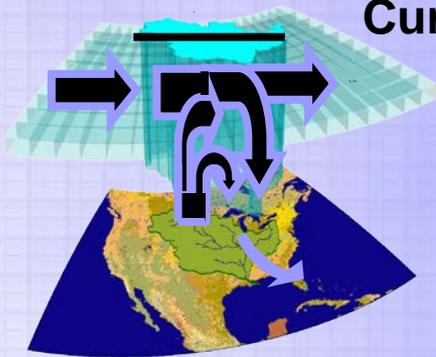


Motivation

- Reliable regional scale climate predictions are essential for assessing the availability and stresses on clean water supplies.
- Understanding and predicting water cycle extremes in a changing climate has direct application for preserving life, environment and economic assets.
- **CHALLENGE:** *provide skillful forecasts of extremes, weeks, seasons, years and even decades in advance that are useful for water resource management.*

Current Limitations:

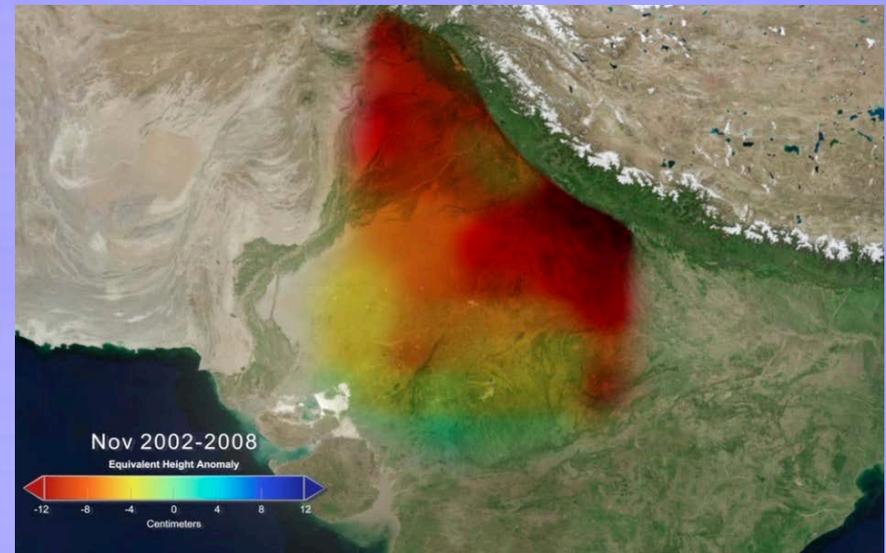


- Translation of observational and simulated knowledge of regional and continental water budgets into better hydro-climate predictions
- Knowledge of the contribution of land surface processes to predictability
- Isolated in-situ and remote sensing observing systems
- Incomplete coupled atmosphere-hydrology models
- Understanding of human and earth system controls on the water cycle
- Disconnected disciplinary research and operational programs.

Unfortunate Realities

- The fact is, we don't even know how much water is stored in North America's lakes, reservoirs, streams, groundwater systems or snow packs (Famiglietti 2012) which is fundamental knowledge needed to manage any resource.
- Our knowledge of Earth's water environment at the surface and shallow subsurface remains appallingly insufficient.
- Our nation's hydrologic modeling assets are simply not up to the task of addressing our most pressing societal issues of food, energy, water, and national security. We are behind where we need to be.

Sandra Postel, lead expert of the Global Water Policy Project wrote: "At this moment, we as a society are like the frog that chooses to stay in a warming pot of water as the heat is gradually turned up—unable to grasp the dire consequences of incremental change".



