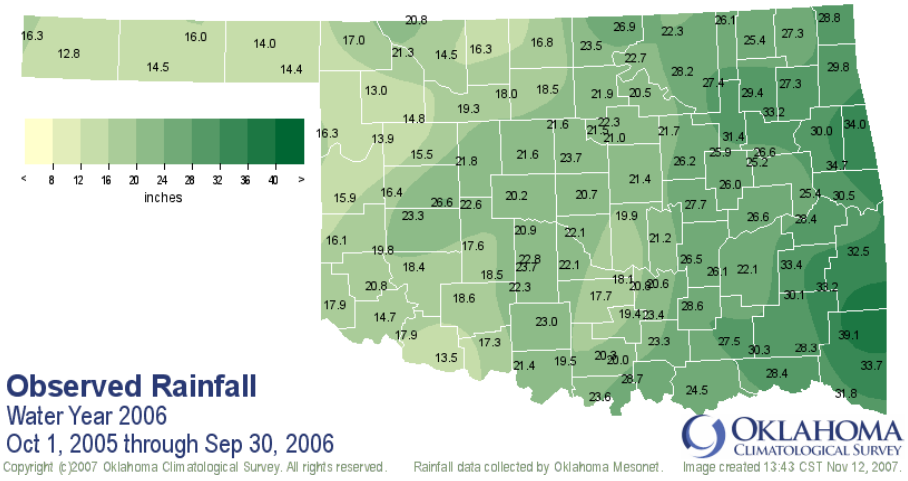
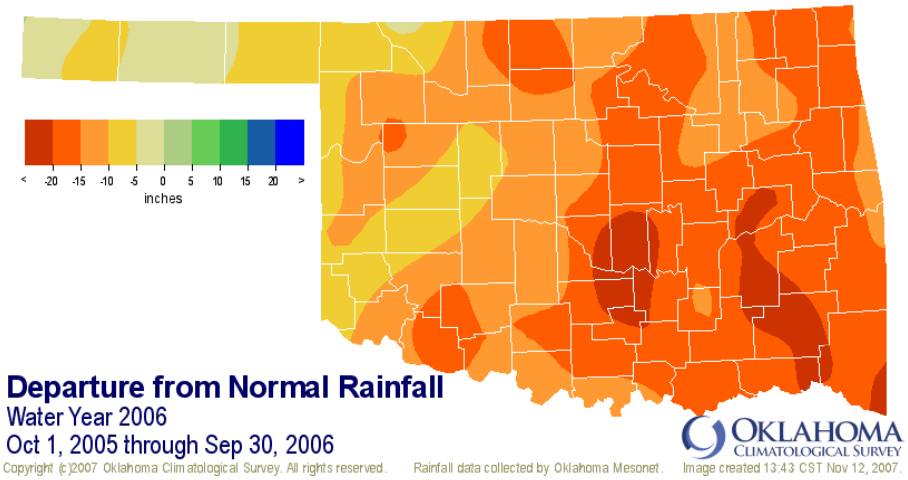
2006-07 Precipitation

Deke Arndt
Associate State Climatologist

The Setup

Where we stood at the beginning of the water year

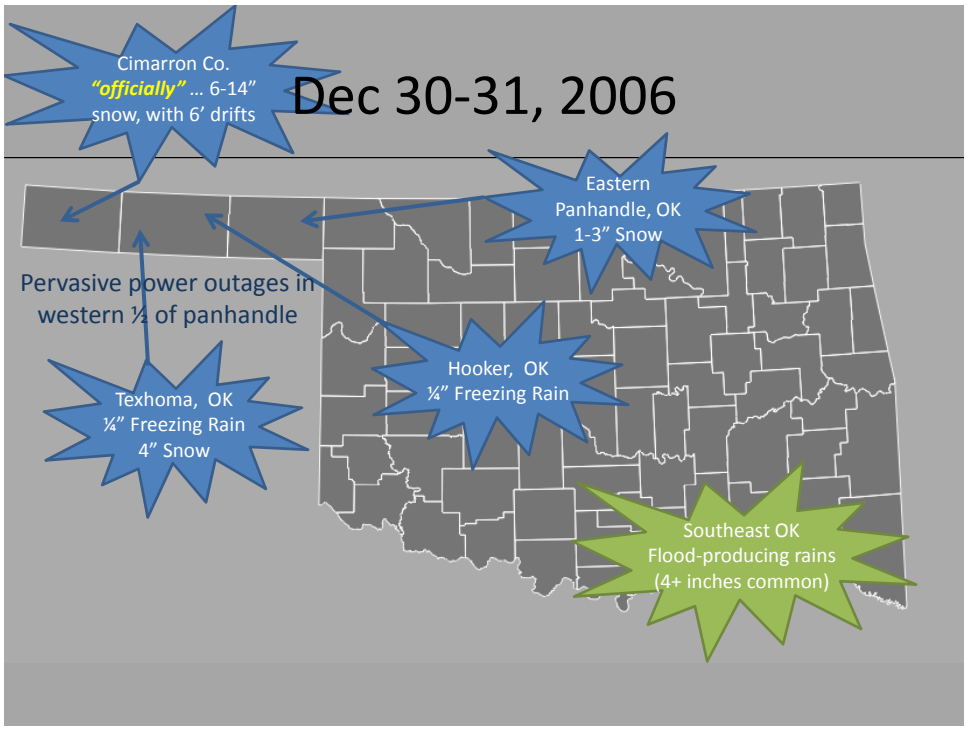




Water Year 2006 Oct 1, 2005 through Sep 30, 2006									
Climate Division	Total Precip	Precip vs. Normal	Percent Normal	Driest since	Rank of 85 such periods	Driest on Record	Wettest on Record	Sep 30 KBDI	365-day SPI
1: Panhandle	15.17"	-5.81"	72 %	2001-02 (14.50")	15th driest *D1*	11.35" (1955-56)	30.38" (1986-87)	317	-1.08 *D1*
2: N. Central	18.88"	-13.07"	59 %	1955-56 (15.00")	4th driest *D3*	15.00" (1955-56)	52.74" (1998-99)	523	-1.74 *D3*
3: Northeast	27.09"	-15.73"	63 %	1965-66 (26.20")	5th driest *D2*	21.62" (1955-56)	58.99" (1972-73)	453	-1.71 *D3*
4: W. Central	18.82"	-10.34"	65 %	1993-94 (18.43")	7th driest *D2*	15.87" (1955-56)	41.82" (1994-95)	433	-1.45 *D2*
5: Central	22.24"	-15.08"	60 %	1955-56 (19.58")	2nd driest *D4*	19.58" (1955-56)	52.68" (1944-45)	429	-1.94 *D3*
6: E. Central	27.81"	-18.35"	60 %	1955-56 (22.45")	2nd driest *D4*	22.45" (1955-56)	69.69" (1944-45)	412	-1.99 *D3*
7: Southwest	17.97"	-12.78"	58 %	1966-67 (17.95")	3rd driest *D3*	16.91" (1955-56)	44.54" (1994-95)	398	-1.91 *D3*
8: S. Central	22.38"	-17.26"	56 %	1955-56 (15.87")	2nd driest *D4*	15.87" (1955-56)	63.25" (1944-45)	573	-2.14 *D4*
9: Southeast	32.07"	-18.71"	63 %	1955-56 (25.58")	2nd driest *D4*	25.58" (1955-56)	78.58" (1944-45)	489	-1.97 *D3*
Statewide	22.40"	-14.15"	61 %	1955-56 (18.16")	2nd driest *D4*	18.16" (1955-56)	48.72" (1972-73)	448	-2.11 *D4*

