Planning Range for Climate Change

Climate Impact Symposium

Metropolitan Washington Council of Governments

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Scientific Consensus

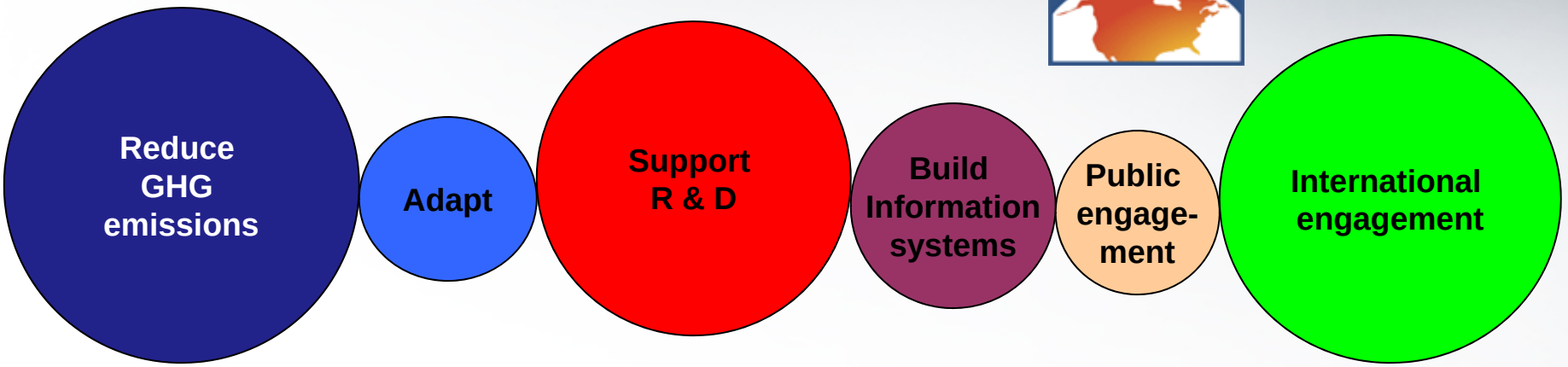
- Climate change is **occurring**, is caused **largely by human activities**, and **poses significant risks** for—and in many cases is already affecting—a broad range of human and natural systems.
- These risks indicate a pressing need for substantial action to **limit the magnitude of climate change** and **prepare for adapting** to its impacts.

