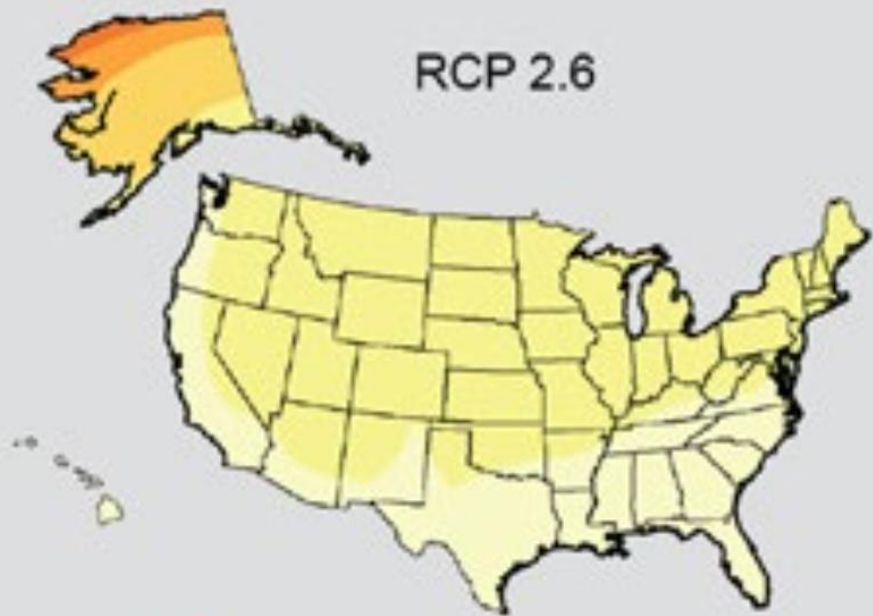
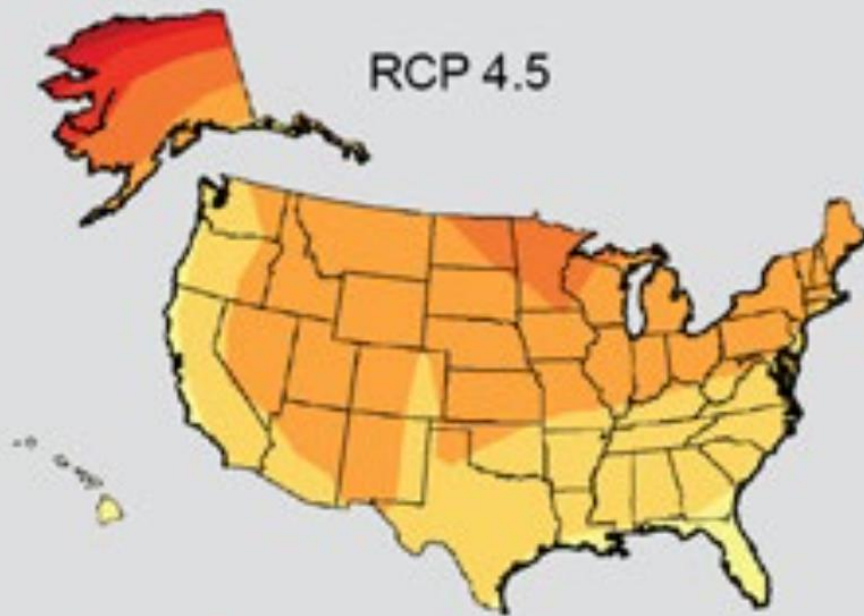


