

# North Dakota's Climate

THE COCORAHS 'STATE CLIMATES' SERIES

## North Dakota – Land of Climatic Extremes

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North Dakota's climate is characterized by large temperature variations across all time scales, light to moderate, irregular precipitation, plentiful sunshine, low humidity and nearly continuous wind. Its location at the geographic center of North America results in a strong continental climate, which is exacerbated by the mountains to the west. The mountains greatly reduce maritime effects on North Dakota's climate by blocking some of the cool, moist Pacific Ocean air masses from moving eastward, or by extensively modifying the temperature and water content of those that do move eastward. However, there are no barriers to the north or south, so air masses from these directions easily overflow the state with little temperature or water content modification. Thus, in every season, and in every year, cold, dry air masses originating in the far north, warm, humid air masses originating in tropical regions, or modified mild, dry air masses from the northern Pacific regularly overflow the state. Movement of these air masses and their associated fronts causes nearly continuous wind and often results in large day-to-day temperature fluctuations in all seasons. This temperature variation is perhaps the most important feature of North Dakota's climate.

The annual average temperature ranges from about 37 degrees Fahrenheit ( $^{\circ}$  F) in northeastern North Dakota to 44 $^{\circ}$  F along most of the southern border. However, annual averages are misleading because they hide the large seasonal temperature variations common throughout the state. January is the coldest month with average temperatures ranging from near zero in the northeast to 15 $^{\circ}$  F in the southwest. The warmest month is July, when average temperatures range from 65 $^{\circ}$  F in the northeast to 72 $^{\circ}$  F in the south. However, average August temperatures are only a degree or two less than July's. The average annual temperature range (difference between July and January average temperatures) is very large, ranging from about 65 $^{\circ}$  F in the east and northeast to 56  $^{\circ}$  F in the southwest. It clearly illustrates the pronounced continental climate of the region.

Average annual precipitation ranges from about 14 to 22 inches from northwestern to southeastern North Dakota. This increase reflects the decreasing distance to the Gulf of Mexico, which is the water source for most of the state's precipitation. On an average, about 75 percent of the annual precipitation falls during the crop-growing season, April to September, and 50 to 60 percent falls during April through July. The coldest months, November through February, average only about 0.50 inch per month, mostly as snow. Measurable precipitation (0.01 inch or more) occurs on an average of 65 to 100 days during the year, but over 50 percent of these events produce less than 0.10 inch.

Despite its northerly location, North Dakota's annual snowfall of 25 to 45 inches is less than other northern states. Winter snowpack, although persistent from December through March, averages only 9 to 15 inches from southwest to northeast. Contrary to widespread belief, blizzards are not frequent events in North Dakota. On the average there are only two to three blizzards per year in the state. In addition, blizzard conditions seldom last more than two days, although a few famous ones have persisted for four days. During blizzard conditions, advancing cold air is accompanied by strong winds that quickly fill the air with fine snow that reduces visibility to only a few feet at times. Even today, when blizzards strike, travelers and snowplows seek shelter as major highways are closed. Although blizzards were rare in the 1980s and most of the 1990s, during the winter of 1996 - 1997 there were nine blizzards and four winter storms, producing all-time record snowfalls of 60 to 120 inches over most of the state.

For more information on North Dakota's climate, please visit the North Dakota Climate Office website at:  
<http://www.ndsu.edu/ndSCO/>