Present Weather Discussion Week THREE



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Weather, Climate, and Climate Change—What the Data Tell Us 18 Sep 2019

Transition to fall pattern is progressing, but we have not yet gotten completely into the dry pattern.





9 Sep 2019 1800z Towering Cumulus T=27C Td=16C T=81F Td=61F Cloud Base = 9000 MSL KLRU

17 Sep 2019 2324Z Fair Weather Cumulus T=30C Td=8.3 T=86 Td=47 Cloud Base = 11,500 MSL KEPZ

But just a few hours later TUESDAY evening the 17th, there were towering cumulus even a few drops of rain in ELP.

Observing tool: the METEOGRAM

http://wxweb.meteostar.com/meteogram/link.shtml?choice=KLRU

Past Weather (meteogram) KLRU Meteogram for Tuesday, 17 Sep 2019 18:55 135 15 18 18 18 18 18 00:55 01.15 01:35 02:35 03:55 20:55 22:15 00:35 0³³⁵ 21:55 22:35 23:55 00.15 21.15 23.15 2,00 22:55 2²⁰ 01.55 .55 02:55 03.15 GMT 18 Day 18 18 SCT SCT 043 050 SCT 045 SCT SCT SCT SCT SCT SCT 060 060 090 060 060 Weather SCT 060 Time of photo Temperature 82 82 77 77 О 72 72 Π_ 67 67 More dry air moving into area ٩ 62 62 57 57 52 52 47 47 T (F) 75 80 59 80 56 86 52 76 51 83 83 86 86 86 85 84 83 79 76 53 75 59 58 56 55 55 47 51 53 53 50 Td (F) 54 50 51 49 48 48 47 48 47 48 49 49 50 48 49 52 48 75 79 Heat Inde Visibility 10 10 10 10 10 10 10 10 miles 10 24hr Rain <mark>WSW</mark> * 7 WNW NA 3 0 Wind Dir WSW W 10 8 WSW W 7 7 WSW 6 <mark>S₩</mark> 8 WSW 9 WSW 6 WSW W WSW SW 7 7 5 NA WSW NA WNW NA <mark>S₩</mark> 6 S₩ 6 <mark>S₩</mark> 6 WSW 6 WSW WSW SW WSW Wind Spd 17 10 17 0 6 10 0 10 10 ١Ô. 8 mph Wind Gust mph mb Pressure 80 64 6 hr High 87 79 6 hr Low Las Cruces, Las Cruces International Airport, NM, United States Latitude: 32.2894 deg Longitude: -106.9219 deg Elevation 1358 meters / 4455 FT

http://wxweb.meteostar.com/meteogram/link.shtml?choice=KELP



http://weather.rap.ucar.edu/upper/epz.gif

Santa Teresa NM KEPZ Evening Sounding Pw = 2.41, Towering cumulus ELP

Strong winds aloft abv, esp abv 30,000 Ft "Leaved" tropopause

Subsidence inversions in Troposphere

Moist layers cirrus clouds

Two lower cloud layers 16,000 Ft

12,000 Ft

Planetary Boundary Layer Surface Layer



Tuesday 2040L Wed18 Sep 0240Z Some Towering Cumulus and precip over ELP, Satellite Radar Composite





X-Axis = Day of year Y-Axis= average number of storms in Atlantic Basin

http://wxweb.meteostar.com/models/noaaport_loop.php?PATH=/var/www/leads_images/satellite/SYS/COMP/

Westerlies: Progression of storms, Cold Air Cumulus coming onshore

Of East Coast Humberto Circulation

Houston: Tropical Depression Imelda

W. Coast Mexico Hurricane Lorena

Banded Structure with Tropical Systems











Two-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



https://www.nhc.noaa.gov/gtwo.php?bas All Disturbances in=epac&fdays=2 Satellité Image from 4:19 am PDT Sep 18 Very Active ITCZ! CENTRAL PACIFIC OUTLOOK ATLANTIC OUTLOOK KIKO LORENA 9 Ο MARIO ۲ 4:58 am PDT Wed Sep 18 2019

