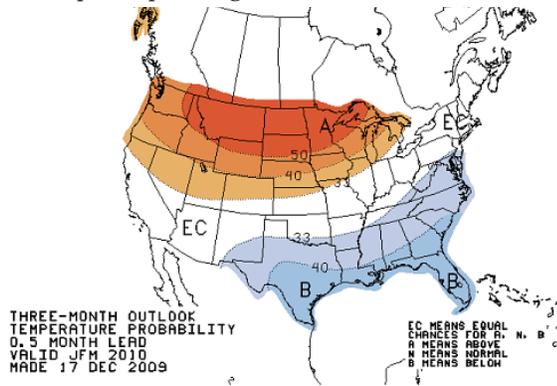
* indicates multiple records, latest year is listed

Source: National Weather Service Cooperative Observation Network Data

The High Plains Regional Climate Center is one of the NOAA Regional Climate Centers, and is involved in the Applied Climate Information System (ACIS) development and management effort. Data found throughout this publication were derived using products built on the ACIS framework.

Climate Outlook

El Niño conditions were present this month and are expected to continue and last through Spring 2010. The temperature outlook indicates a higher probability of above normal temperatures for the Dakotas, Nebraska, Wyoming, northern Kansas, and the northern half of Colorado. Equal chances of above, near, or below normal temperatures are predicted elsewhere. The precipitation outlook indicates a higher probability of above normal precipitation for most of Kansas, the majority of Colorado, southwestern Nebraska, and a very small portion of southeast Wyoming. Only a very small portion of the northwest corner of Wyoming has a high probability of below normal precipitation. Equal chances of above, near, or below normal precipitation are predicted elsewhere in the Region. The seasonal outlooks combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation (ENSO) cycle. More information about these forecasts can be found here: <http://www.cpc.ncep.noaa.gov/>.



Above: 3-Month Outlook Maps Courtesy the NOAA Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>
(left) The Three-Month Temperature Probability Outlook, (right) The Three-Month Precipitation Probability Outlook

Drought Watch

There were minor changes to the U.S. Drought Monitor for the High Plains Region this month. South Dakota, Nebraska, and Kansas remained drought free and abnormal dryness (D0) and moderate drought (D1) conditions remained largely the same across Colorado. However, abnormally dry (D0) conditions have developed in western Wyoming and western North Dakota, due to a low snowpack and low precipitation totals over the past few months, respectively. According to the U.S. Seasonal Drought Outlook released December 19th, the drought conditions in the southwest corner of Colorado are expected to improve while drought conditions are expected to develop in northeast Wyoming and northwest North Dakota through March 2010.

U.S. Drought Monitor High Plains

December 29, 2009
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	89.7	10.3	1.5	0.0	0.0	0.0
Last Week (12/22/2009 map)	90.8	9.2	1.5	0.0	0.0	0.0
3 Months Ago (10/06/2009 map)	88.3	11.7	0.7	0.0	0.0	0.0
Start of Calendar Year (01/06/2009 map)	65.1	34.9	7.0	0.0	0.0	0.0
Start of Water Year (10/06/2009 map)	88.3	11.7	0.7	0.0	0.0	0.0
One Year Ago (12/30/2008 map)	64.3	35.7	7.0	0.0	0.0	0.0

Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>

Released Thursday, December 31, 2009
Author: Richard Heim, NOAA/NESDIS/NCDC

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period
Valid December 17, 2009 - March 2010
Released December 17, 2009

KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events – such as individual storms – cannot be accurately forecast more than a few days in advance. Use caution for applications – such as crops – that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

The U.S. Drought Monitor is produced as a joint effort of the U.S. Department of Agriculture (USDA), National Drought Mitigation Center, U.S. Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA). Real-time data provided through ACIS from the NOAA Regional Climate Centers are often used by the agencies involved in the U.S. Drought Monitor when determining the area and intensity of drought conditions, although the product itself is not produced by HPRCC. For current Drought Monitor information, please see: <http://www.ndmc.unl.edu/dm/monitor.html>
Portions of this Drought Watch are courtesy the Drought Monitor Text Discussion found on the Drought Monitor webpage.

