

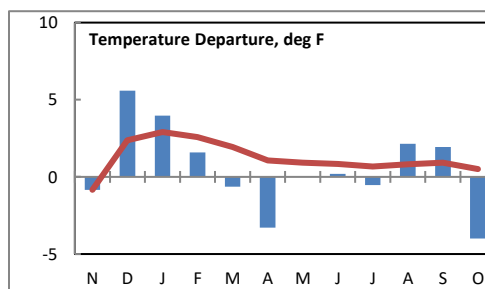
Montana Weather/Precipitation Summary

October 2020 NOAA's National Weather Service Great Falls Montana

Northwesterly flow aloft dominated Montana for much of October with a ridge over the west coast (Fig. 1). Normal is westerly flow with less ridging along the west coast. This pattern produced above normal temperatures early in the month, and below normal for the last part. Additionally, precipitation was mostly above normal, except for southwest Montana. Winds averaged near to above normal.

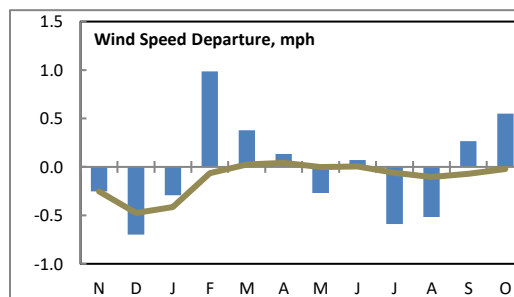
October temperature anomalies ranged from 0.2°F below normal at Mullan Pass to 6.7°F below normal at Wolf Point. The map below shows the variation in departures. The warmest average temperatures were in southern and western Montana. The warmest average temperature was at Norris Madison (Madison), with an average of 48.5°F, while the coolest was 31.6°F at Spur Park (Meagher). The highest temperature was 90°F at Little Bighorn on the 5th. The coldest temperature was -29°F at Potomac (Missoula) on the 25th and near Ringling (Meagher) on 26th. This range of 119°F is well above normal and October's average is 95°F. Only the year 1935 had a larger range when the coldest temperature of record was observed in Montana. The statewide temperature average of 39.9°F was 4.0°F below normal and the 9th coolest of record. Last year's October was cooler. The red line on the graph shows the cumulative 12-month departure from normal, which was 0.5°F above normal. See the state summary and temperature tables below for more details.

Temperature departure from normal

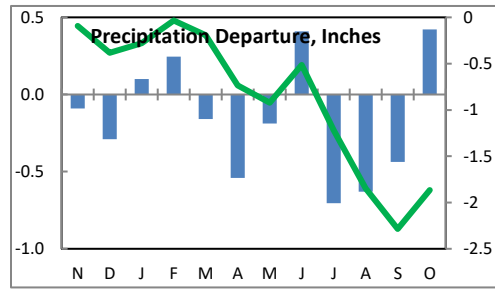
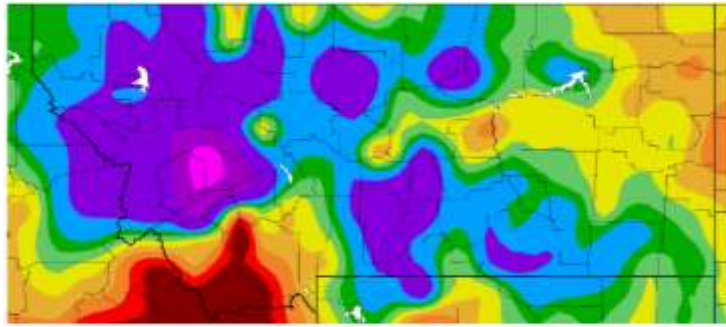


Precipitation was heaviest over the northern Rockies and along the Idaho border. The highest amount (11.40-inches) fell over higher elevations in Missoula County, with the highest amount at a lower elevation at Hungry Horse Dam (5.75-inches) (Flathead) (below). The second map of percent of normal shows gauge and radar-derived precipitation. They both show that much above normal precipitation fell over most of the state. The monthly statewide composite of 1.57" was 0.42" above normal. This ranks as the 14th wettest October of record for Montana. Some areas were very dry and some ranked wetter. Missoula had their 5th wettest October while Mullan Pass and Kalispell were 6th wettest. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is now 1.86" below normal. See state summary and precipitation tables below for more details.

