

Oklahoma's Water Future: Told Through Climate Projections

Dr. Adrienne Wootten, Postdoctoral Research Associate

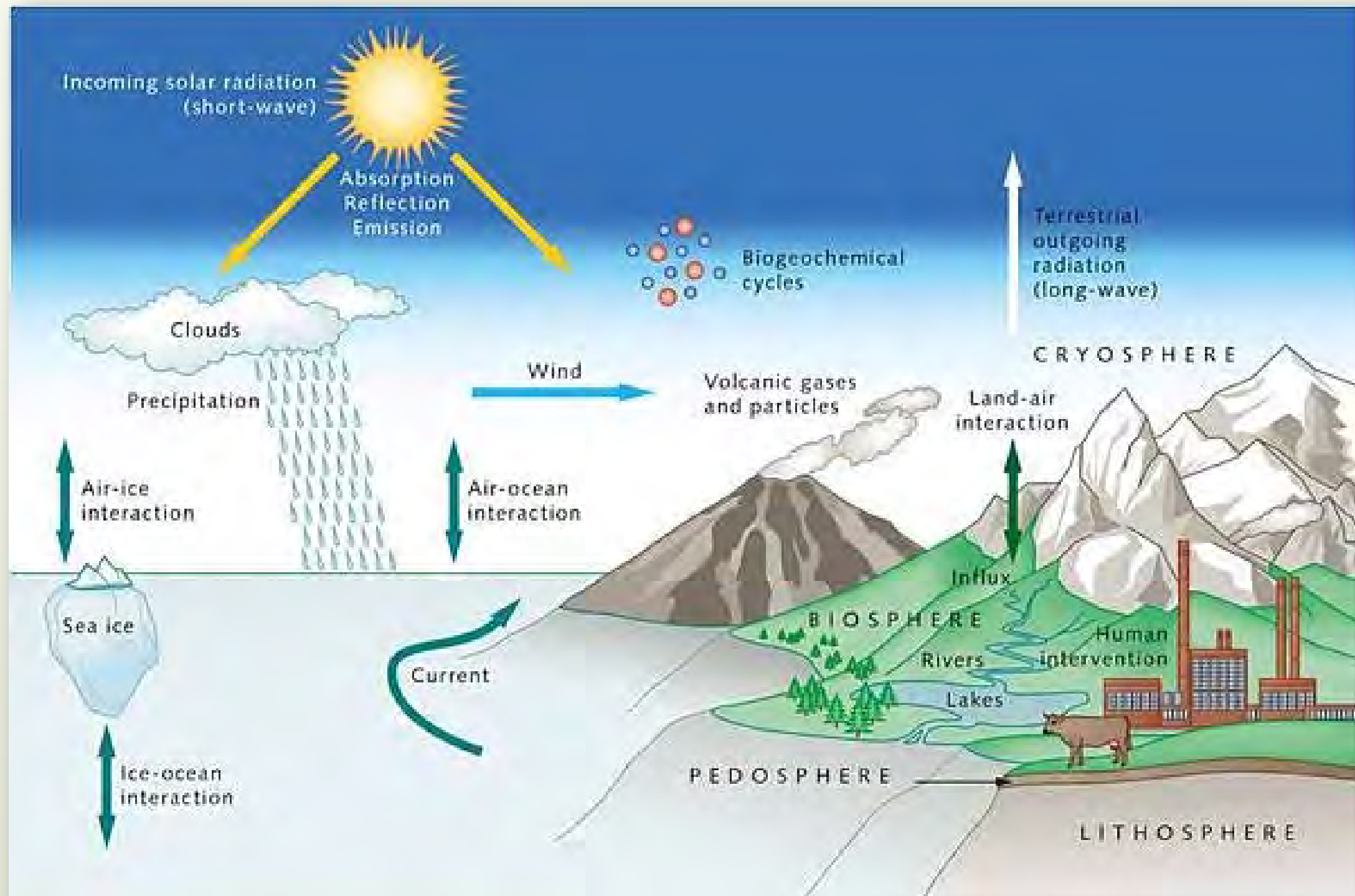
April 4, 2018

South Central Climate Science Center



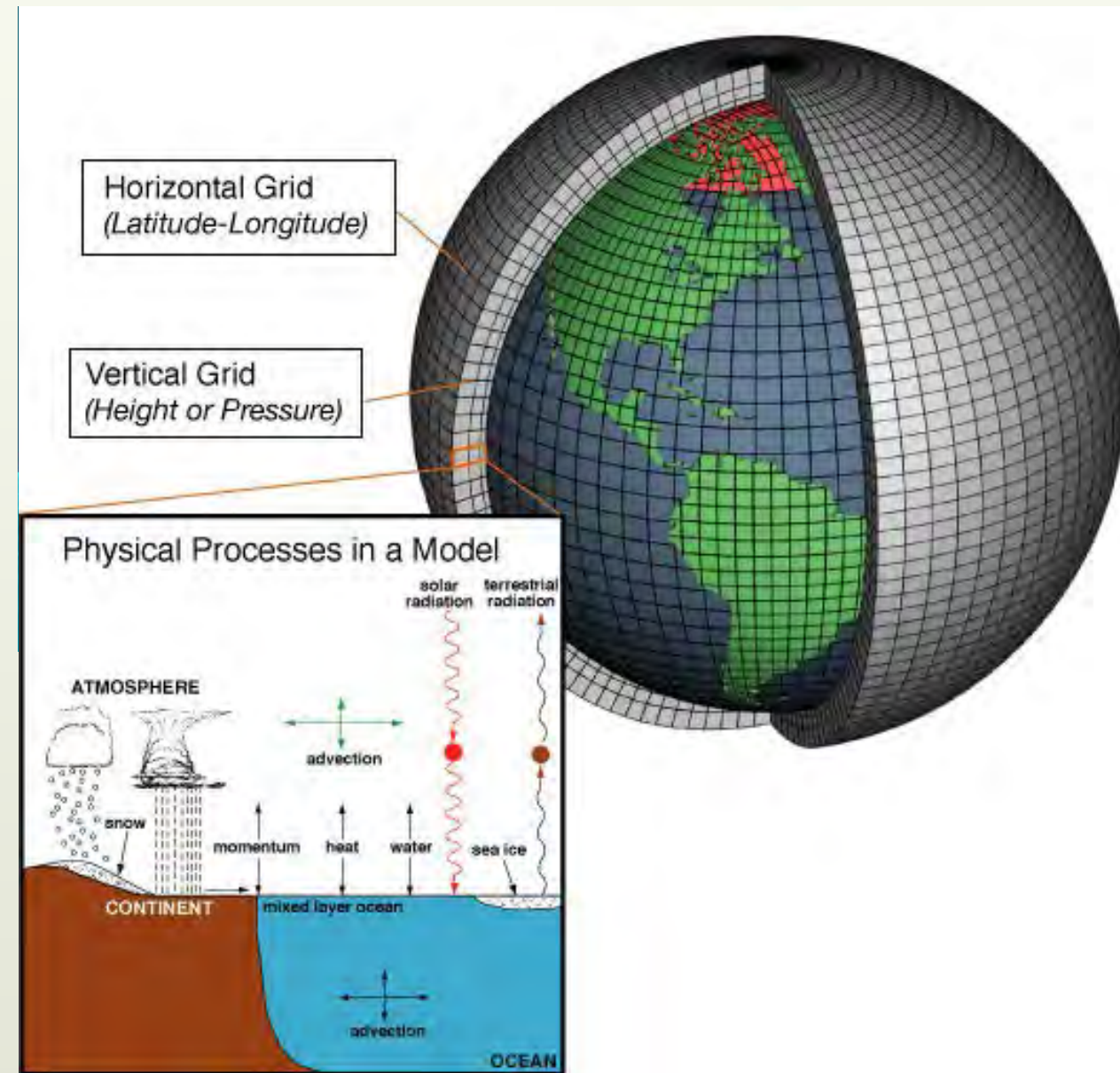
SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Climate is Physics



