

1998

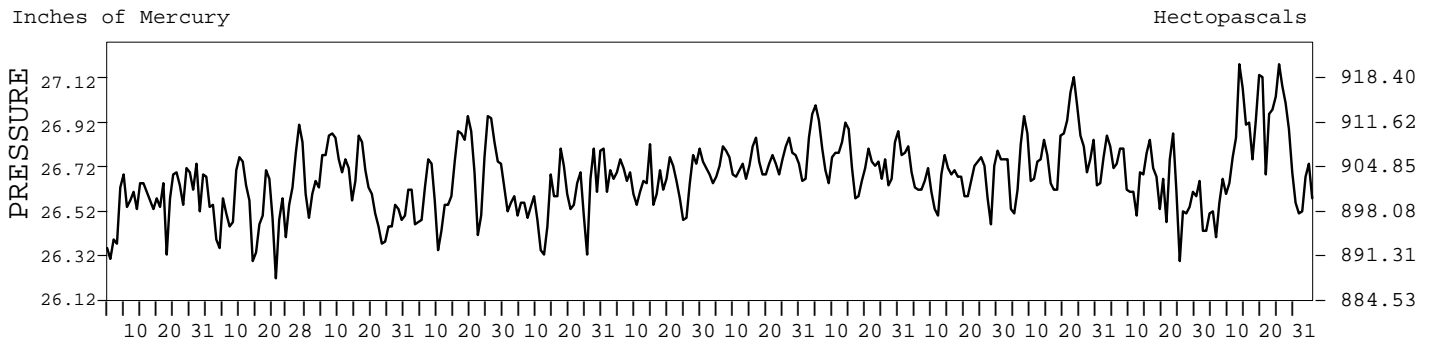
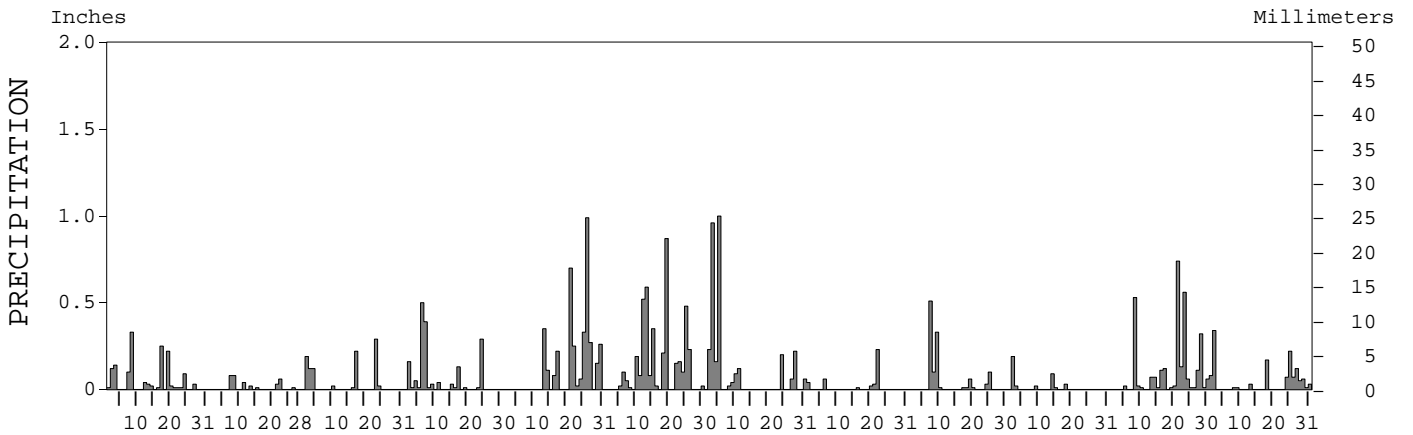
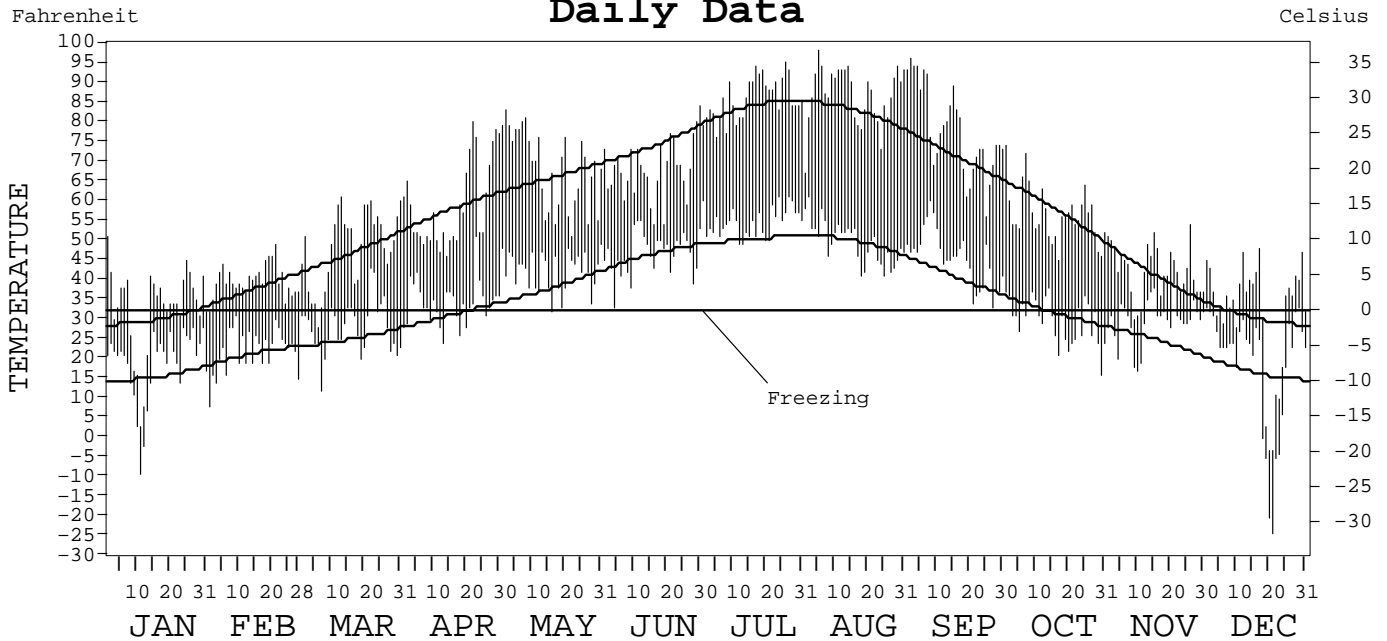
LOCAL CLIMATOLOGICAL DATA  
ANNUAL SUMMARY WITH COMPARATIVE DATA



