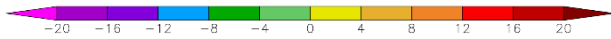
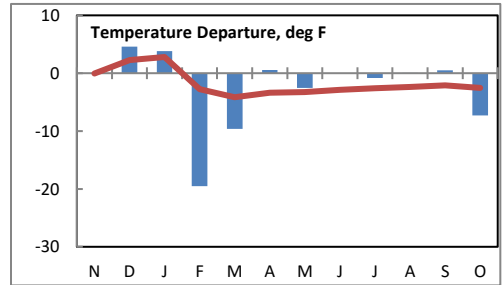
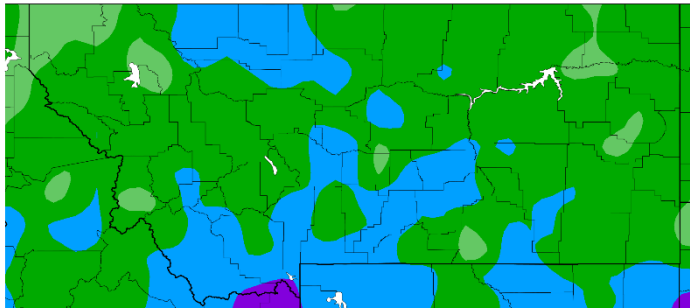


Montana Weather/Precipitation Summary

October 2019 NOAA's National Weather Service Great Falls Montana

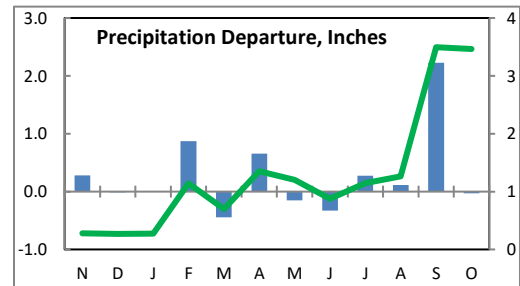
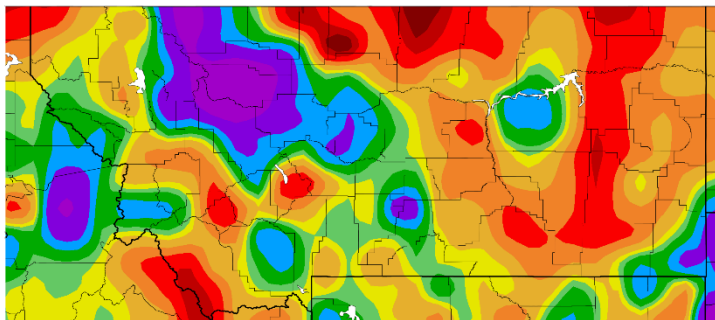
For October, the upper level flow over Montana was generally from the west-northwest. A highlight was a strong trough of low pressure over the central portion of North America (Fig. 1). October's average temperatures were below normal. Precipitation amounts were variable, with a large area of above normal values over the northern Rockies. Winds averaged above normal.

October temperature anomalies ranged from 4.4°F below normal at Glendive to 10.1°F below normal at Dillon. The map below shows the variation. The warmest average temperatures were in eastern and southern Montana. The warmest average temperature was at Yellowtail Dam, with an average of 45.6°F, while the coolest was 22.2°F at Porphory Peak (Meagher). The highest temperature was 78°F at Mizpah and Powderville on the 8th. The coldest temperature was -24°F at Placer Basin SNOTEL on the 29th. This absolute range of 102°F was slightly above average for October (October's record is 121°F). The statewide temperature average of 36.6°F was the second coldest of record. The red line on the graph shows the cumulative 12-month departure from normal, which is 2.5°F below normal. See the state summary and temperature tables below for more details.



