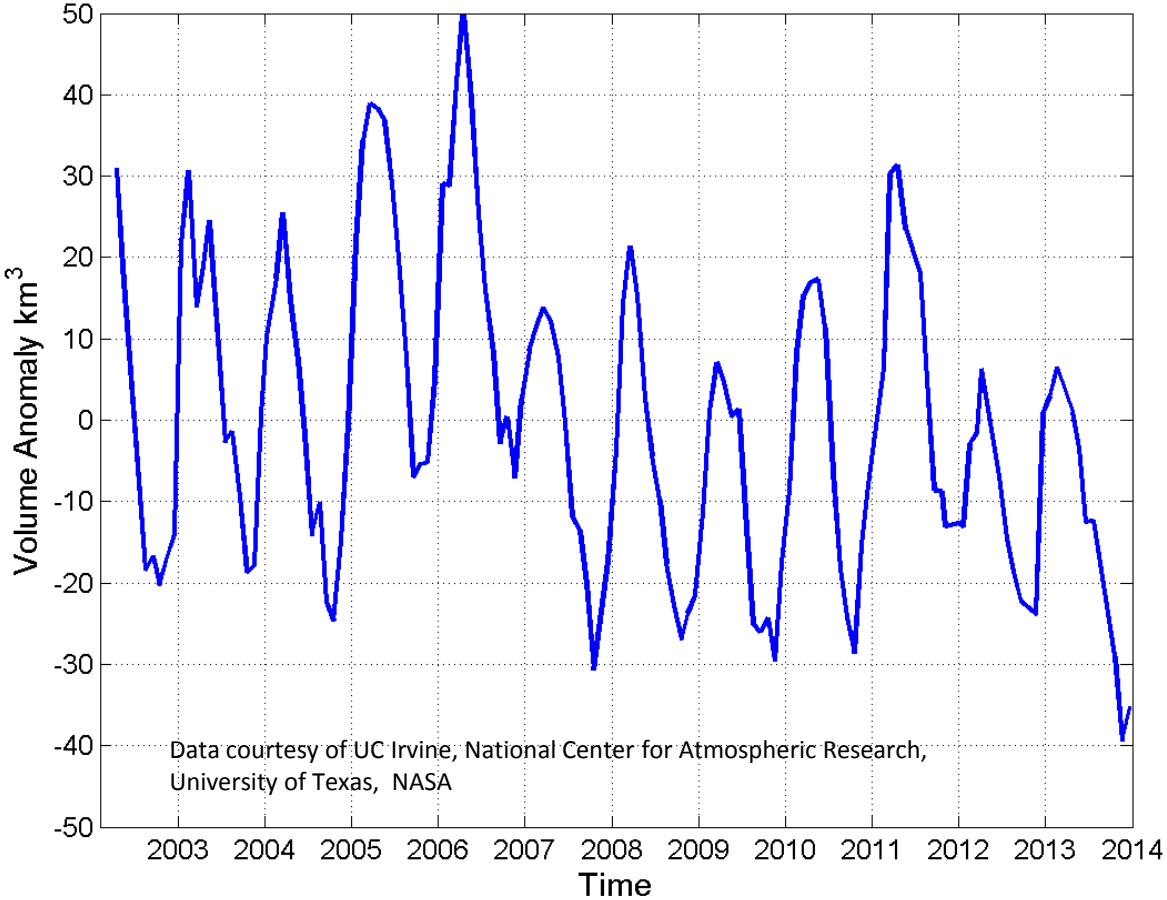
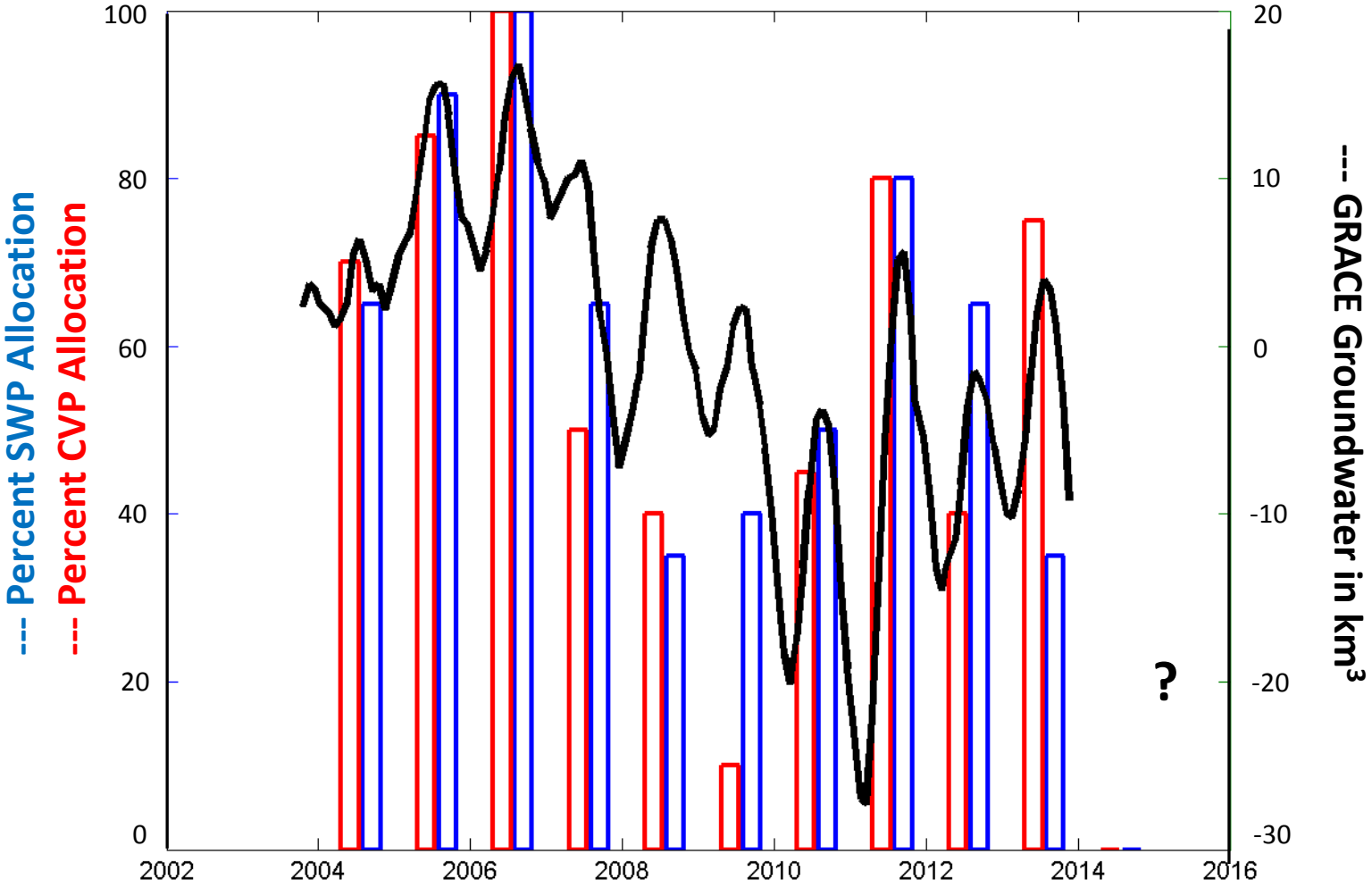
Total Water Storage Changes in the Sacramento-San Joaquin River Basins from the NASA GRACE Satellite Mission for March 2002- December 2013