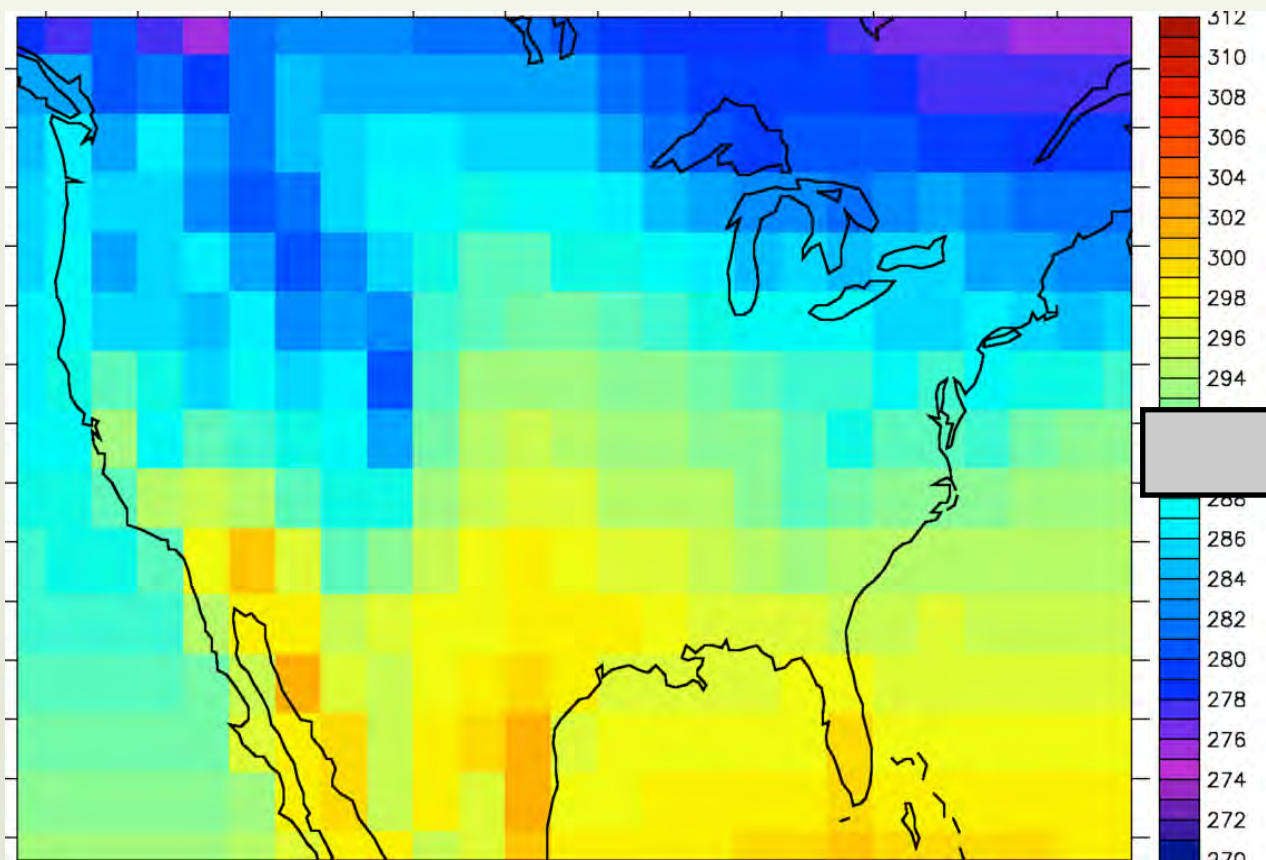
Global Climate Models (GCMs)

- Mathematical representation of interactions
 - ocean, land, ice and atmosphere
- Divide the planet into an immense grid of boxes
 - Calculate these interactions in pieces
- Supercomputers are used to calculate equations representing these physical interactions over time.

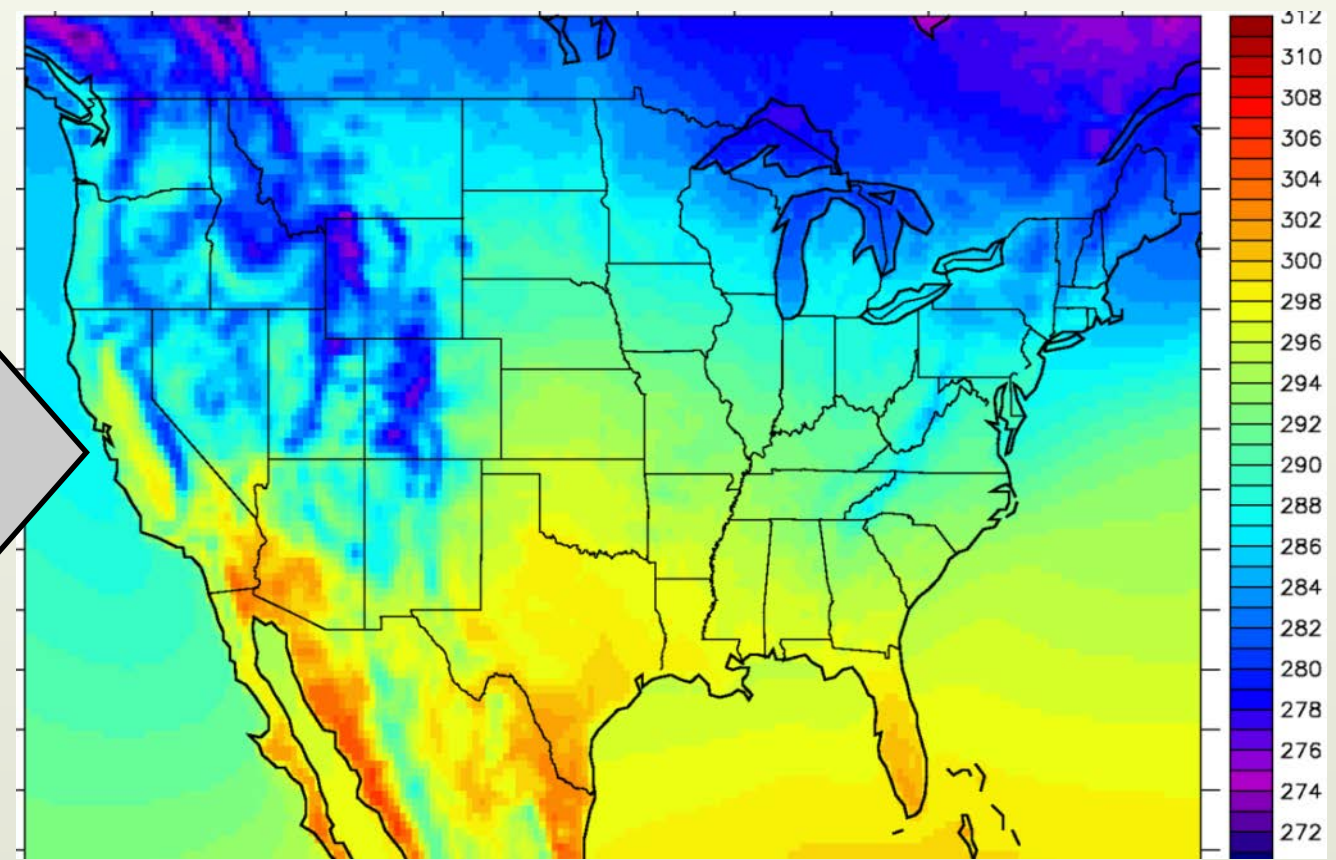


Downscaling

Downscaling - Method to use “coarse resolution” or “low resolution” output (e.g., on 100-500 km grid) from global climate models and obtain “fine resolution” or “high resolution” datasets (e.g., 10-50 km grid) for climate projections



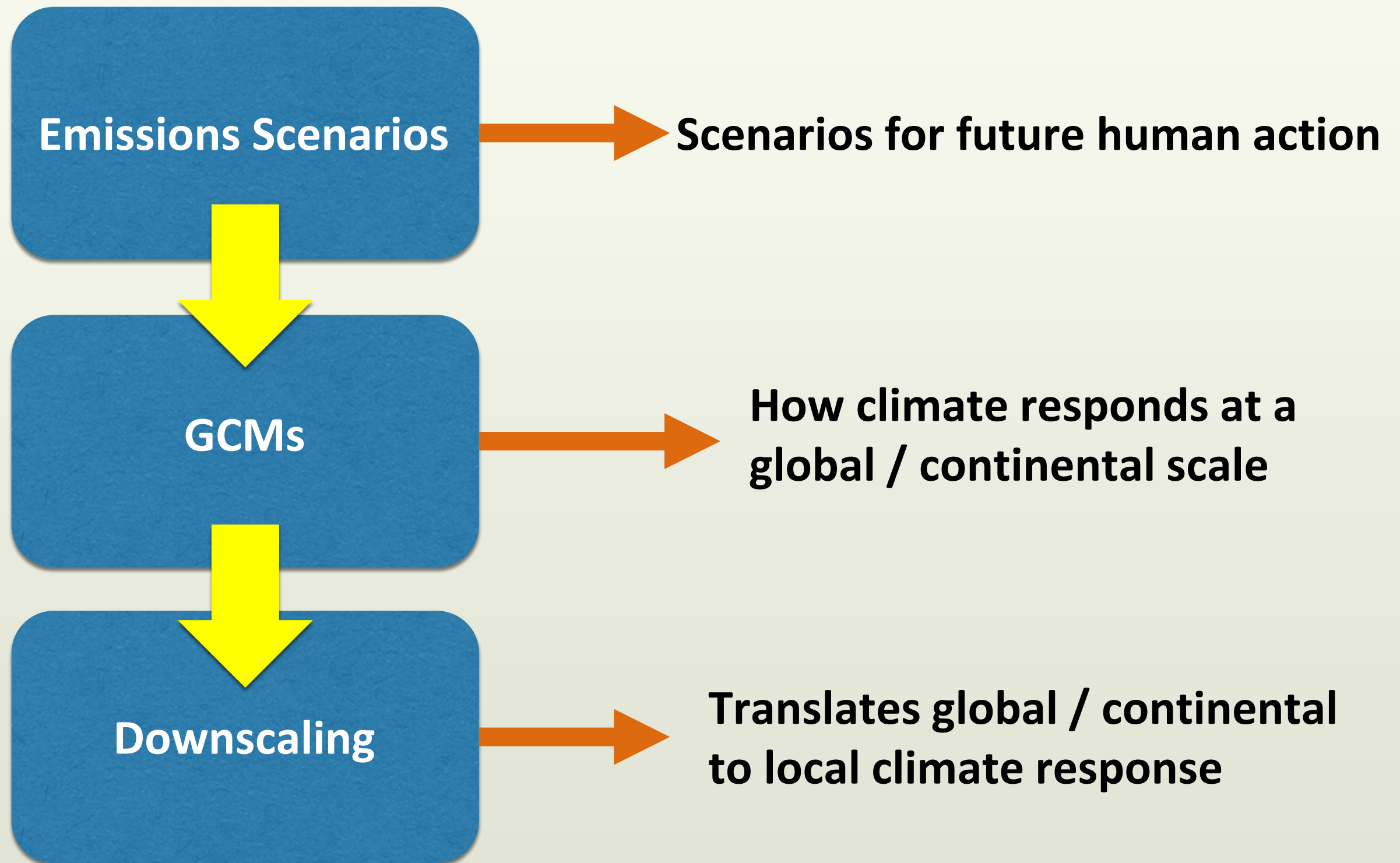
GCM – coarse or low resolution
(e.g., on 100-500km grid)



