Understanding US Drought

in Past 120+ Years

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NOAA/NWS/NCEP/CPC

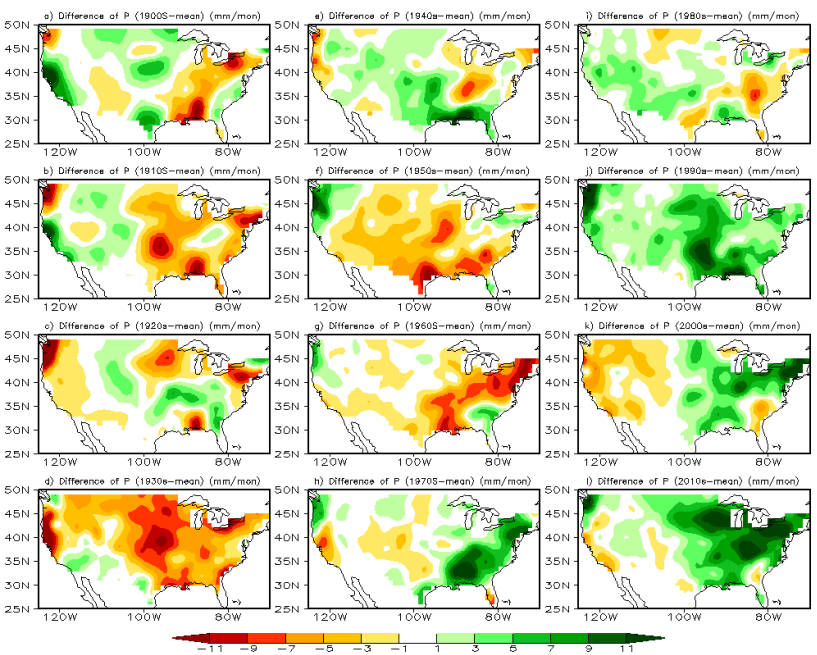
Drought in the US

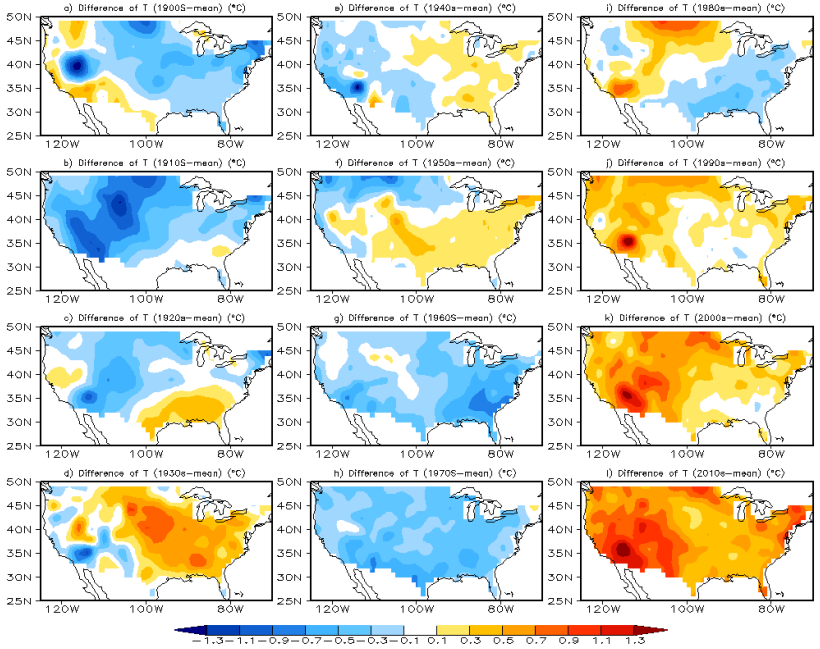
Decadal Variation

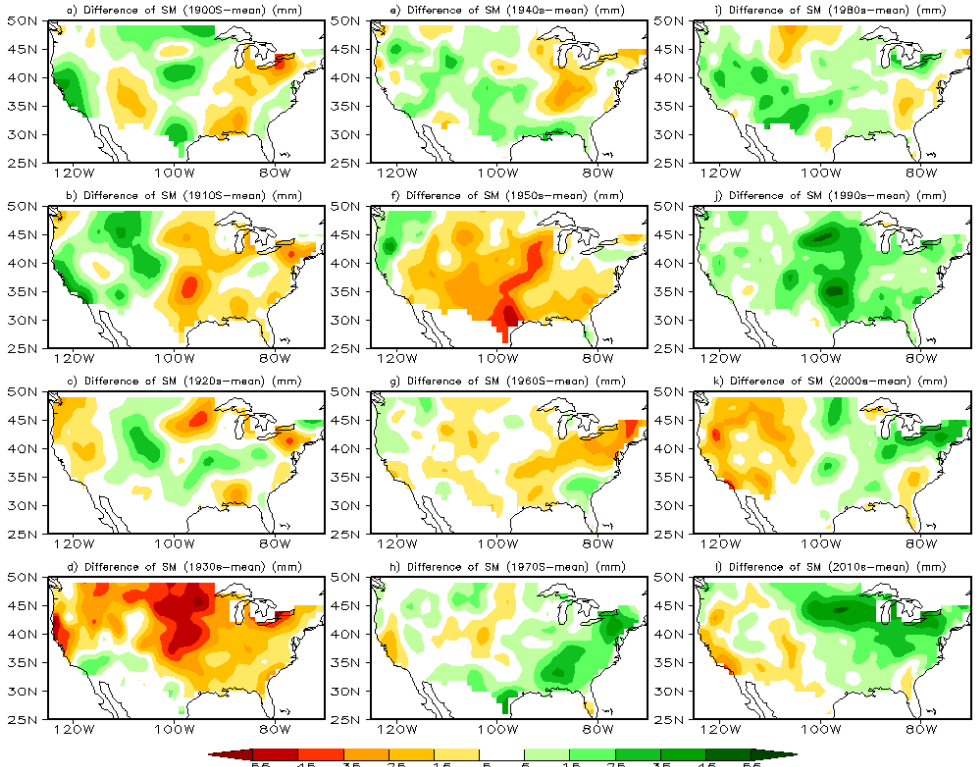