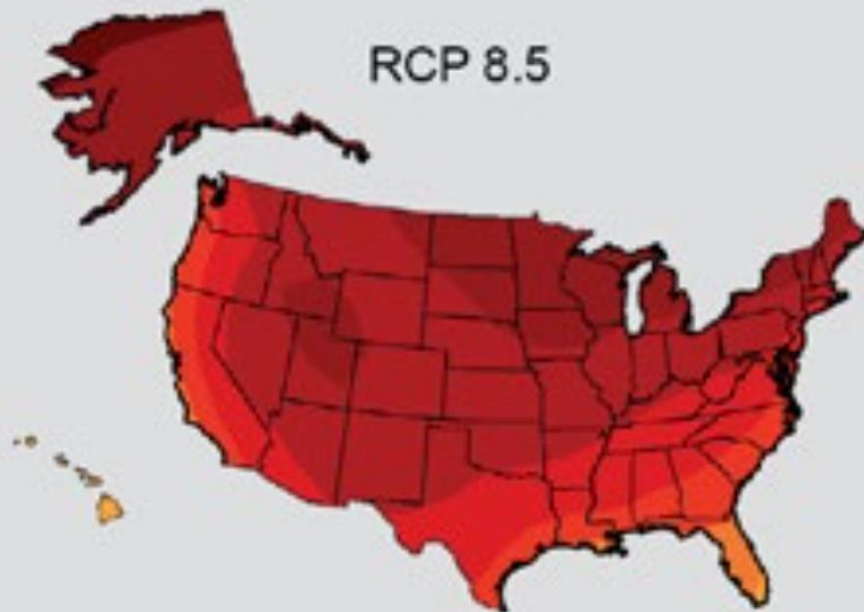
RCP 2.6



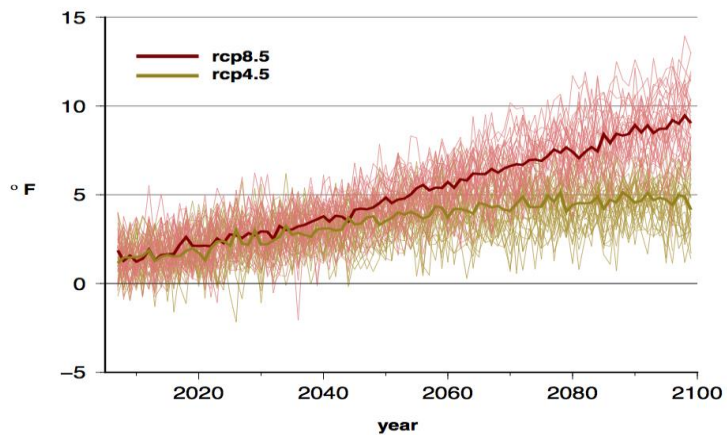
RCP 4.5



RCP 8.5



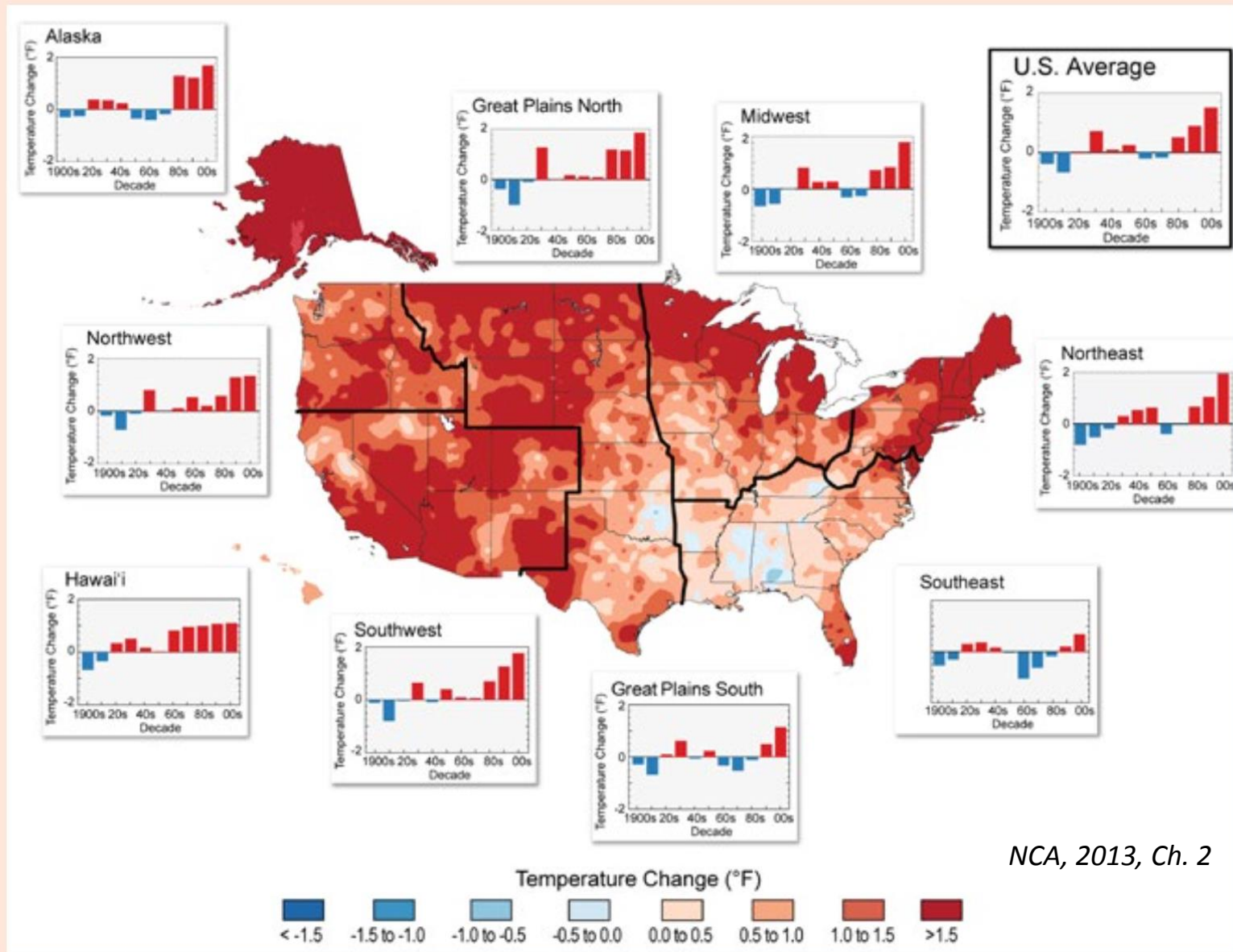
wy temp anom: nocal (2x2 centered at 39N 120W)  
31 cmip5 models (and median); 1961–1990 hist climo



Temperature Change (°F)