Downscaled GCM – fine or high
resolution (e.g., on 10-50km grid)



Process to Projections

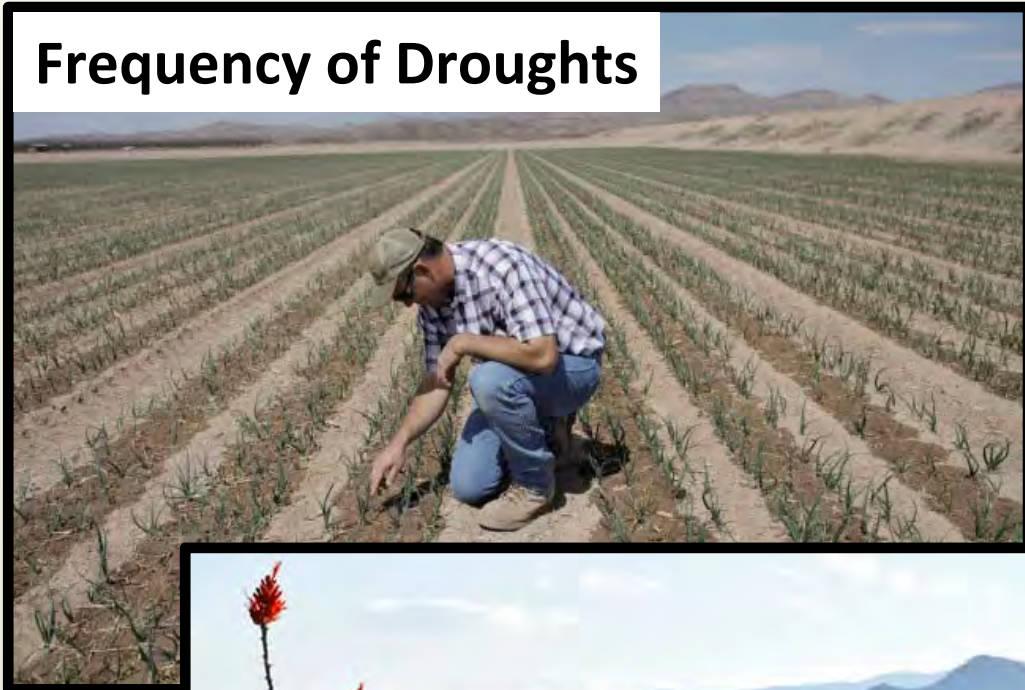


Climate Change and Society

Climate Change – changes in the measures of **climate** that persist over multiple decades or longer.

Why does understanding climate change matter?

Frequency of Droughts



Average High Temperature



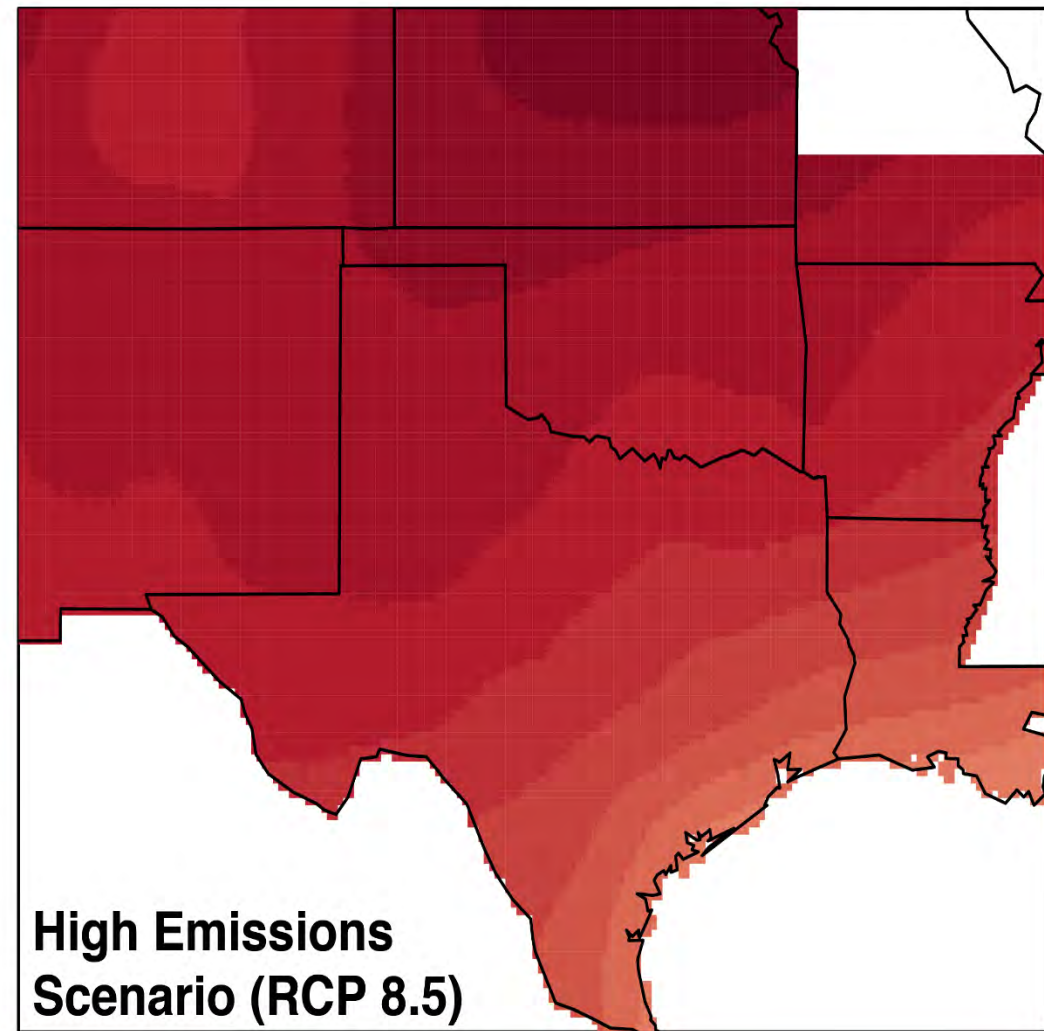
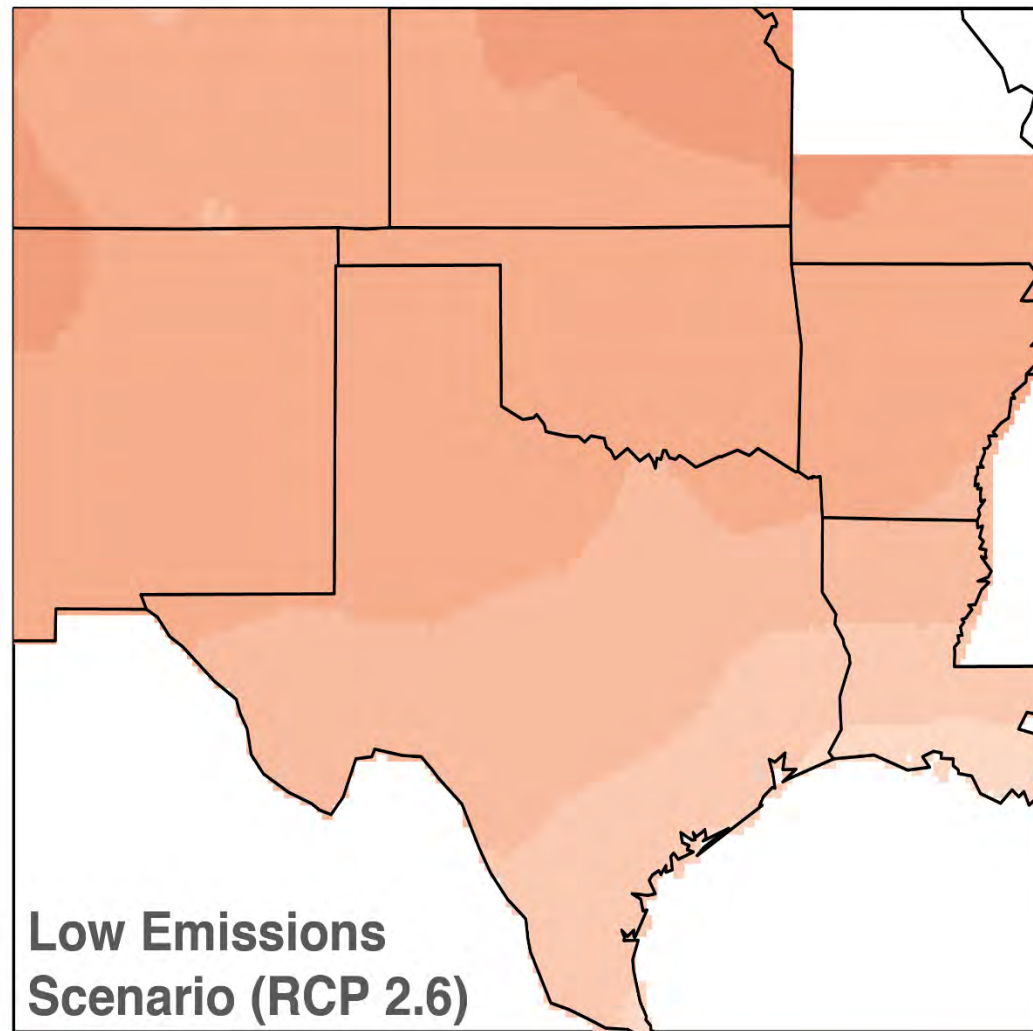
Average Growing Season Length