Attribution

Impact of trend or climate change

Decadal Variations



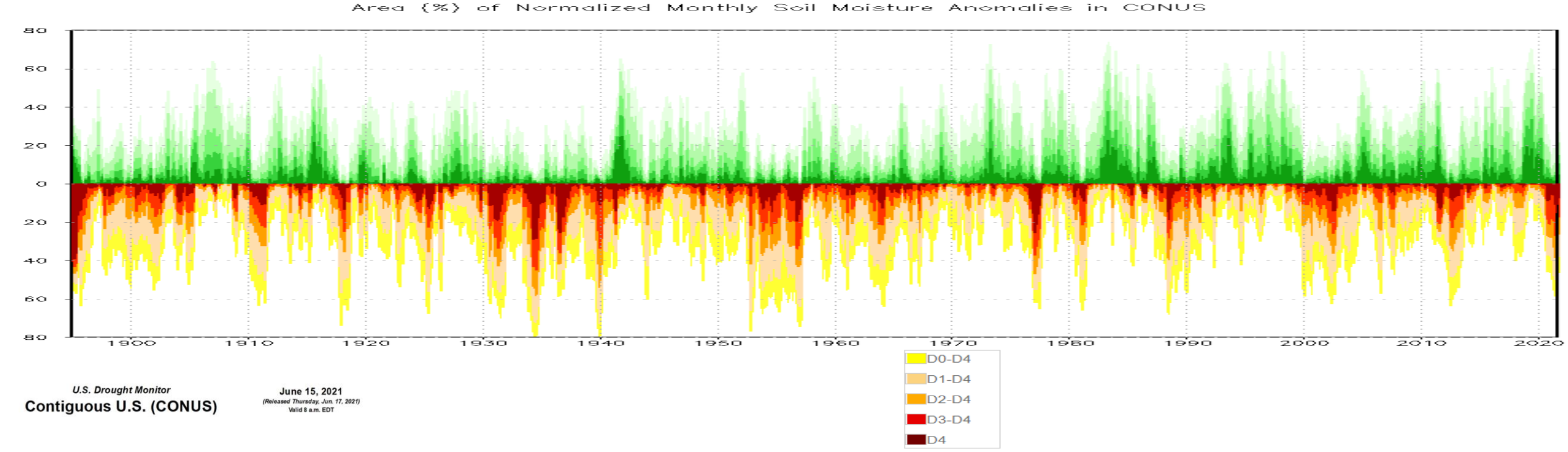


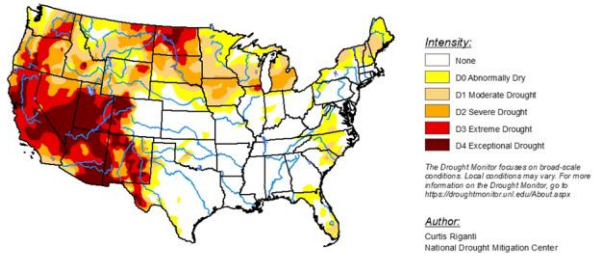


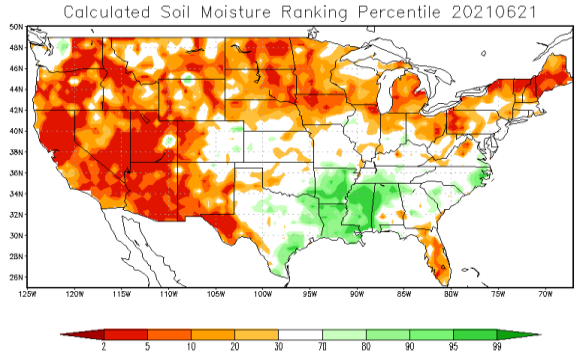
Drought in the US

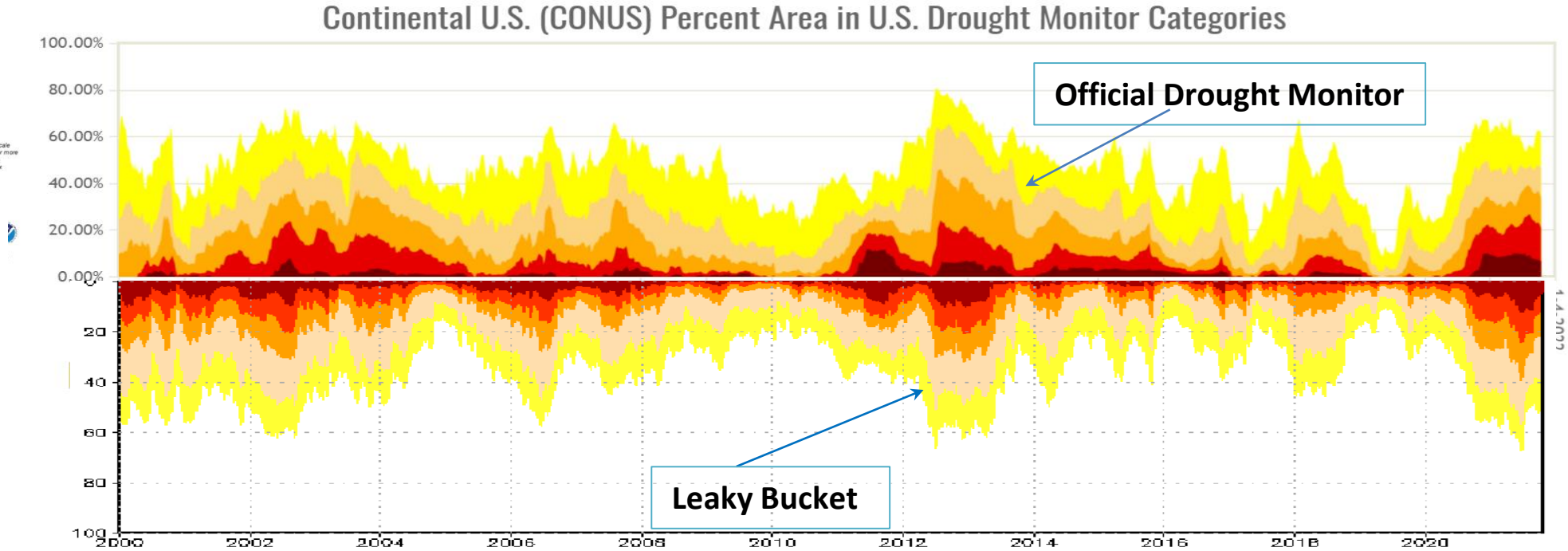
CPC Leaky Bucket Model vs United States Drought Monitor

A Mutual Validation

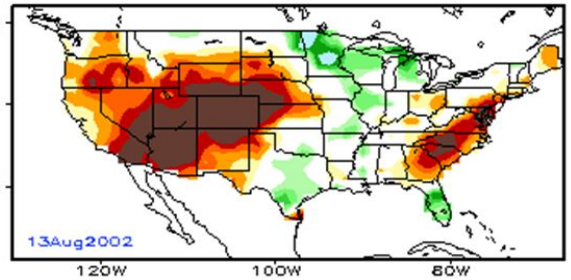

Area (%) of Normalized Monthly Soil Moisture Anomalies in CONUS
80
60
40
20
0
20
40
60
80
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
D0-D4
D1-D4
D2-D4
D3-D4
D4

