

**Climate Scenarios for Supporting  
Vulnerability Assessment and Decision-  
Making:**

*Basic Considerations and Data Sources*

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Social Sciences Round Table

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# National Response to Climate Change:

Building resilience in the face of climate change is now becoming an urgent imperative for the USG

- Executive Order 13514: "Federal Leadership in Environmental, Energy, and Economic Performance"
  - Mainstreaming climate adaptation: adapting practices and institutional arrangements to cope with climate change and continue to meet agency missions
  - Interagency Climate Change Adaptation Task Force (ICCATF)
  - Strategic development of climate change adaptation plans
  
- The President's Climate Action Plan
  - Cut Carbon Pollution in America
  - Prepare the United States for the Impacts of Climate Change
  - Lead International Efforts to Combat Global Climate Change and Prepare for its Impacts
  
- New Executive Order .... "Preparing the United States for the Impacts of Climate Change"

# The U.S. Global Change Research Program: Roles, Responsibilities, and Partnerships

- The U.S. Global Change Research Program (USGCRP) mandated by Global Change Research Act of 1990
- *“To provide for development and coordination of a comprehensive and integrated United States Research Program which will assist the Nation and the world to **understand, assess, predict, and respond** to human-induced and natural processes of global change.”*
- Provides center of gravity for linking climate science with federal adaptation efforts



# The U.S. National Climate Assessment

Impacts on Places and Socioeconomic Sectors

## Regions & Biogeographical Cross-Cuts

### Sectors

- Water Resources
- Energy Supply and Use
- Transportation
- Agriculture
- Forestry
- Ecosystems and Biodiversity
- Human Health

### Sectoral Cross-Cuts

- Water, Energy, and Land Use
- Urban Systems, Infrastructure, and Vulnerability
- Impacts of Climate Change on Tribal, Indigenous, and Native Lands and Resources
- Land Use and Land Cover Change
- Rural Communities
- Biogeochemical Cycles

Oceans and  
Marine  
Resources

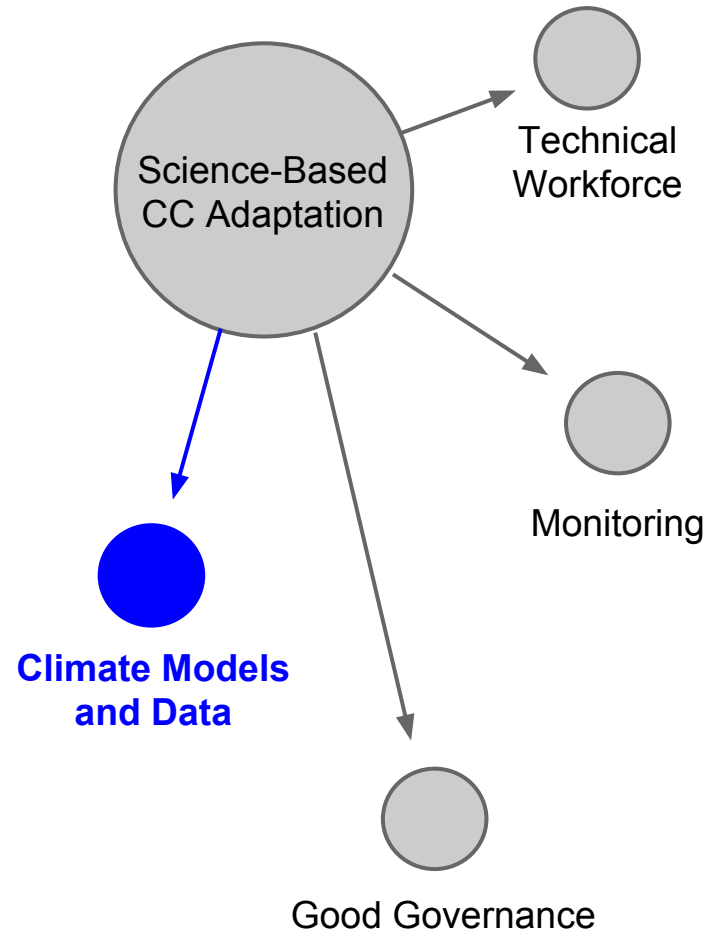


Coasts,  
Development,  
and Ecosystems

# National Need for Information to Support Climate Adaptation

Often need quantitative, analytical guidance to support adapting natural resource management, environmental protection, public health, infrastructure, disaster preparedness,, etc.

