



Federally Supported Global Change Research, Assessment, and Response

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*General Services Administration
Green Building Advisory Committee*



U.S. Global Change Research Program
**National Climate
Assessment**

Main themes

- The U.S. Global Change Research Program provides the best available science for agencies responding to changes in our climate
- The National Climate Assessment (NCA) delivers an assessment of the state of the climate and action in the U.S.
- The latest NCA report was released as a draft from the federal advisory committee in January 2013 at ncadac.globalchange.gov
- Major increase in Federal activities on adaptation research and response

US Global Change Research Program

Global Change Research Act
(1990) Mandate:

“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.”



United States
Global Change
Research Program



13 Federal Departments & Agencies +
Executive Office of the President



U.S. Global Change Research Program
**National Climate
Assessment**

National Climate Assessment: GCRA (1990), Section 106

...not less frequently than every 4 years, the Council... shall prepare... an assessment which –

- integrates, evaluates, and interprets the findings of the Program (USGCRP) and discusses the scientific uncertainties associated with such findings;
- analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
- analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.

The “New” National Climate Assessment



Goal

- Enhance the ability of the United States to **anticipate, mitigate, and adapt** to changes in the global environment.

Vision

- Advance an **inclusive, broad-based, and sustained process** for assessing and communicating scientific knowledge of the impacts, risks, and vulnerabilities associated with a changing global climate in support of decision-making across the United States.



Goals for the NCA

- A **sustained process** for **informing an integrated research program**
- A scientific foundation for decision support, including **scenarios and other tools at multiple scales**
- **Evaluation** of the implications of alternative **adaptation and mitigation options**
- **Community building** within regions and sectors that can lead to enhanced resilience



U.S. Global Change Research Program

**National Climate
Assessment**

Outcomes of the NCA

- **Ongoing, relevant, highly credible analysis** of scientific understanding of climate change impacts, risk, and vulnerability
- Enhanced timely **access to Assessment-related data** from multiple sources useful for decision making
- **National indicators** of change and the capacity to respond

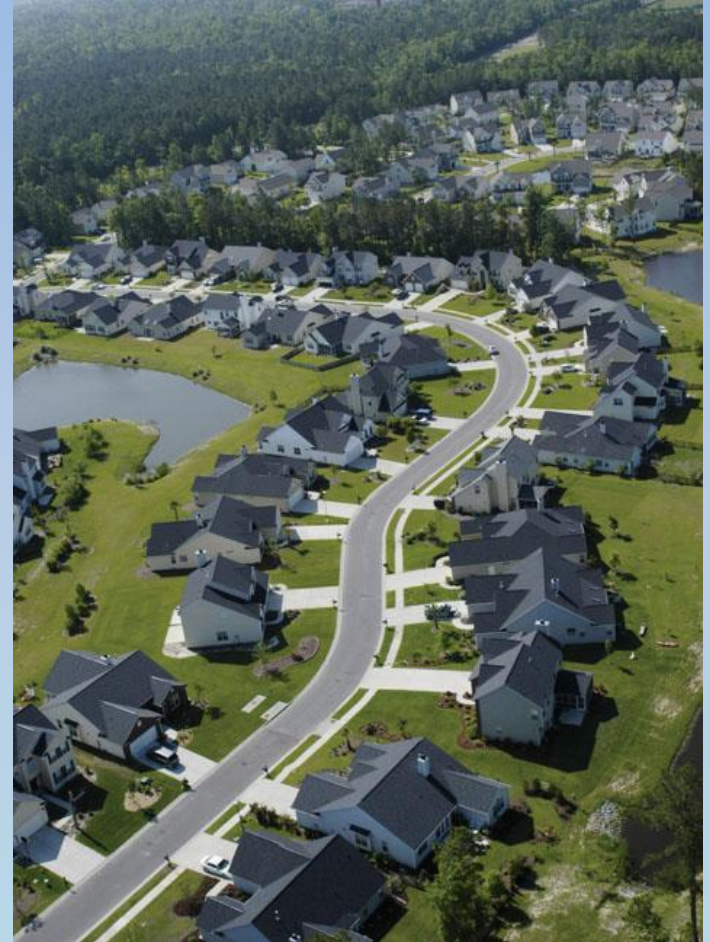


Process to Date

- Interagency Working Group (INCA, 13+ agencies) plans and manages federal components
- 60 member National Climate Assessment and Development Advisory Committee (NCADAC) responsible for development the Third NCA Report and providing advice on the sustained NCA process
- 240 authors selected by NCADAC, from academic, public, and private sectors... and 800 contributors to technical input documents
- 80+ members in NCAnet, a network of partners (mostly) outside of the federal government that connects the NCA to assessment stakeholders

Outline for Third NCA Report

- Letter to the American People
- Executive Summary: Report Findings
- Our Changing Climate
- Sectors & Sectoral Cross-cuts
- Regions & Biogeographical Cross-cuts
- Responses
 - Decision Support
 - Mitigation
 - Adaptation
- Agenda for Climate Change Science
- The NCA Long-term Process
- Appendices
 - Commonly Asked Questions
 - Expanded Climate Science Info



Sectors

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



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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