Winter 2006-07: It Begins

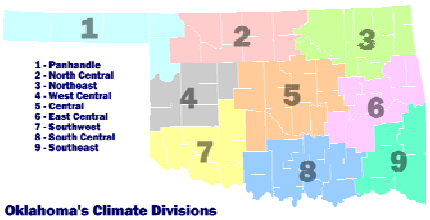
Dec 2006 through Feb 2007



Extremely Rare Snowfall

Extremely Rare Snowfall

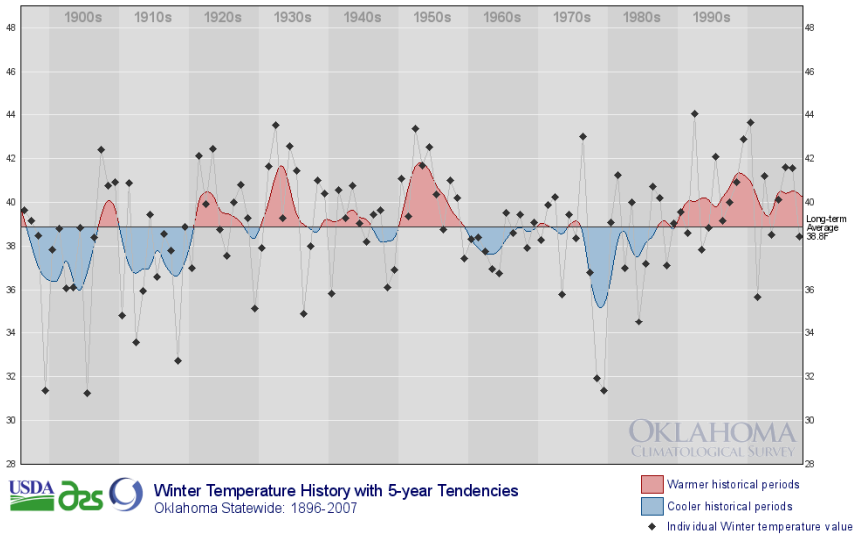
- Wettest Dec. on record for Panhandle climate division
  - Generally 4-5” liquid-water-equivalent in panhandle
- Unofficial reports (we believe them) from western Cimarron Co.:
  - Drifts to 20’
  - Snow totals exceeding 40”
  - This would break the state’s record event snowfall



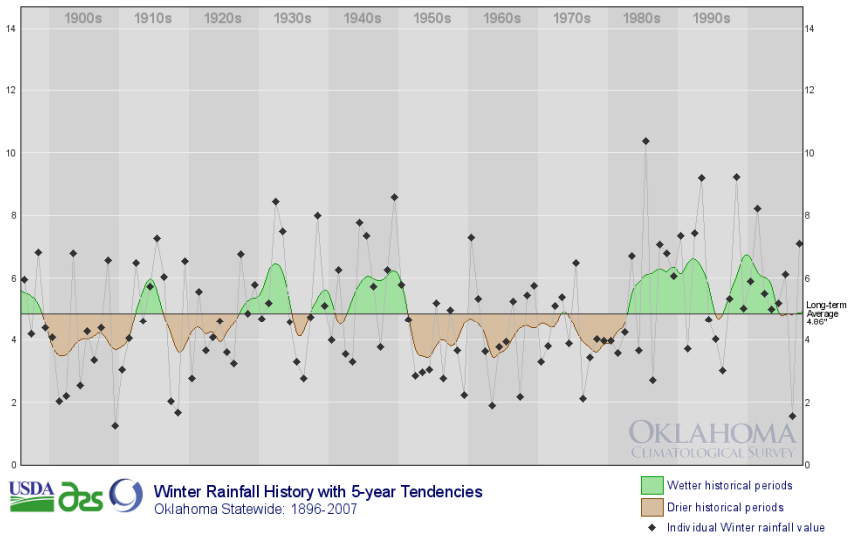
Mid-January 2007

Mid-January 2007

Winter Context



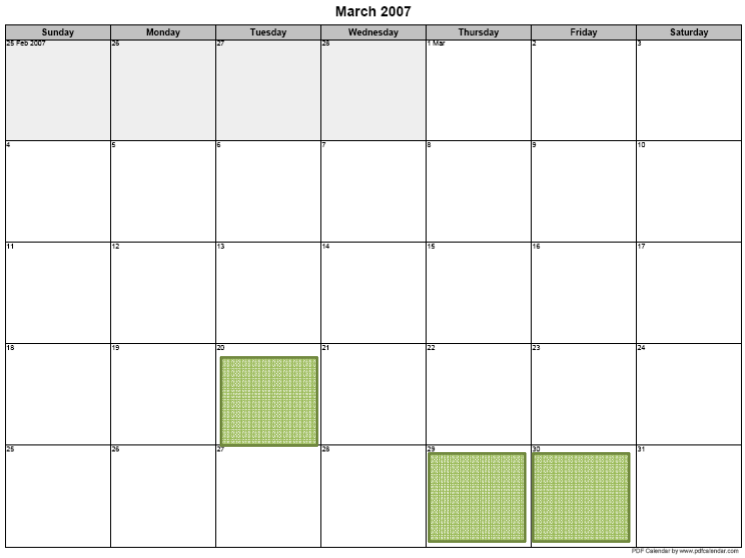
Winter Context



Ahhhh, Spring in Oklahoma

March-April-May 2007

Reported Flooding: March 2007



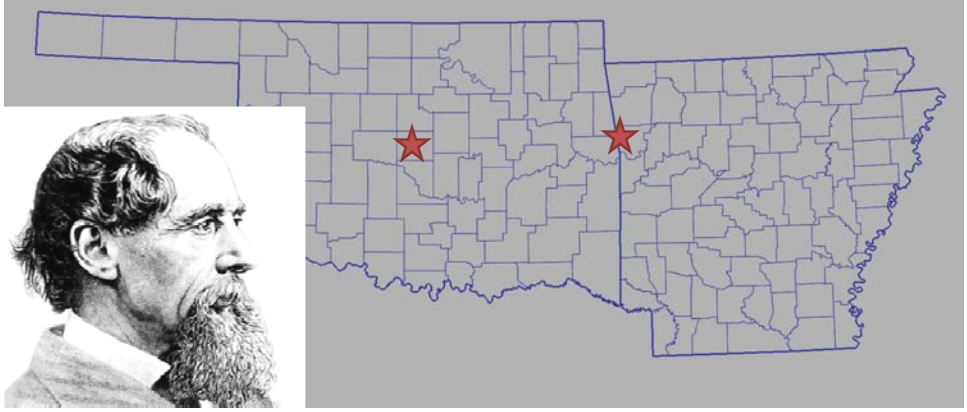
A Tale of Two Cities

Oklahoma City, Oklahoma

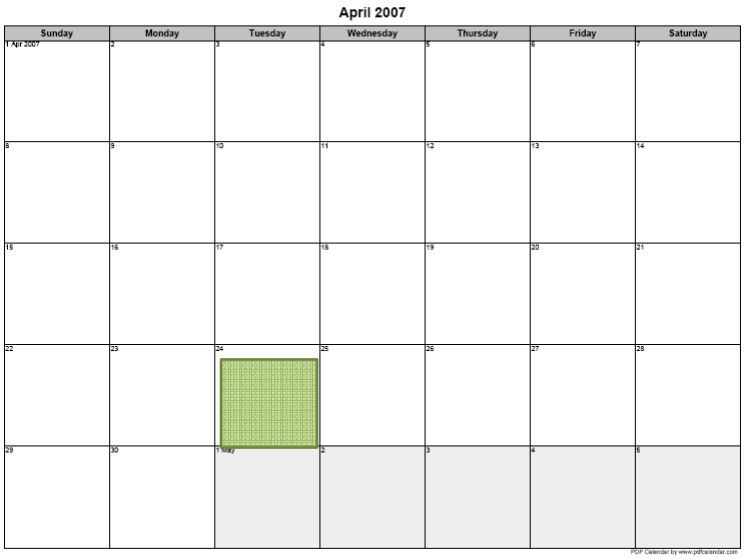
- 8.02” March Precipitation
- Wettest March on Record

Fort Smith, Arkansas

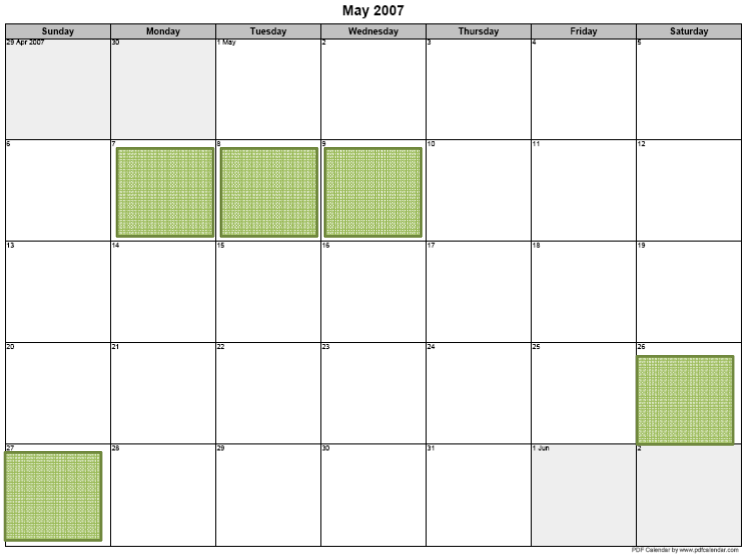
- 0.50” March Precipitation
- Driest March on Record



