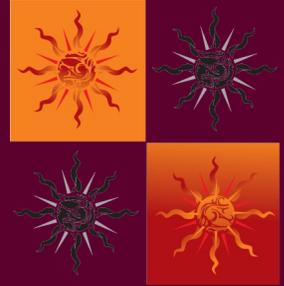




The Four Peaks Post



Spring 2013

National Weather Service — Phoenix, AZ

Spring Edition of The Four Peaks Post Newsletter!

By Charlotte Dewey, Meteorologist Intern

Springtime in Arizona is a wonderful time of year; full of blooming cacti, mild weather to spend time outdoors and baseball season starting. Summer is at our doorsteps, and with summer comes the triple digit weather, whether we like it or not!

We look forward to many more newsletters coming out with great information that will hopefully be helpful and informative.

Inside this issue:

- Precipitation Events: Recurrence
- Observer Awards
- Climate: Monsoon 2013 Outlook
- SAWS V Workshop
- Heat Safety
- NWS Phoenix: YouTube

Office Leadership

Meteorologist in Charge

Gary Woodall

Warning Coordination Meteorologist

Ken Waters

Science and Operations Officer

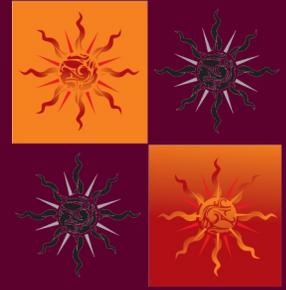
Vacant

Questions:

w-psr.webmaster@noaa.gov



Image credit Arizona Highways Magazine 2001

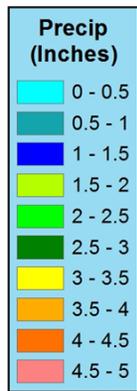
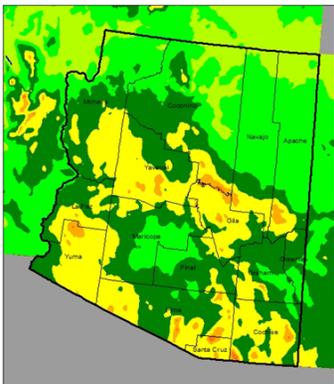


Assessing the Recurrence Interval of Precipitation Events

By Mike McLane, Senior Service Hydrologist

Have you ever wondered how rare that rainfall was that swelled the wash in your back yard, flooded roadways in your neighborhood, or resulted in those swift water rescues that were highlighted on the evening news? National Weather Service forecasters are often asked these same sort of questions by the public and media following heavy precipitation events. Was this a 50 year, 100 year, maybe even a 500 year event?

100 Year ARI Precipitation (3-Hour Duration Event)



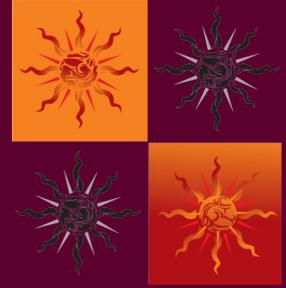
One way of assessing the rareness of a rainfall event is to compare measured or radar estimated rainfall totals to recurrence interval data. A recurrence interval is an estimate of the interval of time between events. It is sometimes referred to as return period.

National Weather Service forecasters use a tool called Flash Flood Monitoring and Prediction (FFMP) system to help determine the need to issue flood advisory and flash flood warning products. FFMP enables forecasters to compare basin radar estimated rainfall totals with Flash Flood Guidance (FFG) thresholds. FFG is an estimate of the average amount of rainfall for a given duration required to produce flash flooding in a basin. A 3-hour FFG of 1.8 inches for instance means an average of 1.8 inches of rain needs to fall in a 3 hour period for flash flooding to occur.

24-hour / 100 Year Average Recurrence Interval Rainfall for Arizona. [More info found here.](#)

The NWS Phoenix Forecast Office recently integrated precipitation frequency average recurrence interval data into FFMP. This new functionality will provide forecasters an additional guidance source, enabling them to assess the rarity of rainfall events. Forecasters will now be able to compare radar rainfall estimates with selected precipitation frequency recurrence intervals. Although it does not take a rare event to produce flash flooding, forecasters will now be able to quickly focus in on those areas where flash flooding is most likely to occur.