Regions & Biogeographical Cross-Cuts

Oceans and
Marine
Resources



Coasts,
Development,
and Ecosystems



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New Scenarios

www.scenarios.globalchange.gov

- Regional climatologies and projections
- Global Sea level rise scenarios

Sea Level Rise: Past, Present, Future

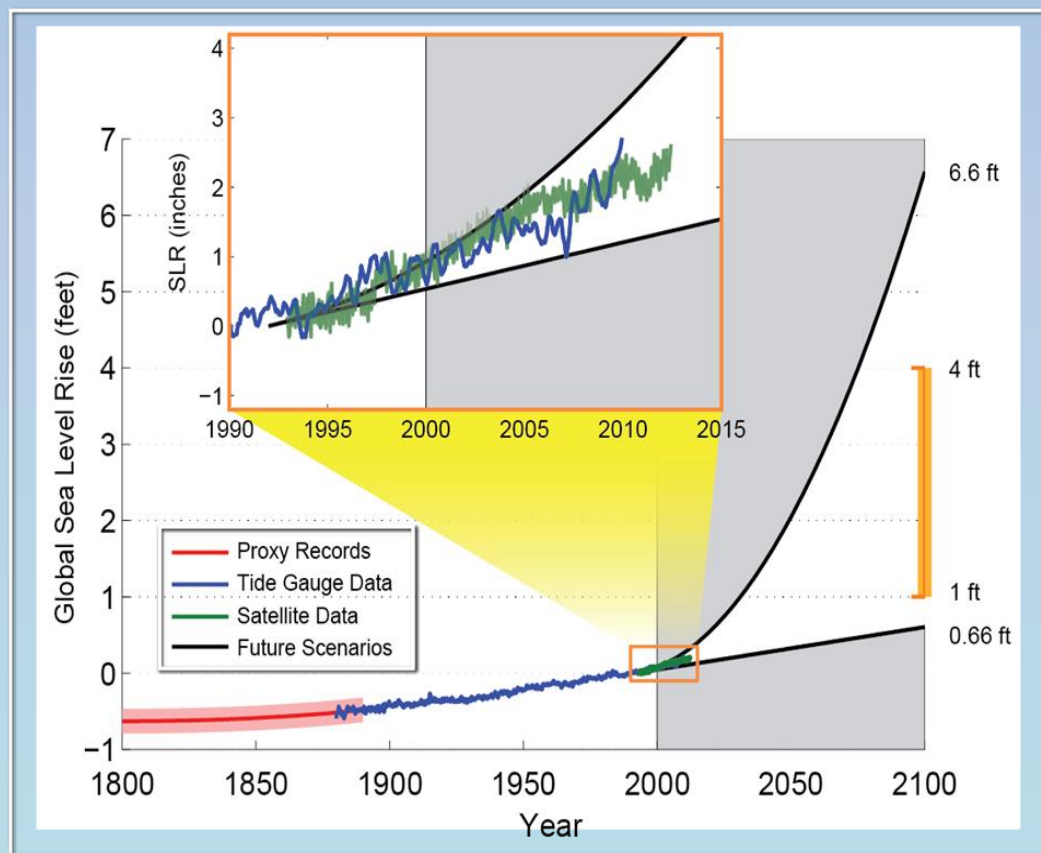


Figure source: Josh Willis, NASA
Jet Propulsion Laboratory

NCA Risk & Decision-Support Framing

- Importance of underlying vulnerabilities
- Assessments of the state of Adaptation, Mitigation and Decision Support
- Inter-sectoral links and cascading effects
 - Water, Energy & Land
 - Biogeochemical Cycles
 - Tribal Resources
 - Land Use & Land Cover
 - Rural Communities
 - Urban Systems, Infrastructure and Vulnerability
 - Coastal Zones, Development and Ecosystems
 - Oceans and Marine Resources – new topic for NCA

Intersecting systems can either increase resilience or result in catastrophic failure - cascading effects through systems

