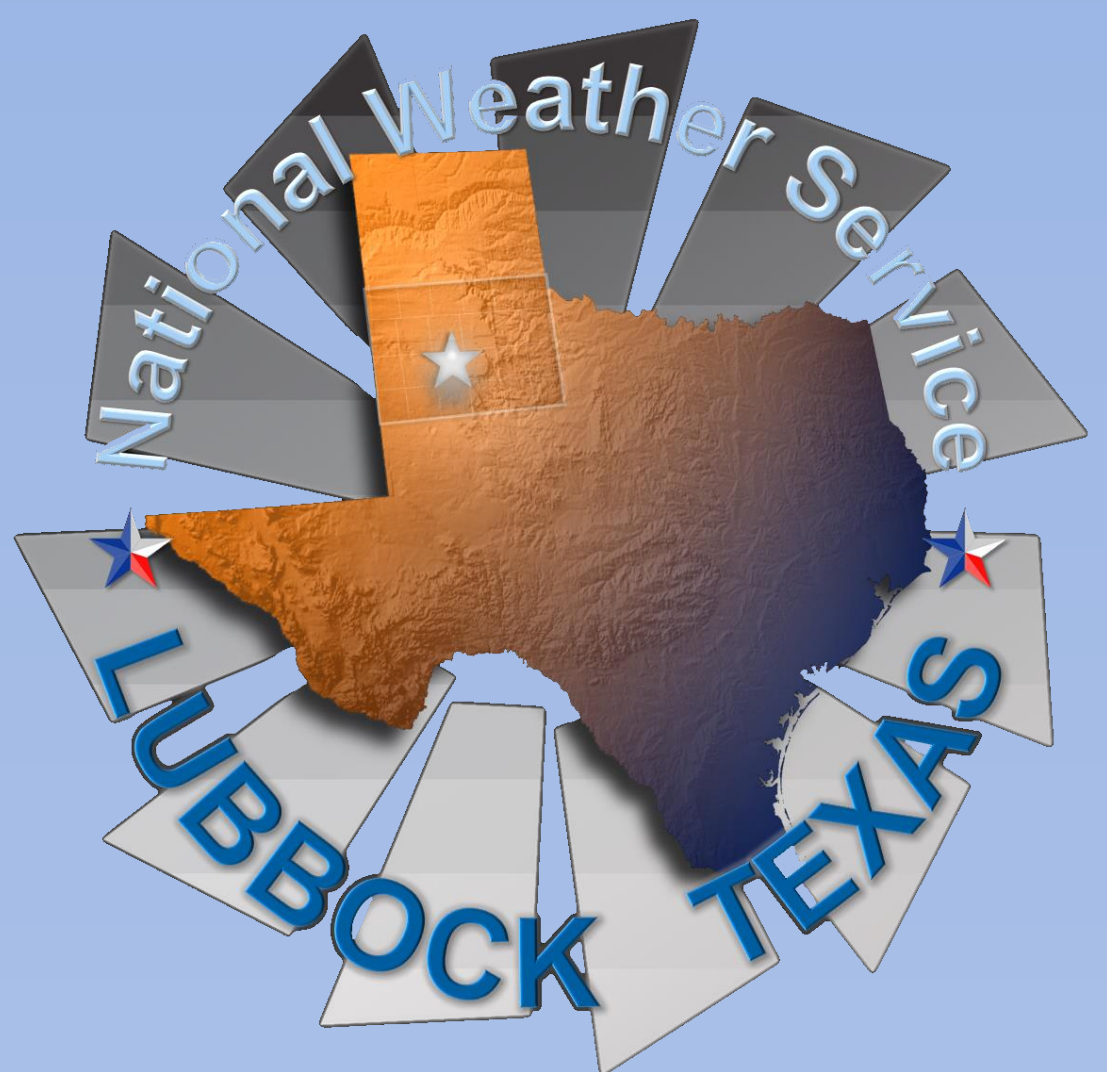




A Comparison of the Summers 2011-14 Heat Wave and Drought on the Southern High Plains To Previous Extreme Years



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INTRODUCTION

- In 2012, study was conducted comparing atmospheric and ground measurements during the summer of 2011 (June – August) to the results of warm, dry, wet, and cool years
- This analysis expands on the initial study by including the summers of 2011-14 creating a more robust data set

Jun - Aug	Average Temperature (°F)	Rank
2011	86.8	1
2012	83.2	9
2013	82.1	38
2014	81.6	52
1981-2010 mean	81.1	

Jun - Aug	Precipitation (inches)	Rank
2011	2.46	1
2012	6.40	34
2013	6.84	46
2014	7.32	59
1981-2010 mean	8.28	

Top chart depicts average temperatures from 2011-2014 of the summer months (June-August) and the corresponding rank across the state of Texas. Bottom chart is the same as top except for precipitation. The 1981-2010 mean is also displayed for comparison. (NOAA National Centers for Environmental Information, Climate at a Glance: U.S. Time Series from <http://www.ncdc.noaa.gov/cag>).

