

Jet Stream Jargon

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Fall/Winter Issue

Editors:

Sally Springer & Carolyn Willis

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**Jet Stream Jargon
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From The Desk of The Meteorologist In Charge

*Submitted by: Keith Meier,
Meteorologist-in-Charge*

Since before the founding of our great nation, the collection of daily weather observations has formed the bedrock for decision making which occurs throughout our state and nation. In true American spirit, a multitude of these observations have been recorded by volunteers who feel strongly about the stewardship of land, water and other resources, in addition to their personal contribution to maintaining this stewardship.

As part of this effort, the Billings National Weather Service Office has over 70 Cooperative Weather Observers recording weather on a daily basis. In the past, most users of this information had to wait until the beginning of the next month to get temperature and precipitation data for these sites. However, technological changes over the last five years have allowed many of our observers to send their observations daily (or at least as often as they are able). Obtaining observations on a daily basis provides a multitude of entities access to this information nearly in real time from our web page or other means. This assists a

variety of data users and decision makers to answer questions concerning temperature and moisture conditions across the state, county, or even within the same county.

Nearly half of our Cooperative Weather Observers send in their observations daily through the use of three different methods: 1) WxCoder III (a web-based data entry system); 2) IVROCS (automated phone system via menu prompts); or 3) the observer calls us or we call them routinely each day. Options one and two provide opportunities for observers to enter previous days' data in the event they are away for a few days. This makes the data available earlier than waiting to send it in on the B91 forms at the end of each month.

Presently, 35 Cooperative Weather Observers use at least one of these methods; over half (19 of the 35) provide daily observations 75% of the time, 9 of the 35 provide daily observations 90% of the time, and 5 of the 35 provide data at least 95% of the time.

The following observers have achieved the highest levels of reporting at 90% or more of the time (in no particular order): Gardiner (Absaroka Lodge Staff), Hardin (Big Horn Co. Sheriff's Office), Broadus

Cont. page 2...**Data Reporting**

What is the Function of the Nimbus Memory Button?

Submitted by: Sally Springer, Observing Program Leader

Do you often wonder what the memory button does? Well, that memory button is there so you can take that long weekend or the much needed two week vacation, but it can be a bit cumbersome if you don't use it on a regular basis. The following is taken from the Nimbus manual pages six and seven.

Daily maximum and minimum temperatures are retrieved via the memory switch and [Max/Min Recall] button to give daily highs and lows and their times. The Nimbus remembers the highs and lows for the last 35 days and also records the times they occurred. This information is retrieved sequentially day by day. The reading of the 35 daily max/min values and the times of occurrence are initiated by moving the [Memory] switch to the left [On] and performing the following steps:

1. Flip the [Memory] toggle switch to [On]. The display will go blank.
2. Press the [Max/Min Recall] button and the display will read the number of days back, beginning with the present day (0.0). For each day there are four pieces of information: the high temperature and the time, and the low temperature and its time. Press the button again and the display will read the high temperature for the day. Another push gives the time of the high. Pushing again gives the low, and once more gives the time of the low. When the button is pushed again the day backs up to 0.1, meaning one day prior to the present. Four more pushes give the highs and lows and their times for this day. You can also press and hold [Recall] in to cycle through data faster.

Example: these are sample readings obtained by repeatedly pressing the [Recall] button:

0.0 zero days back; today
63.5 max temp was 63.5
14:46 at **14:46** (2:46PM)

48.9 min temp was 48.9
6:34 at 6:34AM
0.1 one day back; yesterday
71.4 max temp was 71.4
15:12 at 15:12 (3:12PM)
55.2 min temp was 55.2
7:55 at 7:55AM

3. After day 34 (Note that 35 days of max/min includes today through day 35) the cycle repeats itself.
4. If you happen to accidentally skip past a reading and wish to go back to see what was missed, flip [Memory] switch to [Off] and start over.
5. After retrieving the max/min data, flip [Memory] switch back to [Off] to display the current temperature.