ISSN 0198-3091

MISSOULA,  
MONTANA (MSO)

Daily Data



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# METEOROLOGICAL DATA FOR 1998

## MISSOULA, MT (MSO)

LATITUDE: 46° 55' 15" N      LONGITUDE: 114° 05' 33" W      ELEVATION (FT): GRND: 3197      BARO: 3203      TIME ZONE: MOUNTAIN (UTC+ 7)      WBAN: 24153

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	
TEMPERATURE °F	MEAN DAILY MAXIMUM	32.9	39.9	48.3	59.0	68.2	68.0	85.8	86.8	77.6	56.5	42.3	31.5	58.1	
	HIGHEST DAILY MAXIMUM	51	49	61	80	83	84	95	98	96	74	54	48	98	
	DATE OF OCCURRENCE	01	21	13	22	02	30	26	05	02	01	26	17	AUG 05	
	MEAN DAILY MINIMUM	18.7	22.2	28.0	34.2	42.2	46.7	54.6	49.4	45.5	29.8	29.8	18.4	35.0	
	LOWEST DAILY MINIMUM	-9	8	12	24	32	33	49	41	33	16	17	-24	-24	
	DATE OF OCCURRENCE	11	01	07	13	16	04	13+	25+	27	30	10	21	DEC 21	
	AVERAGE DRY BULB	25.8	31.1	38.2	46.6	55.2	57.4	70.2	68.1	61.6	43.2	36.1	25.0	46.5	
	MEAN WET BULB	24.8	28.9	33.6	40.3	48.3	51.6	60.5	55.2	52.3	38.4	33.7	23.4	40.9	
	MEAN DEW POINT	21.4	25.3	27.5	33.1	41.4	46.6	54.4	45.3	45.5	33.4	30.7	18.9	35.3	
	NUMBER OF DAYS WITH:														
	MAXIMUM ≥ 90°	0	0	0	0	0	0	10	15	6	0	0	0	0	31
	MAXIMUM ≤ 32°	11	1	1	0	0	0	0	0	0	0	3	11	27	
	MINIMUM ≤ 32°	31	28	24	10	1	0	0	0	0	20	23	29	166	
MINIMUM ≤ 0°	2	0	0	0	0	0	0	0	0	0	0	6	8		
H/C	HEATING DEGREE DAYS	1208	944	825	546	296	225	0	23	148	669	860	1234	6978	
	COOLING DEGREE DAYS	0	0	0	0	0	4	167	128	53	0	0	0	352	
RH	MEAN (PERCENT)	82	80	69	64	64	71	62	50	63	73	83	78	70	
	HOUR 05 LST	86	88	83	82	83	87	87	79	85	91	90	84	85	
	HOUR 11 LST	82	80	64	59	54	64	55	42	55	69	79	74	65	
	HOUR 17 LST	78	67	50	44	49	56	41	25	39	48	75	72	54	
	HOUR 23 LST	83	80	74	71	71	77	71	54	71	78	88	81	75	
S	PERCENT POSSIBLE SUNSHINE	51	68	70	77	73	65	85	91	84	72	28	30	66	
W/O	NUMBER OF DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	15	8	1	0	1	0	1	0	1	2	8	6	43	
	THUNDERSTORMS	0	0	0	1	6	7	12	6	3	0	0	0	35	
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
	MIDNIGHT-MIDNIGHT: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
NUMBER OF DAYS WITH:															
CLEAR															
PARTLY CLOUDY															
CLOUDY															
PR	MEAN STATION PRESS. (IN.)	26.59	26.56	26.65	26.68	26.59	26.68	26.75	26.79	26.68	26.80	26.64	26.83	26.69	
	MEAN SEA-LEVEL PRESS. (IN.)	29.98	29.92	30.01	30.00	29.87	29.96	30.00	30.04	29.95	30.14	30.00	30.25	30.01	
WINDS	RESULTANT SPEED (MPH)	1.1	0.3	0.8	2.1	1.0	0.1	1.1	2.3	0.7	1.5	0.6	1.0	0.5	
	RES. DIR. (TENS OF DEGS.)	12	25	35	32	35	10	32	31	29	31	14	13	32	
	MEAN SPEED (MPH)	3.4	3.0	4.3	5.2	6.1	5.9	5.4	4.3	3.7	3.5	3.9	4.7	4.5	
	PREVAIL. DIR. (TENS OF DEGS.)	10	33	35	29	31	12	32	31	33	31	12	12	32	
	MAXIMUM 2-MINUTE WIND:														
	SPEED (MPH)	30	20	30	30	31	34	52	33	26	25	29	31	52	
	DIR. (TENS OF DEGS.)	15	30	28	31	24	36	23	26	29	29	16	27	23	
	DATE OF OCCURRENCE	14	21	16	16	29	01	10	22	18	02	20	17	JUL 10	
	MAXIMUM 5-SECOND WIND:														
	SPEED (MPH)	39	24	37	36	41	43	61	43	30	32	38	38	61	
DIR. (TENS OF DEGS.)	16	32	28	33	23	35	22	26	29	29	16	27	22		
DATE OF OCCURRENCE	14	26+	16	16	29	01	10	22	18	02	20	17	JUL 10		
PRECIPITATION	WATER EQUIVALENT:														
	TOTAL (IN.)	1.44	0.33	0.99	1.68	3.79	4.23	3.16	0.39	1.17	0.36	3.00	1.27	21.81	
	GREATEST 24-HOUR (IN.)	0.39	0.09	0.31	0.86	1.24	1.04	1.19	0.23	0.51	0.19	0.85	0.34	1.24	
	DATE OF OCCURRENCE	07-08	7-8	23-24	06-07	26-27	18-19	02-03	22	07	02	21-22	02	MAY 26-27	
	NUMBER OF DAYS WITH:														
	PRECIPITATION ≥ 0.01	17	8	8	15	13	19	12	6	10	6	21	14	149	
PRECIPITATION ≥ 0.10	6	0	5	5	10	12	7	1	4	1	8	4	63		
PRECIPITATION ≥ 1.00	0	0	0	0	0	0	1	0	0	0	0	0	1		
SNOWFALL	SNOW, ICE PELLETS, HAIL:														
	TOTAL (IN.)	18.6	2.0	5.5	2.0	T	0.0	T	T	0.0	T	9.9	7.6	45.6	
	GREATEST 24-HOUR (IN.)	4.9	1.0	3.5	2.0	T	0.0	T	T	0.0	T	5.0	3.0	5.0	
	DATE OF OCCURRENCE	08	22	17	07	26	05	05	22	0	29+	08	18	NOV 08	
	MAXIMUM SNOW DEPTH (IN.)	6	2	3	T	0	0	0	0	0	0	4	4	6	
	DATE OF OCCURRENCE	21+	06+	17	07							10+	26	JAN 21+	
NUMBER OF DAYS WITH:															
SNOWFALL ≥ 1.0	5	1	2	1	0	0	0	0	0	0	2	3	14		