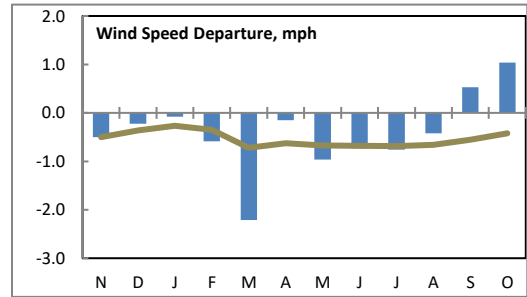
Temperature departure from normal

Precipitation was heaviest in the Marias Pass area, westward to the Mission Mountains, and in the Bridger Mountains. The highest amount (7.30-inches) fell at Marias Pass, Moss Peak and Sacajawea SNOTELs. The statewide composite of 1.04-inches was 0.03" below normal. This ranks as the 63rd wettest October of record for the state. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is 3.47" above normal. See state summary and precipitation tables below for more details. The heaviest monthly snow amount was 44.0-inches at Mystic Lake.

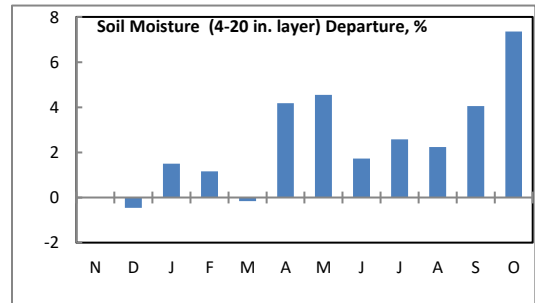


Percent of normal precipitation

Wind speed averages were slightly above normal. Statewide, the month ranked as the 24th windiest October, with an average speed of 9.7-mph. The strongest averages were in along the Rocky Mountain Front and Livingston areas. The composite statewide average was 1.0-mph above normal. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal. The 12-month average is running 0.4-mph below normal.



Statewide soil moisture averages continued above normal for October (right). This data is from 33 NRCS SCAN and SNOTEL, NOAA CRN and MT Mesonet stations. For October, this was the wettest of record, replacing 2016. The record began in 1995.



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

The first week of October was generally cool and dry. Record cold temperatures were recorded over north central Montana on the 1st and 2nd. Snow from late September was still on the ground over north central Montana for most of this period. Temperatures warmed on the 7th and 8th. Readings were near 70°F over western portions of the state on the 7th, reaching 78°F at Mizpah and Powderville on the 8th. A strong cold front brought snow and colder temperatures on the 8th, continuing on the 9th. Record cold temperatures were set across the state from the 9th-13th. Great Falls recorded a low of zero on the 10th. This was their earliest zero temperature of record. The previous record earliest was October 26, 1919. Ringling dropped to -13°F on the 10th. Generally, mild conditions prevailed through the 22nd. This mild period also brought some of the strongest winds of the month. On the 18th, gusts reached 73 mph west of Bynum. A storm system moved into western Montana around the 20th. A foot or more of snow fell over the higher peaks in northwest Montana. Windy and mild conditions returned on the 25th. Temperatures reached near 70°F in parts of the state. Windy conditions were seen nearly across the state. Gusts reached 85 mph at Deep Creek RAWS and 81 mph at Two Medicine. Snow moved in for the 26th-28th. Amounts up to a foot or more were observed over southern Montana, with 6-10-inches across portions of western and north central Montana. Record cold was again observed from the 27th-30th. Placer Basin dropped to -24°F on the 29th. With warmer air, blowing snow was reported in the Browning area on the 30th as winds gusted to 63 mph. Gusts reached 66 mph at Big Timber.

Precipitation/convection

Severe convective weather occurred on zero days in October, which is normal.

New Daily and Monthly Records established in October...