The data we get each month is a testament to the Cooperative Observer's dedication, but we also want you to recharge yourself every now and again. Don't feel tied to home because you have to report weather. You can always hit that memory button and get the data when you get home!

If you have a Cooperative Observer question, need supplies or the Nimbus Manual, give Carolyn or Sally a call and we'll send you what you need!

Data Reporting...continued from page 1 (Powder River Co. Sheriff's Office), Story, WY (A. L. Billings), Huntley (Experiment Station Staff), Red Lodge (Barbara Jaquith), Plevna (Clint Deitz), Roundup 15SW (Doug Parrot) and Hysham (Eunice Achtenberg).

We appreciate the efforts of our Cooperative Observers in maintaining the nation's climatological record. If you are interested in utilizing one of these methods to send your data in, please contact Sally Springer, Observation Program Leader or Carolyn Willis, Cooperative Program Manager. *

Basic Ice Jam Information

Taken From: "An Ice Jam Primer - Chapter 11", with additional information available at the following website: <http://www.usace.army.mil/>

What is an ice jam? An ice jam is a stationary accumulation of ice that restricts flow. Ice jams can cause considerable increases in upstream water levels, while at the same time downstream water levels may drop, exposing water intakes for power plants or municipal water supplies.

What causes an ice jam? River geometries, weather characteristics, and floodplain land-use practices contribute to the ice jam flooding threat at a particular location.

Are there different types of ice jams? Yes, there are three. 1. Freeze-up jams are composed primarily of frazil ice, with some fragmented ice included. They occur during early winter to midwinter. 2. Breakup jams happen during periods of thaw, generally in late winter and early spring, and are composed primarily of fragmented ice formed by the breakup of an ice cover or freeze-up jam, and 3. Combination jams involve both freeze-up and breakup jams.

If you know of an ice jam, please report it to your local authorities who can relay that information to us. Or you can notify any one of the four offices within the state of Montana: Billings, Glasgow, Great Falls, or Missoula. ❄



Meteorologist Bill Rasch talks with students at a career fair held in Billings.

Five Winter Factoids

Selected questions compiled from: "The Handy Answer Weather Book", pages 201-228

1. How many states are members of the "60 Below Club"? There are seven. Alaska, Colorado, Idaho, North Dakota, Minnesota, Wyoming and Montana are the only states with recorded all-time minimum temperatures of -60F or less.

2. What is the record for consecutive hours below zero in the lower 48 states? The month of January 1969 was one of the coldest on record in western North America. Havre, MT, had below-zero temperatures for nearly 400 consecutive hours (just over 16 days).

3. What was the coldest winter this century (ending 1997) in the lower 48 states? The coldest winter in the lower 48 states was the winter of 1978-79.

4. What is the best weather for maple sugar production? The optimal conditions for maple sugar production are temperatures below freezing at night and mild daytime readings. Otherwise the sap just doesn't flow as well.

5. Have there been instances of heavy snow on the Gulf Coast? One. Valentine's Day, 1895, in Rayne, Louisiana, a snowstorm began that dropped 24 inches of snow for a state single storm record. ❄



Meteorologist Dan Borsum talks with Students at Little Bighorn College, Crow Agency, Montana

EMERGENCY TRAVEL KIT

Find the thirty items and use the remaining letters to reveal the hidden message.