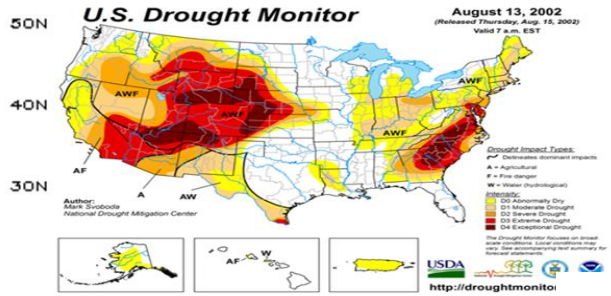

U.S. Drought Monitor
Contiguous U.S. (CONUS)
June 15, 2021
(Released Thursday, Jun. 17, 2021)
Valid 8 a.m. EDT
Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx
Author:
Curtis Riganti
National Drought Mitigation Center

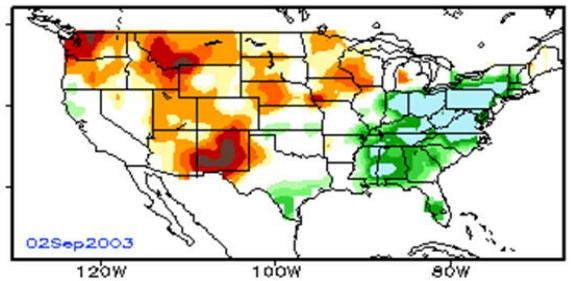

Calculated Soil Moisture Ranking Percentile 20210621
2
5
10
20
30
70
80
90
95
98

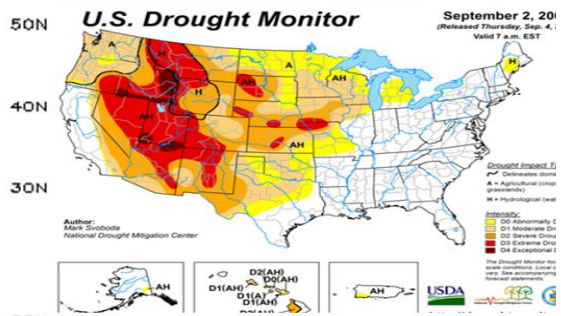

Continental U.S. (CONUS) Percent Area in U.S. Drought Monitor Categories
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
Official Drought Monitor
Leaky Bucket
20
40
60
80
100
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020

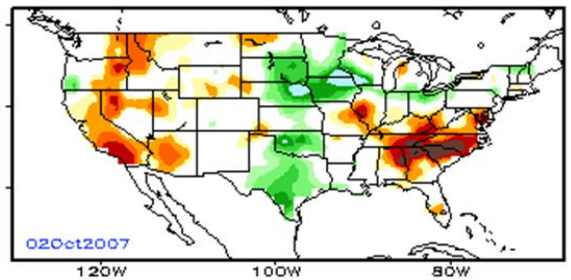
Normalized Monthly Soil Moisture Anomalies (mm)