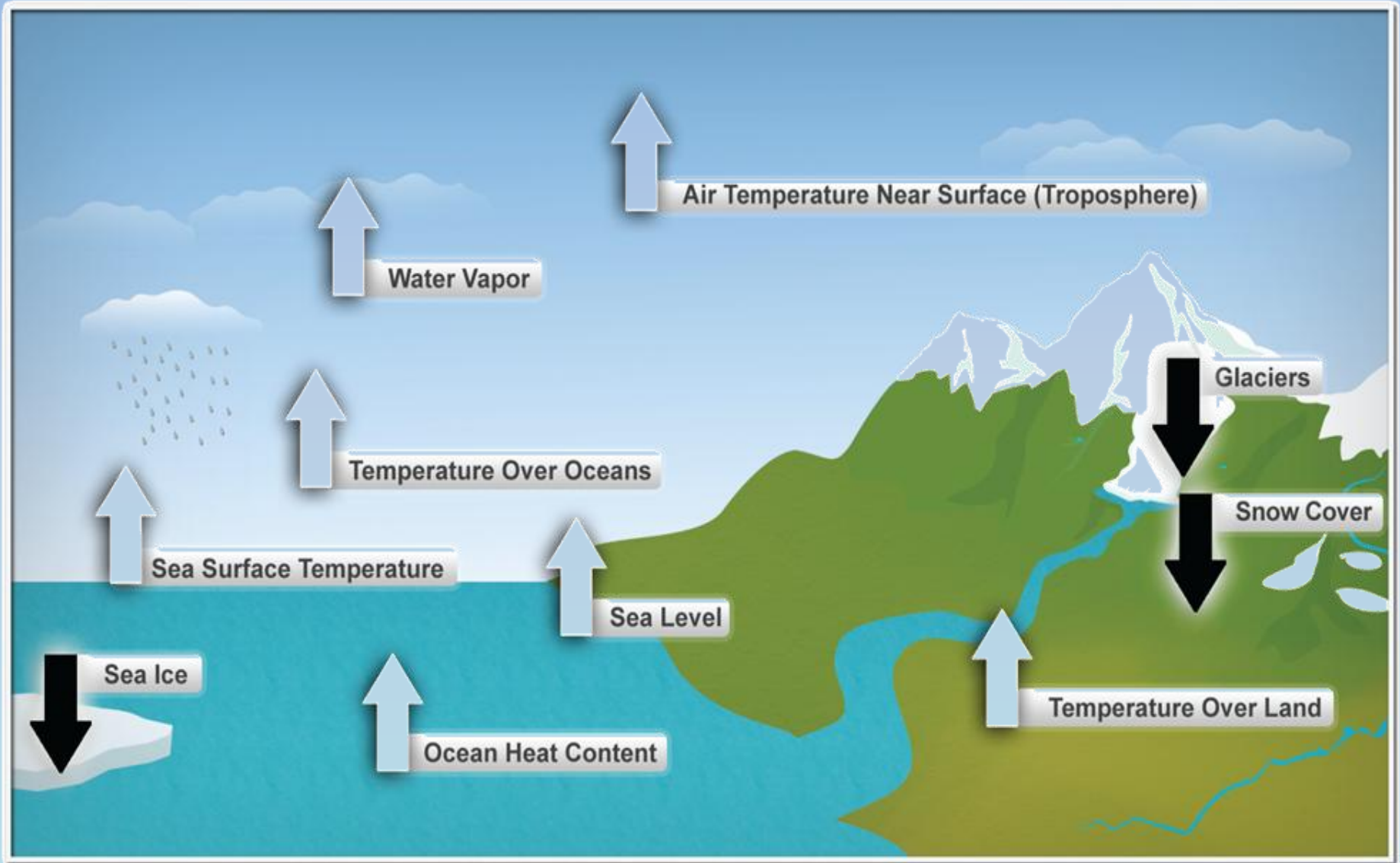


NCA Climate Science News

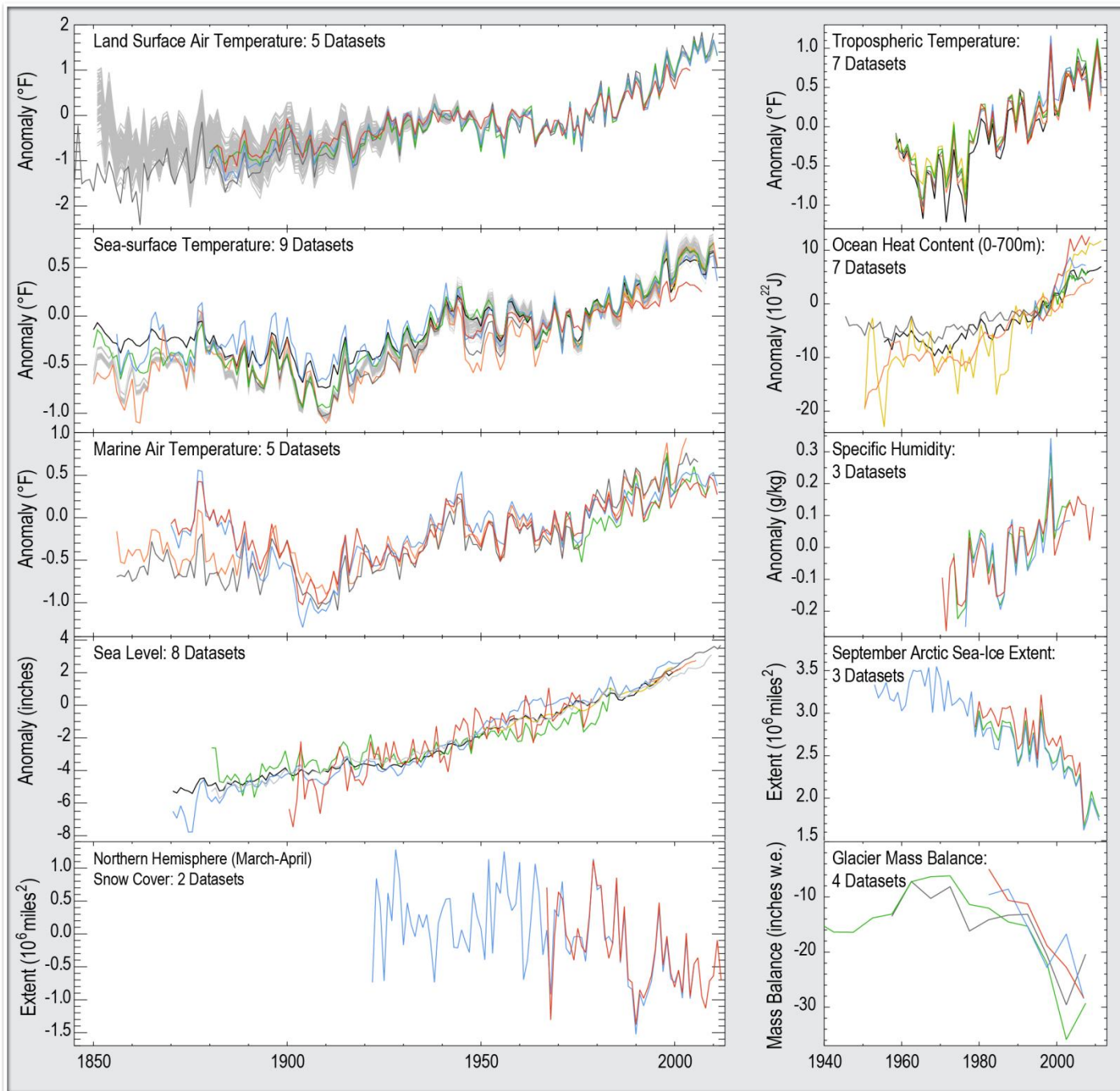
- Rapid change at high latitudes (sea ice decrease, permafrost warming, glacier melt)
- Accelerating sea level rise better documented
- Altered water cycle – groundwater depletion, floods and droughts, seasonal shifts in flood peak
- Heat in the oceans will affect the climate system for years to come
- Oceans absorbing 25% of emitted CO₂, increasing acidity
- Human contributions to global change; attribution of some extreme events (heavy precipitation, heat waves) to human contributions