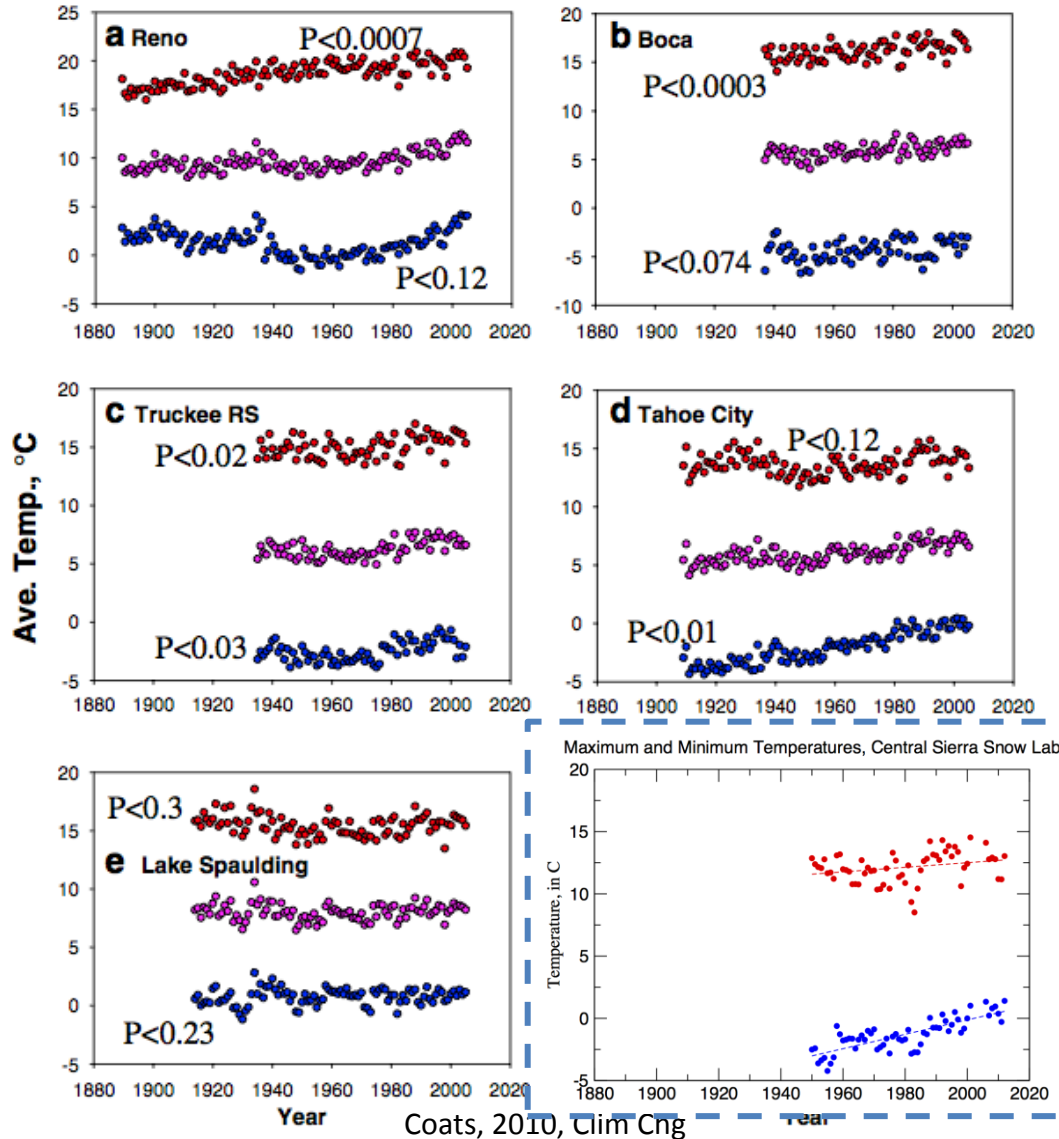


## Observed U.S. Temperature Change



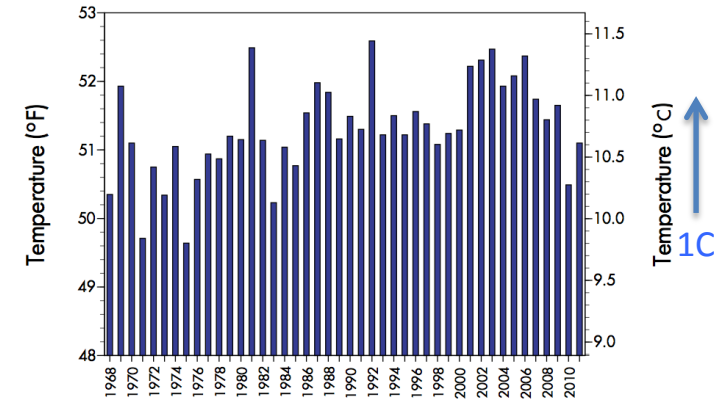
*NCA, 2013, Ch. 2*

**Figure 2.7.** The colors on the map show temperature changes over the past 22 years (1991-2012) compared to the 1901-1960 average, and compared to the 1951-1980 average for Alaska and Hawai'i. The bars on the graphs show the average temperature changes by decade for 1901-2012 (relative to the 1901-1960 average) for each region. The far right bar in each graph (2000s decade) includes 2011 and 2012. The period from 2001 to 2012 was warmer than any previous decade in every region. (Figure source: NOAA NCDC / CICS-NC).

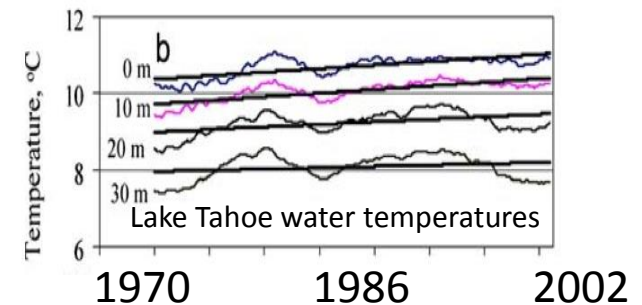


## Annual-Mean Air Temperatures in Tahoe region

### Lake Tahoe WATER temperatures



2012 State of Lake report, UC Davis TERC



### Trends at Tahoe City:

Tmin trend = 4.7 C / 100 yr ( $P < 0.01$ )

Tmax trend = 0.6 C / 100 yr ( $P < 0.12$ )

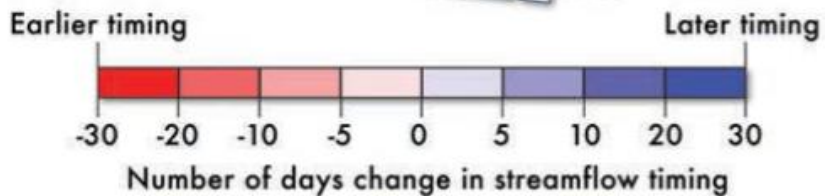
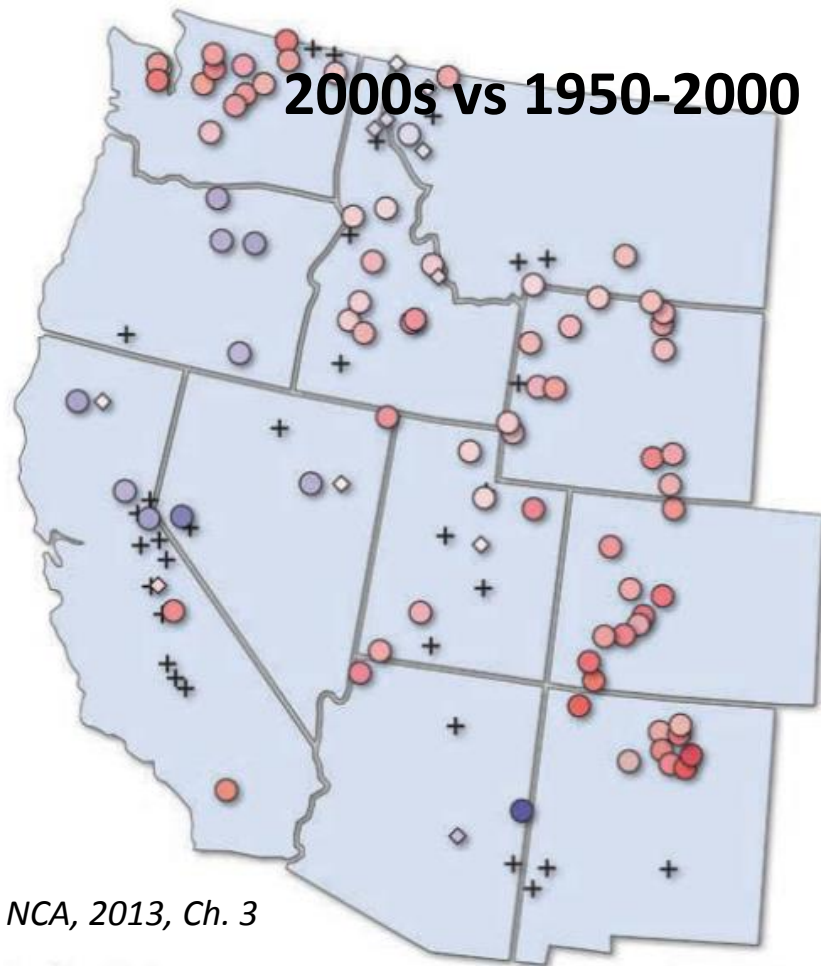
### Trends at CSSL:

Tmin trend = 5.78 C / 100 yr ( $P < 0.001$ )