America's CLIMATE CHOICES

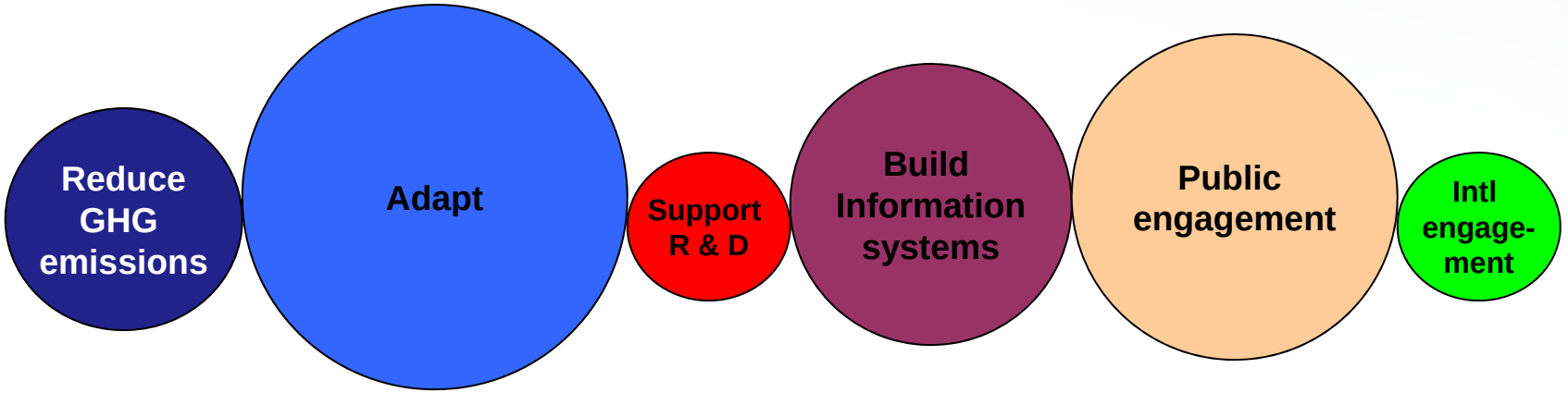
State-Local Actions Are Critical

America's CLIMATE CHOICES

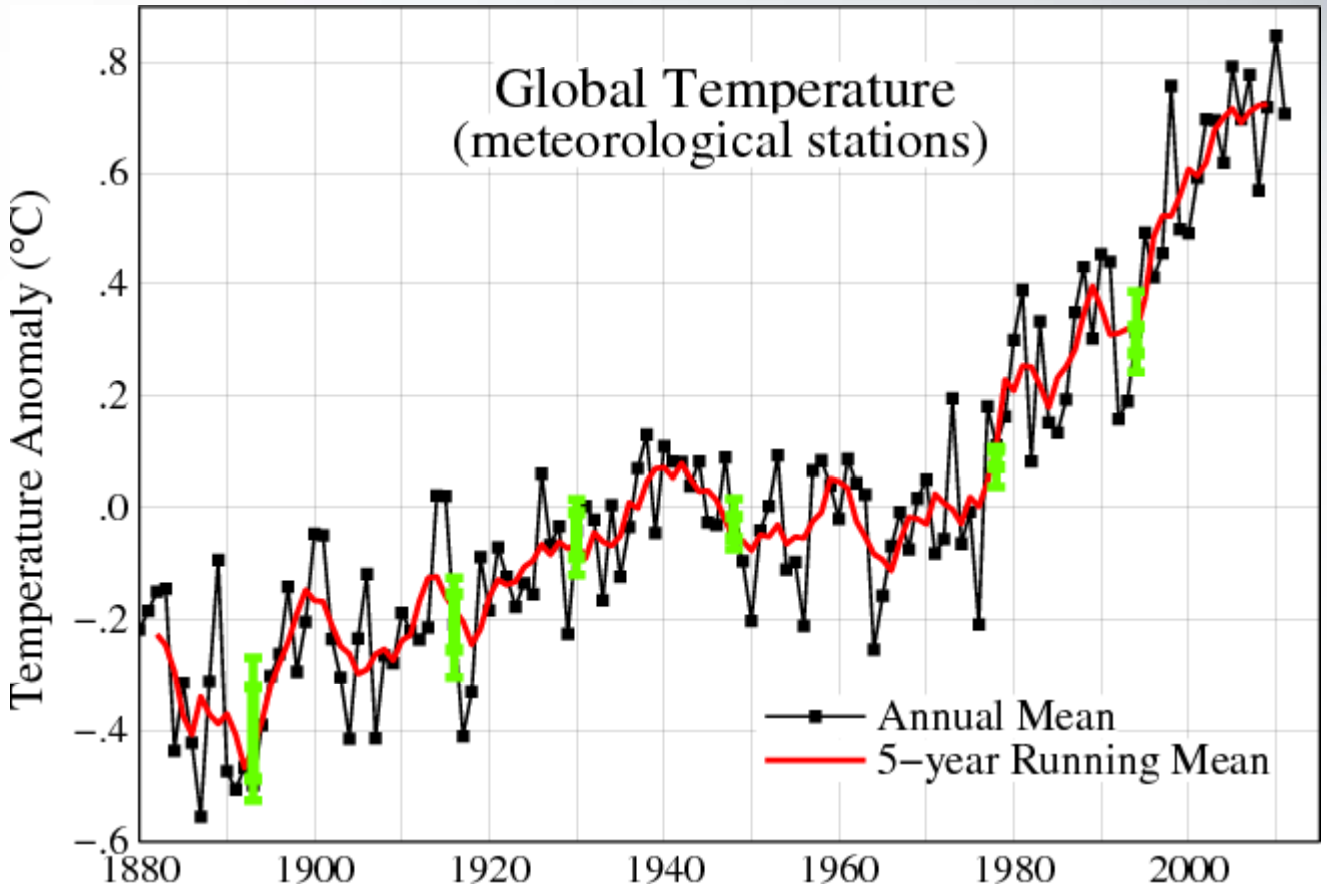
Federal Level



State-local Level

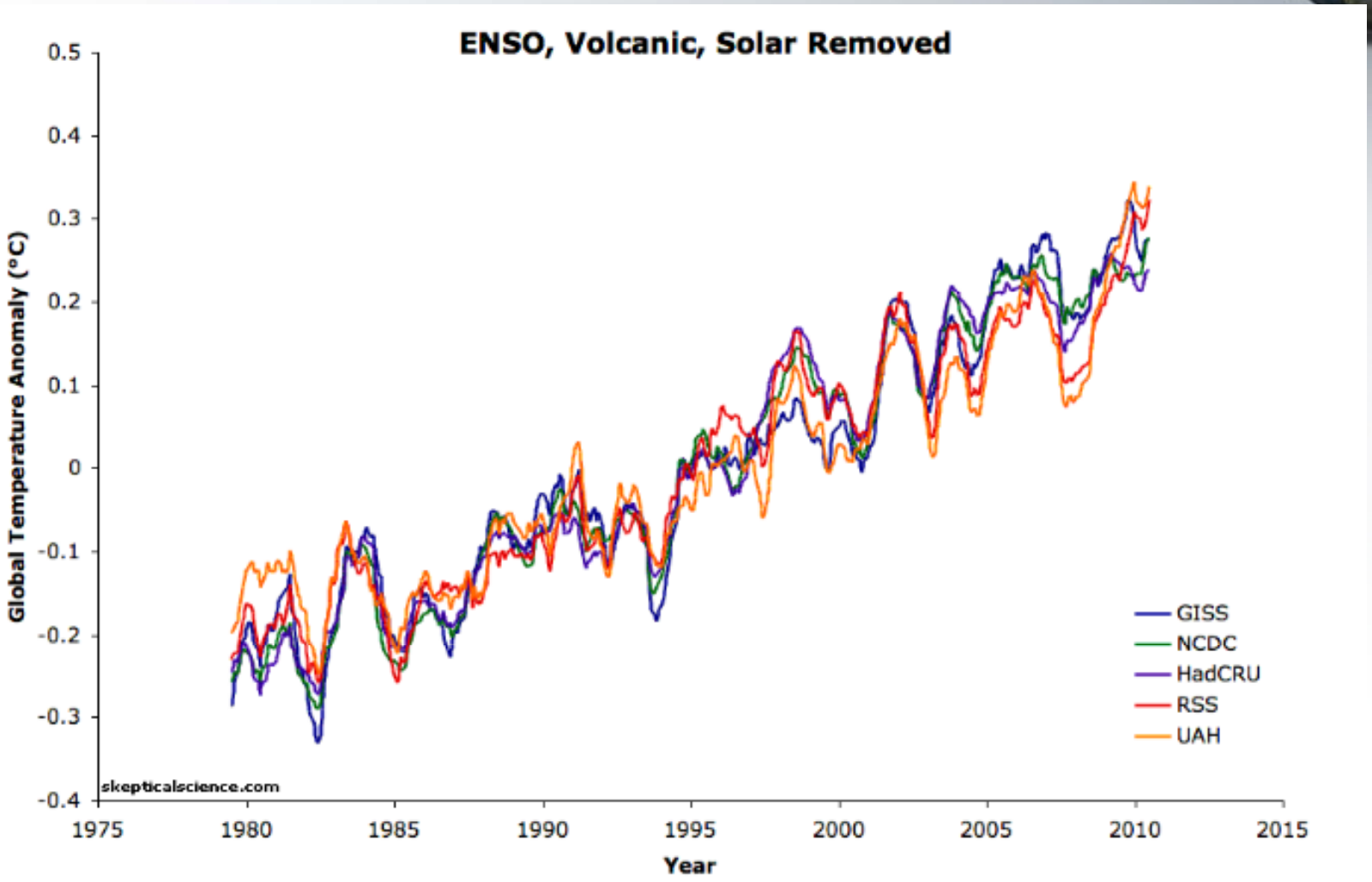


Unequivocal Warming Trend



NASA Goddard Institute of Space Studies
http://data.giss.nasa.gov/gistemp/