Global Climate is Changing

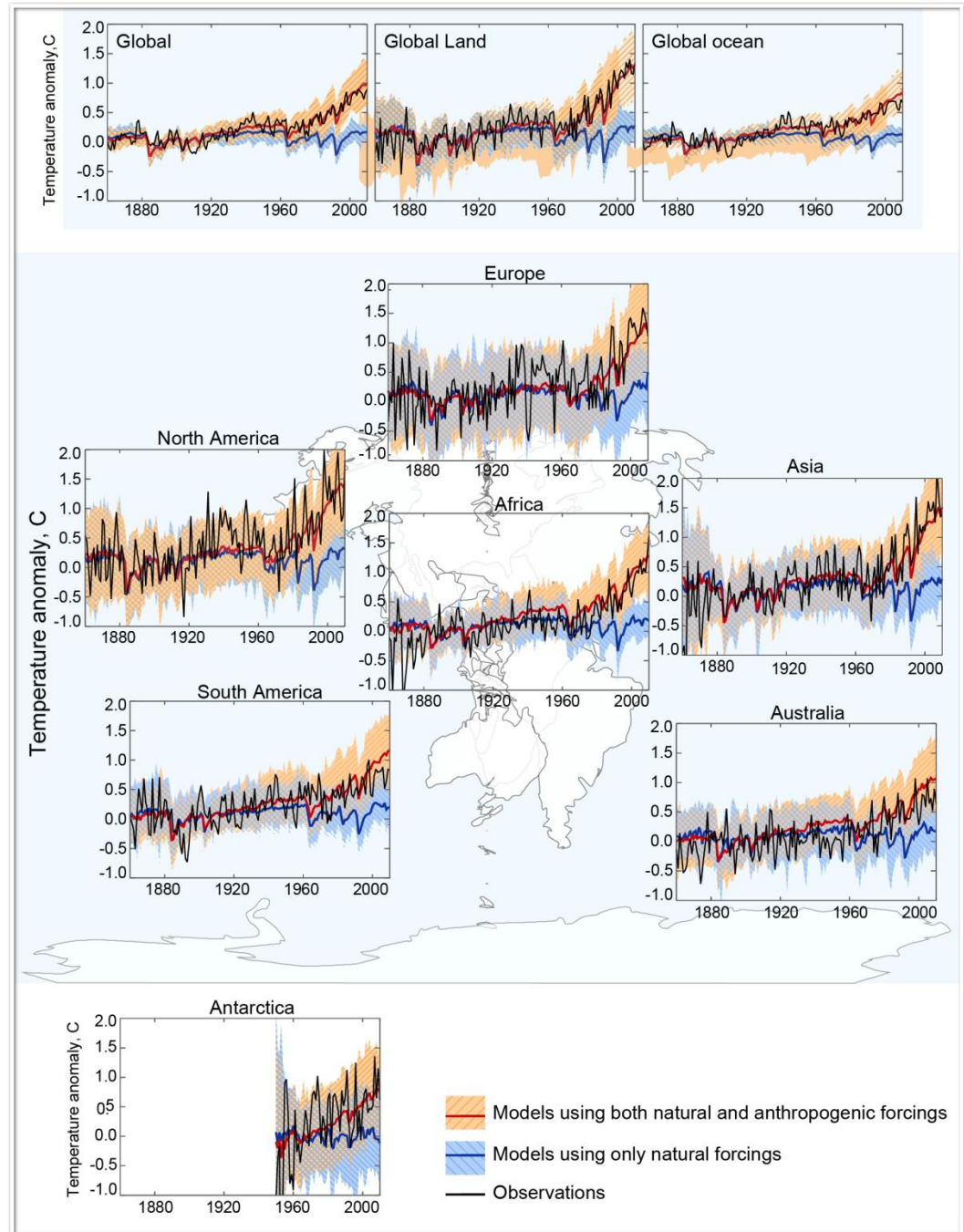
Ten Indicators of a Warming World



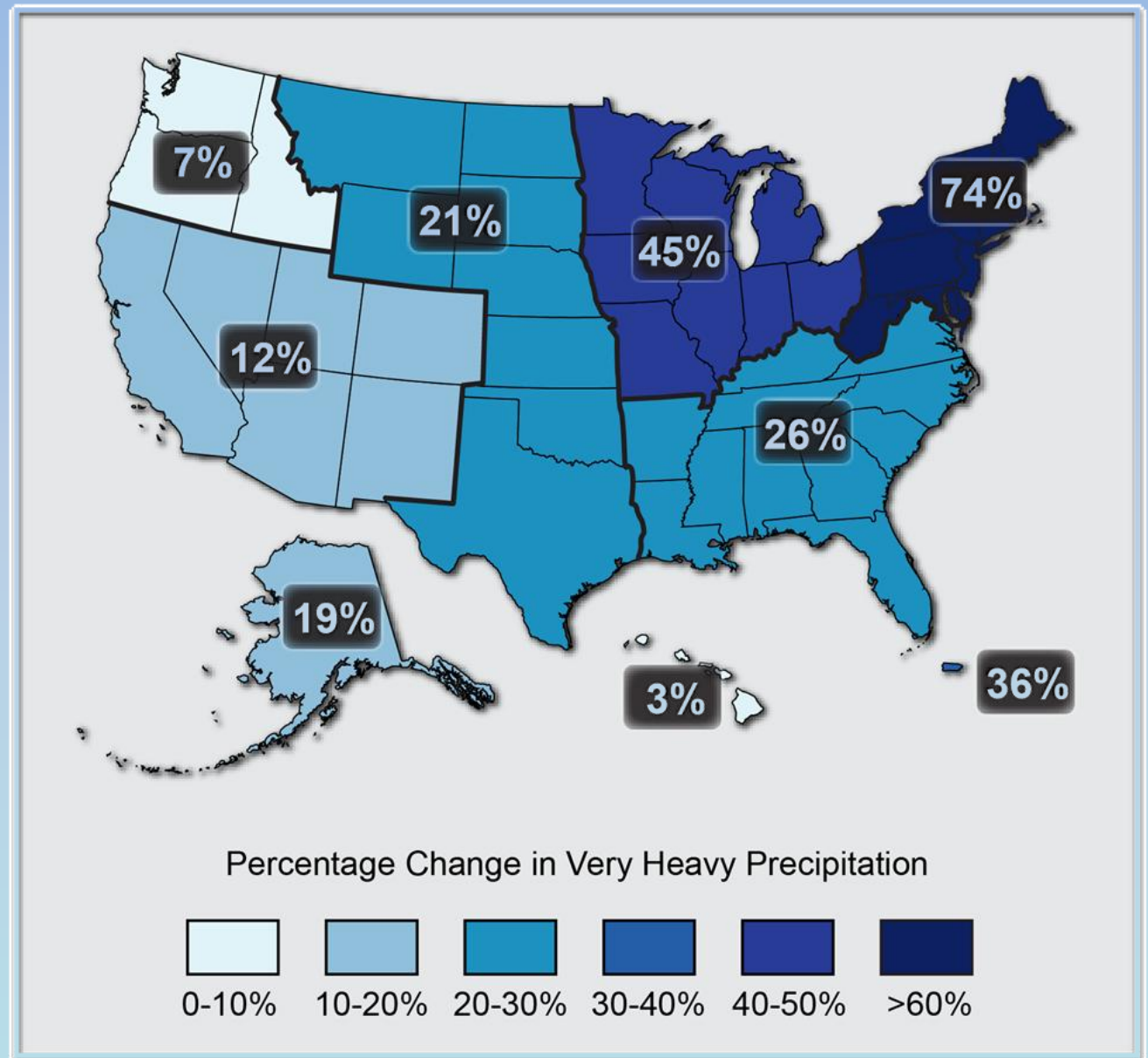
Global Climate is Changing



Increasing evidence that these changes are largely due to human activities



Percentage Change in Heavy Precipitation



Change based on
1901 – 1960
average, top 1%
of all daily events

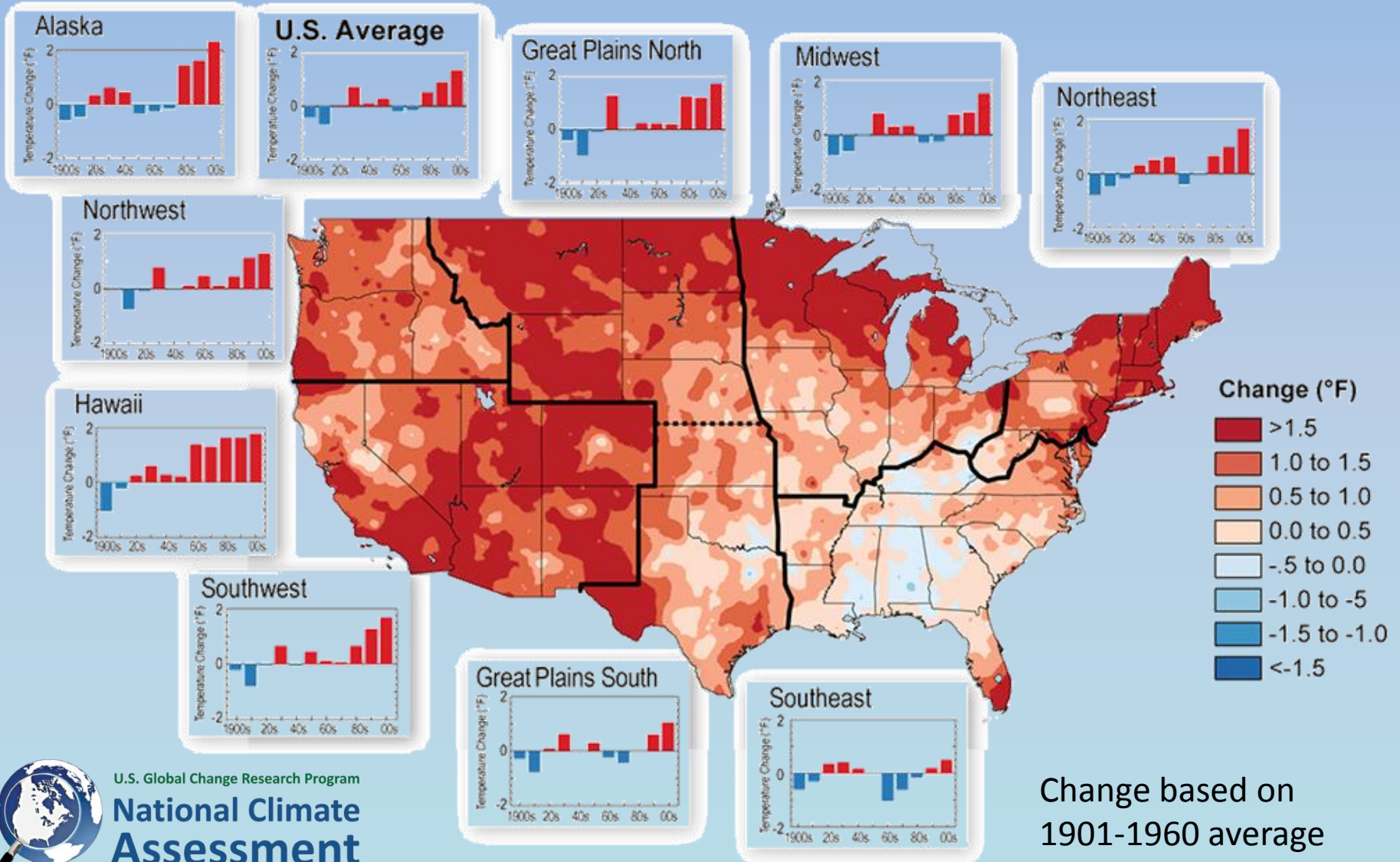


