Something about the Great Salt Lake

National Weather Service

Climate Prediction Center

home Site Map News Organization

HOME > Outreach > Meetings > 34th Annual Climate Diagnostics & Prediction Workshop

Meetings

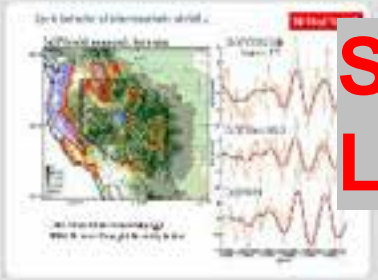
NOAA's 34th Climate Diagnostics and Prediction Workshop will be held during October 26-30, 2009 in Monterey, CA

with the web form, please send the required information as an attachment via email to **huug.vandendool@noaa.gov** or **jae.schemm@noaa.gov**

The abstract deadline is **AUGUST 31, 2009**.

Something about the Great Salt Lake

2



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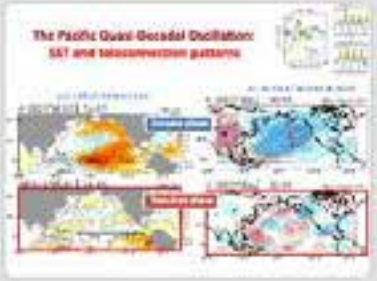

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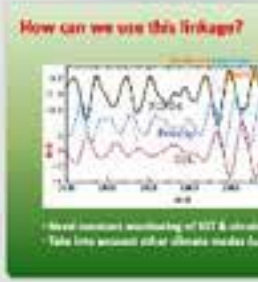

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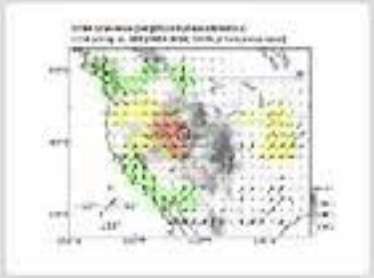

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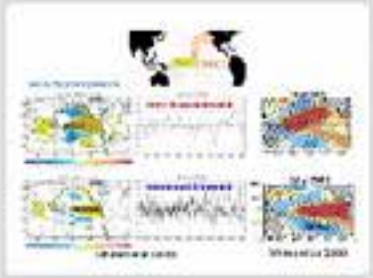

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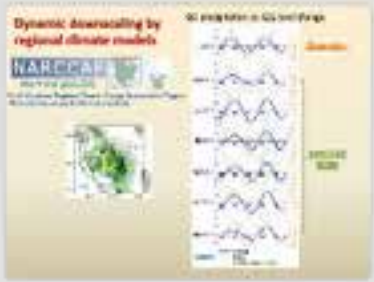
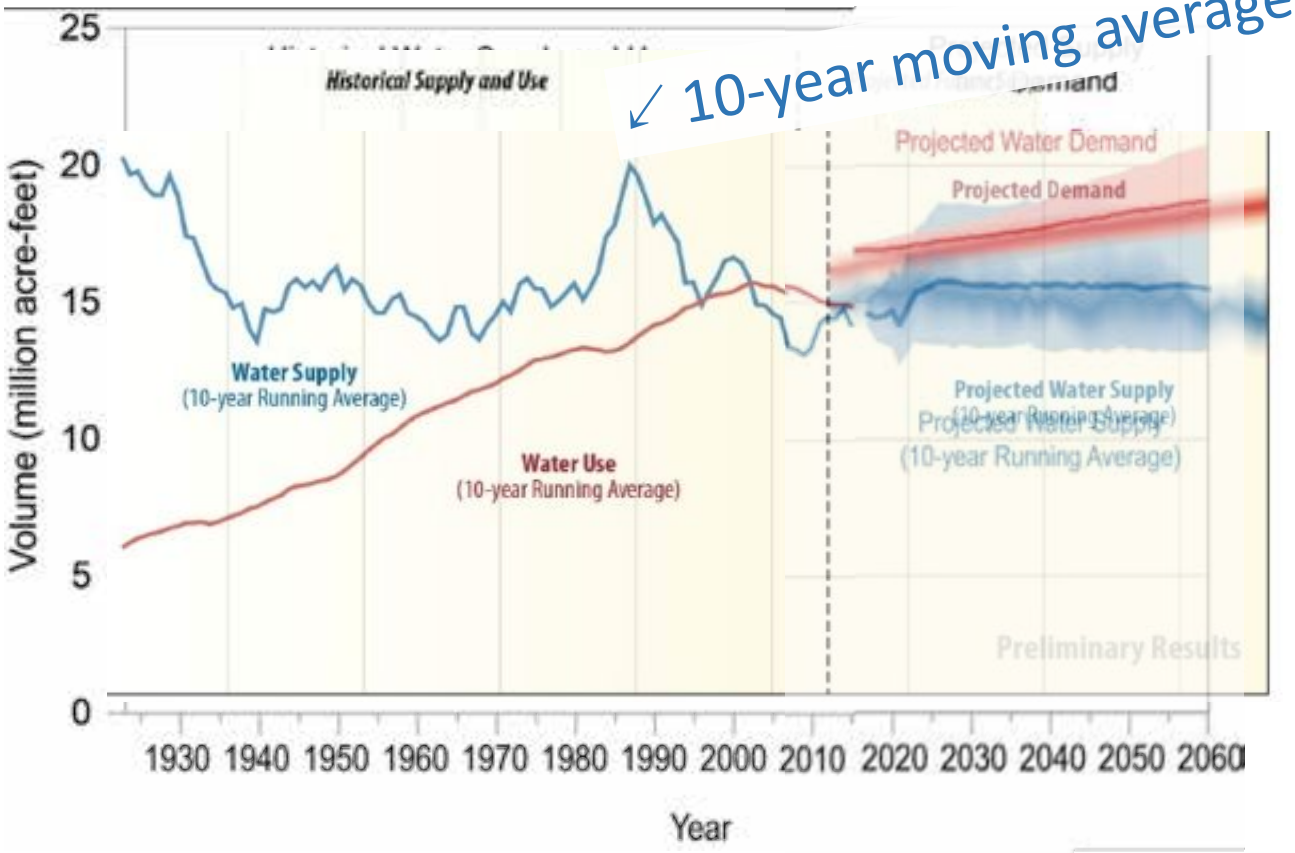


My talk
at that time

Cross-Basin Connection
of

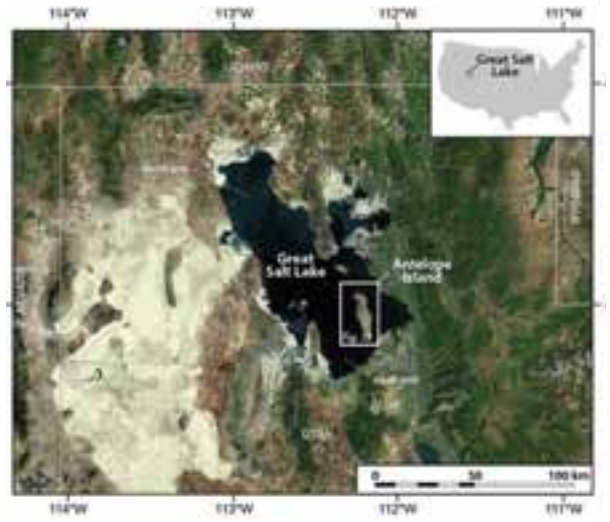
Colorado River Water Supply and the Great Salt Lake

