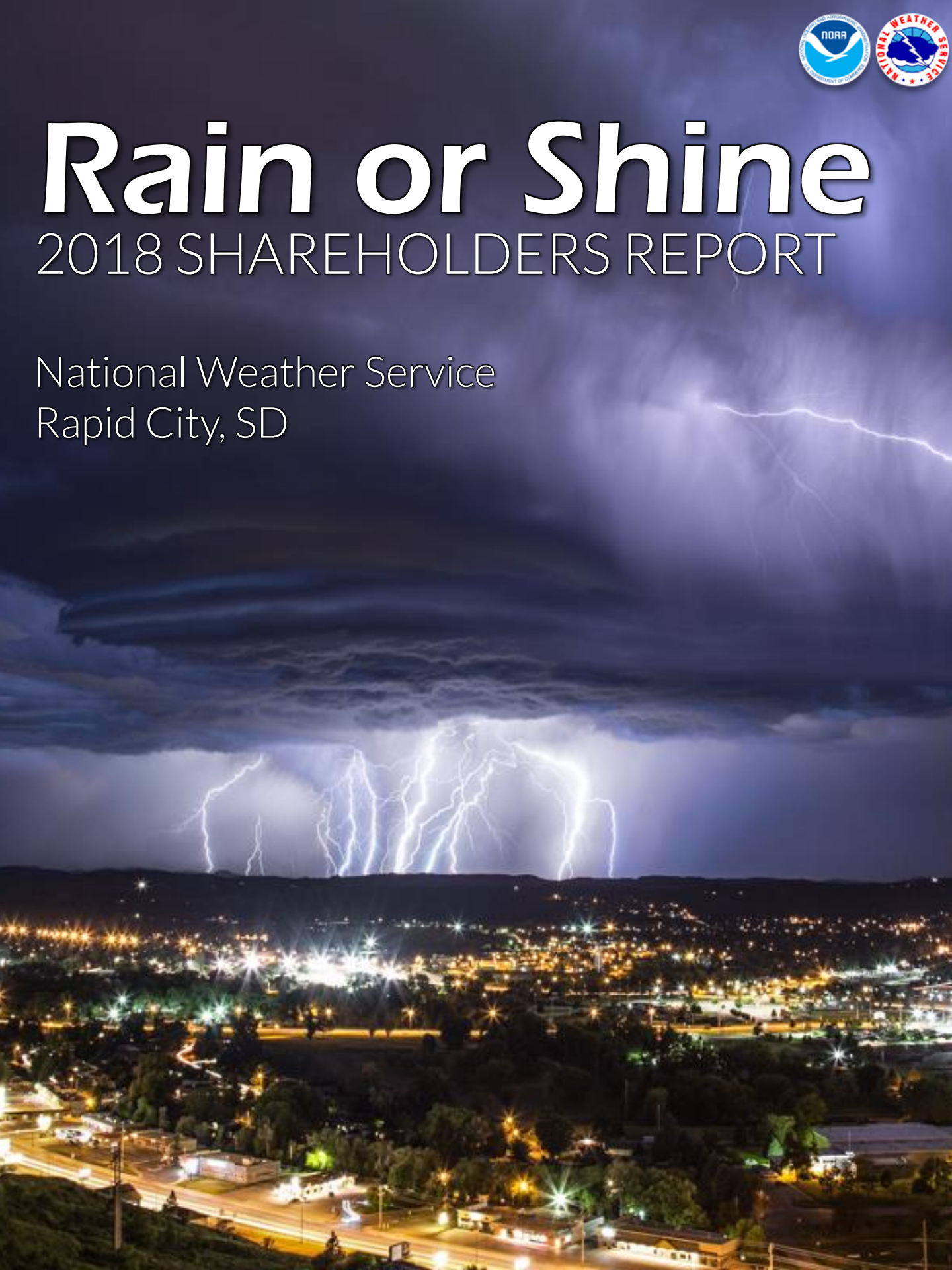




Rain or Shine

2018 SHAREHOLDERS REPORT

National Weather Service
Rapid City, SD



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Welcome

by Dave Hintz, Meteorologist in Charge

Welcome to the 1st edition of “Rain or Shine”, the National Weather Service (NWS) Rapid City’s Shareholders Report. The purpose of this report is to document to you—our partners, our customers, and the American taxpayer—our activities and highlights from the past year. For fiscal year 2018, the National Weather Service was appropriated a budget of around \$1.2 billion dollars. As the Meteorologist in Charge of the office, I feel it is my obligation to let you know how we are accounting for that investment in us.

2018 was a busy year for us. We had several high-profile weather events throughout the year. We’ll talk about the Weather Ready Nation Ambassador Program and what it takes to become one. We’ll profile an important Cooperative Observer award we gave out and congratulate a retirement. We’ll also go over an extensive refurbishment that our radar went through. This is just a sampling of what is inside.

I want to express my deepest thanks to forecasters Katie Pojorlie and Keith Sherburn, and Observation Program Leader Alzina Foscatto, for agreeing to produce and edit our inaugural edition of “Rain or Shine”. I welcome your suggestions on how the NWS can serve you better. I can be reached at david.hintz@noaa.gov.



Significant Weather of 2018



Credit: Toni Lynne Long

April Blizzard

A strong low pressure system brought a spring snowstorm to the region on Friday, April 13, 2018. Precipitation began as rain, and even a few thunderstorms were reported. Then, as cold air filtered into the area, rain changed to snow. Heavy snow was reported across much of western and south central SD, and strong northerly winds resulted in blizzard conditions from blowing snow.

Rapid City Flooding