T H A N T O W R O P E S K Y O S B
 S E S S A L G E R A P S P U M F A
 E K F M A T C H E S O M E E B I B
 X W I R C P S S C A A S T X A R Y
 T H L D H E P I L P T I S T T S S
 R I I E A N G U S E E N U R T T U
 A S T X I C E G K N G I P A E A P
 F T I T N I T N E N Y O P C R I P
 O L K R S L A I O U R E L A I D L
 O E L A W L G T V H R S I S E K I
 D E O C B Y A X T I P H E H S I E
 E R O L H R E E T P T L S R O T S
 R R T O P A P E R T S I L S A N D
 W E A T H E R R A D I O E E D L A
 I T L H Y A T I L E V O H S C O F
 B A I E P L L F L A S H L I G H T
 I W N S M E D I C A T I O N S G S

BABY SUPPLIES
 BATTERIES
 BLANKETS
 CELLPHONE
 CHAINS
 EXTRA CASH
 EXTRA CLOTHES
 EXTRA FOOD
 FIRE EXTINGUISHER
 FIRST AID KIT
 FLARES
 FLASHLIGHT
 GPS
 HYGIENE ITEMS
 KID ACTIVITIES

MAPS
 MATCHES
 MEDICATIONS
 PAPER
 PENCIL
 PET SUPPLIES
 SAND
 SHOVEL
 SPARE GLASSES
 SPARE TIRE
 TOOL KIT
 TOW ROPES
 WATER
 WEATHER RADIO
 WHISTLE

An Unusually Cold Start to September 2008

Submitted by: Virgil Middendorf, Information Technology Officer

An unusually cold start to September was observed at Billings, and Miles City, Montana as well as Sheridan, Wyoming. Through September 11th, the numbers were as follows:

Billings, Montana

Ave max: 63.4 - record (old record 64.7 in 1965)
 Ave min: 44.7 - 7th coldest (record 41.9 in 1962,
 coldest since 43.6 in 1989)
 Ave temp: 54.0 - record (old record 54.4 in 1964)
 Pcpn: 2.30 - tied record wettest (also in 1961)

Miles City, Montana

Ave max: 67.2 - record (old record 67.5 in 1999)
 Ave min: 45.1 - 6th coldest (record 40.3 in 1962,
 coldest since 44.5 in 1974)
 Ave temp: 56.1 - 4th coldest (record 55.2 in 1962,
 coldest since 55.9 in 1965)
 Pcpn: 0.82 - 12th wettest (record 3.75 in 1946,
 wettest since 1.03 2002)