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Assessment**

Change is Apparent Across the Nation

Observed U.S. Temperature Change

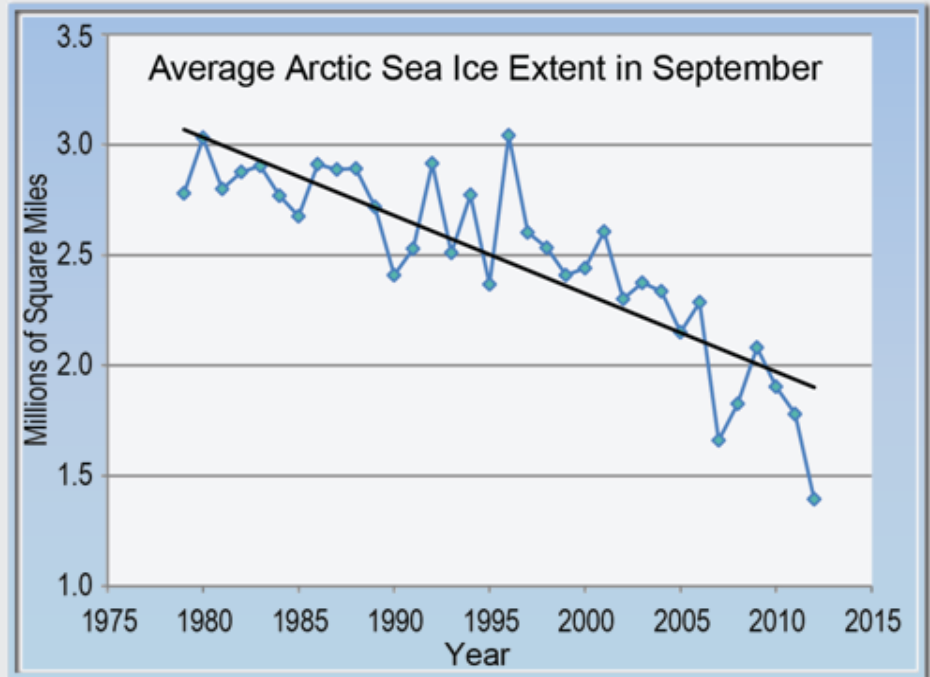
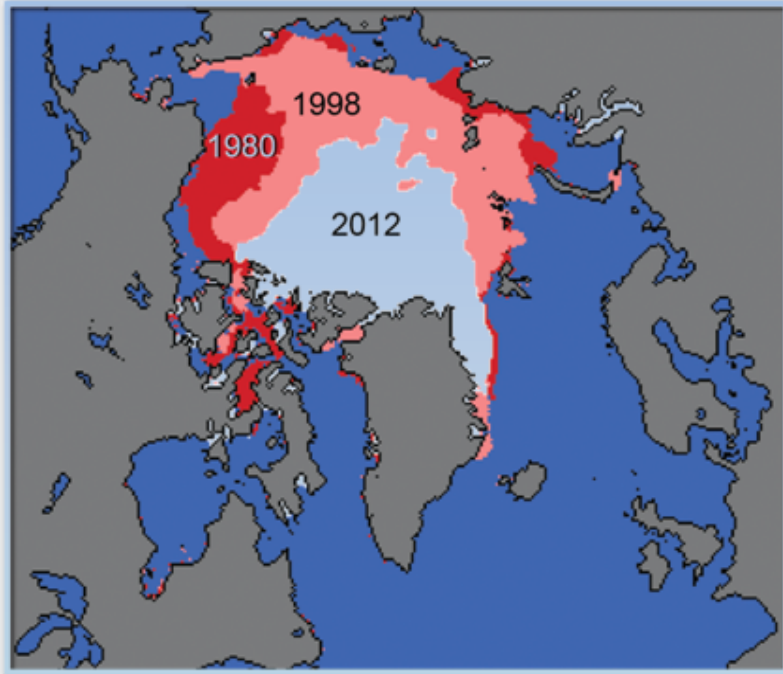


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National Climate Assessment

Change based on
1901-1960 average

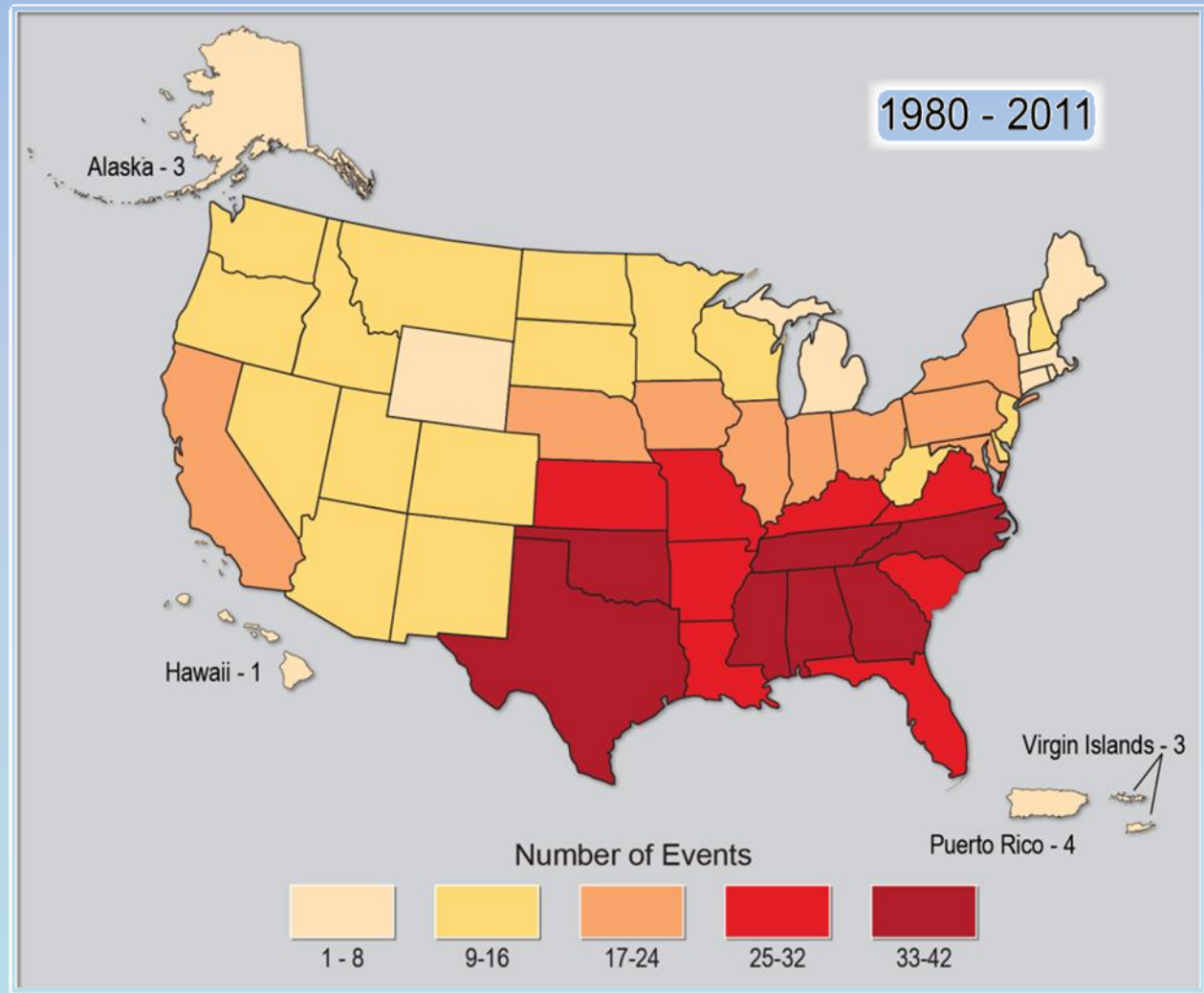
Change is also Apparent Across the Arctic