Late in the afternoon on May 18, 2018, a localized thunderstorm moved over Rapid City and dumped two to three inches of rain in about an hour. Runoff from the heavy rainfall flooded streets and low-lying areas. Rapid Creek quickly rose and overflowed its banks near the fairgrounds. In Rapid City, several water rescues were performed by the fire department. The heaviest rain fell over the Robbinsdale area, where the runoff filled a detention pond near the park and tore up sections of asphalt on Fairlane Drive. Several vehicles were pushed by the rushing water, and one vehicle ended up in the Robbinsdale Park detention pond.



Credit: Rapid City FD



Credit: Martin Volunteer FD

Vineyard Fire

A large fire started on the eastern fringes of Hot Springs, SD on Saturday, August 11, 2018 around 4 pm. The fire burned approximately 560 acres, making it the largest fire in the Black Hills Forest area for 2018. The weather conditions were favorable for fire spread (gusty winds and low relative humidity); however, because of the recent wet period, the overall conditions were not nearly as favorable for a large wildfire as they could have been, and this likely helped to keep the Vineyard Fire from growing beyond 600 acres.

Gillette Tornadoes

During the afternoon of June 1, 2018, a storm dropped four tornadoes around Gillette, WY. The strongest tornado developed about 10 miles west-northwest of Gillette and lasted for 11 minutes over the Oriva Hills subdivision. The tornado destroyed and damaged numerous homes and outbuildings, rolled vehicles, and snapped electrical transmission poles and trees, with the most severe damage consistent with an EF-3 tornado.



Credit: Suzanne Hansen



Credit: Roger Hill

Harding County Tornado

During the evening of June 28, 2018, a storm produced several tornadoes across Carter County, MT and Harding County, SD. Four tornadoes occurred across Harding County (which happened after four tornadoes occurred in Carter County, MT). The first tornado in Harding County crossed the MT-SD state line near Fortyeight Mile Creek, approximately 10 miles south-southwest of Camp Crook. This tornado produced considerable tree and structural damage, including debarking of some trees, collapse of exterior walls of a home, destruction of some farm machinery, and complete destruction of some outbuildings. Based on this damage, winds were estimated at 136 mph, resulting in an EF-3 rating.