(Continued on next page)



Precipitation Events (Continued)

Post analysis of some 2012 monsoon events is showing some promising results. One event we looked at was the flash flooding that occurred in Anthem, AZ the evening of July 31st. Thunderstorms that developed that evening moved north to south across the region producing over 4 inches of very heavy rainfall in a 90 minute period over the Deadman Wash and Skunk Creek drainages. One observer in Anthem actually measured 5.02 inches. Rapid runoff from the high intensity rainfall resulted in significant flooding in the Anthem area.

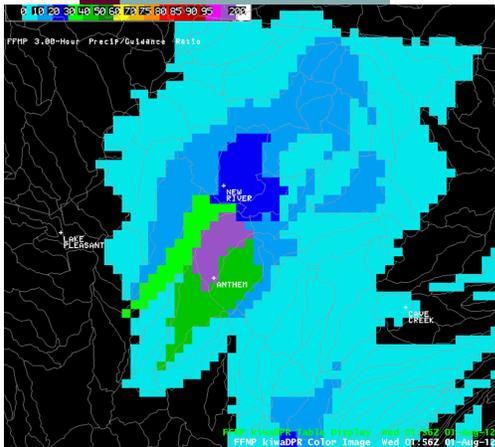
There is no question this was a significant precipitation / flood event, but how rare an event was it? With our new capability in FFMP, a question such as this can now be readily answered. The graphic to the left shows how precipitation frequency data can be used in FFMP. Displayed is the ratio of three hour radar estimated rainfall for this event to the 25 year recurrence interval. The purple colored basin is Deadman Wash and it has a ratio greater than one, meaning, the average rainfall that fell in this basin on average only occurs once every 25 years. Although this recurrence interval is not as great as the 5.02 inch point measurement would indicate, it does show that this event was relatively rare.

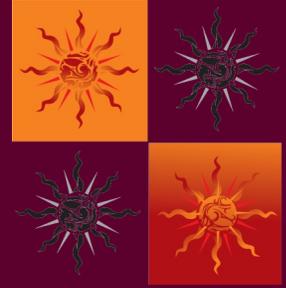
One common misunderstanding when using return frequency data is that for an “X” year event “X” years will pass before an event of the same magnitude reoccurs. This is incorrect. There is a “X”/100 percent chance of the event occurring every year. So for a 100 year event (“X” = 100), there is therefore a 1 percent chance of a similar event occurring in the same area every year. A good analogy is the coin toss. If you flip a coin enough times, it should come up heads 50 percent of the time and tails 50 percent of the time. 10 tosses of the coin though could result in seven heads and three tails. It is important to understand then that the occurrence of a 100 year event today does not preclude an event of the same magnitude from occurring the following day? Multiple events with the same return frequency, just like duplicate occurrences of heads or tails on a coin toss, can follow one another. Over a very long period of time though an event with the same magnitude on average will repeat once every “X” years, where “X” is the event’s recurrence interval.

For additional information on precipitation frequency data, visit the Office of Hydrologic Development’s Precipitation Frequency Data Server at:

http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_gis.html

3-hour Radar Estimated Rainfall / 25 Year Basin Average Recurrence Rainfall





Cooperative Observer Awards

By Keith Kincaid, Cooperative Observation Program Manager

Two of our Cooperative Observers received significant length of service awards.

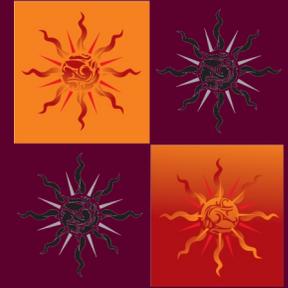
The first was Earle Stewart who is our observer in Laveen, AZ. Earle received the Dick Hagemeyer Award. This award was established in honor of Dick Hagemeyer (1924-2001) who career spanned 51 years with NOAA and his last 20 years as Director of the Pacific Region. Prior to his Directorship, he served as Substation Network Specialist/Cooperative Program Manager. This award is granted to an observer for 45 years of service.

Mr. Stewart began reporting the daily high and low temperatures as well as the daily precipitation for Laveen, AZ on June 1st, 1968. He continues to perform this duty today. The Weather Forecast Office (WFO) Phoenix would like to thank you for your dedication, hard work and continued service.