# NORMALS, MEANS, AND EXTREMES

MISSOULA, MT (MSO)

LATITUDE: 46° 55' 15" N      LONGITUDE: 114° 05' 33" W      ELEVATION (FT): GRND: 3197      BARO: 3203      TIME ZONE: MOUNTAIN (UTC+ 7)      WBAN: 24153

ELEMENT		POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	30.0	37.4	46.6	57.5	65.7	73.9	83.4	82.2	70.9	57.0	40.6	30.2	56.3
	MEAN DAILY MAXIMUM	51	29.6	36.8	45.9	57.0	66.1	73.8	83.9	82.9	71.4	57.1	40.3	30.9	56.3
	HIGHEST DAILY MAXIMUM	54	59	66	75	87	95	98	105	105	99	85	66	60	105
	YEAR OF OCCURRENCE		1953	1995	1978	1987	1986	1987	1973	1961	1967	1980	1983	1956	JUL 1973
	MEAN OF EXTREME MAXS.	51	47.0	51.3	63.1	75.5	84.2	90.9	96.8	95.8	88.5	75.1	57.3	47.5	72.7
	NORMAL DAILY MINIMUM	30	15.4	20.9	24.9	30.9	37.9	46.1	50.1	49.2	40.4	31.3	24.2	16.4	32.3
	MEAN DAILY MINIMUM	51	14.2	19.6	25.2	31.9	39.1	45.7	49.8	48.7	40.6	31.4	23.9	16.6	32.2
	LOWEST DAILY MINIMUM	54	-33	-27	-13	14	21	31	31	30	20	0	-23	-30	-33
	YEAR OF OCCURRENCE		1957	1996	1955	1951	1985	1991	1971	1992	1985	1971	1955	1983	JAN 1957
	MEAN OF EXTREME MINS.	51	-10.5	-1.6	8.1	21.2	27.7	34.9	39.3	38.8	29.0	19.2	6.0	-4.3	17.3
	NORMAL DRY BULB	30	22.7	29.2	35.8	44.2	51.8	60.0	66.8	65.8	55.7	44.2	32.4	23.4	44.3
	MEAN DRY BULB	51	21.9	28.2	35.6	44.4	52.6	59.8	66.9	65.8	56.0	44.2	32.2	23.8	44.3
	MEAN WET BULB	15	22.4	25.4	32.7	39.1	46.2	52.0	55.7	54.2	47.6	38.6	29.6	21.3	38.7
	MEAN DEW POINT	15	18.8	20.6	26.3	31.2	38.6	44.6	46.6	44.7	39.8	32.1	25.6	18.0	32.2
	NORMAL NO. DAYS WITH:														
MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.0	0.2	2.7	9.3	8.9	0.9	0.0	0.0	0.0	22.0	
MAXIMUM ≤ 32°	30	16.3	7.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	5.7	17.7	49.4	
MINIMUM ≤ 32°	30	29.4	26.1	26.2	17.5	5.7	0.2	*	*	4.1	18.0	25.7	29.5	182.4	
MINIMUM ≤ 0°	30	5.0	1.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	*	0.4	3.2	10.6	
H/C	NORMAL HEATING DEG. DAYS	30	1311	1002	905	624	409	179	65	81	303	645	978	1290	7792
	NORMAL COOLING DEG. DAYS	30	0	0	0	0	0	29	121	106	24	0	0	0	280
RH	NORMAL (PERCENT)	30	81	78	70	61	62	61	52	52	63	71	80	84	68
	HOUR 05 LST	30	85	85	84	80	82	84	77	75	83	86	87	86	83
	HOUR 11 LST	30	82	78	67	54	54	53	44	46	56	68	80	83	64
	HOUR 17 LST	30	76	66	52	41	43	42	31	32	40	50	71	80	52
	HOUR 23 LST	30	83	81	75	67	68	68	57	57	69	76	84	85	72
S	PERCENT POSSIBLE SUNSHINE	53	33	44	54	57	59	63	80	77	69	55	33	29	54
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	54	4.9	4.2	1.4	0.3	0.2	0.3	0.2	0.4	1.0	3.0	4.6	6.2	26.7
	THUNDERSTORMS	54	0.0	0.0	0.1	0.7	3.4	5.3	6.4	5.7	2.0	0.3	0.0	0.0	23.9
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	52	6.7	6.4	6.2	6.0	5.6	5.1	3.1	3.6	4.2	5.3	6.5	6.7	5.4
