

Arizona Climate Summary

January 2012

Summary of conditions for December 2011

December 2011 Temperature and Precipitation Summary

December 1st – 17th: November ended with clear, dry weather under the influence of high pressure off the southern California coast. The high broke down and gave way to a low pressure system which brought cold, wet conditions on December 1st. Temperatures the first week of December were 10-15 degrees below normal. The Flagstaff area had 6-8" of snow on the 1st, followed by another 10 inches on the 2nd and 3rd. By the 5th of December, this winter storm also dropped 5.2" of snow on Payson, 5.3" to Navajo National Monument, 3" at Prescott, 3" at Seligman, and 1.7" at Show Low, and 1" at Williams. Rainfall was also widespread, with 1.16" at Tonto Natural Bridge, 0.41" a Cottonwood, 0.25" at Window Rock, 0.52" at Tucson, 0.16" at Scottsdale, 0.17" at Phoenix Airport, 0.29" at Safford Airport, 0.33" at Casa Grande, 0.48" at Davis Monthan AFB, 0.38" at Grand Canyon Airport, and 0.80" at Kingman. By the 6th, the system had moved out of the state, leaving behind significantly cooler temperatures. The warmest daytime temperature on the 6^{th} was 59°F at Yuma and the coldest was 32°F at Fort Valley. Nighttime temperatures dropped into negative numbers with -19°F at Bellemont. Temperatures over the next week remained in the low 70s and upper 60s as the high pressure ridge formed off the coast of Washington state. These temperatures were near average, but would soon drop again as another cold, winter storm system moved in on the 12th. Polar air dropped \daytime temperatures mid 60s in the warmest locations. This storm tapped into a stream of subtropical moisture, resulting in significant rainfall totals. Bisbee received 0.68", Casa Grande had 1.38", Davis Monthan AFB had 1.46", Nogales had 1.84", Phoenix Deer Valley had 0.64", Phoenix Airport had 0.74", Safford had 0.81", Scottsdale had 1.01", Sierra Vista had 1.22", South Mountain Park had 0.83", Tucson Airport had 1.33", and Yuma had 1.13". Snow totals included 11.1" at Bellemont, 3" at the Grand Canyon South Rim, 2" at the Grand Canyon North Rim, 3.8" at Payson, 1.5" at Navajo National Monument, and 1" at Seligman. Another upper air disturbance moved across the southwest on the 15th and a cut-off low pressure system sat over our southwestern border on the 16th and 17th. This system produced very little precipitation and allowed temperatures to rebound back to near average values.

December 18th – 31st: On the 18th, the cut-off low began moving across Arizona, bringing rainfall to all parts of the state on the 18th, 19th and 20th. The greatest reported snowfall was 5" at Show Low, and 0.1" at Canyon de Chelly. The storm was relatively warm as it had been sitting off the southern California coast for several days. Rainfall totals included 0.39" at Davis Monthan, 0.15" at Flagstaff, 0.16" at Gila Bend, 0.21" at Nogales, 0.12" at Phoenix Airport, 0.38" at Safford, 0.12" at Sierra Vista, 0.37" at Tucson Airport, 0.20" at Bisbee, 0.32" at Bellemont, 0.55" at Coronado National Monument, 0.16" at East Mesa, 0.18" at Lost Dutchman State Park, 0.32" at Payson, 0.29" at Sonora Desert Museum, 0.25" at Wickenburg, and 0.74" at Petrified Forest National Park. One last low pressure system moved through eh state on the 22nd-23rd, dropping less than a quarter of an inch of precipitation on most places. This last system did have significantly colder air, lowering daytime temperatures to the lower 60s in the warmest locations. These cooler than normal temperatures remained through Christmas. Nighttime lows dropped into the single digits in the coldest locations, and even Phoenix had nighttime lows in the 30s by Christmas weekend. By the 28th, high pressure settled off the Baja California coast keeping skies clear and allowing temperatures to rise to about 5°F above seasonal normals.

State Climate Office **Dr. Nancy J. Selover, State Climatologist**http://azclimate.asu.edu Tel: 480-965-6265

© 2012 Arizona State Climate Office



School of Geographical Sciences & Urban Planning Arizona State University Tempe, AZ 85287-1508 Edited by Nancy J. Selover & Matt Salerno <u>In This Issue:</u> Overview of December, and the year 2011, graphs of the December daily maximum and minimum temperatures, precipitation, mean daily dew points for Flagstaff, Phoenix, and Tucson; December climate statistics, maps of mean monthly maximum and minimum temperatures, precipitation, dew points, wind speeds for December; and graphs of the mean December temperature and precipitation for the period of record for Tucson, Phoenix, and Flagstaff, graphs of the cumulative precipitation for the calendar year for Flagstaff, Phoenix, and Tucson. Climate calendars for Flagstaff, Phoenix, Tucson, Prescott, Winslow and Yuma, including daily and monthly normals and extremes, for each month of the year, can be downloaded directly from the State Climate website. See p. 19 of this report for calendar abbreviations.

Data are preliminary and are from the National Weather Service Forecast Offices in Flagstaff, Phoenix and Tucson. **Note: The discrepancy between the Statewide Temperature and Precipitation values for Phoenix, Flagstaff and Tucson and the daily values in their graphs are due to the reporting times. Statewide Temperature and Precipitation values are taken at 5pm, while official daily records at the airports are taken from Midnight to Midnight.