Current Disturbances and Two-Day Cyclone Formation Chance: Sig < 40% Sig 40-60% is > 60% Tropical or Sub-Tropical Cyclone: O Depression Sig Storm Hurricane O Post-Tropical Cyclone or Remnants



http://weather.rap.ucar.edu/upper/upaCNTR _500.gif

500 mb rawinsonde data 12z Wed 18 Sep 2019

500 mb Heights (dm) / Temperature (°C) / Humidity (%)

500 MB CHART VT 18 SEP 2019/1200Z Huge Tropical Ridge Hudson Bay to Yucatan. Pacific NW Trof



80

70

90







Aviation Digital Data Service (ADDS)

Output produced by METARs form (1502 UTC 18 September 2019) found at <u>http://aviationweather.gov/metar/data/</u>

Search <METAR KIAH> top reply: <u>https://aviationweather.gov/adds/metars/index?</u> <u>submit=1&station_ids=KIAH&chk_metars=on&chk_</u> <u>tafs=on&std_trans=translated</u>

METAR text: KIAH 181453Z 20007KT 3SM -RA BR BKN009 OVC018 24/23 A2987 RMK AO2 SLP114 P0006 60052 T02440233 53011

Conditions at: KIAH (HOUSTON/INTNL, TX, US) observed 1453 UTC 18 September 2019

Temperature: 24.4°C (76°F)

Dewpoint: 23.3°C (74°F) [RH = 94%]

Pressure (altimeter): 29.87 inches Hg (1011.6 mb)

[Sea-level pressure: 1011.4 mb]

Winds: from the SSW (200 degrees) at 8 MPH (7 knots; 3.6 m/s)

Visibility: 3 miles (5 km)

Ceiling: 900 feet AGL

Clouds: broken clouds at 900 feet AGL overcast cloud deck at 1800 feet AGL

Weather: -RA BR (light rain, mist)

METAR text: KIAH 181436Z 20008KT 2SM RA BR SCT007 BKN012 OVC018 24/23 A2987 RMK AO2 P0004 T02440233

Conditions at: KIAH (HOUSTON/INTNL , TX, US) observed 1436 UTC 18 September 2019

Temperature: 24.4°C (76°F)

Dewpoint: 23.3°C (74°F) [RH = 94%]

Pressure (altimeter): 29.87 inches Hg (1011.6 mb)

Winds: from the SSW (200 degrees) at 9 MPH (8 knots; 4.1 m/s)

Visibility: 2.00 miles (3.22 km)

Ceiling: 1200 feet AGL

Clouds: scattered clouds at 700 feet AGL broken clouds at 1200 feet AGL overcast cloud deck at 1800 feet AGL

Weather: RA BR (moderate rain, mist)

Forecast for: KIAH (HOUSTON/INTNL , TX, US)

Text: KIAH 181405Z 1814/1918 20009G15KT 5SM SHRA BR BKN010 OVC020

Forecast period: 1400 to 1700 UTC 18 September 2019

Forecast type: FROM: standard forecast or significant change

Clicking <CLT> to find the red station

It's AVL, Asheville NC





Aviation Digital Data Service (ADDS)

Output produced by METARs form (1510 UTC 18 September 2019) found at <u>http://www.aviationweather.gov/metar/data/</u>

Search <METAR AVL> top result =

https://www.aviationweather.gov/adds/metars/index?submit= 1&station_ids=KAVL&chk_metars=on&hoursStr=2&chk_tafs= on&std_trans=translated