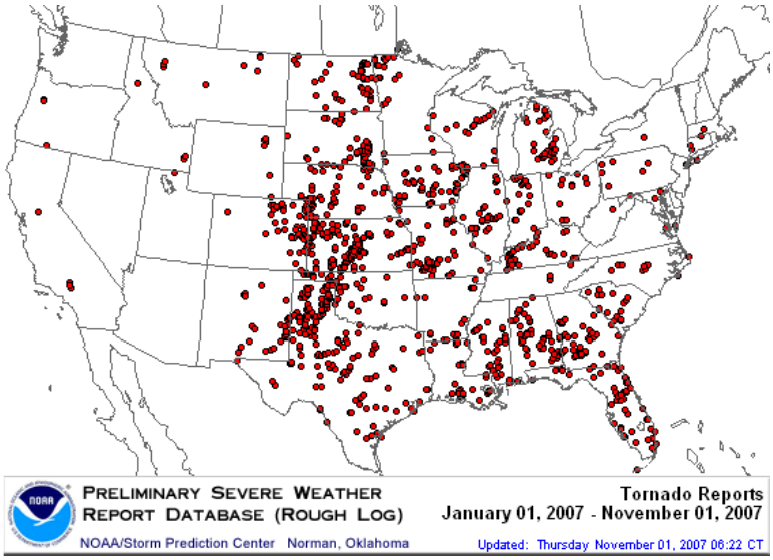
Reported Flooding: April 2007



Reported Flooding: May 2007



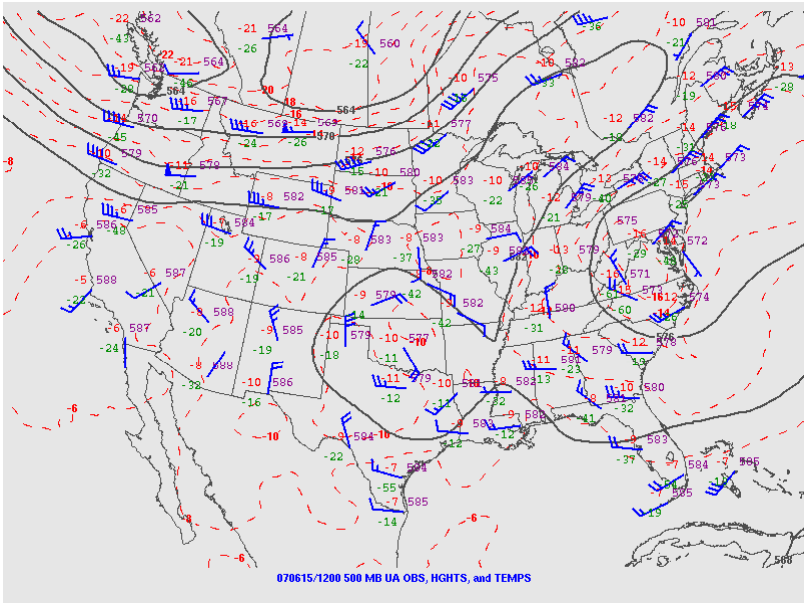
Severe Wx Shifted Westward



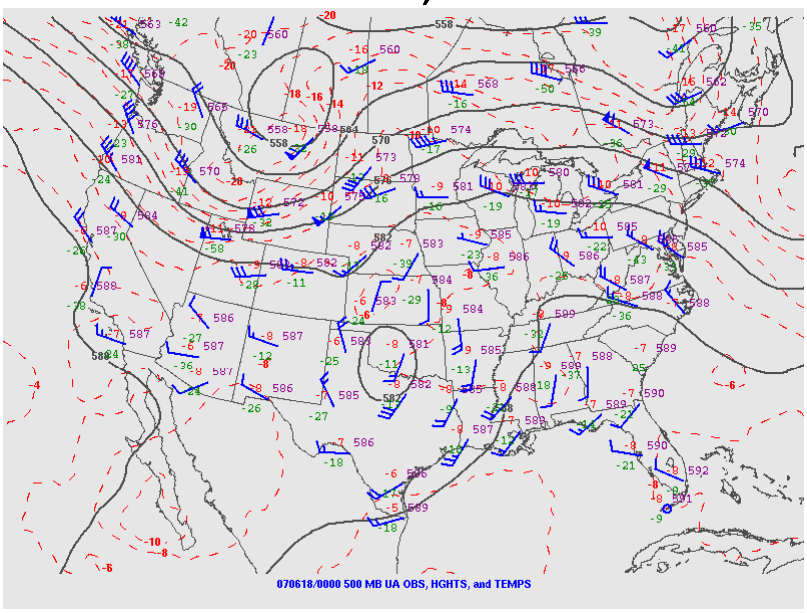
Summer 2007: Make It Stop

June-July-August 2007

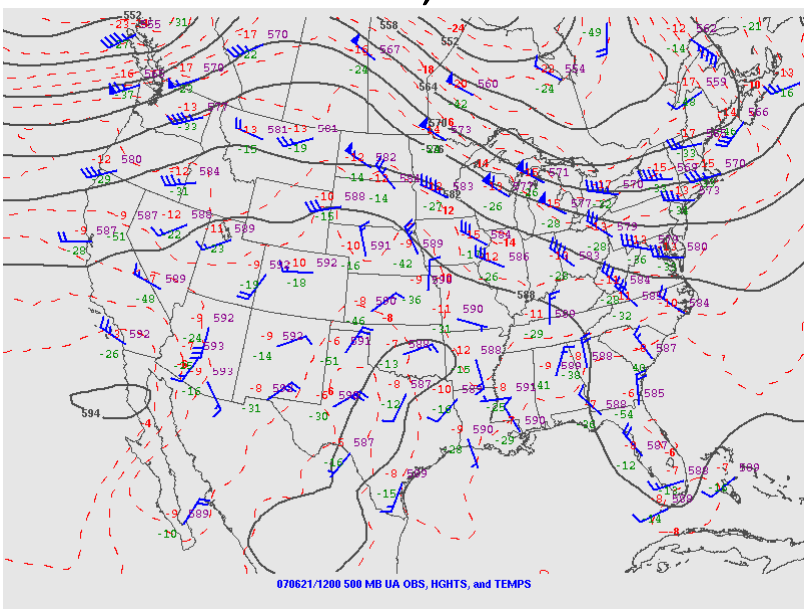
June 15, 2007



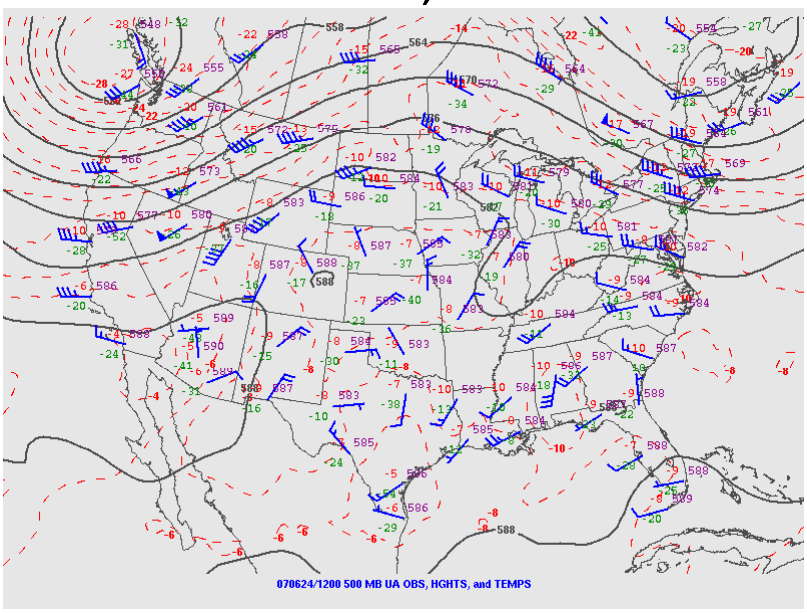
June 18, 2007



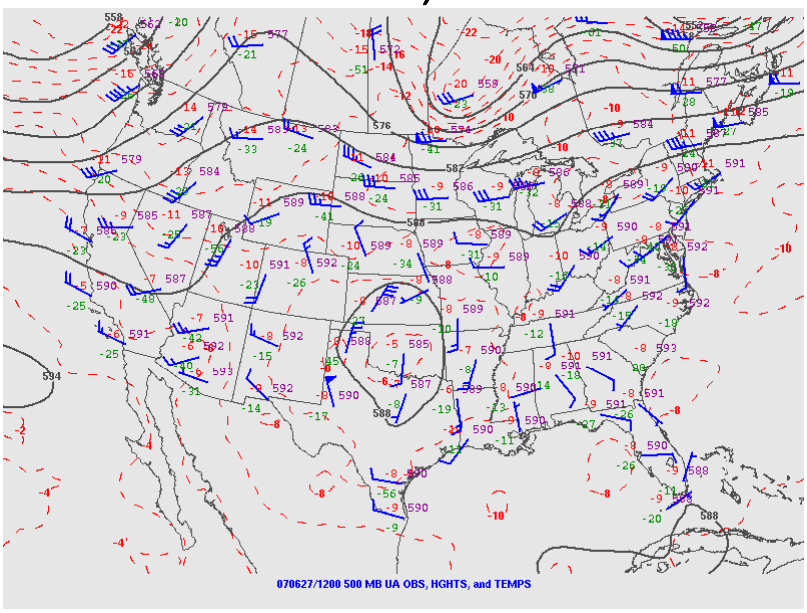
June 21, 2007



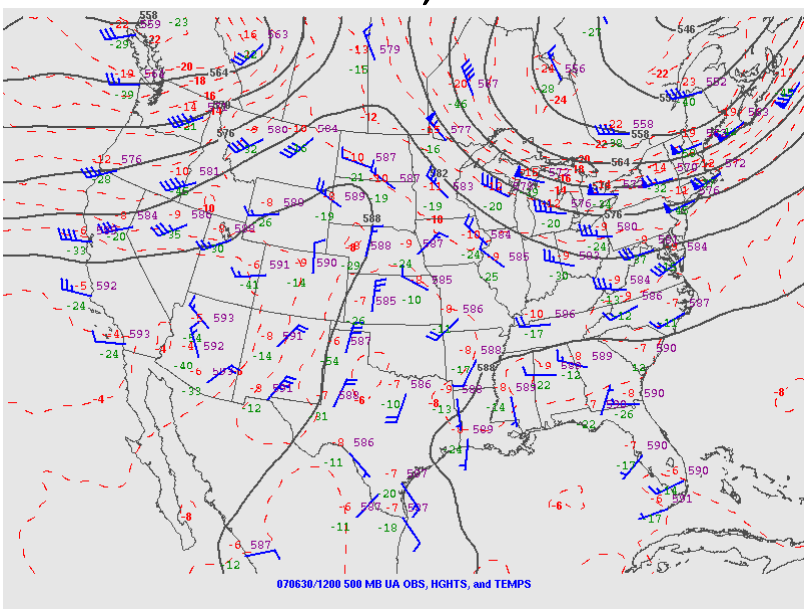
June 24, 2007



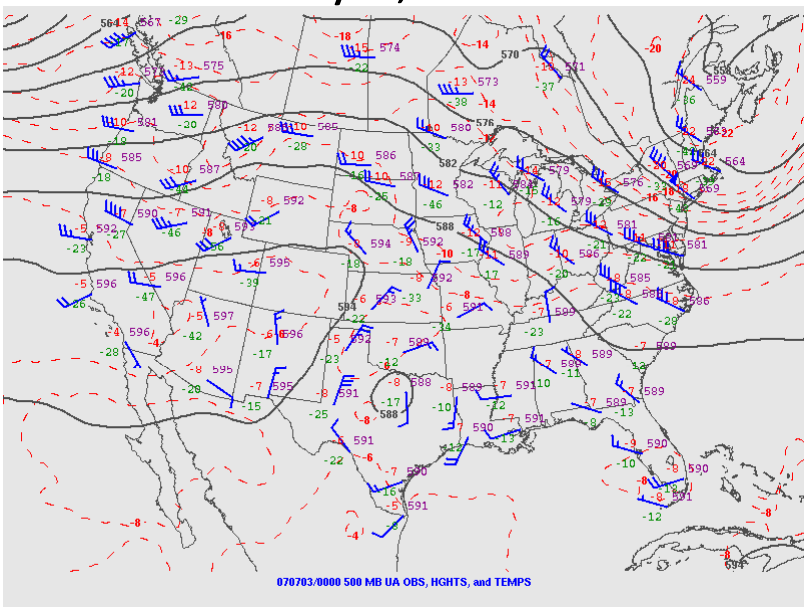
June 27, 2007



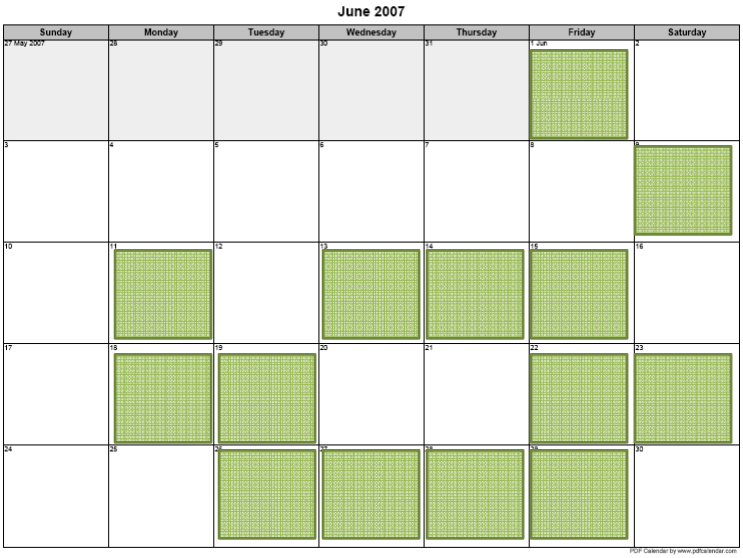
