Coyote Crier

National Weather Service

Spring/Summer 2006

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Lightning Safety

As the monsoon season approaches it is important to review some lightning safety information. Lightning is the nation's number 2 storm killer and no place outside is safe when thunderstorms are in the area. Use these tips below to keep you and your family safe!

- Plan: Plan outdoor activities to avoid thunderstorms. Listen to NOAA Weather Radio for the latest weather forecast before heading out. Weather here in Southeast Arizona can change very rapidly be sure you have the most up-to-date information before going outside.
- 30-30 Rule: If 30 seconds or less between lightning and its thunder, go inside. Stay inside 30 minutes or more after the last rumble of thunder is heard.
- Safe Places: Fully enclosed large buildings provide good lightning protection. Vehicles with solid metal roofs and solid metal sides give some protection.
- Indoors: Don't use corded telephones. Keep away from electrical appliances, wiring, plumbing, and windows.
- Outdoors: Avoid elevated places and open spaces. Stay away from water and tall isolated objects. Do **NOT** go under trees! Allow time to reach safety. Don't seek refuge in open structures.

For more information on lightning safety please visit:

www.lightningsafety.noaa.gov

Inside this issue:

What you should report:

Tornado:	Either on the ground or a funnel cloud aloft
Heavy Rain:	A **half an inch or more**, if it fell in less than an hour
Hail:	**Small Hail** (1/4 inch) or larger
High Wind:	Estimated or measured **40 mph or greater**
Flooding:	**Any** kind of flooding
Snow:	**One inch** or more (2 inches or more if above 5000 ft.)
Visibility:	**Less than one mile** for any reason (fog, dust, snow)
Death/Injury:	**Any** weather-related reason
Damage:	**Any** weather-related reason (most often from wind)
Earthquake:	**Any** tremor

(520) 670-5162 or 1-800-238-3747

Hail Size Estimates

(Size stated in inches)

0.25 ~ Small Hail
0.50 ~ Dime
0.75 ~ Penny
1.00 ~ Quarter
1.25 ~ Half Dollar
1.50 ~ Ping Pong Ball
1.75 ~ Golf Ball
2.00 ~ Lime
2.50 ~ Tennis Ball

NERON

Glen Sampson
Meteorologist In Charge, NWS Tucson AZ

NERON? What is a NERON? As in many large institutions acronyms abound and NERON stands for NOAA's Environmental Real-time Observation Network. NERON is a new national program to install automated climate and weather observing stations every 400 square miles across the nation. Each station can record air temperature, precipitation accumulation, wind direction and speed and soil moisture every five minutes and report that information every 15 to 60 minutes. The implementation of this program is an historic event because no other national climate networks in the world produce observations every 5 minutes and make them available in real time.

The information from these stations will not only describe the Nation's climate but will provide valuable information for water resource management and flood and drought forecasting, and will provide input for sophisticated computer weather models. The opportunities for new weather and climate discoveries are unlimited.

NERON is important for Arizona because 25-29 sites are expected to be installed in the state within the next couple of years. Additionally this network is slated to be installed in New Mexico for a substantial increase in real-time observational data across the Southwest. These data will help many organizations better understand and plan for abnormally dry or wet conditions. A NERON installation in Alabama is shown below.

National Weather Service Mission: "The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community."

Upper Lows: ("A Weatherman's Woe")

Brian Francis
Senior Forecaster, NWS Tucson AZ

The topic of frontal cyclones appeared in the November 2005 issue of the *Coyote Crier*. This article will deal with the concept of **"Upper Lows"** and the associated weather regimes and forecast challenges produced from these systems.

As stated in a previous article, a **low-pressure system** is an area of low atmospheric pressure where less air is above the surface at that point. If the pressure is lower at the surface, the surrounding air will circle in toward the center of lower pressure. The upper low is also generally associated with an upper level pool of cold air, which in turn will lead to instability in the underlying air. This causes the air to rise above the low pressure and generate cloudy weather with precipitation. In contrast, a **high-pressure system** contains subsiding air that generally leads to clear skies and warm temperatures.

Outside of the monsoon season, the weather in Southeast Arizona is primarily influenced by low-pressure systems and high-pressure systems that reside mainly in the middle and upper portions of the atmosphere. For instance, a low pressure system may reside in the middle and/or upper levels of the atmosphere, or from about 15,000 to 30,000 feet above ground level. However, there may not be a *surface reflection* of this low-pressure system as such, or one that can be readily analyzed, identified, or depicted on a surface weather map, primarily due to terrain effects.

The term **cut-off low** is also applied to an enclosed region of low pressure which is "cut off" from the main west-to-east (or "westerly") flow of air in the northern hemisphere. When these systems become "cut-off" from the main westerly flow, they become quite difficult to forecast since the steering flow is very weak. These systems can become stationary, or move in any direction, including back to the west. Thus the old adage: "Upper Lows: a 'Weatherman's Woe'" holds even in this age of advanced numerical weather prediction guidance available to the meteorologist.