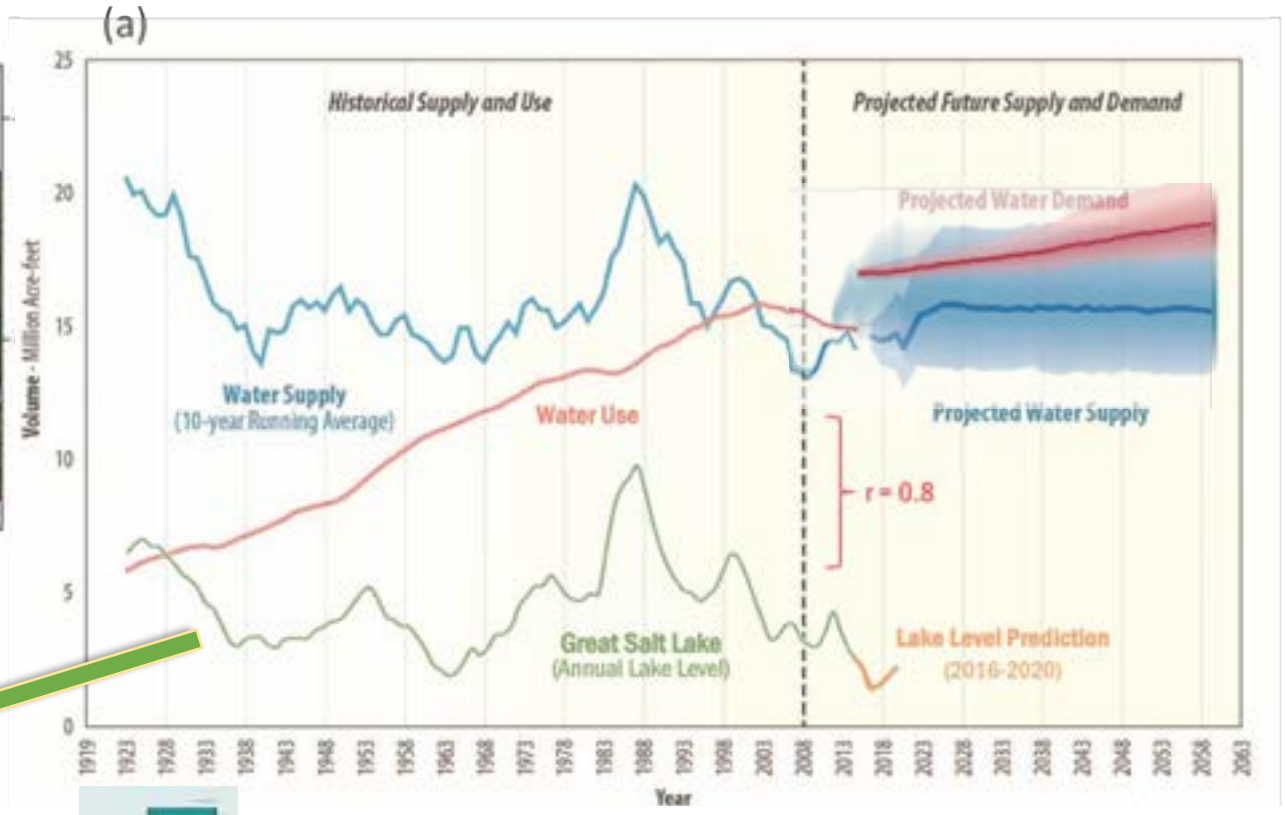
Simon Wang & Yoshi Chikamoto
Utah State University
and
Chaopeng Shen (PennState)



↙ 10-year moving average

BOR





Wang, S.-Y., et al. (2018) *Journal of Hydrometeorology*

Climate driven
multi-year drought periods

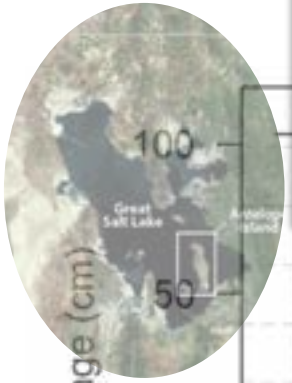
Research paper

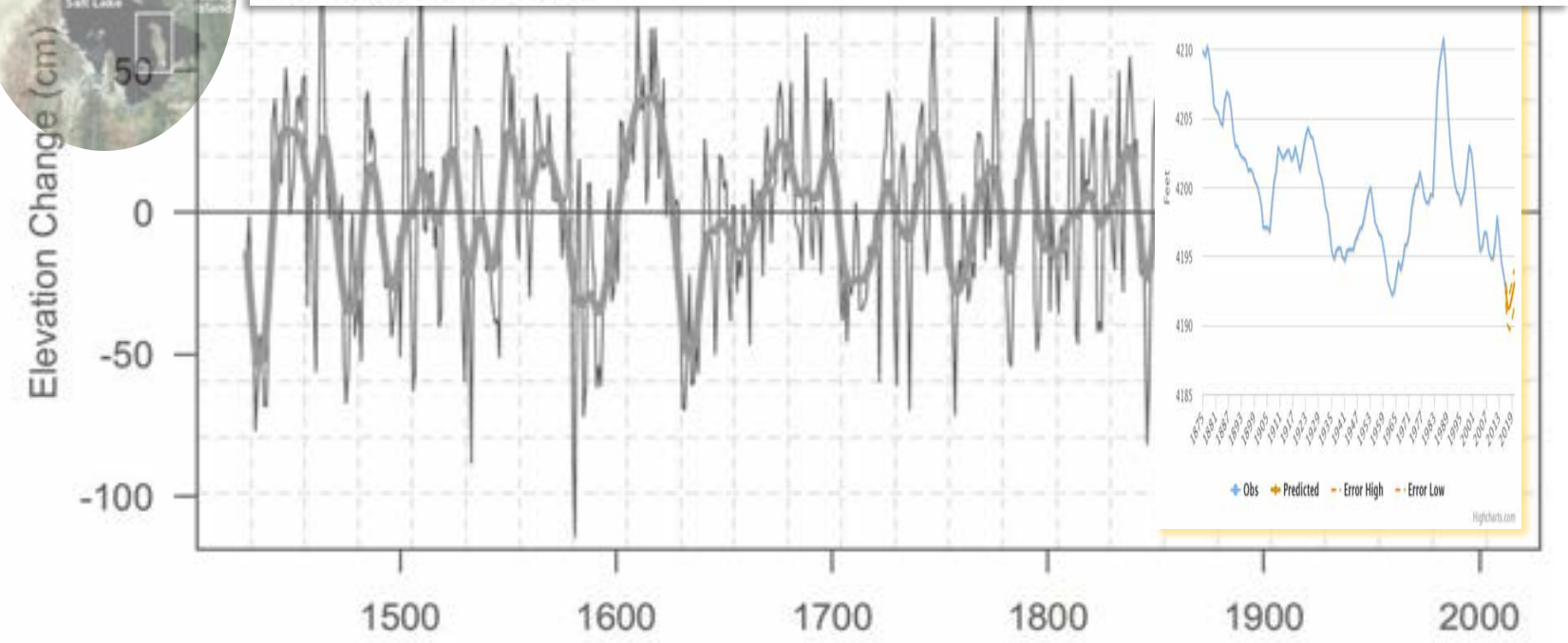
Tree-ring reconstruction of the level of Great Salt Lake 1429 to 2005

The Holocene
1–9

DOI: 10.1177/0959683614530441
hol.sagepub.com
SAGE

R Justin DeRose,[1] Shih-Yu Wang,[2] Brendan M Buckley[3] and Matthew F Bekker[4]