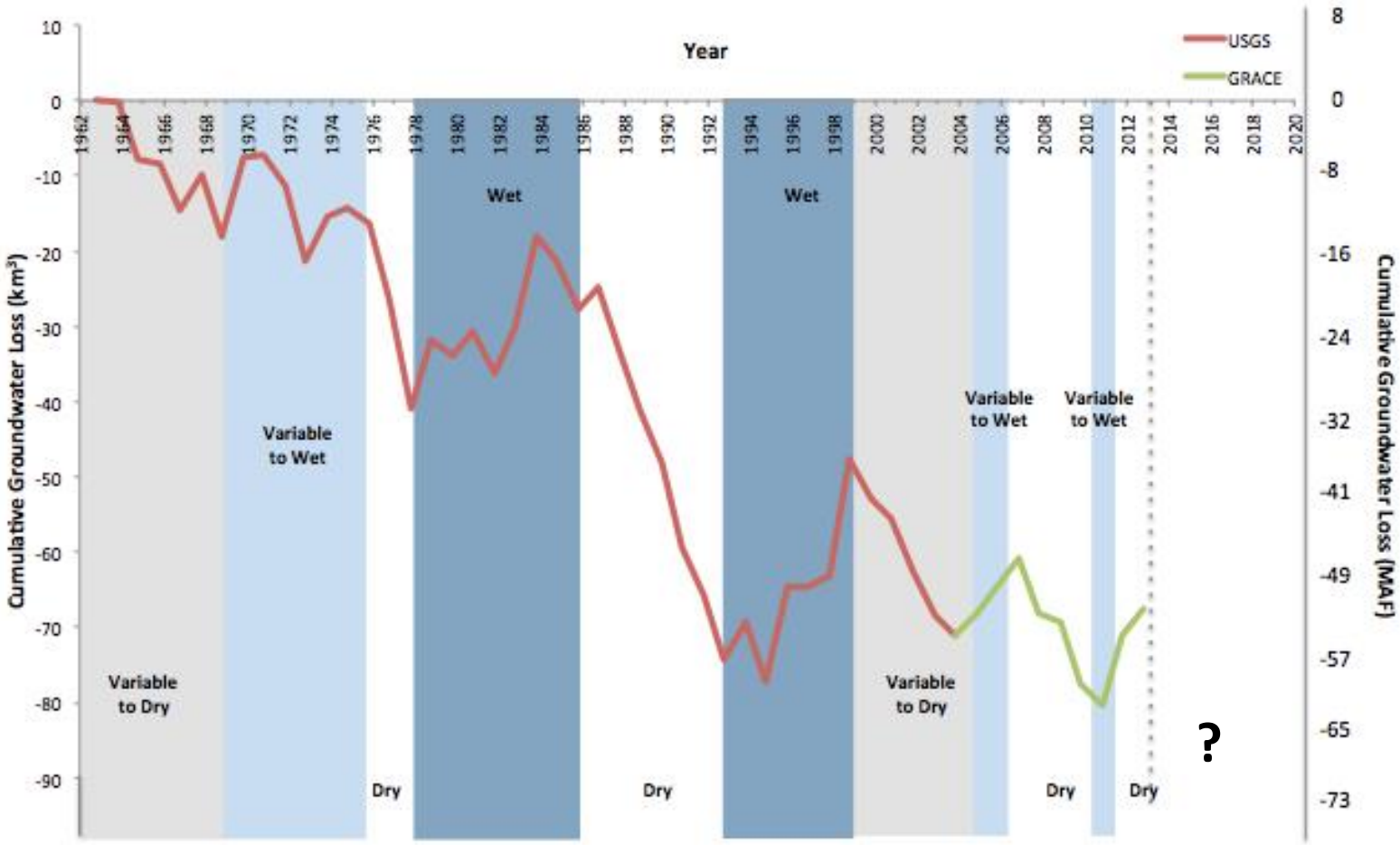


- Monthly changes in all of the snow, river and reservoir storage, soil water and groundwater combined.
- Lowest point since March 2002 is December 2013
- Decline over last 2 years of 25 km^3
- Longer term drought going back to 2006?