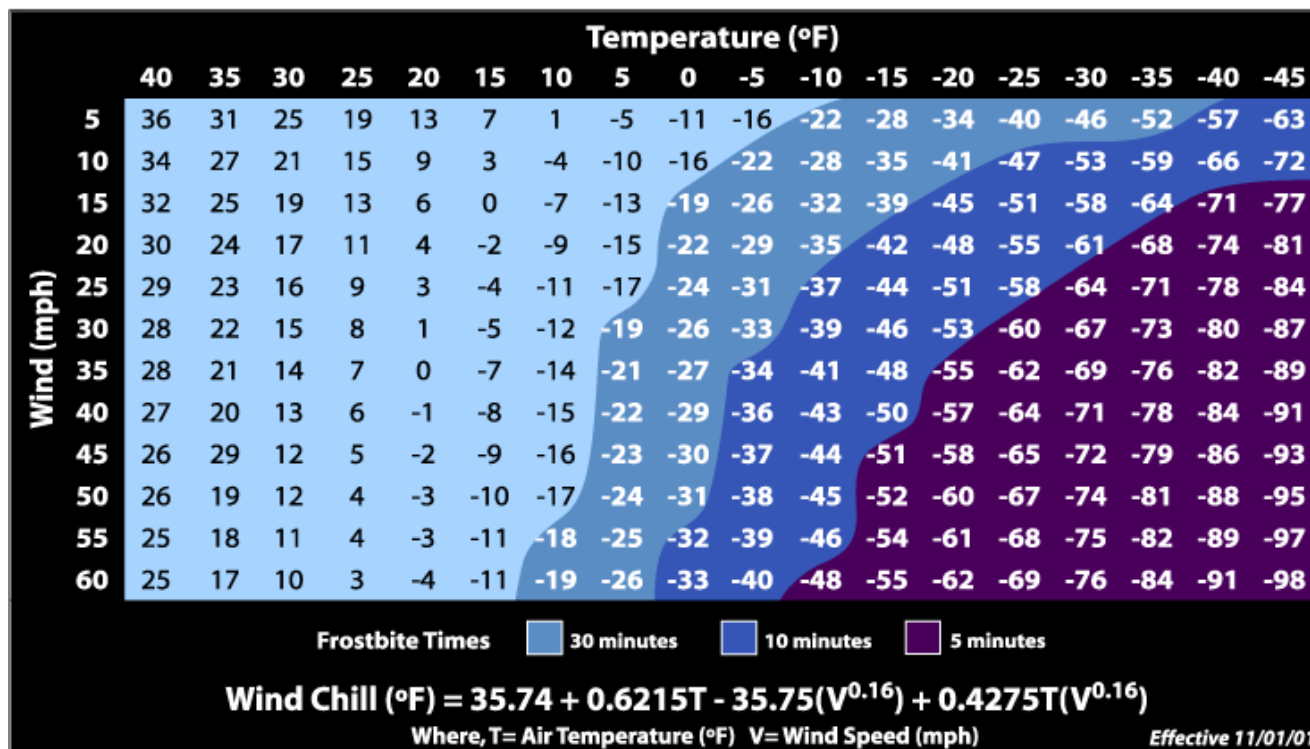
Sheridan, Wyoming

Ave max: 63.0 - record (old record 69.0 1962)
 Ave min: 39.6 - 2nd coldest (record 37.9 in 1962)
 Ave Temp: 51.3 - record (old record 53.5 in 1962)
 Pcpn: 1.53 - 5th wettest (record 2.44 in 1999, wettest
 since 1.59 in 2001)

The warmest temperature in September for Billings was 85 degrees. This temperature was reached on the 16th, 19th, and 20th. This tied the 5th lowest warmest temperature recorded in Billings for September since records started in 1934. It is also the lowest recorded since 1996. The record lowest of 78 was recorded in 1986. Temperatures which do not rise above 85 degrees in September occur on the average of once every eight years. *



Wind Chill Chart



First day of winter
December 21, 2008
11:59 UTC (4:59 am MST)

Daylight Saving time begins
March 8, 2009

First day of spring
March 20, 2009
11:46 UTC (5:46 am MDT)

Russian Weather Proverbs – Do They Hold True Today?

Compiled by: Sally Springer, Observing Program Leader

Proverbs taken from: www.math.montana.edu/~nmp/materials/ess/russian/int_weather/proverbs/proverb_list.html

Out of curiosity, I typed “weather proverbs” into the Google search on the internet. The following Russian weather proverbs were written many years ago, long before weather instruments or mathematical model equations were developed. Do they hold true today? We just might find out next spring!

- ❖ If it’s hot in July, then it’ll be cold in December.
- ❖ If it’s warm and dry in September, then winter will come late.
- ❖ If the first snowfall comes early in fall, then spring will come early.
- ❖ If it’s cold in September, then the snow will melt off in March.
- ❖ If heavy snow falls in the beginning of winter, then heavy rain in the beginning of next summer.
- ❖ If a snowy winter, then a long spring, rainy summer.
- ❖ If a warm winter, then a cold summer.
- ❖ If a dry and cold winter, then a dry and hot summer.
- ❖ If it’s cold in February, then summer will be pleasant.

Cooperative Observers at Ingomar and Sonnette

Portions taken from the following website:
<http://www.travelmt.com/mt-cities-Ingomar.html>

Ingomar is best known for its sheep shearing plant and is a sheep trade center. The first post office was established in 1910 with Simon Sigman as postmaster. Ingomar retains its post office and one rural route with mail delivered every Friday.

Ingomar is located in eastern Montana, on US Highway 12 northwest of Forsyth. Cooperative Observer, Mark Boone, has graciously reported temperature and precipitation data for his station 14 miles northeast of Ingomar for 16 years.

