

DOI Climate Effects Network

Adaptation in the Mid-Atlantic
25 March, 2010



Issues We've Heard at the Conference

- Climate change will not impact a single resource at a time. We must understand whole-systems and feedback responses
- Climate change will be a superimposed stress on already stressed systems, so we have to understand combined effects
- To anticipate change, we must focus on system resilience and thresholds. So, to understand or forecast a local condition we need to study regional/national/even global gradients.
- To verify our models and adaptation responses, we need inter-disciplinary research and observation at the full range of spatial and temporal scales.

The Climate Effects Science Dilemma

Without whole system datasets, adaptation strategies will be incomplete or wrong. However,.....

- ❖ The chances of building new capacity for data collection and analysis from “scratch” are low
- ❖ Valuable historical records are available but scattered, so system-level observation is poor and funding uncertain.
- ❖ By the time we see a climate disturbance signal in a specific location, that location is likely in jeopardy.

So, how do we provide the information our speakers have described in the shortest period of time? How



effectively tap our multiple existing programs?

How do we organize data across scales?

PROBLEM:

It is not possible to assess the complex changes, interactions, and feedbacks caused by climate change at every specific location where resource managers need us to be, or by separate discipline or agency -specific initiatives.

THE NECESSARY ASSUMPTIONS:

The dominant processes controlling ecosystem function are similar and transferable; ecosystem condition is highly variable, but can



What is CEN?

Network Vision Statement: *“To provide earth system information for understanding, tracking, and forecasting the effects of climate change on ecosystems, natural resources, and society; and to empower and assess adaptation or mitigation responses to those changes in the most cost effective, timely, and scientifically-rigorous manner possible.”*



Steps Involved in Network Implementation

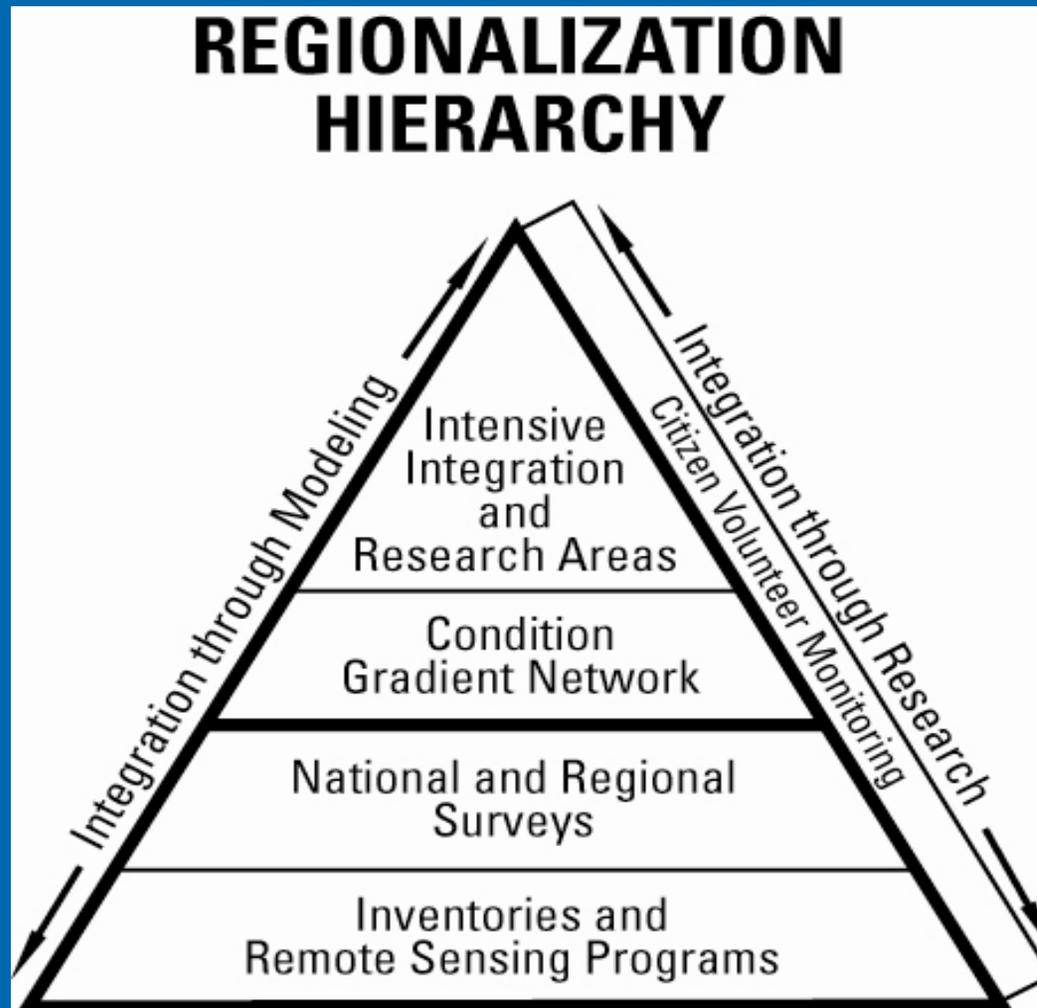
1. Determine specific issues/decisions by focal topic/region (with stakeholders)
2. Determine types of data initially needed to address those issues/decisions
3. Compile data that is already being collected and organize existing capabilities
4. Complete an issue assessment and gap analysis for each issue. **(Begin filling glaring gaps)**
5. Integrate services and enhance existing programs to fill gaps.
6. Ensure results are linked to applications for decision support, and maintain management services.