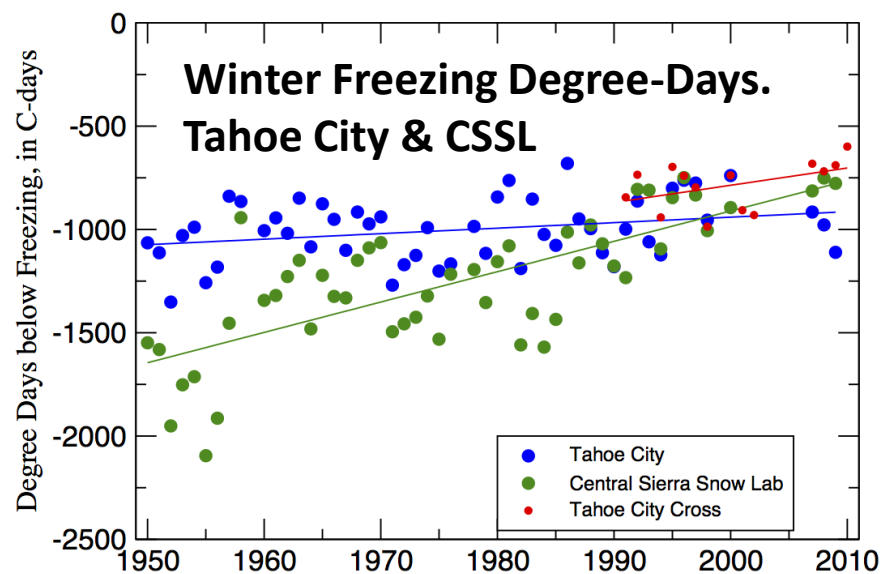
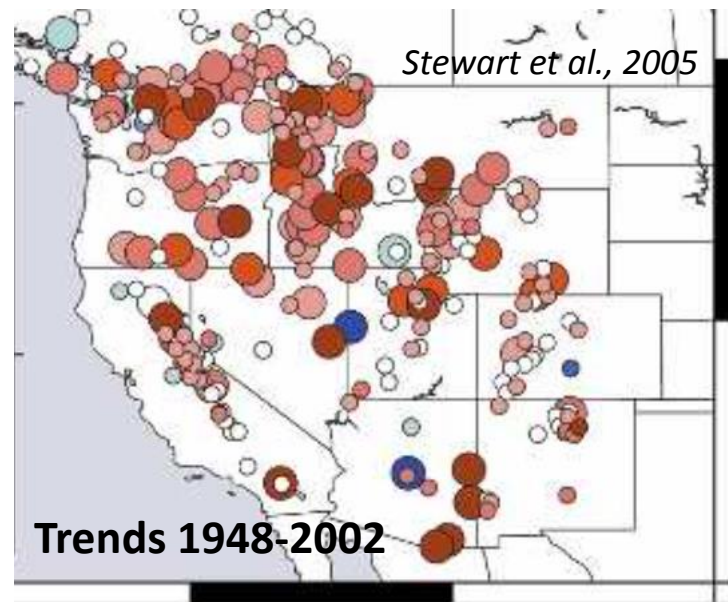
Tmax trend = 1.85 C / 100 yr ( $P < 0.02$ )



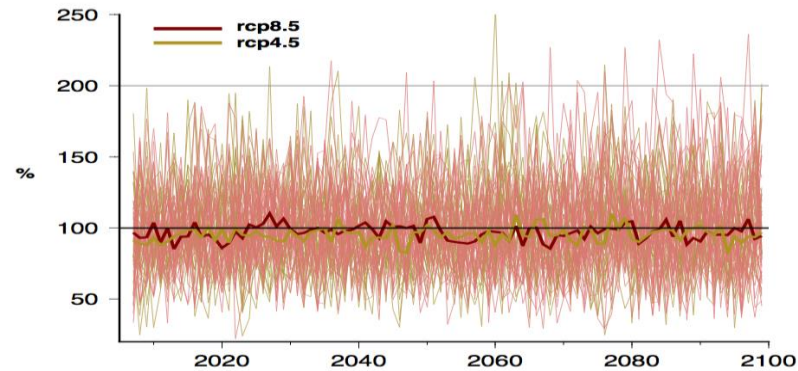
## 2000s vs 1950-2000



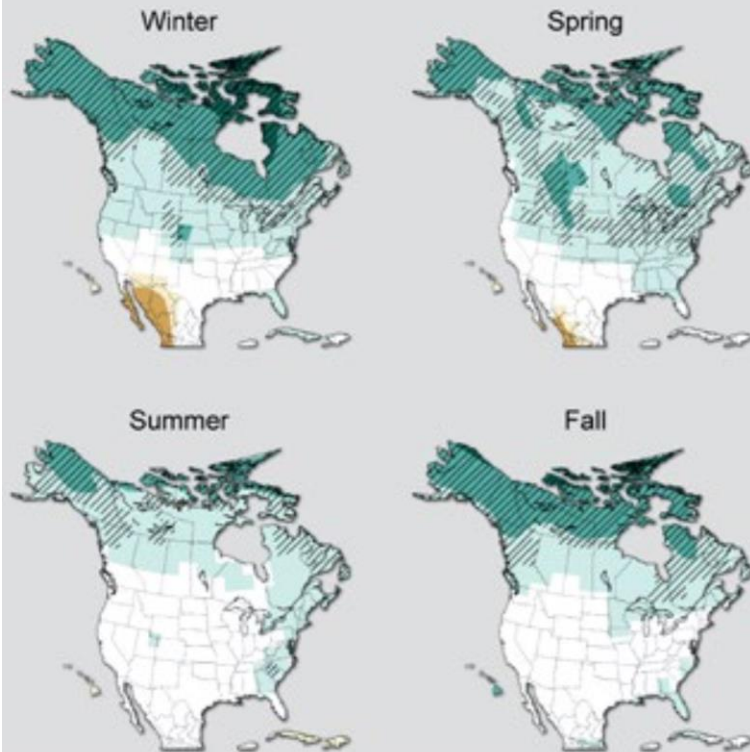
- Timing significantly different at 95% confidence level
- ◇ Timing significantly different at 90% confidence level
- ⊕ Timing not statistically different



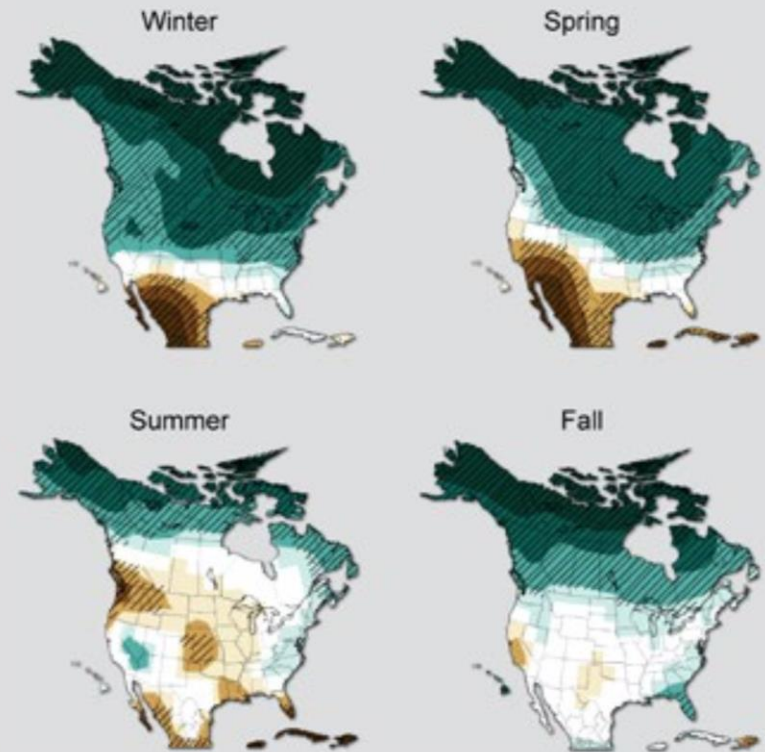
wy precip % of hist: nocal (2x2 centered at 39N 120W)  
31 crip5 models (and median); 1961–1990 hist climo