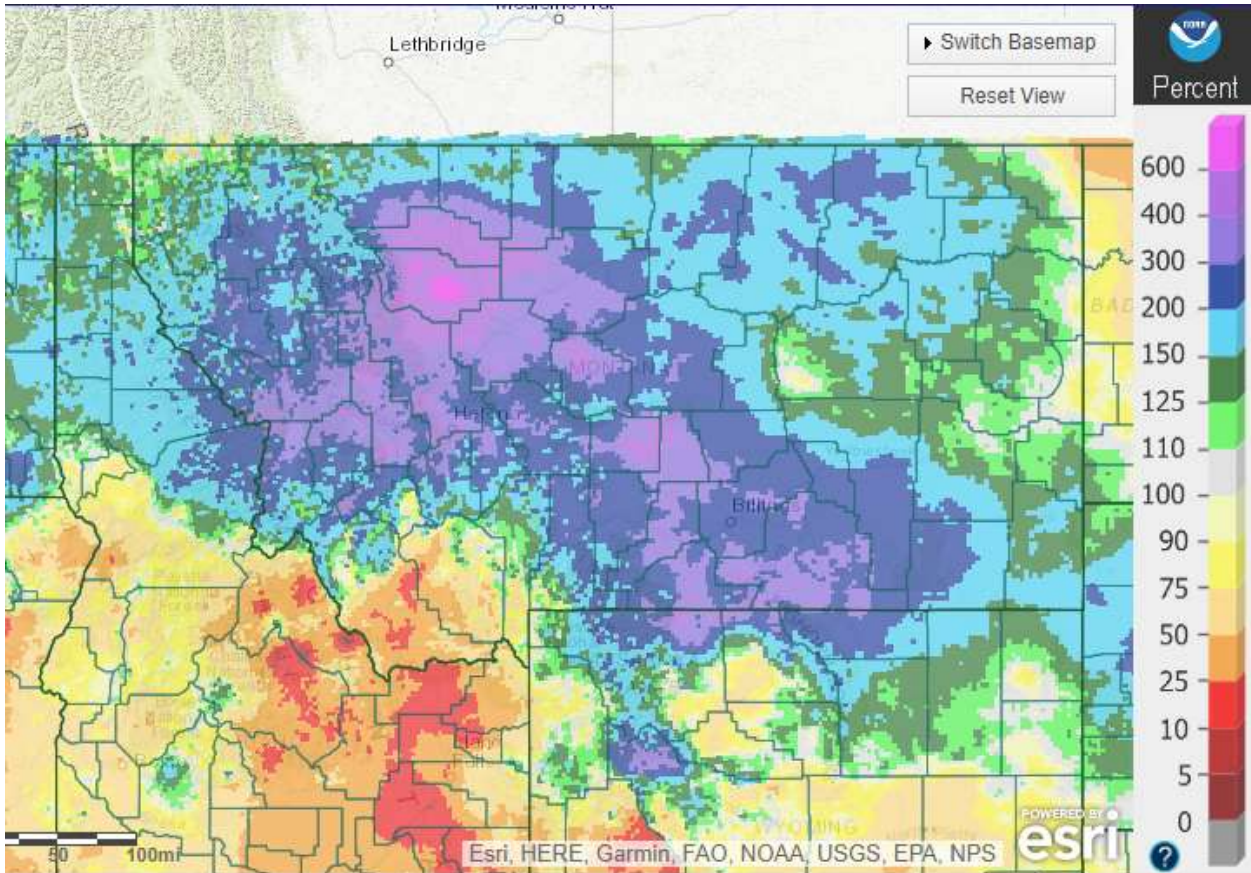
Wind speed averages were near to above normal. Statewide, the month ranked as the 34th windiest October, with an average speed of 9.3-mph. The strongest averages were along the Rocky Mountain Front. The composite statewide average was 0.5-mph above normal. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal.