	MIDNIGHT-MIDNIGHT (OKTAS)	32	6.7	6.0	5.9	5.6	5.2	4.8	3.1	3.3	3.8	4.7	6.0	6.4	5.1
	MEAN NO. DAYS WITH:														
CLEAR	52	2.5	2.9	3.3	3.6	5.3	6.4	15.1	13.3	10.3	6.7	2.4	2.0	73.8	
PARTLY CLOUDY	52	4.2	4.6	6.1	6.8	8.5	9.3	9.8	9.3	8.2	7.3	4.6	4.2	82.9	
CLOUDY	52	24.3	20.8	21.6	19.6	17.2	14.2	5.6	7.8	11.5	16.9	23.0	24.8	207.3	
PR	MEAN STATION PRESSURE(IN)	26	26.76	26.73	26.66	26.69	26.67	26.69	26.73	26.73	26.76	26.78	26.75	26.78	26.73
	MEAN SEA-LEVEL PRES. (IN)	15	30.19	30.15	30.06	30.01	29.95	29.97	29.99	29.99	30.04	30.11	30.12	30.22	30.07
WINDS	MEAN SPEED (MPH)	34	4.9	5.6	6.6	7.4	7.3	7.2	6.9	6.6	6.0	5.1	5.2	4.7	6.1
	PREVAIL.DIR(TENS OF DEGS)	19	11	30	30	30	30	30	31	31	30	31	30	11	30
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	2	33	22	38	37	31	34	52	33	34	31	29	31	52
	DIR. (TENS OF DEGS)		09	15	30	30	29	36	23	26	10	29	16	27	23
	YEAR OF OCCURRENCE		1997	1997	1997	1997	1997	1998	1998	1998	1997	1997	1998	1998	JUL 1998
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	2	39	29	45	40	41	43	61	43	43	38	38	38	61
DIR. (TENS OF DEGS)		16	16	29	30	23	35	22	26	10	25	16	27	22	
YEAR OF OCCURRENCE		1998	1997	1997	1997	1998	1998	1998	1998	1997	1997	1998	1998	JUL 1998	
PRECIPITATION	NORMAL (IN)	30	1.24	0.79	0.97	0.96	1.78	1.78	0.91	1.20	1.12	0.74	0.81	1.16	13.46
	MAXIMUM MONTHLY (IN)	54	2.94	2.18	2.10	3.01	7.38	4.23	3.16	3.29	3.60	3.51	3.00	4.65	7.38
	YEAR OF OCCURRENCE		1969	1986	1989	1994	1980	1998	1998	1998	1985	1975	1998	1996	MAY 1980
	MINIMUM MONTHLY (IN)	54	0.16	0.17	0.20	0.08	0.25	0.35	0.09	T	0.05	0.01	0.22	0.25	T
	YEAR OF OCCURRENCE		1981	1973	1953	1977	1963	1961	1985	1967	1979	1978	1976	1976	AUG 1967
	MAXIMUM IN 24 HOURS (IN)	54	0.88	1.03	0.80	1.65	1.92	1.61	1.80	1.43	1.34	1.49	0.96	0.94	1.92
	YEAR OF OCCURRENCE		1948	1975	1992	1951	1980	1964	1987	1947	1954	1946	1996	1964	MAY 1980
	NORMAL NO. DAYS WITH:														
PRECIPITATION ≥ 0.01	30	13.7	10.4	12.2	10.7	11.8	10.6	7.2	7.9	7.8	7.5	11.1	13.3	124.2	
PRECIPITATION ≥ 1.00	30	0.0	*	0.0	0.0	0.1	0.1	*	*	*	0.1	0.0	0.0	0.3	
SNOWFALL	NORMAL (IN)	30	13.4	7.6	6.4	2.2	1.0	T	0.0	0.0	0.*	1.0	5.5	11.6	48.7
	MAXIMUM MONTHLY (IN)	54	42.5	20.1	16.7	8.2	8.1	0.4	T	T	0.4	5.4	17.7	54.1	54.1
	YEAR OF OCCURRENCE		1963	1975	1997	1970	1978	1996	1994	1996	1983	1973	1947	1996	DEC 1996
	MAXIMUM IN 24 HOURS (IN)	54	11.3	14.4	9.4	6.9	8.1	0.4	T	T	0.4	5.4	6.2	10.3	14.4
	YEAR OF OCCURRENCE		1980	1975	1997	1950	1978	1996	1994	1991	1983	1973	1961	1996	FEB 1975
	MAXIMUM SNOW DEPTH (IN)	50	19	23	13	4	4	0	0	0	0	3	10	13	23
	YEAR OF OCCURRENCE		1982	1979	1969	1951	1961					1985	1961	1983	FEB 1979
NORMAL NO. DAYS WITH:															
SNOWFALL ≥ 1.0	30	4.3	2.2	2.2	0.7	0.3	0.0	0.0	0.0	0.0	0.3	2.0	4.2	16.2	