Central Valley groundwater depletion from GRACE
Surface water allocations and groundwater use are closely connected



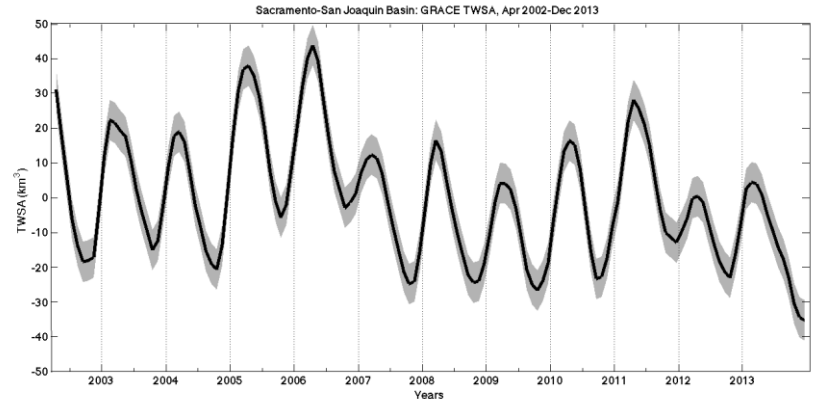
Cumulative Groundwater Depletion in California's Central Valley from USGS and GRACE