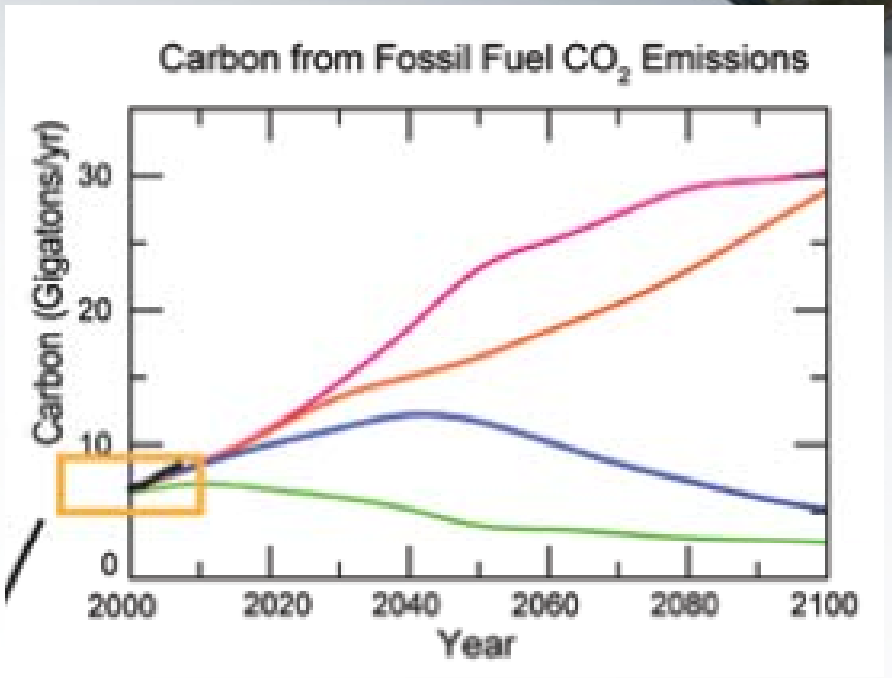
Highly Variable But Warming



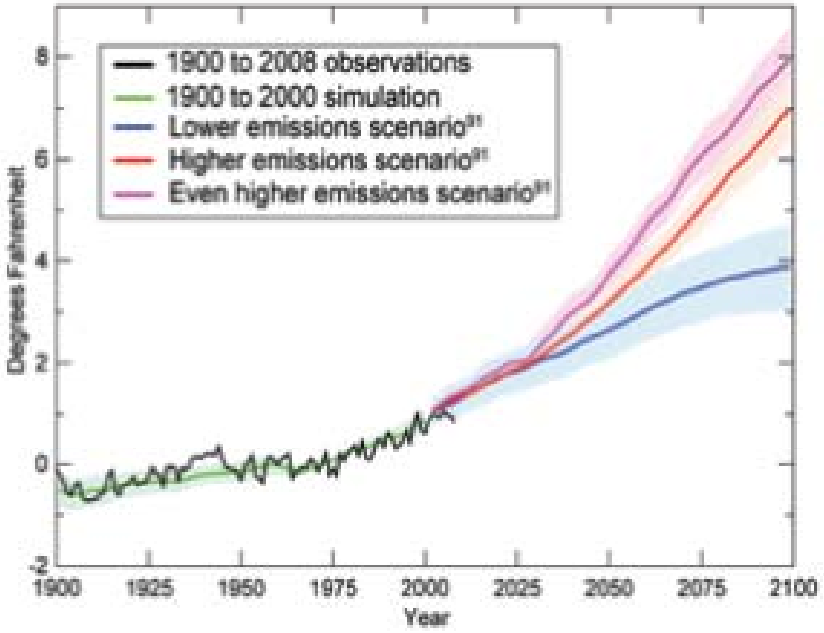
Foster & Rahmstorf (2011) *Environmental Research Letters*

Different Types of Uncertainty

Future Greenhouse Emissions



Global mean temperature change



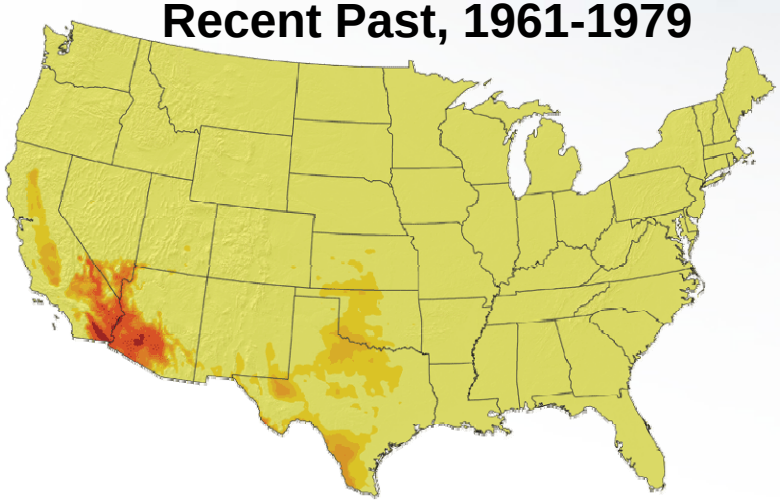
Sensitivity of Climate System to Greenhouse Gases