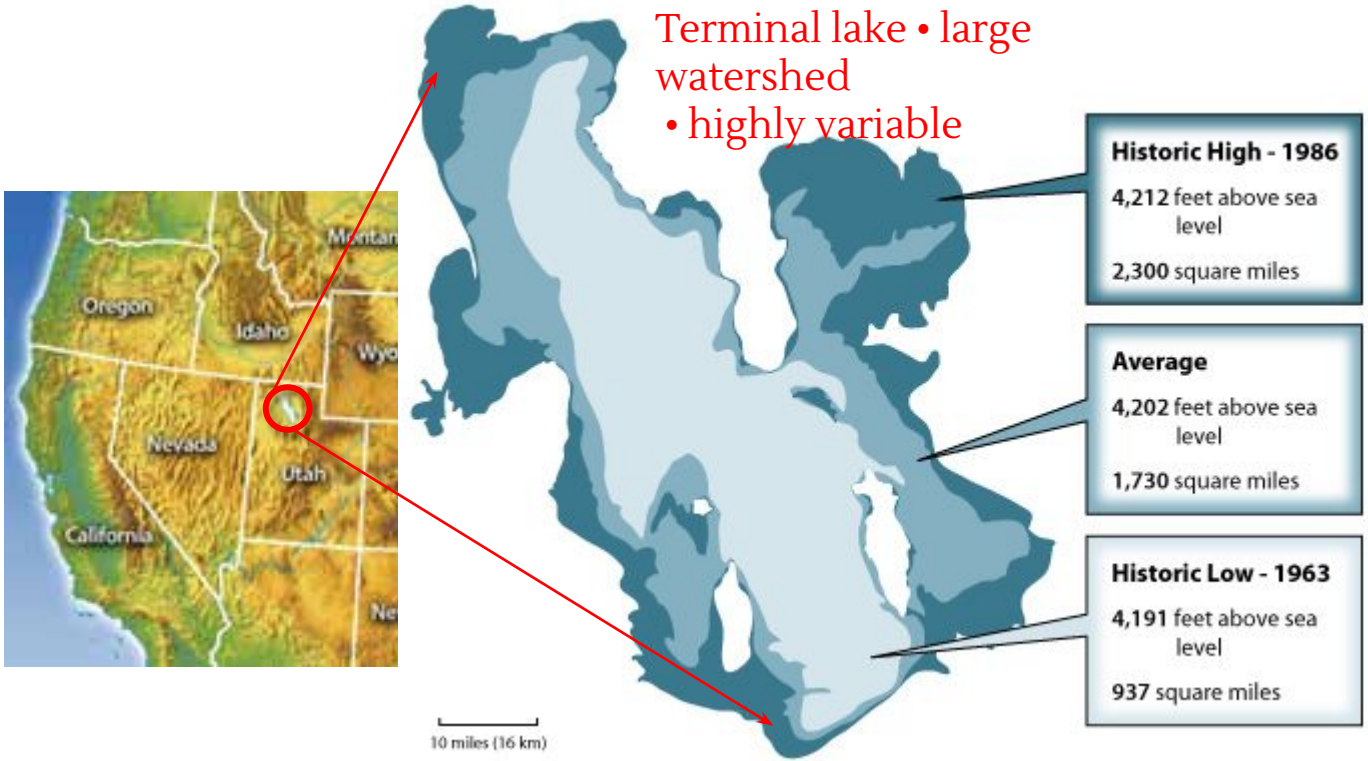
Finding the climate driver

Wang et al. (2010, JCLI)

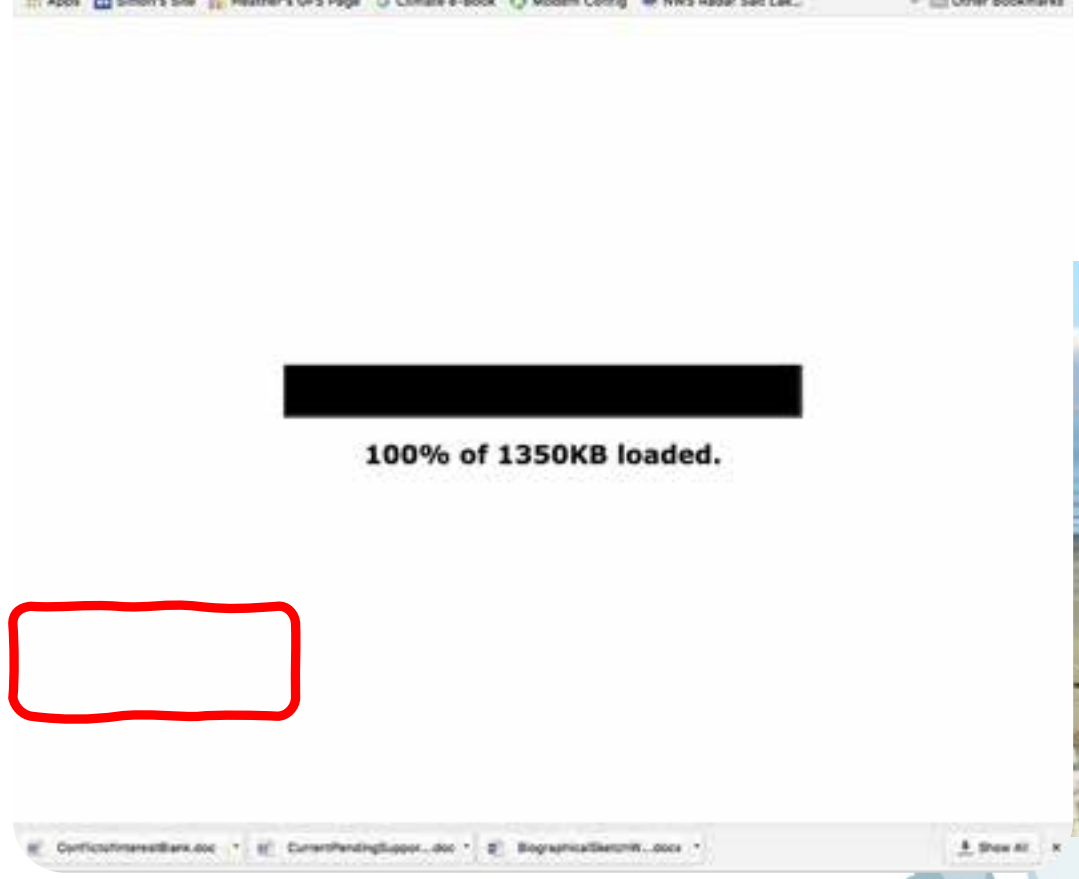
Baseflow (recharge)
Multiple years

Snowmelt and drying season (annual cycle)

The Great Salt Lake, Utah



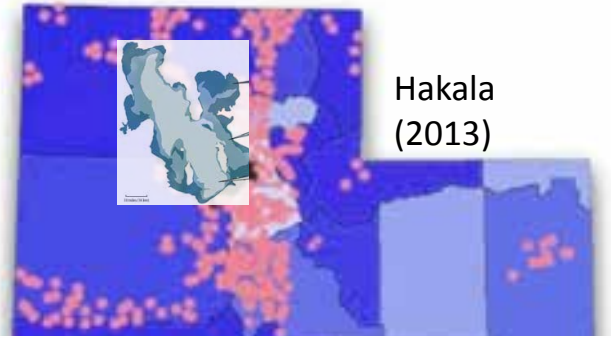
Baseflow


100% of 1350KB loaded.
10 miles (16 km)

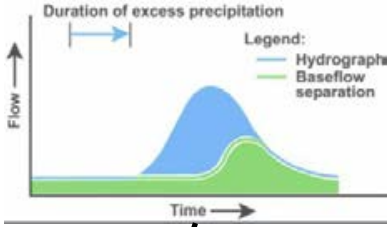

from snow to lake
BEACH ACCESS
SILVER SANDS BEACH

Utah Groundwater Dependence

(color = % dependence on groundwater for public supply

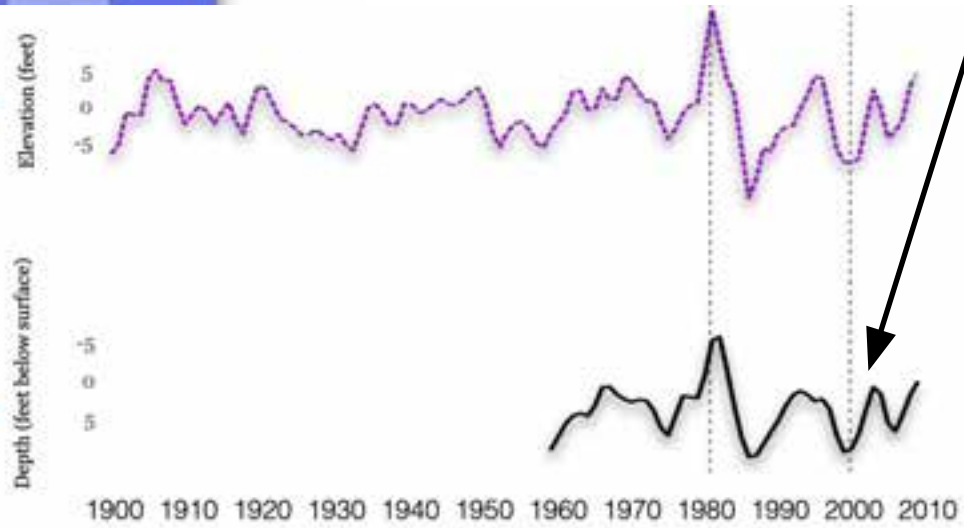


Hakala (2013)



Tendency (slope of original signal)

Tendency (slope of original signal)