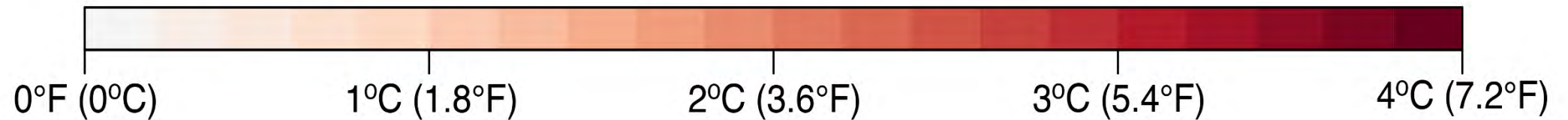
Frequency of Heavy Rains



Projected Change (2041-2070) of the Annual Average High Temperature

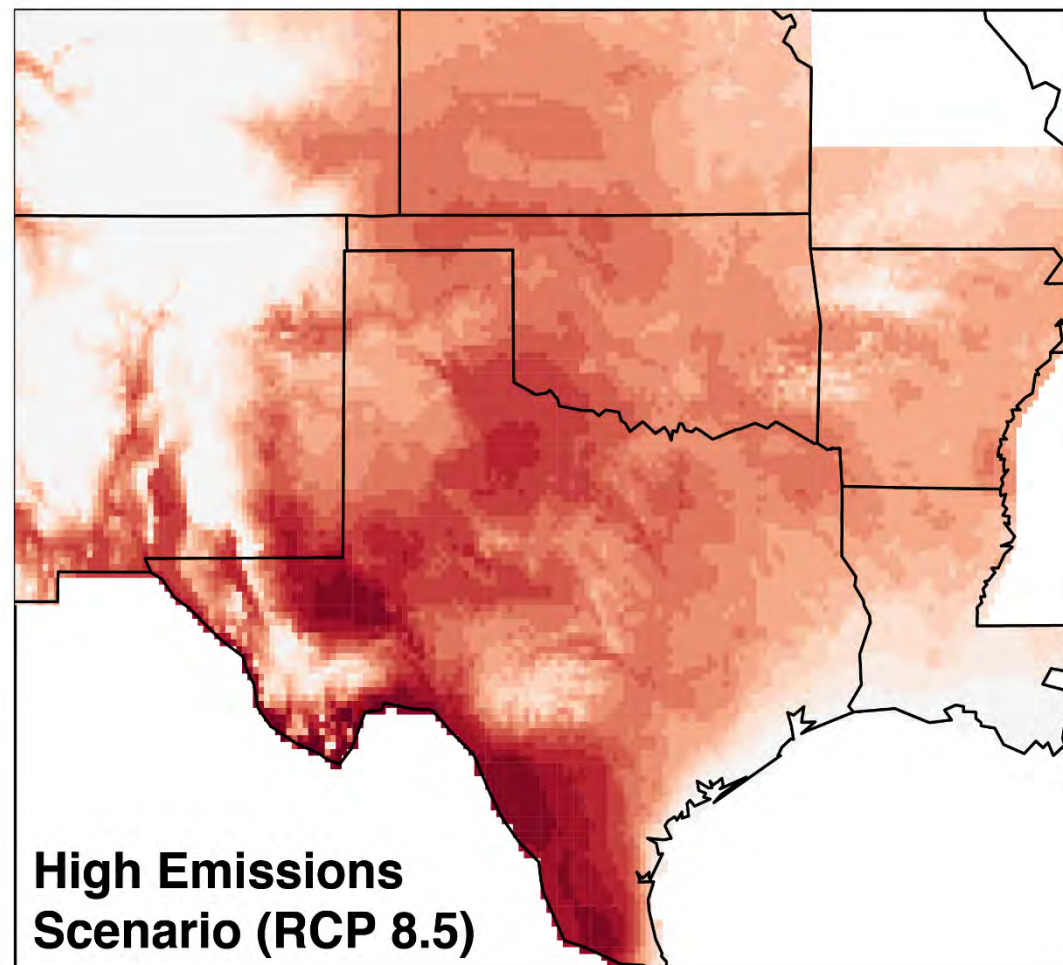
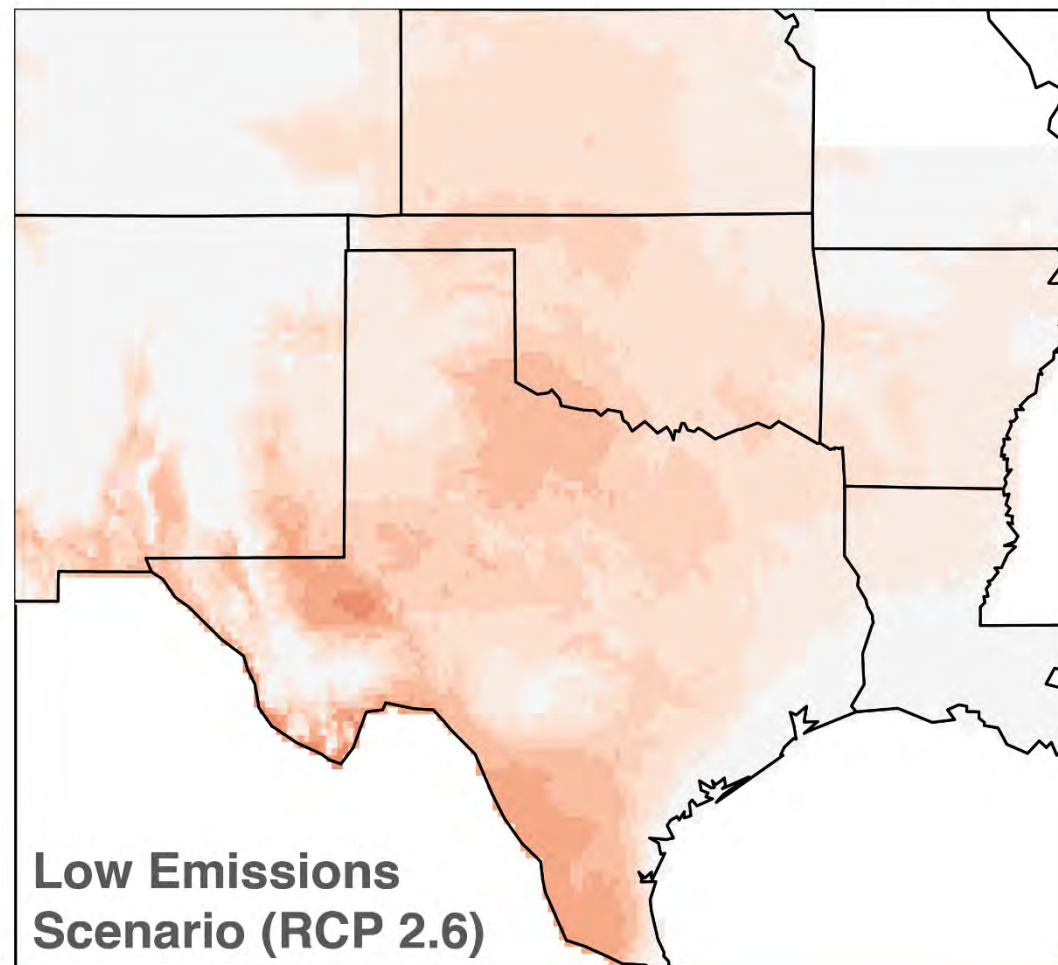


