

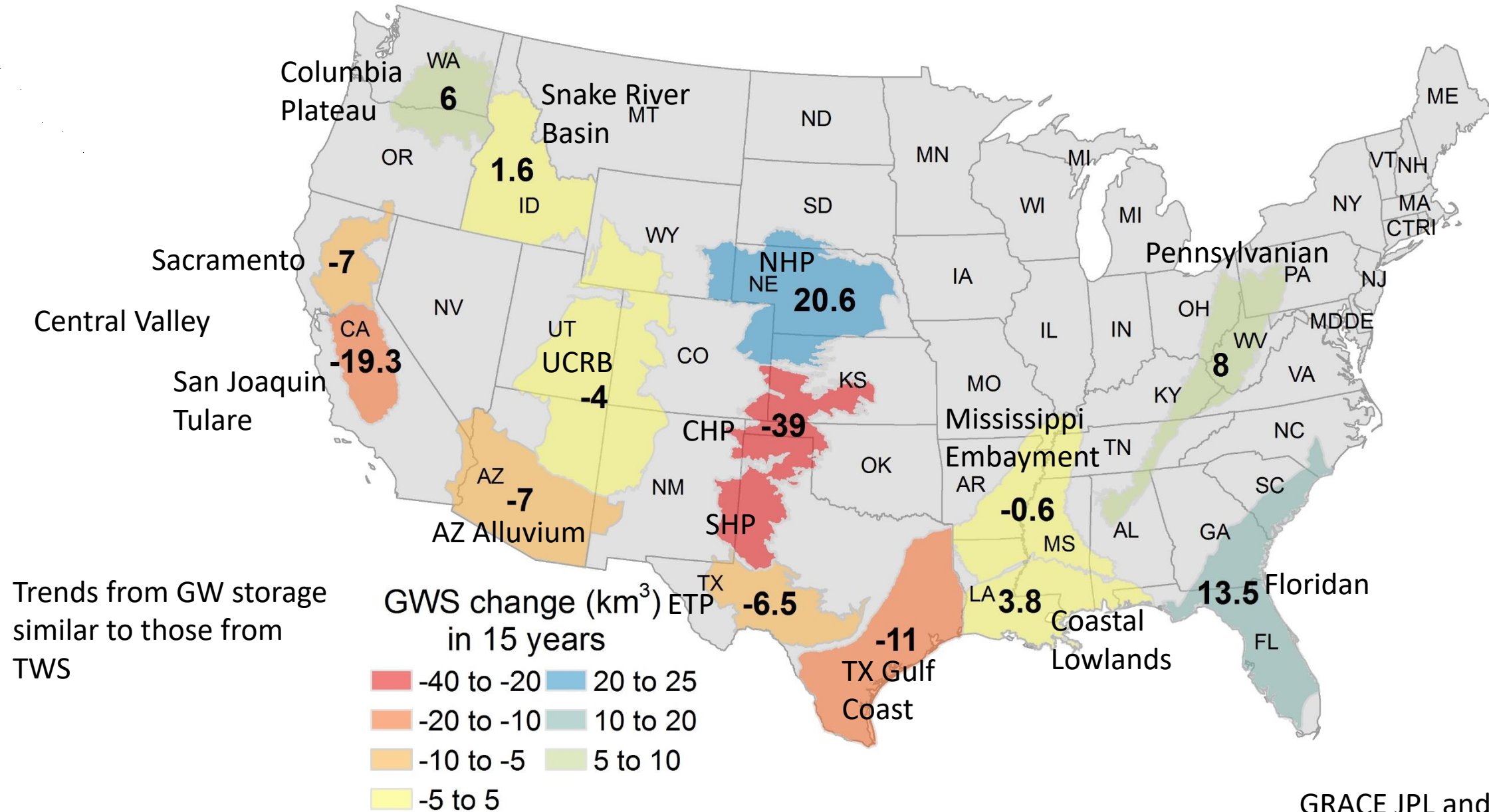
Using GRACE Satellites to Estimate Impacts of Climate and Irrigation on Water Storage Changes in Major U.S. Aquifers