METAR text: KAVL 181454Z 16006KT 8SM OVC007 19/17 A3019 RMK AO2 RAB06E15 SLP199 P0000 60000 T01940167 51009

Conditions at: KAVL (ASHEVILLE, NC, US) observed 1454 UTC 18 September 2019 Temperature: 19.4°C (67°F) Dewpoint: 16.7°C (62°F) [RH = 84%] Pressure (altimeter): 30.19 inches Hg (1022.4 mb) [Sea-level pressure: 1019.9 mb] Winds: from the SSE (160 degrees) at 7 MPH (6 knots; 3.1 m/s) Visibility: 8 miles (13 km) Ceiling: 700 feet AGL Clouds: overcast cloud deck at 700 feet AGL Weather: no significant weather observed at this time METAR text: KAVL 181409Z 15005KT 8SM -RA OVC007 19/17 A3019 RMK AO2 RAB06 CIG 006V010 P0000 T01940172 Conditions at: KAVL (ASHEVILLE, NC, US) observed 1409 UTC 18 September 2019 Temperature: 19.4°C (67°F) Dewpoint: 17.2°C (63°F) [RH = 87%] Pressure (altimeter): 30.19 inches Hg (1022.4 mb) Winds: from the SSE (150 degrees) at 6 MPH (5 knots; 2.6 m/s) Visibility: 8 miles (13 km) Ceiling: 700 feet AGL Clouds: overcast cloud deck at 700 feet AGL Weather: -RA (light rain) METAR text: KAVL 181354Z 14006KT 10SM OVC010 20/17 A3019 RMK AO2 SLP195 T02000167 Conditions at: KAVL (ASHEVILLE, NC, US) observed 1354 UTC 18 September 2019 Temperature: 20.0°C (68°F) Dewpoint: 16.7°C (62°F) [RH = 81%]

Pressure (altimeter): 30.19 inches Hg (1022.4 mb) [Sea-level pressure: 1019.5 mb]

[Sed-level pressure: 1019.5 http]

Winds: from the SE (140 degrees) at 7 MPH (6 knots; 3.1 m/s)

http://weather.rap.ucar.edu/upper/epz.gif Pw down to 2.1cm

Still quite strong winds from the west 30,000 ft and above

Leaved structure of the Tropopause

Multiple Subsidence inversions under the subtropical ridge.

Very Dry above 20,000 ft

Surface Radiation Inversion of Temperature at surface.

Surface water from city probable source of high dew point at surface.



https://forecast.weather.gov/product.php?site=NWS&issuedby=EPZ&product=AFD&format=ci&version=1&glossary=1



.DISCUSSION...

The synoptic pattern across the Western U.S. is beginning to amplify and show signs of a seasonal transition from summer to fall. A deep and sharp upper trough to our NW over WA/OR/CA is slowly pushing east across the west. With broad high pressure over the SE U.S. we are under a deep SW flow aloft with winds becoming a bit more west. This pattern has brought a drier airmass into much of the forecast area and concentrated the deeper monsoon moisture to the south and east of our region. Thus despite a minor jet and weak disturbances aloft, the lack of adequate moisture over most of the area will keep the region generally storm-free today. The exception is southern areas along the international border, and especially Hudspeth county along with the Sacramento mountains.

Sunday we begin to see the northward advection of subtropical monsoonal moisture as a deep Pacific low begins to drop our way from the Pac NW. Both the GFS and the EC allow for a deep influx of moisture from the south. The GFS enhances both the moisture and the dynamics by allowing the low/trough to ingest a tropical storm system and direct it directly over our CWFA as a potent upper wave. The EC never makes that connection, keeping the tropical system out in the Pacific; but it brings the upper low in closer to beef up the moisture and dynamics. Bottom line, for the last two days of this forecast package, is for cooler and wetter conditions out of both models, even if for different reasons. As it appears currently, we could see widespread and numerous showers, possibly scattered storms, with potential for moderate to heavy rain.

https://www.wrh.noaa.gov/twc/monsoon/monsoon.php



NATIONAL WEATHER SERVICE ANIC AND ATMOSPHERIC ADMINISTRATION

Yearly Monsoon Statistics for Tucson



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Monsoon statistics Dewpoint data Monsoon rainfall Monsoon Information Tracking the Monsoon

Monsoon statistics for Tucson (1895-2019)

	Top 10 Wettest Monsoon1) 13.84"/19646) 10.20"/20062) 13.08"/19557) 9.94"/1984		Top 10 Driest Monsoon		
			1) 1.59"/1924	6) 2.50"/1902	
			2) 2.33"/1973	7) 2.58"/1994	
	3) 11.04"/1921	8) 9.85"/1990	3) 2.40"/1989	8) 2.75"/1913	
	4) 10.50"/1983	9) 9.43"/1966	4) 2.42"/2004	9) 2.79"/1918	
	5) 10.21"/1919	10) 8.62"/2011	5) 2.45"/1900	10) 2.81"/2001	