This picture was provided by Spotter #112 of snow in Corona De Tucson which fell on March 11th and 12th of this year!

Providing pictures to the National Weather Service is a great way to let us know the weather that you're observing! Pictures of impressive storm features, hail and storm damage are always welcome. To send your pictures please e-mail them to:

Pamela.Elslager@noaa.gov

Thanks for all the great pictures provided to us by spotters throughout the 2005-2006 winter season!

Dust Storms: *One of Arizona's most Underrated Weather Hazards*

Jeff Davis
Senior Forecaster, NWS Tucson AZ

The state of Arizona is home to some of the most spectacular displays of blowing dust in North America. Dangerous dust storms impact the state several times per year causing major vehicle accidents, property damage, injures and loss of life. Most of the causalities occur on state highways when motorists encounter low visibilities and collide either head-on with other vehicles or stop causing a chain reaction. One of the worst blowing dust events in southeast Arizona occurred on April 9th, 1995 and resulted in 10 fatalities and 20 injures on Interstate 10 near Bowie. Strong winds associated with a low pressure system produced a plume of dust from the Willcox Playa which reduced visibilities to a few feet along Interstate 10 between Willcox and San Simon. This deadly event involved 4 separate accidents, totaling 24 vehicles.

While dust storms are extremely hazardous to motorists, exposure to blowing dust can have other affects on human health, both long and short term. Dust has been known to carry with it a variety of pathogens (fungi and bacteria) and chemical contaminants, all of which can affect your health. In addition, dust particles as large as 10 microns can cause breathing problems and finer particles can infect the lung directly. However, little is known about the direct impacts of dust storm events on public health, despite the attention given to the phenomenon called "dust pneumonia" that clamed lives during the Dust Bowl in the 1930s.

In the mid 80s researchers at Arizona State University did a study that identified 4 different weather types that generate dust storms in Arizona. These classifications are (1) Frontal, (2) Thunder-storms, (3) Tropical disturbances, and (4) Upper level cut-off lows or Troughs. Weather types 1 and 4 typically occur during the transition months of fall and spring, with type 3 occurring mainly in late August through early October. Figure 1 shows the monthly frequency of dust storm fatalities in Arizona which peaks in July.

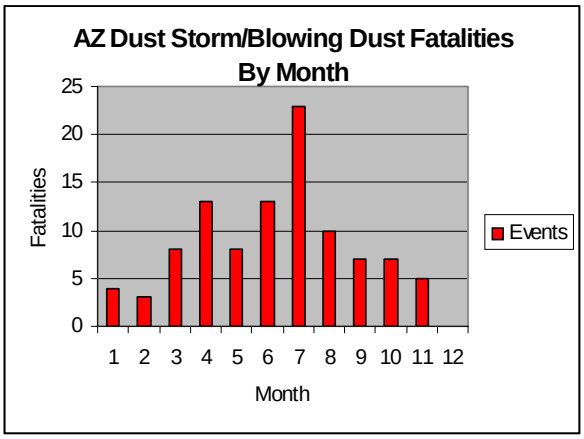

Figure 1: Monthly frequency of dust storm fatalities in Arizona.

The most common dust storm generation type in Arizona is 2, the thunderstorm. The mechanism for generating these dust storms is the organized outflow from downdrafts of decaying thunderstorms. This rain and evaporation cooled outflow results in a cold pool of air at the surface which travels the path of least resistance down the slopes of river basins and valleys. The dust storm takes on the appearance of a solid wall of dust that spans several miles in horizontal extent and several thousand feet vertically.

The largest and most ominous looking of these dust storms is called a "haboob". The name comes from the Arabic word habb, meaning "wind". Haboobs are most common in the central deserts of Arizona during the summer rainy season, with the frequency of occurrence peaking in late July and early August. The city of Phoenix experiences on average about 3 haboobs per year during the months of June through September. Figure 2 shows a classic haboob that moved through the Phoenix area on July 16th, 1971.

** Dust Storm Article Continues on Page 5

** Dust Storm Article Continued from Page 4

Figure 2: A picture of a Haboob that hit Phoenix, Arizona on July 16th, 1971. NOAA Photo Library.

The detection of dust storms is difficult for weather forecasters. Satellite imagery under clear conditions can sometimes detect areas of blowing dust. Figure 3 shows a plume of dust blowing off the Willcox Playa in the enhanced visible satellite imagery.

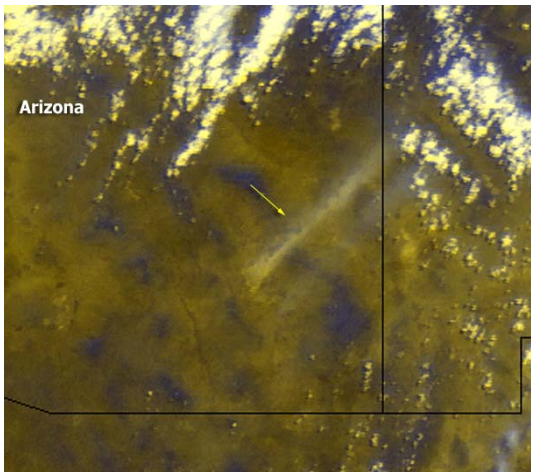

Figure 3: Satellite image of dust plume off the Willcox Playa in April 2004. NOAA Photo Library.