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2010	1.3	1.5	0.8	0.5	0.0	-0.4	-0.8	-1.1	-1.3	-1.4	-1.3	-1.4
2011	-1.3	-1.1	-0.8	-0.6	-0.3	-0.2	-0.1	-0.5	-0.7	-0.8	-0.9	-0.8
2012	-0.7	-0.5	-0.5	-0.4	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.2
2013	-0.4	-0.5	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3
2014	-0.5	-0.6	-0.4	-0.2	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.6
2015	0.5	0.4	0.5	0.7	0.9	1.0	1.2	1.5	1.8	2.1	2.2	2.3

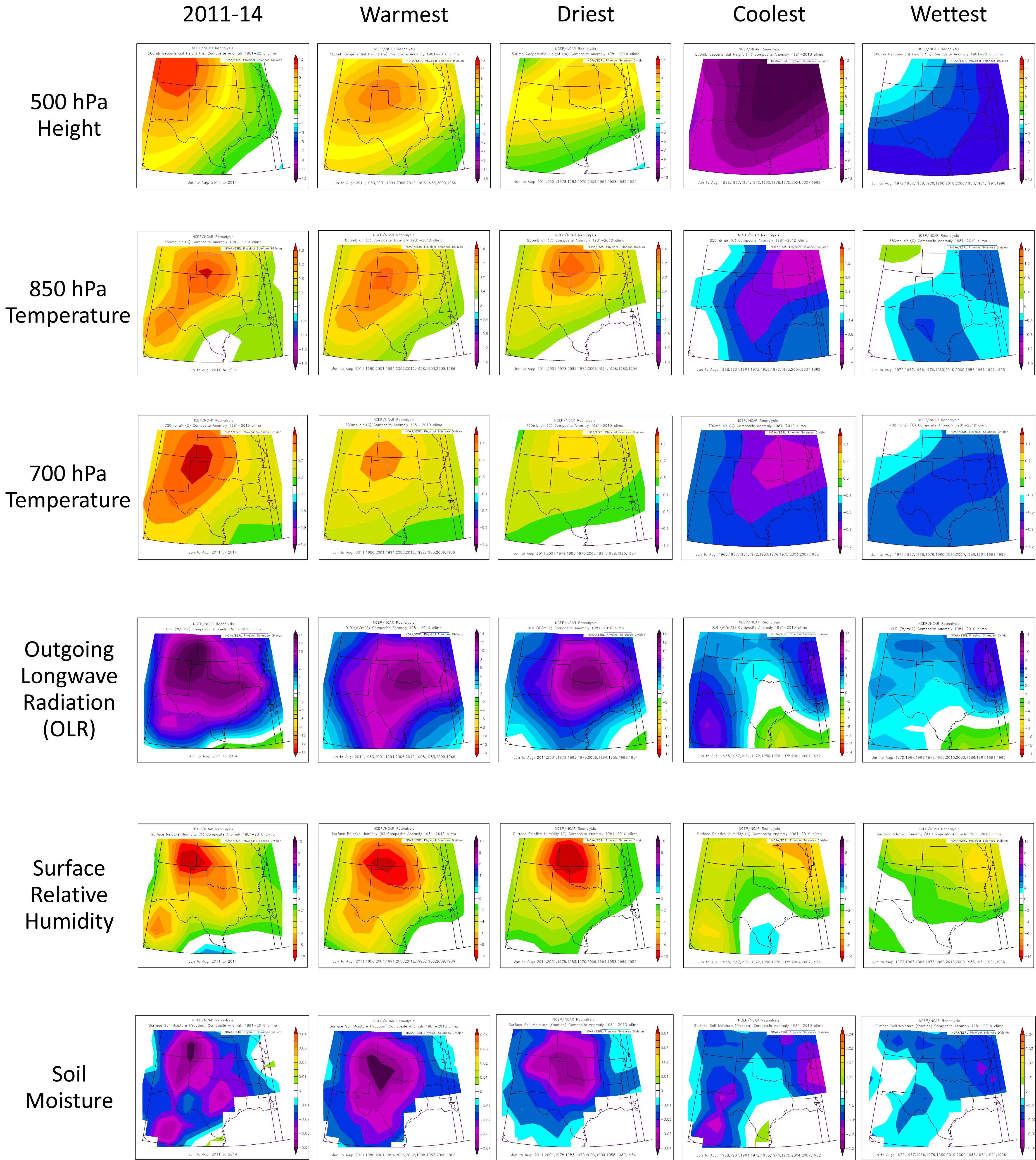
Table depicting historical Oceanic Niño Index (ONI) anomalies in the Niño 3.4 region from 2010-2015. Warm (red) and cold (blue) periods are based on a threshold of +/- 0.5°C for a minimum of five consecutive over-lapping seasons (from http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml).