Key Management and Policy Issues



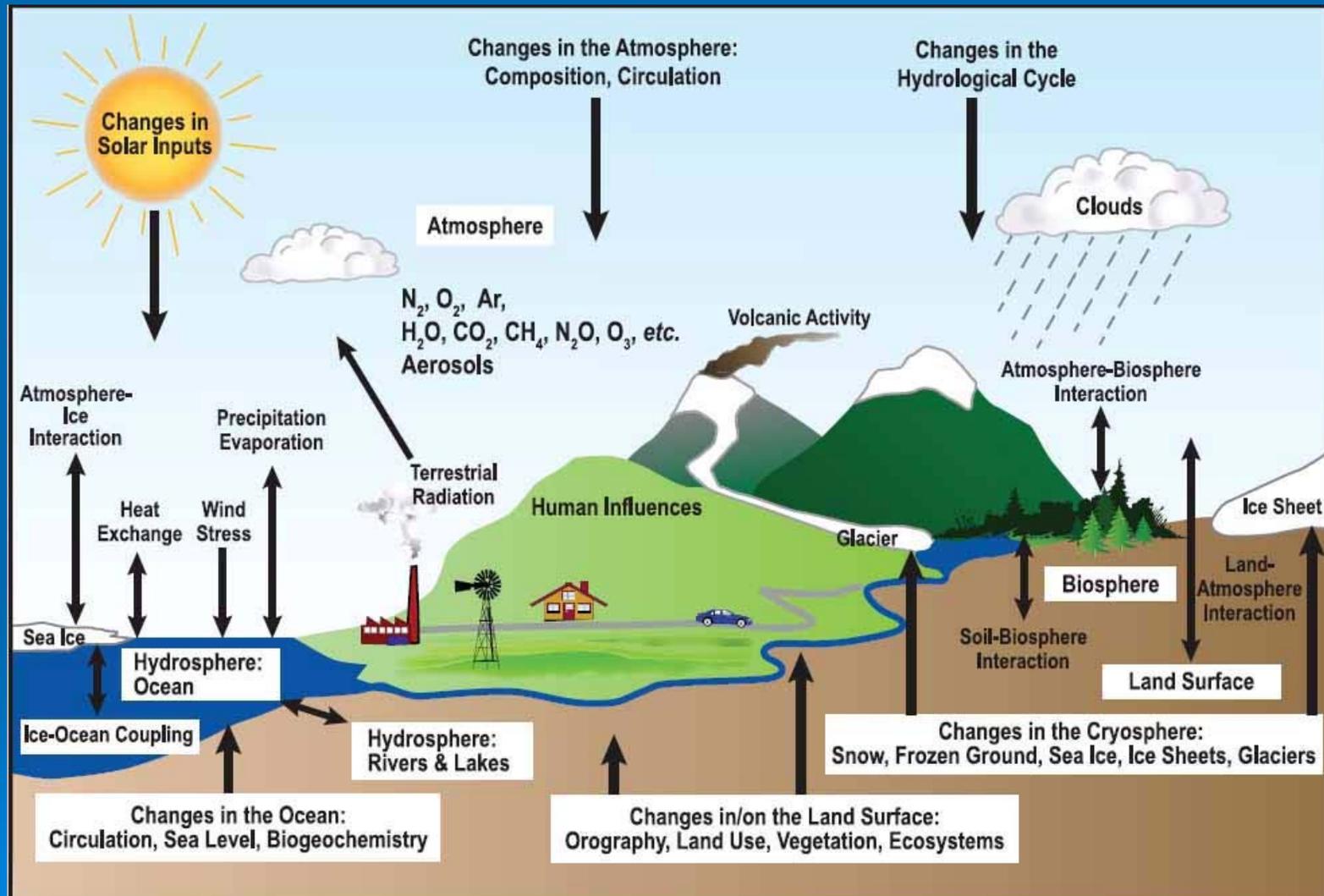
- ❖ Carbon Sequestration
- ❖ Water Availability and Quality
- ❖ Asynchronous seasonal phenology
- ❖ Increased Flood and Drought Risk
- ❖ Coastal Impacts Associated with Sea-level Rise
- ❖ Melting Permafrost and Sea Ice
- ❖ Impacts on Native Peoples
- ❖ Outbreaks of Pests, Invasive Species, and Diseases
- ❖ Species Migration and Habitat Change
- ❖ Threatened and Endangered Species
- ❖ Wildland Fires