Date	Record Type	Location	New Value	Old Record	Year of Old Record
Oct 1	Record cold Min Temp	Cut Bank	1°F	14°F	1950
	Record cold Min Temp	Great Falls	9	22	1959
	Record Daily Snowdepth	Cut Bank	11"	Trace	1919
Oct 1	Record cold Max Temp	Cut Bank	27°F	34°F	1999
		Dillon	36	37	1971
		Great Falls	34	36	1999

Oct 2	Record cold Min Temp	Cut Bank	8°F	15°F	1925
		Great Falls	17	18	1999
		Kalispell	19°F	21°F	1999
	Record Daily Snowdepth	Cut Bank	9"	2"	1947
Oct 3	Record Daily Snowdepth	Cut Bank	9"	2"	2018
Oct 9	Record cold Max Temp	Bozeman	28°F	29°F	1985
		Missoula	35°F	35°F	1985
Oct 10	Record cold Max Temp	Dillon	25°F	26°F	2009
		Miles City	29°F	31°F	2009
Oct 10	Record cold Min Temp	Billings	16°F	16°F	2009
		Cut Bank	-3°F	3°F	2009
		Dillon	7°F	8°F	2009
		Great Falls	0°F	4°F	2009 (1)
		Lewistown	3°F	5°F	2009
Oct 11	Record cold Min Temp	Bozeman	13°F	14°F	2009
		Butte	3°F	11°F	2009
		Dillon	4°F	12°F	2009
		Lewistown	10°F	12°F	2009
Oct 13	Record cold Min Temp	Miles City	19°F	21°F	2006
Oct 27	Record cold Max Temp	Billings	26°F	27°F	1969
		Dillon	25°F	26°F	1946
	Record cold Min Temp	Billings	13°F	22°F	2002
		Bozeman	8°F	9°F	1991
		Dillon	8°F	11°F	1971
		Livingston	23°F	27°F	1969
Oct 28	Record cold Min Temp	Bozeman	5°F	5°F	1971
		Kalispell	5°F	8°F	1971
Oct 29	Record cold Max Temp	Billings	16°F	16°F	1971
		Bozeman	14°F	20°F	1991
		Butte	15°F	19°F	1991
		Dillon	11°F	22°F	1991
		Livingston	12°F	15°F	1991
	Record cold Min Temp	Billings	0°F	1°F	1991
		Bozeman	-14°F	-10°F	1991 (2)
		Butte	-10°F	-9°F	1991
		Dillon	-8°F	-5°F	1991
		Kalispell	-3°F	5°F	1971 (3)
		Livingston	-12°F	-2°F	1971
Oct 30	Record cold Min Temp	Bozeman	-14°F	-10°F	1991
		Missoula	1°F	4°F	1991

- (1) Great Falls: earliest subzero so early in season. Old record 10/26/1919 (-5°F)
- (2) Bozeman: earliest subzero so early in season. Old record 10/30/1991 (-10°F). This is also an all-time low for October
- (3) Kalispell: earliest subzero so early in season. Old record 10/30/1991 (-1°F)

Calendar year (Jan-Oct)

The calendar-year average temperature was 43.3°F, 5.5°F below normal. This was the 2nd coldest of the composite of the 21 stations, and coolest since 1899.

Composite calendar-year precipitation totaled 17.04-inches, 3.20" above normal. This was the fifth wettest such season, and wettest since 1993.

Winds averaged 8.4-mph, which is 0.4-mph below normal. This was the third calmest calendar-year to date.

Of the 20-city snowfall composite, this is the 7th snowiest year-to-date. With an average of 53.8-inches, this is the snowiest such period since 1989.