June 30, 2007



July 3, 2007

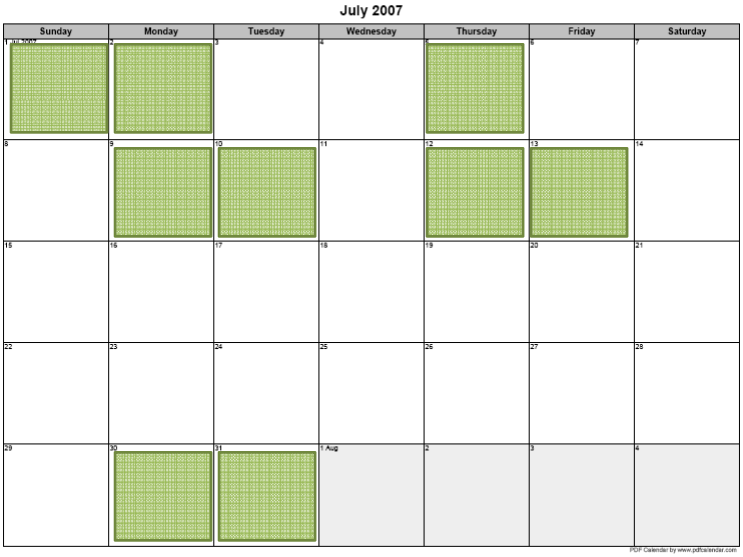


Reported Flooding: June 2007



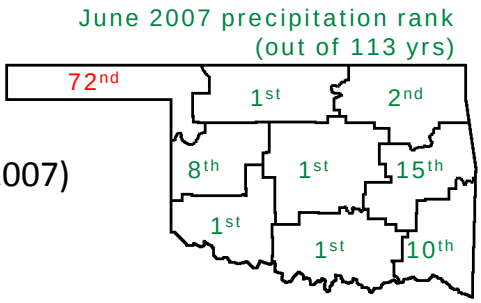
Washita R. Near Chickasha

Reported Flooding: July 2007

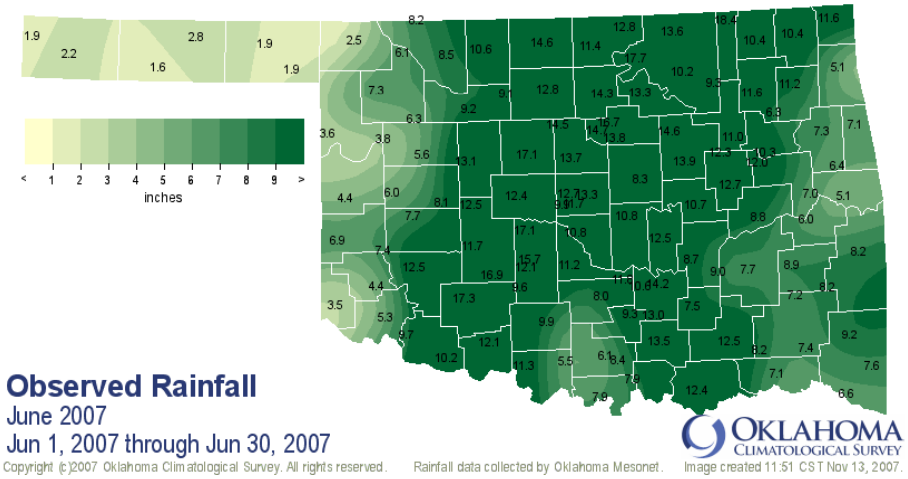


Summer 2007

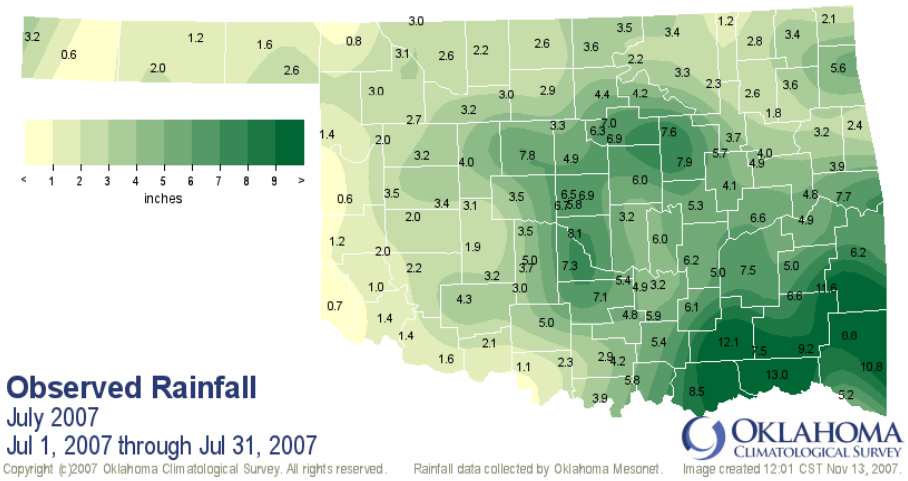
- **June 2007:** Wettest on record (since 1895) for four climate divisions, and for the state overall.
- Damaging [flash-]flooding reported on 15 days
- **Consecutive days with precipitation at OKC**:
  - –Previous record:
  - –14 days (Spring 1937)
  - –New record:
  - –20 days (Jun. 13 – Jul. 2, 2007)