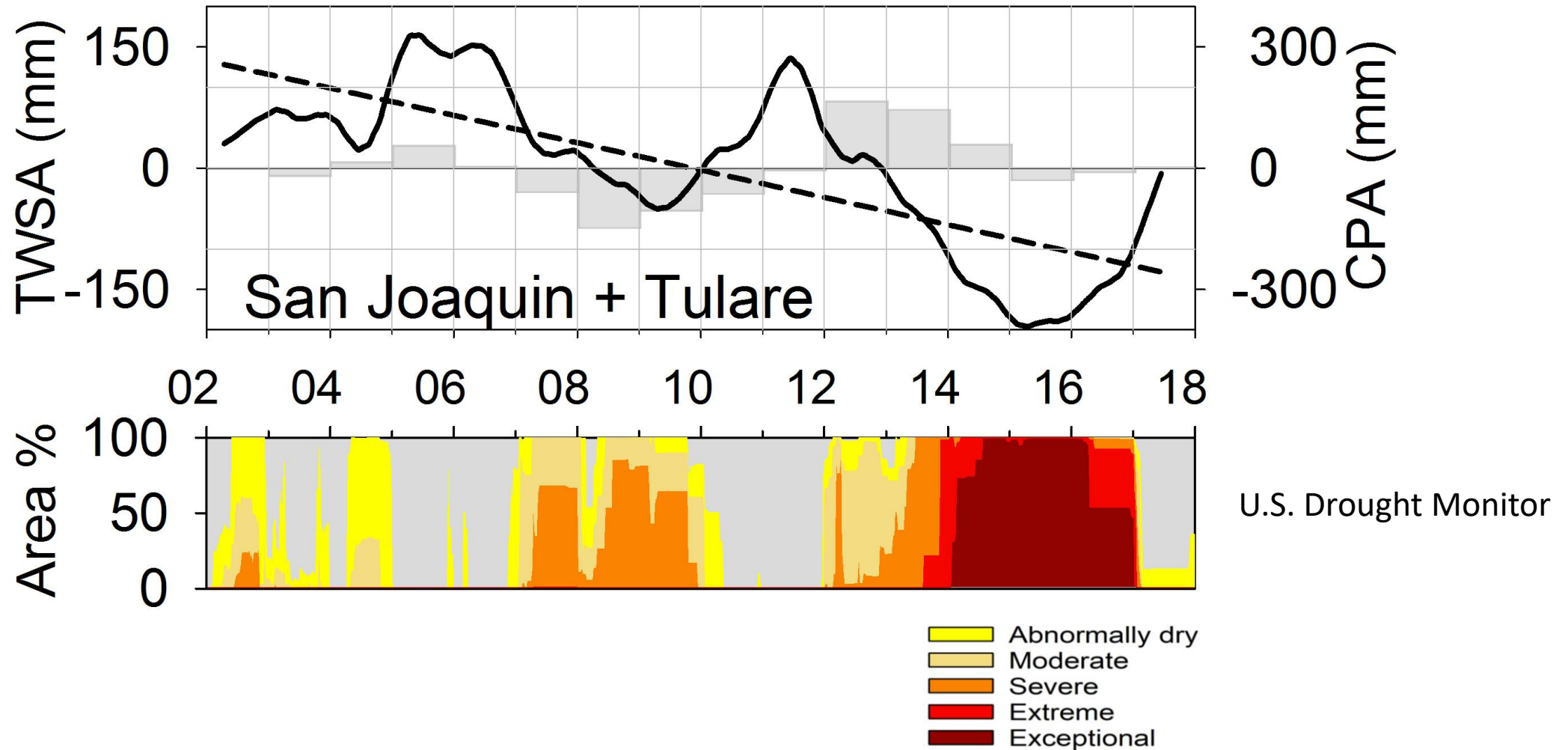
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GRACE Trends in Groundwater Storage (2002 – 2017)