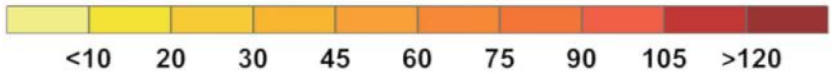
America's CLIMATE CHOICES

Emissions Matter

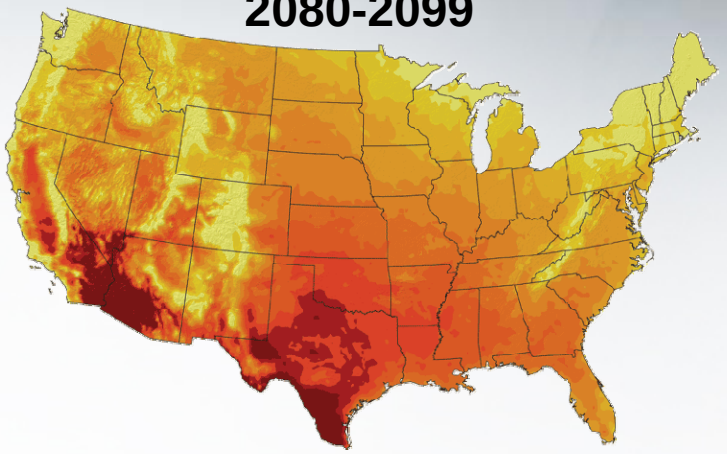
Number of Days Over 100ºF

Recent Past, 1961-1979

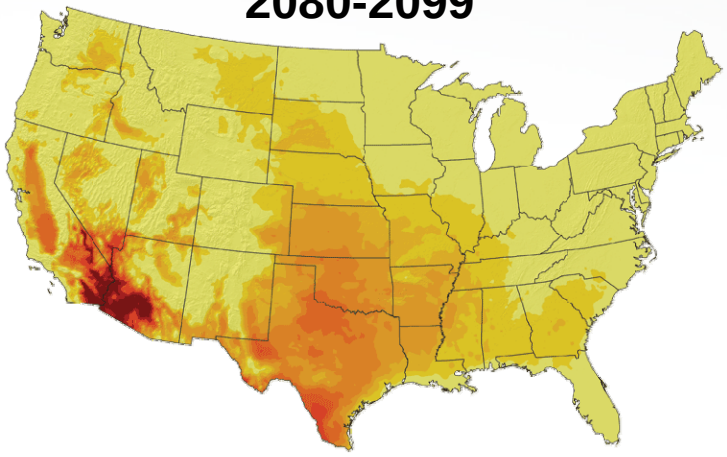


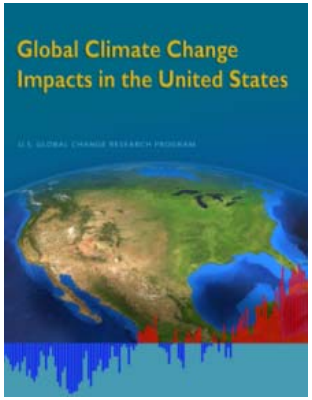


Higher Emissions Scenario 2080-2099



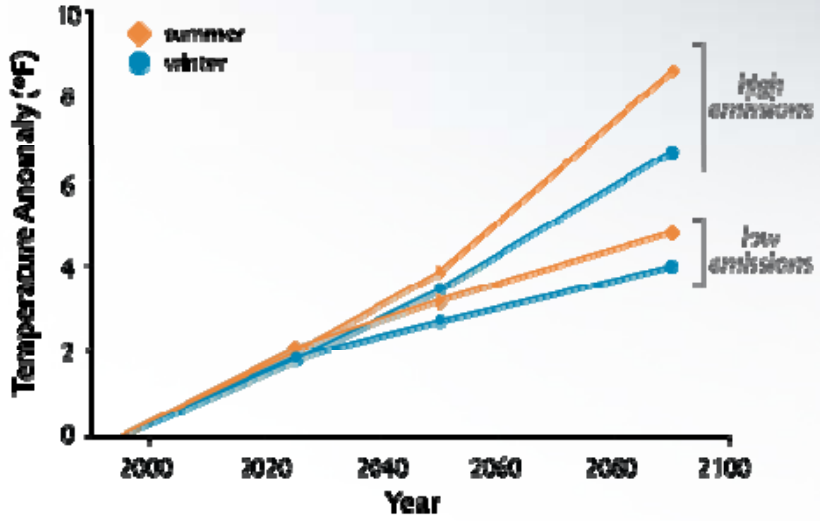
Lower Emissions Scenario, 2080-2099

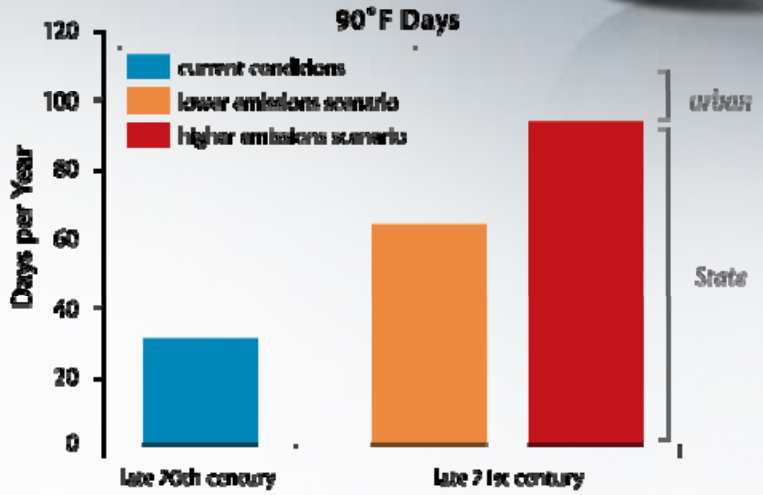


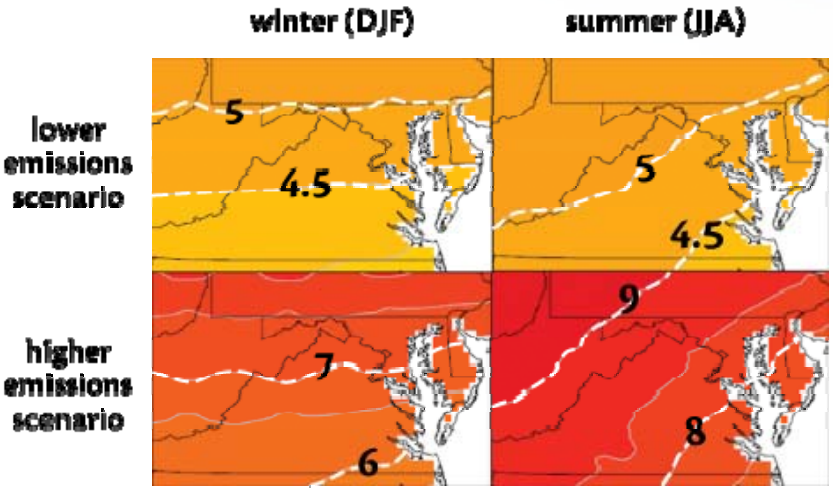