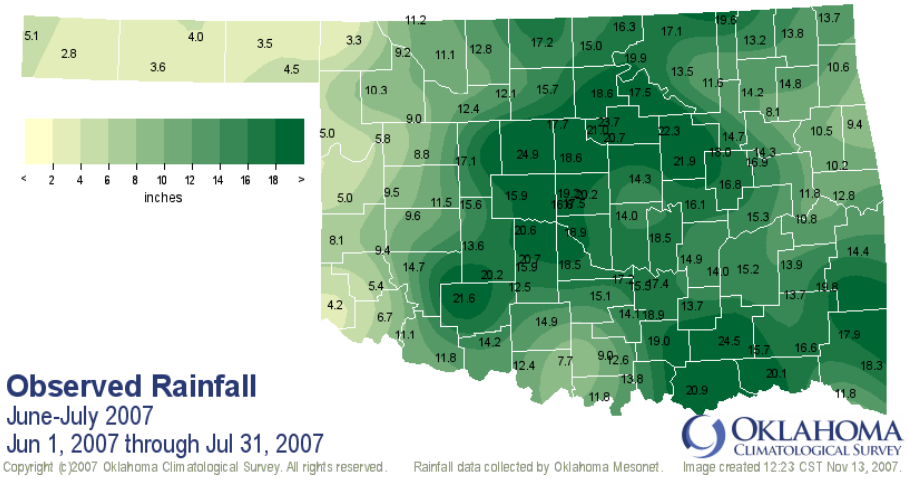
June 2007

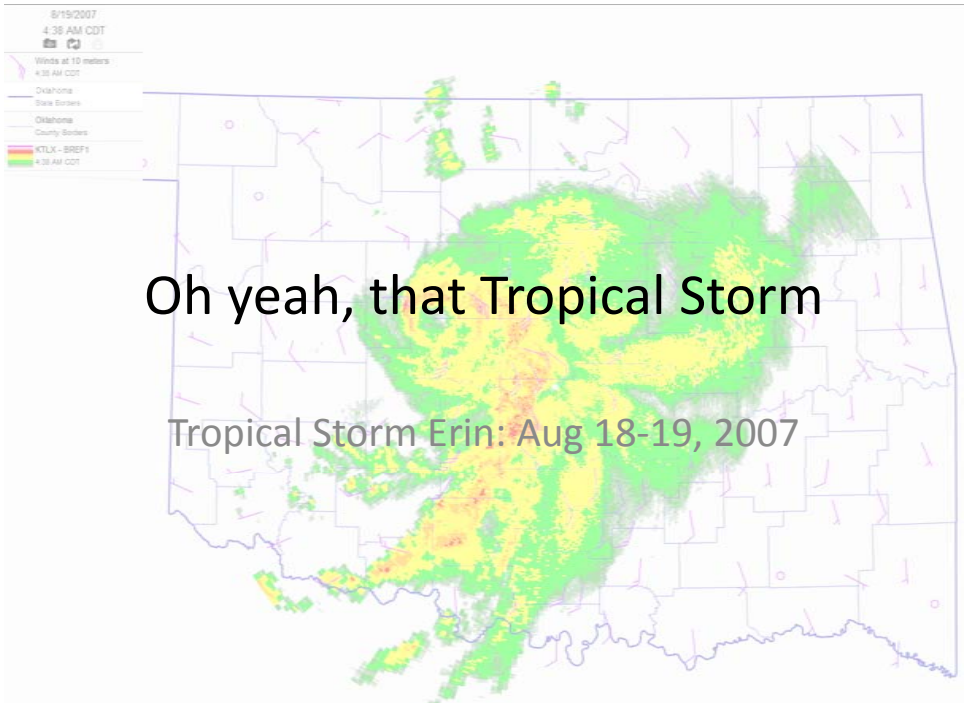


July 2007



June-July 2007

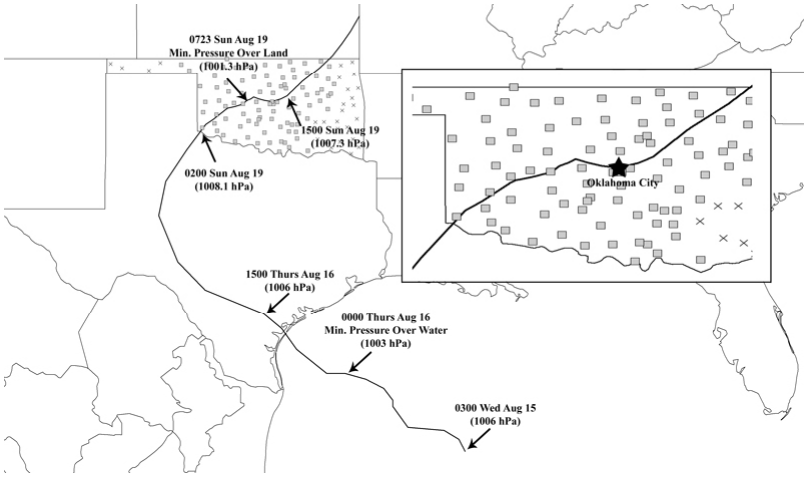




Oh yeah, that Tropical Storm

Tropical Storm Erin: Aug 18-19, 2007

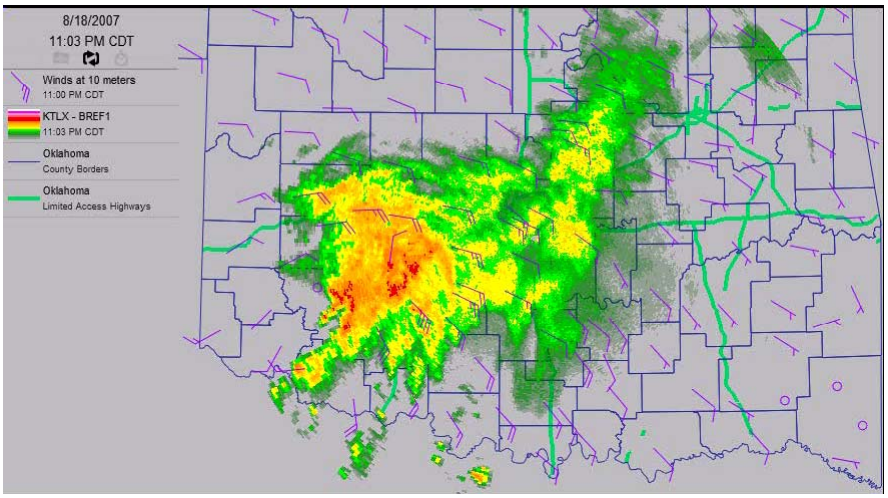
Erin's Storm Track



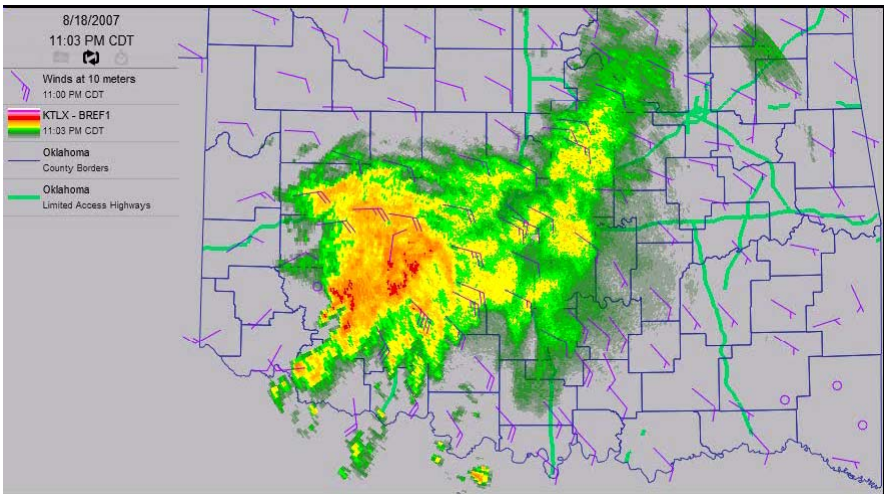
Erin's Offshore Life

Date	Time (UTC)	Lat (deg)	Lon (deg)	Movement	Sustained wind	Central Pressure	Category
15 Aug	0300	23.9 N	91.1 W	NW @ 10mph	30 mph	1006 hPa	Trop. Depression
15 Aug	0600	24.3 N	91.3 W	NW @ 10mph	30 mph	1006 hPa	Trop. Depression
15 Aug	0900	24.6 N	91.8 W	NW @ 10mph	30 mph	1006 hPa	Trop. Depression
15 Aug	1200	24.7 N	93.0 W	WNW @ 13mph	30 mph	1006 hPa	Trop. Depression
15 Aug	1500	25.4 N	93.5 W	WNW @ 14 mph	30 mph	1006 hPa	Trop. Depression
15 Aug	1530	25.6 N	93.5 W	WNW @ 12mph	40 mph	1005 hPa	Trop. Storm
15 Aug	1800	26.0 N	93.8 W	WNW @ 12mph	40 mph	1005 hPa	Trop. Storm
15 Aug	2100	26.3 N	94.4 W	NW @ 13mph	40 mph	1005 hPa	Trop. Storm
16 Aug	0000	26.5 N	95.1 W	NW @ 13mph	40 mph	1003 hPa	Trop. Storm
16 Aug	0300	26.5 N	95.7 W	WNW @ 14 mph	40 mph	1004 hPa	Trop. Storm
16 Aug	0600	26.4 N	96.1 W	WNW @ 12 mph	40 mph	1004 hPa	Trop. Storm
16 Aug	0900	27.3 N	96.7 W	WNW @ 12 mph	40 mph	1004 hPa	Trop. Storm
16 Aug	1200	28.0 N	97.2 W	WNW @ 12 mph	35 mph	1006 hPa	Landfalling Trop. Depression
