THE RADAR POST

NWS GOODLAND'S NEWSLETTER SINCE 2017

Message from the MIC

It is hard to believe that wintry weather has begun across the Tri-State Region and that 2020 is coming to an end. The NWS office in Goodland is ready for whatever winter brings this season.

As winter progresses, it is important that people across the Tri-State Region provide us accurate snowfall measurements. We developed winter weather training to help people measure snow. The training can be found on the Goodland National Weather Service YouTube page at: https://www.youtube.com/watch?v=yUbel43T5lI. These measurements will greatly assist us during the storm by providing actual amounts on the ground. Our dedicated staff are here around the clock and through the holidays for the protection of life and property and enhancement of the economy.

Even though winter has begun, our staff is also preparing for the severe weather season, which is just around the corner. WFO Goodland staff are excited to see how we might be able to help you in 2021.

Be on the lookout for updated communications in 2021, as your local NWS office is working for you.

Ed Holicky
Meteorologist-In-Charge

INSIDE THIS ISSUE

Photo by Ed Holicky

Two Early Snow Systems

To say that this year has given us a few surprises would be quite the understatement. The weather, apparently not wanting to be left out, has also thrown in its fair share of twists and turns. This section will be looking at the two early season snowfalls we received: the first on September 8-9th and the other on October 25-26th.

September 8-9th, 2020
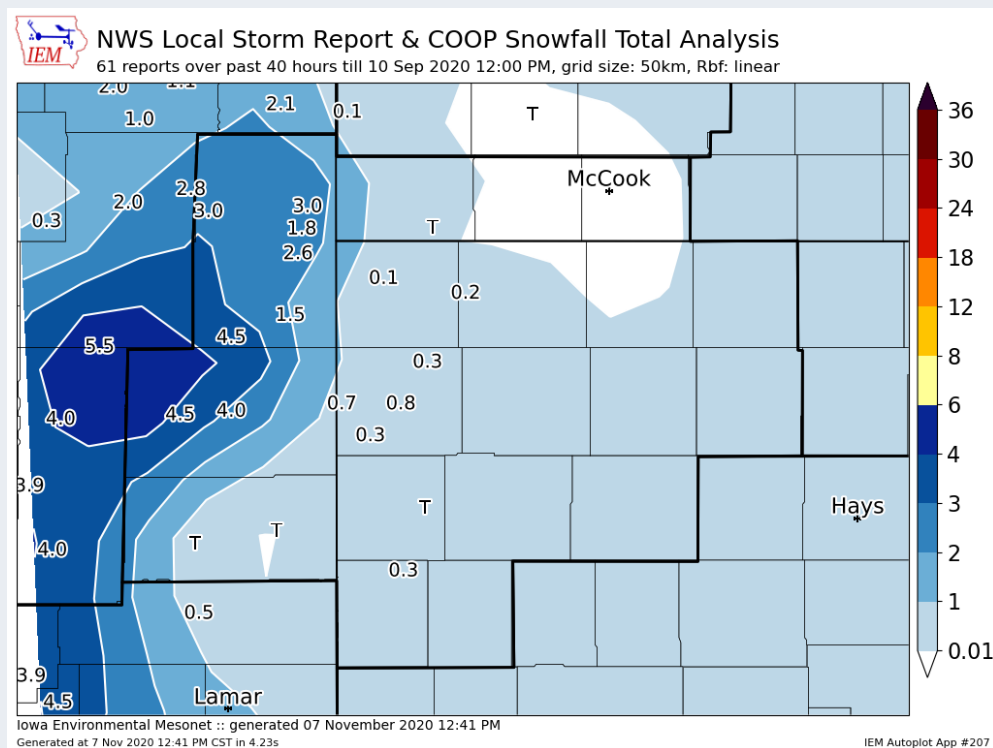
* Image from Iowa Environmental Mesonet. Some shaded areas may not fully be representative of what happened.

Going back to the beginning of September, most would have probably laughed at the idea of a snow storm on this day. Using Goodland as an example, high temperatures during the prior week were in the 80's and 90's with the weekend getting into the upper 90's on Saturday and 100°F on Sunday. The area had been relatively hot and dry for quite a few days with cold fronts only dropping temperatures slightly when they passed through the area. So imagine the surprise as a forecaster when, in the time period of a few days, you are beginning to predict record hot temperatures followed up by record low temperatures with a chance for snow.

Early snow systems, cont.

   But as the days went on and the event got closer, the cold front with the arctic air behind it took shape and began its march south from Canada. Within 48 hours of hitting near 100°F temperatures across the Tri-State area on Sunday, high temperatures plummeted 50° to 60° and snow fell during the overnight hours on Tuesday night. While snow amounts were generally a trace to a few tenths of an inch, except for Eastern Colorado, both Goodland, KS and Yuma, CO set records for their earliest measurable snowfall.