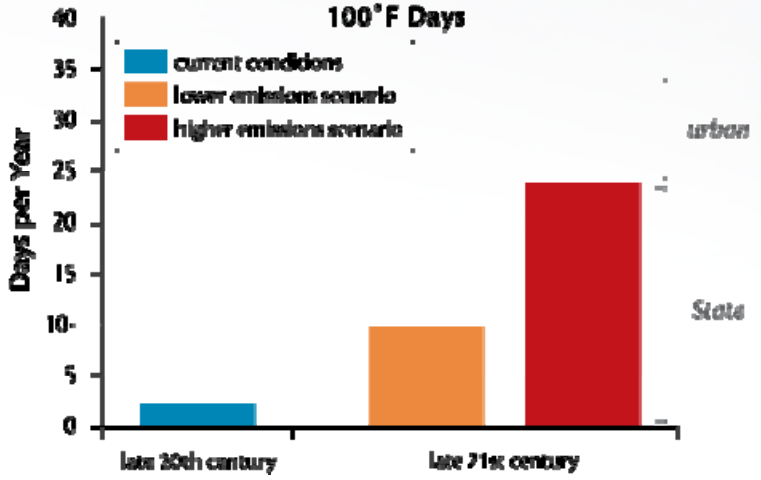
www.globalchange.gov/

Milder Winters, Much Hotter Summers



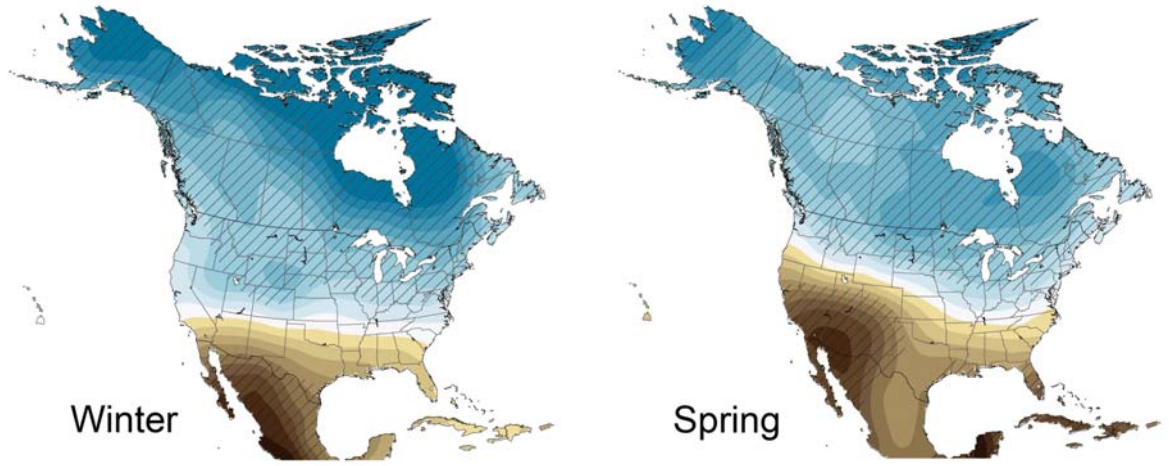




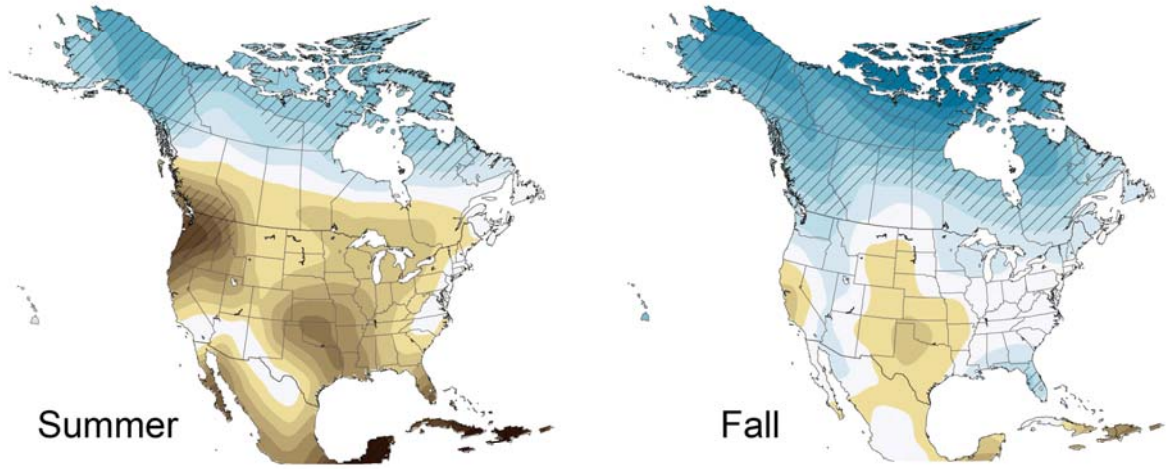


www.umces.edu/applying-science/global-warming-free-state-highlights

Projecting Changes in Precipitation



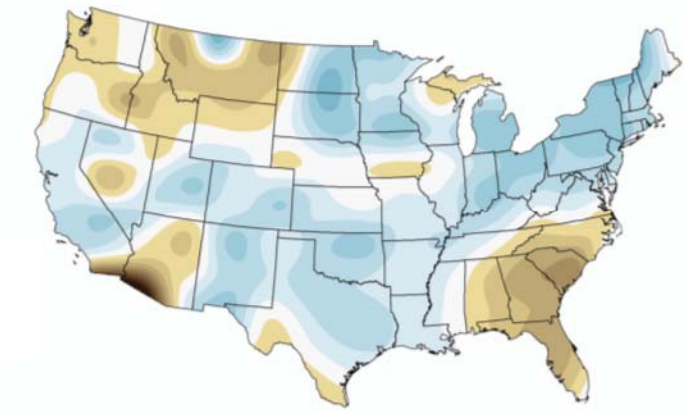
by 2080-90s



Percent Change

<-40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 >40