Spearfish Canyon Tornado

During the afternoon of June 29, 2018, two supercells moved across northeastern WY and western SD. In addition to producing very large hail, the southern supercell spawned a tornado with a continuous path from southeast of Sundance eastward to Spearfish Canyon. Most damage occurred in wooded areas, with widespread snapped trees observed throughout the tornado path. Some structural damage was also surveyed southeast of Sundance, just east of Highway 585, near the beginning of the tornado's path. Based on the damage, maximum winds were estimated to be 105 mph, giving the tornado an EF-1 rating.



Oglala Lakota County Storms in Late July

During the evening of July 27th, an intense supercell developed over extreme northeastern WY and tracked southeast across the Black Hills region. When this storm moved into the northern Black Hills, it produced a wide swath of downed trees in the Spearfish Canyon area. It also produced golf ball sized hail and downed trees around the city of Spearfish. It would be what this storm did once it exited onto the plains, however, that would make it one of the more memorable storms of the summer.



When the storm exited the hills into north central Custer County between Hermosa and Fairburn, it began to quickly gain strength, becoming a massive hail-producing supercell as it moved into Oglala Lakota County south of Red Shirt. As the satellite image below shows, the hail swath extended nearly the length of the county. The town of Oglala took a direct hit from the storm, with nearly every house in the city affected by the baseball sized hail.



The deputy Emergency Manager (EM) for the county asked for a NWS representative to staff the mobile Emergency Operations Center (EOC) in Oglala. Weather Forecast Office (WFO) staff deployed to do the survey in addition to staffing the EOC for the day to answer questions. According to Steve Wilson, the Oglala Sioux Tribe EM, between 550 and 600 homes were damaged by the storm.

Two days later, during the afternoon of July 29th, another supercell developed near the town of Kyle. Once again, NWS personnel were deployed to Oglala Lakota County to survey the damage. Several homes were damaged, with one house completely destroyed. Evidence of straight-line winds with estimated speeds up to 120 mph were found. There was also evidence of a brief tornado. Wilson estimated that an additional 30 homes were damaged by this storm.



Impact-Based Decision Support Services

by Keith Sherburn, Meteorologist

The future of the National Weather Service is rooted in Impact-Based Decision Support Services, also called IDSS. Through IDSS, we are able to provide critical weather information to our core partners when they need it the most: during scheduled events, such as concerts or festivals, or during unplanned emergencies, including wildfires or HAZMAT incidents.

Traditionally, the busiest IDSS-related event for our area of responsibility is the Sturgis Rally, which takes place annually in the middle of the summer severe weather season. Support for this event includes meteorologist participation 1) on-site at the Emergency Operations Center, to provide weather updates to planners and responders and 2) remotely, to provide weather briefings during scheduled conference calls. This year, weather was unusually quiet for the Sturgis Rally, much to the delight of organizers and the hundreds of thousands of attendees.

Although Sturgis was quiet (weather-wise), impactful weather kept us busy with IDSS duties throughout the year. In July, frequent weather updates were provided via phone calls to organizers of the Spearfish Festival in the Park and the Hills Alive Music Festival as severe thunderstorms approached. In May, a concert at Rushmore Plaza Civic Center in Rapid City was able to take place despite a Flash Flood Warning for the area, when we informed organizers that the flooding threat would be downstream of the theatre.

The above are just a few examples of the weather support we can provide during events. If you would like weather support during an event that you are planning, please call the office to see what options are available for you.