SOUTH CENTRAL
CLIMATE SCIENCE CENTER

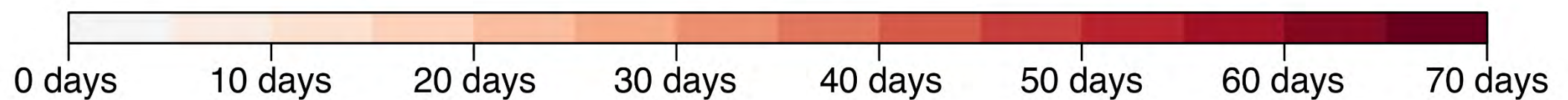


SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Projected Change (2041-2070) of the Average Annual Number of Days the High Temperature is Greater than 100°F

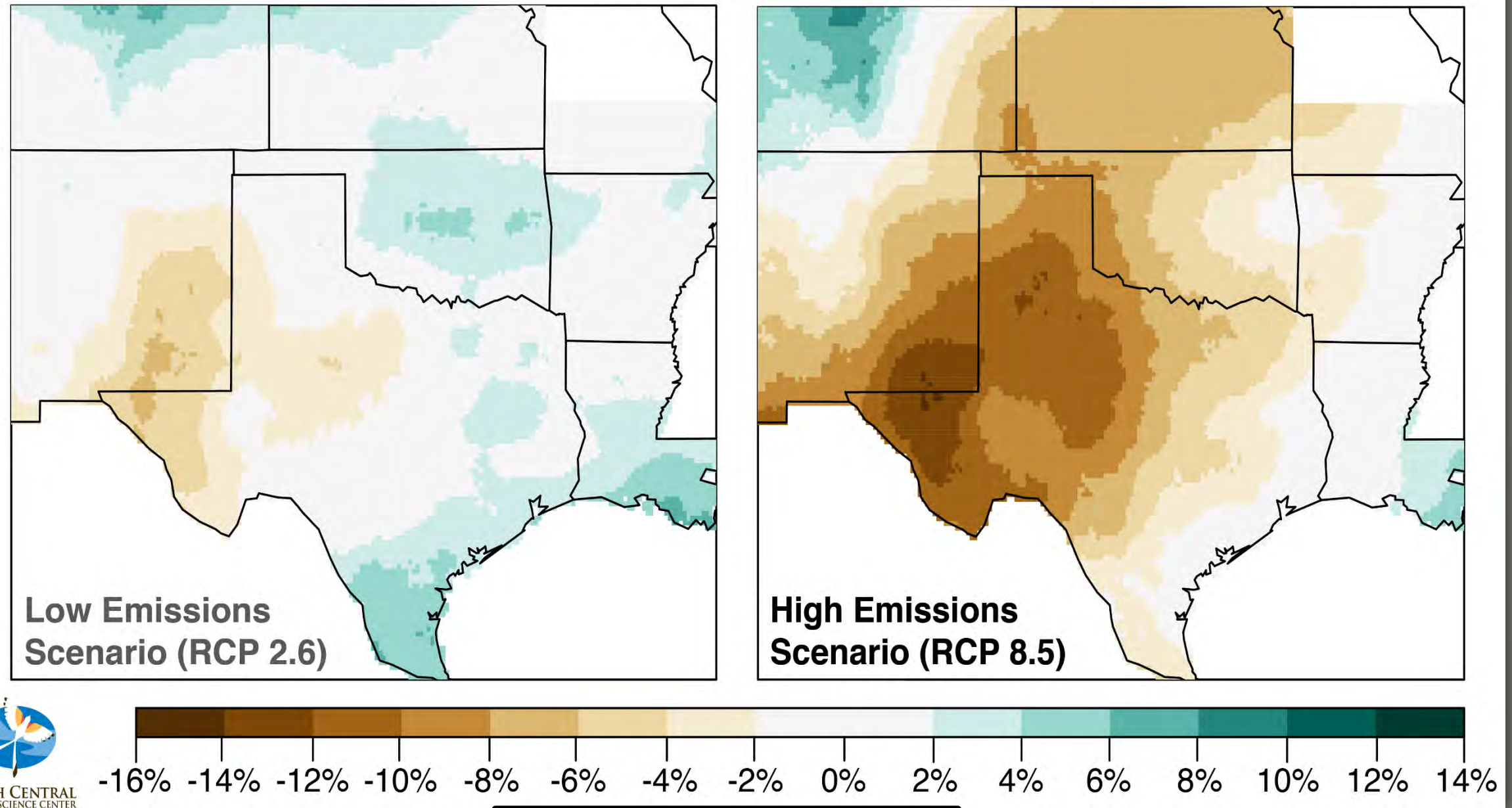


SOUTH CENTRAL
CLIMATE SCIENCE CENTER



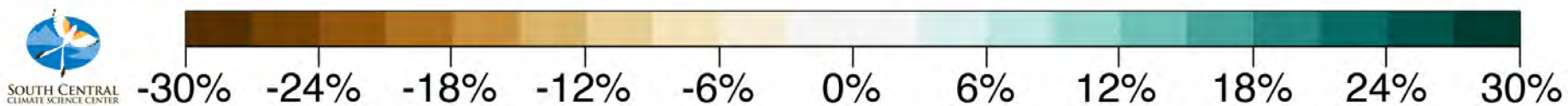
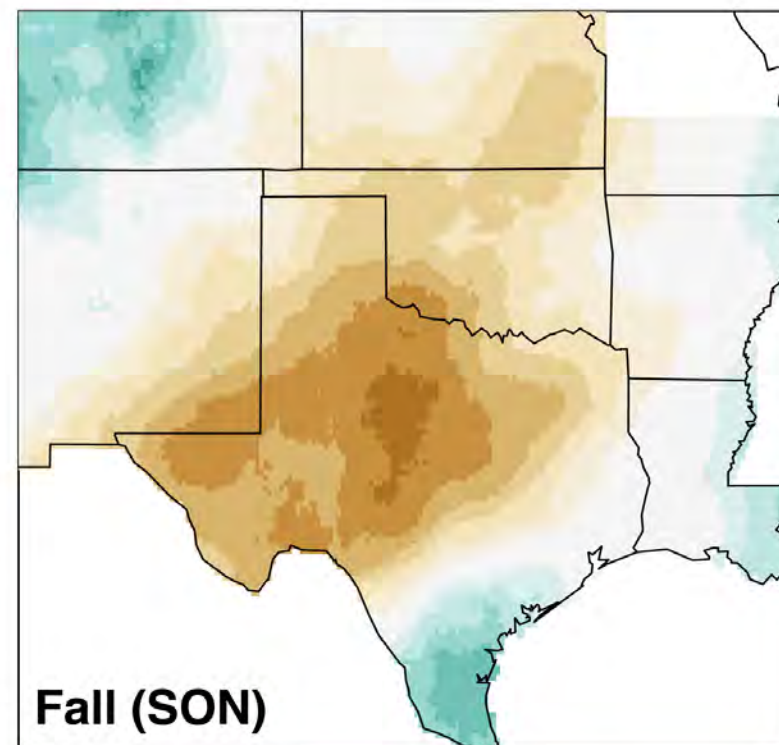
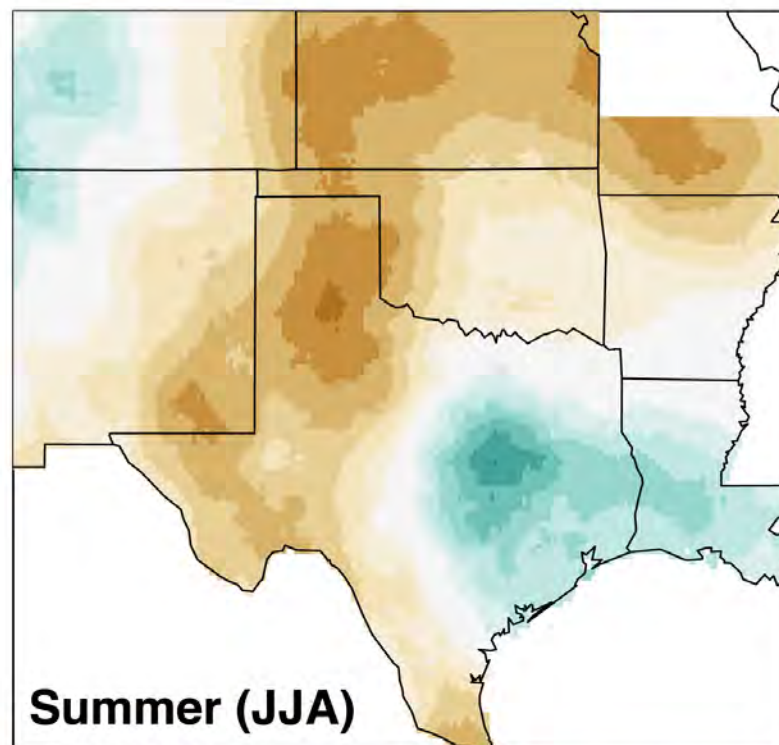