October information:

High Temperature	78°F at Mizpah and Powderville (8 th)	Greatest Precip	4.26" near Melstone
Low Temperature	-24°F at Placer Basin (29 th)		7.30" Moss Peak, Pike Creek, Sacagawea SNOTELs
Warmest Ave Temp	45.6°F at Yellowtail Dam	Peak Wind Gust	85 mph at Deep Creek RAWS and 81 mph at Two Medicine (22 nd)
Coolest Ave Temp	22.2°F at Porphory Peak RAWS (Meagher)		
Range of Temp departures	-4.4°F at Glendive -10.1°F at Dillon	Highest Ave Wind	20.5 mph at Deep Creek RAWS 18.5 mph at Browning
21 city mean monthly Temperature/Normal	36.6/43.8F normal. 2 nd coldest of record (since 1880). 2 nd percentile.	20 city mean monthly wind speed/Normal	9.7 mph/8.6 mph; 24 th windiest of record (since 1936). 72 nd percentile.
22 city mean monthly precipitation/Normal	1.04"/1.07" – 97% of normal. 63 rd wettest of record (since 1880). 55 th percentile.	20 city mean monthly snowfall/Normal	6.7"/2.8" 12 th highest of record.

**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	1.27	106%			1.27	106%			22
Billings	0.84	67%	64	53	0.84	67%	64	50	126
Belgrade	0.82	75%	47	56	0.82	75%	47	56	83
Butte	0.34	44%	98	78	0.34	44%	75	59	126
Cut Bank	0.80	182%	28	24	0.80	182%	28	24	113
Dillon	0.42	61%	45	56	0.42	61%	45	56	80
Glasgow	0.62	83%	44	34	0.62	83%	56	45	123
Great Falls	1.25	145%	26	20	1.25	145%	26	20	128
Havre	0.26	45%	99	71	0.26	45%	99	71	140
Helena	1.00	147%	40	28	1.00	147%	40	28	140
Jordan	1.15	129%			1.15	129%			23
Kalispell	0.92	91%	64	50	0.92	91%	64	50	126
Lewistown	1.16	103%	56	45	1.16	103%	56	45	124
Livingston	1.32	105%	44	36	1.32	105%	44	35	125
Miles City	0.27	29%	113	79	0.27	29%	113	79	143
Missoula	0.63	70%	91	65	0.63	70%	93	66	140
Mullan Pass	4.11	134%	23	28	4.11	134%	23	28	80
Wolf Point	0.56	69%			0.56	69%			22
Glendive	0.76	72%	53	42	0.76	72%	53	42	124
Sidney	0.73	66%	44	54	0.73	66%	44	54	80
BZN MSU	2.24	130%	22	15	2.24	130%	22	15	143
W Yellowst	1.36	90%	51	44	1.36	90%	51	44	115

Rankings and Percentiles are 1=driest, higher numbers=wetter.

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	37.5	43.4	105	97	37.5	43.4	105	97	108
Billings	40.1	48.2	85	99	40.1	48.2	85	99	86
Belgrade	35.0	43.4	85	100	35.0	43.4	85	100	85
Butte	32.9	40.8	126	100	32.9	40.8	126	100	126
Cut Bank	33.3	42.8	110	98	33.3	42.8	110	98	112
Dillon	33.4	43.5	77	100	33.4	43.5	77	100	77
Glasgow	40.1	44.7	112	90	40.1	44.7	112	90	124
Great Falls	36.8	45.2	121	98	36.8	45.2	121	98	123
Havre	37.0	44.3	136	97	37.0	44.3	136	97	140
Helena	38.4	45.6	137	98	38.4	45.6	137	98	140
Jordan	38.7	44.2	98	97	38.7	44.2	98	97	101
Kalispell	36.9	42.1	68	56	36.9	42.1	68	56	121
Lewistown	34.7	43.7	121	100	34.7	43.7	121	100	121
Livingston	37.9	45.1	114	97	37.9	45.1	114	97	117
Miles City	39.1	46.5	137	99	39.1	46.5	137	99	139
Missoula	38.2	45.1	128	100	38.2	45.1	128	100	128
Mullan Pass	30.6	37.6	40	93	30.6	37.6	40	93	43
Wolf Point	39.2	43.7			39.2	43.7			22
Glendive	43.3	47.7	113	90	43.3	47.7	113	90	125
Sidney	38.6	46.9	94	97	38.6	46.9	97	99	98
W Yellowst	26.1	35.6	95	100	26.1	35.6	98	100	98