PRECIPITATION (inches) 1998 MISSOULA, MT (MSO)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	2.94	0.52	0.72	0.64	1.21	4.18	0.25	0.04	0.66	0.67	0.42	0.92	13.17
1970	2.87	0.34	1.06	1.07	1.75	2.84	1.68	0.08	0.48	1.00	0.97	0.94	15.08
1971	1.81	0.56	0.78	2.09	1.35	1.74	0.53	0.91	0.30	0.24	1.18	1.63	13.12
1972	2.04	1.82	1.62	0.96	0.69	1.37	0.64	0.24	1.66	0.78	0.41	1.46	13.69
1973	0.44	0.17	0.23	0.33	0.54	1.57	0.09	0.31	0.60	0.60	2.51	1.62	9.01
1974	2.07	0.68	1.26	0.61	0.44	1.36	1.03	1.18	0.70	0.25	0.50	0.68	10.76
1975	2.03	1.77	0.74	1.01	1.35	2.02	1.51	2.03	0.51	3.51	1.15	0.85	18.48
1976	0.90	1.04	0.40	0.94	0.79	1.52	1.20	0.88	0.58	0.33	0.22	0.25	9.05
1977	0.66	0.18	0.98	0.08	2.13	0.66	0.72	1.28	1.67	0.72	1.02	2.88	12.98
1978	1.15	0.66	0.67	1.08	1.98	0.77	0.57	1.11	1.78	0.01	1.00	0.99	11.77
1979	1.25	1.04	1.22	1.04	0.74	0.67	0.77	1.31	0.05	0.97	0.50	0.81	10.37
1980	1.80	0.60	0.88	0.96	7.38	2.04	1.58	0.62	0.77	0.75	0.63	1.34	19.35
1981	0.16	0.77	1.43	0.74	4.19	2.70	1.07	1.61	1.01	0.62	1.07	1.98	17.35
1982	2.07	1.31	1.52	1.34	2.03	1.83	0.94	0.38	2.09	0.43	0.37	1.07	15.38
1983	0.62	0.95	1.10	0.72	2.65	2.26	2.44	1.27	1.37	0.37	1.17	1.79	16.71
1984	0.86	0.44	1.32	2.04	2.02	1.47	0.38	1.47	0.79	0.96	0.89	0.66	13.30
1985	0.19	0.70	0.44	0.55	1.57	0.38	0.09	3.29	3.60	0.80	0.51	0.38	12.50
1986	0.93	2.18	0.54	0.51	1.69	2.66	0.84	1.68	3.54	0.44	1.07	0.50	16.58
1987	0.28	0.37	1.23	0.41	1.31	1.52	2.47	1.05	0.09	0.02	0.26	1.12	10.13
1988	0.74	0.57	1.04	0.69	3.12	1.68	0.50	0.29	0.51	0.51	0.67	0.75	11.07
1989	0.75	0.46	2.10	1.01	1.35	1.44	1.58	2.08	0.88	0.46	0.84	0.61	13.56
1990	0.92	0.29	0.72	1.37	3.56	0.42	0.75	2.64	0.06	0.81	0.87	1.11	13.52
1991	0.62	0.19	1.22	0.30	2.27	2.92	0.27	0.62	0.31	0.29	1.66	0.95	11.62
1992	0.40	0.18	1.19	1.67	0.68	2.13	1.75	0.60	0.73	0.53	0.96	0.78	11.60
1993	0.86	0.67	0.66	1.83	1.99	1.45	2.02	1.32	0.35	2.00	0.46	0.40	14.01
1994	0.35	0.49	0.49	3.01	1.78	1.45	0.94	0.29	0.31	1.52	0.42	0.59	11.64
1995	0.86	0.37	0.63	0.75	1.09	2.33	1.84	1.19	2.56	1.14	1.85	1.61	16.22
1996	2.06	0.84	0.77	2.37	2.23	1.92	0.36	1.15	0.70	0.64	1.86	4.65	19.55
1997	1.69	0.80	1.79	1.49	1.73	2.25	1.52	0.95	0.65	1.19	0.36	0.33	14.75
1998	1.44	0.33	0.99	1.68	3.79	4.23	3.16	0.39	1.17	0.36	3.00	1.27	21.81
POR= 112 YRS	1.06	0.82	0.90	1.05	1.83	1.97	0.93	0.90	1.10	0.90	1.02	1.12	13.60