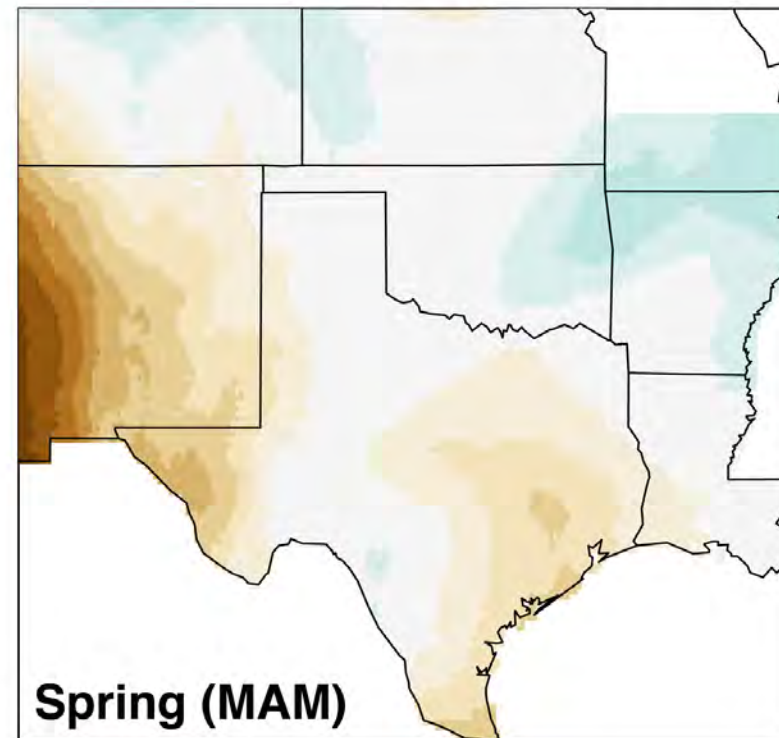
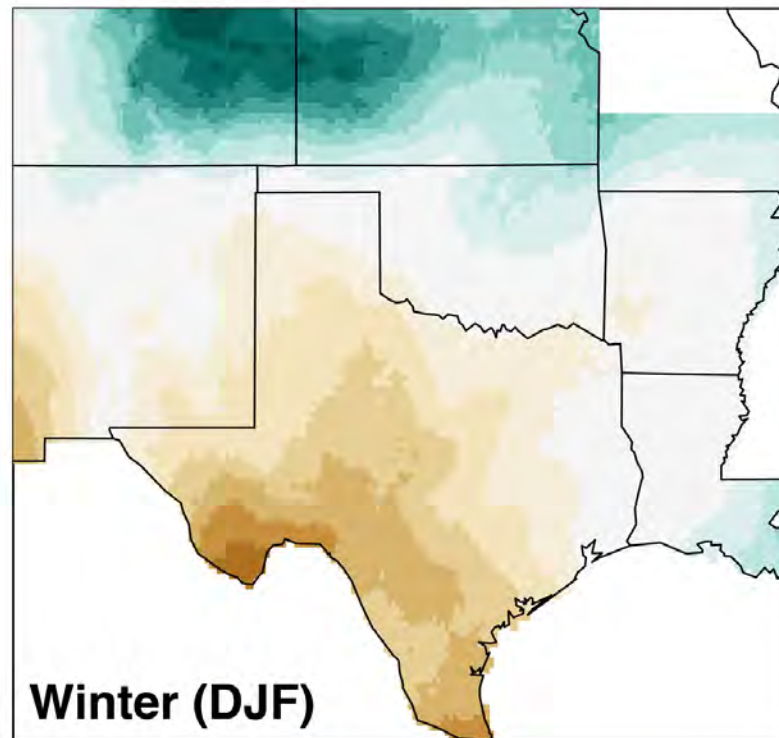
SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Projected Change (2041-2070) of the Average Annual Precipitation



SOUTH CENTRAL
CLIMATE SCIENCE CENTER

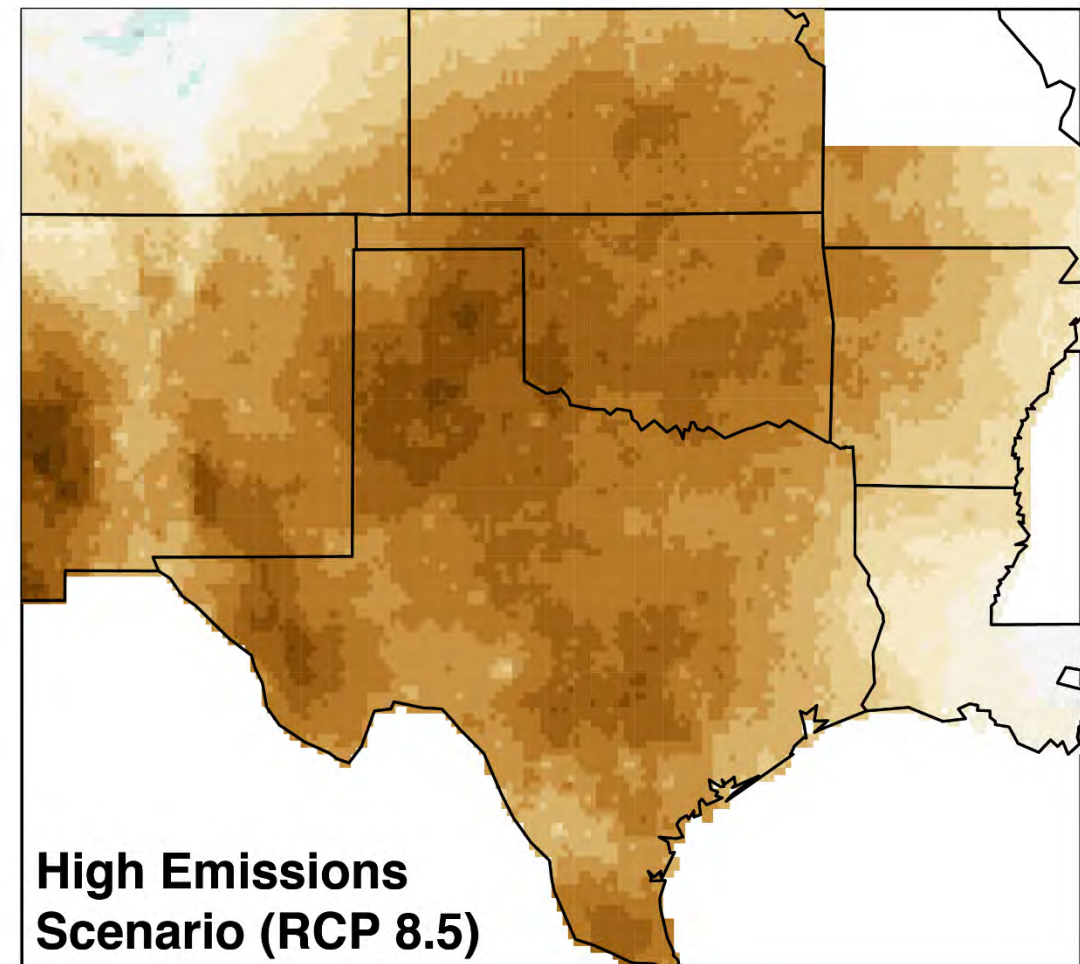
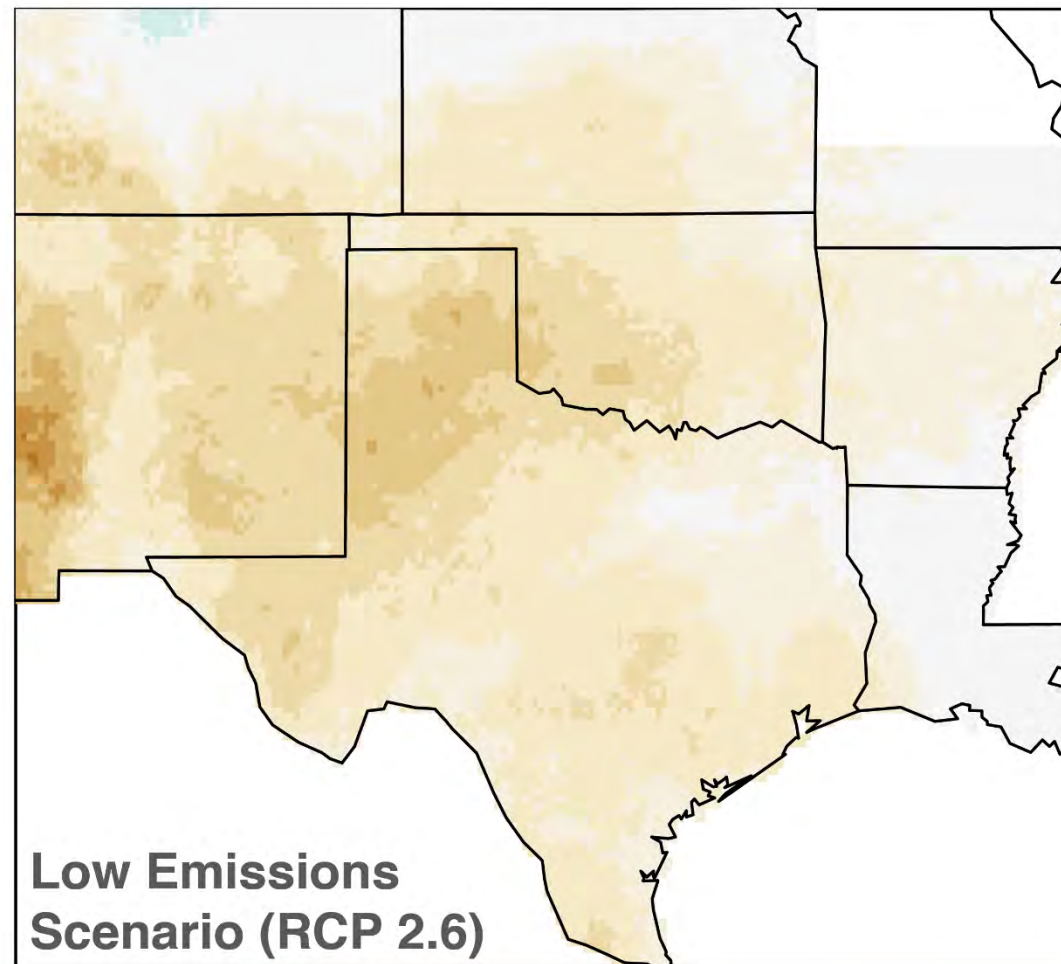
Projected Change (2041-2070) of the Average Seasonal Precipitation - High Emissions Scenario (RCP 8.5)



