11 Pressure

11.1 General Description

Average sea-level pressure (SLP) is used to standardize surface pressure maps. Pressure is generally reported in units of millibars. Airports report their station pressure in millibars, which is reduced to sea level to ensure a common standard across the world. They also report an equivalent reading in inches of mercury, referred to as the altimeter setting. In Montana, pressure climatology shows little in the way of variation throughout the year. Maximum pressure usually occurs in July during the afternoon while minimum pressure occurs in March during the morning. The differences between average extremes are usually less than 10 mb or 0.33 inches of mercury. Since most weather systems either form north or east of Montana, the state occasionally experiences intense high or low pressures.

The highest pressure recorded in the state generally occurs during the winter under a very cold air mass. The highest pressure in the state occurred at Bozeman on January 9, 1962 (1067.7 mb). The equivalent reading in inches was 30.86-inches. Morning low temperatures were in the -40 to -50°F range in southwest Montana on January 9. Helena reported a value of 1066.5 mb (31.40 inches) this same day. Havre recorded a value of 31.17-inches in February 1899. Temperatures were nearly -60°F in December 1983 when the second highest pressure value in the state was measured at Miles City (1067.3 mb – 31.42 inches). Conversely, deep low pressure is more likely in the far east when strong low pressure areas develop and move northward over the plains. The lowest pressure of record occurred at Glendive when the pressure fell to 971 mb (28.67-inches). This was from a low that developed from the remnants of a west coast tropical storm which evolved into a strong extratropical low over the northern plains. This occurred on September 25, 1986. Table 1 further summarizes highest and lowest values at select locations across Montana.

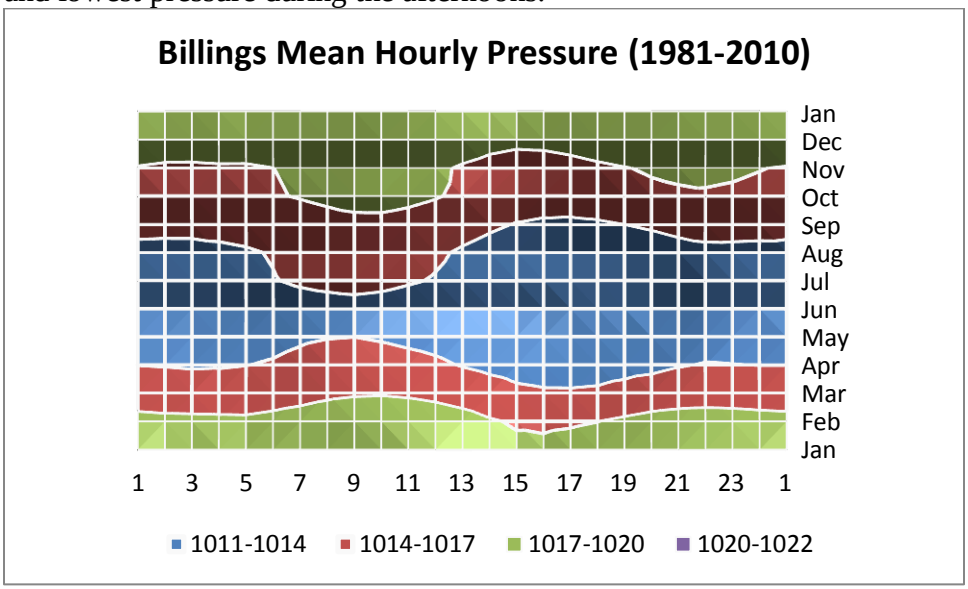
Table 1. Highest and lowest pressure values at select locations across Montana