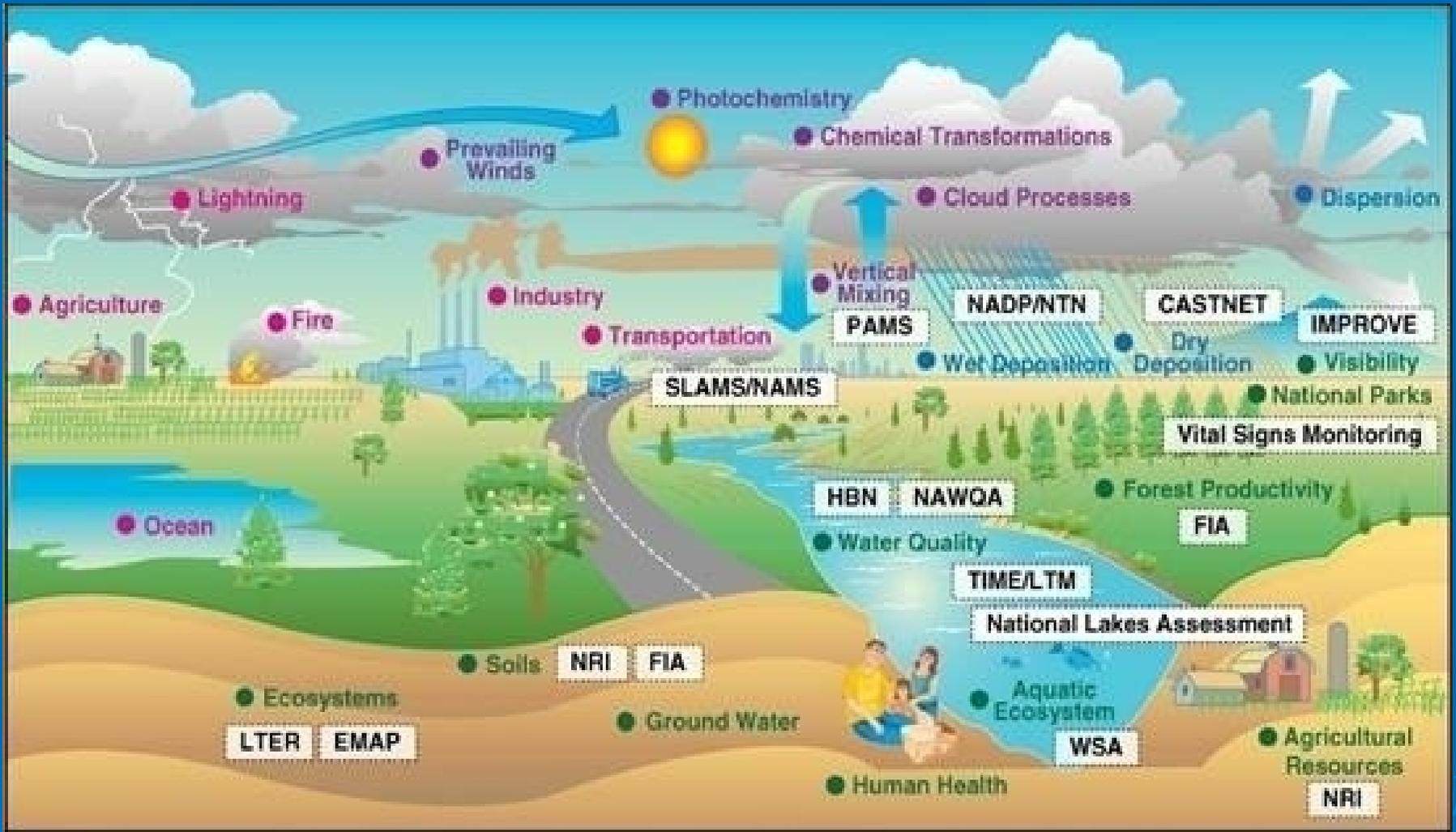
Organizing Existing and New Observation and Research Programs