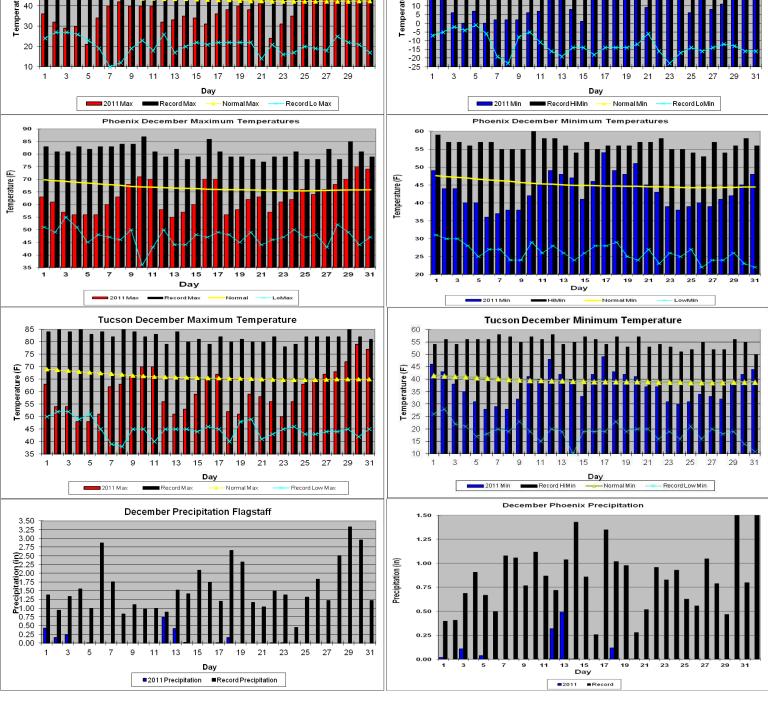
2011 Annual Summary:

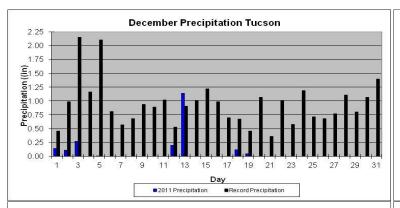
2011 was a year of contrasts across the state with northern and southern Arizona receiving near average precipitation while central Arizona was much drier than normal. Phoenix received just over half its normal precipitation of 8.03". Flagstaff had 20.67", just under their normal of 21.86", and Tucson had 12.23', just over their normal of 11.59". This August was the hottest ever in Phoenix and the 2nd hottest for both Flagstaff and Tucson, as well as many other Arizona towns. August 2011 was also tied with July 2009 as the warmest month ever in Phoenix. The high temperatures were largely a result of a lack of thunderstorms which cool the air through evaporation. The high humidity levels also kept nighttime temperatures quite warm. In early July, the dry winter and spring contributed to a monster dust storm that moved northwest from Tucson all the way through Phoenix to Wickenburg. Significant rainfall did not come to central Arizona until the following week. Five more large dust storms moved through Phoenix before the monsoon ended its activity around September 17th. The first 100°F day in Phoenix was April 1st, which ranks 2nd, after March 26, 1988, the earliest 100° day. The early heat did not last, as May had no special ranking in temperature, but once the monsoon began, things heated up across the valley. Fall was also relatively warm in Arizona, but several cold winter storm in early November and early December cooled things off with significant snowfalls around the state. By Christmas, the southwest had received more snowfall than anywhere else in the contiguous 48 states. Just after Christmas, the pattern turned dry just in time for the New Year.

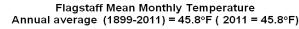
	Tucson		Phoenix		Flagstaff	
Month	Temperature	Precipitation	Temperature	Precipitation	Temperature	Precipitation
Jan	No ranking	10 th driest	27 th warmest	17 th driest	No ranking	4 th driest
Feb	No ranking	No ranking	No ranking	No ranking	26 th coolest	18 th wettest
Mar	5 th warmest	Tied 10 th driest	8 th warmest	18 th driest	20 th warmest	No ranking
Apr	10 th warmest	No ranking	10 th warmest tie	No ranking	No ranking	No ranking
May	No ranking	No ranking	No ranking	No ranking	25 th coolest	No ranking
Jun	15 th warmest	No ranking	22 nd warmest	Tied as driest	25 th coolest	Tied as driest
Jul	16 th warmest	No ranking	12 th warmest tie	21 st wettest	No ranking	No ranking
Aug	2 nd hottest	No ranking	1 st hottest	19 th driest	2 nd hottest	No ranking
Sep	22 nd warmest	1 st wettest	3 rd hottest	19 th driest	No ranking	23 rd wettest
Oct	13 th warmest	29 th driest	8 th warmest	No ranking	No ranking	9 th driest
Nov	No ranking	No ranking	27 th warmest tie	No ranking	No ranking	No ranking
Dec	No ranking	16 th wettest	No ranking	No ranking	No ranking	No ranking
Annual	19 th warmest tie	No ranking	14 th warmest	21 st driest	No ranking	No ranking

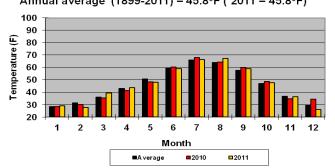
[&]quot;No ranking" means the temperature or precipitation was not within the top 30 warmest, coolest, wettest or driest.