October 25-26th, 2020

   Compared to the case in early September, there might not seem to be too much special about this particular snow storm. Temperatures leading up to this event were fairly typical and none of the snow totals were record breaking though they could be classified as above average. Most of the area had been dry for at least 20+ days though this also is not uncommon for this time of year. What made this storm interesting was the meteorological setup for it.
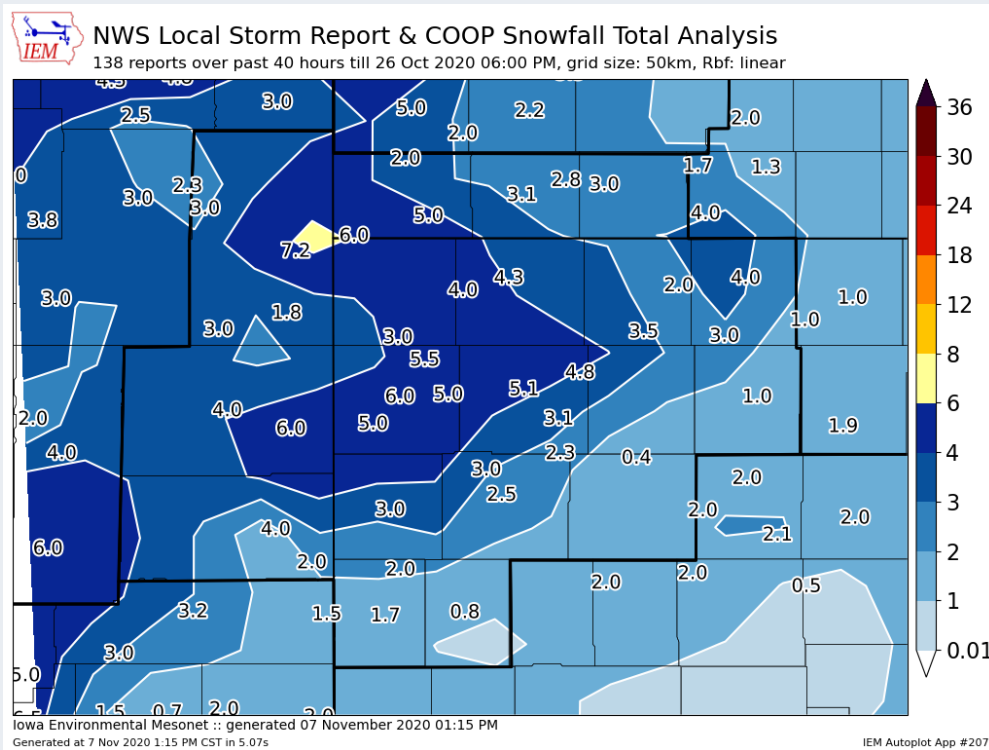
Early snow systems, cont.

NWS Local Storm Report & COOP Snowfall Total Analysis
138 reports over past 40 hours till 26 Oct 2020 06:00 PM, grid size: 50km, Rbf: linear

Iowa Environmental Mesonet :: generated 07 November 2020 01:15 PM
Generated at 7 Nov 2020 1:15 PM CST in 5.07s   IEM Autoplot App #207

* Image from Iowa Environmental Mesonet. Some shaded areas may not fully be representative of what happened.

One thing you may have noticed if you watched this snow was that most of it fell nearly straight down with winds either light or no stronger than usual. Lighter snowfalls are more likely to do this in our area, but not necessarily snows of this magnitude. This is because this snowfall didn't have a surface low pressure nearby to increase the winds (see next page for picture example).

Now there are always many more factors that determine how much snow is received, where it is received, and how strong the winds are when the snow falls. This case diverges from what we would typically expect in this area for snows of this magnitude.

Did you know...

Tornadoes can occur during any month and season. While the atmosphere is not as conducive for severe weather and tornadoes in the winter, it is not impossible to have a tornado occur. As of December 2019, the month with the fewest number of tornadoes occurring is January, with three. These three tornadoes all occurred in January of 2006.

Early snow systems, cont.

October 25-26, 2020

"Typical" case example
November 26, 2019
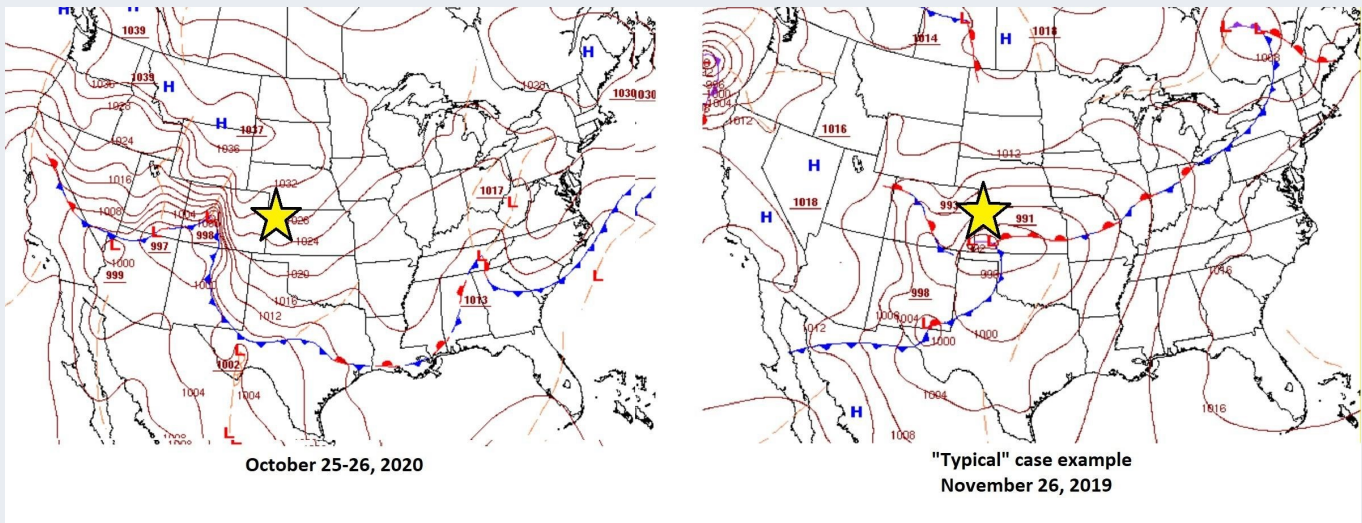
For Goodland's last 5 higher snowfalls, most of them have a similar setup to the image on the right. We have a low pressure system south of us, generally near or just north of the Kansas/Oklahoma border. The reason this is ideal is that most low pressure systems have precipitation around them in a full circle. With low pressure systems during the winter, cold air is often on the north side of the low which means that any precipitation there is often snow. The low pressure system also pulls moisture from the south, so that there is more moisture available in the colder air for snow.