- The climate science enterprise has key role to play here, but ...
- **What data, what models, how to deal with uncertainty?**
- **Analysis paralysis**



- "I know that climate change is something I need to pay attention to, but how do I sort through the information and data that are out there to identify what's most relevant to me?"
- "What kind of predictions do climate models make for my region/watershed?"
- "How 'good' are these models?"
- "Which is the 'best' model?"
- "Do I need to do downscaling to have accurate information for my region?"
- "Is it true that these model simulations are so uncertain that we cannot use their output for anything practical?"
- "If I'm not getting accurate, regional-scale predictions from climate science, what good is it to me?"

# Turn the problem upside-down:

- Start with the decision context, not with future climate
- With a team of scientists and stakeholders, collectively develop understanding of the sensitivity of your system and your decision to climate variability and change
- This process provides insight into the uncertainties and knowledge gaps that actually matter to your problem
- You can then use this insight to tailor selection of climate science information and other data - sample widely over only those aspects important to your specific problem, and only to the level of detail needed
- Inherently participatory: Increases the credibility, relevance, and legitimacy of the scientific information in the decision process

# It might rain tomorrow, but ... what do you have planned?



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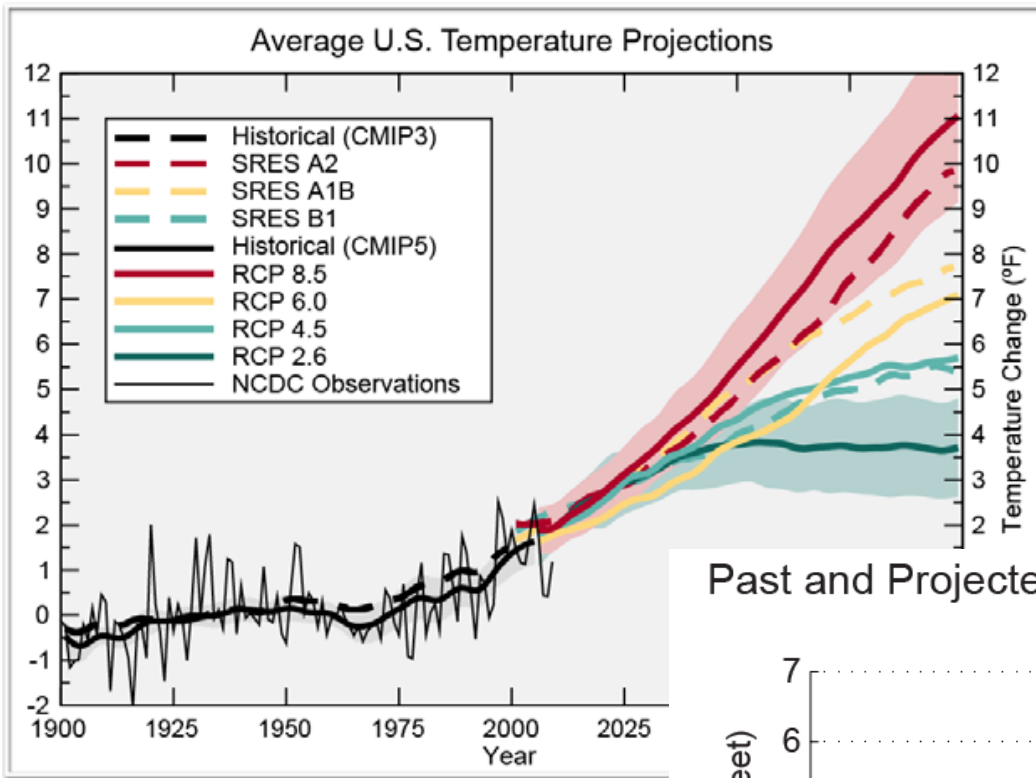