Arctic Sea Ice Decline

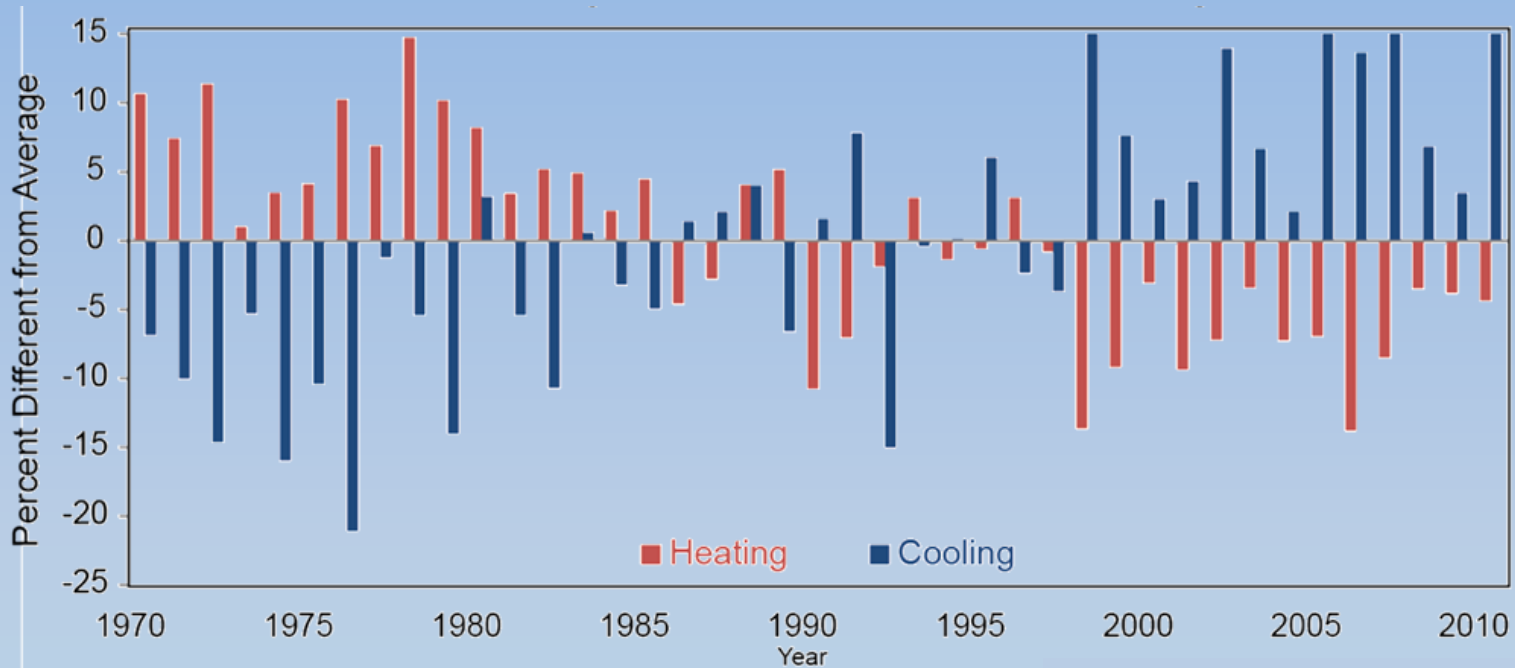


Sea ice extent in 2012 was 40% below recent median

Billion Dollar Weather/Climate Disasters in last 30 years

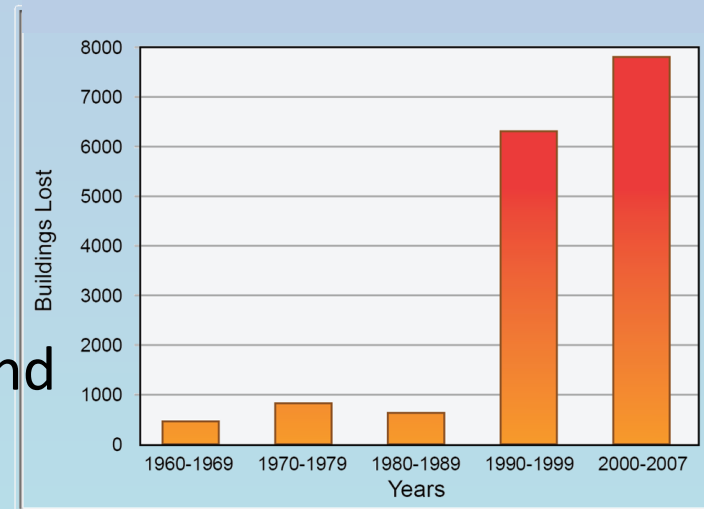


Infrastructure Affected



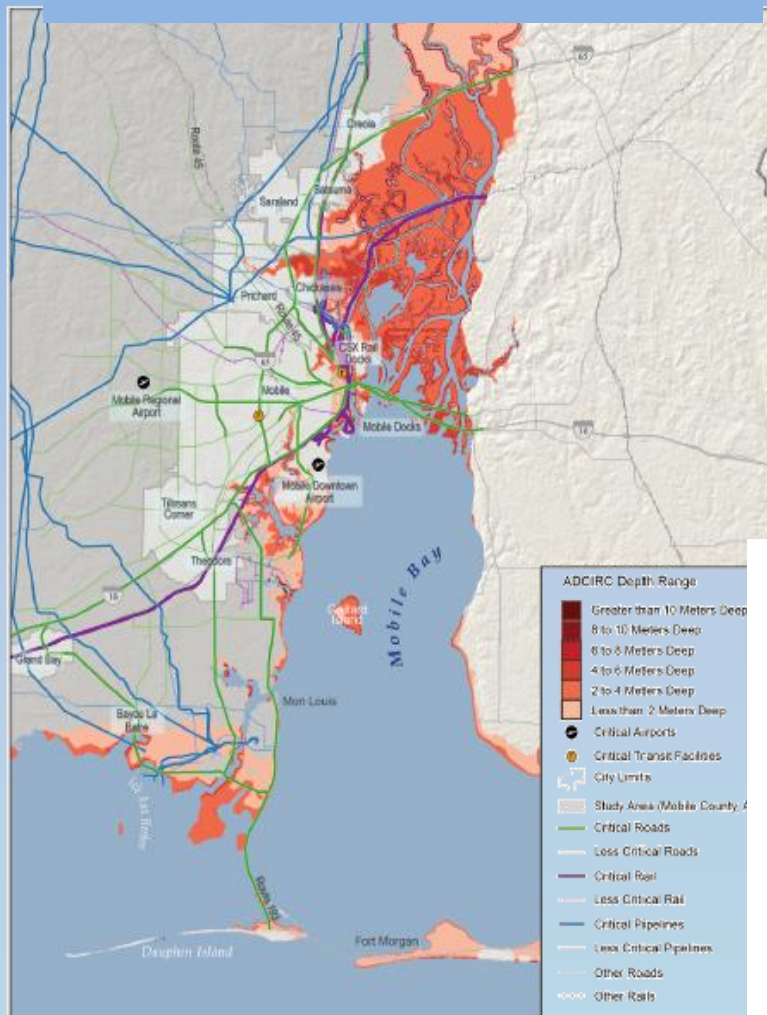
Cooling demand is in blue -
Warming demand in red –
change since 1970