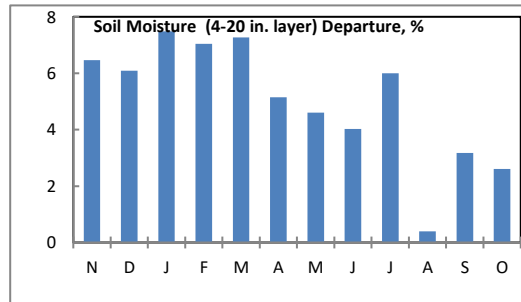
Precipitation percent of normal (gauge only)



Percent of normal precipitation for October over Montana (radar and gauge-based)



Some areas stayed dry through mid-month, then the snows came. The snow largely melted by the end of the month, with most soaking into the dry ground. Statewide soil moisture departures from normal ended up above normal. October ranked as 4th wettest of 25 years. This data is from 33 NRCS SCAN and SNOTEL, NOAA CRN and MT Mesonet stations.



Refer to NCEI's State of the Climate report for the latest monthly discussion: <http://www.ncdc.noaa.gov/sotc/>

October continued the warm and dry conditions from September. Haze from wildfires filled the skies in the west for a few days early in the month. Record high temperatures were recorded at various locations from the 4th through 8th. Big Horn reached 90°F on the 5th. Very windy conditions prevailed over the southwest on the 10th. Gusts reached 73-mph at Norris Hill and 82-mph at Yellow Mule RAWS. Daily peak gust records were set at Dillon and Bozeman. A weather system brought rain to much of western Montana on the 11th and 12th. Widespread amounts of one to 1.5-inches were reported, with Mullan Pass measuring 2.26-inches. Strong winds prevailed over eastern Montana. Gusts reached 60-mph at Pendroy and 81-mph at a site in the Crazy Mountains. Strong winds returned to the southwest on the 13th. Wise River reached 61-mph, Stevensville 64-mph, 69-mph in the Bridgers and 79-mph at Point Six. Dillon had a gust to 59-mph, their third highest gust of record for October. Some rain fell over the northern Rockies. Goat Haunt picked up just under 1-inch. Windy conditions continued through the 16th. Gusts reached 64-mph at Livingston and 84-mph at Deep Creek RAWS.

A major change in the weather came on the 16th, when a strong cold front moved through, bringing the start of a week and a half of snowy and cold conditions. The first round of snow set daily snowfall records at several locations in central Montana, including Billings, Great Falls and Helena. Up to a foot of snow fell over a large area of southern Montana, including Roundup, Billings, Rapelje and Reed Point. Record low maximum and minimum temperatures were set at Billings, Bozeman and Cut Bank. At Great Falls, 12.4-inches of snow on the 17th and 18th was the highest for any 2-day period in October. Larger amounts across central Montana included 13-inches at Choteau, 13-inches at Hilger and 12-inches at Augusta. Over southern Montana, higher amounts included 21-inches at Rapelje, 20-inches at Ryegate, and 16-inches at Cooke City and Roundup.

The period from the 22nd-27th brought additional snow, and the coldest temperatures seen in Montana in October since 1935. Snowfall of up to 25-inches fell in portions of Helena on the 23rd-24th. At the Helena Airport, 17.6-inches on the 23rd-24th is their highest two-day total of record and 5th highest overall. This is one of the heaviest snows for the city since March 2003. Other heavy snowfalls included 25-inches at Red Lodge, 20-inches near Livingston, 18-inches at Drummond, Potomac, and Townsend and 17-inches at Plains and Big Timber. See the two maps showing the snowfall from each of the heavy snow events at the end of this document. The patterns of snowfall were similar, with the second event producing heavy snow over a wider area. Record low temperatures were set across the state from the 22nd through 26th. Potomac fell to -29°F on the 25th, and Ringling registered the same on the 26th. These were the second coldest temperatures recorded in Montana in October, the coldest so early in the season and the coldest October temperatures since -30°F was recorded at Summit on October 31, 1935. Bozeman had a low of -20°F on the 26th, which was 31°F cooler than their previous lowest temperature for the date. Even their high temperature for the date (19°F) was 9°F cooler than the previous lowest maximum temperature for the date.

Warmer temperatures returned on the 27th, along with wind. Deep Creek had a gust to 85-mph, while Big Timber measured 66-mph and East Glacier had a gust to 64-mph. Warm temperatures continued through the rest of the month, with many locations in the central and western portions reaching the 60s on the 29th. A passing cold front brought strong winds over most of the state on the 30th. Some of the stronger gusts were 66-mph at Great Falls and 74-mph at Glasgow.