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AVERAGE TEMPERATURE (°F) 1998 MISSOULA, MT (MSO)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	17.9	20.7	29.0	46.5	54.3	58.8	64.3	67.0	56.8	40.2	31.8	26.0	42.8
1970	22.9	32.2	34.3	39.8	52.6	63.0	68.2	67.7	50.6	41.5	33.9	22.5	44.1
1971	26.3	32.2	35.5	44.8	54.5	58.3	67.1	71.5	51.9	42.2	33.7	21.1	44.9
1972	20.6	28.1	40.6	42.6	54.2	62.0	64.9	66.4	51.4	42.5	33.6	19.3	43.9
1973	21.5	30.9	39.0	43.1	53.2	60.0	69.6	67.4	56.5	45.3	30.2	30.3	45.6
1974	21.2	31.9	35.4	45.9	48.5	65.0	68.1	65.1	57.1	46.3	34.7	27.8	45.6
1975	22.7	22.4	33.0	39.3	49.2	55.4	71.8	62.1	56.1	43.6	30.4	25.7	42.6
1976	28.0	31.7	34.8	46.3	55.0	56.8	66.8	63.2	57.4	43.9	32.3	24.4	45.1
1977	18.6	31.9	34.2	46.9	50.3	63.4	65.8	67.6	54.6	44.2	31.3	24.5	44.4
1978	24.2	27.3	39.8	46.1	48.3	59.6	65.3	63.5	55.1	45.3	26.7	15.9	43.1
1979	5.6	25.5	35.9	43.9	52.2	62.3	69.2	69.1	61.4	48.1	27.2	31.2	44.3
1980	16.3	29.6	34.6	49.8	54.7	58.6	65.5	61.8	57.0	45.3	34.2	30.5	44.8
1981	29.5	31.4	40.0	46.7	53.4	57.5	65.0	69.4	56.7	41.7	32.7	24.0	45.7
1982	21.2	22.7	38.3	41.6	51.0	63.0	64.6	66.0	56.2	45.0	29.0	22.7	43.4
1983	30.0	34.5	39.9	44.6	51.8	58.6	62.1	68.9	51.1	43.8	34.3	11.8	44.3
1984	25.4	32.1	39.7	43.8	49.3	56.8	67.2	68.4	52.8	42.5	33.9	20.1	44.3
1985	19.2	23.7	36.2	47.7	55.4	62.0	74.8	62.2	50.5	40.3	21.7	14.7	42.4
1986	26.0	28.6	41.7	43.5	54.3	65.5	62.5	69.5	53.0	44.7	31.7	21.4	45.2
1987	20.5	30.6	38.0	50.1	55.9	62.9	64.7	62.2	59.3	45.2	34.2	24.2	45.7
1988	20.5	32.5	38.3	47.7	52.1	64.0	67.0	66.3	56.4	50.3	34.3	22.9	46.0
1989	26.7	15.8	32.6	44.7	52.2	61.6	71.2	63.3	55.9	44.9	37.2	24.1	44.2
1990	31.5	29.6	38.0	47.8	50.4	59.8	68.1	66.0	62.6	42.7	36.1	15.6	45.7
1991	21.5	34.9	35.8	43.9	51.1	56.8	68.4	69.6	58.3	44.4	30.4	26.6	45.1
1992	26.6	36.4	43.3	46.9	56.4	64.4	64.2	65.9	54.7	47.2	31.1	19.4	46.4
1993	15.3	18.4	38.5	44.7	58.8	58.3	59.4	63.2	55.5	46.1	27.0	27.6	42.7
1994	33.8	26.3	40.3	48.1	55.6	59.9	70.1	70.8	60.5	45.2	31.6	24.0	47.2
1995	25.0	34.5	38.0	45.0	53.4	59.0	66.7	64.1	58.0	42.2	36.6	27.2	45.8
1996	22.4	25.3	34.6	45.5	48.2	60.4	69.0	64.9	54.1	44.3	30.6	23.9	43.6
1997	21.4	26.7	35.9	40.8	55.0	59.1	64.9	66.8	58.3	44.9	33.8	25.7	44.4
1998	25.8	31.1	38.2	46.6	55.2	57.4	70.2	68.1	61.6	43.2	36.1	25.0	46.5
POR= 96 YRS	22.1	27.7	35.8	44.9	52.8	59.9	67.5	66.0	56.2	45.0	32.7	24.6	44.6

HEATING DEGREE DAYS (base 65°F) 1998 MISSOULA, MT (MSO)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969-70	69	46	262	763	991	1200	1297	911	942	751	377	140	7749
1970-71	32	12	425	722	928	1313	1195	911	908	600	319	211	7576
1971-72	75	12	386	700	934	1352	1371	1062	749	666	338	133	7778
1972-73	81	39	400	688	936	1416	1343	946	800	651	353	186	7839
1973-74	18	47	262	606	1036	1070	1357	919	910	569	505	103	7402
1974-75	27	60	230	575	903	1147	1302	1184	985	765	483	281	7942
1975-76	9	116	263	657	1032	1213	1141	959	929	554	302	258	7433
1976-77	25	89	231	647	974	1253	1431	918	950	536	450	76	7580
1977-78	59	76	310	637	1001	1245	1259	1050	771	564	511	171	7654
1978-79	67	110	308	604	1141	1515	1841	1099	893	625	389	126	8718
1979-80	37	13	121	517	1130	1043	1506	1018	935	448	318	198	7284
1980-81	53	119	243	603	917	1063	1092	934	768	542	353	228	6915
1981-82	39	16	256	718	963	1266	1351	1182	824	698	425	104	7842
1982-83	71	48	267	611	1072	1304	1079	845	772	607	402	189	7267
1983-84	126	10	413	652	913	1647	1222	947	779	631	479	259	8078
1984-85	37	18	370	692	926	1383	1413	1154	885	513	304	130	7825
1985-86	0	121	429	755	1294	1554	1205	1014	716	637	370	53	8148
1986-87	102	7	358	622	993	1346	1371	956	828	439	273	126	7421
1987-88	87	110	171	604	918	1258	1374	938	820	514	398	118	7310
1988-89	48	36	285	451	915	1300	1180	1377	1000	602	386	124	7704
1989-90	9	114	268	618	828	1262	1035	988	832	511	443	207	7115
1990-91	31	71	92	682	862	1525	1341	839	898	628	419	241	7629
1991-92	12	8	202	628	1031	1187	1185	823	667	536	261	103	6643
1992-93	75	105	304	543	1011	1405	1537	1298	812	603	209	213	8115
1993-94	181	105	285	577	1133	1153	961	1077	758	501	285	184	7200
1994-95	34	7	131	608	996	1263	1233	848	831	593	354	186	7084
1995-96	36	90	228	697	845	1165	1316	1146	938	578	513	155	7707
1996-97	28	76	333	634	1027	1268	1344	1063	895	719	302	175	7864
1997-98	59	28	210	617	930	1210	1208	944	825	546	296	225	7098
1998-	0	23	148	669	860	1234							

