Temperature

1. Daily

Figure 1 can look a little overwhelming, but it is actually fairly simple. All data is from the Fargo, North Dakota airport. The top purple line represents the daily record highs, while the bottom tan line represents the daily record lows. The “steady” dark red line shows the normal daily highs and the steady dark blue line shows the normal daily lows. The final two lines, the lighter red and lighter blue lines, are the daily highs and lows from 2018. What stands out? Look for periods when the daily lows are greater than the normal highs. These would be warm periods. You can see there were not too many, but they fell during January, February, and March (Point A labels one). Warm periods are also represented by days when the daily highs approached or exceeded the record highs. These generally occurred in May and September (Point B labels one). At Fargo, record highs were set on May 24th (92 degrees), May 25th (93 degrees), May 26th (tie 93 degrees), and September 16th (94 degrees). Cool periods can be defined similarly. Point C shows a cold period in early April, but there were others in October and November. Finally, point D shows where several daily lows touched daily record lows. Record lows were set on July 27th (tie 46 degrees) and August 2nd (40 degrees). The highest temperature of 2018 was 94 degrees on September 16th (the highest temperatures typically occur somewhere from May to September), while the coldest temperature of 2018 was –23 degrees on January 5th (the coldest temperatures usually occur in December, January, and February).
2. Monthly

Figure 2 Monthly Temperature Statistics at Fargo, ND

Figure 2 shows how the Fargo monthly average temperatures compared to normal. A month with a red bar indicates the month was warmer than normal, while a month with a blue bar represents a month that was colder than normal. The value above or below the red or blue bar indicates the departure from normal. As an example, in January 2018, Fargo was 1.9 degrees above normal. When comparing the results of Figure 2 with what was seen on Figure 1 (on the previous page), February, March, and April were all below normal. You can see on Figure 1 there were stretches of cold weather throughout these months. The months of May and June were exceptionally warm, with Figure 2 showing the three daily temperature records that were set in May. July, August, and September were fairly normal months, before it turned colder again for October and November. December then turned back to the warmer side. Looking at the top 10 warmest and coldest months on record, the month of April tied the 6th coldest (34.5 degrees), May the 4th warmest (63.6 degrees), June the 6th warmest (70.3 degrees), and October the 7th coldest (40.1 degrees).

3. Yearly

Figure 3 Yearly Temperature Statistics at Fargo, ND

Figure 3 shows how the Fargo yearly average temperature compared to the 1981-2010 normal (the latest 30 year normals). 2018 is on the far right hand side of the graphic, with other recent years shown to the left. A year with a red bar indicates the year was warmer than normal, while a year with a blue bar represents a year that was colder than normal. The value above or below the red or blue bar indicates the departure from normal. For example, in 2008, Fargo was 2.5 degrees below normal. For all the temperature swings in 2018, Fargo ended up 1.2 degrees below normal.

Precipitation

1. Daily

Figure 4 plots the daily precipitation amounts at Fargo throughout 2018. As expected, the daily amounts greater than 0.60 inches typically fell during the “warmer” months of May through September. However, one did occur in early March (A on Figure 4) and another occurred in early October (B). The most liquid equivalent, 1.63 inches, fell on September 20th (C). Daily records were set with 0.89 inches on March 5th (A) and 0.46 on December 27th (D).
2. Monthly

Figure 5 looks at how the Fargo monthly average precipitation compared to normal. A month with a green bar indicates the month was wetter than normal, while a month with a brown bar represents a month that was drier than normal. The value above or below the green or brown bar indicates the departure from normal. For example, in January 2018, Fargo was 0.49 inches below normal. March 2018 became the 10th wettest (1.95 inches), while April became the 10th driest (0.37 inches).