Great Salt Lake level

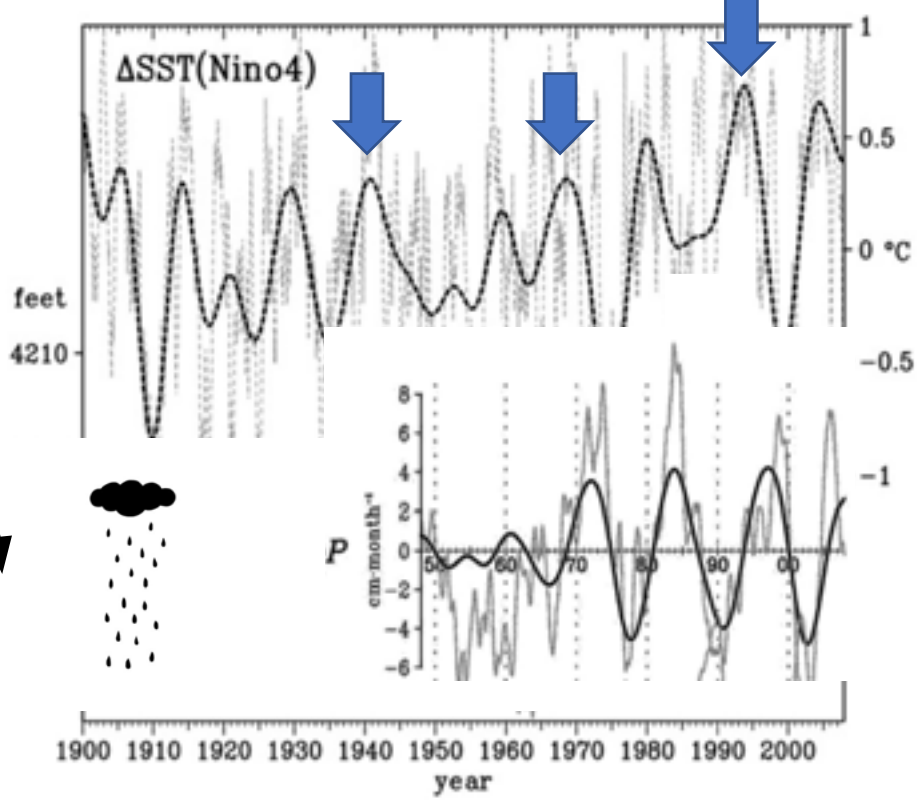
Groundwater over northern Utah

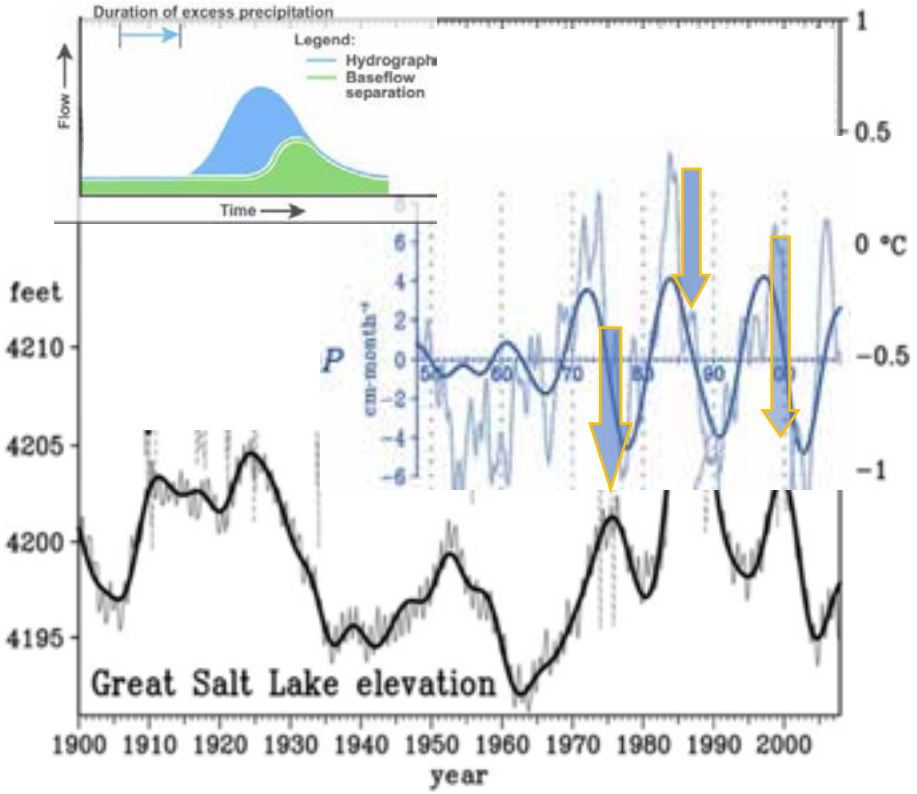
Location of observational groundwater wells

Finding the climate driver

Wang et al. (2010, JCLI)

“quasi-decadal oscillation”

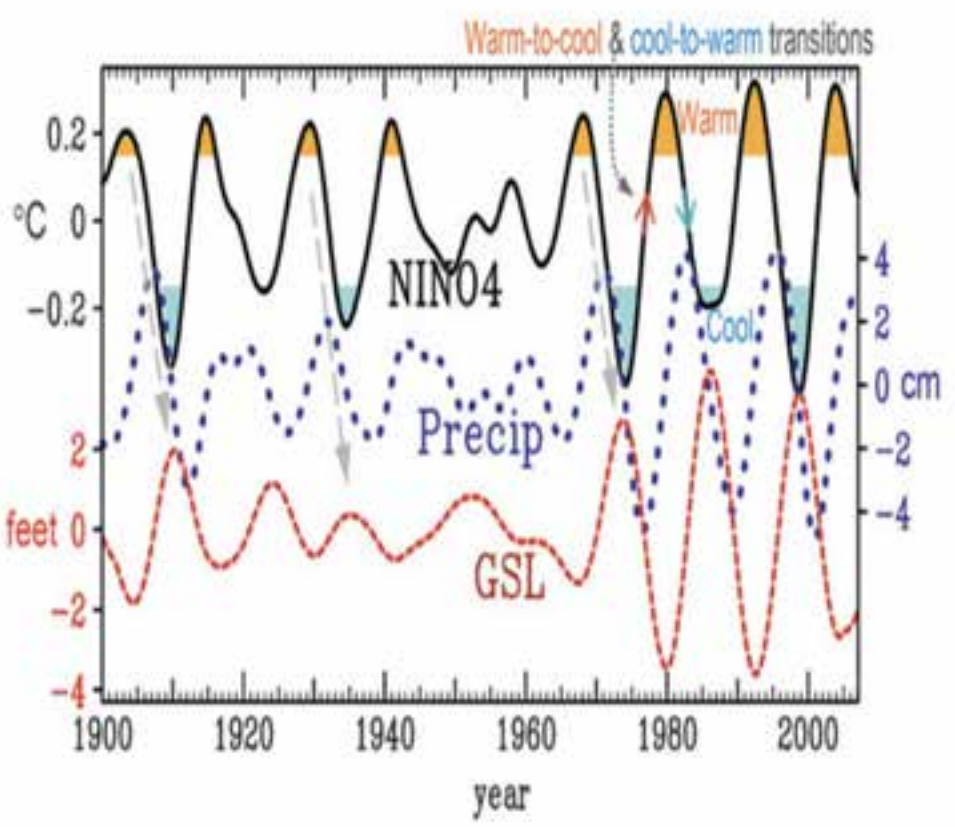



Duration of excess precipitation
Legend:
Hydrograph
Baseflow separation
Flow
Time
feet
4210
4205
4200
4195
P
cm-month
0 °C
−0.5
−1
Great Salt Lake elevation
1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000
year

2010

2011

2012



UtahStateUniversity

UTAH CLIMATE CENTER

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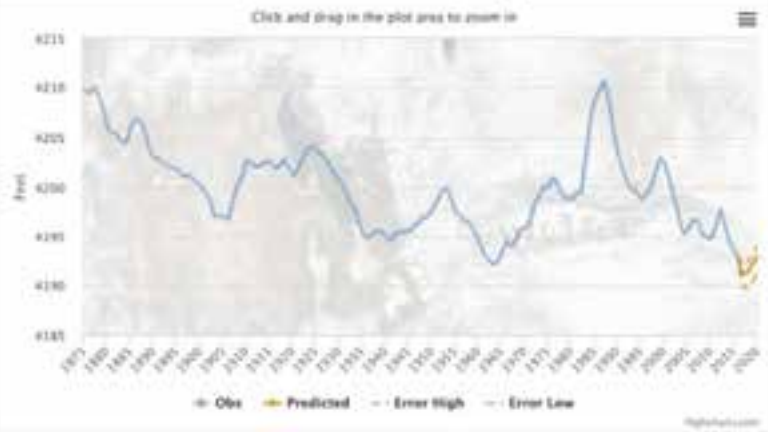
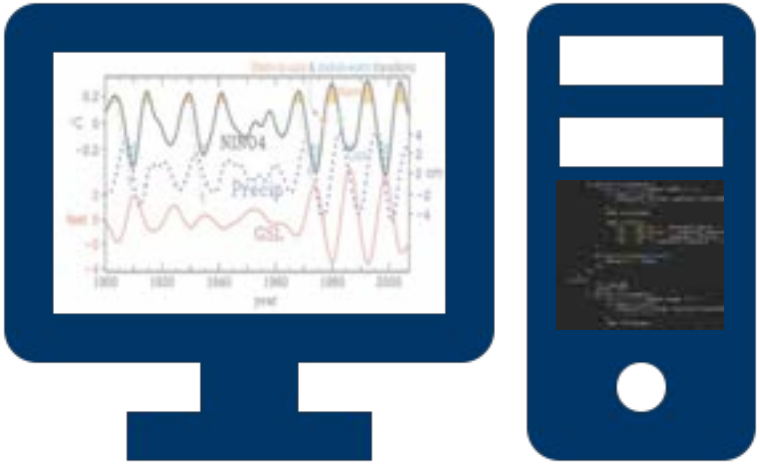
Great Salt Lake Annual Level Prediction