(CENR Framework, 1997)

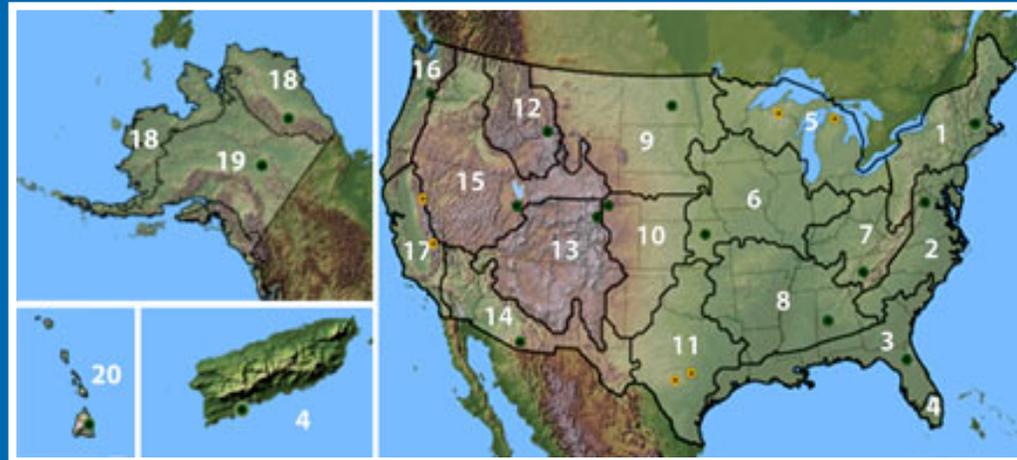
To understand climate effects, we need to understand whole systems and feedbacks





● Sources ● Transport / Transformation ● Removal ● Effects Monitoring Program

NEON Domains



Extensive science networks



NPN citizen science

Project BudBurst
A National Phenology Network Field Campaign for Citizen Scientists

Learn why phenology is important

Participate!

Report your observations online

Does climate change affect budburst?