The highest daily temperatures in October occurred on four days at Whitehall. West Yellowstone had the state's lowest temperature on nine days.

Precipitation/convection

Severe convective weather occurred on zero days in October, which is than normal. There was some small pea-sized hail reported near Bozeman (11th), Shelby (12th), and East Glacier on (30th).

Monthly snow records established for October 2020...

Location	2020 Monthly Snow	Old monthly record	Comments
Big Timber	35.0"		Second highest for October Eighth snowiest month
Bynum	33.3"	16.6" - 1975	Second snowiest month
Choteau	24.4"	21.0" - 1975	Seventh snowiest month
Columbus	22.6"	18.9" - 2008	
Cut Bank	20.9"	17.5" - 1934	Ninth snowiest month
Fort Benton	17.3"	13.0" - 1951	
Great Falls	28.0"	18.5" - 1925	Eighth snowiest month
Hardin	20.0"	9.8" - 1949	
Helena	25.4"		Second highest for October
Judith Gap	28.0"	24.5" - 2019	Second highest month
Livingston	25.4"	16.5" - 1951	Twelve highest month
Loma	20.7"	11.0" - 1984	
Mystic Lake	51.0"		Third highest for October
Rapelje	42.0"	33.0" - 1916	Fifth highest month
Ryegate	29.0"	20.8" - 1975	Second highest month
Stanford	21.0"	21.0" - 1975	
Sun River	19.9"	13.1" - 1957	

October information:

High Temperature	90°F at Big Horn (5 th)	Greatest Precip	5.75" at Hungry Horse Dam
Low Temperature	-29°F Potomac (25 th) (Missoula) & Ringling (26 th) (Meagher)		11.40" at North Fork Jocko SNOTEL (Missoula)
Warmest Ave Temp	48.5°F at Norris Madison (Madison)	Peak Wind Gust	74 mph at Glasgow (30 th)
Coollest Ave Temp	31.6°F at Spur Park SNOTEL (Meagher)		85 mph at Deep Creek RAWS (27 th)
Range of Temp departures	-6.7°F at Cut Bank to -0.2°F at Mullan Pass	Highest Ave Wind	20.0 mph at Deep Creek RAWS 13.3 mph at Cut Bank
21 city mean monthly Temperature/Nrml	39.9/43.8F normal. 9 th coolest of record (since 1880). 7 th percentile.	20 city mean monthly wind speed/Nrml	9.3 mph/8.7 mph; 34 th windiest of record (since 1936). 60 th percentile.
22 city mean monthly precipitation/Nrml	1.57"/1.14" - 137% of normal. 14 th wettest of record (since 1880). 89 th percentile.	20 city mean monthly snowfall/Nrml	12.3"/2.9" - 3 rd highest of record (since 1880). 97 th percentile

**Historical Rank of Precipitation (inches)
for the Current Month and Water Year to Date**

Location	Oct	% of Norm	Rank	Pcntl	Oct 1 - 31	% of norm	Rank	Pcntl	Years
Baker	0.79	65%	46	51	0.79	65%	45	51	96
Billings	2.16	183%	16	13	2.16	183%	16	12	127
Belgrade	1.11	101%	35	41	1.11	101%	35	41	84
Butte	0.84	108%	49	38	0.84	108%	43	33	127
Cut Bank	1.00	227%	19	16	1.00	227%	19	16	114
Dillon	0.04	6%	76	94	0.04	6%	76	94	81
Glasgow	1.22	163%	22	17	1.22	163%	26	20	124
Great Falls	2.04	237%	11	8	2.04	237%	11	8	129
Havre	0.84	145%	43	30	0.84	145%	43	30	141
Helena	2.03	299%	11	7	2.03	299%	11	7	141
Jordan	0.77	87%	43	42	0.77	87%	42	42	99
Kalispell	2.68	265%	7	5	2.68	265%	7	5	127
Lewistown	1.32	117%	44	35	1.32	117%	44	35	125
Livingston	2.12	168%	14	11	2.12	168%	14	10	126
Miles City	0.85	92%	59	41	0.85	92%	59	41	144
Missoula	2.93	326%	5	3	2.93	326%	7	4	141
Mullan Pass	6.11	199%	7	7	6.11	199%	7	7	83
Wolf Point	0.48	59%	45	49	0.48	59%	50	54	92
Glendive	1.02	96%	36	28	1.02	96%	36	28	126
Sidney	0.67	61%	50	61	0.67	61%	50	61	81
BZN MSU	1.71	99%	53	36	1.71	99%	53	36	144
W Yellowst	1.72	114%	37	31	1.72	114%	36	30	116

Rankings and Percentiles are 1=wettest, higher numbers=drier.