December 2011 Daily Temperature, Precipitation, & Dew Point for Flagstaff, Phoenix, and Tucson Flagstaff December Minimum Temperature 40 35 30 25 20 15 10 5 -10 -15 -20 -25 Temperature (F) Temperature (F) 2011 Max Record Max Normal Max Record Lo Max 2011 Min Record HiMin Normal Min Record LoMin Phoenix December Maximum Temperatures Phoenix December Minimum Temperatures Temperature (F) Temperature (F) Day Day 2011 Max Record Max Normal LoMax Tucson December Maximum Temperature Tucson December Minimum Temperature **Lemberature (F)**45
40
35
30
25 21 23 19 21

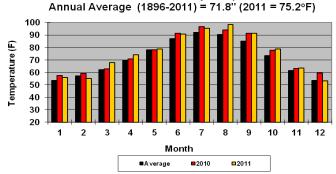




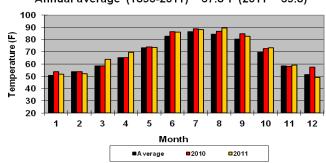


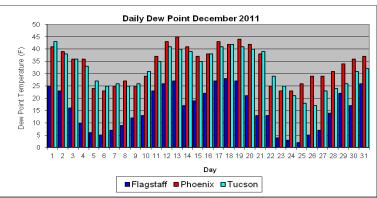


Phoenix Mean Monthly Temperature al Average (1896-2011) = 71.8" (2011 = 75.2°F)

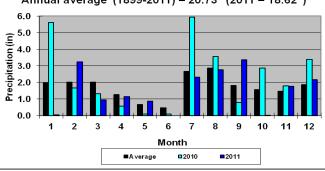


Tucson Mean Monthly Temperature Annual average (1895-2011) = 67.8°F (2011 = 69.8)

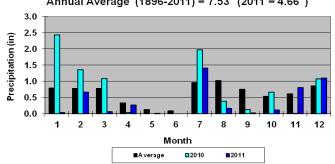




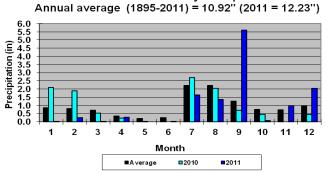
Flagstaff Mean Monthly Precipitation
Annual average (1899-2011) = 20.73" (2011 = 18.62")



Phoenix Mean Monthly Precipitation Annual Average (1896-2011) = 7.53" (2011 = 4.66")



Tucson Mean Monthly Precipitation



FLAGSTAFF CLIMATE STATISTICS

December 2011

December	er 2011		
This December was tied for 25 th coldest and had no significant ranking for precipitation.	Cooling Degree Days 0 Normal 0 Degree base 65°F		
Avg Max Temp (F) 39.2 Normal 42.5 Avg Min Temp (F) 13.3 Normal 16.8 Avg Mean Temp (F) 26.3 Normal 29.6 Departure from Normal (F) -3.3 Highest Monthly Avg Temp (F) 39.8 in 1980 Lowest Monthly Avg Temp (F) 21.9 in 1972, 1932 Highest Temp this month (F): 61 on 29 th Lowest Temp this month (F): 0 on 4 th and 6 th	Total December Precipitation 2.16" Normal December Precipitation 1.87" Departure from normal +0.29" Greatest 24-Hr Precipitation 1.62 on 12/12-13 Total Precipitation Year-to-Date 20.67" Departure from Normal -1.19" Number of Days: Clear 17 Partly Cloudy 10 Cloudy 4		
Record High (F): 68 on 12/11/1950 Record Low (F): -23 on 12/23/1990, 12/08/1978 Temperature or precipitation records this month: 6 th LoMax 21 set, previous record 23 in 1912. Flagstaff Number of Days of: Minimum Temp 10° or lower 14 Minimum Temp 20° or higher 9 Maximum Temp 30° or lower 4 Maximum Temp 50° or higher 5	Greatest December Precipitation 7.30" in 1967 Least December Precipitation 0.00" in 1999, 1917, 1958 Average Wind Speed 5.6 mph Highest Peak Gust 39 mph from 30° on 23 rd		
Heating Degree Days 1197 Normal 1097 PHOENIX CLIMA December			
This December had no significant ranking for temperature or precipitation.	No temperature or precipitation records were set		

This December had no significant ranking for			
temperature or precipitation.	No temperature or precipitation records were set		
	this month:		
Avg Max Temp(F) 63.0 Normal 66.0			
Avg Min Temp(F) 43.4 Normal 44.8	Phoenix Number of Days of:		
Avg Mean Temp (F) 53.2 Normal 55.4	Minimum Temp 40° or lower 11		
Departure from Normal (F) -2.2	Minimum Temp 50° or higher 2		
	Maximum Temp 60° or lower 12		
Highest Monthly Avg Temp (F) 61.3 in 1980	Maximum Temp 80° or higher 7		
Lowest Monthly Avg Temp (F) 46.6 in 1911			
	Heating Degree Days 359 Normal 294		
Highest Temp this month (F): 75 on 30 th	Cooling Degree Days 0 Normal 1		
Lowest Temp this month (F): 36 on 6 th	Degree base 65°F		
Pagend High (E): 97 on 12/10/1050			

Record High (F): 87 on 12/10/1950 Record Low (F): 22 on 12/26/1911,

Record Low (F): 22 on 12/26/1911, 12/31/2900 Total December Precipitation 1.10"