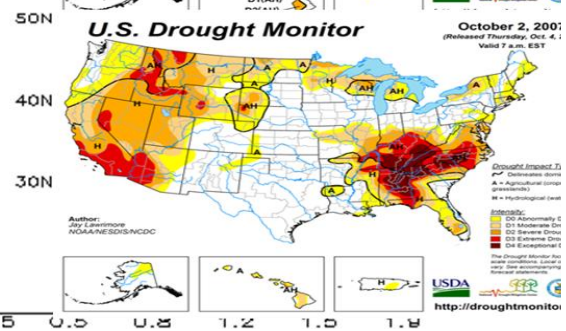




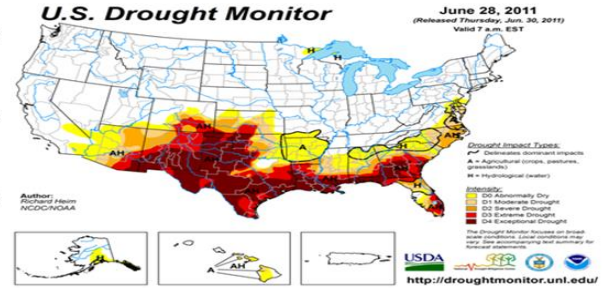


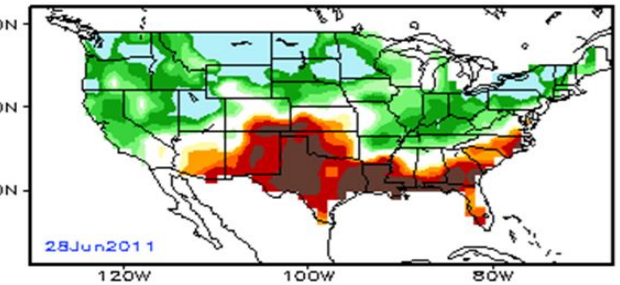


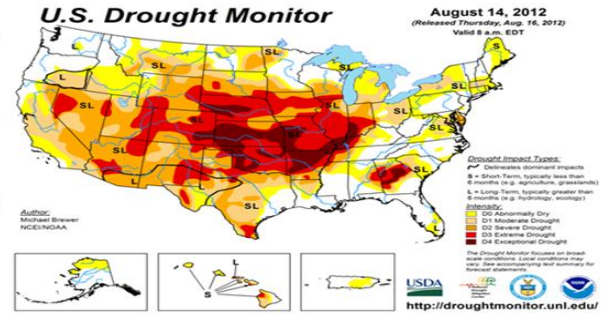


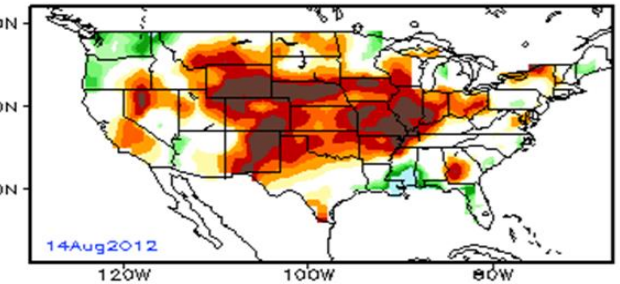


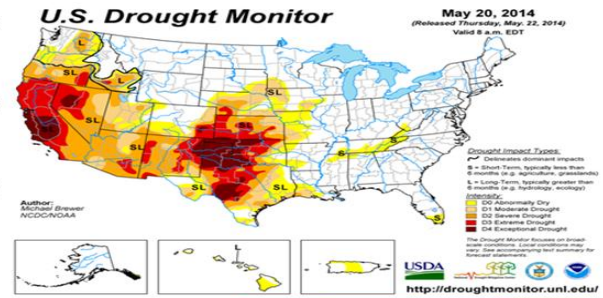
Normalized Monthly Soil Moisture Anomalies (mm)