For an automated version of this chart, updated daily, go to

<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS>

**Historical Rank of Average Temperature (°F)
for the Current Month and Water Year to Date**

Location	Oct	Normal	Rank	Pcntl	Oct 1 - 31	Normal	Rank	Pcntl	Years
Baker	38.9	43.4	102	94	38.9	43.4	102	94	109
Billings	44.0	48.2	107	87	44.0	48.2	107	87	123
Belgrade	40.4	43.4	77	89	40.4	43.4	77	89	86
Butte	39.1	40.8	99	78	39.1	40.8	99	78	127
Cut Bank	37.1	42.8	104	92	37.1	42.8	104	92	113
Dillon	42.0	43.5	59	75	42.0	43.5	59	75	78
Glasgow	39.2	44.7	116	93	39.2	44.7	116	93	125
Great Falls	40.8	45.2	114	92	40.8	45.2	114	92	124
Havre	39.2	44.3	133	94	39.2	44.3	133	94	141
Helena	43.2	45.6	104	74	43.2	45.6	104	74	141
Jordan	40.3	44.2	95	93	40.3	44.2	95	93	102
Kalispell	40.0	42.1	68	55	40.0	42.1	68	55	122
Lewistown	39.7	43.7	108	88	39.7	43.7	108	88	122
Livingston	43.0	45.1	99	84	43.0	45.1	99	84	118
Miles City	41.8	46.5	131	94	41.8	46.5	131	94	140
Missoula	42.3	45.1	106	82	42.3	45.1	106	82	129
Mullan Pass	37.4	37.6	23	51	37.4	37.6	23	51	44
Wolf Point	37.0	43.7	75	99	37.0	43.7	75	97	77
Glendive	38.6	47.7	125	99	38.6	47.7	124	98	126
Sidney	38.1	46.9	95	97	38.1	46.9	98	99	99
W Yellowst	34.8	35.6	84	74	34.8	35.6	89	77	115

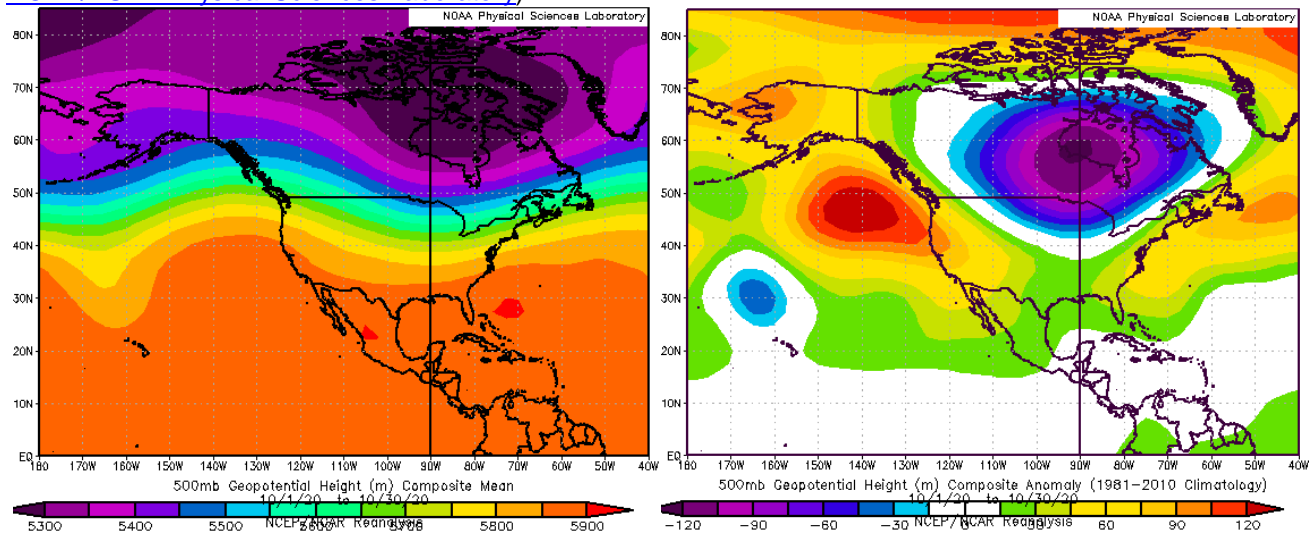
Rankings and Percentiles are 1=coldest, higher numbers=warmer.