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	12.6	10.5			12.6	10.5			22
Billings	12.7	10.5	7	7	12.7	10.5	7	7	85
Belgrade	6.1	5.7	18	32	6.1	5.7	13	23	54
Butte	5.2	6.3	48	85	5.2	6.3	47	84	56
Cut Bank	14.6	12.9	18	23	14.6	12.9	18	23	76
Dillon	9.5	8.8	22	32	9.5	8.8	22	32	66
Glasgow	11.3	10.3	8	9	11.3	10.3	11	14	74
Great Falls	12.5	12.4	47	57	12.5	12.4	47	57	82
Havre	11.3	8.8	7	5	11.3	8.8	7	5	131
Helena	6.8	6.6	89	63	6.8	6.6	89	63	140
Jordan	10.1	7.8	2	3	10.1	7.8	2	3	36
Kalispell	5.0	4.7	93	77	5.0	4.7	93	77	121
Lewistown	9.9	9.3	26	33	9.9	9.3	26	33	76
Livingston	17.4	13.7	10	17	17.4	13.7	10	17	55
Miles City	10.9	10.1	10	7	10.9	10.1	10	7	129
Missoula	4.2	4.7	60	71	4.2	4.7	60	71	84
Mullan Pass	4.6	6.0	28	93	4.6	6.0	27	93	29
Wolf Point	9.0	7.8			9.0	7.8			22
Glendive	11.6	10.0	3	11	11.6	10.0	3	11	28
Sidney	11.1	8.8	2	5	11.10	8.8	2	6	31
W Yellowst	6.6	5.6			6.60	5.6			6

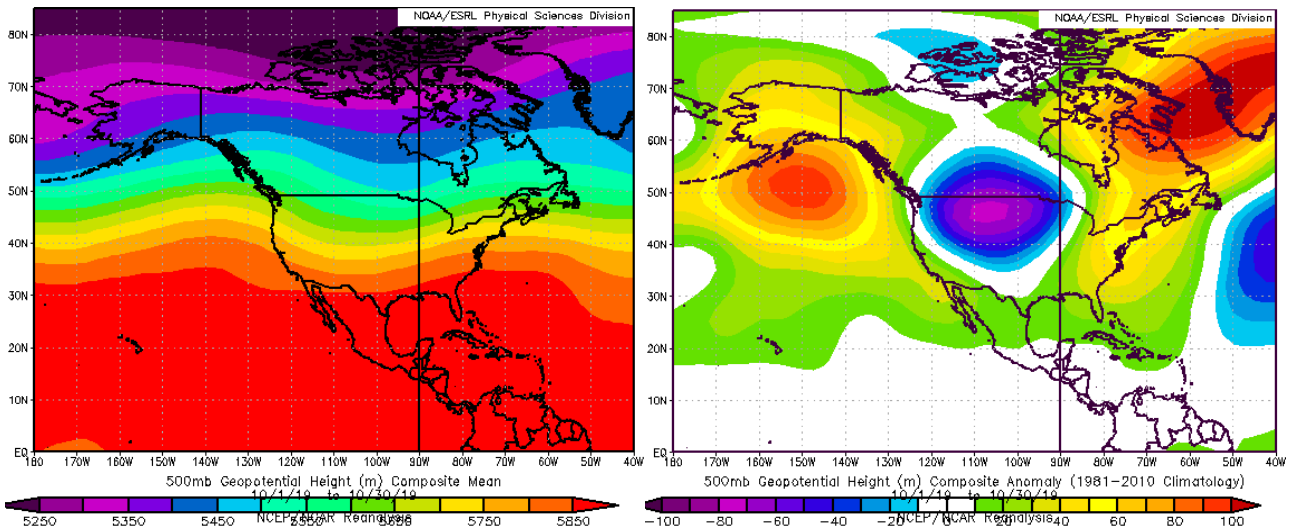


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right) (right).

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 access 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.