The second award was presented to Wayne and Judy Beulke who report the daily high and low temperatures and precipitation to our office from Bouse AZ. Mr. and Mrs. Beulke began their observing duties in January of 1973. They were presented with a 40 Year length of service award and continue to report the readings to our office today. In addition to these duties, Mr. Beulke is also one of our volunteer weather spotters and has helped our office out during heavy rainfall events by checking the washes in the

Bouse area and reporting this information to our office. WFO Phoenix would like to thank you for your dedication and service.





Southwest Climate Corner

By Mark O'Malley, Forecaster/Climate Science Program Manager

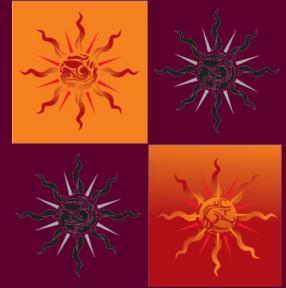
The winter season of 2012-2013 was characterized by ENSO neutral conditions; that is near normal sea surface temperatures across the central and eastern equatorial Pacific Ocean. Without the influence of El Nino or La Nina, more variable storm tracks brought a wide variety of weather regimes to the desert southwest. Temperatures through the entire winter season 2012-13 were not remarkably far from normal, though extremes on both the cold and warm side were notable. In general, slightly cooler than normal weather occurred over northeast Arizona, while slightly warmer than average conditions prevailed over central and southwest Arizona, as well as southeast California. Like the past several winters, precipitation was mostly below normal across the region, though some locations along the Mogollon Rim did experience several beneficial rain and snow events.

Numbers in parenthesis are departure from normal/average, using 1981-2010 normal period.

(Continued on next page)

City	Oct 2012 Avg Temp	Nov 2012 Avg Temp	Dec 2012 Avg Temp	Jan 2013 Avg Temp	Feb 2013 Avg Temp	Mar 2013 Avg Temp	Apr 2013 Avg Temp	Winter Average
Phoenix	78.8 (+2.1)	68.4 (+4.3)	56.7 (+1.3)	53.6 (-2.8)	57.1 (-2.6)	69.5 (+4.3)	75.3 (+2.6)	65.6 (+1.3)
Yuma	79.4 (+1.9)	68.1 (+2.4)	58.4 (+1.0)	55.6 (-3.0)	59.1 (-2.8)	70.6 (+3.4)	75.0 (+2.0)	66.6 (+0.7)
Tucson	73.4 (+2.4)	64.8 (+5.0)	53.4 (+1.5)	49.8 (-2.8)	50.8 (-4.5)	65.7 (+5.6)	69.8 (+2.8)	61.1 (+1.4)
Flagstaff	49.3 (+2.5)	39.6 (+2.9)	28.3 (-1.3)	23.9 (-6.0)	27.9 (-4.2)	40.0 (+3.0)	44.6 (+1.3)	36.2 (-0.3)

City	Oct 2012 Precip	Nov 2012 Precip	Dec 2012 Precip	Jan 2013 Precip	Feb 2013 Precip	Mar 2013 Precip	Apr 2013 Precip	Winter Precip
Phoenix	T (-0.58)	0.05 (-0.60)	0.87 (-0.01)	1.39 (+0.48)	0.31 (-0.61)	0.85 (-0.14)	0.06 (-0.22)	3.53 (-1.68)
Yuma	0.03 (-0.18)	T (-0.22)	0.60 (+0.09)	1.02 (+0.65)	0.01 (-0.38)	0.08 (-0.25)	T (-0.15)	1.74 (-0.44)
Tucson	T (-0.89)	0.03 (-0.54)	1.18 (+0.25)	0.81 (-0.13)	0.79 (-0.07)	0.01 (-0.72)	0.12 (-0.19)	2.94 (-2.29)
Flagstaff	1.03 (-0.63)	1.02 (-0.74)	2.08 (+0.21)	2.64 (+0.59)	0.86 (-1.30)	1.38 (-0.74)	0.12 (-1.03)	9.13 (-3.64)