Historical Rank of Average Wind Speed (mph) for the Current Month and Water Year to Date

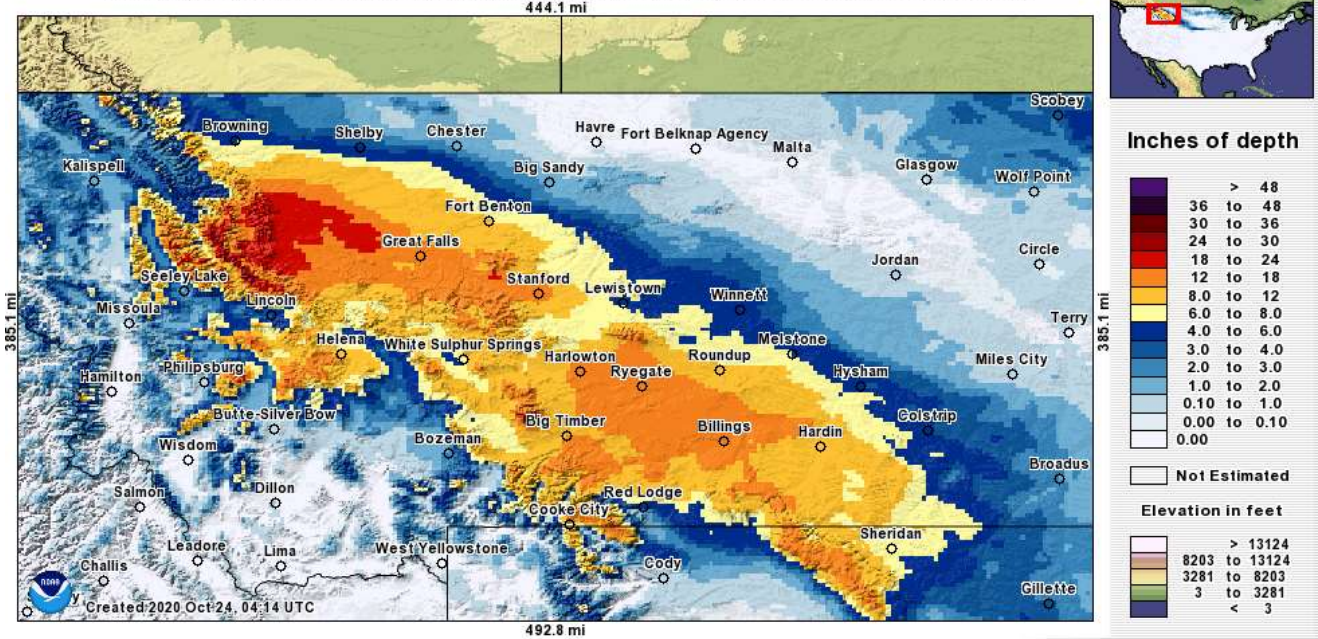
Location	Oct	Normal	Rank	Pcntl	Oct 1 - 31	Normal	Rank	Pcntl	Years
Baker	11.3	10.5			11.3	10.5			23
Billings	12.2	10.5	14	15	12.2	10.5			86
Belgrade	6.4	5.3	13	22	6.4	5.3			55
Butte	5.9	6.3	35	61	5.9	6.3			57
Cut Bank	13.3	13.2	34	43	13.3	13.2			77
Dillon	10.7	8.8	7	9	10.7	8.8			67
Glasgow	10.6	10.3	15	19	10.6	10.3			75
Great Falls	12.4	12.4	49	59	12.4	12.4			83
Havre	10.3	8.8	23	17	10.3	8.8			132
Helena	6.9	6.6	86	61	6.9	6.6			141
Jordan	9.0	7.8	6	14	9.0	7.8			37
Kalispell	5.2	4.7	94	77	5.2	4.7			122
Lewistown	9.5	9.3	34	43	9.5	9.3			77
Livingston	15.7	15.6	17	29	15.7	15.6			56
Miles City	10.0	10.1	33	25	10.0	10.1			130
Missoula	4.7	4.7	47	55	4.7	4.7			85
Mullan Pass	5.5	6.0	22	70	5.5	6.0			30
Wolf Point	8.4	7.8			8.4	7.8			23
Glendive	9.9	10.0	18	61	9.9	10.0			29
Sidney	9.3	8.8	11	48	9.30	8.8			32
W Yellowst	7.3	5.6			7.30	5.6			8