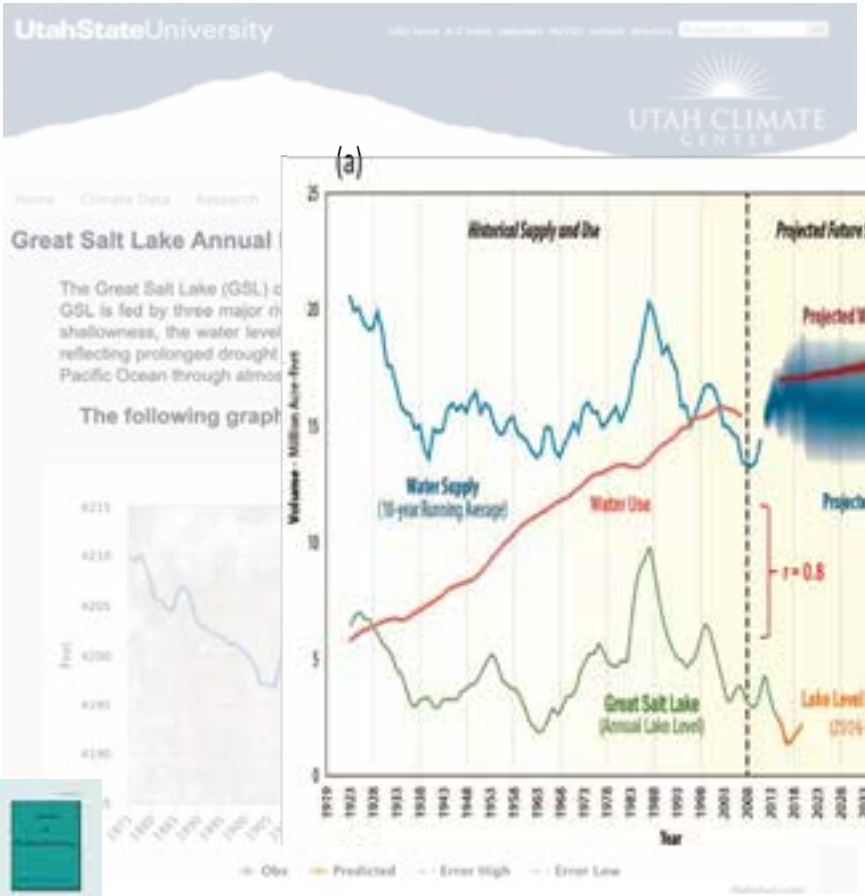
The Great Salt Lake (GSL) contributes an estimated $1.3 billion annually to Utah's economy. The GSL is fed by three major rivers from the Uinta Mountain range in northeastern Utah. Due to its shallowness, the water level can rise dramatically in wet years and fall during dry years, hence reflecting prolonged drought and wet periods. The lake level change is strongly modulated by the Pacific Ocean through atmospheric circulations that fluctuate at low frequency.

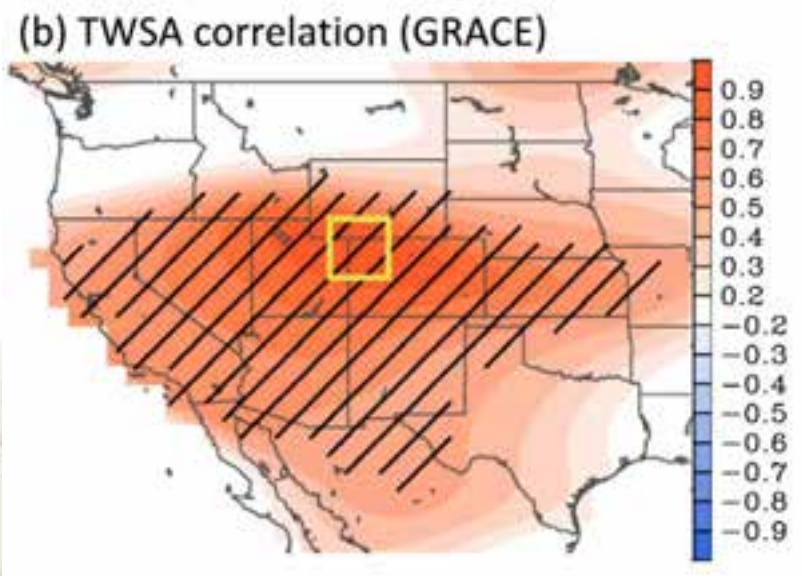
The following graph shows the observed annual lake level (blue) and predicted lake level (orange).



Toggle Years: 60 Years 30 Years 10 Years

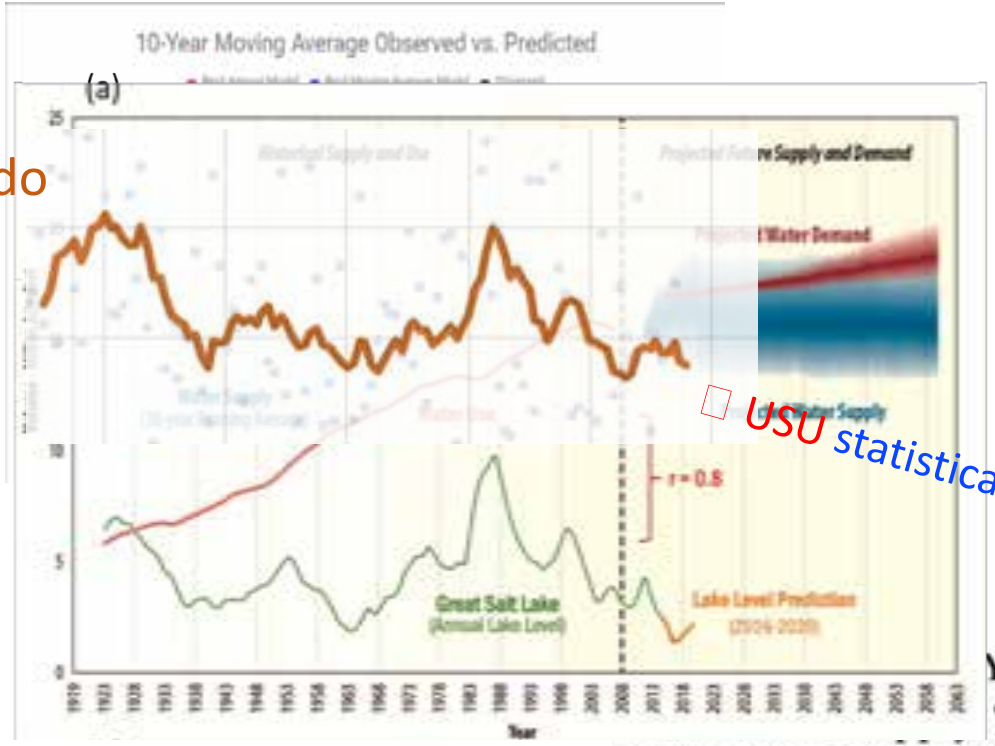






Wang, S.-Y., (2018) *Journal of Hydrometeorology*

Colorado River Water Supply



USU statistical models

MDPI

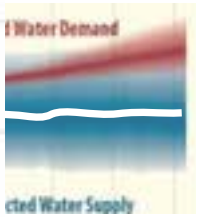
Year Forecast for the Colorado
Time Series Modeling

Brian Plucinski [1], Yan Sun [1], S.-Y. Simon Wang [2,*], Robert R. Gillies [2], James Eklund [3] and C.-C. Wang [4]

[1] Department of Mathematics and Statistics, Utah State University, Logan, UT
[2] Department of Plants, Soils & Climate, Utah State University/Utah Climate Center, Logan, UT