Observed annual change 1950-2008

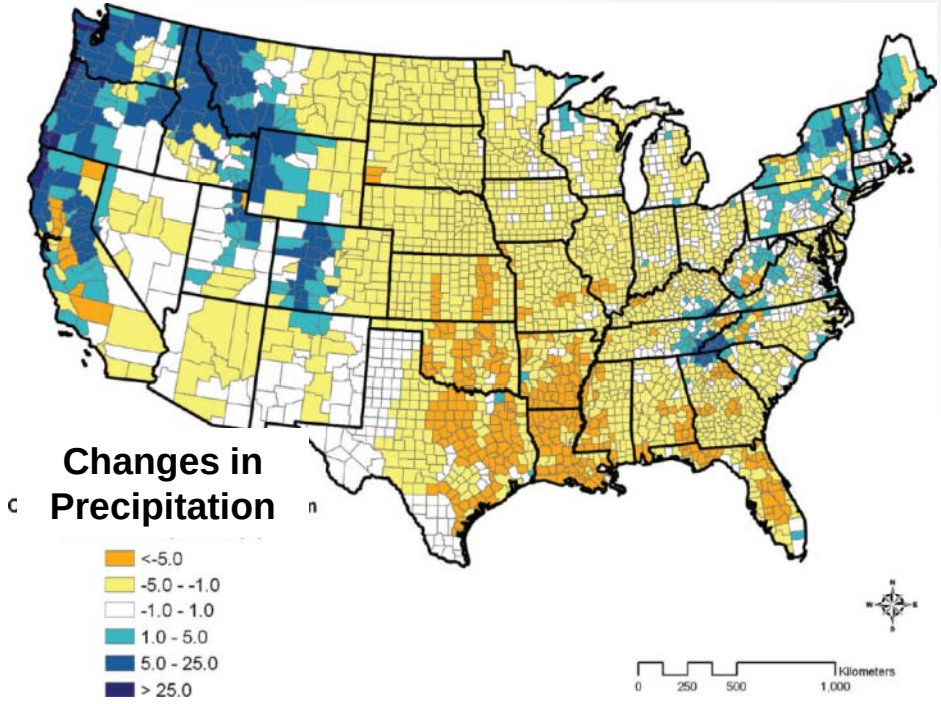


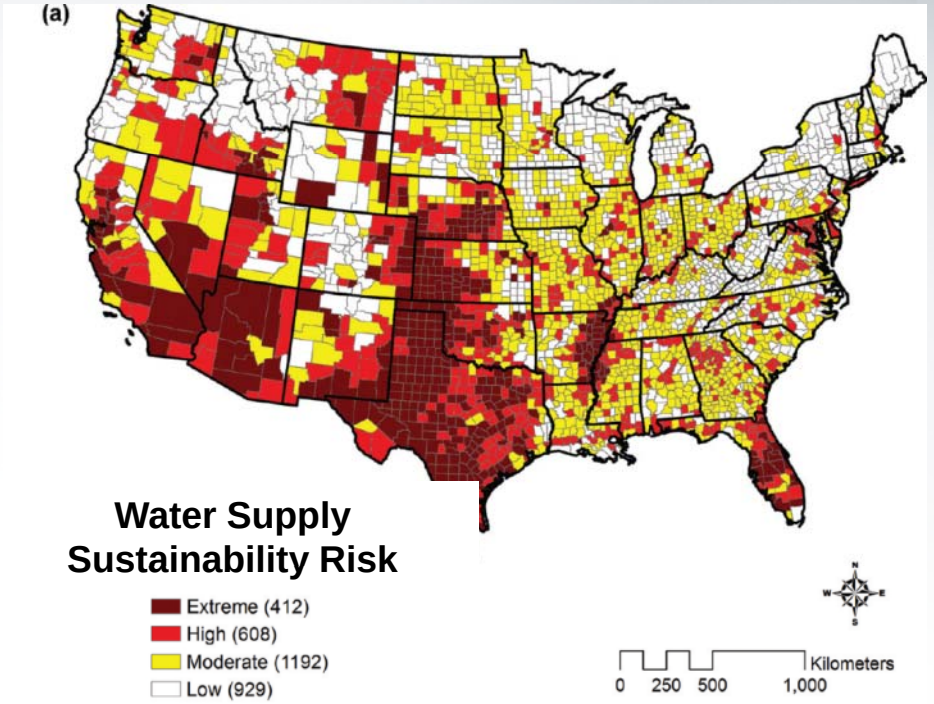
Percent Change

-30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 >40

www.globalchange.gov/

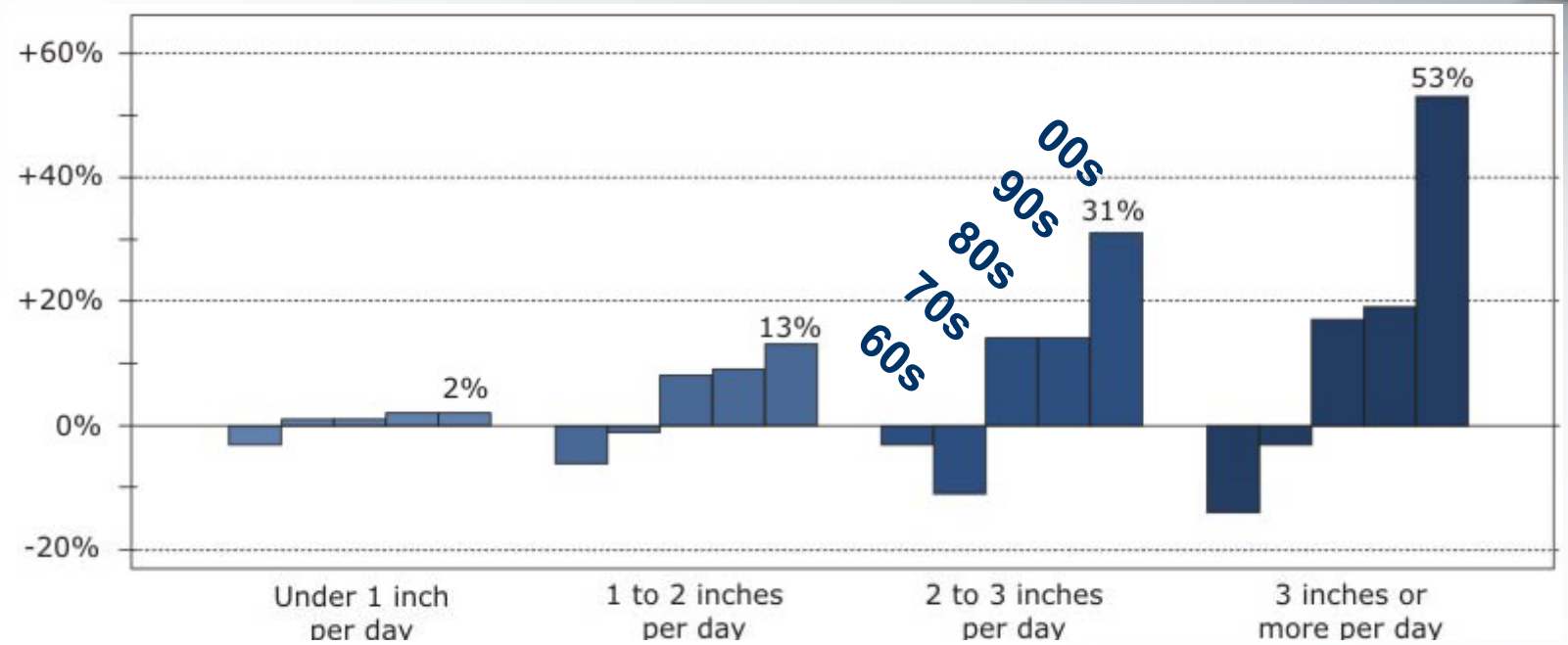
Available Water in 2050?





Roy et al. 2012 *ES&T*

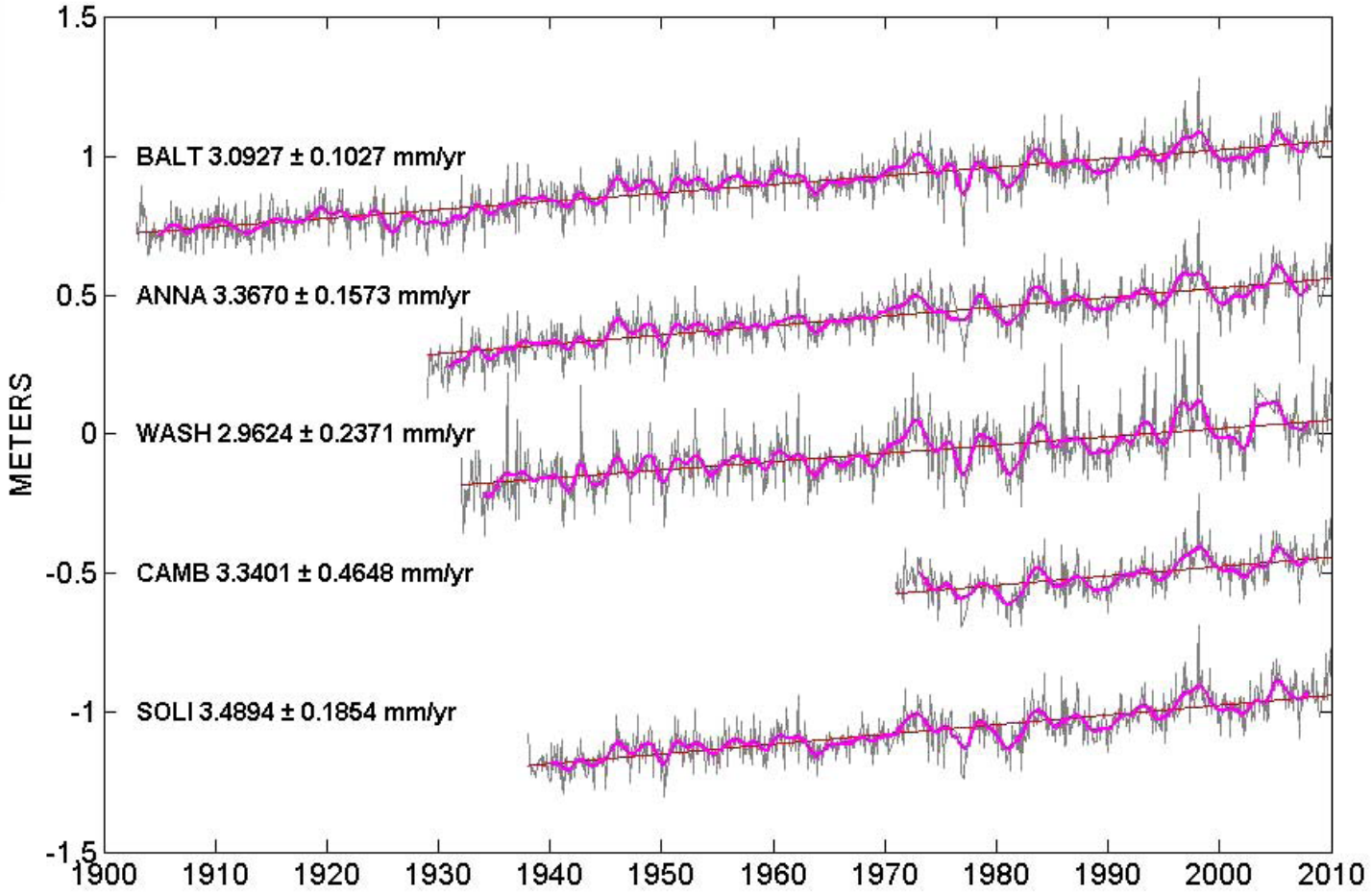
More Frequent Downpours



Changing Frequency Relative to 1961-1990 For Midwest U.S.