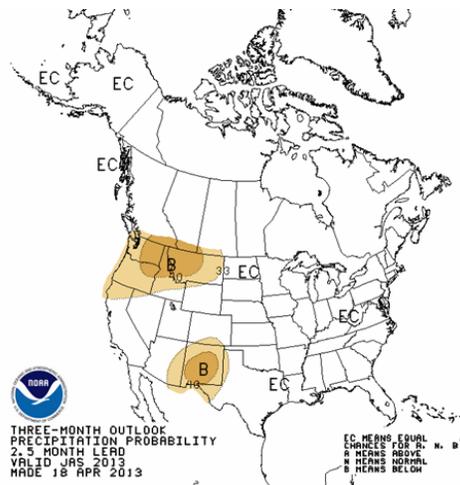
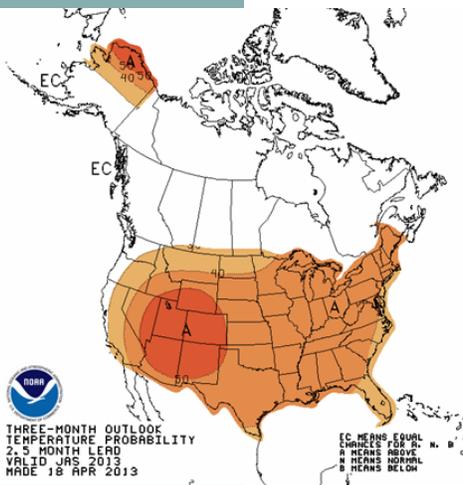
Climate Corner (Continued)

Monsoon Outlook

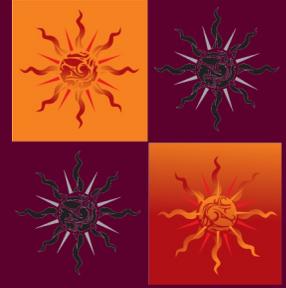
So, what does the upcoming monsoon season hold for the state of Arizona? Unfortunately, there aren't any climate signals or indications from climate models as to the timing of deeper moisture return; nor for any tendencies towards more or less thunderstorm activity this year. The only definitive signal from climate models (primarily based on past trends) is a greater likelihood that the summer months will be warmer than average. Below are images depicting the probability of temperature and precipitation outcomes generated by the Climate Prediction Center, respectively. There is about a 50% chance that temperatures during the summer will be warmer than average (still leaving about a 17%

change of cooler than normal conditions). Slightly better chances exist that monsoon rainfall will be less than normal for New Mexico, but little shift in the odds for Arizona.

Below is a summary of average monsoon rainfall for select cities across the state, along with observations from the past several years.



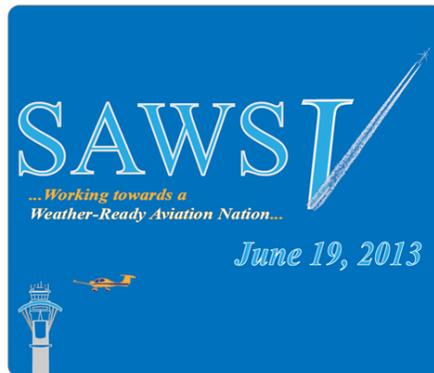
6/15-9/30 City	Average Monsoon Rainfall	2012	2011	2010	2009	2008	2007
Phoenix	2.71	3.00	1.60	2.48	0.87	5.70	0.74
Yuma	1.30	2.25	0.76	0.61	1.76	1.49	1.98
Tucson	6.08	6.02	8.62	5.45	2.86	5.52	6.57
Flagstaff	8.31	6.30	8.43	10.38	2.87	5.44	8.32



Southwest Aviation Weather Safety (SAWS) Workshop V:

“Virtually” Taking Off June 2013

By Jessica Nolte, Meteorologist/Aviation Program Manager



The fifth installment of the Southwest Aviation Weather Safety (SAWS) Workshop will take-off into a new era of the workshop's history *as it will be hosted entirely in a virtual/webinar format*. Our original plans to host the workshop in beautiful Long Beach, California had to be re-worked into a virtual workshop format. We are excited to host the workshop virtually and know we can reach *an even broader audience* who might not have been able to travel and join us in Southern California!

Similar to previous SAWS formats, we will host two workshop sessions with one designed for aviation meteorologists and a second designed as an aviator and controller weather workshop. Participation in this workshop is intended to satisfy FAAST WINGS accreditation. If you are seeking WINGS credit, be sure to attend the Aviation and Controller Weather Workshop session from 12:25 pm to 4:00 pm PDT.