Download free materials

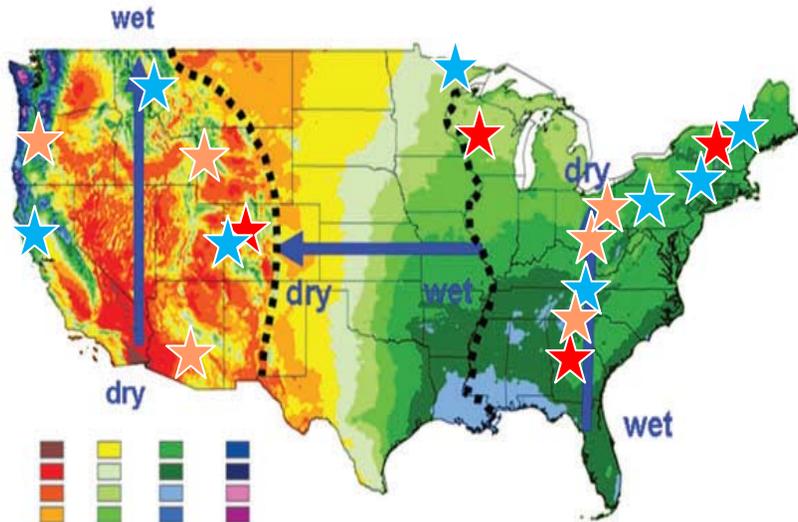
Map results from around the country

www.budburst.org

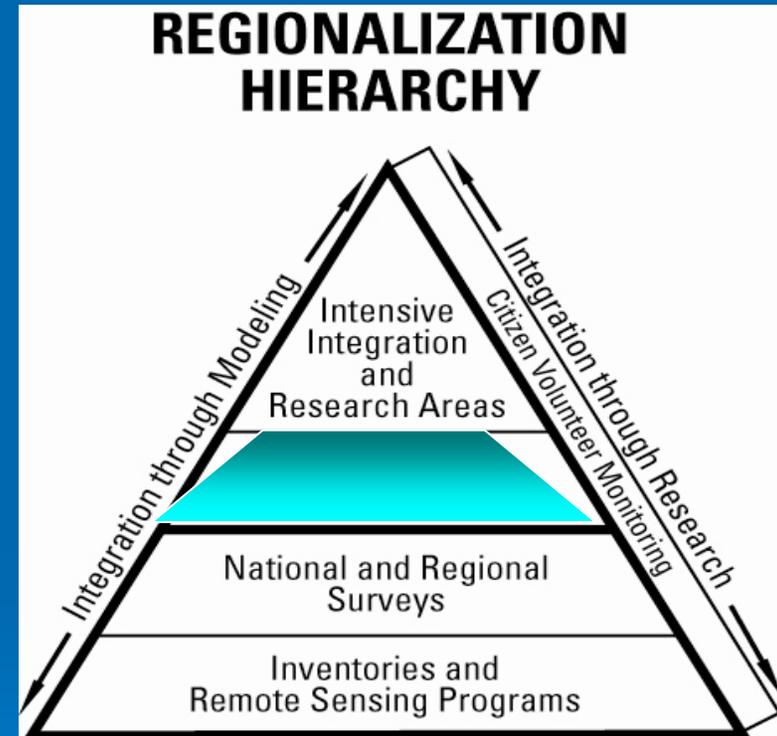
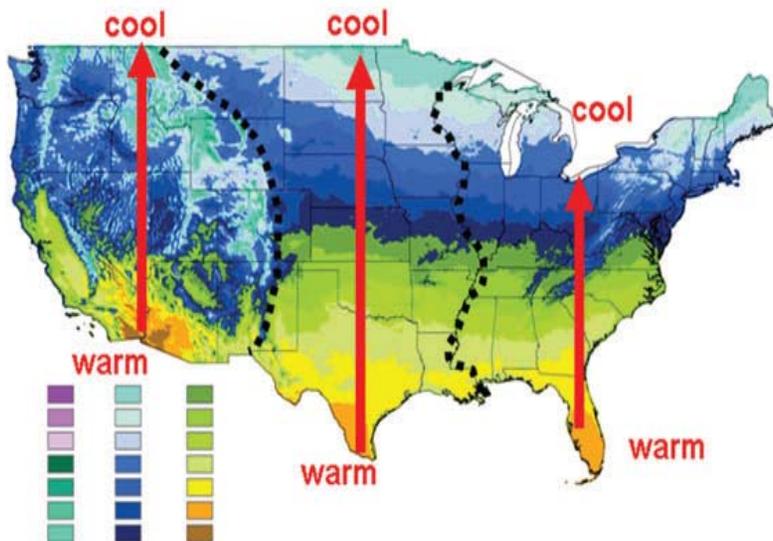
Logos for participating institutions: University of Wisconsin-Milwaukee, PCA, Chicago Botanic Garden, University of Montana, UCSB, University of Wisconsin, and others.