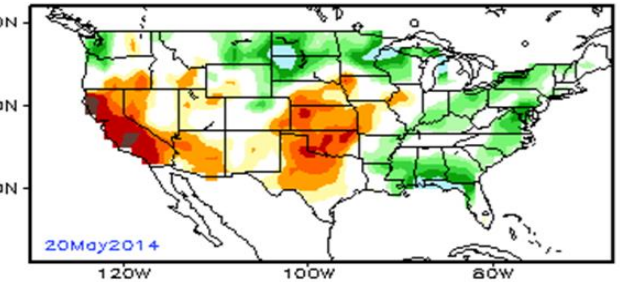


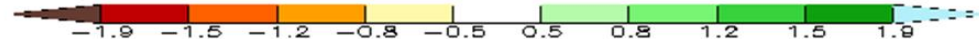












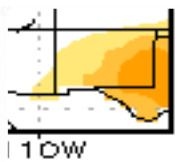
Drought in

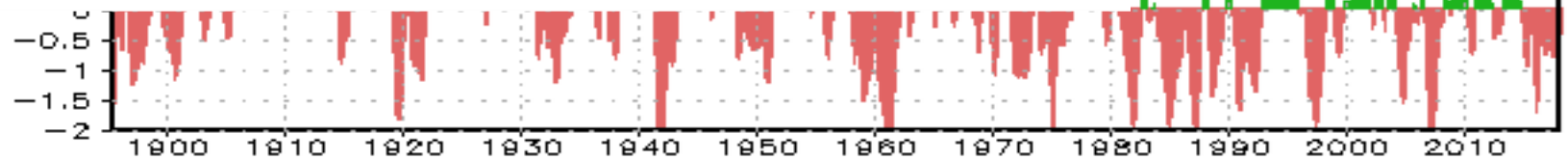
Western CONUS & Colorado River Basin

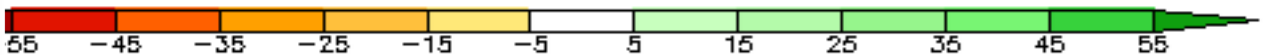
EOF Analysis of Simulated Soil Moisture

68% total var

55%