3. Yearly

Figure 6 looks at how the Fargo yearly precipitation compared to the 1981-2010 normal (the latest 30 year normals). 2018 is on the far right hand side of the graphic, with other recent years shown to the left. A year with a green bar indicates the year was wetter than normal, while a year with a brown bar represents a year that was drier than normal. The value above or below the green or brown bar indicates the departure from normal. As an example, in 2008, Fargo was 8.24 inches above normal. 2018 turned out a little drier than normal.

Figure 6 only shows yearly precipitation information for Fargo. Figure 7 gives an areal depiction of the 2018 precipitation across the entire area. Quite a few summer heavy rain events hammered southeast South Dakota, southern Minnesota, and Iowa, with the red colors in those areas showing 2018 precipitation totals above 40 inches. The lowest totals on Figure 7 were across portions of central and northeast North Dakota into northwest Minnesota.
**Snowfall**

1. Daily

![Figure 8 Daily Snowfall Statistics at Fargo, ND](image)

Figure 8 plots the daily snowfall amounts at Fargo throughout 2018. The highest snowfall amounts are usually associated with Colorado Lows, which are more typical in October and November and again in March and April. The most snowfall, 6.3 inches, fell on March 5th, which set a new record for that date. A daily record also occurred on December 27th, with 4.9 inches.

2. Monthly

![Figure 9 Monthly Snowfall Statistics at Fargo, ND](image)

Figure 9 plots the monthly snowfall amounts at Fargo throughout 2018. The most snowfall, 19.4 inches, fell in March, which was the 3rd most snow ever in March.

No yearly snowfall amounts are shown here. Since the snow season actually crosses years (2018-19), it is not a true calendar year statistic.

**Snow Depth**

![Figure 10 Daily Snow Depth at NWS Grand Forks, ND](image)

Figure 10 plots the daily snow depth at the National Weather Service in Grand Forks throughout 2018. The snow depth measurement is taken at 6 am each day. The snow depth went to zero in mid April. There was a Winter Storm in early October, which brought an early snow cover to the Grand Forks area. A late December Winter Storm also brought a lot of snow to Grand Forks.
Other Stations

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Table 1 Miscellaneous 2018 Daily Statistics for Various Climate Sites

Figure 11 shows the number of days in each month during 2018 with an average wind speed greater than 15 mph at both the Grand Forks and Baudette airports. Grand Forks, being in the flat ancient Lake Agassiz bed, is quite a bit windier than Baudette, which is located in tree covered terrain. The winter, spring, and fall months tend to have the most wind. Looking at Figure 12, the 2018 Grand Forks data can be compared to the past five years. 2018 was a typical year wind-wise.

2018 will go down in the books as a fairly normal year. Looking at Table 2, for yearly average temperature, Fargo ended up at 41.2 degrees, or 1.2 degrees below normal. Other stations shown in Table 2 varied from a little above normal to a little below normal. Fargo had 21.63 inches of precipitation, ending up 0.95 inches below normal. At Fargo, neither the yearly average temperature or the yearly precipitation made it into the “top ten” list.

![Graph showing wind statistics](image-url)

![Graph showing yearly statistics](image-url)

Figure 11 Windy Days at the Grand Forks & Baudette airports in 2018

Figure 12 Windy Days at the Grand Forks airport since 2013

Although the most detailed records exist for the Fargo-Moorhead climate site (FAR) and the National Weather Service site in Grand Forks (NWS GF), some information is also kept for a few other sites (DVL = Devils Lake, GFK = Grand Forks airport, BDE = Baudette, PKD = Park Rapids). Table 1 shows from left to right, the highest temperature and date, lowest temperature and date, highest daily precipitation and date, highest daily snowfall and date, and highest wind speed and date.