Colorado River Water Supply

2020



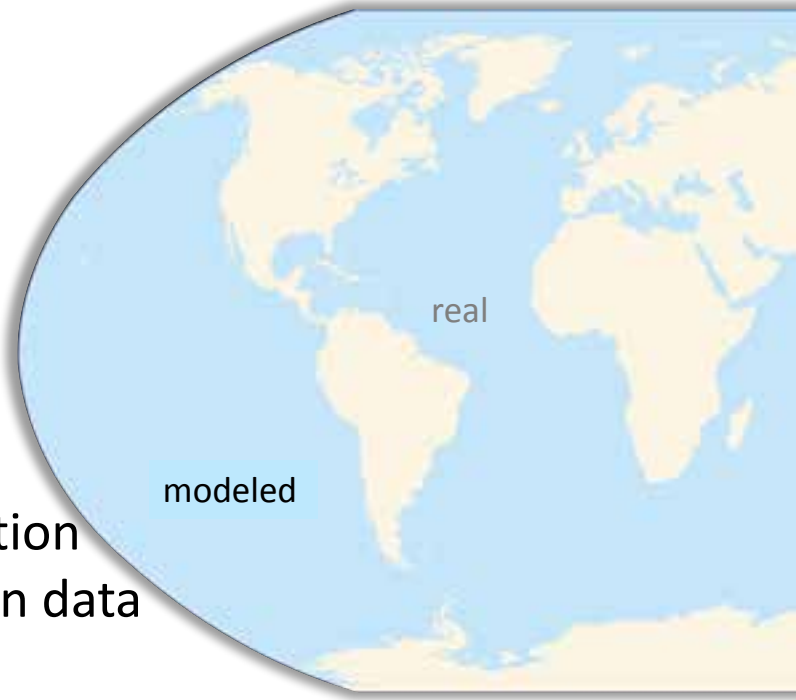
Climate downscaling

statistical models

NEXT STEP:

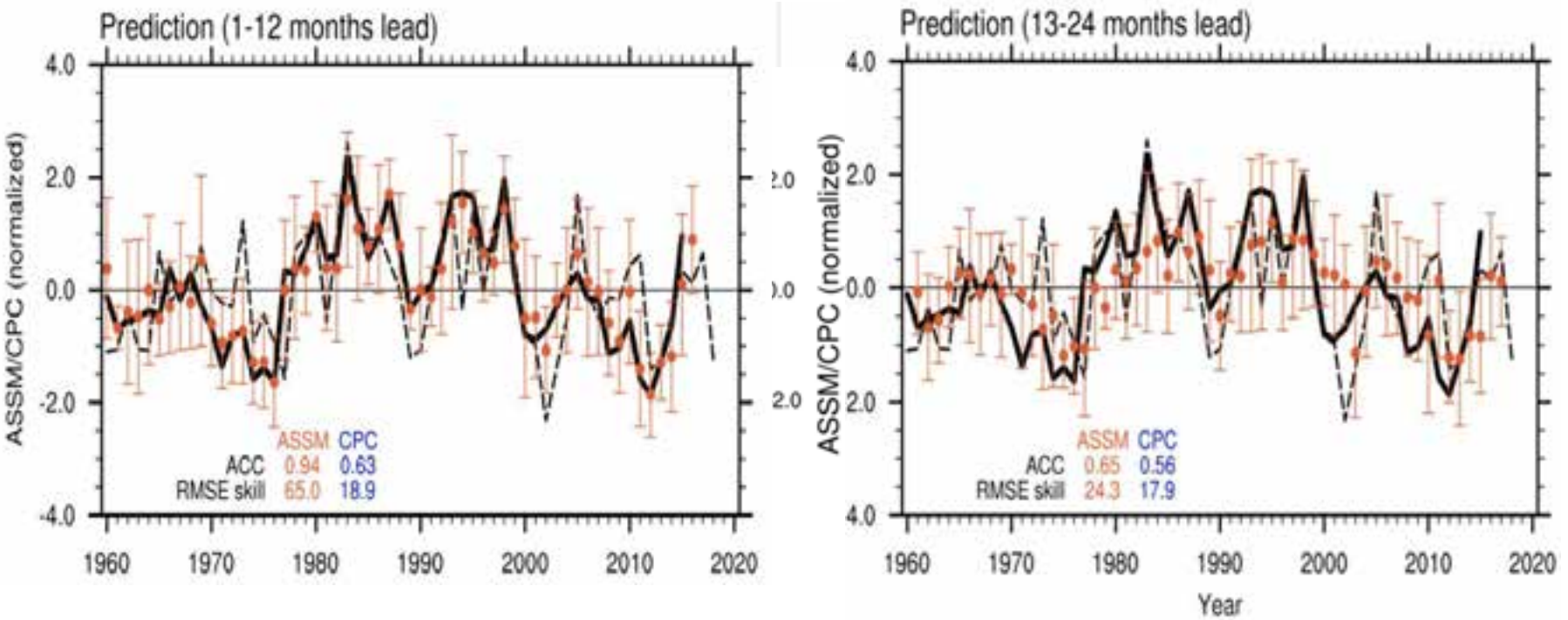
Colorado River Water Supply

Decadal prediction via partial ocean data assimilation



- Soil moisture's low-pass filtering

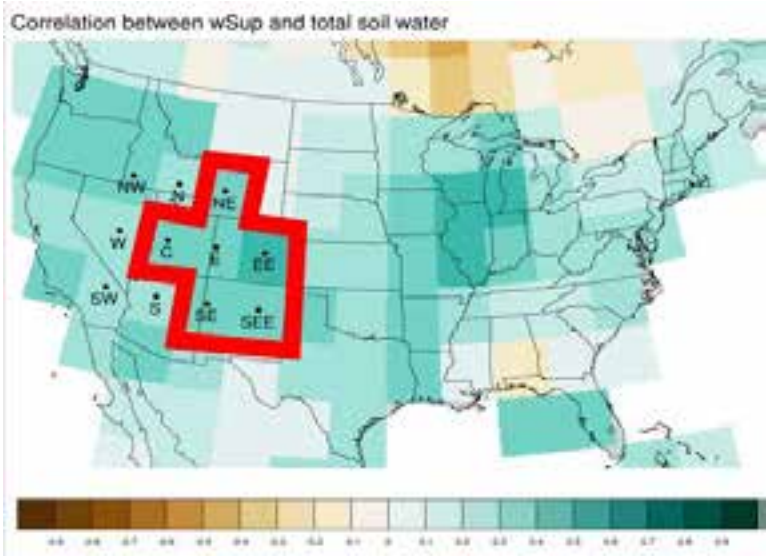
Prediction evaluation:



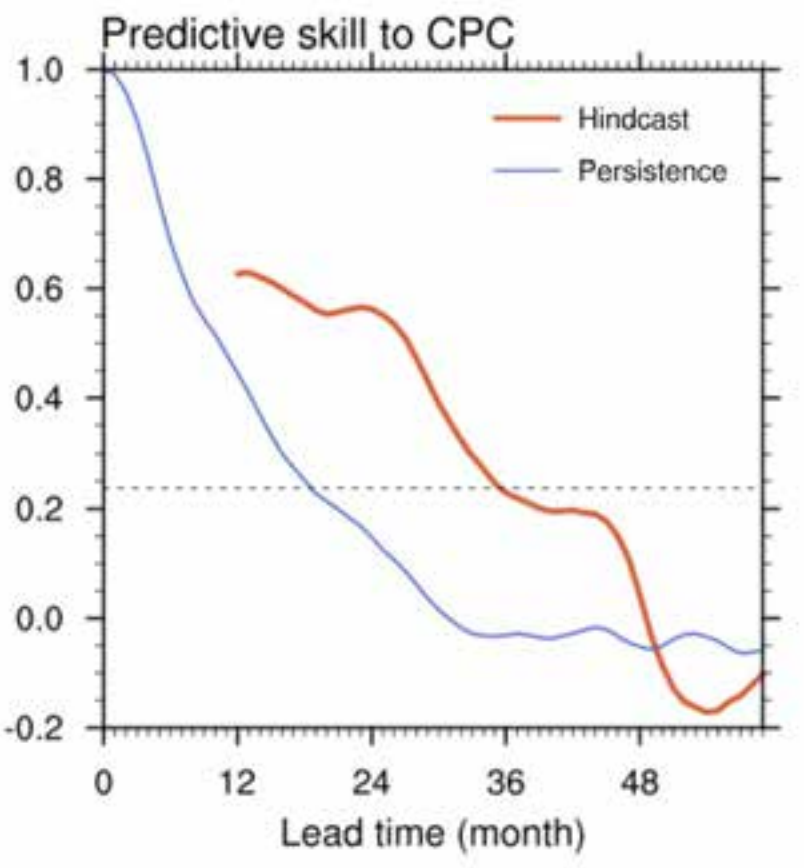
Soil moisture

Chikamoto et al. (2020)