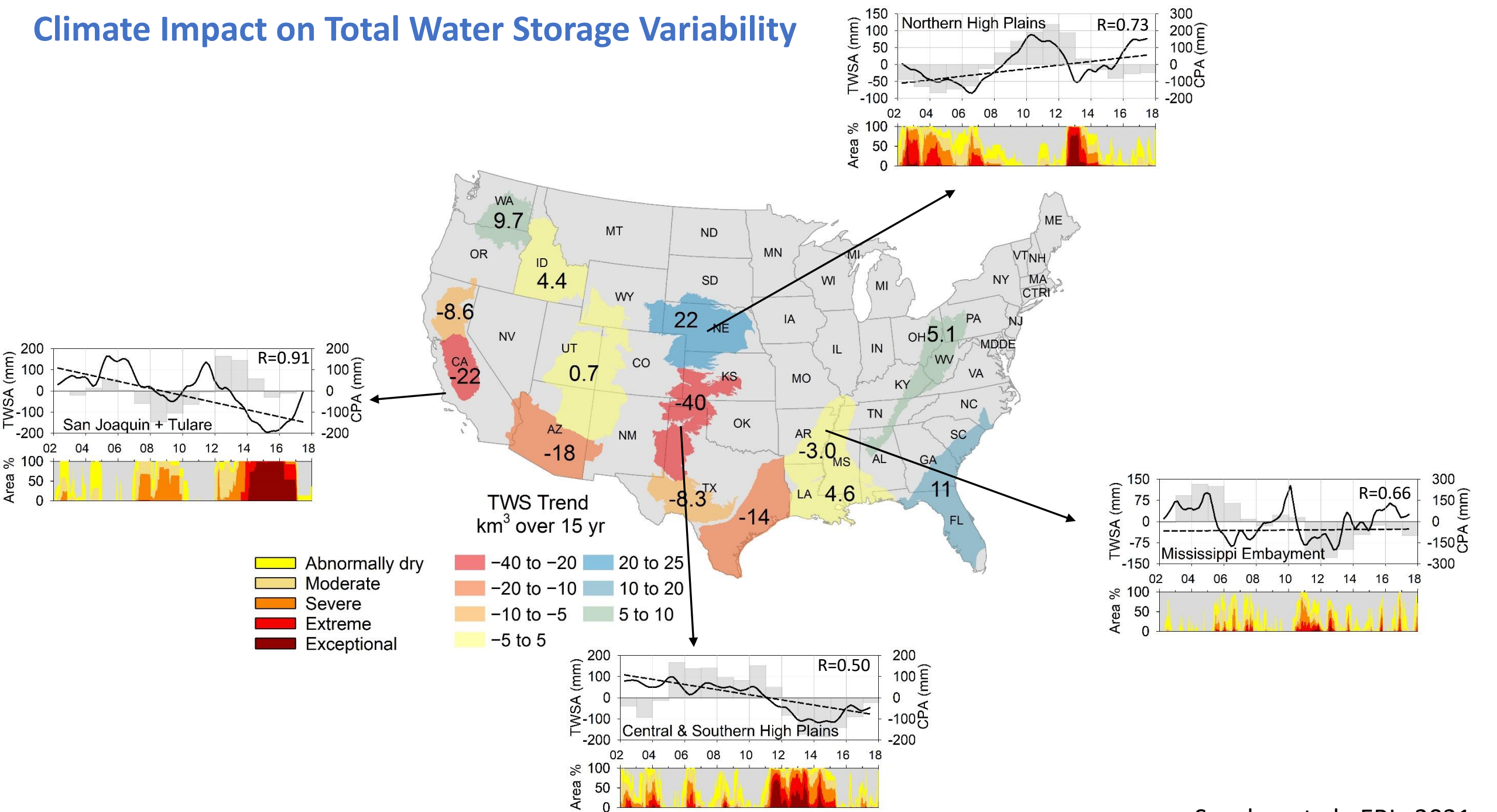


Climate Impact on Total Water Storage Variations

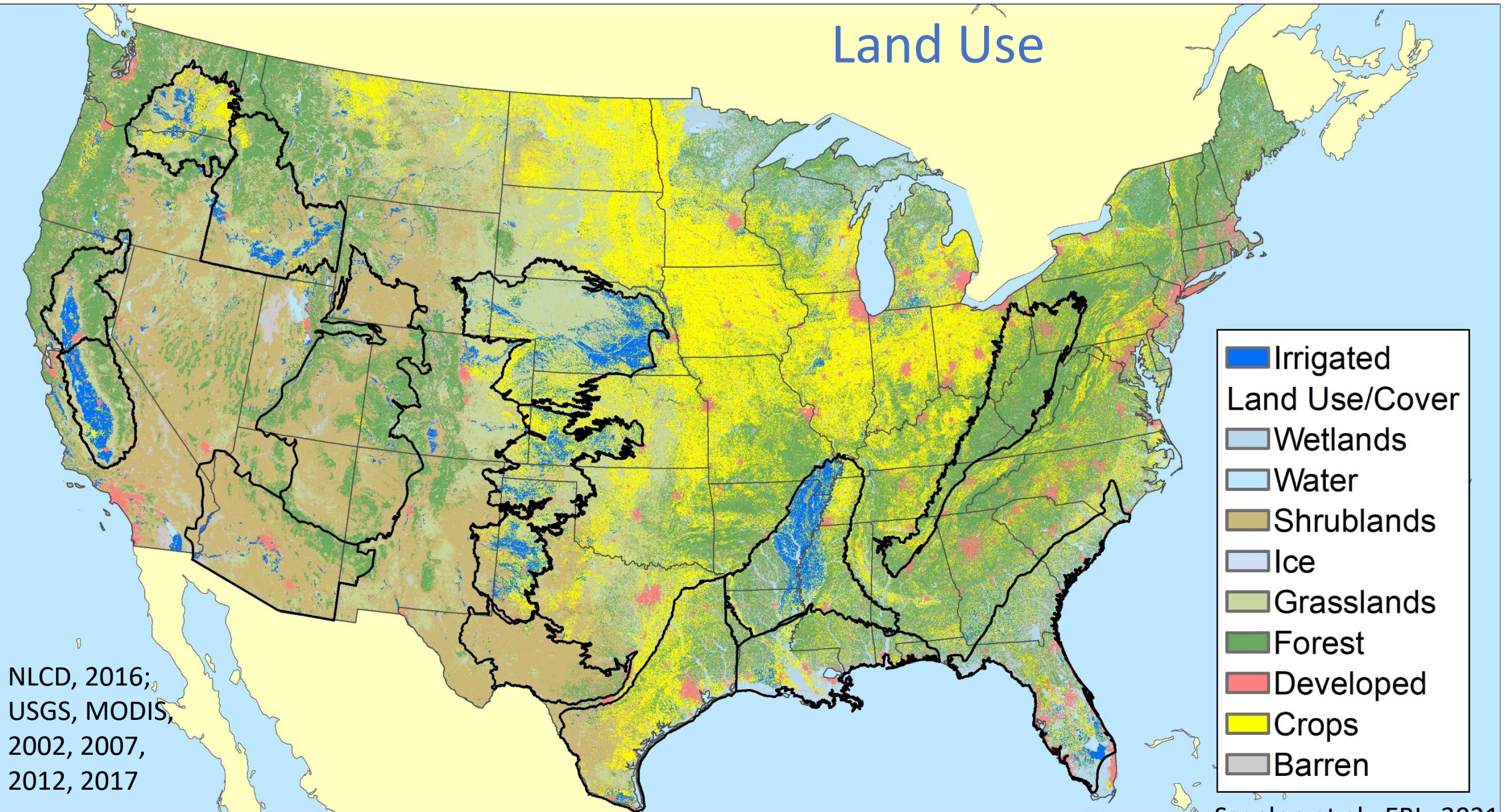


Correlation between GRACE TWS variations and the US Drought Monitor 0.91

Climate Impact on Total Water Storage Variability