Photos of various plants and flowers.

Build Climate Effects Gradients

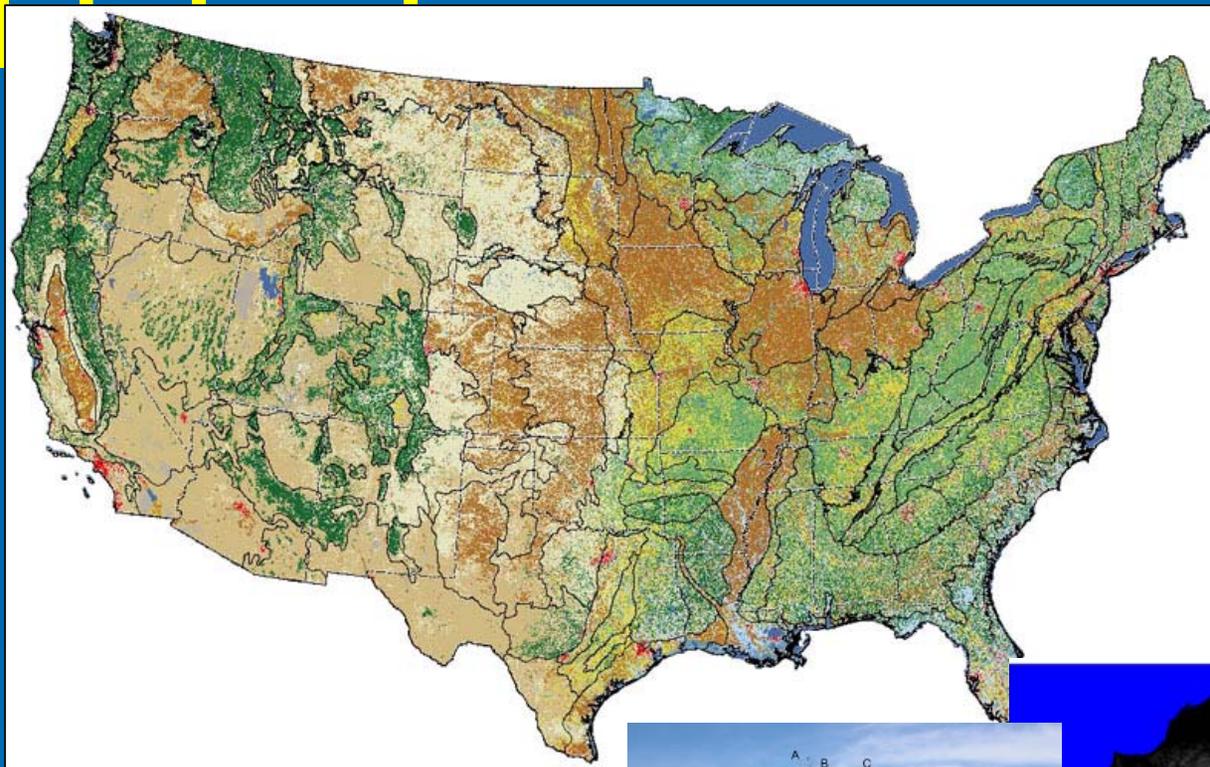


WEBB Site ★
HBN Site ★
FS/ARS Site ★



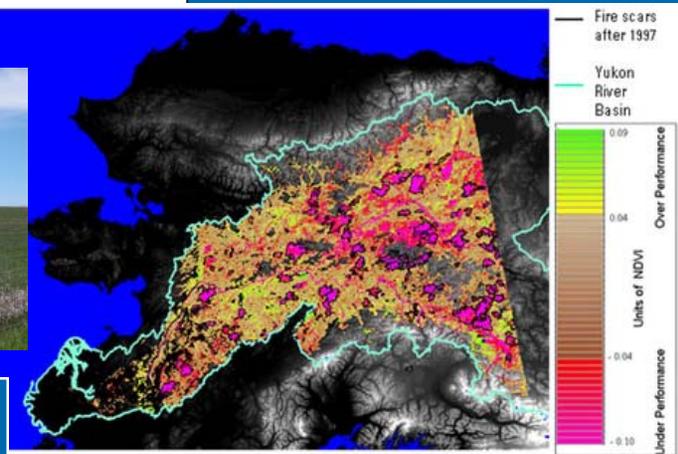
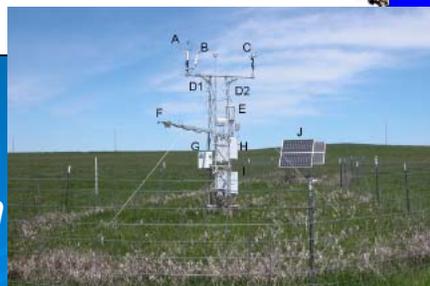
Change will happen first at ecosystem boundaries (ecotones)

Goal: Linking process understanding to the local, regional, national, and global scales



Land Cover Trends: 30-Year Record of Ecoregion Change in the Conterminous US (all 84 ecoregions)