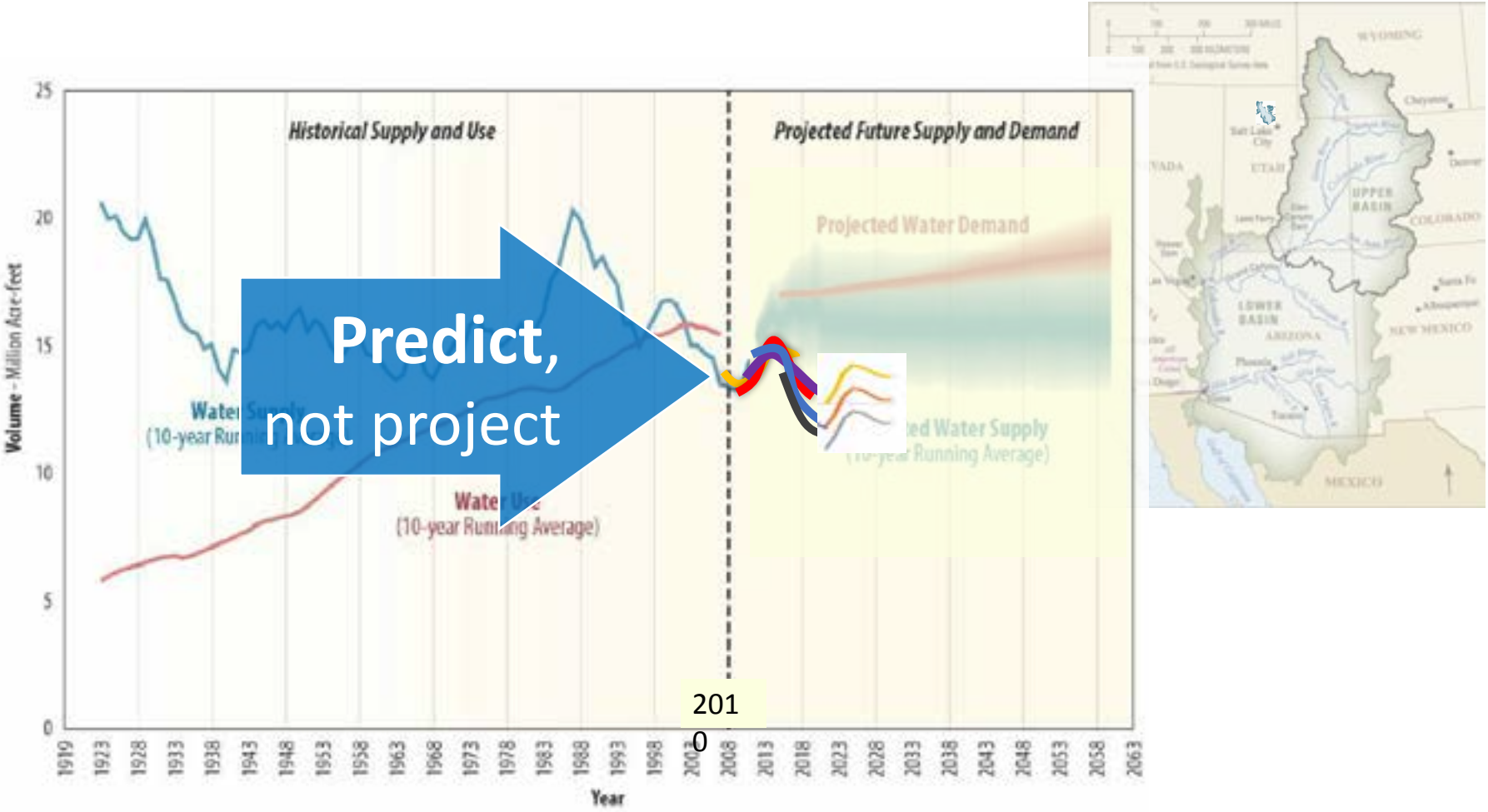
Prediction evaluation:



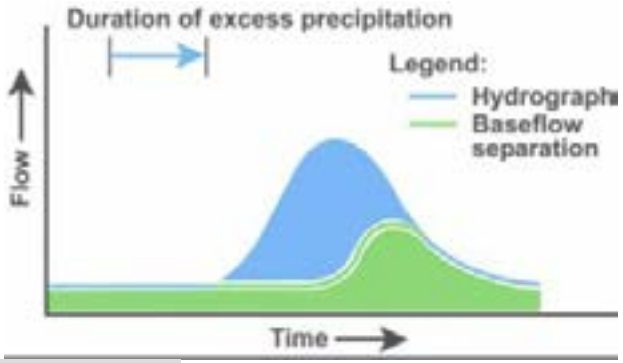
Soil moisture



Chikamoto et al. (2020)

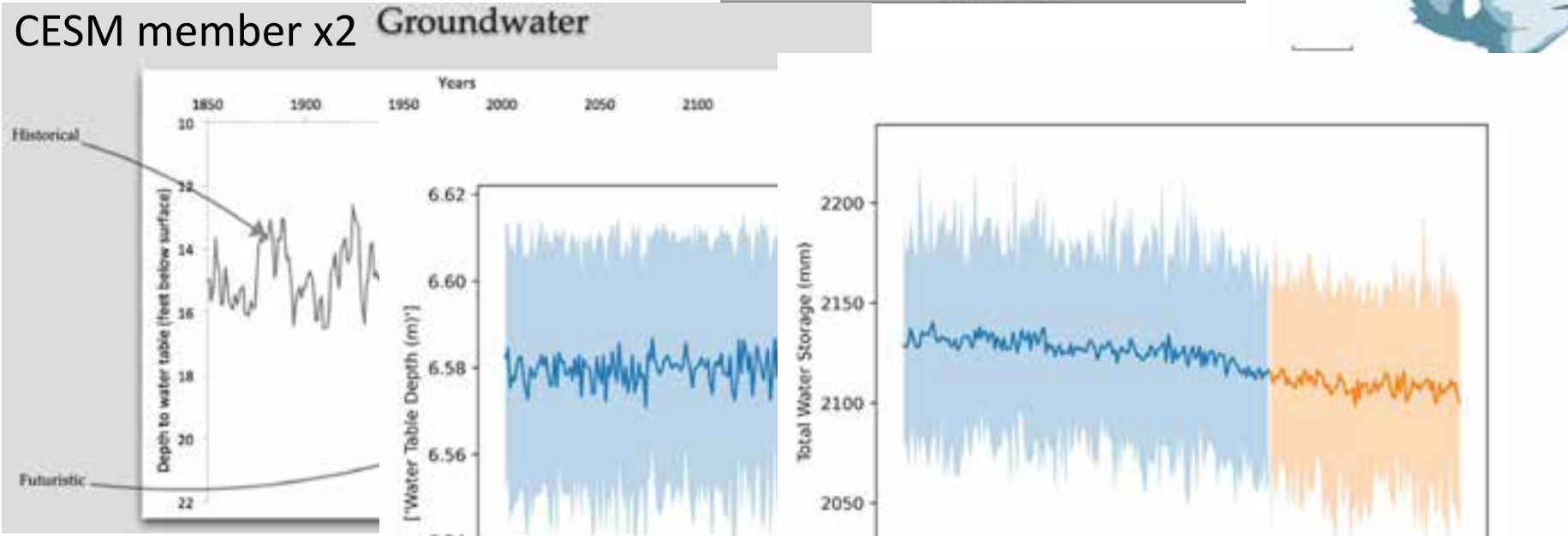

Historical Supply and Use
Projected Future Supply and Demand
Projected Water Demand
Predict,
not project
Volume - Million Acre-feet
Year
2010
25
20
15
10
5
0
1919
1923
1928
1933
1938
1943
1948
1953
1958
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
2018
2023
2028
2033
2038
2043
2048
2053
2058
2063