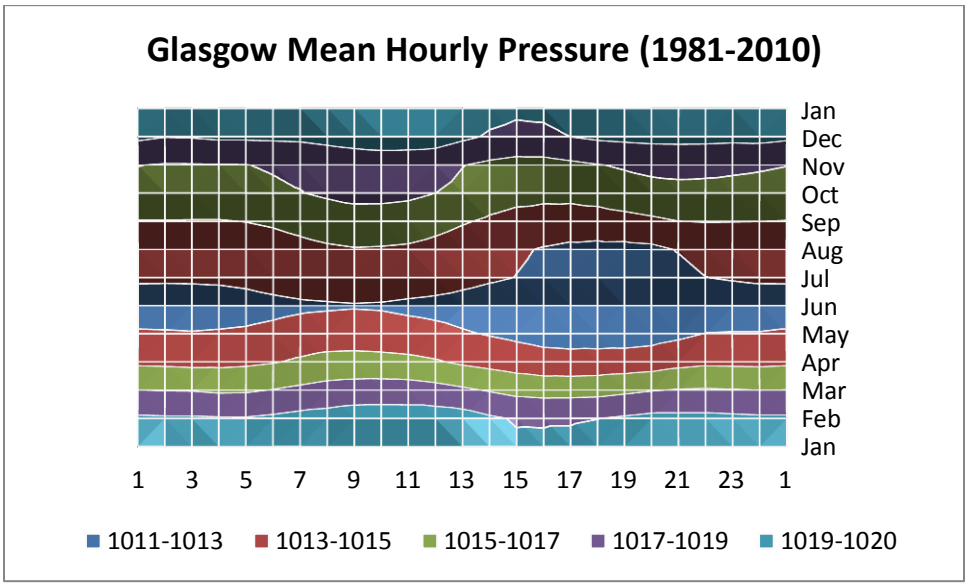
Billings	1058.4 mb	24 Dec 1983	980.3 mb	01 Feb 1963
Bozeman	1067.7 mb	09 Jan 1962	983.4 mb	01 Feb 1963
Butte	1058.0 mb	24 Dec 1983	980.1 mb	28 Jan 2008
Cut Bank	1060.0 mb	24 Dec 1983	980.7 mb	22 Dec 1955
Dillon	1062.3 mb	9 Jan 1962	980.7 mb	15 Nov 1942
Glasgow	1063.1 mb	24 Dec 1983	974.2 mb	25 Sep 1986
Great Falls	1060.6 mb	10 Jan 1962	980.0 mb	15 Jan 1942
Havre	1062.0 mb	23 Dec 1983	975.3 mb	11 Jan 1932
Helena	1058.8 mb	23 Dec 1983	979.4 mb	11 Jan 1932
Jordan	1056.4 mb	07 Jan 2015	989.1 mb	08 Nov 2002
Kalispell	1058.5 mb	09 Jan 1962	980.9 mb	22 Dec 1955
Lewistown	1060.0 mb	24 Dec 1983	976.6 mb	01 Jan 1963
Livingston	1060.5 mb	24 Dec 1983	981.7 mb	09 Mar 2009
Miles City	1067.3 mb	24 Dec 1983	972.0 mb	25 Sep 1986
Missoula	1059.8 mb	10 Jan 1962	980.2 mb	22 Jan 1943

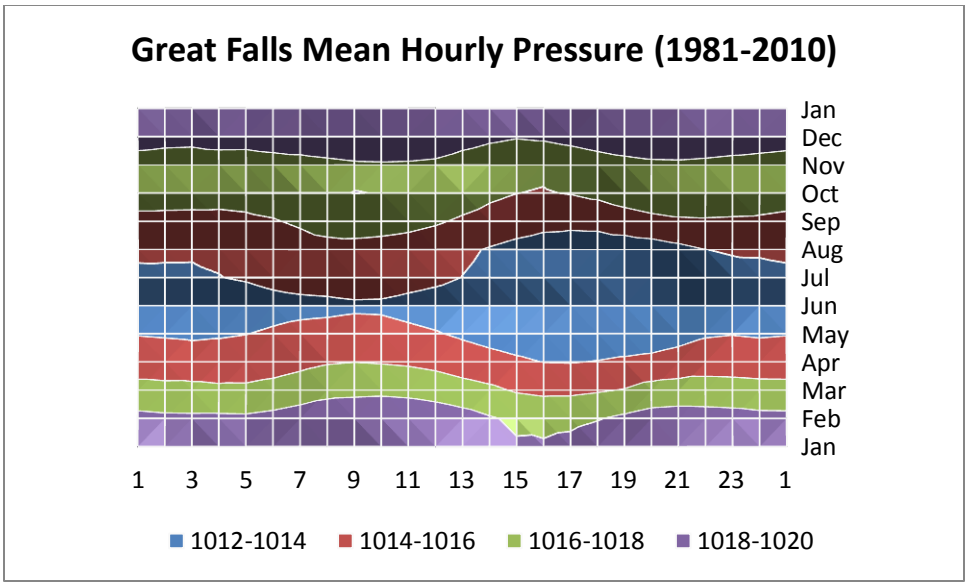
Wolf Point	1057.7 mb	07 Jan 2015	974.6 mb	25 Sep 1986