Presentation topics include: Forecasting and Aviation Operations from the airlines perspective, GA user concerns, climatology and forecasting tools, aviation weather basics, Southern California weather hazards, forecast tools and resources for pilots, and many more!

The Workshop Agenda is set and registration will be opening very soon! Keep an eye on the SAWS V website at <http://www.wrh.noaa.gov/psr/SAWS5/> and watch for Registration to go live. You can also find the latest agenda and additional information about the workshop on the SAWS V website.

If you have questions about the Workshop, please contact the WFO Phoenix Aviation Program Manager Jessica Nolte (Jessica.Nolte@noaa.gov). We are looking forward to carrying on the tradition of bringing aviation users and aviation weather service providers together from across, but not limited to, the Southwest and West Coast regions. Safe flying and hope to “see” you in the webinar this June!



Monsoon Season

June 15 - September 30



Monsoon Safety Awareness: Heat Safety

By Charlotte Dewey, Intern Meteorologist

During Arizona's hottest months, special products are issued by the National Weather Service (NWS) Phoenix office to inform and alert the public when hot weather, by Arizona standards, is expected. A main concern, is to raise public awareness and to prevent heat illness from happening. When the NWS Phoenix office issues a heat product, it aims to serve as a sign that on that day, outdoor activities should be very closely watched.

The human body has an ability to tolerate heat as the summer wears on, research has shown. So when a temperature of 105 degrees in May seems pretty hot, by the end of June or July that same 105 degrees won't seem quite as hot. Our bodies will acclimate to the heat as the summer months continue. For this reasoning, there is not one single temperature threshold used by NWS Phoenix to determine a level when a heat product will be issued.

If significantly hot temperatures are forecast, NWS Phoenix will issue an Excessive Heat Watch generally two to three days in advance. Helping to alert public and emergency officials and the media outlets to advertise and give a "heads up". If significantly hot weather is forecast for today or tomorrow, then the Watch will be upgraded to an Excessive Heat Warning.

Nationwide, Heat is the number one weather related killer, according to data from the Center for Disease Control and Prevention (CDC).

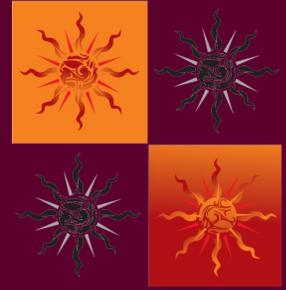
Some safety tips you can take during excessive heat:

Dress for summer. Wear lightweight, light-colored clothing to help the body maintain more of a normal temperature. Wear a hat to help protect your head from the sun exposure. If you must be outdoors, aim for early morning or evening time.

Spend more time indoors in air-conditioned places, especially during the hottest part of the day, from early afternoon through early evening.

Drink plenty of water, or non-alcoholic fluids. Being dehydrated can cause other illnesses and the heat exposure on top of that will

More Heat Safety information can be found here: <http://www.wrh.noaa.gov/psr/general/safety/heat/#safety>



NWS Phoenix on YouTube!

By Charlotte Dewey, Meteorologist Intern/Social Media Program

As Social Media continues to evolve and change, the National Weather Service is doing its part to keep up with various outlets of communication. National Weather Service Phoenix is on [Twitter](#) and [Facebook](#), and we're proud to announce we now have a YouTube Channel! Please visit our channel here: <http://www.youtube.com/user/NWSPhoenix>.

One of our goals as an agency, is to provide the most up to date and accurate weather and climate information so that the general public and the emergency management community are informed of hazards and potential impacts. By using Social Media networks, we can reach a wider range of the public community to inform of current hazards and events impacting local areas.

We are excited to be able to use these different social network platforms to communicate with the public. Please check us out on Twitter, Facebook and YouTube for updates on current weather systems, climate information, outlook and recap write-ups and even some daily weather trivia.

Arizona Winter Temperature Departures

Ave. Temperature dep from Ave (deg)
10/1/2012 - 3/29/2013

Phoenix, AZ
Tucson, AZ
Flagstaff, AZ

Generated 3/29/2013 at 10:02 using presentation software.
National Weather Service

Winter 2012-2013 Recap for Arizona & ENSO Outlook

NWSPhoenix - 5 videos

18 views

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