Sonnette is located just outside of Custer National Forest along Pumpkin Creek. Sonnette was first established by trapper and buffalo hunter Charles Mason, and the area was known as Camps Pass. Later, the community was known as Selway and came to be called Sonnette when the post office was established in 1926.

Sonnette is located in southeast Montana, to the east of Broadus off of US Highway 212. Donald and Lucille Ottesen began taking Cooperative Observer data in 1965.

A little bit of history to share with those who have a common interest in gathering local climate data. Thanks Mark, Donald and Lucille! ✨

Fall Averages

Submitted by: Matt Solum, General Forecaster

Fall arrived Monday September 22nd at 9:44 AM MDT and will end Sunday December 21st at 5:04 AM MST. The following table lists the normal temperature and precipitation statistics for Billings and Miles City, Montana and Sheridan, Wyoming for the fall season. Normals are 30 year averages calculated from 1971 to 2000. Temperatures are in degrees Fahrenheit and precipitation values are in inches.

Billings				
Date	Hi	Lo	Ave	Precip
9/22 – 9/30	68.6	43.1	55.9	0.25
10/1 – 10/31	58.9	37.2	48.1	1.26
11/1 – 11/30	42.7	25.6	34.1	0.75
12/1 – 12/21	36.0	18.5	27.3	0.47
9/22 – 12/21	49.9	29.4	39.7	2.72
Miles City				
Date	Hi	Lo	Ave	Precip
9/22 – 9/30	69.6	42.0	55.8	0.25
10/1 – 10/31	60.0	35.3	47.7	1.13
11/1 – 11/30	41.8	21.6	31.7	0.52
12/1 – 12/21	32.4	12.0	22.2	0.23
9/22 – 12/21	48.7	26.1	37.4	2.10
Sheridan				
Date	Hi	Lo	Ave	Precip
9/22 – 9/30	69.7	37.7	53.7	0.35
10/1 – 10/31	59.8	30.3	45.1	1.41
11/1 – 11/30	43.4	18.5	31.0	0.80
12/1 – 12/21	36.4	11.4	23.9	0.51
9/22 – 12/21	50.7	23.5	37.1	3.07

Water Year in Review 2007-2008

Submitted by: Matt Solum, General Forecaster

The 2007-2008 water year across southeast Montana and northern Wyoming ended September 30th and saw a mix of above and below normal precipitation. Billings, Montana received 13.76 inches of precipitation during the 2007-2008 water year, 1.01 inches below normal. This is the 9th year, out of the last 10 years, that the water year precipitation was below normal for Billings. Since 1998, the only water year that was above normal was 2006-2007 which netted 16.86 inches.

Sheridan, Wyoming received 15.88 inches, 1.16 inches above normal during the 2007-2008 water year. This is the first time since the 2004-2005 water year that precipitation was above normal. That water year saw 16.13 inches of precipitation. ✨

Great Divide Workshop Is A Great Success!

Submitted by: Matt Solum, General Forecaster

The 12th Annual Great Divide Weather Workshop attracted meteorologists from across the United States and Canada during the week of October 6th. The National Weather Service (NWS) forecast offices in Billings and Glasgow hosted the 12th Annual Great Divide Weather Workshop in Billings, Montana October 7th through the 9th. A mix of meteorologists from across the United States and Canada gathered to share ideas and research. Topics of interest included forecast challenges faced within the Intermountain West and the Western High Plains, and societal impacts during high impact events (such as the recent October 10-12th heavy snow event). In addition, NWS National Centers were also represented at the conference, and included NOAA's Storm Prediction Center and the National Center for Environmental Prediction. ✱

Summer Review

Submitted by: Matt Solum, General Forecaster

Summer ended Monday September 22nd at 9:44 AM MDT. Much of the region was above normal during the summer months in terms of temperature and below normal in terms of precipitation. The following table lists the average temperature and precipitation statistics for Billings and Miles City, Montana and Sheridan, Wyoming for the fall season, calculated from 1971 to 2000. These are also referred to as 30-year Normals. All temperatures are in degrees Fahrenheit and all precipitation values are in inches.

