January Weather Wrap

By Bill Kappel

Temperatures were slightly cooler than normal and precipitation was right at normal for January, but the big weather event of the month was the damaging Chinook winds that developed on the 9th.

The month was book-ended by cold air, with lows well below zero from the 4th through the 7th and again from the 26th to the 27th. We also had our normal "January thaw" late in the month.

The new year started off cold and a little snowy, but we are still waiting for a big snowstorm to affect the region. The first two days of the new year saw slightly above-normal temperatures and dry conditions. Highs reached into the low to mid-40s, with overnight lows in the low teens. But these were the last above-normal temperatures for the remainder of the first week of the year. A strong push of Arctic air moved into the region around 3:30 p.m. on the 2nd. This held temperatures in the teens and low 20s for highs on the 3rd with low clouds, fog, and a few flurries developing.

However, that was a shallow air mass, so the next morning, that cold air drained away briefly from the high areas of the Palmer Divide (generally above 7,000 feet). This resulted in an unusual situation where we were warmer, reaching the low 40s, than the lower elevations to our north and south, known as an inversion. The lower elevation regions were stuck in the shallow layer of cold air, with highs only reaching the teens and low 20s. But, by early that afternoon, a stronger and deeper push of cold air rushed back in and this time there was no escaping for us. Temperatures quickly tumbled below zero that evening and didn't warm much the next afternoon.

Highs only managed to reach the mid-single digits on the 5th with light snow falling most of the day. Most areas received 2-6 inches of powdery snow, just enough to cause driving problems and require driveways to be cleared. Skies cleared out that evening and, with the cold air in place, combined with very efficient radiational cooling, temperatures plummeted to record levels. Lows reached 15-25 degrees F below zero for many spots; thank goodness the wind wasn't blowing too. During the period starting from the evening of the 4th through the morning of the 7th, temperatures reached below zero each day, a pretty long stretch of cold for us. A slow warming trend returned over the next few days, just in time for the weekend. Temperatures were in the low 30s on Saturday, and then back to normal levels by Sunday afternoon as highs reached the mid-40s.

The second week of January was mild and dry compared to the first week of the month, but there was plenty of excitement during that week. Temperatures reached the mid-40s to low 50s each afternoon from the 8th through the 11th, but these mild temperatures were aided by strong westerly winds, known as Chinook winds in our region. The term is derived from the name of the Native American tribe along the West Coast (Chinook) and has been used to reference the situation where strong, warm winds occur and melt snow very efficiently. The term Chinook is there also known as "snow eater" because of how efficiently the dry and warm winds melt snow. This type of weather pattern is very common along the Front Range of the Rockies, and occurs several times per year in our region.

Normally, the winds are relatively well-behaved, with only minor inconveniences for our area. This time was different. Winds peaked across the region from the morning through the afternoon of the 9th. During this 12-to-18-hour period, winds consistently gusted over 60mph. The winds set a new all-time record at the Colorado Springs Airport when an 80mph gust occurred. Areas along the west slopes of Cheyenne Mountain reached over 100mph. These strong, Chinook winds not only melted most of the snow that had accumulated the previous week, but also caused significant damage in the area and caused havoc on the roadways.

The usual Chinook winds were enhanced this time by two factors. First, a very strong jet stream (winds around 16,000 feet above the surface) was moving over the region at the same time the atmospheric profile forced the winds that normally stay aloft to be deflected down to the surface. Imagine the Rocky Mountains acting like rocks on the bottom of a stream and the airflow acting like the water flowing over them. In this case, the Rocky Mountains cause ripples in the airflow. Normally, the up-and-down motion never reaches the ground because it can move freely into the higher atmosphere. But the ripples were forced to the surface because there was a lid on the atmosphere (known as a stable layer). Also, the air was colder than surrounding air to start off with (meaning denser). This allowed it to accelerate downward and was enhanced as it "flowed down the east slopes of the Front Range. As the air descended, it warmed up and dried out (the reason it is so efficient at melting snow). Also unusual was the duration that these key factors were in place over our region. The duration and intensity of the event combined to produce the dangerous and damaging conditions we experienced.

Colder air moved into the region that evening and changed the atmospheric profile enough to stop the damaging winds, but intensive winds still continued on the 10th as cold air rushed into the area. Another quick push of cold air ended the strong westerly flow on the 12th and cooled temperatures back to below normal levels, as highs only reached the low 30s that afternoon.

Temperatures jumped back to the low 40s the next two days as a storm system began to affect the region. This storm originated in the Southwest, so there wasn't much cold air associated with it. This led to wet snow (especially by January standards). The storm affected the region with various rounds of snow moving through the region over the three-day period, with 3-6 inches of snow accumulating.

The week of Jan. 16th started off cold and snowy, with highs holding in the upper 20s that afternoon as light snow accumulated to about 2-3 inches in the area by early evening. The storm departed quickly, and sunshine returned over the next few days. Temperatures also moderated, reaching the low 40s on the 17th, the mid-40s on the 18th, and low 50s on the 19th. But another quick-moving system rolled in late on the 19th and brought some light snow just in time for the morning commute on the 20th. This made for some slippery roads, as 1-2 inches of snow fell that morning. Temperatures also cooled back to normal and slightly below normal level through the remainder of the weekend, with mid- to upper 30s each afternoon.