Cooperative Observer Award

by Mitch Erickson, Hydrometeorological Technician

This year, we had the honor of presenting Robert and Claralee Dillinger, of Rozet, WY, the General Albert Myer award for 65 years of service to the Cooperative Observer Program (COOP). Robert began taking weather observations for the National Weather Service in July of 1953. Robert carries on a family tradition started in 1916, when his father, Jacob, homesteaded the ranch in eastern Campbell County. In 1941 a cooperative weather station was started at the Dillinger ranch, with Jacob and Ruby Dillinger being the first observers. After a tragic accident, Robert assumed the duties for his father and has carried on that dedication ever since. Being ranchers and working the family land for over 100 years, the Dillingers know the importance of understanding the weather patterns, precipitation, and climate trends, which has made the family important allies to the NWS and their neighbors. Claralee even becomes our eyes and ears in a radar-blind area by reporting local thunderstorm activity. It has been a privilege and an honor working with them for these many years, and we look forward to many more as Robert's granddaughter will be carrying on the family tradition by assuming the station duties when Robert decides to hang up his thermometer.



Pictured above, from left to right: Robert Dillinger, Mitchell Erickson (HMT), Claralee Dillinger

The COOP Program

The National Weather Service Cooperative Observer Program (COOP) is truly the Nation's weather and climate observing network of, by, and for the people. COOP data are invaluable in learning more about the floods, droughts, heat and cold waves affecting us all. The data are also used in agricultural planning and assessment, engineering, environmental-impact assessment, utilities planning, and litigation. COOP data play a critical role in efforts to recognize and evaluate the extent of human impacts on climate from local to global scales. Volunteer weather observers conscientiously contribute their time so that these observations can provide the vital information we need. For more information, visit <https://www.weather.gov/coop>.

Outreach Events

by Susan Sanders,
Warning Coordination Meteorologist

This year, the Rapid City NWS staff provided numerous presentations, briefings, and office tours to various groups and participated in several trade shows, career programs, and emergency exercises.



Kelly Whitaker (ITO) leading a session on computer programming at SDSM&T.

The largest program of the year was the Women in Science Workshop held at the South Dakota School of Mines & Technology (SDSM&T) on March 6. More than 750 seventh-grade girls and teachers from Rapid City and the southern Black Hills attended the program. NWS women led sessions on meteorology, hydrology, and computer programming, while other personnel staffed a table in the exhibit hall.

Another workshop was held for the first time at Black Hills State University (BHSU), where over 300 girls and teachers from the northern Black Hills, northwestern South Dakota, and northeastern Wyoming heard presentations from women scientists. Our office again provided speakers and an exhibit on meteorology.



Alzina Foscato (OPL) teaching girls about weather balloons at BHSU.

TED^xRapidCity

by Kelly Whitaker, Information Technology Officer



Attending local leadership events is encouraged at our office.

It helps to create a greater sense of camaraderie among coworkers while connecting us with our local community. One such event took place this summer with TED^xRapidCity, which four of us attended. The thirteen speakers based their talks on the theme “Pivot”, broadening our understanding of:

Pictured above, from left to right: Keith Sherburn (Meteorologist), Katie Pojorlie (Meteorologist), Kelly Whitaker (ITO), Dave Hintz (MIC)

- **Native American culture**
- **school bus evacuation**
- **the effects of death and terminal illness on families**
- **immunology**
- **the art of conversation through music**
- **how to create poetry from random words**
- **American politics**
- **why it's important for engineers to have good social skills**

We enjoyed it so much that we plan on being volunteers for next year's conference.



WFO Rapid City Media Day

by Matt Bunkers, Science and Operations Officer

Since 2016, NWS Rapid City has been hosting a two-hour media seminar twice per year (in the spring and fall) to discuss relevant weather topics for the upcoming season. Meteorologists from all three local television stations have attended each of the seminars. Spring topics have included case reviews of past tornadoes and hailstorms, forecasting Black Hills thunderstorms, and doing storm surveys. Fall topics have included forecasting blizzards, freezing drizzle, windstorms, and conditions that lead to numerous vehicle accidents. Other topics have included discussion of radar upgrades and the new GOES-16 satellite data.

The goal of these seminars is to share science information between the NWS and the TV meteorologists so that we can better work together to provide weather information to the people of our region. This is also a great opportunity to foster partner relations, exchange ideas, and find out areas where we need to improve the products and services that we provide.