Billings								
Date	Norm Hi	2008 Ave Hi	Norm Lo	2008 Ave Lo	Norm Ave	2008 Ave	Norm Precip	2008 Precip
6/20 – 6/30	82.0	85.9	54.3	55.4	68.1	70.6	0.46	0.05
7/1 – 7/31	85.8	88.5	58.3	59.2	72.0	73.9	1.28	0.77
8/1 – 8/31	84.5	88.0	57.3	57.2	70.9	72.6	0.85	1.18
9/1 – 9/22	74.0	70.2	48.0	47.0	61.0	58.6	1.10	2.44
6/20 – 9/22	82.4	83.8	54.8	55.8	68.6	69.6	3.69	4.44
Miles City								
Date	Norm Hi	2008 Ave Hi	Norm Lo	2008 Ave Lo	Norm Ave	2008 Ave	Norm Precip	2008 Precip
6/20 – 6/30	83.4	84.4	56.5	55.2	70.0	69.8	0.78	0.46
7/1 – 7/31	87.9	89.7	60.2	60.1	74.1	74.9	1.61	0.88
8/1 – 8/31	86.8	89.3	58.9	58.7	72.9	74.0	1.16	0.75
9/1 – 9/22	75.5	73.5	48.5	46.8	62.0	60.2	0.94	0.99
6/20 – 9/22	84.1	85.2	56.6	56.0	70.4	70.6	4.49	3.08
Sheridan								
Date	Norm Hi	2008 Ave Hi	Norm Lo	2008 Ave Lo	Norm Ave	2008 Ave	Norm Precip	2008 Precip
6/20 – 6/30	81.2	81.4	49.4	47.5	65.3	64.4	0.42	0.26
7/1 – 7/31	85.2	87.4	52.4	52.3	68.8	69.8	1.11	0.92
8/1 – 8/31	84.9	88.0	51.5	50.4	68.2	69.2	0.80	0.28
9/1 – 9/22	75.5	69.7	43.7	39.5	59.6	54.6	1.07	1.56
6/20 – 9/22	82.9	82.8	50.2	48.2	66.5	65.5	3.41	3.02

Winter Averages

Submitted by: Matt Solum, General Forecaster

Winter will arrive Sunday December 21st at 5:04 AM MST and will end Friday March 20th at 5:44 AM MDT. The following table shows the normal temperature and precipitation statistics for Billings and Miles City, Montana and Sheridan, Wyoming for the winter season. Normals are based upon 30 year averages calculated from 1971 to 2000. Temperatures are in degrees Fahrenheit, while precipitation and snowfall values are in inches. Snowfall is not measured in Miles City, Montana or Sheridan, Wyoming.

Billings					
Date	Hi	Lo	Ave	Precip	Snowfall
12/21 – 12/31	33.1	15.3	24.2	0.21	3.3
1/1 – 1/31	32.8	15.1	24.0	0.81	10.9
2/1 – 2/28	39.5	20.1	29.8	0.58	6.5
3/1 – 3/20	46.1	25.3	35.7	0.69	6.8
12/21 – 3/20	38.0	18.9	28.5	2.29	27.6

Miles City				
Date	Hi	Lo	Ave	Precip
12/21 – 12/31	27.8	8.4	18.1	0.20
1/1 – 1/31	27.3	7.4	17.4	0.50
2/1 – 2/28	35.2	14.3	24.8	0.34
3/1 – 3/20	44.0	21.8	32.9	0.30
12/21 – 3/20	33.8	13.1	23.4	1.28

Sheridan				
Date	Hi	Lo	Ave	Precip
12/21 – 12/31	33.2	9.7	21.5	0.19
1/1 – 1/31	33.0	9.7	21.3	0.77
2/1 – 2/28	39.0	14.9	26.9	0.57
3/1 – 3/20	46.5	21.7	34.1	0.57
12/21 – 3/20	38.1	14.0	26.1	2.05

Be Your Own Forecaster

Submitted by: Joe Lester, General Forecaster
 Cloud picture taken from:

www.arh.noaa.gov/brochures/docs/CloudChart.pdf

Forecasting the weather can be very difficult, however, the atmosphere can give clues to what might happen in the near future. By looking at the sky and observing the winds, you might be able to predict what will happen at your location.