- Drought years from 2011-2014 were associated with a weak or moderate La Niña or neutral conditions
- La Niña events are historically associated with drier and warmer than normal periods for the southern High Plains
- Weak to moderate El Niño conditions became present when the drought was ending

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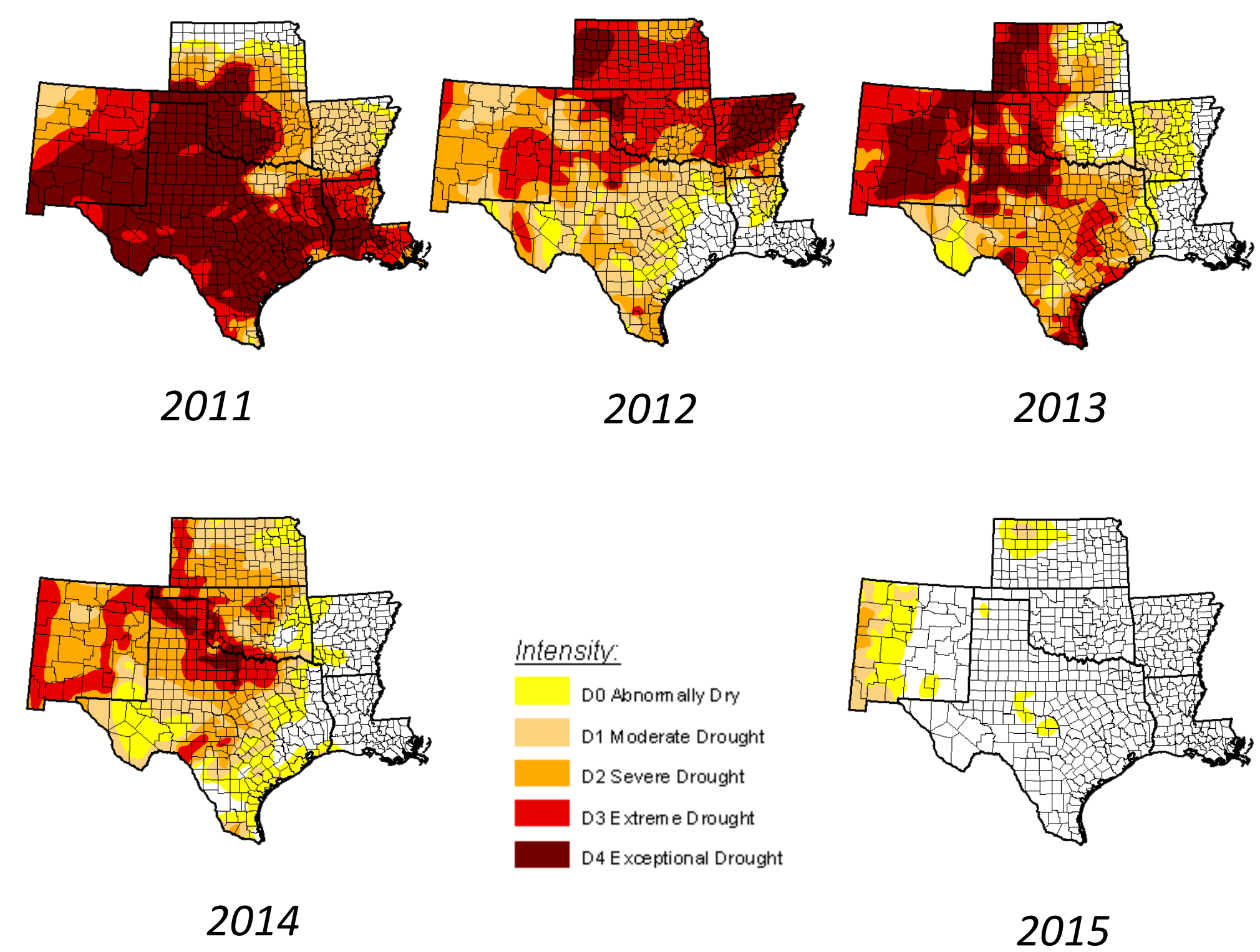
ANOMALY COMPOSITE ANALYSIS



METHODS AND DATA

- 2011-14 anomalies were compared to the 85th percentile of wettest and warmest years, and 15th percentile of driest and coolest years
- Anomaly composite data was obtained from the Earth System Research Laboratory (ESRL) Physical Sciences Division using NCEP/NCAR reanalysis data available from the following website: <http://www.esrl.noaa.gov/psd/>
Note: Percentiles were taken using the first available years in the composite data. The earliest composite data is available for the year 1948.

DROUGHT INTENSITY



Drought intensity reported by the US Drought Monitor (<http://droughtmonitor.unl.edu>) for the months of July from 2011 – 2015 for the southern High Plains.

SUMMARY

- Results using an updated data set depict similar outcomes as the previous study
- Composites for 2011-14 were all similar to those of the most extreme warmest and driest years
- The exceptionally dry weather of 2011-14 contributed to the remarkably large temperature anomalies observed through the summer months
- Coolest and wettest years tended to exhibit lower 500 hPa heights and lower 850/750 hPa temperatures compared to 2011-14 and the warmest and driest years
- Surface relative humidity and soil moisture anomalies were negative for the coolest and wettest years but not as extreme as measured for 2011-14 and the driest and warmest years; OLR was similar but with positive anomalies