![Table showing miscellaneous 2018 yearly statistics](image-url)

Table 2 Miscellaneous 2018 Yearly Statistics for Various Climate Sites
Other Statistics

1. Warnings

Figure 13 Various Warnings Issued by the NWS Grand Forks, ND

Figure 13 plots various warnings issued by the NWS in Grand Forks throughout the year. The scale (the length of the various vertical bars) doesn’t match for all the warnings. The winter, spring, and fall warnings are shown with hollow vertical bars. Winter Storm Warnings (WS) are shown by the hollow black vertical bars, Blizzard Warnings (BZD) are shown by the hollow light blue vertical bars, Red Flag Warnings (RFW) are shown by the hollow red vertical bars, and River Flood Warnings (FLW) are shown by the hollow green vertical bars. The numbers of each product issued that month are shown above the associated vertical bar. As an example, in March 2018, there were 3 Winter Storm Warnings issued. For River Flood Warnings, only warnings above moderate flood stage were shown.

The summer convective warnings are shown with filled in vertical bars. Tornado Warnings (TOR) are shown by the solid red vertical bars, Severe Thunderstorm Warnings (SVR) are shown by the solid orange vertical bars, and Flash Flood Warnings (FFW) are shown by the solid green vertical bars. Again, the numbers of each product issued that month are shown above the associated vertical bar. As an example, in June 2018, there were 2 Flash Flood Warnings issued. This chart is just a neat way to look at when and how many warnings were issued throughout the year. Now let’s take a closer look at some of the individual warning types.

2. Winter Storm Warnings

Figure 14 Winter Storm Warning 1 (January 10-11)

Figure 15 Winter Storm Warning 2 (February 18)
Figures 14 to 20 show snowfall totals from the seven Winter Storm Warnings that were issued in 2018. Winter Storms 1 and 2 (previous page) targeted the New Rockford to Mayville to Bemidji areas, Winter Storm 3 brought widespread snow to the area, Winter Storms 4 and 6 brought heavy snow to small areas, and Winter Storm 5 affected the Lisbon to Wahpeton to Wadena areas. The final Winter Storm of 2018, from December 26th to 28th, brought the most snow to southeast North Dakota into adjacent areas of west central and northwest Minnesota.
3. Blizzard Warnings

There were three blizzards in 2018. Blizzards 1 and 3 mainly targeted the Red River Valley (the red area in Figures 21 and 23). Blizzard 2 targeted eastern North Dakota and the Red River Valley (the red area in Figure 22). Blizzards are usually the highest impact winter event, and can shut down travel across wide stretches of country. Blizzard 2 occurred during the post Christmas travel period, forcing many travelers to adjust their plans accordingly.

Traditionally, the Red River Valley is where most blizzards occur. Figure 24 shows the number of blizzards per county, covering the winters of 2008-09 through 2017-18. The graphic clearly shows the higher number of blizzards in the immediate Red River Valley. It is pretty rare to have a blizzard east of the Red River Valley, where there is more terrain and trees.

Finally, Figure 25 shows what the primary wind direction is for the blizzards that cover the same time period as Figure 24. GFK is the Grand Forks airport and FAR is the Fargo airport. The lines extending from the circle at each of these points represents the direction the wind blows from. At both Grand Forks and Fargo, the primary wind direction is from the north-northwest.
4. Red Flag Warnings

Figures 26 to 31 show the six Red Flag Warnings that were issued by the NWS in Grand Forks during 2018. Red Flag Warnings are issued for dangerous fire weather conditions (low humidity, strong winds, dry fuels). All six warnings were issued after the snow had melted in the spring and before the green-up.

5. River Flood Warnings

Looking at all of eastern North Dakota and the northwest quarter of Minnesota, the spring flood of 2018 was fairly benign. However, there were a few areas that were affected. Four Flood Warnings were issued for moderate flooding: the Red River at Oslo, the Snake River at Warren and Alvarado, and the Goose River at Hillsboro. Hydrographs for Oslo (Figure 32) and Hillsboro (Figure 33) are shown below.
6. Severe Thunderstorm Warnings

Looking back at Figure 13 on Page 6, the number of Severe Thunderstorms Warnings (SVR) issued by month in 2018 are shown. June was the most active month, with 72 Severe Thunderstorm Warnings issued. These tapered off each month through September. Figure 34 breaks the totals shown in Figure 13 into county based information, or the number of Severe Thunderstorm Warnings issued by county in 2018. The highest total was 37 in Polk County, Minnesota (value underlined), and the lowest total was 5 in Kittson County, Minnesota. You can compare this year to last year (Figure 35).