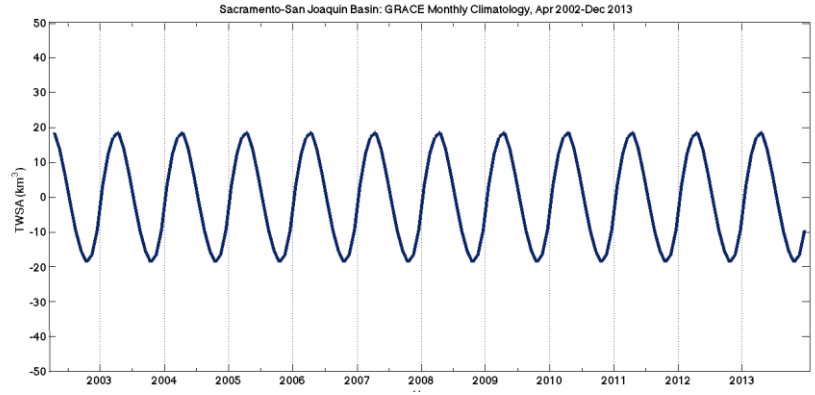
UCCHM, 2014

An example of water cycle change from GRACE
Increasing extremes in California

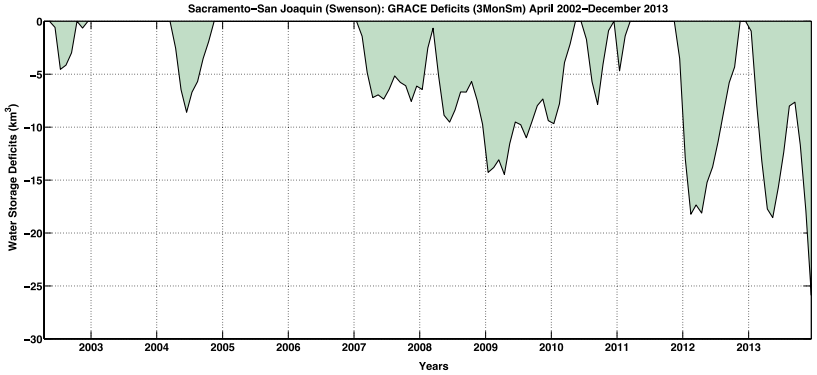
Monthly changes in total water storage



Average changes in total water storage



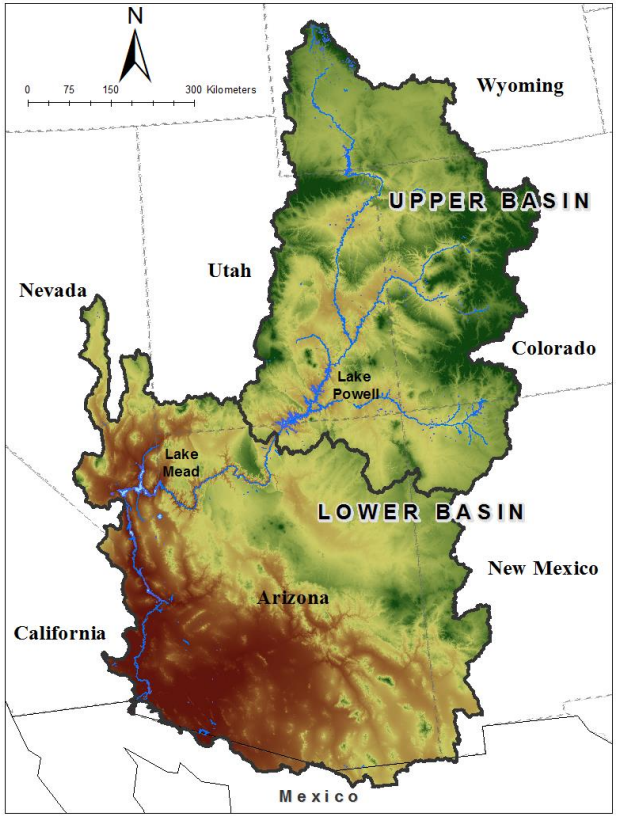
Negative deviations from average water storage conditons

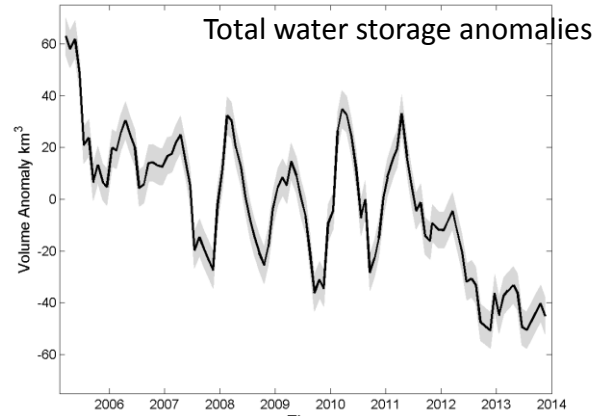


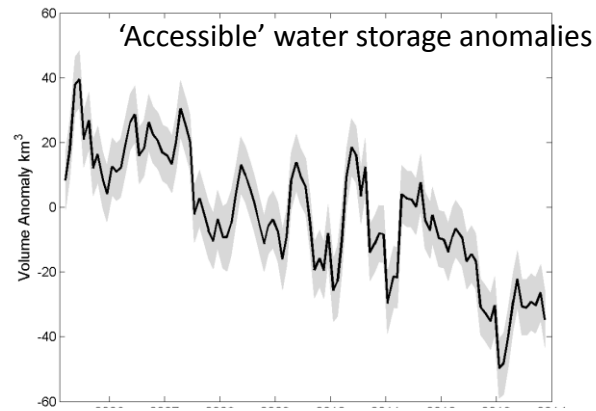
Thomas et al., 2014

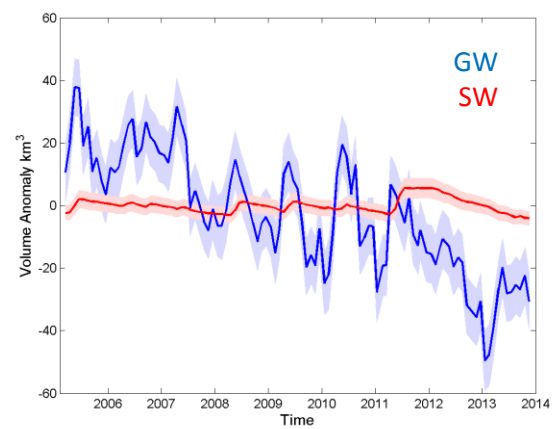
Estimating groundwater storage changes with GRACE