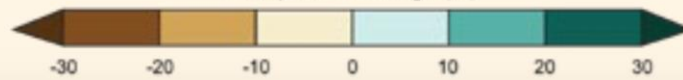
### Rapid Emissions Reductions (RCP 2.6)



### Continued Emissions Increases (RCP 8.5)

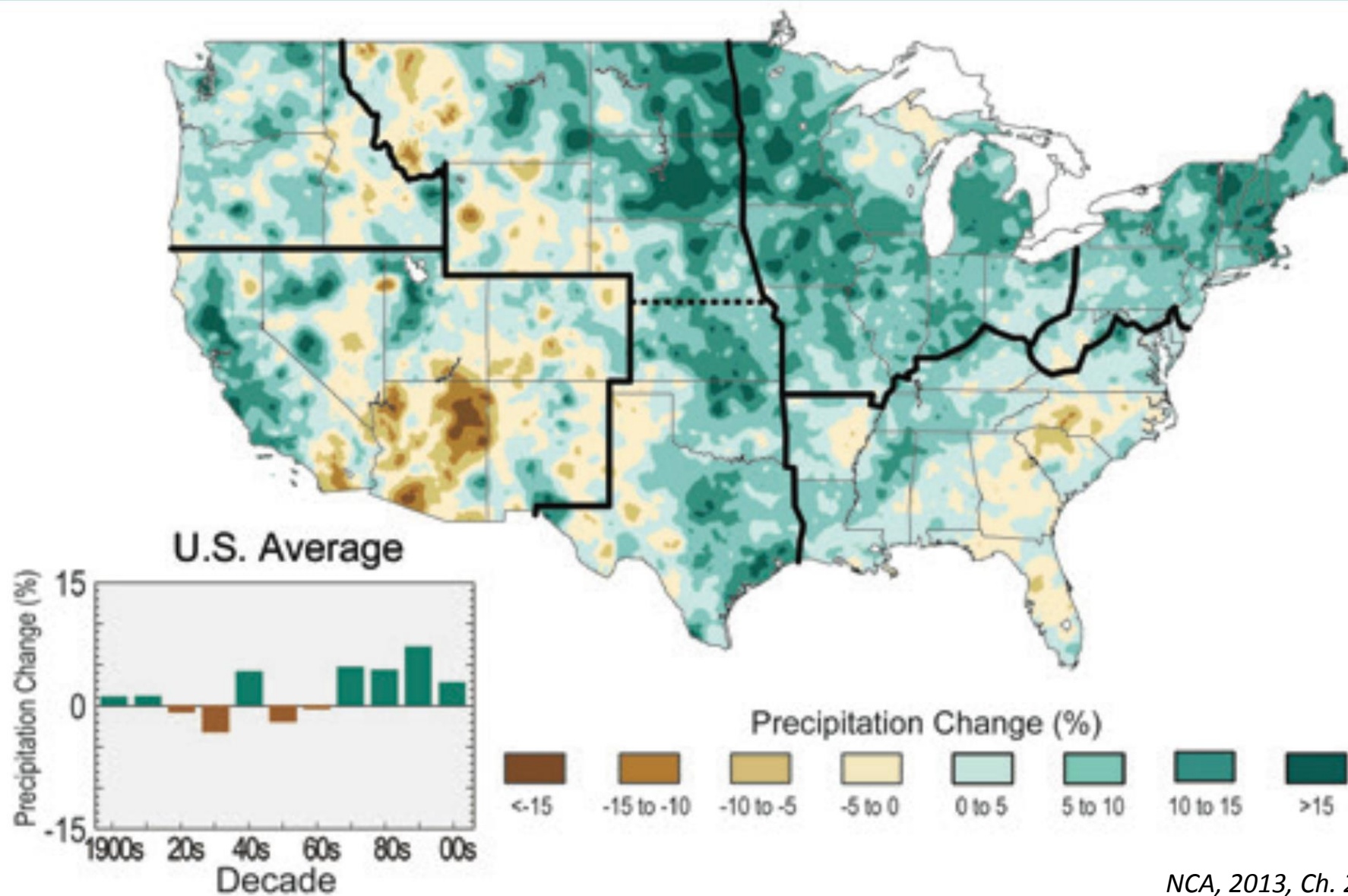


Precipitation Change (%)