Seasonal precipitation has a very different projected change for each season.

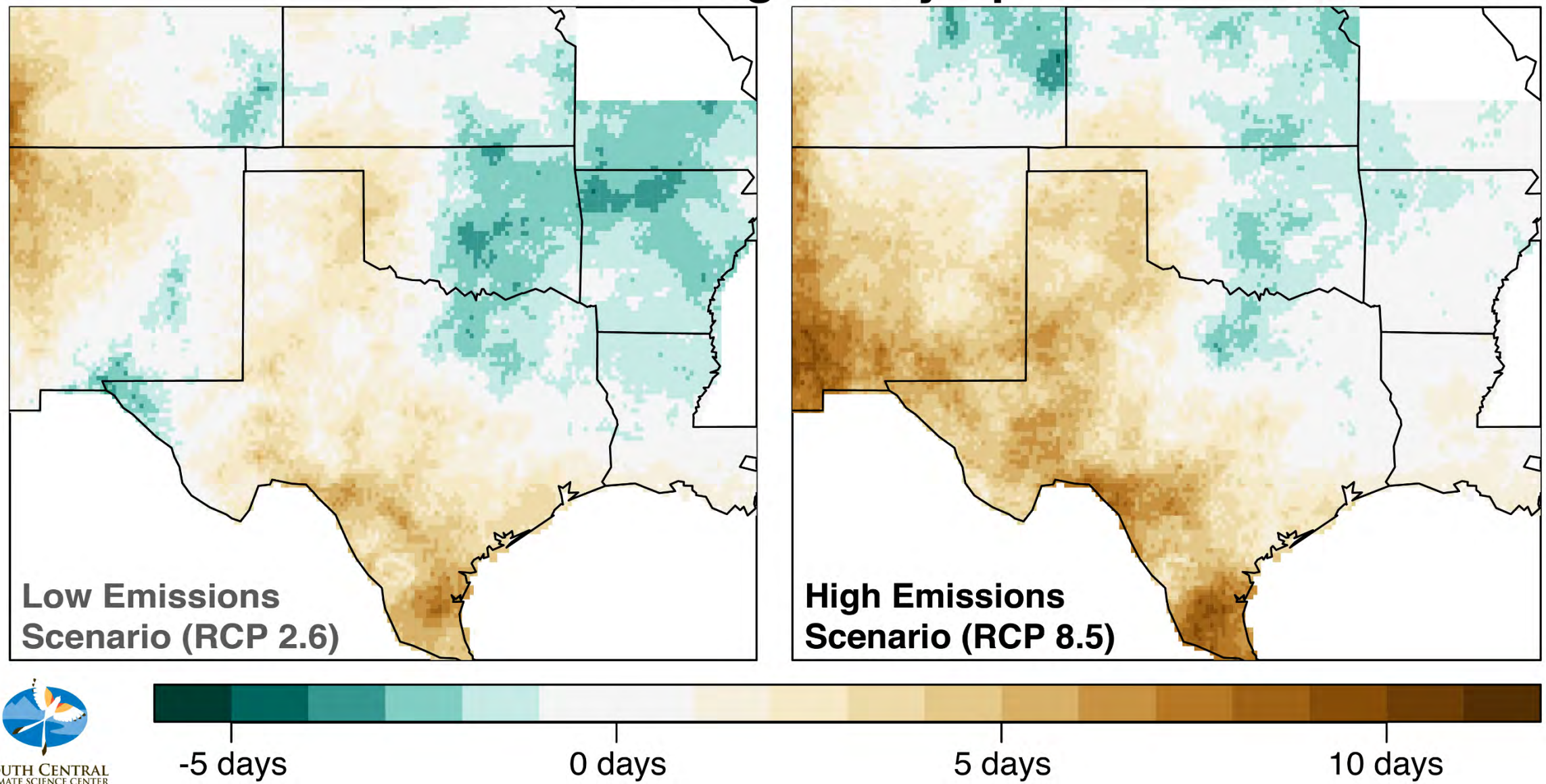


Projected Change (2041-2070) of the Average Annual Number of Days with Precipitation