Normal December Precipitation 0.88"	
Departure from normal +0.22"	Greatest December Precipitation 3.98" in 1967
Greatest 24-Hr Precipitation 0.60" on 12/12-13	Least December Precipitation 0.00" in 1900,
Total Precipitation Year-to-Date 4.66	2000, 1896, and 14 other years
Departure from Normal -3.37"	
	Average Wind Speed 4.6 mph
Number of Days:	Highest Peak Gust 26 mph from 270° on 18 th
Clear 14	
Partly Cloudy 13	
Cloudy 4	
TUCSON CLIMAT December	
December	2011
This December was tied for 22 nd coolest and had no	
significant ranking for precipitation.	Heating Degree Days 490 Normal 405
	Cooling Degree Days 0 Normal 0
Avg Max Temp(F) 60.4 Normal 64.8	Degree base 65°F
Avg Min Temp(F) 37.4 Normal 39.1	
Avg Mean Temp(F) 48.9 Normal 51.9	
Departure from Normal (F) -1.7	Total December Precipitation 2.03"
	Normal December Precipitation 0.93"
Highest Monthly Avg Temp (F) 58.1 in 1980	Departure from normal +1.10"
Lowest Monthly Avg Temp (F) 41.3 in 1915	Greatest 24-Hr Precipitation 1.64" on 12/19-20
Highest Terror this words (E) 70 an 20 th	Total Precipitation Year-to-Date 12.23"
Highest Temp this month (F): 79 on 30 th Lowest Temp this month (F): 28 on 6 th & 8 th	Departure from Normal +0.64"
Lowest Temp this month (F): 28 on 6 th & 8 th	Greatest December Precipitation 5.85" in 1914
Record High (F): 85 on 12/08/1939, 12/29/1921,	Least December Precipitation 5.83 in 1914 Least December Precipitation 0.00" in 1898,
12/02/1911	1996, 2000, and 8 other years.
Record Low (F): 10 on 12/14/1901	1990, 2000, and o other years.
	Number of Days:
Temperature or precipitation records this month:	Clear 18
4 th LoMax 48 set, previous record 49 set in 1971	Partly Cloudy 5
5 th LoMax 48 set, previous record 51 set in 1953	Cloudy 2
13 th Precip 1.14" set, previous record 0.39" in 1993.	
	A W' 10 1 77 1
Tucson Number of Days of: Minimum Target 20° on lawyer	Average Wind Speed 5.5 mph
Minimum Temp 30° or lower 4 Minimum Temp 40° or higher 14	Highest Peak Gust 45 mph from 130° on 17 th
Minimum Temp 40° or higher 14 Maximum Temp 50° or lower 3	Data are from the National Weather Service and the
Maximum Temp 70° or higher 5	National Climatic Data Center and are preliminary .
waximum remp to or inglier	rational Chinatic Data Center and are premimary.

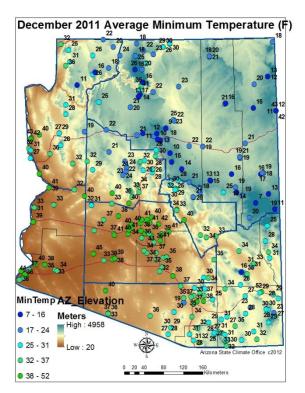
Winds for December:

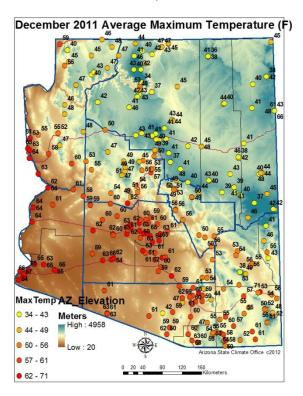
Day	Phoenix		Flags	Flagstaff		Tucson	
(mph)	Avg	Max	Avg	Max	Avg	Max	
1	7	26	5.1	22	8.9	40	
2	4.3	16	3	15	3.1	20	
3	7	21	5.2	30	6.6	20	
4	4.5	15	2.8	15	2	21	
5	4.5	18	11.4	29	5	20	
6	4.2	16	2.8	18	3.2	14	
7	2	16	2.6	13	6	21	
8	2.4	10	2.3	15	3.6	16	
9	3.1	14	2.3	18	4.4	16	
10	3.8	20	2.3	14	9.2	33	
11	3.6	15	3.7	28	5.4	20	
12	8.8	26	5.1	21	5.3	26	
13	8.4	23	3.6	13	5.6	18	
14	4.3	15	5.2	16	3.5	17	
15	2.8	15	4.9	18	2.4	18	
16	11.6	25	16.9	33	17.5	41	
17	7.6	18	12.7	28	15.1	45	
18	7.6	26	2.9	14	3.4	24	
19	3.9	18	7.9	20	2	20	
20	3.6	13	1.8	16	2.7	18	
21	2.8	18	5.5	20	4.4	18	
22	6.1	23	10.3	31	6.1	25	
23	5.1	21	16.9	39	4.5	20	
24	1.8	13	13.3	35	4.6	21	
25	3.4	13	4.2	20	6	22	
26	3	10	4	18	5.3	21	
27	2.4	8	2.9	18	5.1	18	
28	3.4	12	0.7	10	4.9	16	
29	3.4	15	2.4	18	5.2	17	
30	3.3	13	4.4	23	5.8	26	
31	3.5	13	3.5	20	4.1	18	

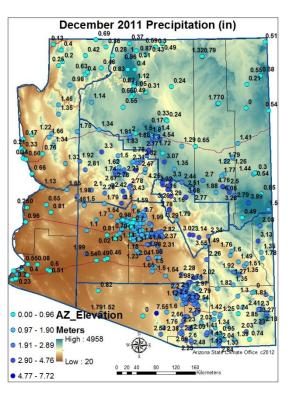
Dew Points for December: Daily Average Dew Point (°F):