The last week of the month started cold, then warmed up nicely through the end of the month. Temperatures were seasonal from the 22nd through the 24th, with highs reaching the upper 30s and low 40s. There were plenty of high clouds around each day, but nothing that would produce any precipitation. This quiet weather pattern was interrupted during the early morning hours of the 24th, as a push of cold air moved in before sunrise. This cold front was shallow and lacked any significant moisture or associated storm energy. Therefore, we mainly saw fog and low clouds that day with a few flurries at times. The cold air stuck around for the next few days, holding temperatures well below freezing during the day and touching below zero overnight.

A few areas of light snow developed each afternoon, as the atmosphere was just unstable enough to squeeze out any moisture available. Temperatures held below freezing from the evening of the 23rd through the morning of the 28th, but only about a half inch of snow accumulated during the period. This cold air mass was quickly replaced by high pressure moving in from the west that brought with it mild air. Temperatures reached the low 40s on the 28th, then the warmest temperatures of the month moved in from the 29th through the 31st as highs reached the low to mid-50s each afternoon.

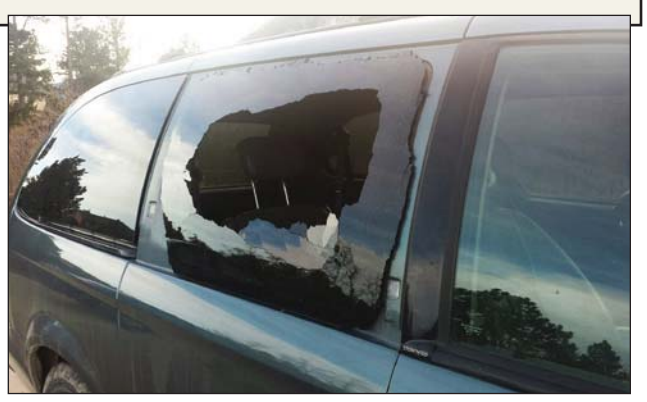
From Jan. 8-11, the extreme Chinook winds got our attention. Even seasoned Colorado residents kept saying they had never seen anything like this before. On Jan. 9, the Colorado Department of Transportation (CDOT) imposed a high-profile vehicle restriction from Monument to the New Mexico border. CDOT reported that at least 16 semi-trucks blew over onto their sides on I-25 alone. Among countless downed trees, a 75-foot pine blew down on Palmer Divide Avenue east of Highway 83. Flying debris smashed windows, buildings, and into people. A woman in Woodmoor reported that a flying piece of metal smashed through the back window of her car, where she had two pups in the back seat; they were upset but unharmed. People lost greenhouse panels and trampolines, and the wind destroyed storage sheds or moved them off their foundations. And parents had to collect their students from school using their own cars, since school bus service was canceled in the afternoon to avoid those high-profile vehicles blowing over.

The El Paso County Office of Emergency Management set up a helpline at 575-8888 for residents who needed resources, or for senior or disabled residents who needed help with debris cleanup, which was done by the county as well as local volunteer groups coordinated by the South Central Colorado chapter of Voluntary Organizations Active in Disaster (VOAD). To see how your volunteer organization's skills can be connected with this network in future emergencies, contact Isaac Ring at coscrvoad@gmail.com.

CDOT reminded motorists to consult the department's traveler information tools when they have questions: See www.COTRIP.org to view road conditions, travel alerts, and track snow plows. Call 511 anywhere in Colorado for periodically updated road conditions, or sign up for GovDelivery text or email alerts.

Above: High-profile trucks waited on the side of I-25 ramp during the high winds. *Photo by Jackie Burhans.*

Below: Sand blasted right through Patrick and Becky Burkart's car window. *Photo by Audrey Burkart.*



A look ahead

February is often a dry and cold month for the region as we move toward the snowy and unsettled conditions of March and April. Precipitation averages less than an inch, with average high temperatures in the 30s. It can get very cold in February with Arctic air making strong pushes into the region, but days begin to get a little longer, which leads to some nice, sunny days and snow melts faster.

January 2017 Weather Statistics

Average High	**38.1°** (-2.0°)
100-year return frequency value max **48.4°** min **30.8°**	
Average Low	**12.9°** (+0.3°)
100-year return frequency value max **26.6°** min **6.6°**	
Highest Temperature	**56° on the 31st**
Lowest Temperature	**-15° on the 6th**
Monthly Precipitation	**0.59"**
	(-0.12" 17% below normal)
100-year return frequency value max **1.56"** min **0.01"**	
Monthly Snowfall	**11.3"**
	(-2.0", 15% below normal)
Season to Date Snow	**53.6"**
	(-27.3", 49% below normal)
(the snow season is from July 1 to June 30)	
Season to Date Precip.	**7.49"**
	(-4.14", 26% below normal)
(the precip season is from July 1 to June 30)	
Heating Degree Days	**1225** (+34)
Cooling Degree Days	**0**

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