# **Climate Scenario Information**

Data Sources

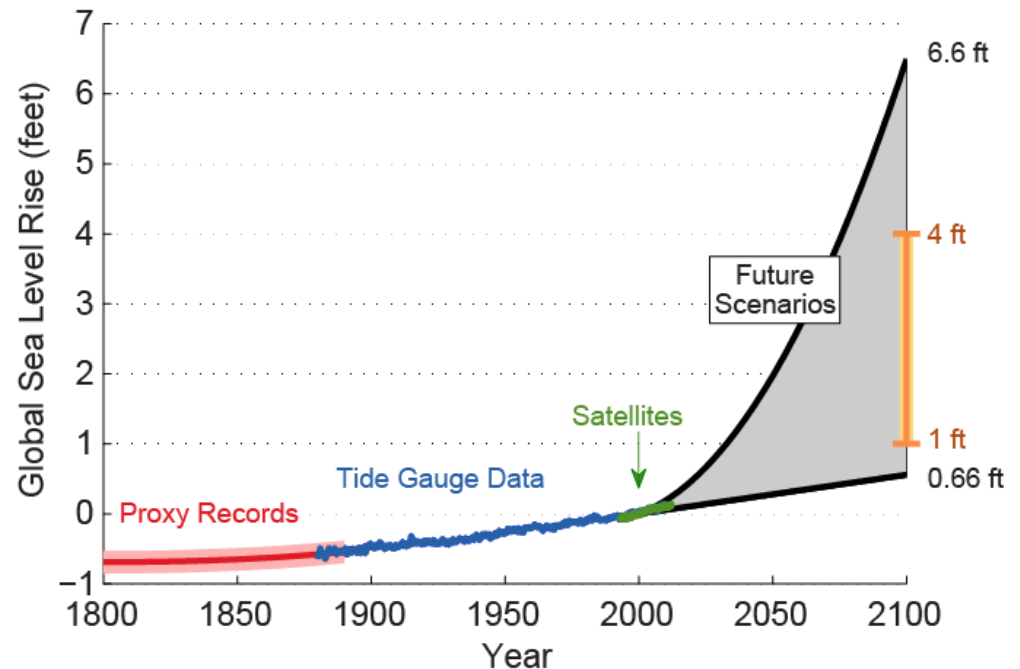
Confidence/What's Known

Applications



Temperature  
Precipitation  
Sea Level

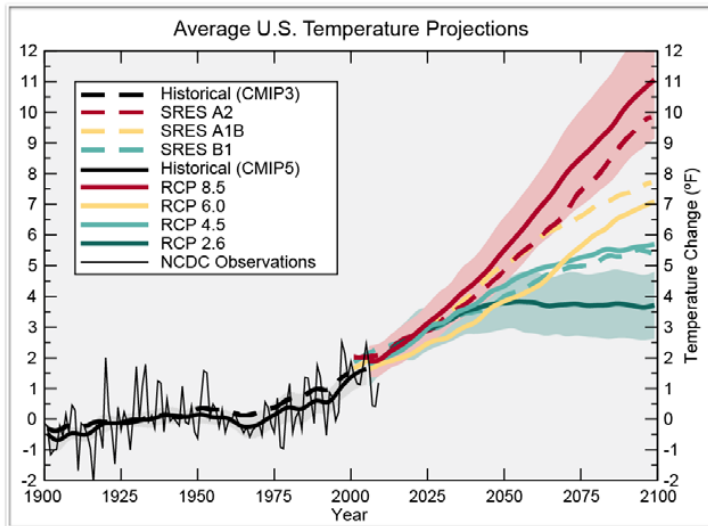
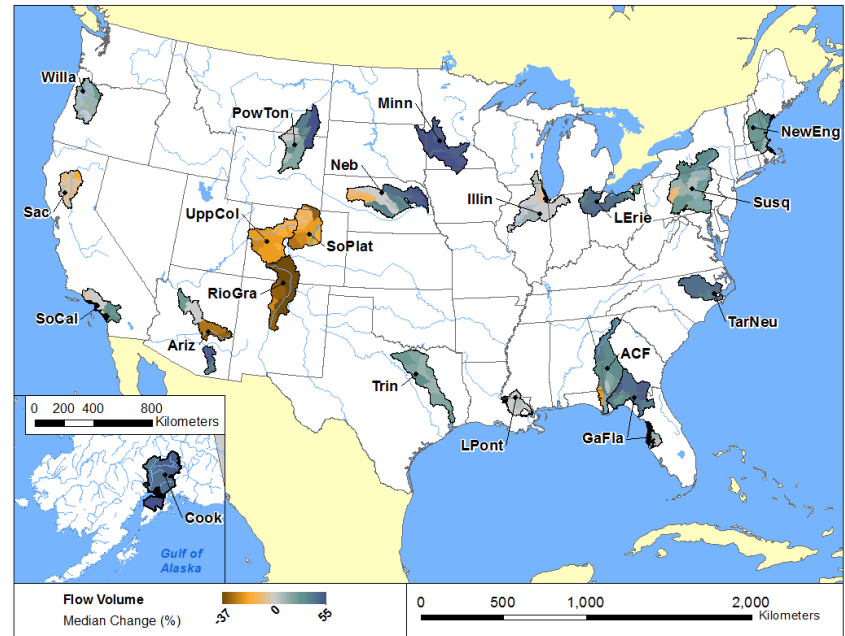
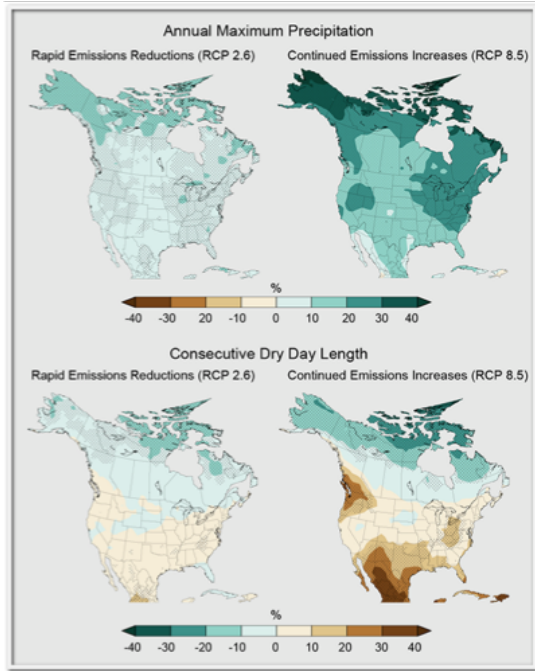
Past and Projected Changes in Global Sea Level Rise