State Summaries

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Alamosa San Luis Airport	33.6	-1.4	16.1	-1.0	47	12/01	-15	12/10	0.10	-0.23	30
Akron Washington County Airport	32.7	11.6	22.1	-6.6	58	12/21	-17	12/09	0.09	-0.31	22
Colorado Springs Municipal Airport	33.9	12.6	23.2	-5.8	58	12/21+	-15	12/09	0.67	0.25	160
Grand Junction Walker Field Airport	28.5	6.7	17.6	-10.6	48	12/01	-16	12/10	1.10	0.58	212
Pueblo Memorial Airport	39.6	9.2	24.4	-5.9	65	12/21+	-17	12/09	0.18	-0.21	46

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	29.9	14.4	22.2	-8.0	60	12/01	-5	12/10	1.36	0.50	158
Dodge City Regional Airport	38.6	16.9	27.8	-5.3	60	12/16+	-3	12/10	0.38	-0.39	49
Goodland Renner Field	35.0	11.6	23.3	-6.3	63	12/21	-12	12/09	0.49	0.09	122
Topeka Municipal Airport	36.5	19.6	28.1	-3.3	61	12/01	-4	12/10	1.95	0.53	137
Wichita Mid-Continent Airport	39.4	20.5	29.9	-3.7	57	12/01	4	12/10	0.39	-0.96	29

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	26.3	3.7	15.0	-10.1	45	12/21	-14	12/15+	0.02	-0.40	5
Grand Island Airport	26.7	9.9	18.3	-7.3	58	12/01	-8	12/15	1.74	1.08	264
Lincoln Municipal Airport	28.6	10.7	19.7	-6.8	59	12/01	-13	12/10	2.33	1.47	271
Omaha Eppley Airfield	28.2	12.5	20.4	-5.3	57	12/01	-6	12/15+	2.27	1.35	247
Norfolk Karl Stefan Airport	25.2	9.5	17.4	-6.4	56	12/01	-11	12/10	2.00	1.35	308
North Platte Regional Airport	29.2	6.5	17.8	-7.9	54	12/01	-18	12/10	0.67	0.27	167
Valentine Miller Field	25.8	6.4	16.1	-7.5	45	12/01	-16	12/10+	0.64	0.31	194

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	17.6	3.5	10.5	-4.6	38	12/17	-17	12/15	0.91	0.47	207
Fargo International Airport	16.7	2.7	9.7	-2.8	36	12/01	-13	12/29+	1.85	1.28	325
Grand Forks International Airport	14.4	-0.6	6.9	-4.4	34	12/01	-23	12/09	0.67	0.12	122
Theodore Roosevelt Airport	16.2	-0.2	8.0	-10.2	43	12/01	-26	12/15	0.21	-0.13	62
Williston International Airport	14.7	-3.1	5.8	-7.2	36	12/01	-27	12/15	0.48	-0.09	84

All Data are Preliminary and Subject to Change.

Source: National Weather Service Cooperative Observation Network Data

Data are retrieved through the Applied Climate Information System (ACIS).

These data are available for the entire period of record through the CLIMOD system. For more information please see <http://hprcc.unl.edu/services>.

December 2009 Climate Summary

South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	18.6	3.3	11.0	-5.0	41	12/01	-20	12/15	0.96	0.58	253
Huron Regional Airport	20.6	5.9	13.3	-5.3	46	12/01	-15	12/15	1.67	1.28	428
Pierre Regional Airport	20.6	6.7	13.7	-8.2	44	12/01	-13	12/15	0.30	-0.18	63
Rapid City Regional Airport	25.1	7.2	16.1	-8.6	47	12/17+	-13	12/09	0.83	0.42	202
Sioux Falls Joe Foss Field Airport	23.1	7.0	15.1	-3.2	51	12/01	-10	12/29	2.03	1.51	390

Wyoming	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Casper Natrona County International AP	26.4	4.9	15.6	-8.2	46	12/22+	-29	12/08	0.97	0.35	156
Cheyenne Municipal Airport	29.7	11.7	20.7	-6.4	48	12/20	-19	12/09	0.66	0.20	143
Lander Hunt Field Airport	21.5	1.6	11.6	-9.7	42	12/16	-24	12/09	0.79	0.18	130
Laramie Regional Airport	22.3	2.0	12.1	-9.1	39	12/13	-24	12/09	0.13	-0.33	28
Rawlins Municipal Airport	24.4	6.2	15.3	-8.8	41	12/01	-12	12/28+	0.04	-0.45	8
Sheridan County Airport	26.7	5.1	16.0	-6.4	49	12/21+	-19	12/09	0.15	-0.53	22