7. Tornado Warnings

Looking back at Figure 13 on Page 6, the number of Severe Thunderstorms Warnings (SVR) issued by month in 2018 are shown. June was the most active month, with 72 Severe Thunderstorm Warnings issued. These tapered off each month through September. Figure 34 breaks the totals shown in Figure 13 into county based information, or the number of Severe Thunderstorm Warnings issued by county in 2018. The highest total was 37 in Polk County, Minnesota (value underlined), and the lowest total was 5 in Kittson County, Minnesota. You can compare this year to last year (Figure 35).
Looking back at Figure 13 on Page 6, the number of Tornado Warnings (TOR) issued by month in 2018 are shown. June was the most active month, with 16 Tornado Warnings issued. These tapered off each month through August. Figure 36 breaks the totals shown in Figure 12 into county based information, or the number of Tornado Warnings issued by county in 2018. The highest total was 5 in Cass County, North Dakota (value underlined). You can compare this year to last year (Figure 37).

![Figure 38 Confirmed Tornadoes in 2018](image)

**KEY**

- **T** = June 8 (7 tornadoes) **black**
- **T** = June 14 (3 tornadoes) **red**
- **T** = June 28 (1 tornado) **red**
- **T** = June 29 (4 tornadoes) **green**
- **T** = July 4 (3 tornadoes) **magenta**
- **T** = July 8 (1 tornado) **tan**
- **T** = July 11 (3 tornadoes) **black**
- **T** = August 26 (3 tornadoes) **blue**

Each T in Figure 38 represents the approximate location of each confirmed tornado in 2018. The various colors of each T are broken down in the **KEY**. Basically each color represents a different date, so 25 tornadoes occurred on eight different dates in the summer of 2018. Each T shows the approximate location of the tornado, but it does not show the actual track.

Two long track tornadoes occurred on August 26th, both in Minnesota. The first one touched down about 9 miles southwest of Winger at 1030 pm CST and lifted about 4 miles northwest of Fosston at 1049 pm CST (~21 miles). The second one touched down 3 miles north-northeast of Fosston at 1051 pm CST and lifted about 9 miles north-northeast of Leonard (~26 miles).
How did the number of Tornado Warnings (TOR), Severe Thunderstorm Warnings (SVR), and Flash Flood Warnings (FFW) issued during the summer of 2018 compare to previous years? Figure 39 shows this comparison. The number of Severe Thunderstorm Warnings increased from some of the lower years, the number of Tornado Warnings was about average, and the number of Flash Flood Warnings was fairly low. Looking at the summer as a whole, there were a few very active days with quite a few warnings issued. In addition, there were some very inactive periods, which sometimes stretched for a few weeks.

7. Drought

The U. S. Drought Monitor is one way to monitor drought. This product is issued weekly throughout the year. Figures 40 to 43 show the Drought Monitor at four different points in 2018, with the key shown to the left. There was a particularly dry stretch in the late summer and early fall of 2018, where D2 and D3 drought conditions spread from areas south of Devils Lake into portions of the northern Red River Valley. (S = short term impacts, typically less than 6 months, L = long term impacts, typically greater than 6 months)

8. Solar Radiation

Figure 44 shows the amount of solar radiation measured daily in 2018 near Goodridge, Minnesota. The peak amounts of radiation are received in June, with the least amounts in November, December, and January. In 2018, there was an early October Winter Storm. Figure 44 shows low amounts of solar radiation in early October due to thick cloud cover. After this early October Winter Storm, it almost seemed like an additional month was added to the cold season.