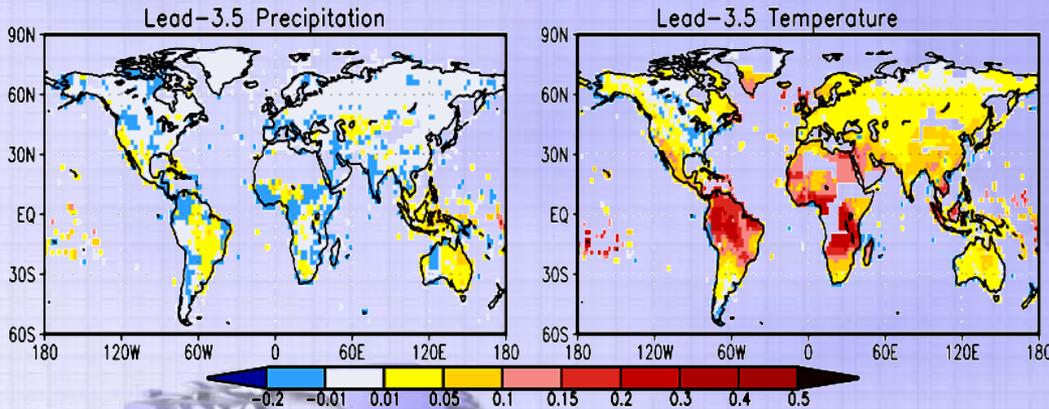
North American Water Program

Solutions for North America's freshwater sustainability challenges

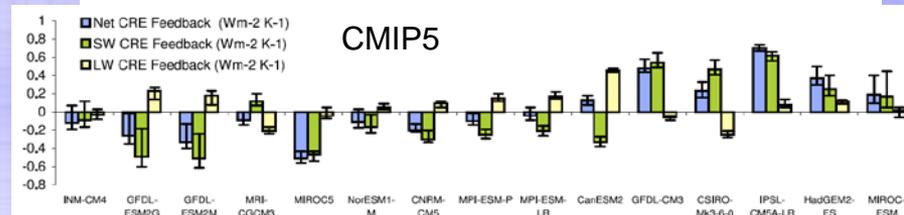
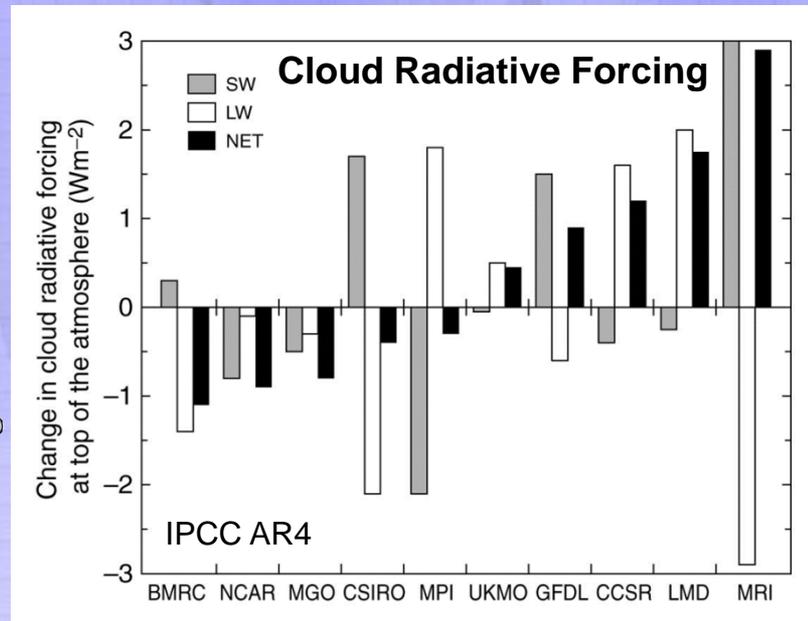
Motivation:

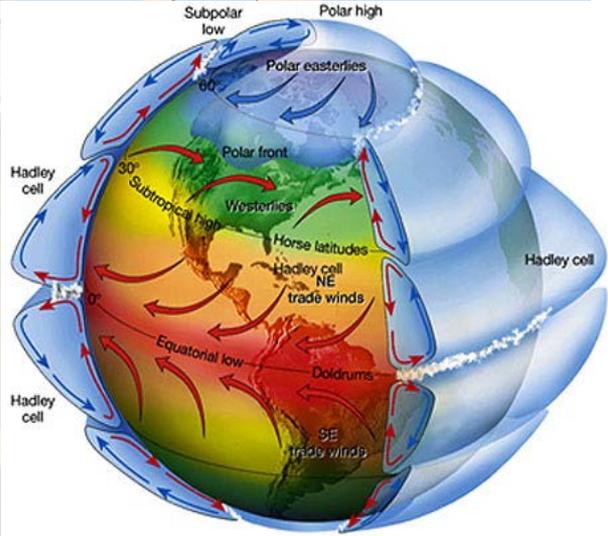
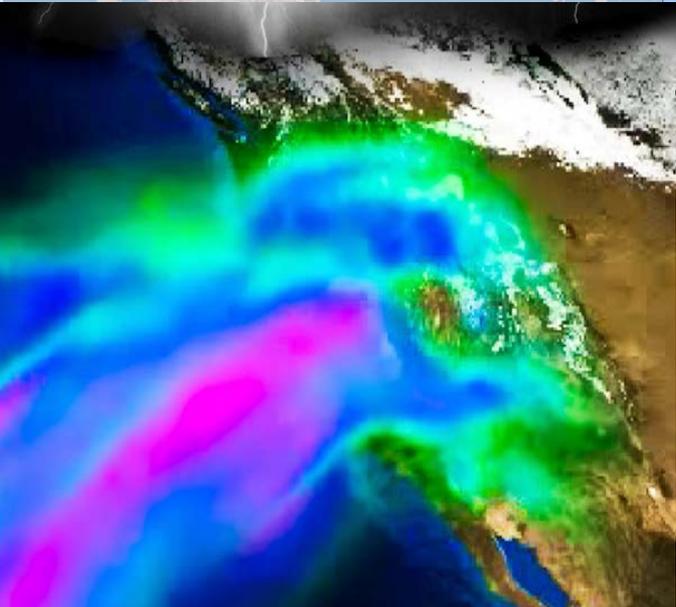
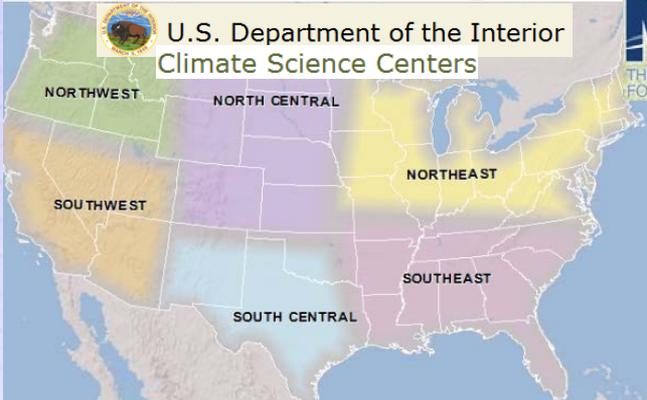
- *North American Water Crisis:* Droughts, rising temperatures, population growth, urban sprawl, over-extraction and waste – our freshwater supplies can no longer quench our thirst.
- We lack the water storage and flux knowledge, prediction skill and science-informed water management methods to adequately address North America's freshwater sustainability challenges.
- Atmospheric processes, terrestrial rivers and hydroclimatic processes transcend eco-regions and political boundaries requiring a continental-to-global scale synthesis.