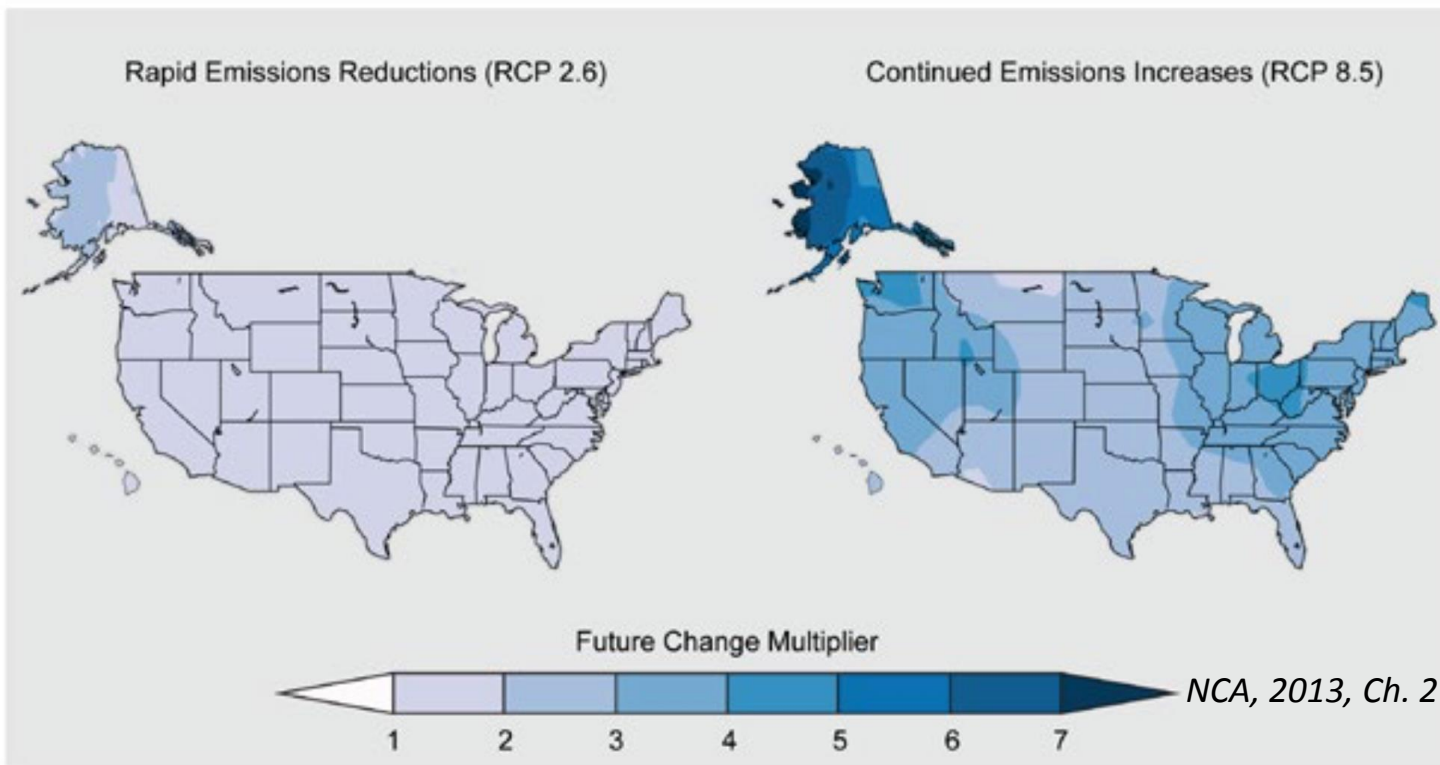




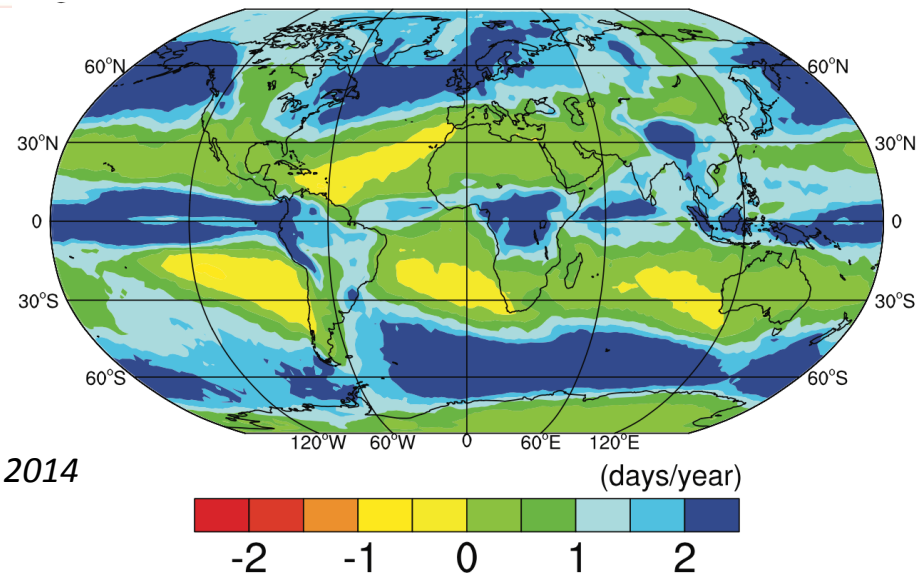
# Observed U.S. Precipitation Change



## Projected Change in Heavy Precipitation Events

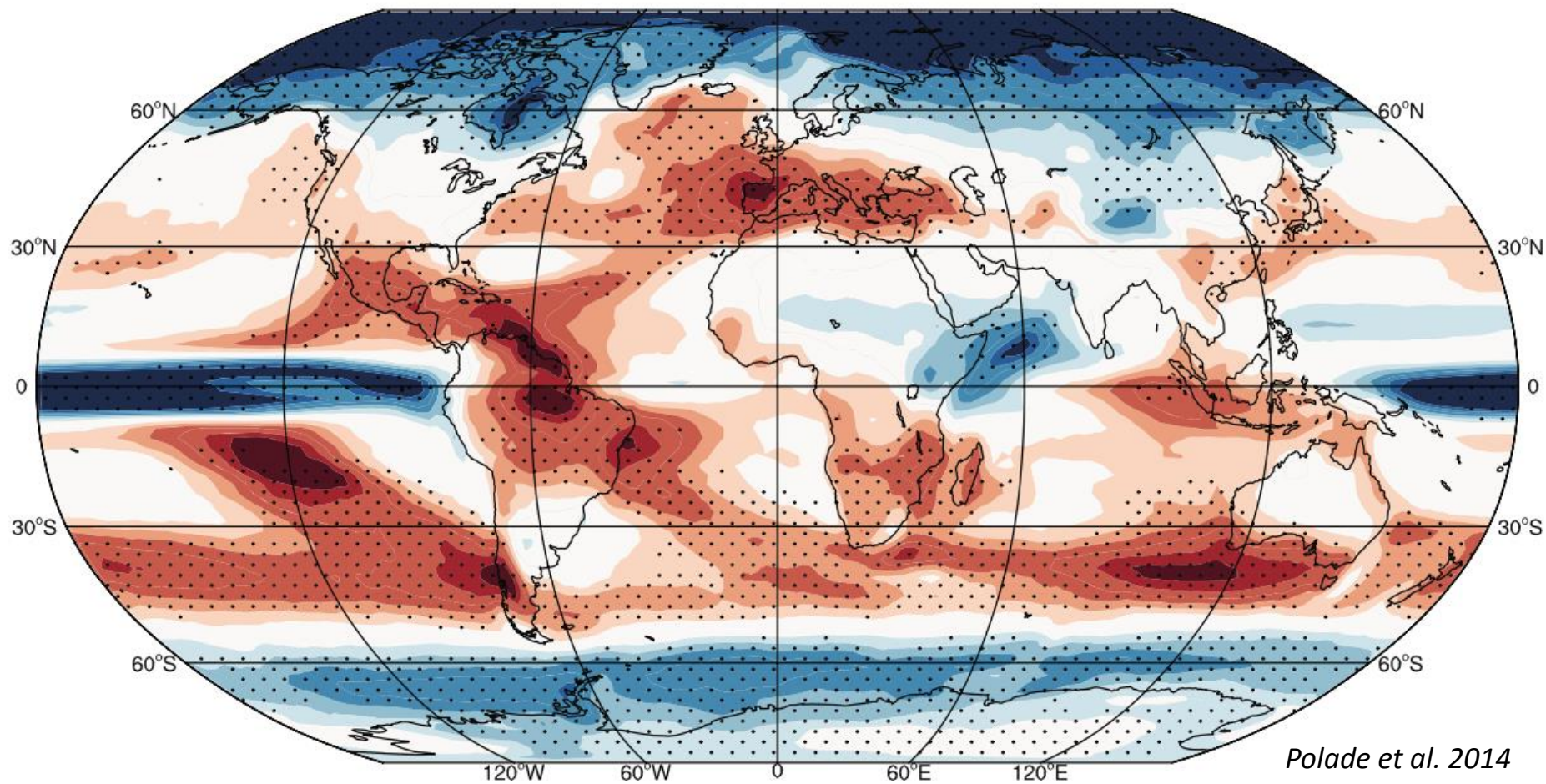