Looking now at the image on the left, you can notice that the nearest low is over in Central Colorado. That low was too far away from us to provide much support for snow. Looking at the image again, you can see that the cold front was also well past us into Southern Texas so that wasn't providing support either. If anything, the high pressure in Montana was creeping down to us and was going to hinder our snowfall. What ended up providing decent snowfall for us was a combination of moisture moving in from the middle parts of the atmosphere, and a good cold layer above us for snow to develop.

The takeaway from this case can be that not all systems that produce snow are the same. There are common themes and certain physical processes do need to be in place, but you may not always need a low or cold front right nearby your area. However, those features are quite helpful when you are looking for snow.
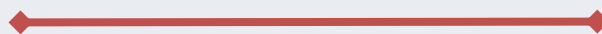
Did you know...

Thundersnow occurs when the precipitation falling during a thunderstorm is snow and not rain.

The Conference Must Go On

Given certain circumstances, some of the national conferences that we meteorologists attend such as the Annual National Weather Association Conference were not held in person this year. However, instead of admitting defeat and just looking forward to next year, the conference was held virtually and we were able to send one of our meteorologists.

The conference has many different speakers presenting upcoming changes to operations, the latest technology and recent research from across the country that benefits us as we complete our daily mission of serving our community. This was the first time the National Weather Association (NWA) held a conference in this fashion. It was a bit odd to not be there in person, but with the Q&A panels we could still chat and ask questions.

But all in all the conference was a great success and experience. We were able to learn quite a few things from forecasters across the nation and even bring back new tools to aid us in our forecasts. Another success of the conference was the virtual format enabled many people to attend the conference who would otherwise be unable to travel. A record was set for most attendees at an NWA conference. This led the leadership team to announce that the goal for next year's conference would be to run a hybrid conference. While it seems like the virtual could replace the physical conference, it was a bit harder to meet other people. Many of the hang outs and other networking opportunities that generally occur when the day is over were also unavailable. The hybrid idea will allow that those who can travel to enjoy the full conference while those who can't travel can still obtain all the information presented. It'll be something to look forward to next year!

Fun Facts

Blizzard Warnings are not dependent on the amount of snow expected.
They are dependent on wind speed, visibility and duration of the event.

Measurable snow has been observed in all 50 states!
Snow has even been recorded at the summits of volcanos in Hawaii.

What is La Nina and How Will It Affect Me?

   You might not think that the ocean would have a major influence on the weather patterns for the high plains. That would be incorrect because the ocean actually has major implications.

   Meteorologists are able to examine large scale climate signals to get a hint of what the upcoming winter season will be like. The Climate Prediction Center (CPC) has issued a La Nina Advisory for the Winter Season and into the spring. This means that La Nina conditions are expected to strengthen and continue throughout the winter months.
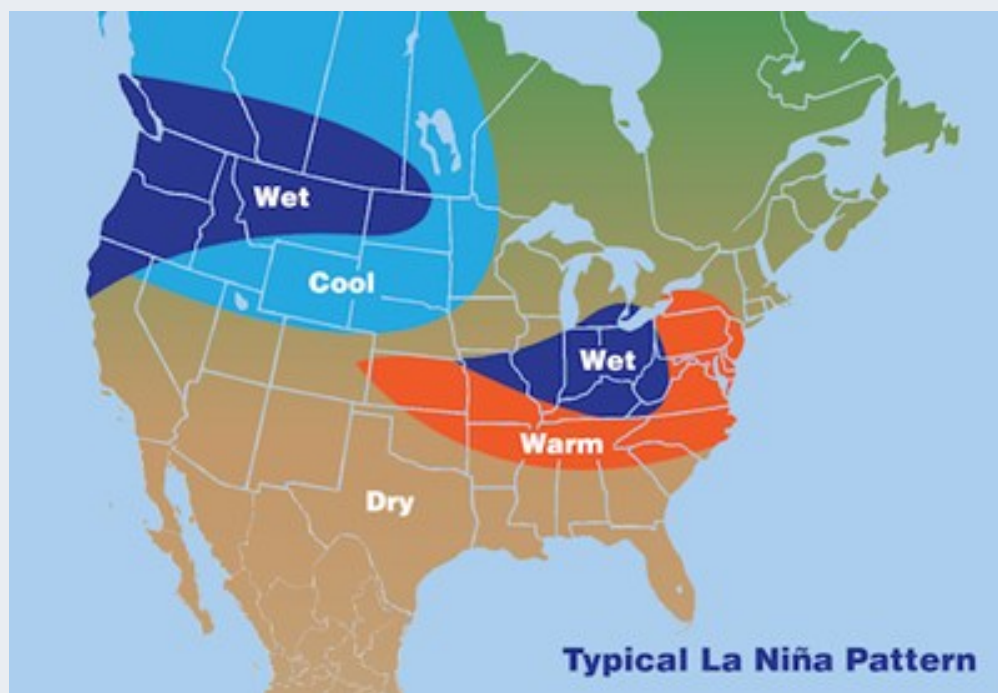
   So what is La Nina? La Nina represents periods of below-average sea surface temperatures across the east-central Equatorial Pacific. It is a part of the El Nino Southern Oscillation (ENSO) cycle and is the opposite of El Nino. During the El Nino years, the ocean waters along South America and California warm to above normal temperatures, which in turn causes more rain to fall over the United States.