Pictured at left, during 2018 Fall Media Day, from right to left: Dr. Matt Bunkers (SOO), Susan Sanders (WCM), Megan Murat (KNBN-TV), Taylor Nicolaisen (KEVN-TV), and David Hintz (MIC)

Major Radar Upgrades

by Pat Baye, Electronic Systems Analyst

The Rapid City WSR-88D radar has undergone multiple major upgrades this year to ensure the reliable operation of this vital system for years to come. A nationwide effort is underway to upgrade all Doppler radars for increased service life, the Service Life Extension Program (SLEP).

In January, we were the very first radar in the nation to upgrade our operating system software to Build 18.0. This new software provided many upgrades for the meteorologists that improve storm detection and tracking. Another benefit of the software upgrade, from a maintenance perspective, is that antenna movement has been dampened, reducing stress on the pedestal and associated equipment and increasing the mean time between failures.

As the first in the nation to upgrade our software, we have been put in a unique position to be first for numerous other upgrades in the SLEP program. We were the first to install the new GPS system at our New Underwood facilities; this provides us with accurate timing, which is essential for proper radar operation. We were also one of the first to install a new upgrade for the transmitter oil system that keeps the high powered radio frequency amplifier running with great reliability.

The next step of the SLEP is to upgrade all the radar antenna pedestals in the entire fleet. We were chosen as the first radar system to receive this upgrade. A crew arrived at the New Underwood site in late November. They staged construction equipment that was used to remove the radar dome, pull the current antenna pedestal from the tower, and replace it with a newly refurbished pedestal. Then they put the radar dome back on the tower and began testing the new equipment. During this time, our radar was out of service for approximately three weeks. Our old pedestal will be refurbished and used at another site for their SLEP upgrade. This upgrade will extend the WSR-88D radar reliability for decades to come.



The dome comes off! Our radar dome was removed, and the antenna pedestal was replaced, on the morning of December 6th.

NWS Week of Service

by Katie Pojorlie, Meteorologist

Besides serving the country by providing weather forecasts and warnings, the National Weather Service reaches out to those in need in our communities. One week each year is designated as the “NWS Week of Service”, when NWS employees are encouraged to participate in some sort of community service on their personal time. In the past, employees from NWS Rapid City have held drives for Feeding South Dakota, Goodwill, and Working Against Violence, Inc. (WAVI); additionally, we’ve served a meal at Cornerstone Rescue Mission. This year, some of us volunteered at Feeding South Dakota. We set up an assembly line of food and packed several bags for their Backpack Program, which provides food for underprivileged children to eat over the weekends.

*Pictured below, left to right: Kelly Whitaker (ITO),
Katie Pojorlie (Meteorologist), Nathan Rambo (ET),
Melissa Smith (Hydrologist),
Scott Rudge (Meteorologist),
Dave Hintz (MIC)*





SKYWARN®

Spotter Program

by Susan Sanders,
Warning Coordination Meteorologist

The National Weather Service works with local emergency managers to organize, train, and deploy SKYWARN® spotters for tornadoes and flash floods. Most of the SKYWARN® spotters are emergency response agencies, such as fire departments, search and rescue organizations, and law enforcement agencies. The office also recruits individuals to report hail, strong winds, heavy rain, and snow.

Storm reports provide valuable real-time, ground-truth information in support of Doppler radar, satellite, and ground stations. The reports assist forecasters in making decisions whether to warn for storms or cancel warnings.

The office conducted 23 spotter training classes this year, with a total of 481 attendees. Classes are conducted from mid-March through May each year.

Check our SKYWARN Spotters web page (www.weather.gov/unr/skywarn) for next year's schedule.