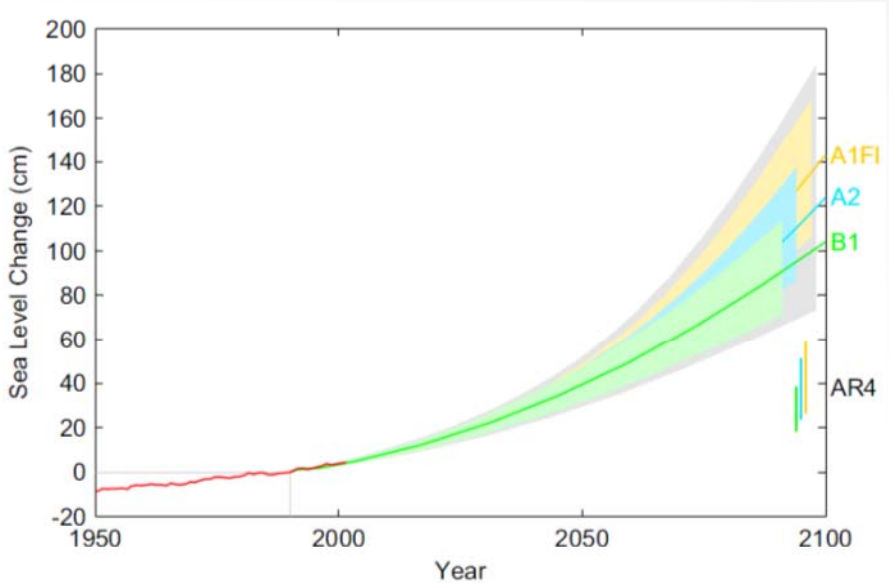
Rocky Mountain Climate Organization 2012

Sea Level Rise in the Chesapeake



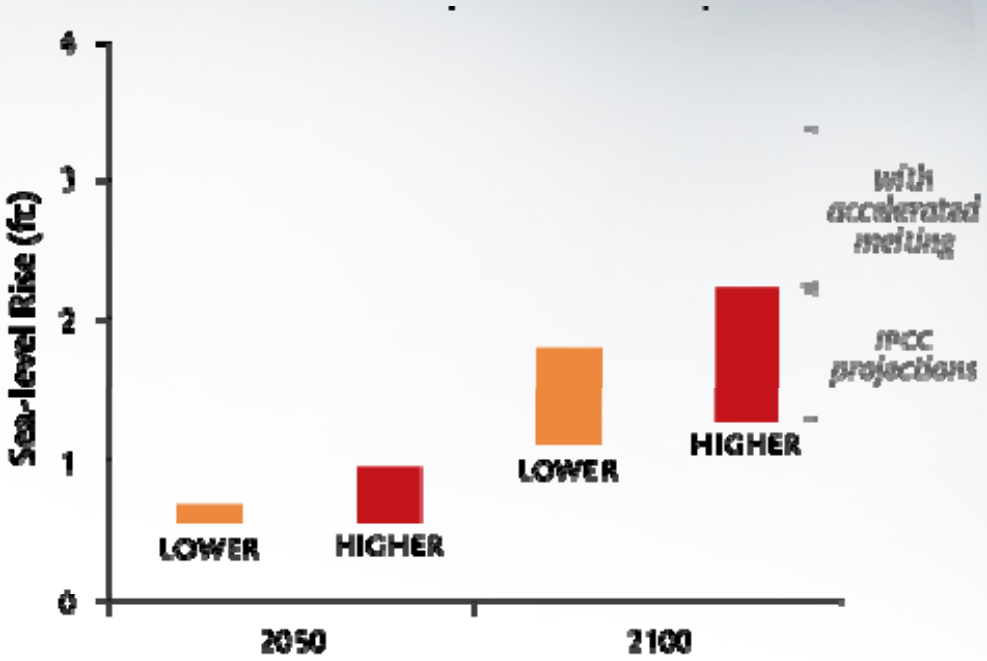
www.umces.edu/applying-science/global-warming-free-state-highlights

How Much Will Sea Level Rise?



Semi-empirical model

Vermeer & Rahmstorf (2009) *PNAS*



Mid-Chesapeake Bay Relative Sea Level Rise
Includes Subsidence

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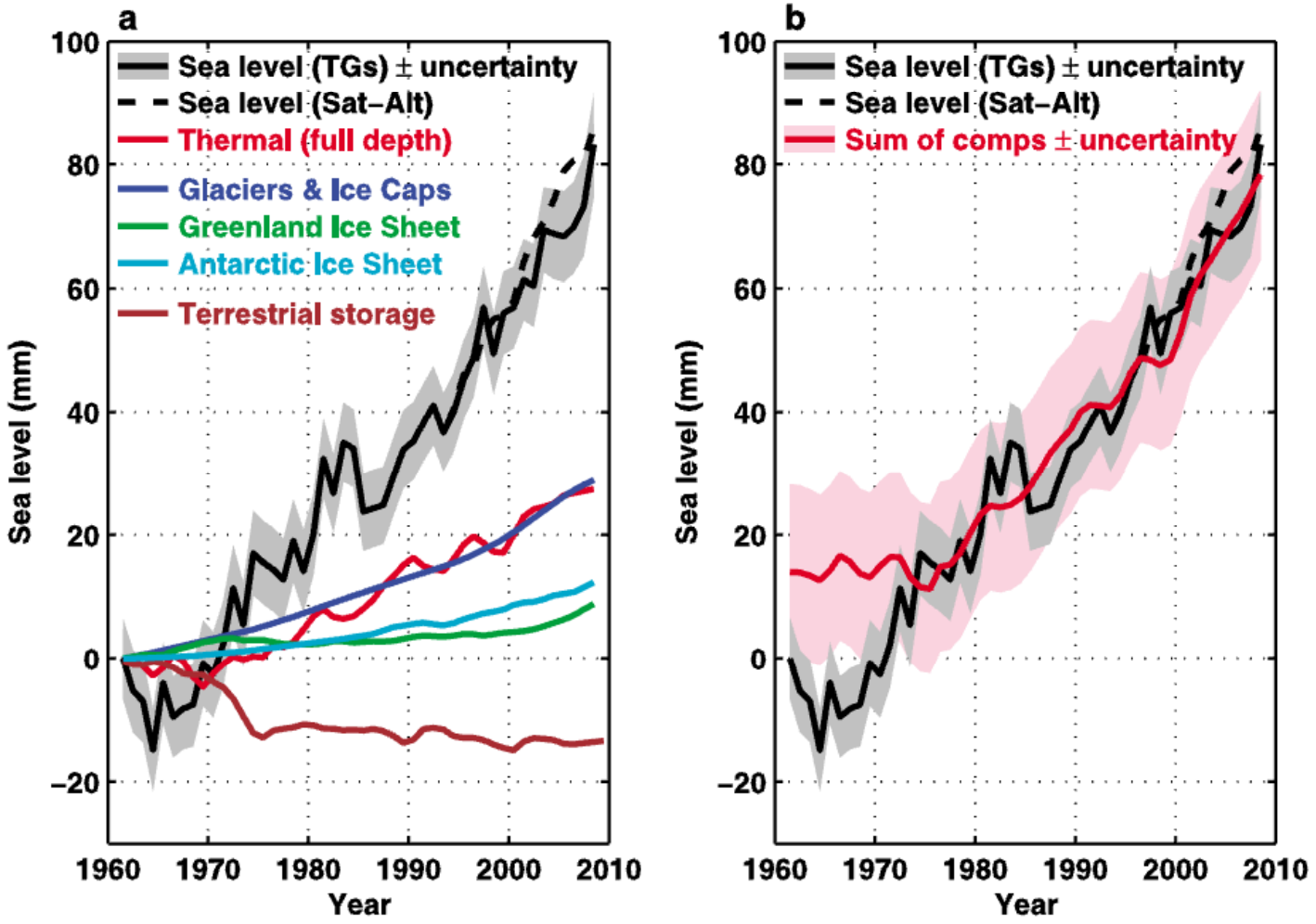
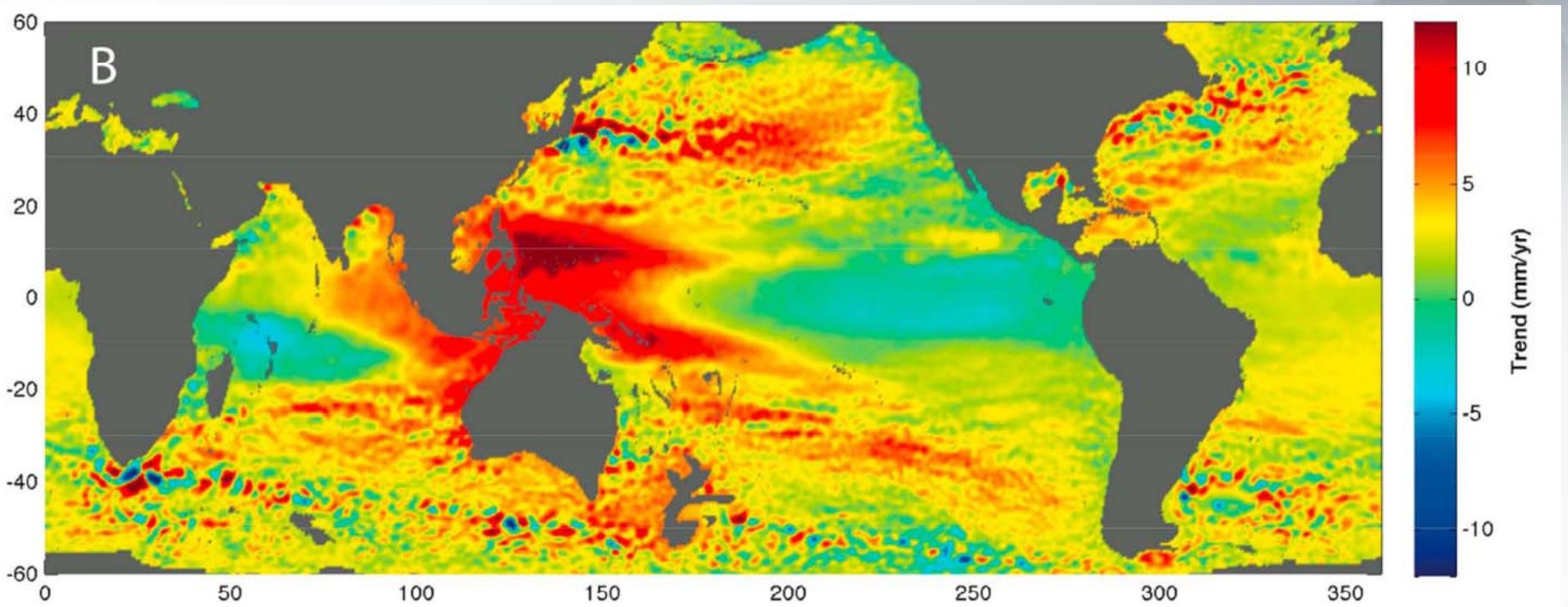
Contributions to Sea Level Rise