Dunymore	ige Dew 1		-
Day	Phx	Tuc	Flg
1	41	43	25
2	39	38	23
3	36	36	16
4	36	33	10
5	24	27	6
6	23	25	5
7	25	26	7
8	27	25	9
9	25	26	12
10	29	31	13
11	37	35	23
12	43	41	26
13	45	40	27
14	41	39	17
15	37	35	19
16	38	38	22
17	43	41	27
18	42	42	28
19	44	41	27
20	42	40	21
21	38	39	13
22	25	29	13
23	23	25	4
24	23	21	3
25	26	18	2
26	29	17	5
27	29	23	7
28	31	24	14
29	34	26	22
30	36	31	17
31	37	32	26

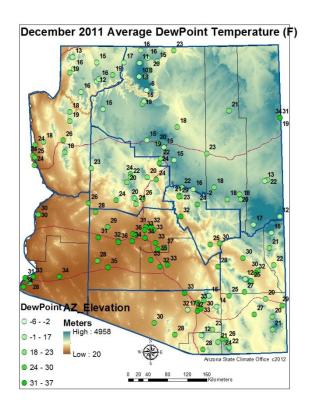
December 2011 Temperature, Dew Point, Wind Speed, and Precipitation Maps are based on **preliminary data** from the National Weather Service, the Arizona Meteorological Network (AZMet), operated by the University of Arizona College of Agriculture Cooperative Extension and the RAWS (Remote Automated Weather Station) network operated by the Bureau of Land Management and Forest Service and the CoCoRaHS (Community Collaborative Rain, Hail and Snow) Network.

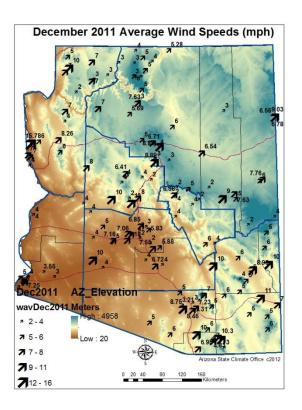


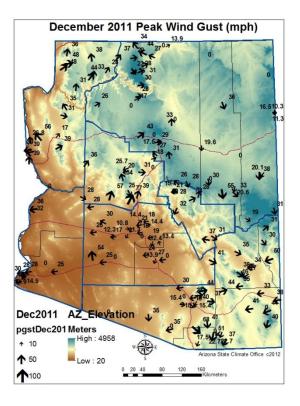




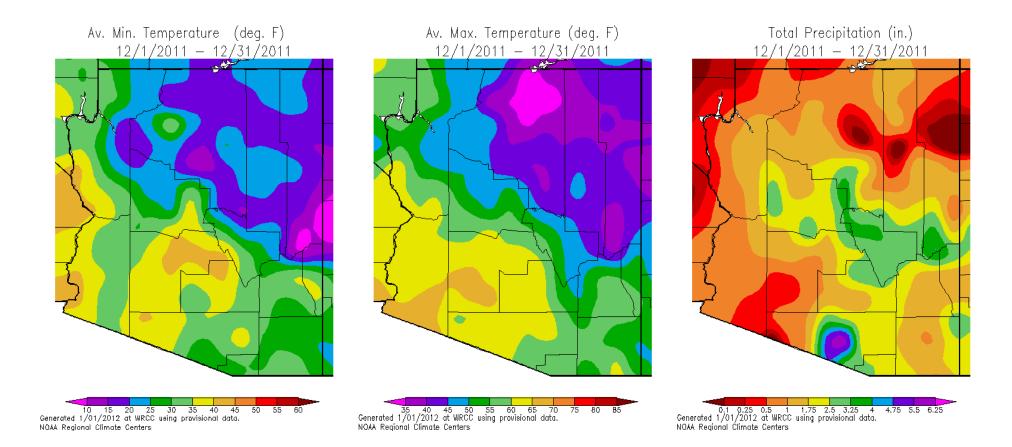
Average nighttime temperatures ranged from 7°F at Sunrise Mountain, to 52°F at Bowie. Average daytime temperatures ranged from 34°F at Bright Angel at the bottom of the Grand Canyon, to 71°F at Bowie. Precipitation values ranged from 0" in a few places in the southwest desert and along the lower Colorado River to 7.72" at Bright Angel and 7.55" at Kitt Peak. Most of the precipitation fell on the 12th and 13th during our first major winter storm. As is normal for this time of year, the warmest areas were in the southwest deserts and the coldest areas were just above the rim and at the higher elevations of the San Francisco Peaks and the White Mountains.