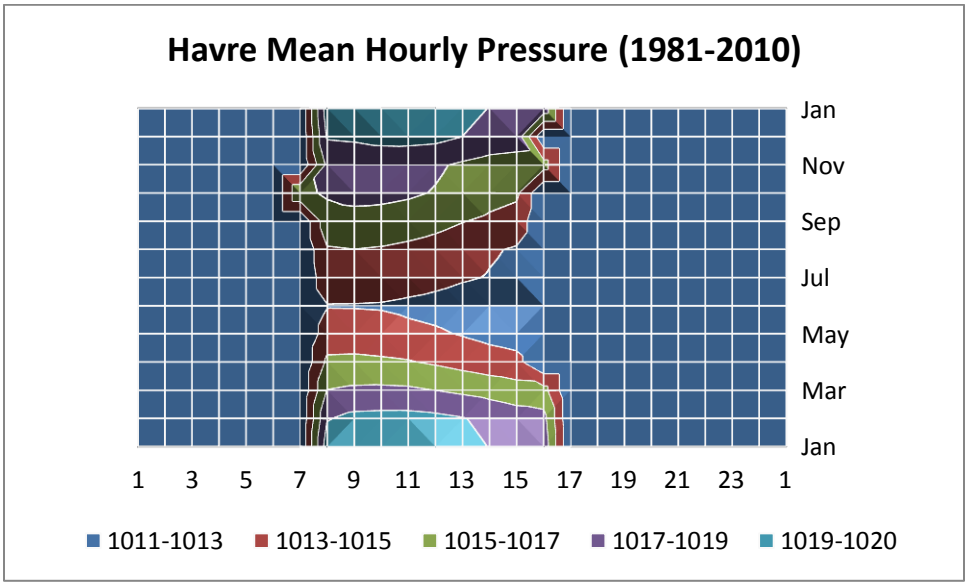
11.2 Mean hourly pressure

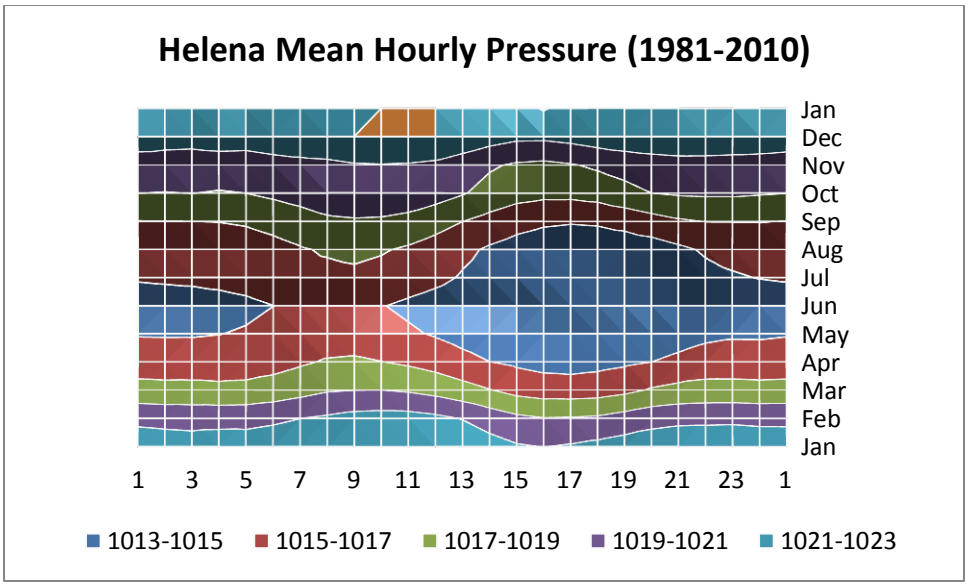
At most locations, the pressure is lowest during the summer and highest during the winter. There is also a diurnal variation with highest pressure during the nighttime hours and lowest pressure during the afternoons.