16 Aug	1500	28.5 N	97.8 W	NW @ 15mph	35 mph	1006 hPa	Overland Trop. Depression

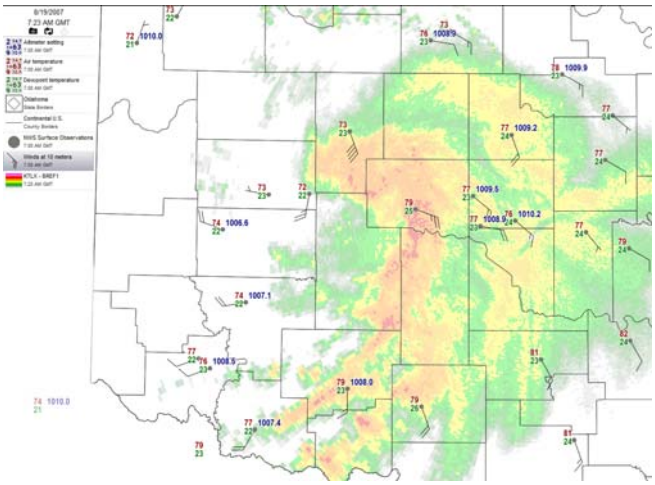
Erin's Onshore Life



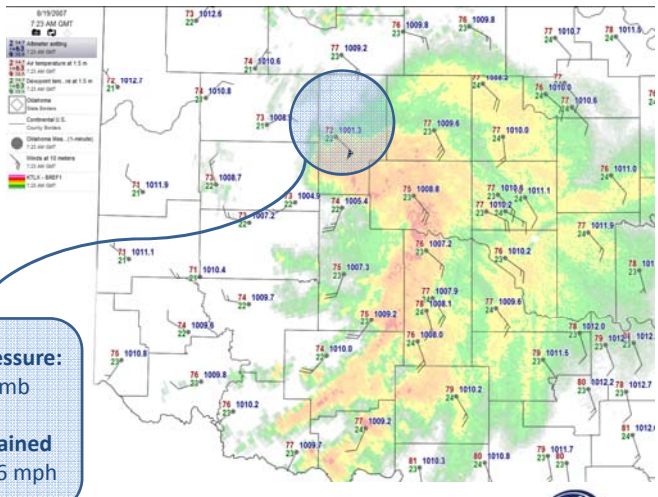
Erin's Onshore Life



Erin: 2:00 am CDT



Erin: 2:23 am CDT



Central Pressure: 1001.3 mb

Peak sustained wind: 57.6 mph

Oklahoma Mesonet

Erin's Rainfall Superlatives

Amount (cm)	Station (identifier)	Historical Rank (1 = wettest)	Month	Period of Record
23.0	Watonga (349364)	1	All Months	1902-2007
22.9*	Fort Cobb (FTCB)	1	All Months	1994-2007
21.7	Okmulgee (OKMU)	1	All Months	1994-2007
19.7	Okemah (OKEM)	1	All Months	1994-2007
18.0	El Reno (ELRE)	1	All Months	1994-2007
16.6*	Weatherford (WEAT)	1	All Months	1994-2007
16.4	Weatherford (349422)	4 / 1	All Months / August	1905-2007
15.6	Marlow 1WSW (345581)	4 / 1	All Months / August	1900-2007
15.4	Chickasha Experiment Stn (341750)	5 / 1	All Months / August	1953-2007
14.3	Union City (349086)	3 / 1	All Months / August	1914-2007
14.2	Norman 3SSE (346386)	10 / 1	All Months / August	1894-2007
13.6	Kingfisher (KING)	1	All Months	1994-2007
13.2	Blanchard 2SSW (340830)	4 / 1	All Months / August	1902-2007
13.0	Lindsay 2W (345216)	9 / 1	All Months / August	1938-2007
12.6	Norman (NRMN)	1	All Months	2002-2007
12.5	Minco (MINC)	1	All Months	1994-2007
10.6	Acme (ACME)	1	All Months	1994-2007
9.9	Rossevelt (347727)	1	August	1943-2007
9.7	Okla. City Will Rogers (346661)	1	August	1948-2007