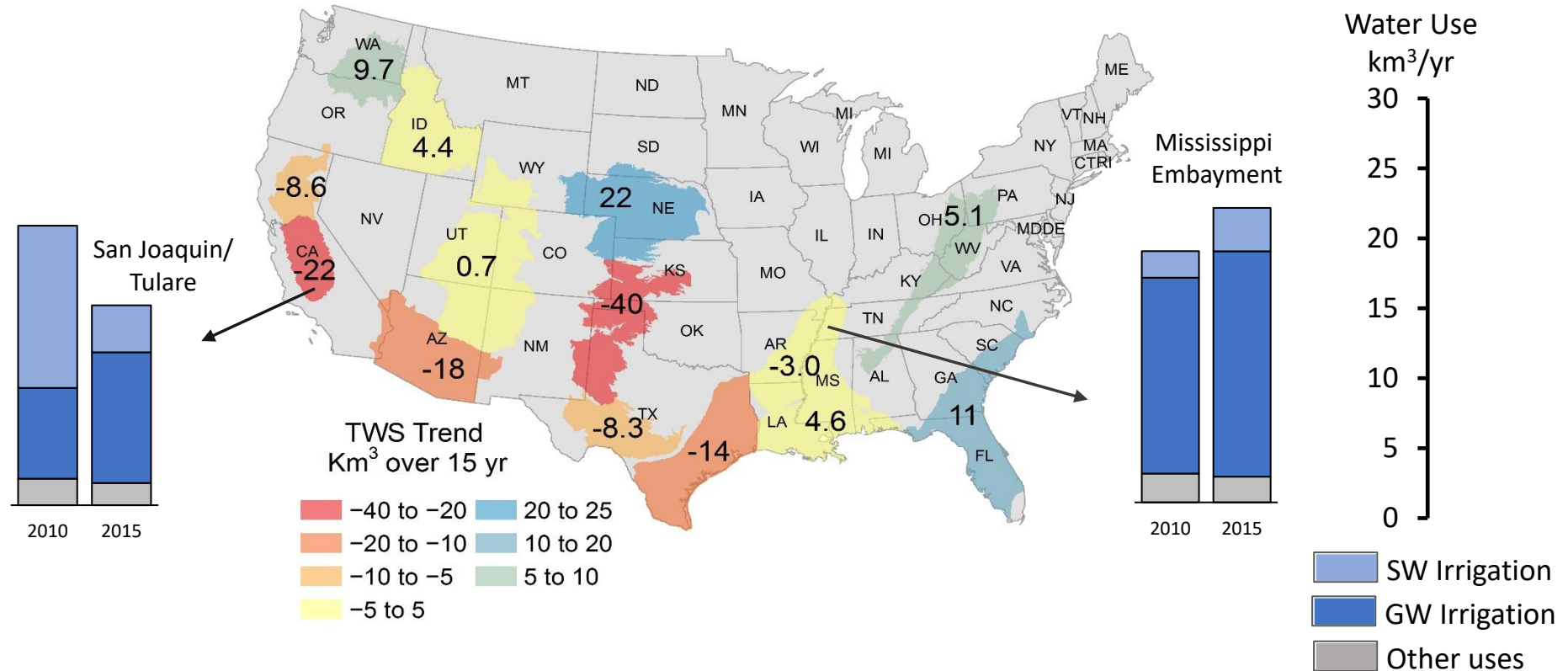
Land Use



NLCD, 2016;
USGS, MODIS,
2002, 2007,
2012, 2017

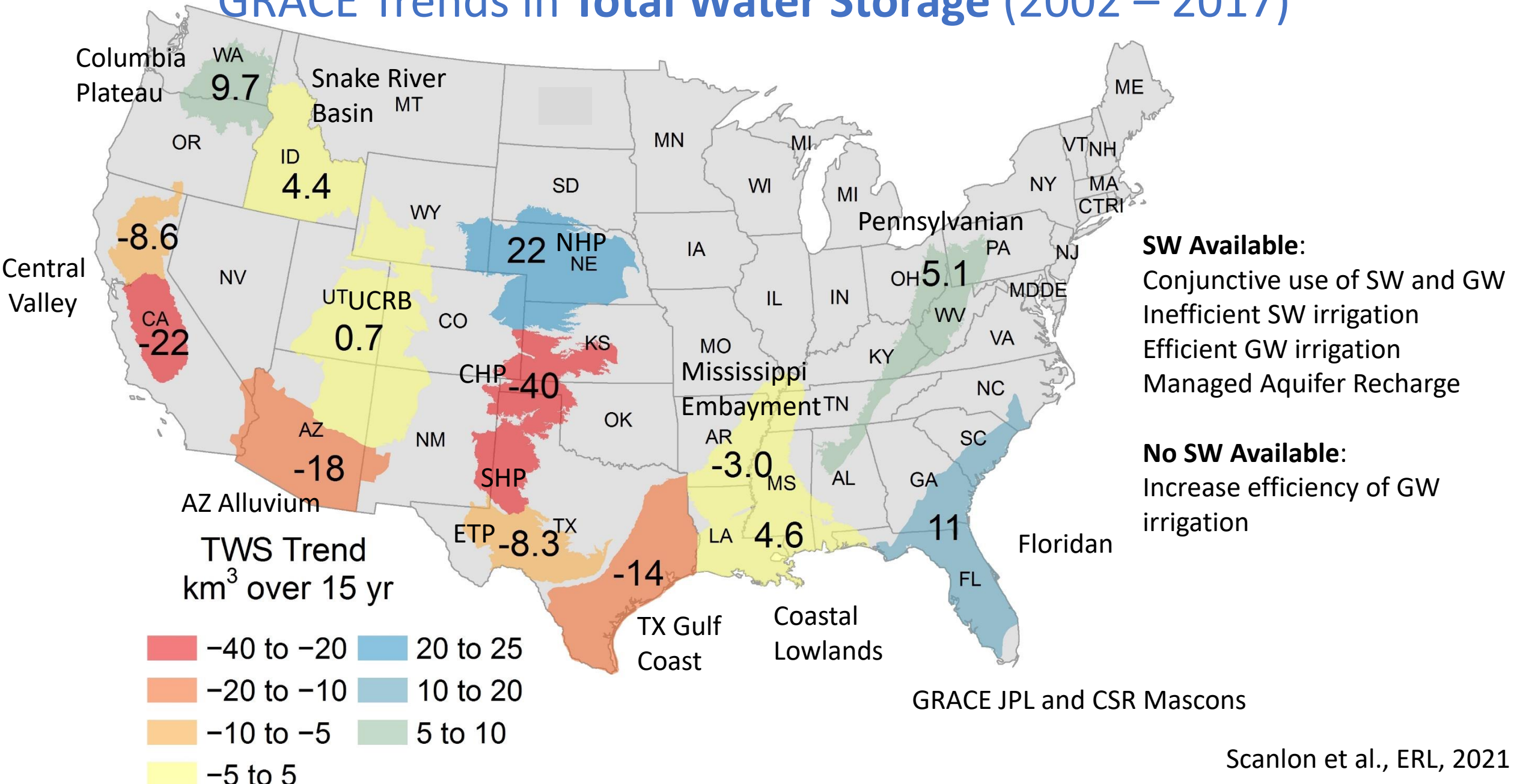
Human Intervention

Irrigation



Approaches toward more Sustainable Management

GRACE Trends in Total Water Storage (2002 – 2017)



Summary

1. How is total water storage changing in U.S. aquifers? (↑, ↓, →)

GW storage declining in southwest and southcentral U.S. but stable or rising elsewhere, interannual variability dominant

2. What is causing changes in water storage? Climate? Human intervention?

Drought amplified by GW irrigation in southwest and southcentral U.S., lower drought intensity in the humid E U.S.

USGS Powell Research Study

Collaboration among USGS, NASA, and academia



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