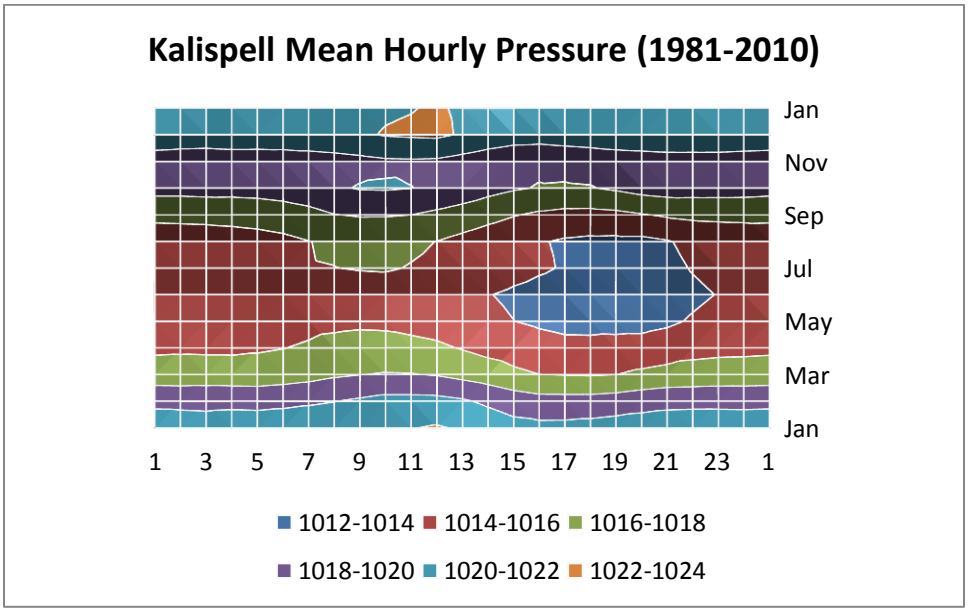


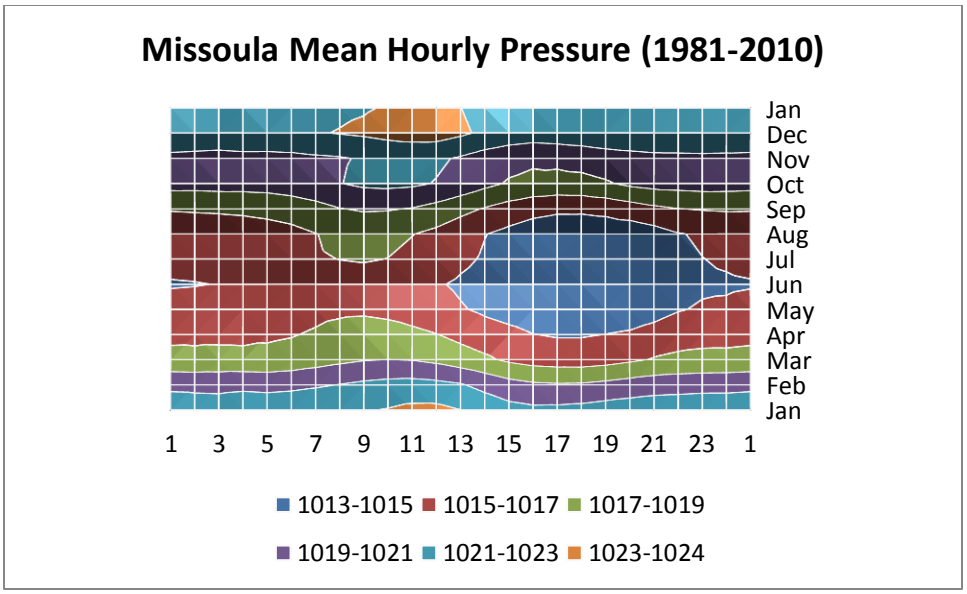



Great Falls Mean Hourly Pressure (1981-2010)
Jan
Dec
Nov
Oct
Sep
Aug
Jul
Jun
May
Apr
Mar
Feb
Jan
1 3 5 7 9 11 13 15 17 19 21 23 1
1012-1014
1014-1016
1016-1018
1018-1020


Havre Mean Hourly Pressure (1981-2010)
Jan
Nov
Sep
Jul
May
Mar
Jan
1 3 5 7 9 11 13 15 17 19 21 23 1
1011-1013
1013-1015
1015-1017
1017-1019
1019-1020


Helena Mean Hourly Pressure (1981-2010)
Jan
Dec
Nov
Oct
Sep
Aug
Jul
Jun
May
Apr
Mar
Feb
Jan
1 3 5 7 9 11 13 15 17 19 21 23 1
1013-1015
1015-1017
1017-1019
1019-1021
1021-1023


Kalispell Mean Hourly Pressure (1981-2010)
Jan
Nov
Sep
Jul
May
Mar
Jan
1 3 5 7 9 11 13 15 17 19 21 23 1
1012-1014
1014-1016
1016-1018
1018-1020
1020-1022
1022-1024



11.3 Extreme pressure areas

Mean sea level pressure values of 1050 mb are usually associated with large and cold air masses. These typically would generate during the winter months. Montana is visited by a 1050 mb or greater high pressure area about every three years. In 2014, Montana had three of these high pressure areas alone!

Deep low pressure areas are as uncommon as strong high pressure areas over Montana. Sea level pressure below 980 mb has been recorded only three times since 1970. The most recent near 980 mb value was March 9, 2009, when Livingston recorded a pressure of 981.7 mb. The lowest annual pressure is closer to 987 mb.