More Erin Rainfall Superlatives

Station	Period	Observed Amount	Comparable Benchmark (Tortorelli & Rea)	Benchmark Value
Fort Cobb Mesonet	24-Hr Rain	23.5 cm (9.25")	100-yr Event	~21.1 cm
Watonga COOP	Daily Rain	23.0 cm (9.05")	100-yr Event	~20.3 cm
Fort Cobb Mesonet	12-Hr Rain	23.2 cm (9.13")	500-yr Event	~23.6 cm
Fort Cobb Mesonet	3-Hr Rain	18.7 cm (7.36")	500-yr Event	~19.1 cm

Near Chickasha

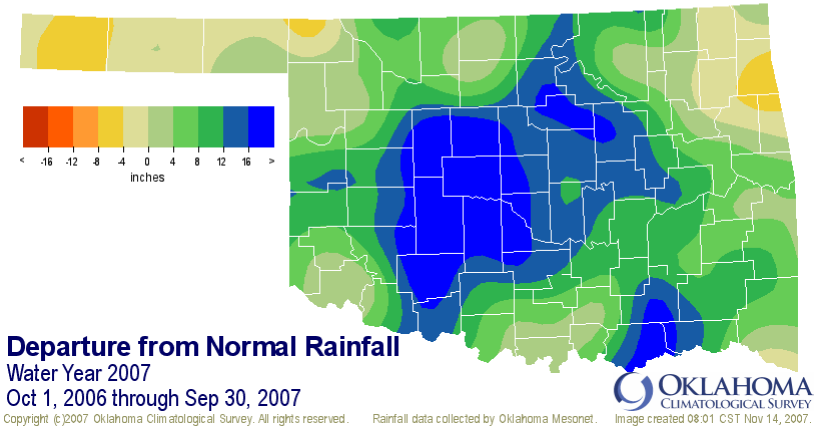
Photo by Laura Martin, Oklahoma Mesonet

Near Chickasha

The Big Picture

Climatological Fit

How does WY2007 fit?

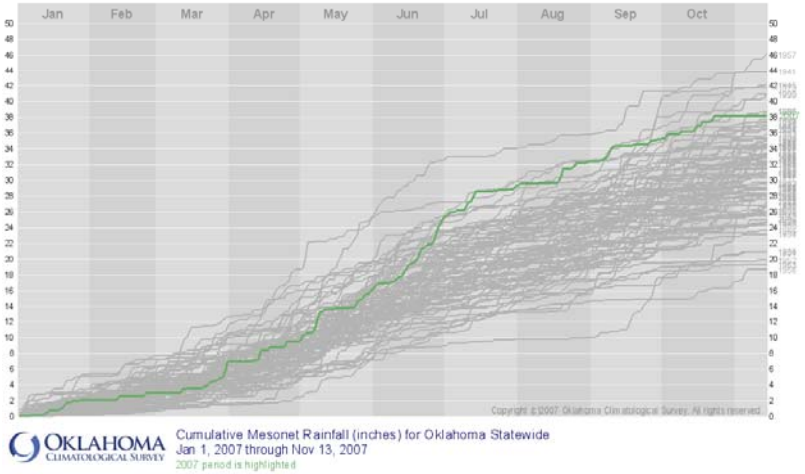


How does WY 2007 fit?

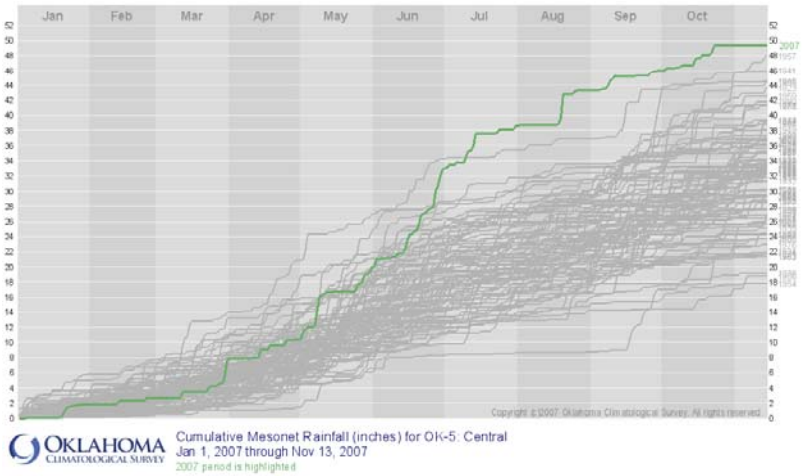
Water Year 2007
Oct 1, 2006 through Sep 30, 2007

Climate Division	Total Rainfall	Departure from Normal	Pct of Normal	Driest since	Wettest since	Rank of 86 such periods	Driest on Record	Wettest on Record	Sep 30 25 cm FWI	Sep 30 KBDI	365-day SPI
OK-1: Panhandle	19.00"	-1.98"	91 %	2005-06 (17.41")	2004-05 (25.03")	40th driest	11.35" (1955-56)	30.38" (1986-87)	0.21	458	-0.13
OK-2: N. Central	38.46"	+6.51"	120 %	2005-06 (20.40")	1998-99 (52.74")	7th wettest	15.00" (1955-56)	52.74" (1998-99)	0.38	346	+1.32
OK-3: Northeast	46.32"	+3.50"	108 %	2005-06 (27.65")	1998-99 (57.70")	17th wettest	21.62" (1955-56)	58.99" (1972-73)	0.66	297	+0.83
OK-4: W. Central	40.00"	+10.85"	137 %	2005-06 (22.44")	1994-95 (41.82")	3rd wettest	15.87" (1955-56)	41.82" (1994-95)	0.60	202	+2.07
OK-5: Central	53.57"	+16.26"	144 %	2005-06 (23.25")	--	1st wettest	19.58" (1955-56)	52.68" (1944-45)	0.60	277	+2.23
OK-6: E. Central	51.94"	+5.79"	113 %	2005-06 (28.48")	1998-99 (52.27")	14th wettest	22.45" (1955-56)	69.69" (1944-45)	0.84	214	+0.98
OK-7: Southwest	42.58"	+11.83"	138 %	2005-06 (19.52")	1994-95 (44.54")	3rd wettest	16.91" (1955-56)	44.54" (1994-95)	0.42	338	+2.02
OK-8: S. Central	49.32"	+9.68"	124 %	2005-06 (24.88")	1994-95 (49.72")	10th wettest	15.87" (1955-56)	63.25" (1944-45)	0.30	464	+1.28
OK-9: Southeast	57.76"	+6.99"	114 %	2005-06 (34.69")	2000-01 (58.67")	14th wettest	25.58" (1955-56)	78.58" (1944-45)	0.65	421	+0.94
Oklahoma Statewide	44.40"	+7.85"	121 %	2005-06 (24.12")	1994-95 (45.14")	7th wettest	18.16" (1955-56)	48.72" (1972-73)	0.51	337	+1.52

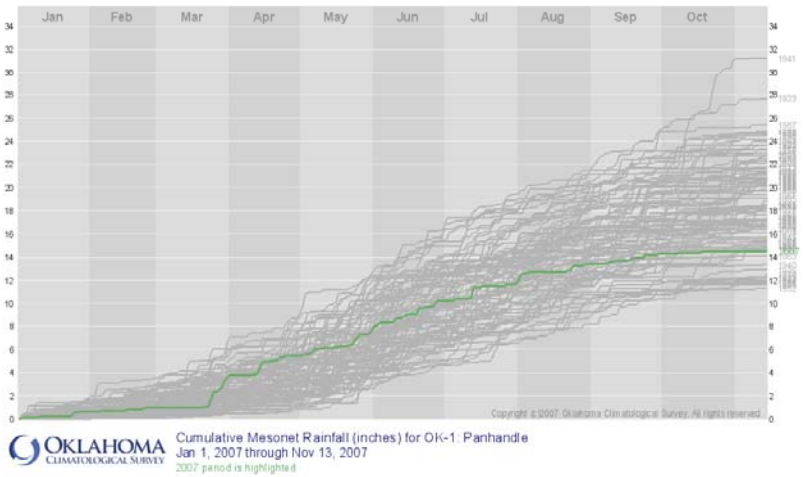
How does 2007 fit?