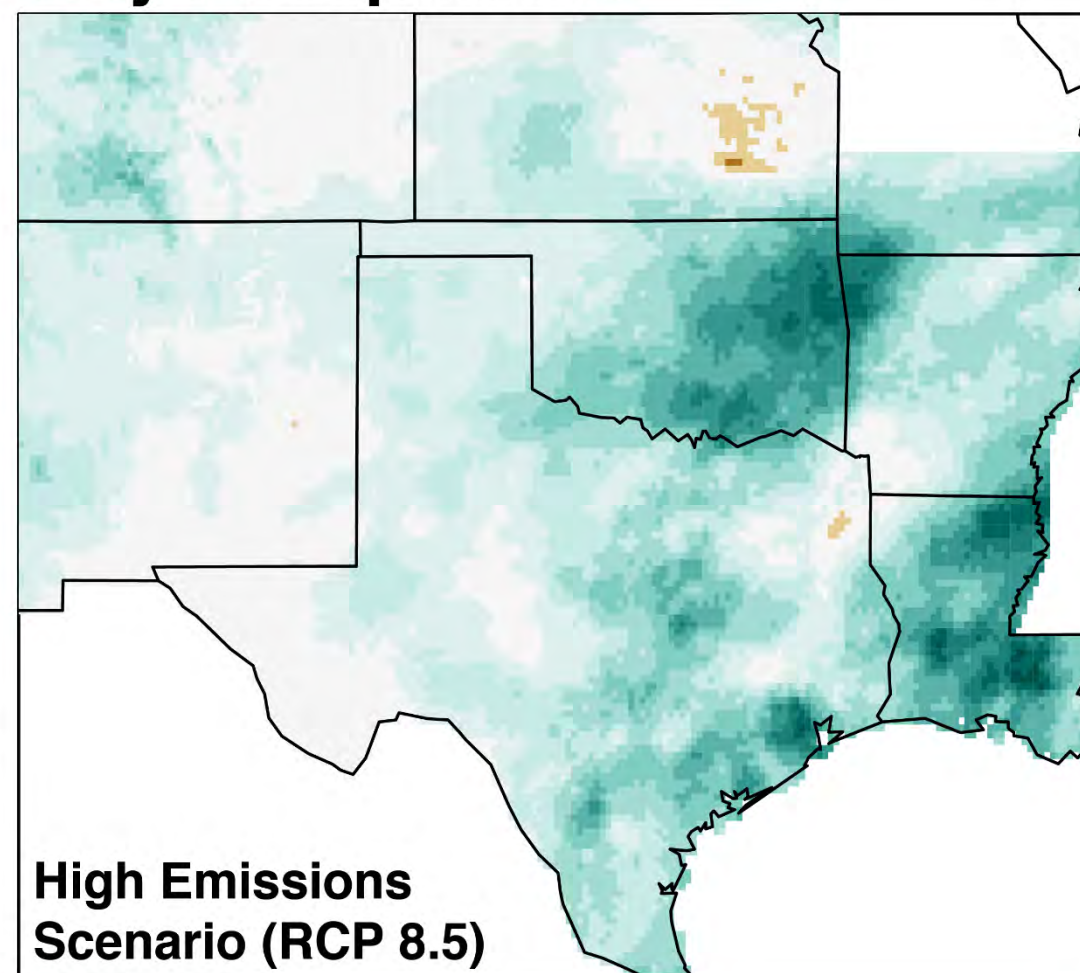
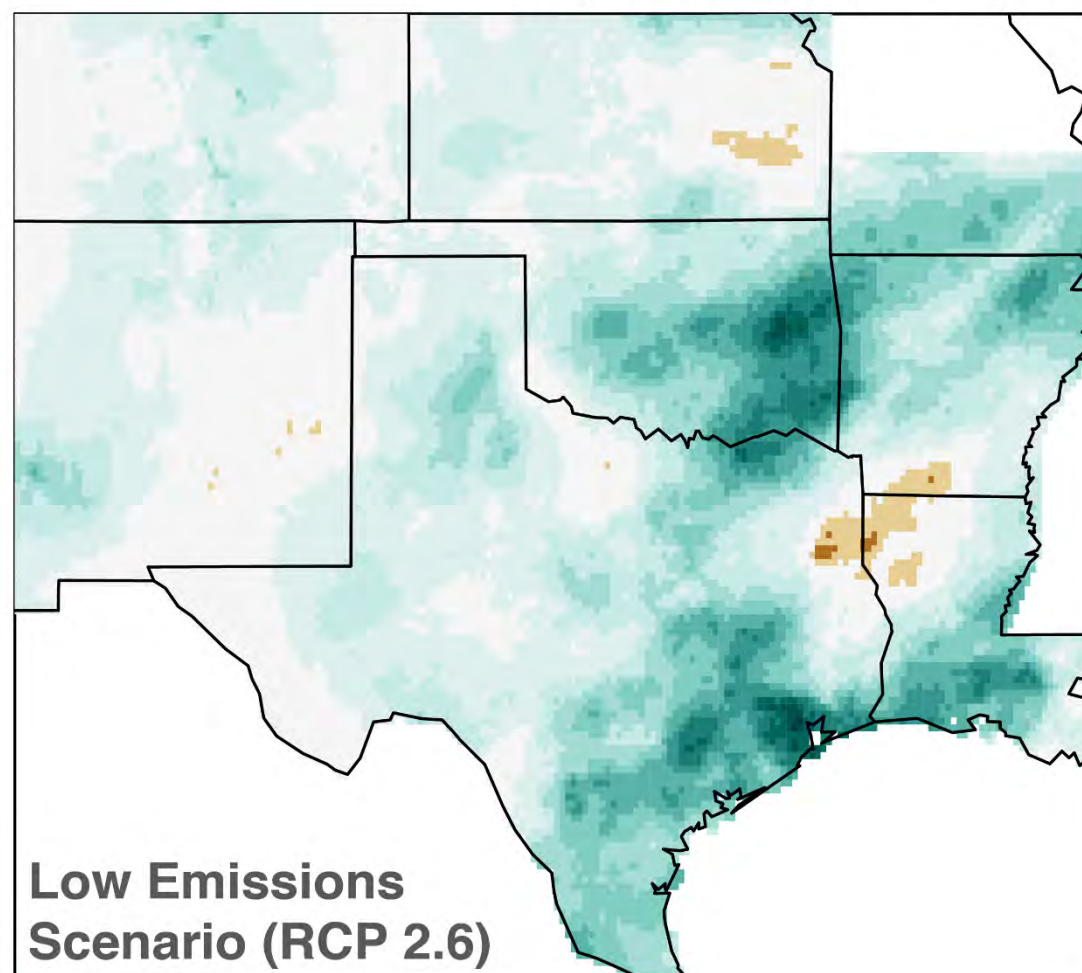
SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Projected Change (2041-2070) of the Average Annual Longest Dry Spell



SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Projected Change (2041-2070) of the Average Annual Maximum 1-Day Precipitation



SOUTH CENTRAL
CLIMATE SCIENCE CENTER



SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Oklahoma's Water Future

- Temperatures are projected to increase
 - Increased frequency of drought
- Precipitation – little change to a decrease projected
 - Drought is a concern, but also flooding with more intense precipitation events.
- But, is this the whole story?



A Word of Caution

Climate projections *can tell you*

- How climate may continue to change

But Climate projections *can't tell you*

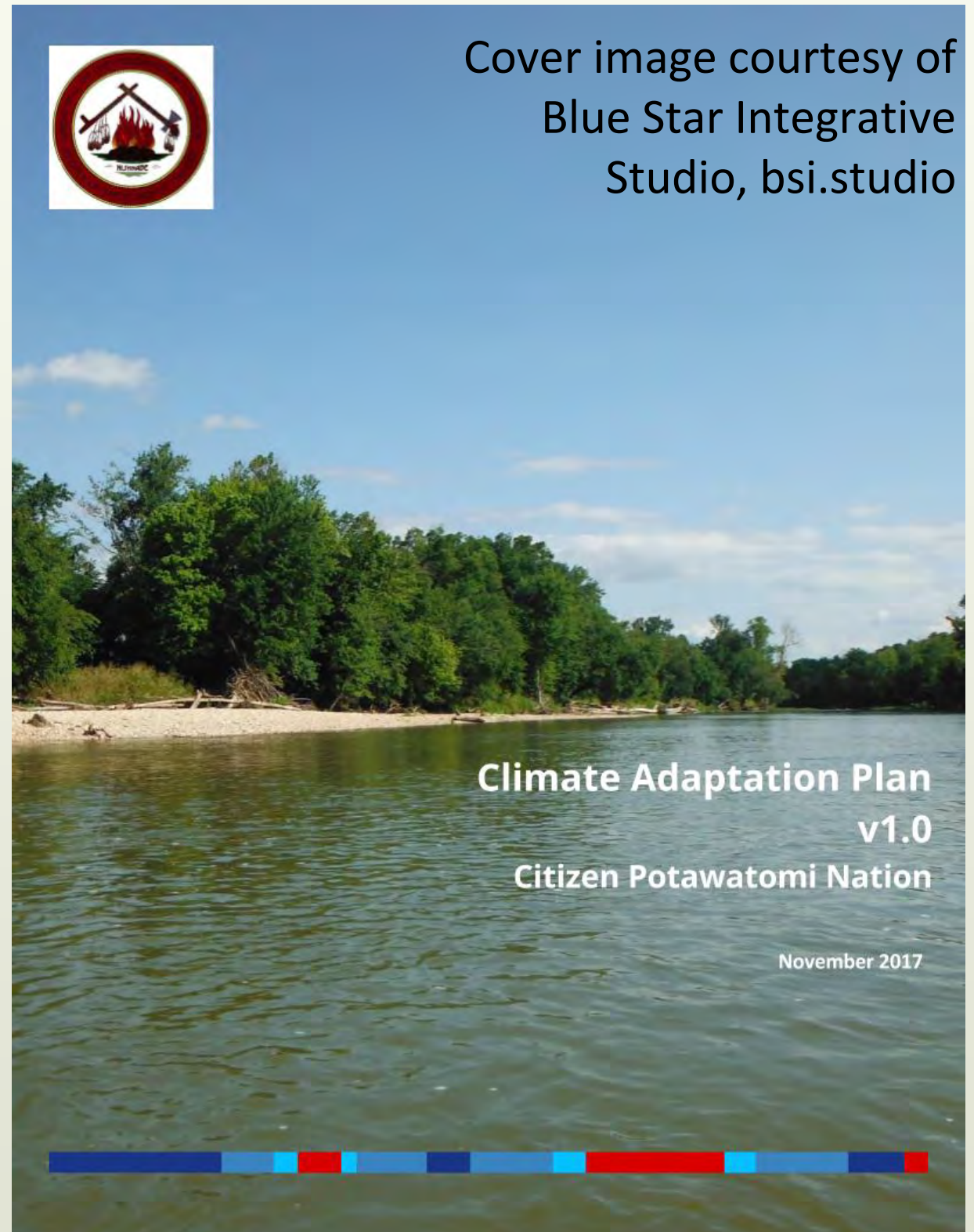
- How risk tolerant you are
- How vulnerable your communities are

You who know the watersheds, lakes, and communities - Ask what if?



Projections in Planning

- Active engagement
 - Direct interaction
 - Getting projections involved (where desired)
- Feedback on needs / wants
 - Science / stakeholder interaction



Cover image courtesy of
Blue Star Integrative
Studio, bsi.studio



SOUTH CENTRAL
CLIMATE SCIENCE CENTER

Questions?

Dr. Adrienne Wootten

amwootte@ou.edu



SOUTH CENTRAL
CLIMATE SCIENCE CENTER