Scenarios Sources:  
Observed Trends  
Historical Analogues  
Paleo Proxies  
Model Simulations

# Derived Quantities:

- Streamflow
- Soil Moisture
- Growing Season
- Extreme Indices



# What about confidence? A tricky question ... some stuff we understand pretty well:

- Average temps up; loss of snowpack; spring earlier/fall later
- We might/might not have more, or stronger, extreme weather events (storms) as a result of climate change
- For four types of events in particular climate change is altering conditions so that impact of future extreme weather events will probably be even more severe than today:
  - SLR will tend to increase the risk of severe inundation for any given coastal storm
  - Increased atmospheric moisture content will tend to lead to larger volumes of rainfall during heavy precipitation events
  - More, and more severe, heat waves
  - Increased temperatures (esp. in continental interiors), will also tend to lead to increased evapotranspiration and drier soils → deeper/longer droughts

# Key Data Sources Links

USGCRP: <http://www.globalchange.gov/>

The National Climate Assessment Draft Report: <http://ncadac.globalchange.gov/>

## National Climate Assessment Scenarios Products:

- Regional Summaries: <http://scenarios.globalchange.gov/node/1155>
- Sea Level Rise: <http://scenarios.globalchange.gov/report/global-sea-level-rise-scenarios-united-states-national-climate-assessment>
- Sea Level Rise Planning Tool for Sandy Recovery: <http://globalchange.gov/what-we-do/assessment/coastal-resilience-resources>

## External Climate Scenario Data Resources:

- North American Regional Climate Change Assessment Program (NARCCAP): <http://www.narccap.ucar.edu/>
- LLNL IPCC CMIP3 and CMIP5 Archive: <http://www-pcmdi.llnl.gov/>
- Bureau of Reclamation Downscaled CMIP3 and CMIP5 Portal: [http://gdo-dcp.ucllnl.org/downscaled\\_cmip\\_projections/](http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/)
- NASA Earth Exchange Downscaled CMIP5 Portal: [https://portal.nccs.nasa.gov/portal\\_home/published/NEX.html](https://portal.nccs.nasa.gov/portal_home/published/NEX.html)
- USGS Geo Data Portal: <http://cida.usgs.gov/gdp/>
- Climate Wizard: <http://www.climatewizard.org/>