Rankings and Percentiles are 1=winiest, higher numbers=calmer.

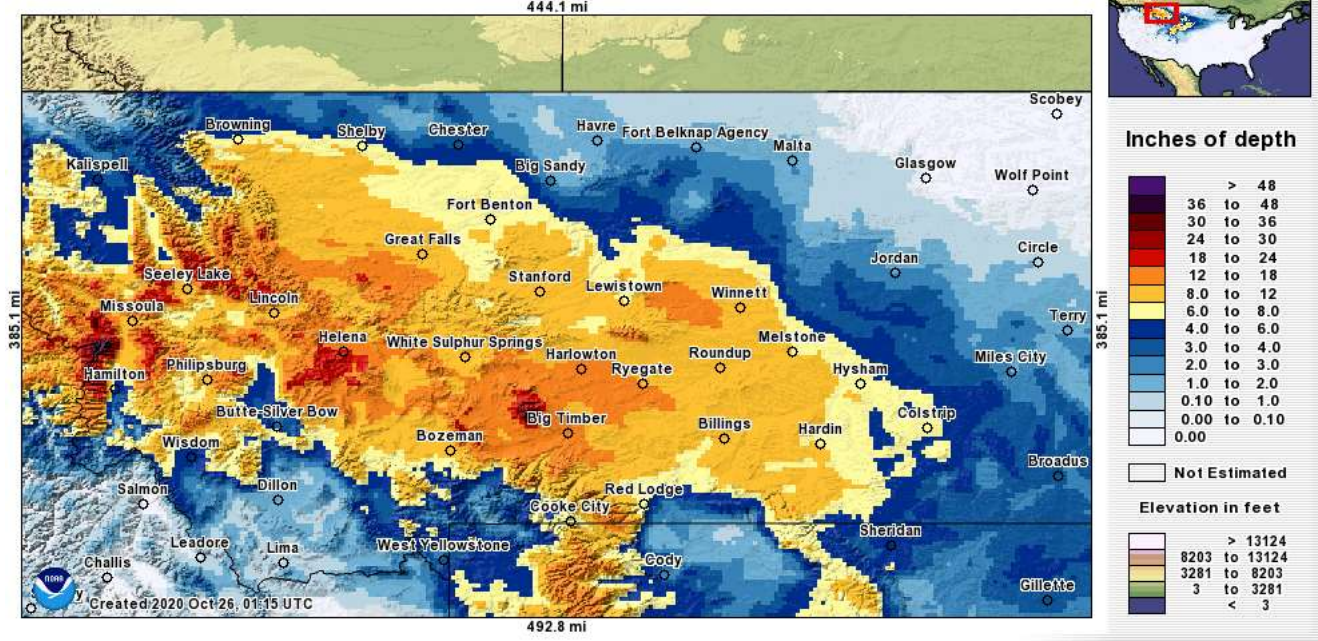
Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (left) and climatology for the month (right) (from [NOAA/ESRL Physical Sciences Laboratory](#)).



Interpolated Observed Snowfall Analysis during 72h preceding 2020 October 19, 0:00 UTC



Interpolated Observed Snowfall Analysis during 72h preceding 2020 October 26, 0:00 UTC



For the latest information on mountain snowpack from the NRCS, go to: <https://www.wcc.nrcs.usda.gov/gis/snow.html>

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to: <http://droughtmonitor.unl.edu/>

These data are preliminary and have not undergone final QC by NEIC. Therefore, these data are subject to revision. Final and certified climate data can be accessed at the National Environmental Information Center (NEIC) <http://www.ncei.noaa.gov>. Many more links are on the Drought Information Page of the NWS Great Falls web site at <http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=txf>. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.