Building loss from
fires in CA in wildland
–urban interface



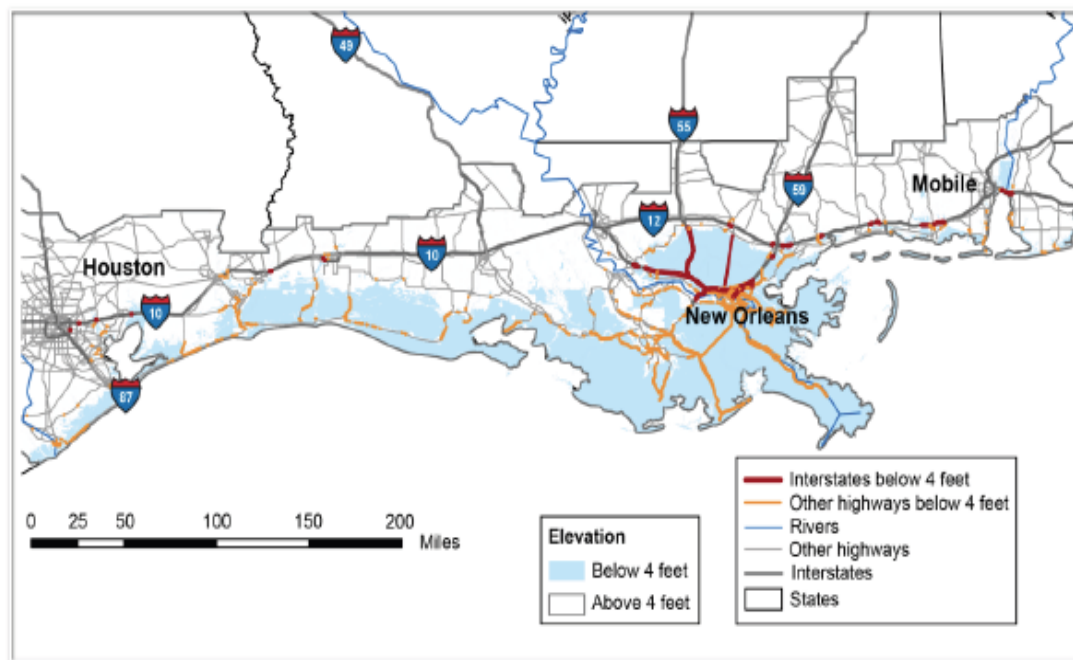
Infrastructure affected by multiple factors