How does 2007 fit?



How does 2007 fit?



From OCS's Climate Change Statement

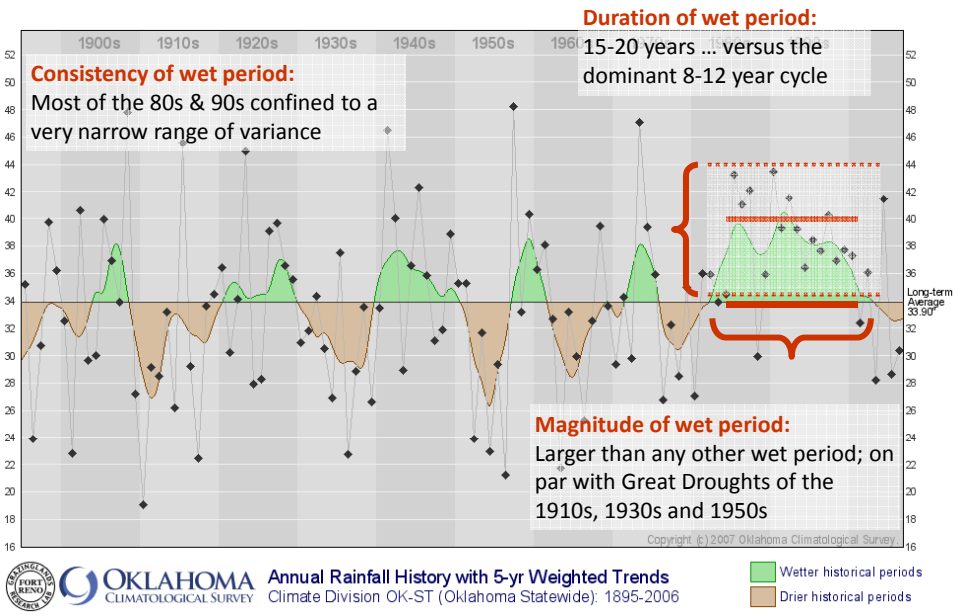
- OCS expects the following scenarios … should the projected range of warming materialize for the remainder of the 21st century:
  - Frequency of hot extremes and heat waves will increase.
  - Cold extremes and cold air outbreaks will decrease.
  - Atmospheric water content will increase.
  - The jet stream and its associated storms will move poleward.

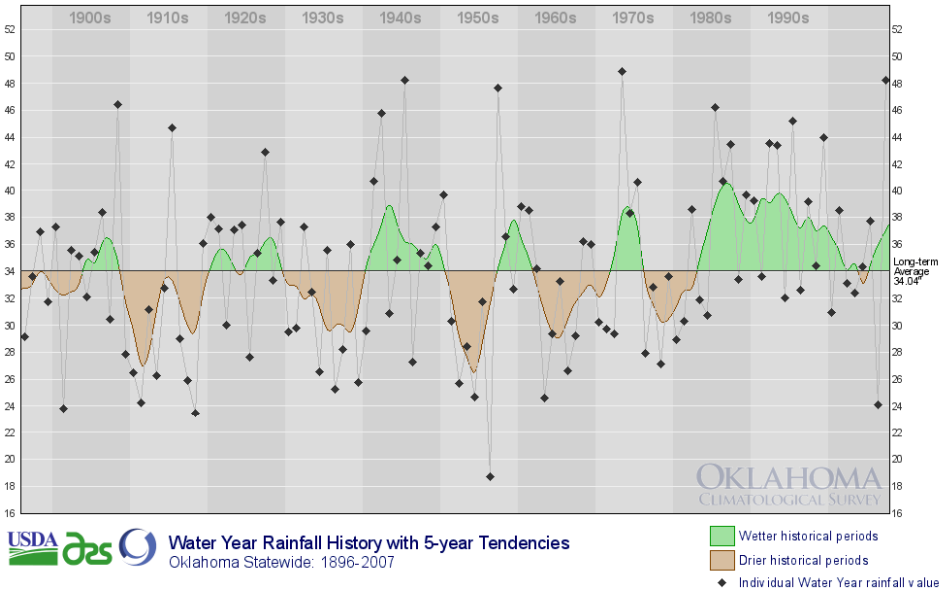
http://climate.ok.gov/

From OCS's Climate Change Statement

Implications for Oklahoma

- The warm season becomes longer and arrives earlier.
- The cool season warms and shortens which leads to a longer frost-free period and growing season.
- Increased year-round evaporation from the ground and transpiration from green vegetation.
- Drought frequency and severity increases, esp. during summer.
- Drier / warmer conditions will increase the risk of wildfires.
- Rain-free periods will lengthen, but individual rainfall events will become more intense.
- More runoff and flash flooding will occur.


Duration of wet period:
15-20 years … versus the dominant 8-12 year cycle
Consistency of wet period:
Most of the 80s & 90s confined to a very narrow range of variance
Magnitude of wet period:
Larger than any other wet period; on par with Great Droughts of the 1910s, 1930s and 1950s
1900s
1910s
1920s
1930s
1940s
1950s
Long-term Average 33.90"
Copyright (c) 2007 Oklahoma Climatological Survey
OKLAHOMA CLIMATOLOGICAL SURVEY
Annual Rainfall History with 5-yr Weighted Trends
Climate Division OK-ST (Oklahoma Statewide): 1895-2006
Wetter historical periods
Drier historical periods


1900s
1910s
1920s
1930s
1940s
1950s
1960s
1970s
1980s
1990s
Long-term Average 34.04"
OKLAHOMA CLIMATOLOGICAL SURVEY
USDA
Water Year Rainfall History with 5-year Tendencies
Oklahoma Statewide: 1896-2007
Wetter historical periods
Drier historical periods
Individual Water Year rainfall value

Thanks!
Think Positive!
Deke Arndt
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405-325-3076
Photo by Ken Meyers, OCS

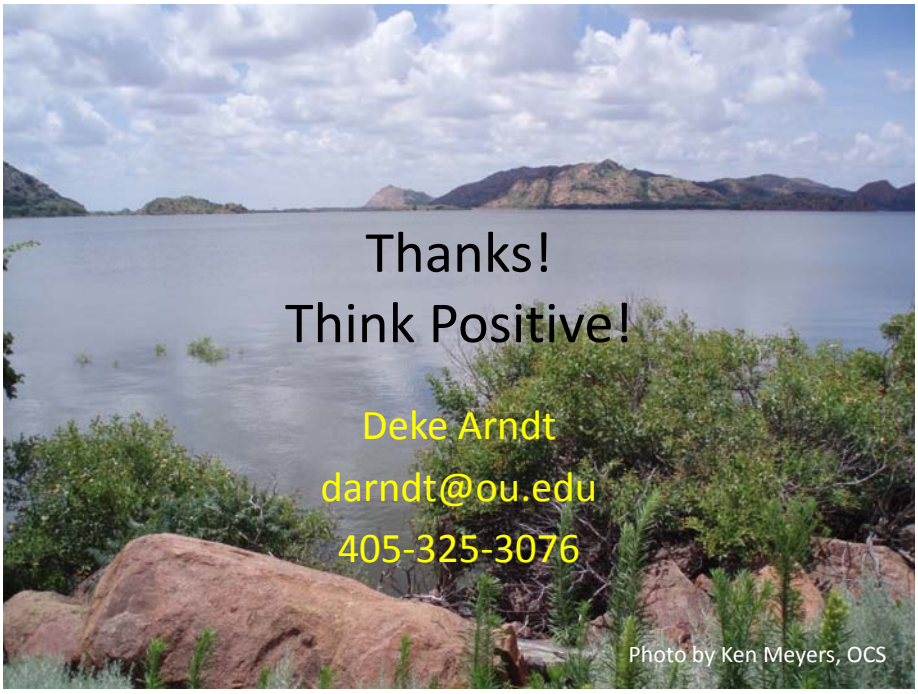
Thanks!
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Photo by Ken Meyers, OCS