Colorado River Basin



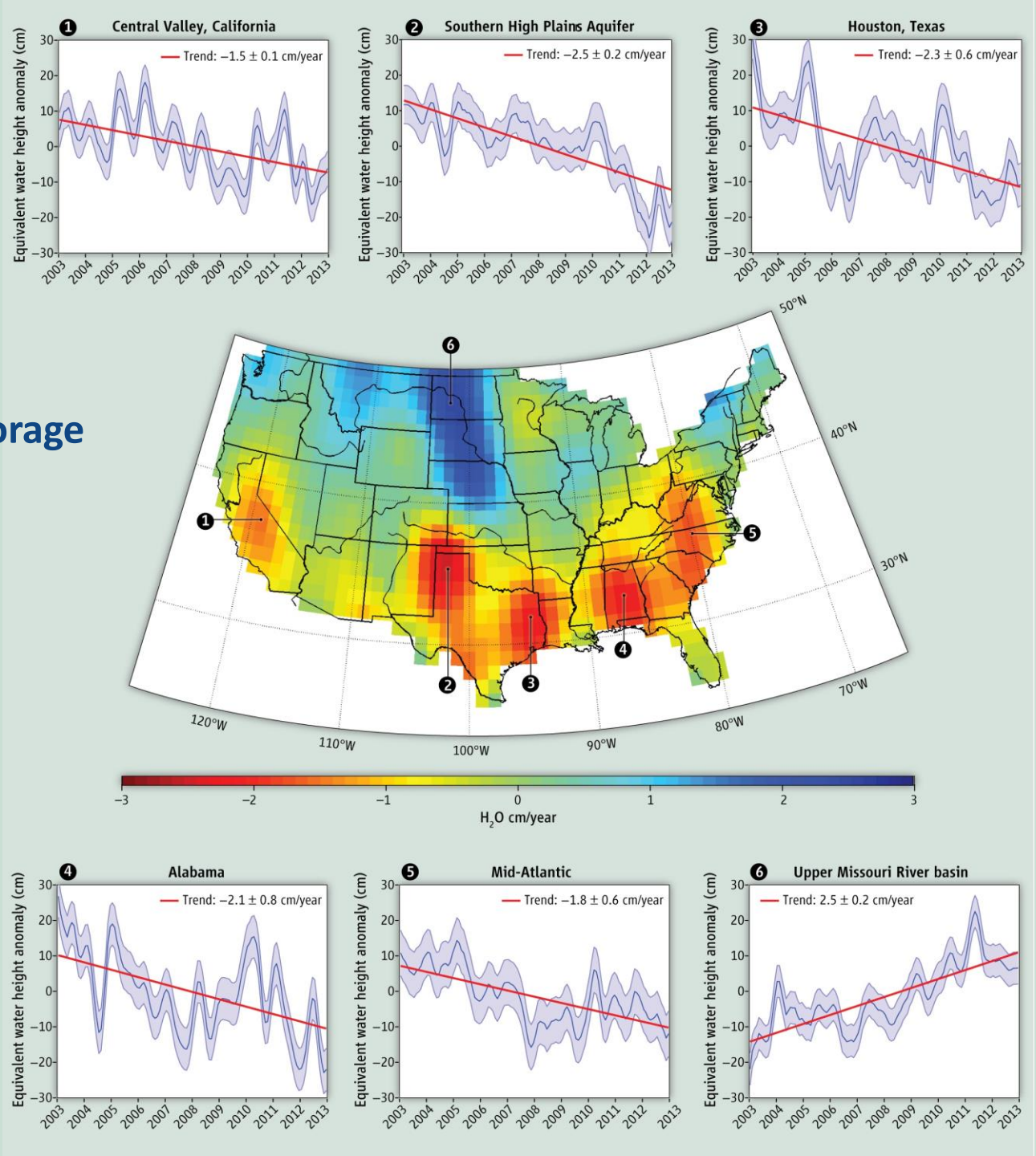






Castle et al., 2014, in prep

Trends in Freshwater Storage from GRACE, 2003-2012



Famiglietti and Rodell, 2013

I PLEDGE TO
SAVE water BY
not taking
a bath
'til
next SUMMER