Leeville Bridge,
Coastal Louisiana



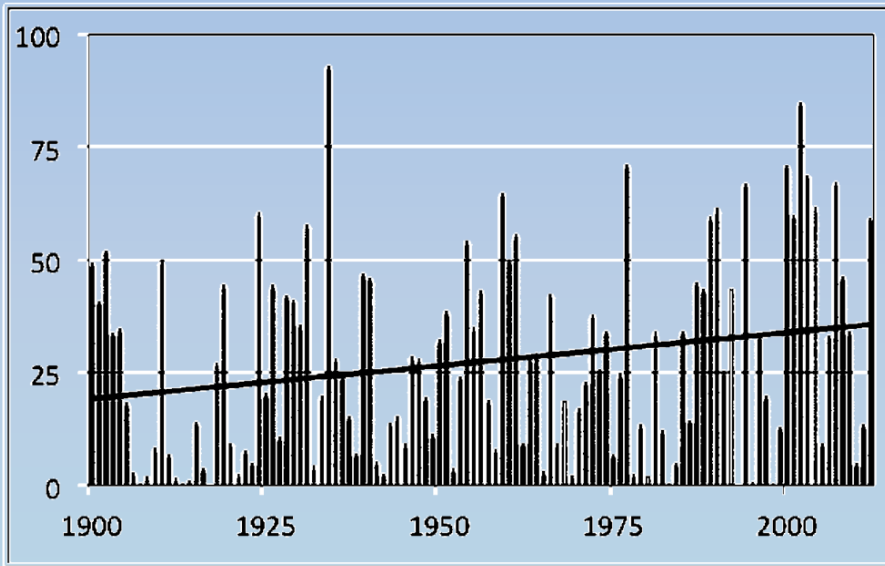
Mobile, Alabama

Gulf Coast Transportation Hubs at Risk

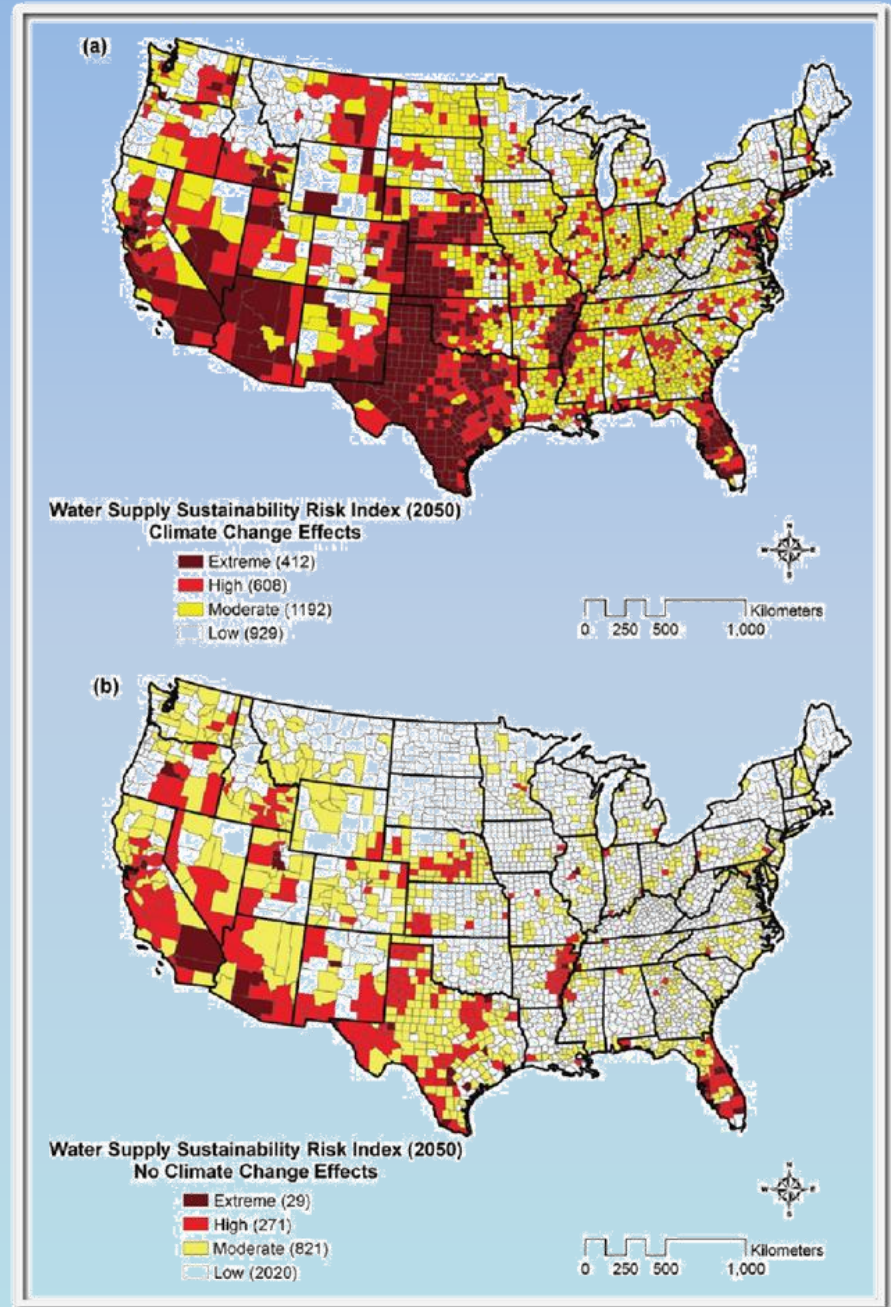


Water Supply Reliability

Water Supplies Projected to Decline

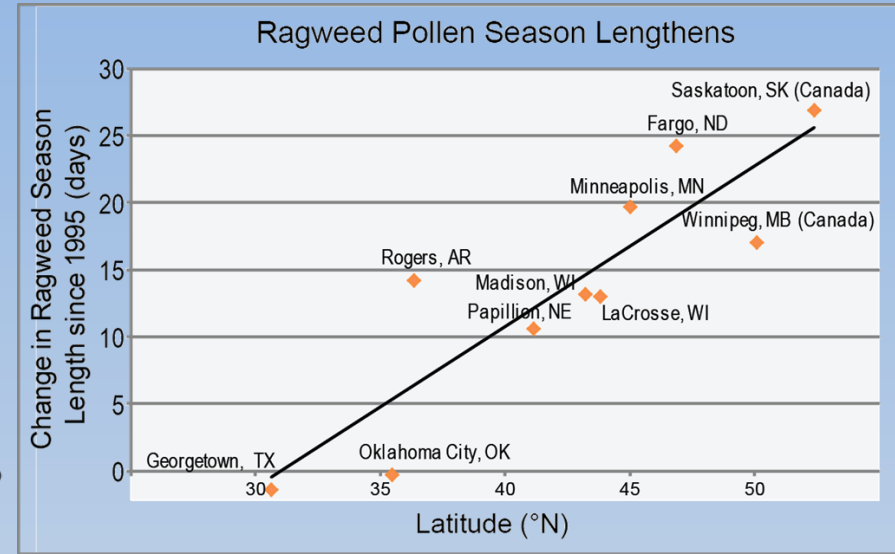
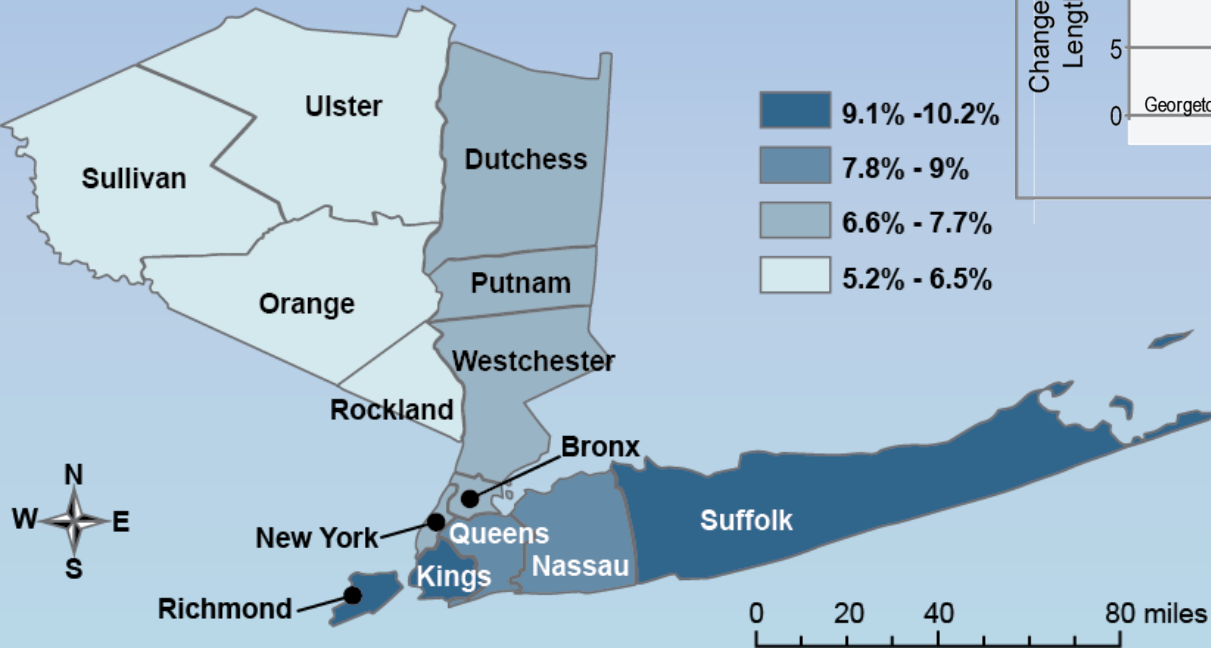


Percent of West in Summer Drought



Human Health & Well-being

Climate Change Worsens Asthma



Effectiveness of Fuel Treatments



Ecosystem Restoration



Adaptation and Mitigation

Adaptation Possibilities for Coastal Infrastructure



**National
Climate
Assessment**

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Adaptation Process

Adaptation is Iterative
Risk Management...



Adaptation Challenges

- Non-stationarity is a new paradigm
- Trends vs abrupt change/extreme events
- Knowing “what to adapt to” especially if outside the envelope of prior experience
- Cascading effects and cross-system issues
- International context
- Institutional and regulatory issues
- Incorporating “ecosystem-based approaches” into engineered systems



Progress in Adaptation in the Federal Government

Climate Change Preparedness and Adaptation Science

- National Climate Assessment / activities of U.S. Global Change Research Program

Interagency Climate Change Adaptation Task Force

- Chaired by CEQ, OSTP and NOAA with participation of 20 agencies.
- Coordinates and guides interagency adaptation work, including national cross-cutting strategies (Freshwater Resources; Fish, Wildlife and Plants: National Ocean Policy Implementation)

EO 13514

- Required all Federal agencies to evaluate agency climate-change risks and vulnerabilities and manage the effects of climate change on the agency's operations and mission

Agency Adaptation Plans

- Adaptation policies, vulnerabilities and risks, and adaptation actions

Principles to Guide Adaptation

1. Integrate into ongoing planning
2. Prioritize protection of the most vulnerable
3. Use Best-available Science
4. Build Strong Partnerships
5. Use a Risk Management Approach
6. Protect Ecosystem Services
7. Ensure Multiple Benefits
8. Evaluate Performance



Reframing the Role of Architects, Engineerings and Planners: Some Suggestions

- Make sure you are solving the right problem
- Engage a broad range of stakeholders and decision makers in collaborative, participatory processes to focus on solutions
- Leverage existing systems, institutions, partnerships and networks to build on existing capacity
- Understand regional culture and its influence in decision making. Identify and engage trusted intermediaries who can assist with coordination
- Advance coordination and evaluation processes based on shared learning and joint problem-solving.

Current Activities of the Sustained Assessment Process

- **Design of GCIS:** Data archiving, management, retrieval, tools
- **Communications and engagement:** NCAnet; NCA Communications and Engagement Workgroup
- **Regional coordination:** maintenance and building of regional and sectoral networks
- **Indicators:** NCA Indicators Workgroup, multiple funded interagency activities; proposed NCADAC products
- **Scenarios:** NCA scenarios workgroup; SBE Task Force; several proposed NCADAC products