**99% percentile daily precipitation**





# Changes in Number of Dry Days per year, RCP8.5



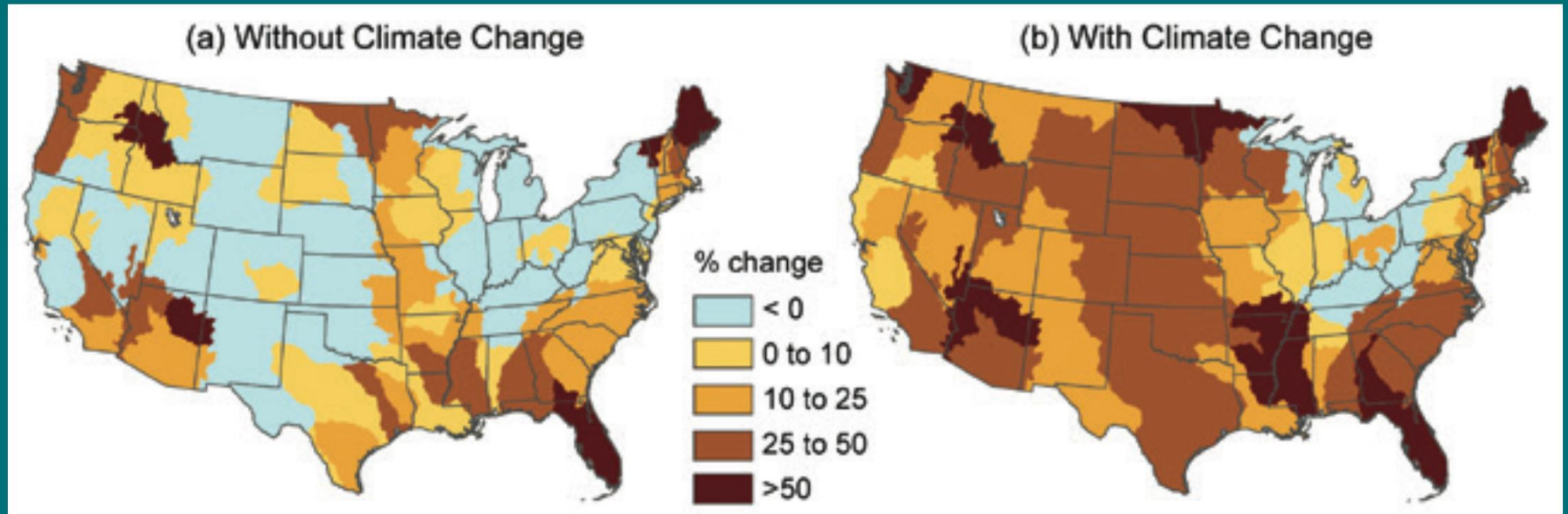
*Polade et al. 2014*

(days/year)



-30   -20   -10   0   10   20   30

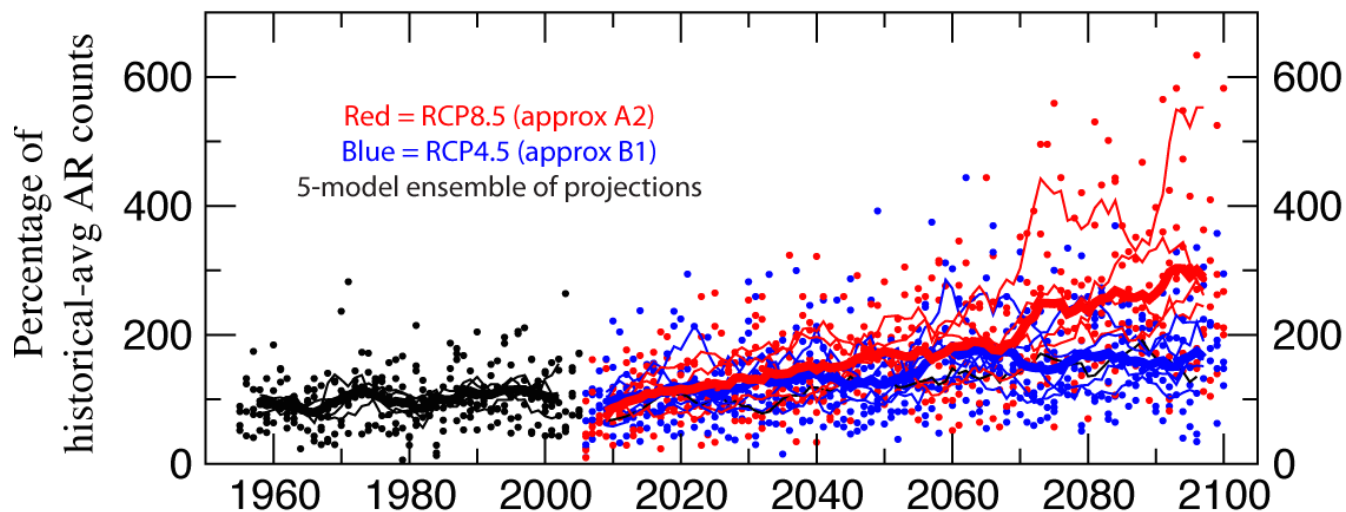
## Projected Changes in Water Withdrawals