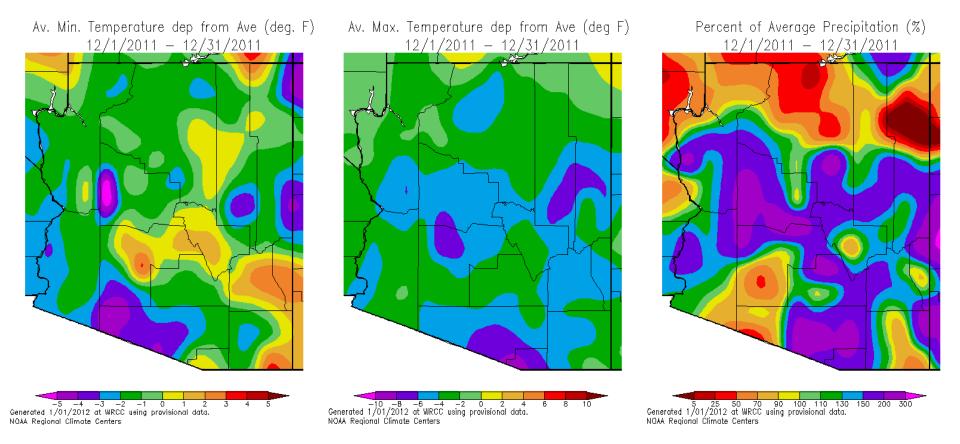




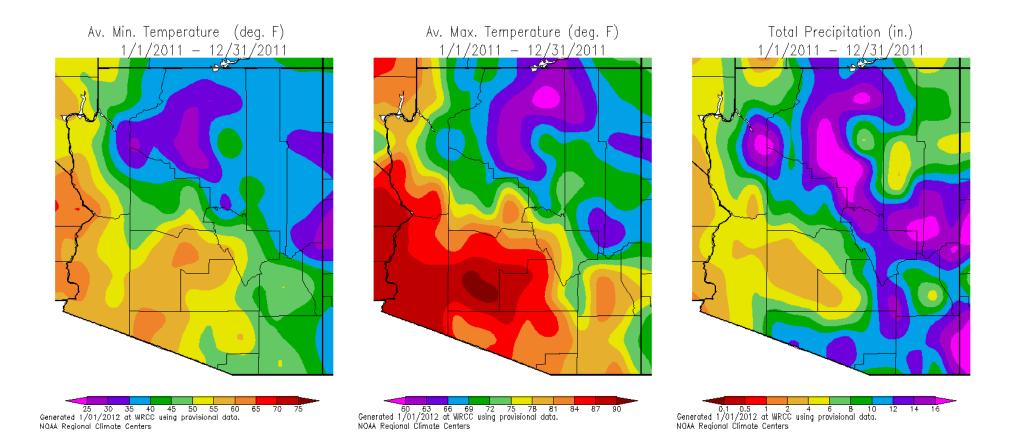


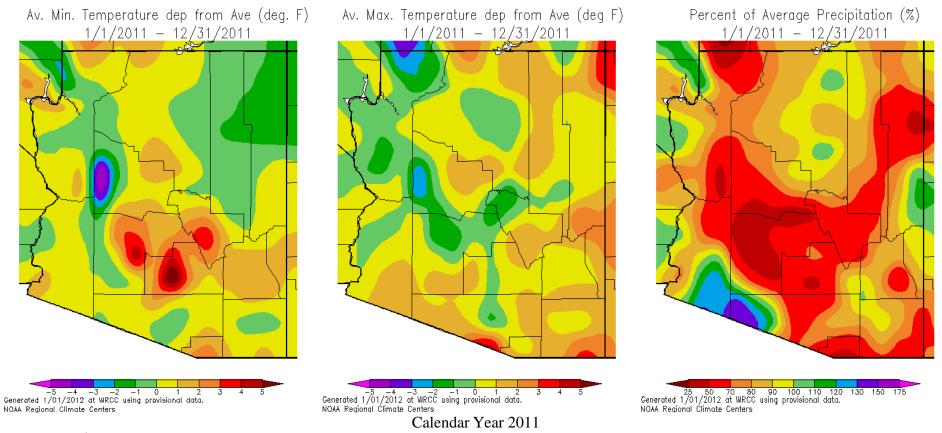
Average monthly dew points ranged from -6°F at Bright Angel in the Grand Canyon, to 37°F at Williams Gateway Airport in Mesa. Average winds were light, with 15 mph as the highest average at Laughlin-Bullhead City. The highest peak wind gust was 72 mph at Humbug Creek in southern Yavapai County. Peak wind gusts blew in all different directions, which is typical as the high winds are generally attributed to thunderstorm outflows, which have no dominant direction unless the storms are steered by upper level winds. The arrows point to the direction the winds blow from.