Ranked probability skill score



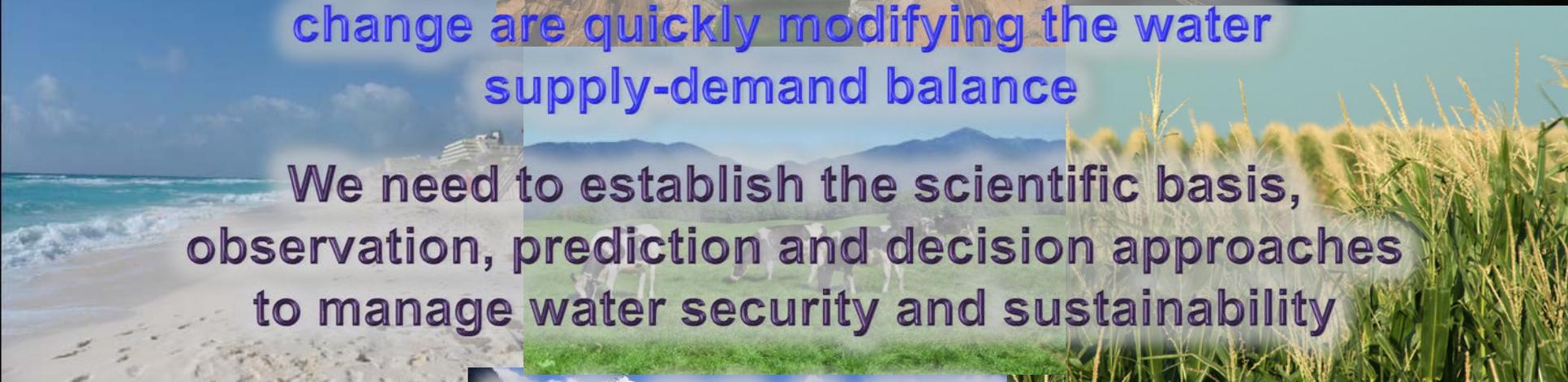
This shows our low precipitation forecast skill versus temperature. Our skill in predicting the water cycle is woefully inadequate to reliably inform critical societal decision making.







Water is critical to every aspect of the North American economy, public health, energy, and food production



Population, climate and environmental change are quickly modifying the water supply-demand balance

We need to establish the scientific basis, observation, prediction and decision approaches to manage water security and sustainability



NAWWP



Ensuring America's water security

NAWP

Just the Facts...

Vision: Establish the scientific basis, observation, modeling and decision approaches needed to manage water security and sustainability through climate, population and environmental change uncertainties.

Objective: An interdisciplinary integration of North American hydroclimate observation and prediction resources that transcends scales and enables procedures and analytic tools to adapt to change.

Science Question: How does climate, environmental and population change affect the water cycle across scales, to what extent is it predictable, and can we adapt to achieve freshwater sustainability?

Challenges: *to organize NAWP efforts*

- **Adaptation:** Develop the scientific basis and tools to adapt to climate, population and environmental change.
- **Benchmarking:** Assess water dynamics, water cycle sensitivity, and evaluate/improve model skill.
- **Science informing decisions:** Develop the capacity for science-informed sustainable water management practices.

Implementation:

- Quantify. Systematically quantify North American water storages and fluxes.
- Understand. Analyze water cycle variations, trends and extremes; adaptation measure impacts.
- Predict. Improve continental precipitation, cloud and hydrology prediction.
- Solutions. Develop and transition new observations, models, and tools to operations.



NAWP

The way forward...

To be successful, NAWP must:

- **Evolve and mature with broad science community and stakeholder participation**
 - NAWP white paper must be circulated widely inviting revision and clarification
 - Science & stakeholder forums must be conducted to build grassroots support
 - NAWP presentations and conferences and workshops to invite participation
 - Organizations must take ownership of key NAWP components
 - Involvement of international organizations (Canada, Mexico, Central America are critical)
- **Develop an organizational structure and plans**
 - Convene a scientific discovery team to finalize vision, establish organization, and build partnerships.
 - Establish a project office to coalesce partnerships, disseminate information and organize workshops
 - Draft science and implementation plans
 - Form working groups, or NAWP circles to refine and implement the NAWP challenges

There are clear needs and roles for a wide variety of governmental, academic, non-profit and private sector organizations to lead various NAWP initiatives toward solutions for North America's freshwater sustainability challenges.