Month by month rainfall

as of	r Septem	ber 16th

Year	June (15-30)	July	August	September	Total
Normal	0.15"	2.25"	2.39"	1.29"	6.08"
2019	Trace	1.07"	1.57"	0.74"	3.38"
2018	0.91"	2.26"	2.71"	1.14"	7.02"
2017	Trace	6.80"	1.74"	0.03"	8.57"
2016	1.39"	3.32"	1.09"	1.60"	7.40"
2015	0.35"	2.08"	1.80"	2.40"	6.63"
2014	0.00"	1.43"	1.89"	2.76"	6.08"
2013	0.03"	2.60"	0.48"	0.63"	3.74"
2012	0.34"	4.13"	1.17"	0.38"	6.02"
2011	0.03"	1.64"	1 35"	5.60"	8 62"

Haywood plot of monsoon rainfall years

for Tucson since 1895 Click on image for larger view Monsoon rainfall for Tucson (1895-2019) 🤍



Tucson, AZ Weather Forecast Office

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The "Haywood plot" on the left shows the accumulated rainfall totals for each monsoon year recorded at the official site in Tucson.

Haywood plots are useful in tracking current season rainfall compared to the seasonal results from the past.

Top 10 wettest Monsoon in Green Top 10 driest Monsoon in Brown 1981-2010 normal in Black 2019 in Blue 2018 in Red Remaining years in Gray

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Haywood plot of monsoon rainfall years



Historical rankings for 2019 monsoon rainfall:

June 15th-30th: Trace (48th period with no measurable) July: 1.07" (25th driest July on record) August: 1.57" (45th driest August on record) September: 0.74" (54th wettest September on record to date) Overall: 3.38" (thru September 16th, the 25th driest Monsoon on record to date)

The Tucson International airport needs to record 2.70" of rain from September 17th to the 30th to end up right at the normal monsoon rainfall total of 6.08". Since 1895 only **3 years** were able to record more than 2.70" from September 17th to the 30th. It looks highly doubtful that Monsoon 2019 will end up normal or wetter than normal.

An update to the above paragraph will occur around September 19th. https://www.wrh.noaa.gov/twc/monsoon/monsoon_elp.php







Yearly Monsoon Statistics for El Paso Texas



Tucson, AZ

Weather Forecast Office

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Monsoon statistics for El Paso (1879-2019)

Top 10 Wettest Monsoon		Top 10 Driest Monsoon		
1) 15.28"/2006	6) 9.88"/1974	1) 0.23"/1994	6) 1.66"/1953	
2) 12.78"/1881	7) 9.68"/1984	2) 0.82"/1891	7) 1.78"/2003	
3) 11.94"/1880	8) 9.40"/1990	3) 0.96"/1934	8) 1.85"/1969	
4) 10.08"/1958	9) 8.95"/2008	4) 1.33"/1892	9) 2.19"/1963	
5) 10.04"/1897	10) 8.33"/1988	5) 1.46"/1945	10) 2.28"/1937	

Month by month rainfall

as of September 16th

YEAR	June (15-30)	July	August	September	Total	
Normal	0.51"	1.66"	1.61"	1.36"	5.14"	
2019	Trace	0.18"	0.89"	1.13"	2.20"	
2018	0.31"	1.36"	1.16"	1.21"	4.04"	
2017	1.00"	3.37"	2.01"	1.16"	7.54"	
2016	0.19"	0.24"	4.46"	2.12"	7.01"	
2015	0.11"	2.88"	1.55"	0.33"	4.87"	
2014	0.01"	0.69"	1.79"	4.23"	6.72"	
2013	0.06"	3.13"	1.12"	3.85"	8.16"	
2012	Trace	2.39"	0.65"	1.41"	4.45"	
		0.50%				

https://www.wrh.noaa.gov/twc/monsoon/dewpoint_tracker_elp.php

2019 monsoon daily average surface dewpoint El Paso, Texas

Chart is updated hourly. Hit reload or CRTL-F5 to refresh

Red line - historical average daily dewpoint (1949-2018) Blue line - 2019 average daily dewpoint value.



https://www.wrh.noaa.gov/twc/monsoon/dewpoint_tracker_elp.php