   The La Nina patterns are the result of the strengthening westerly wind fields from the surface through the mid layers of the atmosphere, that in return push warm surface water from the eastern to the western pacific basins. La Nina and El Nino episodes last for on average 9-12 months. Being in a La Nina or El Nino is actually quite irregular with the majority of the time ENSO is near neutral; a La Nina or El Nino event typically happens every two to seven years with El Nino happening more frequently.

   What might a La Nina winter look like for the High Plains? The three month outlook that the CPC put out on October 15th shows above normal temperatures and below normal precipitation. This is consistent with what has happened in past La Nina years across the High Plains while the northwest and eastern Midwest states have wet conditions.
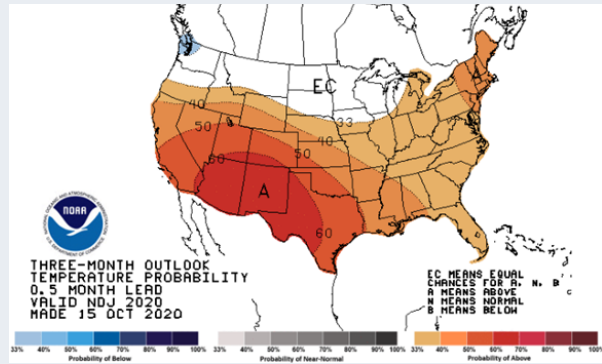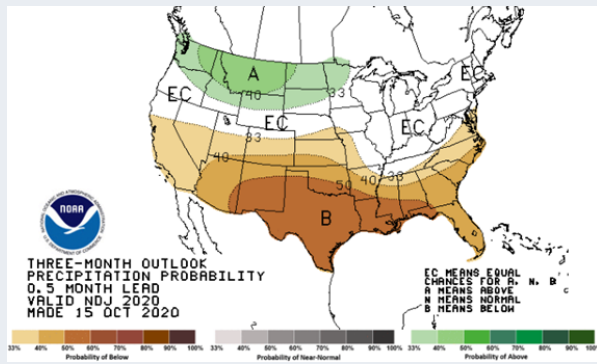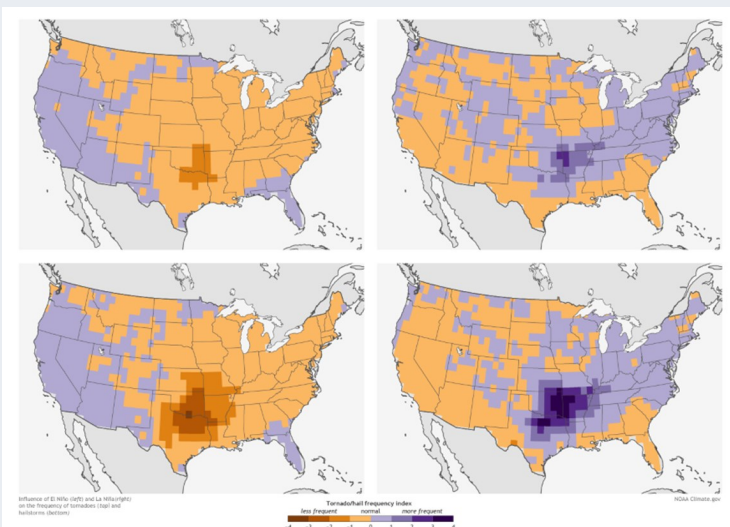
(Source: cpc.ncep.noaa.gov)

Unfortunately due to the projected drier winter, drought conditions are expected to continue across the majority of the High Plains based on the CPC's latest projection. The CPC uses probabilities to convey the chances for these conditions as shown in the pictures above.

Even though the CPC is forecasting a warmer and drier winter, that doesn't mean that we won't have snowfall and bitterly cold temperatures. The bottom line is to still be prepared for a variety of winter weather during the season. *(Read this article if you haven't yet)*

However forecasting for the long term winter outlook is challenging as other weather phenomena can make it difficult to forecast past two weeks. A few other things that can aid forecasters into making the most accurate long term forecast include the Madden-Julian Oscillation and the Arctic Oscillation. These can help predict what the influence of the jet stream will have on the weather.