Church et al. 2011 *Geophysical Research Letters*

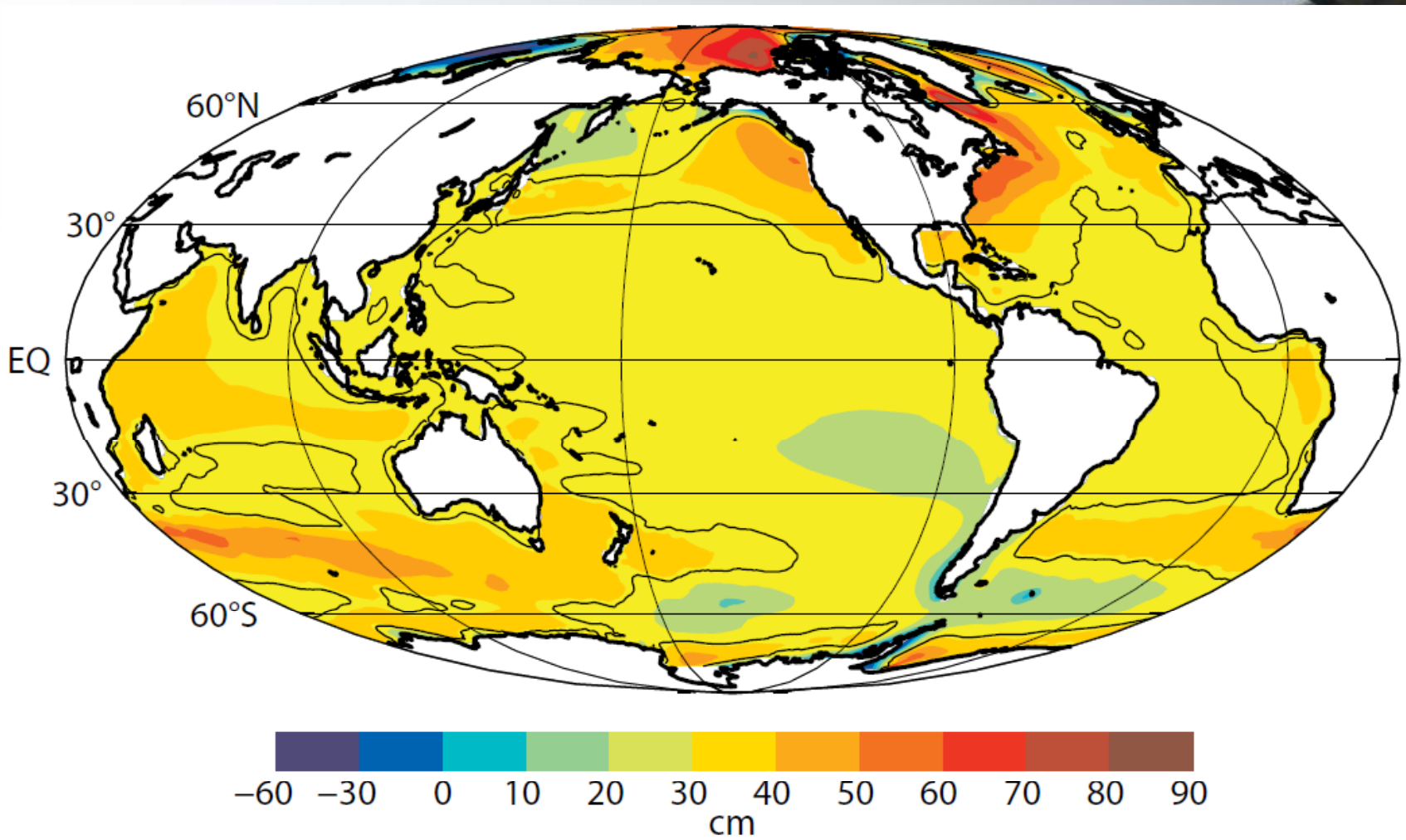
Sea Level Isn't Level



Global mean sea level rise
1950-2009 1.97 mm/yr
1993-2009 3.22 mm/yr

Hamlington et al. 2011. *Journal of Geophysical Research*

Regional Distribution of SL Rise



Church et al 2011 *Oceanus*

Questions?

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- www.umces.edu/people/president