Retirement of Ken Clark

by Alzina Foscatto, Observation Program Leader

Kenneth (Ken) Clark was with the Army and Federal Government for over 39 years. While in the Army, Ken was a part of the 1st Cavalry Division for 6 years, during which he performed ballistic meteorology on deployments to combat theatres in Granada, Honduras and Panama.

Ken was also stationed at Fort Sill, Oklahoma for 6 years, where he was trained as a Special Operations Weather Officer on the implementation of meteorological assets. During his time in Fort Sill, he was deployed to Iraq with a Special Operations Task Squad.

With the Army, Ken received the combat theatre Meritorious Service Medal for coordinating U.S. and Coalition Meteorological assets during the Persian Gulf War. He also received a Battlefield Commendation Medal and General's Coin, presented by General Abrams II, while in Iraq.

Ken's time in the federal government was with National Oceanic and Atmospheric Administration (NOAA) and National Weather Service (NWS). Ken's first assignment was in Metlakatla, Alaska as a Meteorology Technician. During his time in Alaska, Ken was recertified and worked as an Electronic Technician (ET) for the Alaska Region Electronics Center. Ken had a record of 100% no equipment down time for a 2-year period.

While being an ET in Alaska, Ken was responsible for electronic equipment for WFO Anchorage Center Fields, WFO Kodiak, Weather Service Office (WSO) King Salmon, Talkeetna Contract Weather Office (CWO), and CWO Seward. Ken was reclassified and promoted as the Alaska Region Quality Control Program manager.

At WFO Juneau, Alaska, Ken was promoted to the Data Acquisition Program Manager. In January 1999, Ken moved to WFO Rapid City office as a Hydrometeorological Technician (HMT) and was promoted to the Observation Program Leader (OPL). He retired as the OPL at the end of September 2018.

During retirement, Ken plans to spend a lot of time with his grandkids and working on old cars.



Weather-Ready Nation Ambassadors

by Jeff Johnson, Meteorologist

The Weather-Ready Nation (WRN) initiative is about readying our communities for extreme weather events, but the NWS cannot do this alone. We need partnerships with other government agencies at all levels, emergency managers, media, schools, businesses, and non-profits to help spread the word when threatening weather approaches.



Pictured, from left to right: Superintendent Cheryl Schreier, Chief of Interpretation and Education Maureen McGee-Ballinger, and Chief Ranger Don Hart from Mount Rushmore National Memorial

The NWS at Rapid City is actively recruiting WRN Ambassadors to help advance this initiative. We currently have around 50 Ambassadors in our area, and that number will continue to grow as community leaders recognize that being weather-ready is vital to our livelihoods. If your organization is committed to serving as an example and helping our communities become more ready, responsive, and resilient to the impacts of extreme weather events, we invite you to join us in becoming a Weather-Ready Nation Ambassador.



Pictured, from left to right: Susan Sanders (WCM), Darrell Shoemaker, and Rapid City Mayor Steve Allender

Current Weather Ready Nation Ambassadors

Government Agencies

Angostura Irrigation District
Badlands National Park
Belle Fourche Irrigation District
Campbell County, WY EMA
City of Rapid City, SD
City of Sturgis, SD
Deadwood, SD Fire Department
Devils Tower National Monument
Faith, SD Police Department
Fall River County, SD EMA
Great Plains Interagency Dispatch Center
Jackson County, SD EMA
Meade County, SD EMA
Minuteman Missile National Historic Site
Mount Rushmore National Memorial
Oglala Sioux Tribe
Pennington County, SD EMA
Sanford Underground Research Facility
SD Department of Health
SD Office of Emergency Management
US Bureau of Reclamation, Rapid City Field Office
Wind Cave National Park
WY Department of Family Services
WY Department of Health
WY Department of Transportation
WY Office of Homeland Security

Corporate & Small Business

Black Hills Surgical Hospital

Media

Bethesda Christian Broadcasting, Rapid City
HomeSlice Media Group, Rapid City/Sturgis
KBFS-AM/KYDT-FM, Belle Fourche
KBJM-AM, Lemmon
KEVN-TV, Rapid City
KILI-FM, Porcupine
KNBN-TV, Rapid City
KOTA-TV, Rapid City
WY PBS