Interestingly enough, La Nina also has been found with a more active Spring severe weather season across the plains as well. A published paper found that with a La Nina pattern, that specifically based in the Tri-State area that normal to above normal hailstorms and tornadoes are possible. The reason is due to the influence of the location of the jet stream over North America. However, the rise over our area isn't as significant as it is East Oklahoma and Arkansas.

So the bottom line is, for the High Plains region, it's best to be prepared for all types of wintry weather this season. This season will feature periods of cold, wet weather and other times of warmer and dry weather. The type of precipitation that can be expected is dependent on the temperatures as rain, snow, sleet, and freezing rain are all possible during this winter weather season.

(Source: climate.gov Michon Scott)

Real Stories of NWS Goodland in Action

Thursday, November 26th, 2020—Thanksgiving

   On Thanksgiving afternoon, the NWS Goodland staff was alerted that some NWS offices started to experience communication outages that did not allow them to operate to their full capability. The NWS Goodland staff shortly realized that one of their neighboring offices appeared to be included in this outage.

   Soon after, the neighboring office contacted NWS Goodland to confirm that they had been affected by the outage and asked for NWS Goodland to provide backup services for their area. Backup services include but are not limited to forecasting for the area and monitoring weather conditions in case warnings need to be issued.

   Luckily, the evening shift meteorologists had just arrived to help the current on-duty staff in dealing with this emergency outage situation. Immediately, the NWS Goodland staff utilized a backup plan that they have been trained on: one meteorologist would focus on the Goodland area's tasks, another would focus on the neighboring area's tasks while the two remaining meteorologists would provide support to both areas and keep lines of communication open. Preparations were also made in case the communication outage continued for an extended period of time. This plan worked out extremely well as the NWS Goodland staff was able to successfully provide services for both areas until the communications issues were resolved at the neighboring office which resumed servicing their area later that evening.

   Did you know? The NWS has a mission statement: provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy. The NWS has contingency plans in place to help succeed in their mission for a multitude of scenarios such as this one. If one NWS office goes down for any reason, another NWS office is there to take up their tasks to ensure uninterrupted service for the public.
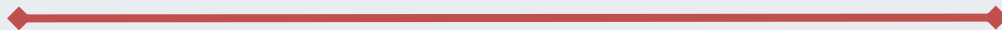
Partner Familiarity Webinars

   During this pandemic, meteorologists from NWS Goodland are no longer able to travel to meetings, exercises, hold spotter talks, or conduct familiarity visits, similar to what we did last fall. This hurts our ability of building and maintaining relationships with our closest partners.

   Therefore, as a way to remain close to you, our partners, we will be hosting a webinar on the 3rd Wednesday of each month to discuss NWS happenings, updates, and get your feedback on anything you may have.

   Please contact Ryan Husted, 785-899-2360, for more information.

New Kanorado Weather Station

The Northwest Kansas Regional Homeland Security Council funded a Davis Instruments personal weather station in Kanorado, KS. This weather station is part of a nationwide network of thousands of unofficial, yet very useful, weather stations. The Kanorado station features a Davis Vantage Pro2 Wireless Weather Station which records temperature, dew point, humidity, wind direction, wind speed, precipitation (rainfall and melted snow), and barometric pressure. The station was installed on November 12, 2020.

The wind sensor (anemometer) is located about 24 feet above ground level. It is free of obstructions from trees and buildings. The standard height for wind sensors is 10 meters (32.8 ft) above the ground. The temperature, humidity and precipitation data is gathered from a sensor located approximately 20 feet above the ground. The recommended height is 2 meters (about 6 feet) above the ground over a grassy area. Since this unit is in a public location it was decided to mount it higher to reduce the potential for unauthorized access.

This unofficial data is transmitted at 15 minute intervals to several web sites, and is ingested in near real time by the National Weather Service office in Goodland. The data will be used for live monitoring of current weather conditions, verification of various products we issue and Decision Support Services (DSS). DSS can be briefing first responders on the closest weather conditions for a rescue, fire, hazardous materials situation, etc.

If you are interested in learning more about personal weather stations or viewing the data from these existing stations, please contact us at 785-899-2360.

THE RADAR POST

Kids Korner: Snow Storm in a Jar

This fun experiment allows you to learn how to make a snow storm from the warmth of your own home. Using easy to find items such as baby oil, water, paint, glitter, Alka Seltzer, and a jar you can make your own mini snow storm without the cold temperatures! Follow the instructions below and enjoy your personal snow storm!

What you'll need:

- Jar with a lid
- Baby oil
- Iridescent or silver glitter
- White acrylic paint
- Alka Seltzer (make sure it has citric acid and sodium bicarbonate)
- Water
- Blue food coloring (optional)

Instructions:

- Fill a jar about two-thirds full with baby oil and set aside
- In a separate bowl or measuring cup, add a small squirt of white paint to water and stir until combined. If using a 16 oz. jar, recommend using about one-quarter cup of water. If your jar is a different size, just adjust the amount of water accordingly.
- Pour the paint and water mixture into the jar, leaving some room at the top of the jar for the mixture to fizz.
- Add glitter and a few drops of food coloring if desired. Then, wait for the glitter and water to settle at the bottom.
- Break up an Alka Seltzer tablet into small pieces, then drop two or three pieces into the jar.
- Watch what happens! The white water will bubble up through the oil making a slow motion snow storm.