Will there be thunderstorms today? During the summer, look at the sky early in the morning. Altocumulus castellanus clouds are small, billowy, chaotic clouds, usually taller than they are wide. These clouds are a sign of instability in

the atmosphere. They are usually 10,000 to 15,000 feet above the ground and are often precursors to afternoon thunderstorm development.

Is it going to rain? In order to get precipitation, air must move upward. So, pay attention to the wind direction. A north to east wind is “upslope wind” (it blows toward the mountains) for much of southeast Montana. These winds are often associated with precipitation. If you live adjacent to a mountain range, notice which way the wind is blowing. A wind blowing up the mountain is moist, whereas a wind blowing down the slope is drier. Cont. page 12...**Forecaster**

What is the Coop Program?

*Submitted by: Carolyn Willis,
Cooperative Program Manager*

The National Weather Service's (NWS) Cooperative Observer Program (COOP) is the nation's largest and oldest weather network. It was established in 1891 to formalize the collection of meteorological observations and establish/record climate conditions in the United States. Our nation has a long history of weather observations. Many of the country's founders, including George Washington, Thomas Jefferson, and Benjamin Franklin kept weather records. Today, more than 11,000 Cooperative Weather Observers across the United States donate more than a million hours each year to collect daily weather data.

The Cooperative Observer Program is truly the nation's weather and climate observing network of, by, and for the people. Thanks to its dedicated participants, many decades of relatively stable operation, and stations in many rural locations, the Cooperative Network is the most comprehensive daily source of U.S. temperature and precipitation data and for establishing a valuable climate record.

The everyday operations of the COOP program including training, data acquisition, and station management are managed by the NWS. Data processing, which includes quality control, archiving, and publication, are handled by NOAA's National Climatic Data Center (NCDC). Participants in the Coop program receive a set of simple weather instruments and observing instructions from the NWS. Equipment used at NWS cooperative stations may be owned by the NWS, the observer or by a company or utility or other government agency, as long as it meets NWS equipment standards.

Of the more than 11,000 COOP stations, nearly 5,000 are climate stations, and more than 6,000 cooperative stations support hydrology. Climate stations report 24-hour maximum and minimum temperatures, liquid equivalent of precipitation, snowfall, snow depth and other special

phenomena such as days with thunder, hail, or fog. Hydrologic stations, on the other hand, report liquid equivalent of precipitation and some may also observe river water level heights, 24-hour maximum and minimum temperature, snowfall, snow depth, evaporation and other measurements as needed. Observations are sent as monthly reports to the NCDC in Asheville, N.C. or to the local NWS office where the data is digitized, checked and archived (i.e., about 5,800 COOP stations have their monthly summaries published by NCDC. Several thousand observers also report 24-hour summaries of observations to the NWS on a daily basis.) Data is transmitted through telephone, computer or mailed to the NWS at the end of the month.



JoAnn Ferguson, Coop Observer at Livingston Airport, received a 15 year Length of Service Award.



Judy Rue, Coop Observer at McLeod, received a 10 year Length of Service Award.



Ina Winge, Coop Observer at Nye, Montana, Received a 10 year Length of Service Award.



Willis Busenitz, Coop Observer in Busby, MT, received a 35 year Length of Service Award.