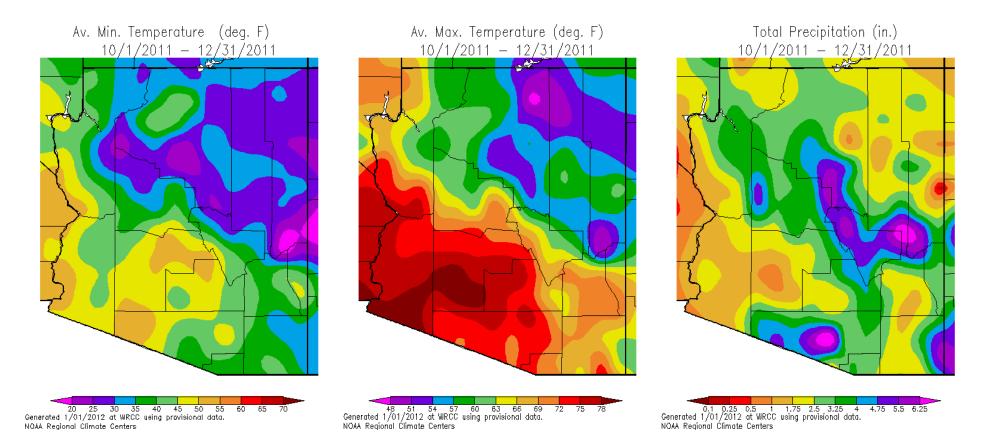


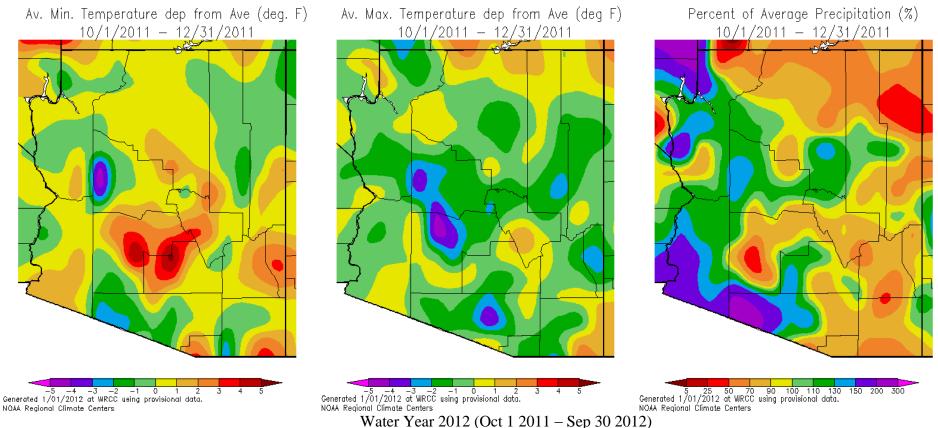
December minimum temperatures were 0-3°F warmer than average across eastern Maricopa, Gila, Graham, Greenlee, and eastern Cochise counties, and 1-4°F colder than average across northern and western Arizona, Pinal, Pima and western Cochise counties. Daytime temperatures were much colder than normal everywhere in the state. Precipitation in December was again quite localized ranging from less than 5% of average in northern Apache County, to over 200% of average in Yavapai and western Pima counties. Northern Coconino and Mohave counties had between 25 and 90% of average precipitation.





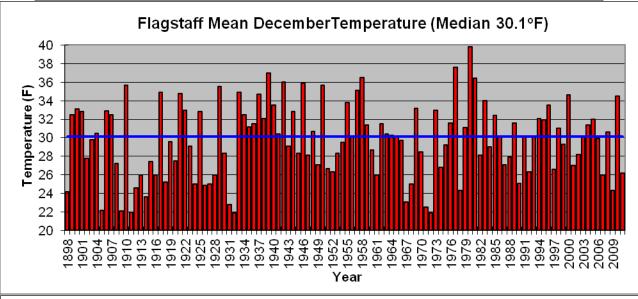
Since January 1st, nighttime temperatures have been within 2°F of average across the Colorado Plateau, and within 1°F of average across southern Arizona. The warmest area is in western Pinal County and central Maricopa County west of Phoenix at 2-5°F warmer than average. Daytime temperatures have been within 2°F of average statewide. The coldest areas are Mohave, western Yavapai, northern Maricopa and northern Gila counties. Precipitation for the calendar year is near average in most of Coconino County and in the Tucson area, while central Arizona has received less than 70% of average. Yuma and western Pima Counties have received significantly above average precipitation (120-150% of average).

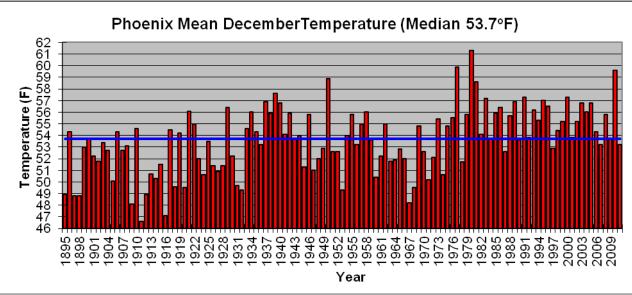


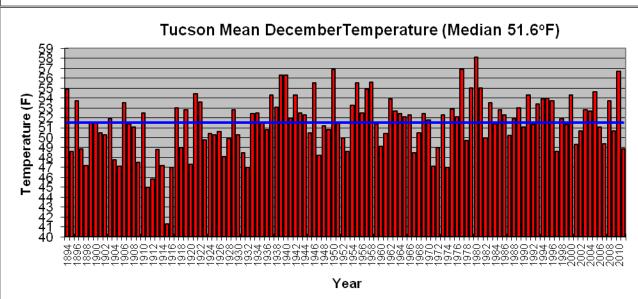


The new water year, 2012, which began October 1st, is a reflection of the fall weather in 2011. The nighttime lows have been within 1°F of average across the Colorado Plateau, while southern Arizona has generally been 0-3°F warmer than average. Western Pima County has been 1-3°F colder than average while Maricopa and western Pinal counties have been 2-5°F warmer than average. Daytime high temperatures have been within 2°F of the long-term average on the Colorado Plateau. Yavapai, Maricopa, and Pima counties were 0-4°F colder than average. So far this water year, the eastern 2/3 of the state had had less than 90% if average precipitation while the western 1/3 has had 100-200% of average precipitation. The exception is western Maricopa County which has been quite dry with 25-90% of average precipitation. Like the 2011 water year, this one has been wet through December, but turned dry just after Christmas. Predictions are for the weak to moderate La Niña to bring dry conditions through March.