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COOLING DEGREE DAYS (base 65°F) 1998 MISSOULA, MT (MSO)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	0	0	0	0	0	25	56	117	22	0	0	0	220
1970	0	0	0	0	0	88	138	104	3	0	0	0	333
1971	0	0	0	0	1	14	146	220	0	0	0	0	381
1972	0	0	0	0	11	47	85	85	0	0	0	0	228
1973	0	0	0	0	0	43	165	124	15	0	0	0	347
1974	0	0	0	0	0	106	128	68	1	0	0	0	303
1975	0	0	0	0	0	0	227	31	0	0	0	0	258
1976	0	0	0	0	0	21	89	41	7	0	0	0	158
1977	0	0	0	0	1	36	92	163	3	0	0	0	295
1978	0	0	0	0	0	14	83	69	19	0	0	0	185
1979	0	0	0	0	0	50	177	146	17	0	0	0	390
1980	0	0	0	0	4	13	74	26	8	0	0	0	125
1981	0	0	0	0	0	10	48	158	10	0	0	0	226
1982	0	0	0	0	0	51	66	83	7	0	0	0	207
1983	0	0	0	0	0	4	43	138	5	0	0	0	190
1984	0	0	0	0	0	16	114	129	12	0	0	0	271
1985	0	0	0	0	11	47	311	39	0	0	0	0	408
1986	0	0	0	0	46	78	32	154	4	0	0	0	314
1987	0	0	0	0	0	69	85	31	7	0	0	0	192
1988	0	0	0	0	5	92	115	85	32	0	0	0	329
1989	0	0	0	0	0	27	209	71	1	0	0	0	308
1990	0	0	0	0	0	58	135	109	26	0	0	0	328
1991	0	0	0	0	0	1	125	157	6	0	0	0	289
1992	0	0	0	0	0	92	55	140	1	0	0	0	288
1993	0	0	0	0	24	18	15	57	4	0	0	0	118
1994	0	0	0	0	0	39	198	194	6	0	0	0	437
1995	0	0	0	0	1	16	96	69	25	0	0	0	207
1996	0	0	0	0	0	23	157	77	12	0	0	0	269
1997	0	0	0	0	1	3	63	95	16	0	0	0	178
1998	0	0	0	0	0	4	167	128	53	0	0	0	352

SNOWFALL (inches) 1998 MISSOULA, MT (MSO)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969-70	0.0	0.0	0.0	T	1.9	8.6	23.5	1.5	9.5	8.2	3.0	0.0	56.2
1970-71	0.0	0.0	T	1.1	4.4	12.7	9.9	3.4	6.3	3.5	T	T	41.3
1971-72	0.0	0.0	T	0.7	13.1	16.7	22.5	15.2	9.9	3.0	0.0	0.0	81.1
1972-73	0.0	0.0	0.2	1.2	4.5	8.9	3.0	2.1	0.5	0.2	T	T	20.6
1973-74	0.0	0.0	0.0	5.4	13.4	13.9	11.1	8.2	4.6	0.3	T	0.0	56.9
1974-75	0.0	0.0	0.0	0.2	2.7	7.5	16.9	20.1	7.1	3.0	T	0.0	57.5
1975-76	0.0	0.0	0.0	5.0	10.4	6.1	8.9	9.9	2.5	2.0	0.0	0.0	44.8
1976-77	0.0	0.0	0.0	0.4	1.2	3.0	10.3	1.8	12.5	1.0	T	0.0	30.2
1977-78	0.0	0.0	T	0.1	9.6	20.6	16.1	6.6	5.2	T	8.1	0.0	66.3
1978-79	0.0	0.0	0.0	0.0	12.3	14.1	20.0	7.1	7.3	1.9	0.0	0.0	62.7
1979-80	0.0	0.0	0.0	T	7.4	3.1	25.5	3.7	11.8	2.2	1.0	0.0	54.7
1980-81	0.0	0.0	0.0	T	0.9	2.1	1.4	8.0	2.0	T	0.0	0.0	14.4
1981-82	0.0	0.0	0.0	1.4	1.2	14.4	27.0	9.7	9.0	6.6	T	0.0	69.3
1982-83	0.0	0.0	0.0	0.5	2.8	10.4	4.8	5.2	0.5	T	T	0.0	24.2
1983-84	0.0	0.0	0.4	0.0	5.6	27.0	4.1	3.6	1.7	T	T	0.0	42.4
1984-85	0.0	0.0	T	3.9	3.3	10.0	2.5	11.8	3.3	0.1	T	0.0	34.9
1985-86	0.0	0.0	0.0	3.5	6.1	6.2	6.2	18.3	0.1	0.1	0.4	0.0	40.9
1986-87	0.0	0.0	0.0	0.0	7.2	7.0	3.9	2.3	7.8	0.2	T	0.0	28.4
1987-88	0.0	0.0	0.0	0.0	2.4	7.5	13.3	3.1	5.6	0.5	0.4	0.0	32.8
1988-89	0.0	0.0	0.0	0.0	7.4	9.0	9.0	9.4	16.3	5.2	0.0	0.0	56.3
1989-90	T	T	T	0.1	1.9	8.8	3.9	6.7	2.7	0.3	T	0.0	24.4
1990-91	0.0	T	0.0	0.4	8.3	17.3	9.4	0.2	7.6	1.9	T	0.0	45.1
1991-92	0.0	T	0.0	3.4	9.7	6.5	6.3	T	0.2	0.1	T	0.0	26.2
1992-93	T	0.0	T	T	4.7	11.4	13.5	12.2	1.1	1.2	T	0.0	44.1
1993-94	T	0.0	0.0	0.0	7.2	5.5	3.4	8.6	0.3	T	0.0	0.0	25.0
1994-95	T	0.0	0.0	0.3	3.4	8.6	4.3	0.9	5.3	T	0.0	0.0	22.8
1995-96	0.0	0.0	0.0	T	9.5	5.9	28.3	1.4	4.6	0.1	0.4	0.4	50.6
1996-97	0.0	T	T	0.7	16.1	54.1	8.6	9.0	16.7	6.0	0.0	0.0	111.2
1997-98	0.0	T	0.0	0.0	2.1	4.0	18.6	2.0	5.5	2.0	T	0.0	34.2
1998-	T	T	0.0	T	9.9	7.6							
POR= 53 YRS	T	T	0.0	0.8	6.0	10.5	12.1	7.3	6.0	2.1	1.0	0.0	45.8