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State Spotlight - North Dakota

F. Adnan Akyüz - State Climatologist, Barb Mullins
North Dakota State Climate Office, North Dakota State University



Precipitation:

December monthly precipitation was below normal in the west and northwest plus a few Counties in the eastern central and southeastern part of the state with a range from 25% to 90% of normal. The remaining areas had above normal precipitation ranging from 150% to 300% plus percent of normal precipitation (Figure 1. High Plains Regional Climate Center). Monthly total precipitation ranged from 0.1 to 2.7 inches. The higher amounts fell in the south central and eastern edge of the state. The state average precipitation was 0.81 inches which was 45% of normal precipitation. Traces to measurable amounts of snow fell almost daily during the first half of the month. A major winter storm system hit the eastern and central parts of the US from the 23rd through the 26th. All of North Dakota had snowfall during the four day event. Total snowfall in inches for the 23rd through the 26th was 6.0 at Williston, 13.8 at Bismarck, 17.2 at Fargo, and 23.6 at Grand Forks. The National Weather Services recorded breaking snowfall records at all four cities on the 25th.

Temperature:

December monthly departure from normal air temperatures were below normal across the state with a range of -10°F in the west to -2°F in the east (Figure 2. High Plains Regional Climate Center). The monthly average temperatures ranged from 1°F in the north to 11°F in the south. Average air temperatures on December 1st were around 30°F. Daily average air temperatures quickly dropped to 20 to 30°F below normal during the first half of the month. Daily average air temperatures were near normal or just below during the second half of the month.

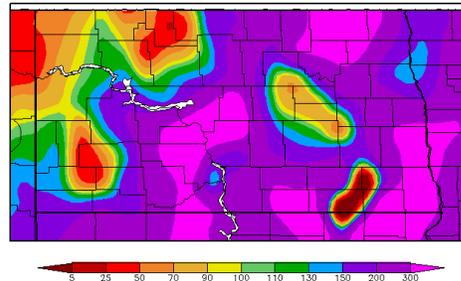


Figure 1. Precipitation Percent of Normal in December 2009 for North Dakota (High Plains Regional Climate Center)

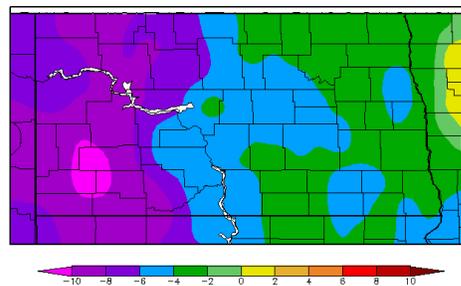


Figure 2. Temperature Departure from Normal in December 2009 for North Dakota (High Plains Regional Climate Center)

For more information about the North Dakota State Climate Office: <http://www.ndsu.edu/ndsco>

For more information on the North Dakota Agricultural Network: <http://www.ndawn.ndsu.nodak.edu>

The North Dakota Agricultural Network is a part of the Automated Weather Data Network (AWDN).

About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) operates out of the University of Nebraska - Lincoln (UNL) in Lincoln, Nebraska. As one of 6 regional climate centers operated under the National Oceanic and Atmospheric Administration (NOAA), HPRCC works closely with other organizations such as the National Climatic Data Center (NCDC), Local and Regional National Weather Service (NWS) Offices, and other climate services organizations such as the National Drought Mitigation Center (also located at UNL) to provide climate data services and specialized climate products.

For More Information Online

High Plains Regional Climate Center: <http://hprcc.unl.edu>

High Plains Regional Climate Services: <http://hprcc.unl.edu/services>

CLIMOD: <http://climod.unl.edu>

NOAA Regional Climate Centers and ACIS: <http://www.rcc-acis.org>

National Weather Service: <http://www.weather.gov>

National Climatic Data Center: <http://ncdc.noaa.gov>

University of Nebraska - Lincoln: <http://www.unl.edu>

National Drought Mitigation Center: <http://drought.unl.edu>

Climate Prediction Center: <http://www.cpc.noaa.gov>

NOAA Storm Prediction Center: <http://www.spc.noaa.gov>



Photo of the Nebraska Sandhills by Bill Sorensen - Senior Programmer - HPRCC

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