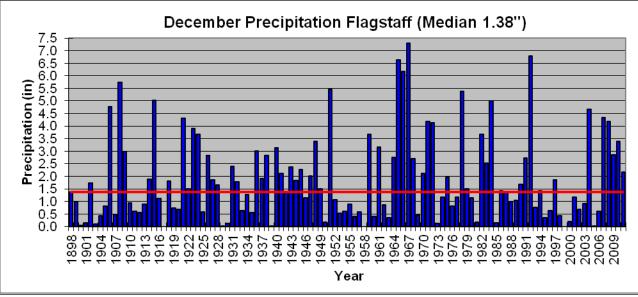
December Mean Temperature Graphs – Flagstaff, Phoenix, and Tucson 1895-2011:

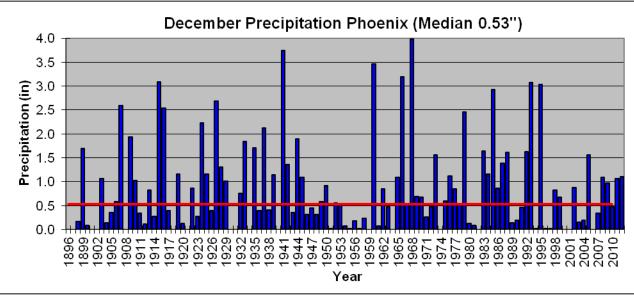


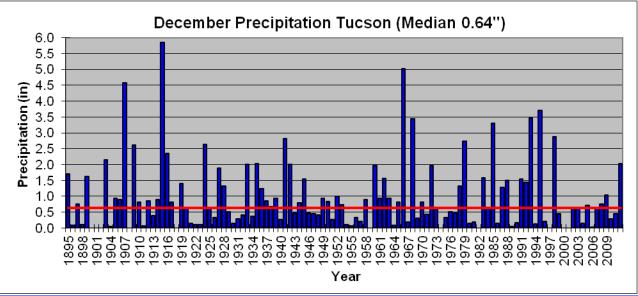




<u>December Mean Precipitation Graphs – Flagstaff, Phoenix, and Tucson 1895-2011:</u>

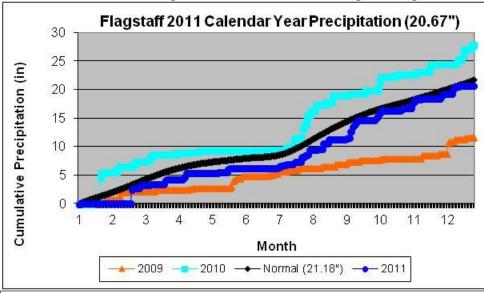


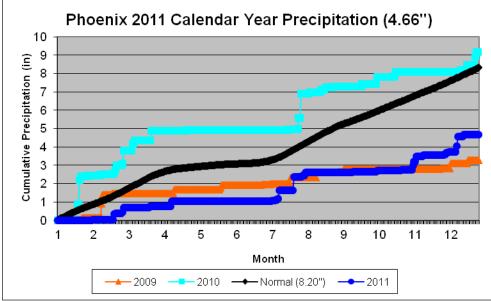


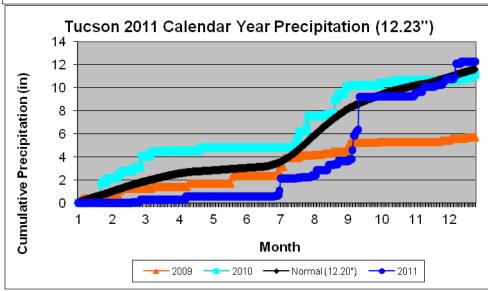


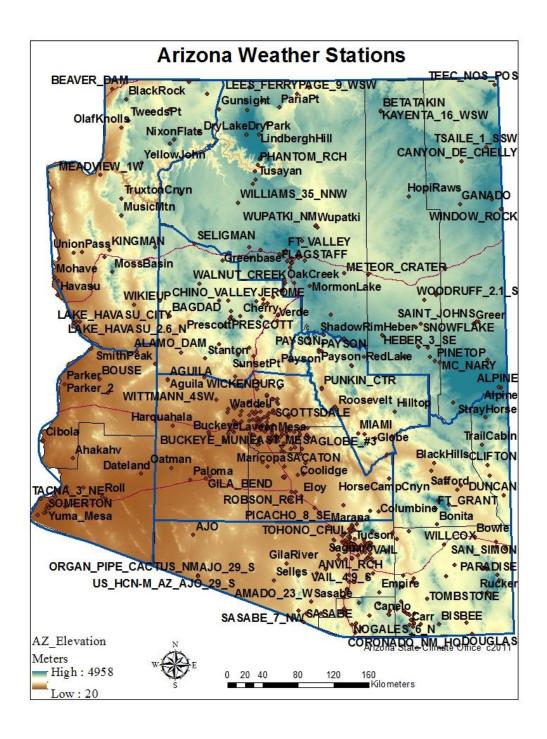
2011 Cumulative Precipitation Graphs – Flagstaff, Phoenix and Tucson:

Precipitation is well below average in Phoenix and near average in Flagstaff and Tucson.









The downloadable normals and extremes calendars use the following abbreviations:

NORM = 30 year (1971-2000) average value (degrees Fahrenheit (F))

OBS = The temperature observation for that day this year

AVG = Average daily temperature

HI MAX = Highest maximum temperature for that day (F)

LO MAX = Lowest maximum temperature for that day (F)

LO MIN = Lowest minimum temperature for that day (F)

HI MIN = Highest minimum temperature for that day (F)

Mx PCP = Maximum precipitation for that day (inches)

Mx SNO = Maximum snowfall for that day (inches)