‘America Is Safer When Our Schools Are Safer’: U.S. Schools Receive Life-Saving NOAA Public Alert Radios

Taken from: <http://www.weather.gov/nwr/>

As of August 2008, Federal agencies have begun distributing more than 182,000 Public Alert Radios to preschools, Head Start programs, K-12 nonpublic schools and nonpublic school central offices, K-12 school district offices and post-secondary schools. In two earlier phases, the federal government distributed radios to all 97,000 K-12 public schools across the country, bringing the program to a close this September with life-saving radios in every school in the nation.

The radios sound an alarm to alert school personnel about hazardous weather and other emergencies, even when other means of
Cont. on page 11...**Radios**



Byron Nelson, Coop Observer at the Sheridan Field Research Station, received a 50 year “Honored Institution Award” for the station.

Radios...communication are disabled. The radios are distributed by the Department of Commerce's National Oceanic and Atmospheric Administration with funding from the U.S. Department of Homeland Security and assistance from the departments of Education and Health and Human Services.

Commonly known as NOAA Weather Radio All Hazards: <http://www.weather.gov/nwr/> these Public Alert Radios provide alerts and safety steps on a wide range of emergencies — from an approaching tornado, a telephone outage disrupting 911 emergency services, local roads overrun by flash floods, a derailed train posing a hazardous material threat, or the urgent need to be on the lookout for an abducted child.

The program also encourages school officials, emergency managers, human service providers, and Citizen Corps Councils across the country to partner and align their efforts with local emergency plans to build overall community preparedness. By coordinating with their local emergency managers and Citizen Corps Council, schools also can obtain technical and other assistance to improve their school safety plans and other emergency preparedness efforts.

For additional information on the Public Alert Radios for Schools Program, see the Web site: <http://public-alert-radio.nws.noaa.gov/> NOAA understands and predicts changes in the Earth's environment, from the depths of the ocean to the surface of the sun, and conserves and manages our coastal and marine resources.

The Billings NWS office is working with over 100 private schools in south central and southeast Montana as well as Sheridan County, Wyoming, regarding these radios, to assure the radios are properly programmed and set up. ✨

Education Materials Available

*Submitted by: Carolyn Willis,
Cooperative Program Manager*

If you are a parent, grandparent, homeschooler, babysitter, or anyone who works with children, the National Weather Service has materials that are both educational as well as fun. Take a look at the webpage:

<http://www.weather.gov/om/edures.shtml> where you will find the following items available online:

Classroom Materials:

- ❖ [Safety Brochures, Booklets, etc. on weather topics](#)
- ❖ [Videos, slides, books, posters, charts, software, calendars, more!](#)
- ❖ [Ideas and sources of ideas for classrooms](#)
- ❖ [K-12 outreach activities in weather and climate](#)
- ❖ [Lightning safety games, activities, lesson plans for Teachers](#)
- ❖ [National Severe Storm Lab Education Page](#)
- ❖ [How to keep your school safe during hazardous weather](#)
- ❖ [National Science Education Standards](#)

Student Sites:

- ❖ [Play time for kids](#)
- ❖ [Climate games, activities, links, materials](#)
- ❖ [FEMA's homework for kids](#)
- ❖ [FEMA's kid links](#)
- ❖ [Jetstream and Weather](#)

Satellite images:

- ❖ [Images from NOAA Library collection](#)
- ❖ [Lightning photos](#)

Glossary:

- ❖ [Glossary of Weather Terms](#)

Forecaster...continued from page 8

Is it going to be windy today? If you live near a mountain range, you may notice altocumulus



standing lenticularis (ACSL or “lenticular”) clouds over and just downwind of the mountains. These are stationary lens-shaped or saucer-shaped clouds that are indicative of strong winds blowing over and perpendicular

to the mountain range. These clouds are a sign that it may become quite windy later in the day.

When is it going to warm up? When an arctic air mass settles over the region, notice which way the wind is blowing. If a north to east wind is occurring, the arctic air will remain in place. However, once southwest or west winds develop, a warm up is on the way. Warmer air tends to flow down the east slopes of the mountains and this is a signal that the colder air is beginning to retreat to the east. ❄

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