Academia

SD School of Mines and Technology: American
Meteorological Society Chapter/Weather Club
Sinte Gleska University

Education

Rapid City Area Schools
Campbell County, WY School District

Non-Profit, Association, or NGO

Black Hills Area Council, BSA
Black Hills Rapids Soccer Club
Journey Museum & Learning Center
Lakota Nation Invitational
Main Street Square, Rapid City
Wings as Eagles Ministries Dream Center

For more information, see <https://www.weather.gov/wrn/ambassadors>.

Signing up only takes about 5 minutes of your time. You may also contact our office to learn more about this important initiative.

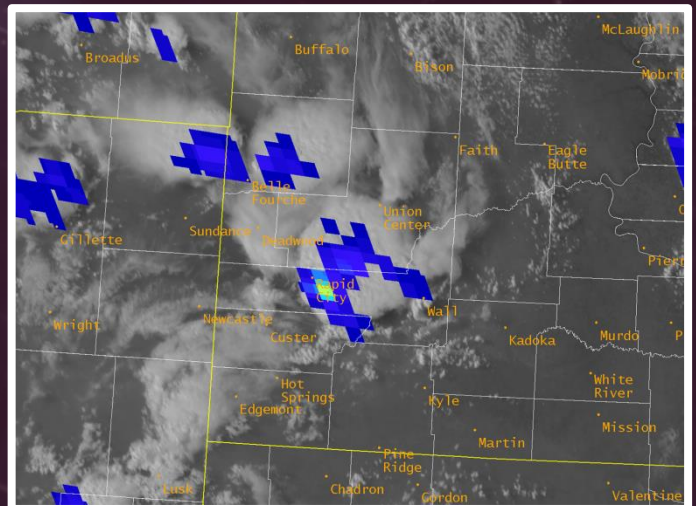
Geostationary Weather Satellites

by Dave Hintz, Meteorologist In Charge

The latest generation of Geostationary Operational Environmental Satellites (GOES), known as the GOES-R Series, is the nation's most advanced fleet of geostationary weather satellites. We have had weather satellites helping us monitor the weather and cloud cover of the earth since April 1, 1960, when TIROS-1 was launched on April 1, 1960. It wasn't until October 16, 1975 that GOES-1 went operational.

GOES-R (now GOES-16) was launched on November 19, 2016. GOES-16 replaced GOES-13 as NOAA's operational GOES-East satellite on December 18, 2017. GOES-S, (now GOES-17) was launched on March 1, 2018. GOES-17 is scheduled to replace GOES-15 as NOAA's operational GOES-West satellite sometime in 2019.

One of the instruments aboard both satellites is the Geostationary Lightning Mapper (GLM). The GLM measures total lightning (in-cloud, cloud-to-cloud and cloud-to-ground) activity continuously across the US. Studies have shown a lightning "jump" can occur many minutes prior to the onset of severe weather. The trends in total lightning available by the GLM will provide critical information to our forecasters, allowing them to focus on developing severe storms much earlier and be able to better see those storms that are on the fringe on our radar viewing area. The total lightning data from the GLM has great potential to increase lead time for severe thunderstorm and tornado warnings and reduce false alarm rates.