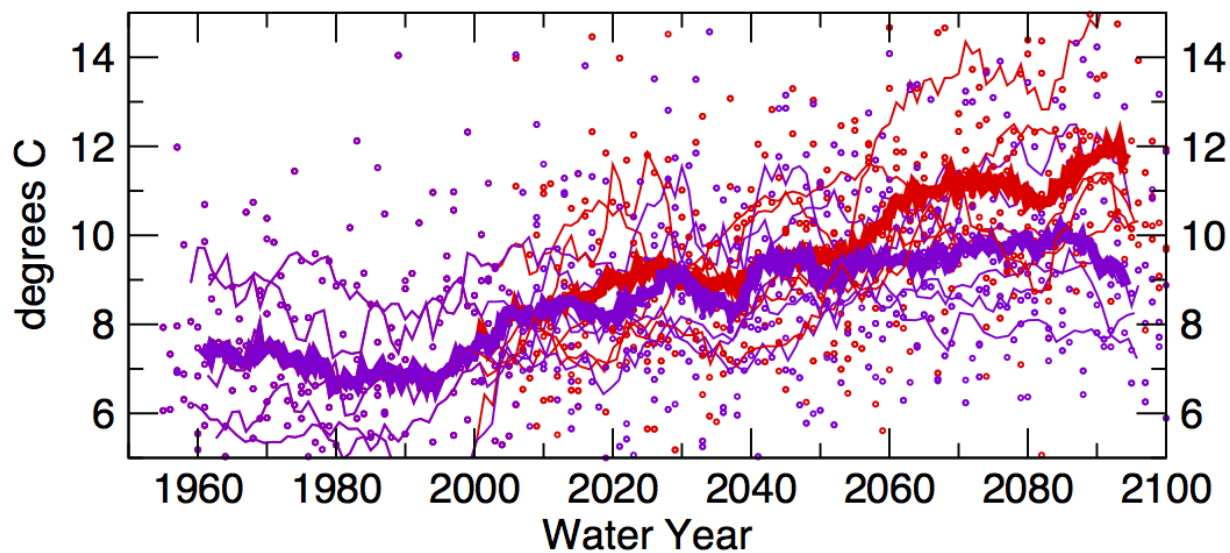
The effects of climate change, primarily associated with increasing temperatures and potential evapotranspiration, are projected to significantly increase water demand across most of the United States. Maps show percent change from 2005 to 2060 in projected demand for water assuming (a) change in population and socioeconomic conditions consistent with the A1B emissions scenario (increasing emissions through the middle of this century, with gradual reductions thereafter), but with no change in climate, and (b) combined changes in population, socioeconomic conditions, and climate according to the A1B emissions scenario. (Figure source: Brown et al. 2013<sup>4</sup>)



Numbers of Days with ARs making landfall per year  
West Coast of North America, 25N to 42N

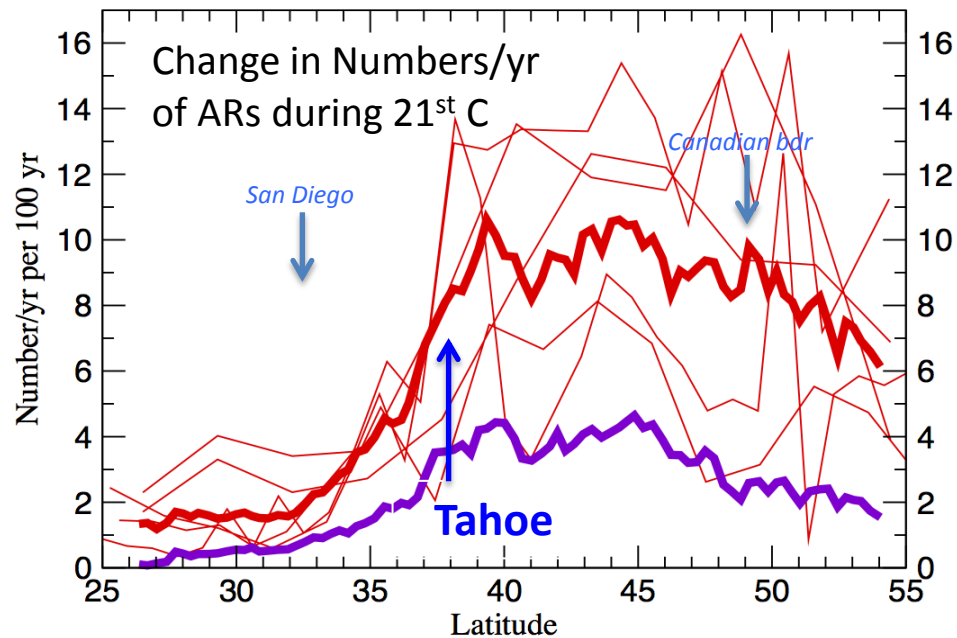


Air Temperatures at 850 mb in ARs making Landfall  
Central California Coast



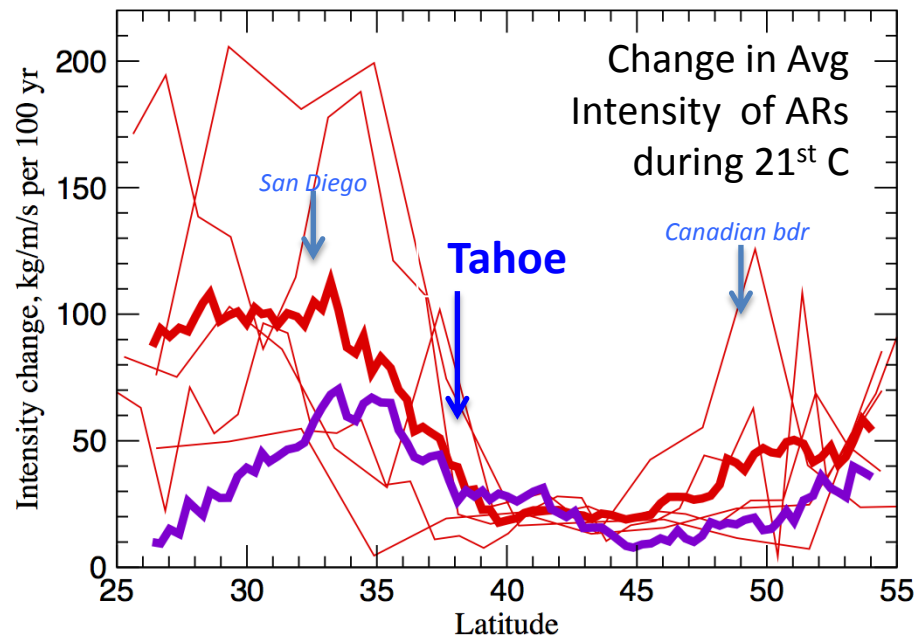


# Distribution of mean changes by latitude along the west coast from 2005-2100



Thin lines  
individual  
models (only  
red, RCP8.5,  
versions shown)

Heavy lines,  
ensemble  
means



# SNAWPS Concept, Fall 2012

- USGS, UC Davis, Desert Research Institute and other scientific organizations under the Tahoe Science Consortium are looking for ways to leverage funding & efforts to create a

## **Sierra Nevada Atmospheric and Watershed Prediction System (SNAWPS)**

- This community effort will bring together existing (and developing) models of  
**atmosphere**  
**watershed**  
**lake dynamics & quality**  
**forest**  
**ecosystems**  
into a *continually updated modeling system* **open to all scientists & users**
- The system will be used to regularly predict and track current conditions & to produce occasional projections of climate changes & effects to help managers & public make informed decisions critical to health and economic well-being.

# Sierra Nevada Atmosphere-Watershed Science Community Model