Baseflow & Groundwater



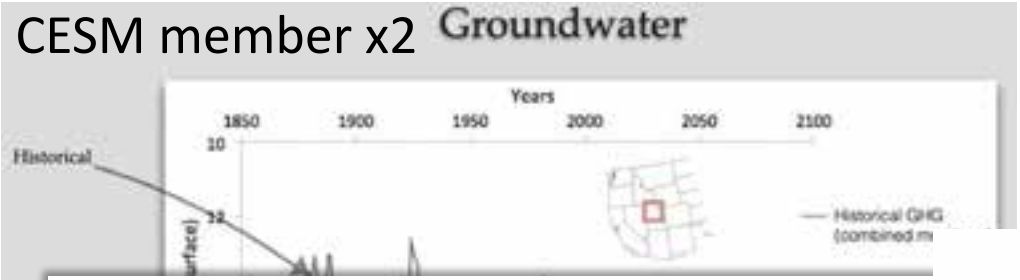
Hakala (2013)

CESM member x2



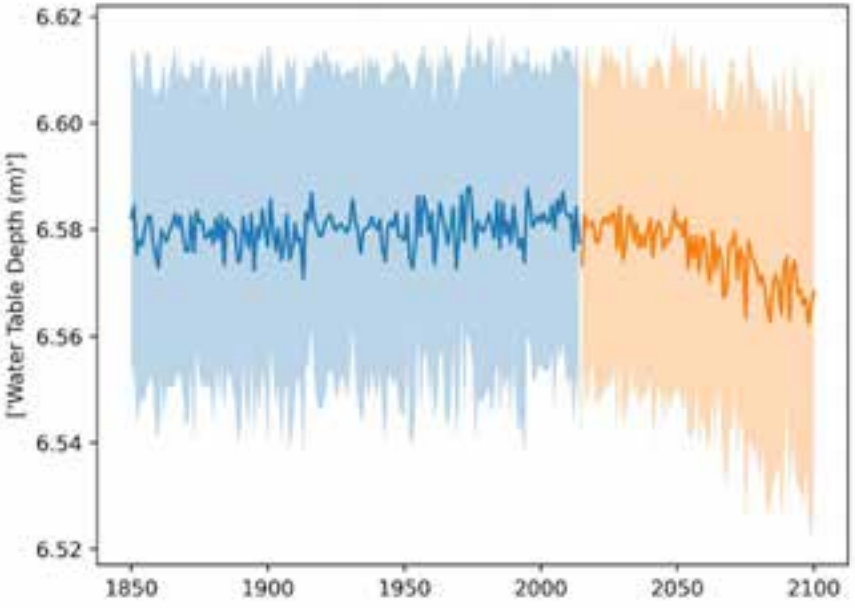
Hakala (2013)

CESM member x2

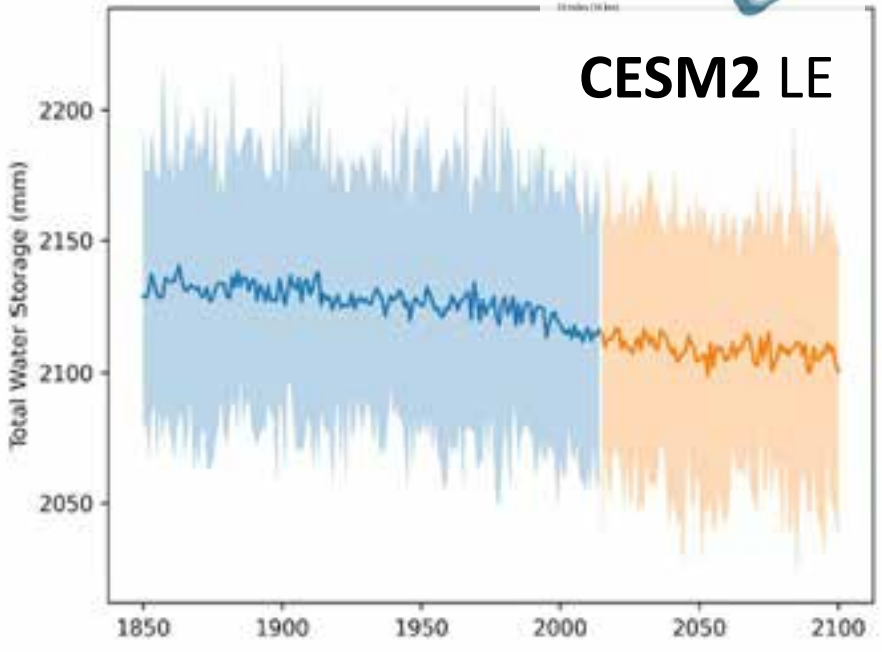


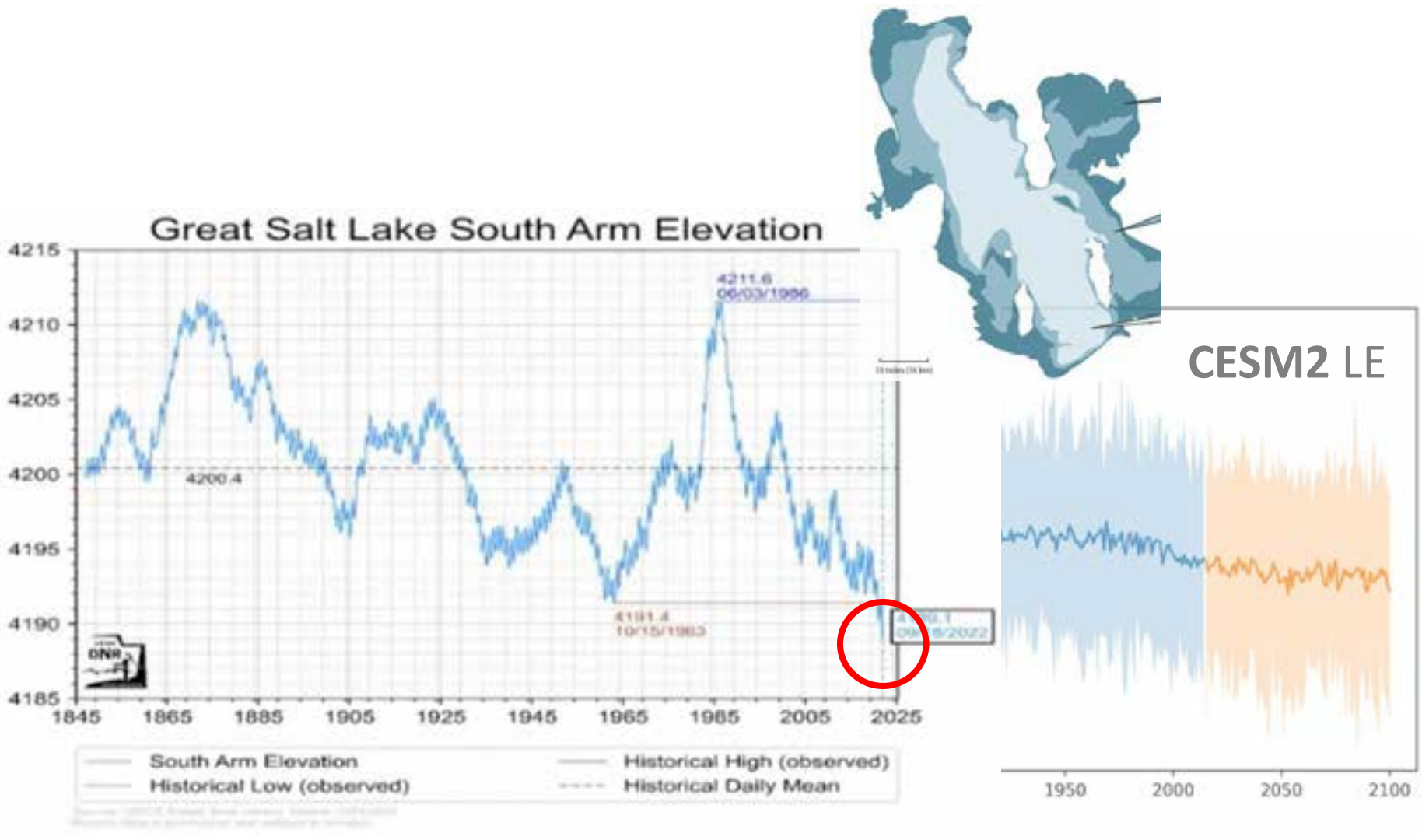
Water Storage Projection

CESM1 LE



CESM2 LE




Great Salt Lake South Arm Elevation
4215
4210
4205
4200
4195
4190
4185
1845
1865
1885
1905
1925
1945
1965
1985
2005
2025
4211.6
06/03/1996
4200.4
4181.4
10/15/1983
South Arm Elevation
Historical Low (observed)
Historical High (observed)
Historical Daily Mean
CESM2 LE
1950
2000
2050
2100