

Colorado's Climate

THE COCORAHS 'STATE CLIMATES' SERIES

Climate -- Rocky Mountain High

By Nolan Doesken, State Climatologist

In a nutshell, Colorado is relatively dry, low humidity and a very sunny state with relatively comfortable temperatures. But there is much more to the story. Colorado covers about 104,000 square miles and is the 8th largest state. It straddles the many mountain ranges that form the crest of the Rocky Mountains with over 50 individual peaks taller than 14,000 feet and hundreds more topping 13,000 feet. West of these ranges are plateaus, valleys, and canyons including the Colorado River valley and its tributaries. The state is the headwaters for several great Rivers -- the Colorado, the Rio Grande, the Arkansas and the Platte. While Colorado is best known for its mountains, nearly half of the state is high-elevation plains. Colorado is the highest elevation state in the union, averaging close to 7,000 feet above sea level.

Colorado is interior to the North American continent far from the moderating effects of oceans. So the state is prone to large daily and seasonal swings in temperatures. The mountains have a huge effect on the climate -- producing dramatic local temperature differences and complex precipitation patterns. The high mountain ranges along the Continental Divide help harvest moisture from the Pacific Ocean during the winter months that might otherwise just blow over. Likewise, the mountains also help trigger summer thunderstorms and occasionally block moisture moving northward from the Gulf of Mexico producing infrequent but sometimes heavy rain over the eastern half of the state.

Colorado is unique in its diverse seasonal patterns in precipitation. Mid winter is the wettest time of year in the highest mountains while early summer is the driest. Nearby in eastern Colorado winter is the dry season while early summer can be wet. Spring is the wettest season for some of the eastern foothills. May is the wettest month for Denver and northeastern Colorado while June is the wettest month in the prime agricultural counties of far northeastern Colorado. July is the wettest month on average for most of southeastern Colorado and southern Colorado's mountain valleys, while August is often the wettest month for far southwestern Colorado. The autumn months are typically the wettest months of the year in Colorado's westernmost valley -- and then we're back to winter again.

The central Rockies, not surprisingly, are drier than the Sierra and Cascades, but still average 20" to 45" of precipitation annually and locally over 50" in a few spots near Wolf Creek Pass in southwestern Colorado. The wettest region of the state is the Park Range east of Steamboat Springs where average annual precipitation approaches 60". Winter begins early and lasts into April and May at the higher elevations with much of the annual precipitation falling as snow. Seasonal snowfall totals in the mountains range from 75-150" in the valleys to 200" to over 500" in the snowier mountains. At lower elevations more of the annual precipitation falls as rain. A few areas of west central and southeast Colorado get less than 25" of snowfall annually, on average.

The mountains create strong rain shadow effects. Colorado's eastern plains average between 12 and 18" of precipitation annually. The driest areas are in interior valleys where some locations get less than 10 inches of moisture annually. The driest city is Alamosa in south central Colorado averaging only about 7". While Colorado's wettest areas are limited to the higher elevations of the state, the heaviest rainstorms occur at lower elevations especially east of the mountains. Heavy downpours are infrequent but are possible anytime from March and April into early October. The heaviest rain ever reported in Colorado occurred near the Kansas border back in May 1935 when close to two feet of rain fell in one day. Events that

extreme are rare, but Colorado does have a history of dangerous flash floods. Back in 1976 an intense late-July storm over the eastern foothills dropped over 10" of rain west of Loveland. This resulted in the infamous "Big Thompson Canyon flash flood" that claimed at least 140 lives. In 1997 more than 12" of rain fell in a few hours over portions of the City of Fort Collins. This storm helped motivate the CoCoRaHS network.

Temperatures are controlled by elevation, latitude and topography. Chinook winds (westerly winds blowing down the east slope of the Rockies) can bring dry, and surprisingly mild air even in midwinter east of the mountains, but can be quickly replaced by cold air coming down across the High Plains from Canada. Temperature changes of 60F or more are not uncommon. Western Colorado sees more moderate temperature changes, which is why there is a wonderful fruit tree and vineyard area on the slopes of the Grand Mesa near Grand Junction.

The hottest temperature ever reported in Colorado at an official National Weather Service cooperative weather station was 114 F at lower elevation sites east of the mountains -- Las Animas on July 1, 1933 and Sedgwick on July 11, 1954. In most years temperatures climb to 104 F or higher for a few days each summer in southeast Colorado and at least 100 F near Grand Junction in western Colorado. Temperatures get cooler as you go up in the mountains. In the higher mountains above 10,000 feet, summer high temperatures rarely reach 80 F while atop the highest peak only a few days each year see temperatures in the 50's.

The coldest temperature officially measured was -61 F at Maybell in the Yampa River Valley in NW Colorado on February 1, 1985. While average and daytime temperatures decrease with elevation, the coldest nighttime temperatures have all been measured in mountain valleys. The perennial cold spot in Colorado is the Taylor Park weather station not far from Gunnison and Crested Butte. This location has seen temperatures of -35 F or colder in most winters, although the cold has been less extreme in recent years. While infrequent, extreme cold can also grip the eastern plains. Many locations have seen temperatures of -30 F or colder a few times in the past century, but most winters have only a few days when the temperature dips below zero.

The nearby mountains and the high elevation plains create an ideal environment for summer thunderstorm development when sufficient humidity is present. Portions of eastern Colorado are among the nation's most hail prone areas with several areas averaging over six hail days per year. Cloud watching can be glorious in Colorado with wide expanses and generally clear air. But late spring and summer storms can be severe, especially over eastern Colorado. Colorado is not in the nation's main "Tornado Alley" but tornadoes are spotted every year and can be very dangerous.

For more information on Colorado's Climate please visit the Colorado Climate Center website at: <http://ccc.atmos.colostate.edu/>