You can keep your snow storm in a jar by placing the lid on it for storage. Any time you want to have another storm, just add a few more pieces of Alka Seltzer. If you run out of water, you can just add more.

What's happening?

This experiment has a lot of cool things going on. The ingredients in Alka Seltzer mix with water to form carbon dioxide bubbles causing some of the water/paint mixture (snow) to rise and fall. The snow storm occurs due to the pressure changes caused by the Alka Seltzer as the water creates pressure upwards and the oil pushes it down. This is similar to how weather happens in our atmosphere.

Virtual Winter Spotter Training

Blizzards, ice storms and dust storms are just a few of the many weather events that impact the Central High Plains during the late fall to early spring. Snowfall records were set in September, blowing dust significantly impacted travel throughout the Tri-State area in October and a late October storm brought snow and ice to the region.

In order to help people prepare for the winter weather season, meteorologists at the National Weather Service in Goodland created the office's first ever virtual winter spotter training course. The four part series of videos covered topics such as measuring snow and ice, measuring liquid equivalent, preparing an emergency kit and how to make a storm report.

"The goal of the winter training was to send a seasonal reminder of how to stay warm and safe, and drive safely during the winter," said lead meteorologist and team member, Jesse Lundquist.

Winter storm reports are a crucial source of information for forecasters. Not only do they provide forecasters with a snapshot of what is happening in an area, but that information can be relayed to emergency personnel, road crews and people in the path of the storm.

"Weather reports help us to know what the impacts are so we keep people informed about the weather during the event," Lundquist said. "These videos also showed how easy sending us weather reports are and what kind of information is needed for a weather report."

If you missed out on the training, the videos can be found on the Goodland National Weather Service YouTube page at: https://www.youtube.com/watch?v=yUbeI43T5lI
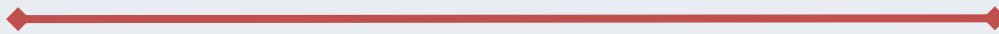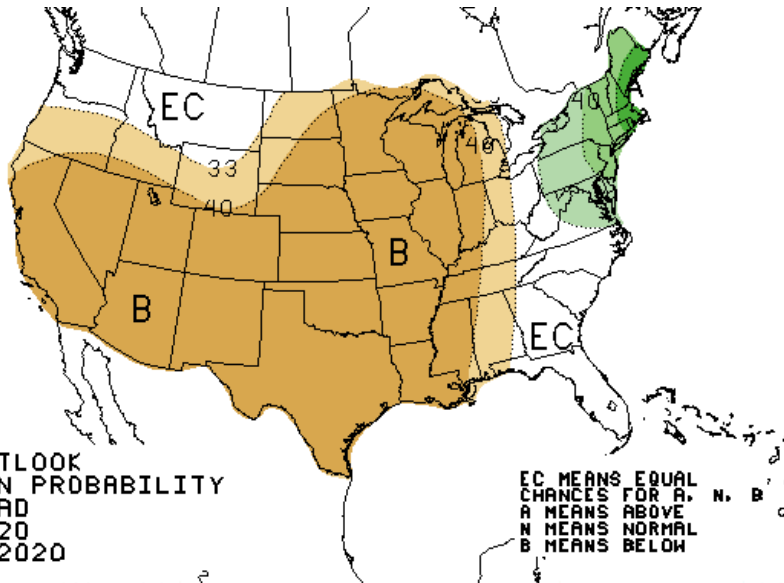
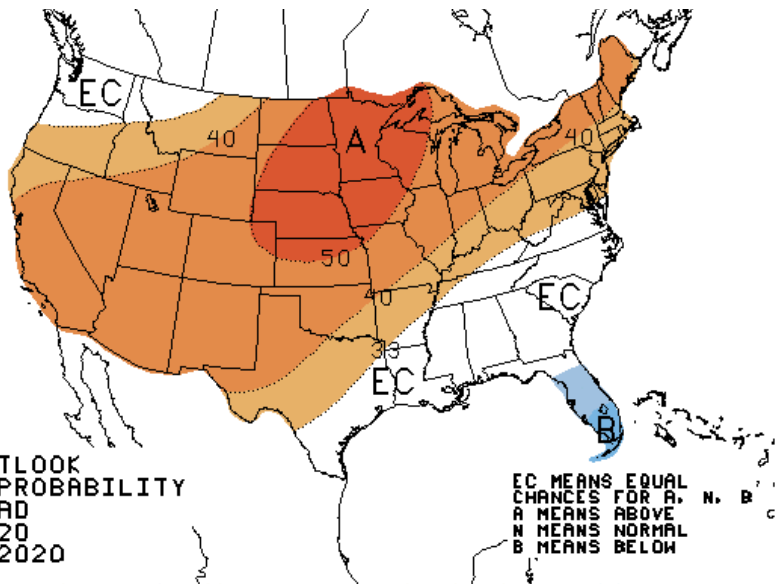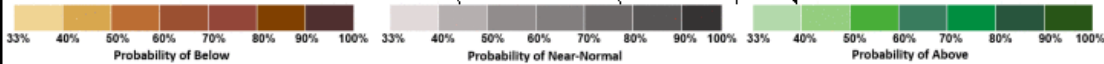### *Virtual Spring Spotter Training*

We will be holding our Spring Spotter training virtually also.
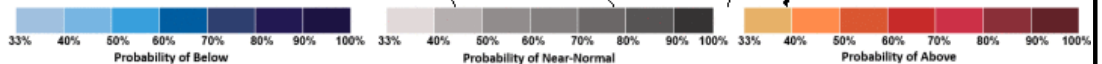
Call 785-899-2360 for more information.