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REFERENCE NOTES:

<p>PAGE 1: THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).</p> <p>PAGE 2 AND 3: H/C INDICATES HEATING AND COOLING DEGREE DAYS. RH INDICATES RELATIVE HUMIDITY W/O INDICATES WEATHER AND OBSTRUCTIONS S INDICATES SUNSHINE. PR INDICATES PRESSURE. CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).</p> <p>GENERAL: T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE. + INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES. BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA. NORMALS ARE 30-YEAR AVERAGES (1961 - 1990). ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM. PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH. POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING. WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED. 0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05. CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET. THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.</p>	<p>GENERAL CONTINUED: CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED. WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH. RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION. AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2. SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL. A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F. DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR. DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY. WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.</p> <p>ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTHS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.</p>
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1998  
MISSOULA,  
MONTANA (MSO)

Missoula is situated in the heart of the Montana Rocky Mountains in the extreme north portion of the Bitterroot Valley, and about 5 miles east of the confluence of the Bitterroot and Clark Fork Rivers. The Clark Fork Valley begins at Missoula and extends about 20 miles west-northwestward. The Bitterroot Valley extends about 70 miles due southward from Missoula. The Continental Divide is 60 to 80 miles east of Missoula, and the Bitterroot Range is only about 20 miles away to the southwest. These two mountain ranges have a marked effect on the climate of Missoula.

The prevailing flow of air aloft over western Montana is from the west and southwest during spring and summer months, and from the west and northwest during the winter months. Since this air must pass over the Bitterroot Range, it loses much of its moisture on the western slopes of these mountains. As a result, Missoula receives only between 12 inches and 15 inches of precipitation annually. This small amount of precipitation makes for a semi-arid climate. There is sufficient irrigation water, however, from the nearby mountains. The heaviest precipitation, of about 2 inches, is received in each month of May and June.

Generally the spring months are cool and a little damp, with almost daily shower activity during May and June. There are about 137 growing days each year. The summer months are dry with moderate temperatures and cool nights. Seldom does the temperature reach 100 degrees. Oppressively warm nighttime temperatures are unknown.

In the winter, the Continental Divide shields the Missoula area from much of the severely cold air which moves down the continent from arctic regions. Because of this shielding effect, many of the cold waves which sweep down over eastern Montana miss the Missoula area entirely. Under certain conditions, however, the cold Arctic air does break over the Continental Divide, and moves with force into the Bitterroot and Clark Fork Valleys. When this happens, Missoula experiences severe blizzard conditions. The cold air is funnelled to the city through Hell Gate which is the mouth of the Clark Fork River canyon at Missoula. Locally these blizzards are referred to as Hell Gate Blizzards. After the valleys of western Montana are filled with the cold air, prolonged cold spells may occur. January is the coldest month, although periods of sub-zero weather occur occasionally in December and February. Rarely, there are brief periods of sub-zero weather in November and March. During the winter months the sunshine is limited to about 30 percent of the possible amount.

# STATION LOCATION

MISSOULA, MONTANA

LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE											* Type	REMARKS	
						SEA LEVEL	GROUND												
							WIND	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY			EMERGENCY
<u>COOPERATIVE</u> Fort Missoula 3.75 miles SW of Post Office	11/01/70	5/31/98		46°51'	114°04'	3150		±5											Location of equipment uncertain for cooperative stations. \$ - Breaks in record prior to 1936 ± - Added 4/1/93.
M.J. Elrod 205 5th Street <u>CITY</u> Montana Building Higgins Ave. & Broadway	6/01/98	10/31/35	3.5 mi. ENE	46°52'	114°00'	3204		5											
Post Office Building Pattee & Broadway	11/01/38	11/30/44	300 ft. E	46°52'	114°00'	3218	91	81	80		77				77				Nearness to mouth of canyon caused winds to reflect local up canyon day winds and down canyon night drainage winds.
<u>AIRPORT</u> Missoula County Airport Temporary Adm. Bldg.	10/01/41	9/30/50	6.5 mi. WNW of P.O.	46°55'	114°05'	3202	32	5	4		4	4		3					CAA to 12/1/44. Excellent instrument location.
Permanent Adm. Bldg. Missoula County Airport	10/01/50	9/04/53	300 ft. W	46°55'	114°05'	3200	33	17	16		15	4		15					
Administration Building Missoula County AP + + Name changed to Johnson-Bell Field in June 1968.	9/04/53	6/24/82	No Change	46°55'	114°05'	#3190	a20	17	16	%71	3	d16 e31		b3	c4	NA			# - 3200 feet to 3/1/60. a - 33 feet to 9/4/53, then 36 feet to 4/5/58. b - Removed 6/61. c - Commissioned 1700 feet S of office 3/1/60, moved to site 1420 feet SSW of office 11/1/65. d - 4 feet to 6/4/69. e - Moved to the roof 12/12/77. % - Commissioned 9/25/62.
NWSO, Johnson-Bell Field	6/24/82	Present	0.5 mi. NW	46°56'	114°06'	3197	32	6	5	23	3	4		4	f5	NA			f - Type change 9/13/85. S ASOS Commissioned 09/01/96

SUBSCRIPTION: Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.  
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