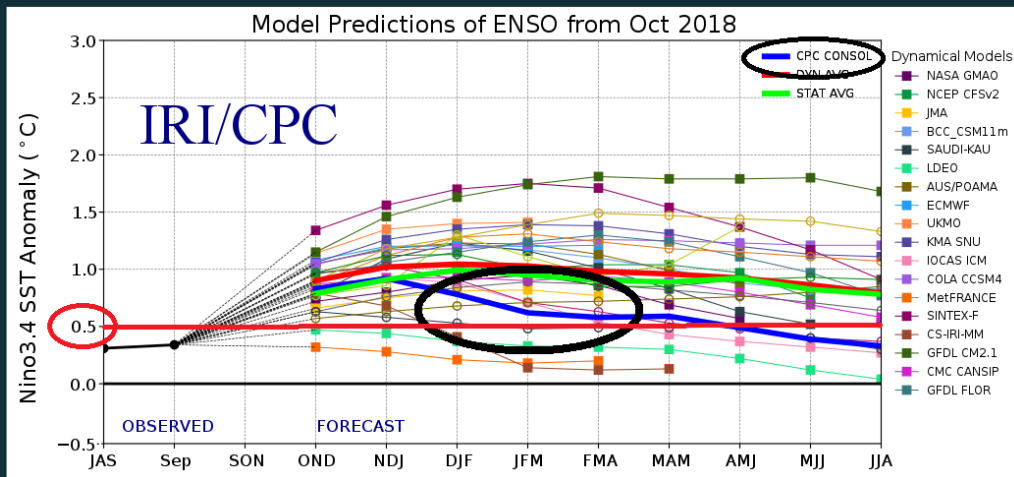


GLM data for the August 23, 2018 hail storm over Rapid City

Outlook for Early 2019

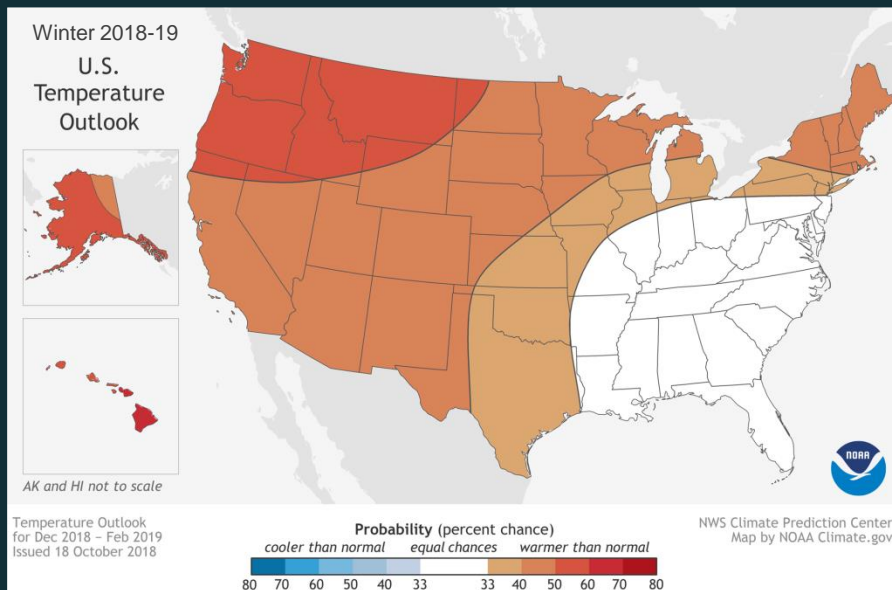
by Scott Rudge, Meteorologist

A mild winter and early spring could be in store for much of the area. The latest climate outlook issued in November has a weak El Niño forecast through late spring. A weak El



Niño occurs when equatorial Pacific Sea Surface Temperatures (SST) range between 0.5 and 1.0 degree above average for a 5 month period (see chart at left).

El Niño is an ocean-atmosphere climate interaction that is linked to periodic warming in SSTs in the equatorial Pacific Ocean region. This warming influences weather patterns across the United States. During the winter, typical El Niño conditions in the US can include wetter-than-average precipitation across the southern US, and warmer and drier conditions in parts of the northern US.



While the forecast is for warmer than average temperatures across the Northern Plains, that does not preclude the possibility of Arctic air slipping into the area for a few short visits, along with the occasional bout of snowy weather. But over the course of the entire winter, temperatures should be slightly warmer than average into early spring.



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