Climate Corner

ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.0 MONTH LEAD
VALID DEC 2020
MADE 30 NOV 2020

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

33% 40% 50% 60% 70% 80% 90% 100%
Probability of Below

33% 40% 50% 60% 70% 80% 90% 100%
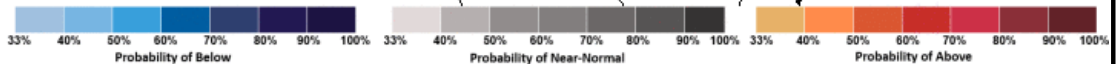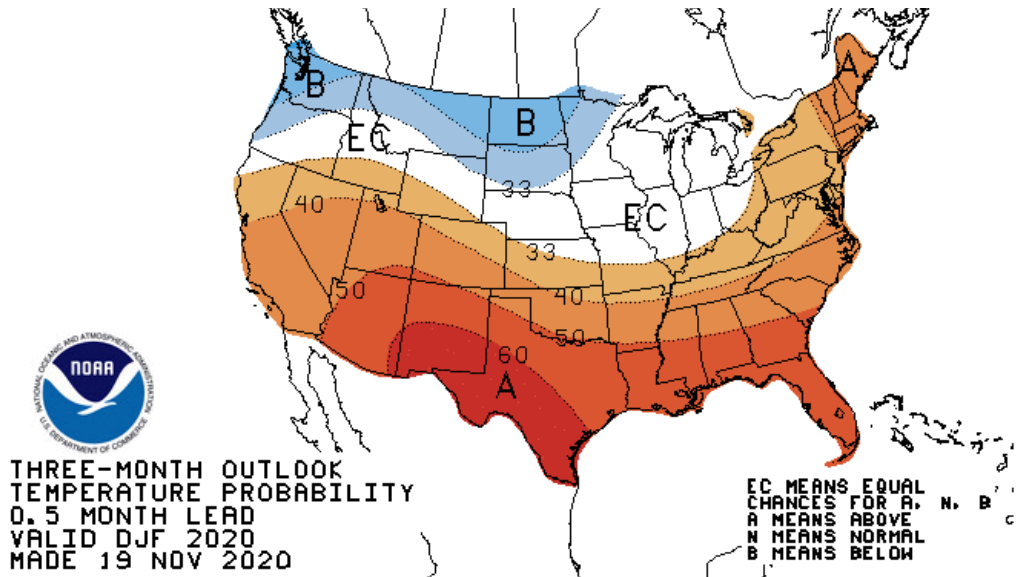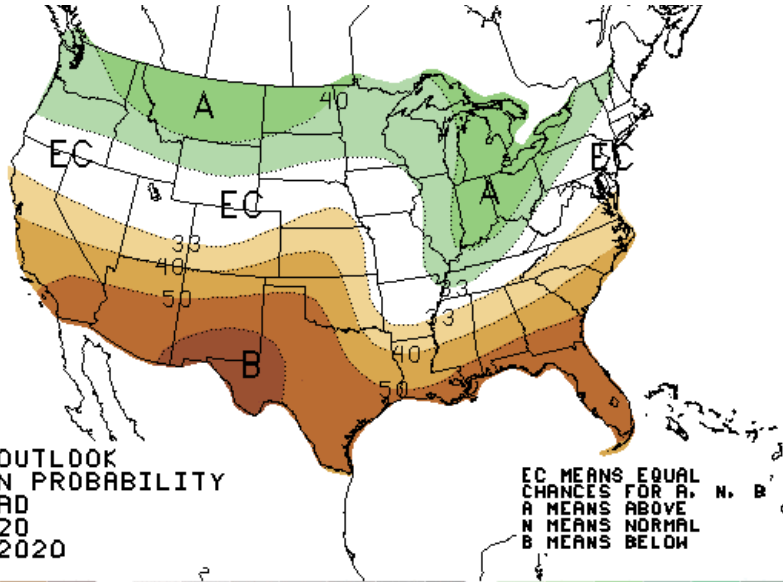Probability of Near-Normal

33% 40% 50% 60% 70% 80% 90% 100%
Probability of Above

ONE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.0 MONTH LEAD
VALID DEC 2020
MADE 30 NOV 2020

EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

33% 40% 50% 60% 70% 80% 90% 100%
Probability of Below

33% 40% 50% 60% 70% 80% 90% 100%
Probability of Near-Normal

33% 40% 50% 60% 70% 80% 90% 100%
Probability of Above

One Month Summary

The one-month outlook shows the possibility of above normal temperatures and below normal precipitation.