However, clouds associated with thunderstorms and their anvil cloud shields mask the blowing dust in satellite imagery. For cases involving thunderstorms, forecasters turn to Doppler radar velocity and reflectivity images for identifying outflow boundaries that may contain blowing dust. Figure 4 is a radar velocity image overlaid with station reports depicting an outflow boundary approaching Phoenix from the southeast. The current National Weather Service (NWS) radar system cannot discriminate from dust particles versus precipitation. Therefore, forecasters still rely heavily on surface observations from automated weather stations and the SKYWARN spotter network.

As a SKYWARN spotter, you play a very important role in warning the public of these dangerous dust storms. The NWS in Tucson will issue a Dust Storm Warning for visibilities of ¼ of a mile or less. A Blowing Dust Advisory will be issued when observed visibilities are at 1 mile or less, but greater than ¼ of a mile.

As we approach the peak season for dust storms in Arizona, just remember that the NWS relies on your reports of blowing dust to help save lives. If blowing dust is sighted, please contact the NWS as soon as possible and be prepared to give your location, visibility, and time of the event.

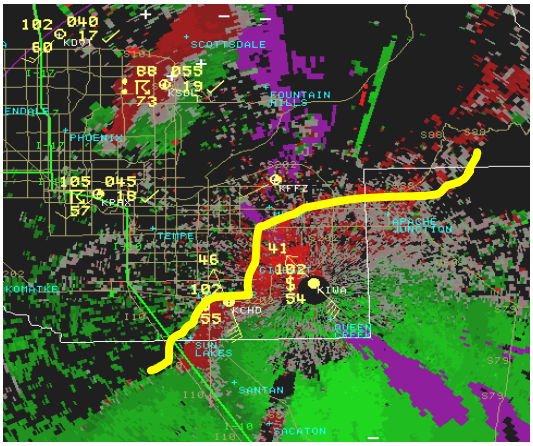

Figure 4: Doppler radar velocity image of the July 14, 2002 dust storm that hit Phoenix. The yellow line depicts the leading edge of the thunderstorm outflow.

Dust Storm Safety Tips:

- If dense dust is observed blowing across or approaching a roadway, pull your vehicle off the pavement as far as possible, stop, turn off lights, set the emergency brake, take your foot off of the brake petal to be sure the tail lights are not illuminated.
- Don't enter the dust storm area if you can avoid it.
- If you can't pull off the roadway, proceed at a speed suitable for visibility, turn on lights and sound horn occasionally. Use the painted center line to help guide you. Look for a safe place to pull off the roadway.
- Never stop on the traveled portion of the roadway.

National Weather Service

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Spotters:

Remember to keep your information up-to-date! Current phone number, address, and e-mail address help us stay in contact with you. The easiest way to update your information is to send an e-mail to:

Pamela.Elslager@noaa.gov

The Staff at NWS Tucson

Meteorologist in Charge	Glen Sampson
Administrative Support Assistant	Bonnie Maguire
Warning Coordination Meteorologist	Tom Evans
Science and Operations Officer	Erik Pytlak
Electronic System Analyst	Jim Schmidt
IT Specialist	Evelyn Bersack
Electronic Technicians	Kris Johnson
	Norm Phelps
Service Hydrologist	Mike Schaffner
Senior Forecasters	Jeff Davis
	Brian Francis
	John Glueck
	Jim Meyer
	Greg Mollere
Forecasters	Chris Rasmussen
	Steve Reedy
	Craig Shoemaker
	Gary Zell
	Pamela Elslager
Meteorologist Intern	Glenn Lader
Observations Program Leader	Angel Corona
Hydrometeorologcial Technicians	Hans Hanson
	Mic Sherwood

Spotter Training Dates and Locations

Date	Time	Location
May 2, 2006	6:30 pm	Oscar Yrun Community Center 3020 E. Tacoma St., Sierra Vista
May 8, 2006	6:30 pm	Safford General Services Building 921 Thatcher Blvd., Safford
May 20, 2006	1:30 pm	U of A Campus, ENRB Room 253 520 N. Park Ave., Tucson
May 23, 2006	6:30 pm	Oro Valley Town Hall 11000 N. La Canada Dr., Oro Valley

For this spring/summer season four training sessions are being offered. Anyone is welcome to attend the class and there is no need to register. Please just show up on the day of the class. Being a trained spotter is a vital part of being an informative and prepared spotter. If you cannot attend any of these training sessions, additional classes will be offered in the winter.

Contact us if you have any additional questions or if you would like spotter training in your area! National Weather Service (520) 670-5162. Please speak with Pam or Tom to schedule additional classes.