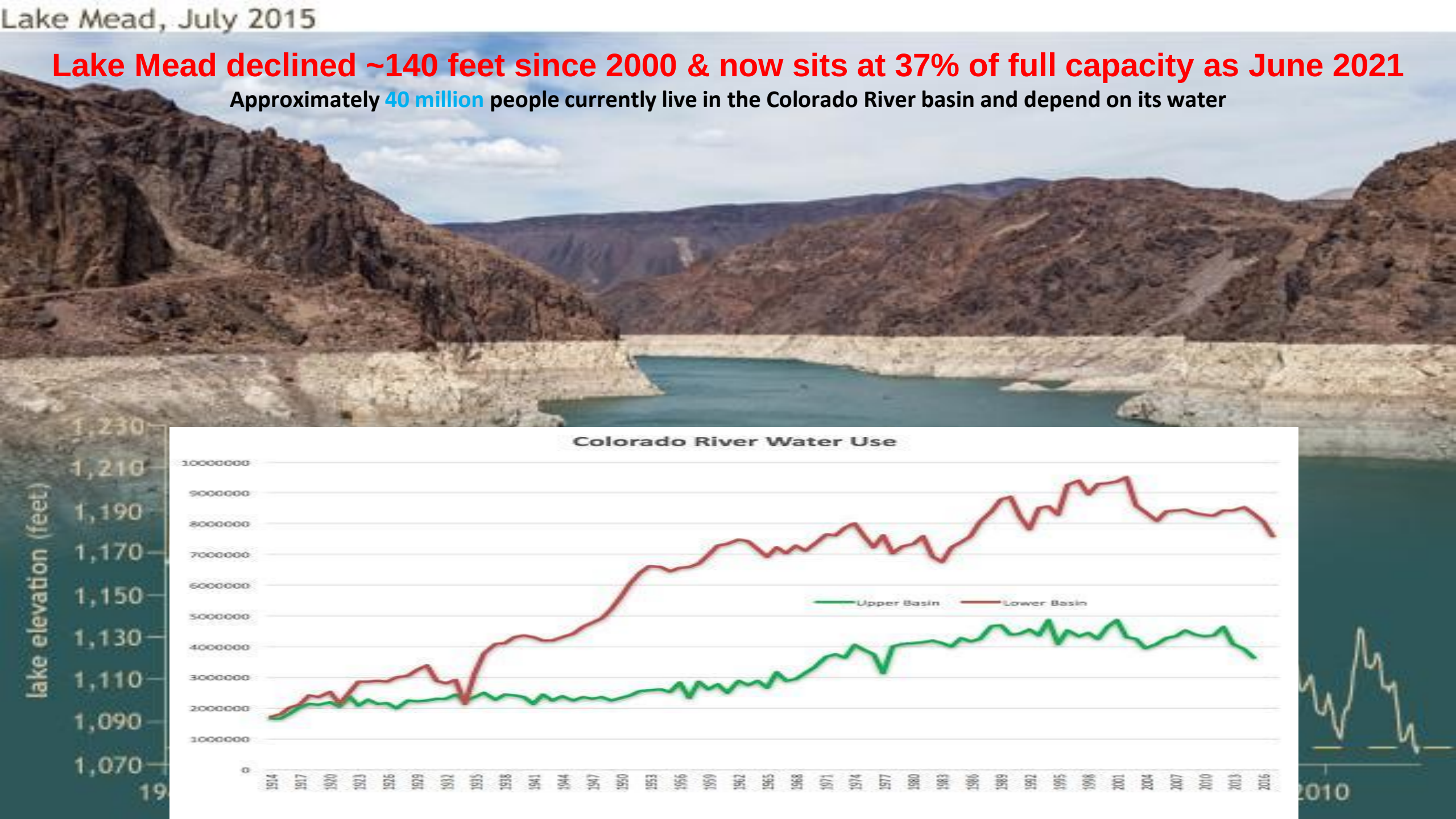


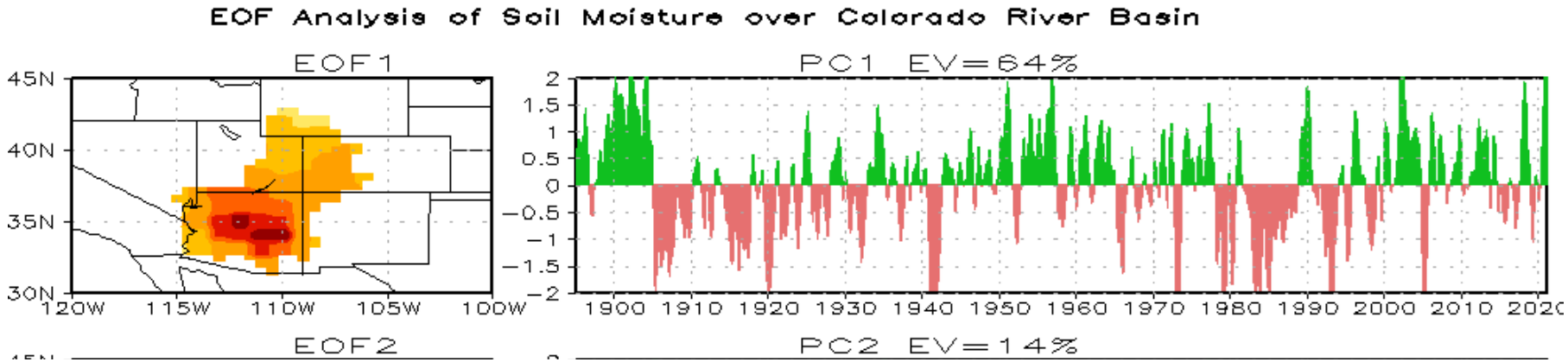


Lake Mead, July 2015

Lake Mead declined ~140 feet since 2000 & now sits at 37% of full capacity as June 2021

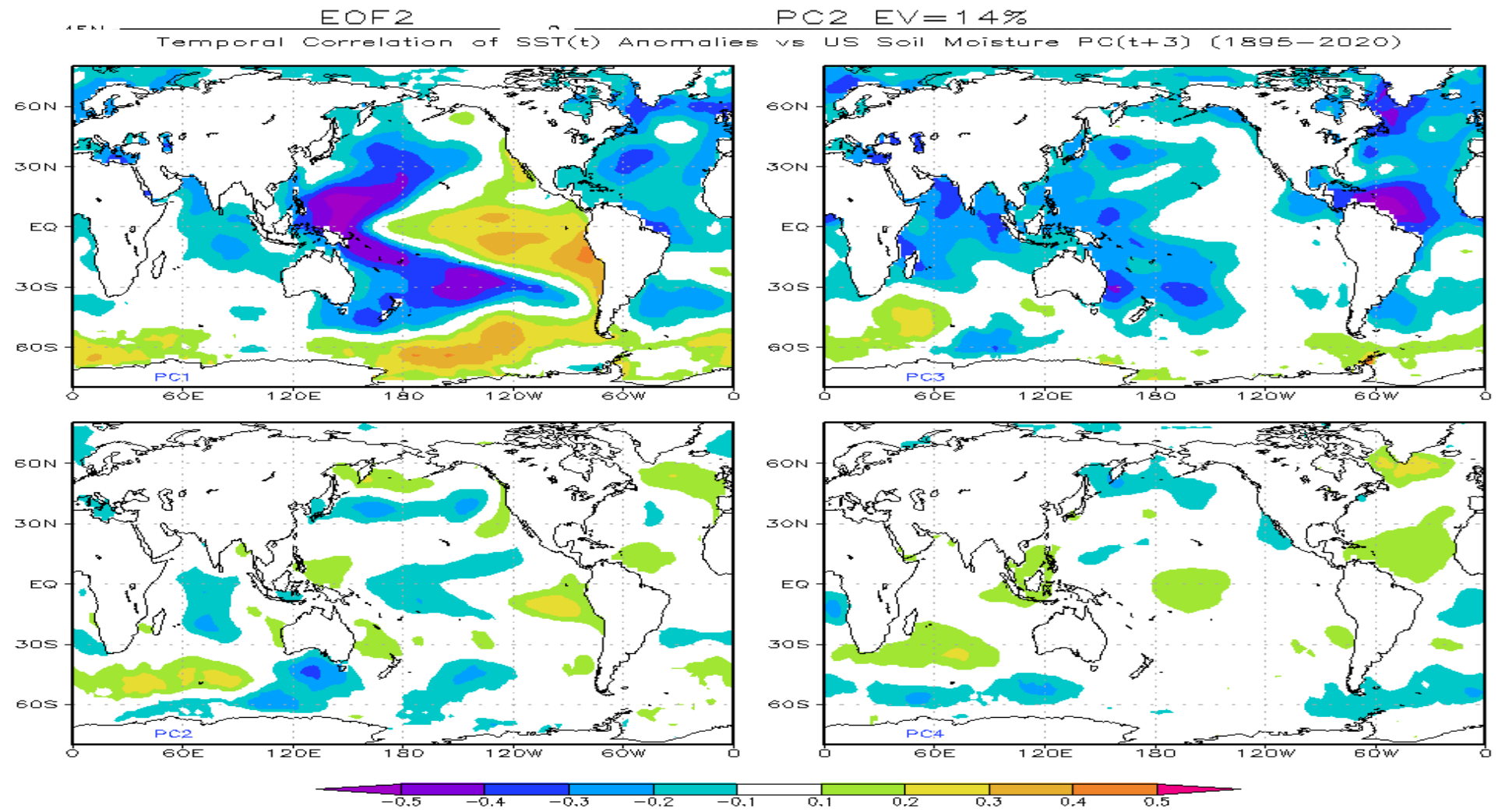
Approximately 40 million people currently live in the Colorado River basin and depend on its water