Climate Corner

THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID DJF 2020
MADE 19 NOV 2020

EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Probability of Below
Probability of Near-Normal
Probability of Above

THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.5 MONTH LEAD
VALID DJF 2020
MADE 19 NOV 2020

EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Probability of Below
Probability of Near-Normal
Probability of Above

Three Month Summary

The three-month outlook shows the possibility for below normal precipitation. Above normal temperatures are possible for Eastern Colorado and Northwestern Kansas and equal chances for above normal, normal or below normal temperatures for Southwestern Nebraska.

U.S. Drought Monitor

December 8, 2020
(Released Thursday, Dec. 10, 2020)
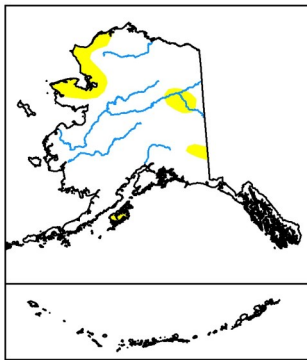**Valid 7 a.m. EST**
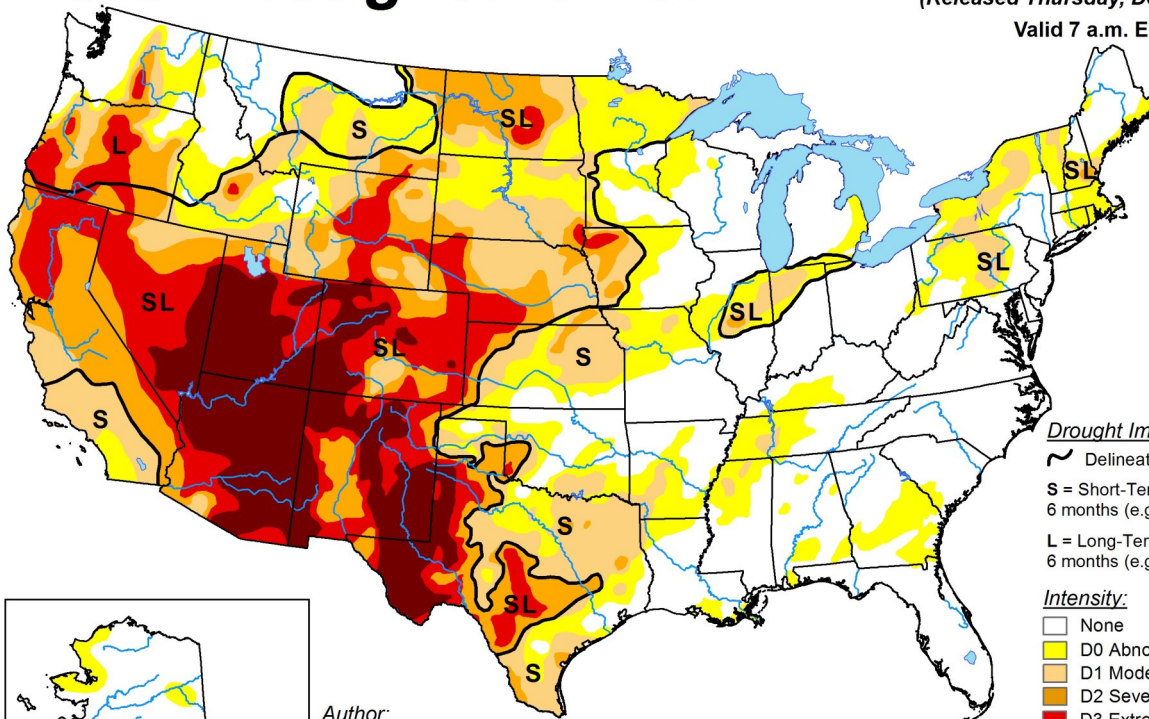
Drought Impact Types:

~ Delineates dominant impacts

S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Author:
David Simeral
Western Regional Climate Center
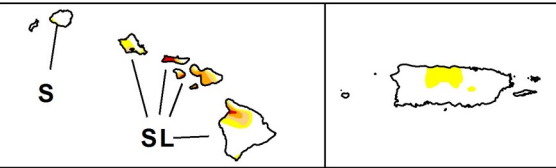
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

USDA   NDMC   droughtmonitor.unl.edu

City**	Precip to Date (in.)	Normal to Date (in.)	Departure From Normal (in.)
Goodland	16.18	19.65	-3.47
Burlington	13.42	17.45	-4.03
McCook	14.52	22.90	-8.38
Hill City	15.36	22.51	-7.15

***Data as of December 31, 2020*

Useful Links

· Storm Prediction Center
- www.spc.noaa.gov
· Weather Prediction Center
- www.wpc.ncep.noaa.gov
· Climate Prediction Center
- www.cpc.ncep.noaa.gov
· Climate Data
- www.ncei.noaa.gov
· CoCoRaHS
- www.cocorahs.com
· Weather Models
- www.ncep.noaa.gov
· Space Weather
- www.swpc.noaa.gov
 SciJinks
-scijinks.gov/

Contact Us

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Website:

http://www.weather.gov/gld

Facebook:

http://www.facebook.com/nwsgoodland

Twitter:

https://twitter.com/NWSGoodland