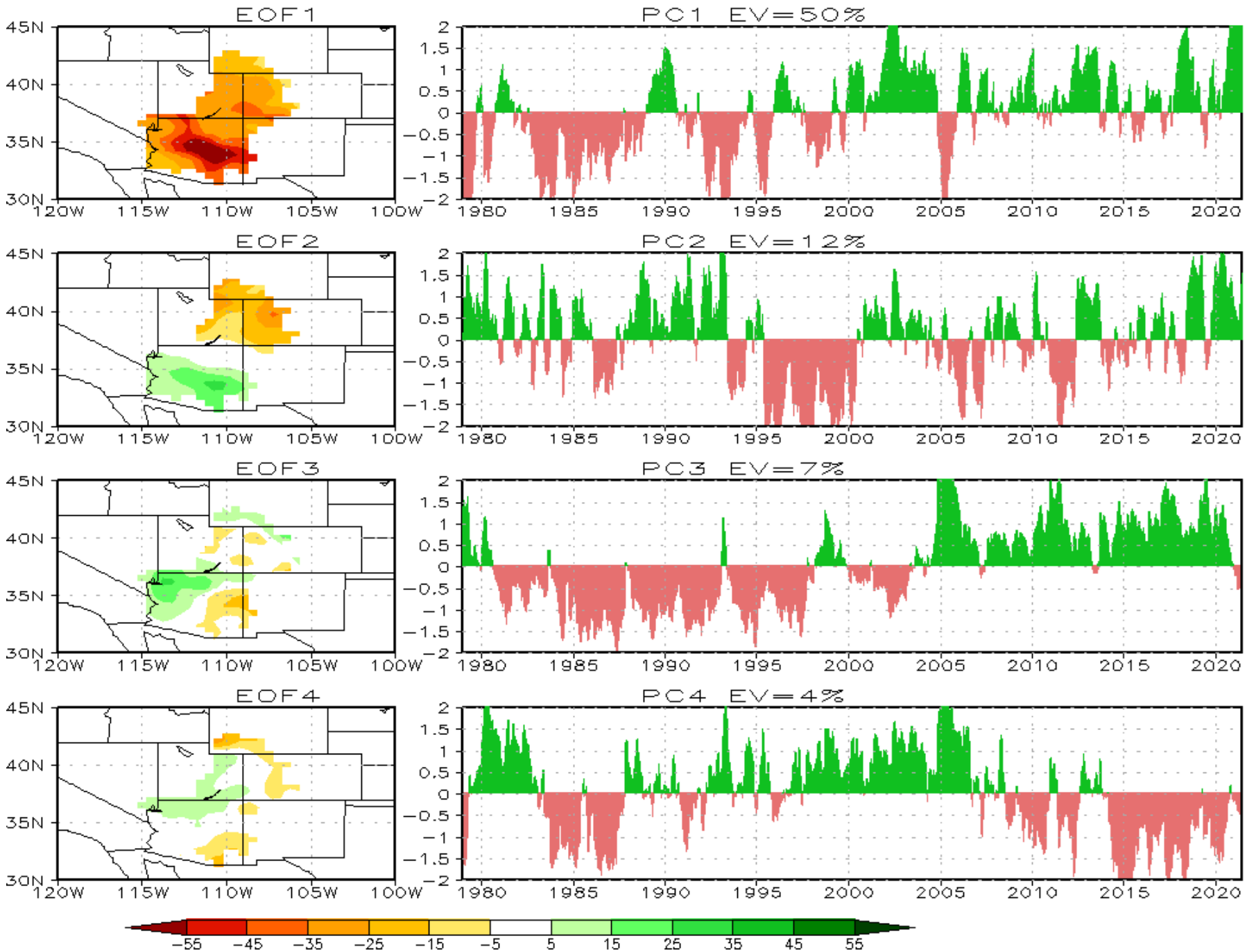


88% total var

CONUS-50% West-68%



94% total var - monthly
73% - daily



Summary

1. Significant decadal spatial-temporal variations
2. Long-term trend: T2m west US, P northeast
3. More simple soil moisture structures for US West with much dominant low-frequency EOF modes

(low-frequency & large-scale !! potentially more predictable?)

4. Future Work: Drought Prediction & Predictability