Global Change R&D:
Science in Support of Climate Change Monitoring & Adaptation



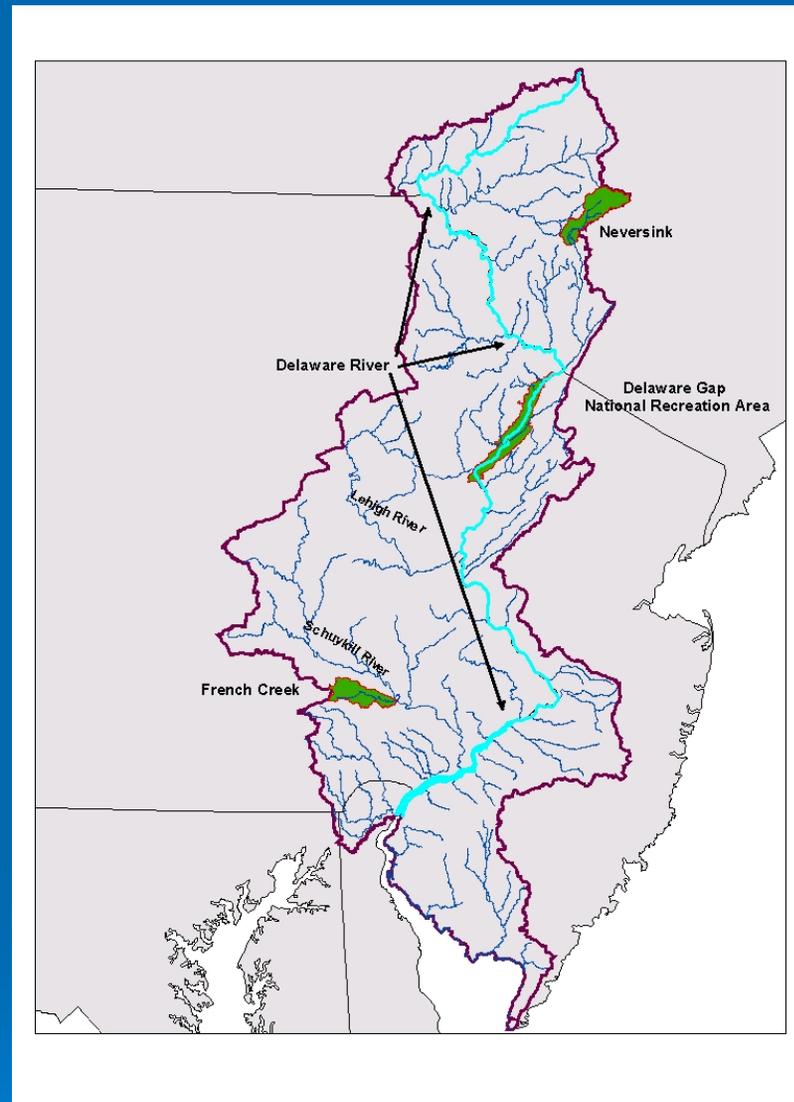
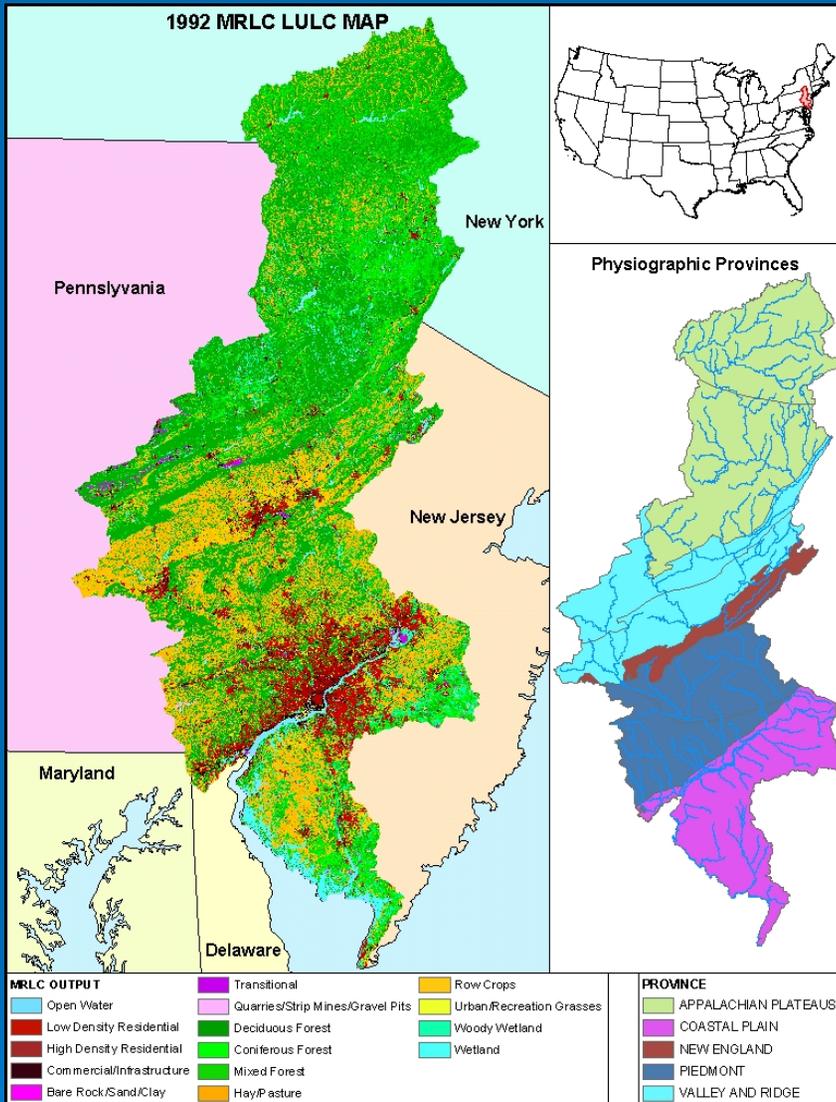
**FY 09 & FY 10
Major**



Who Will Guide CEN?

- DOI Data Integration and Dissemination Working Group
- USGS Science Planning Team
- USGS Executive Leadership Team
- The Climate Science Centers and Landscape Conservation Cooperatives
- USGCRP
- CEN Science Advisory Board

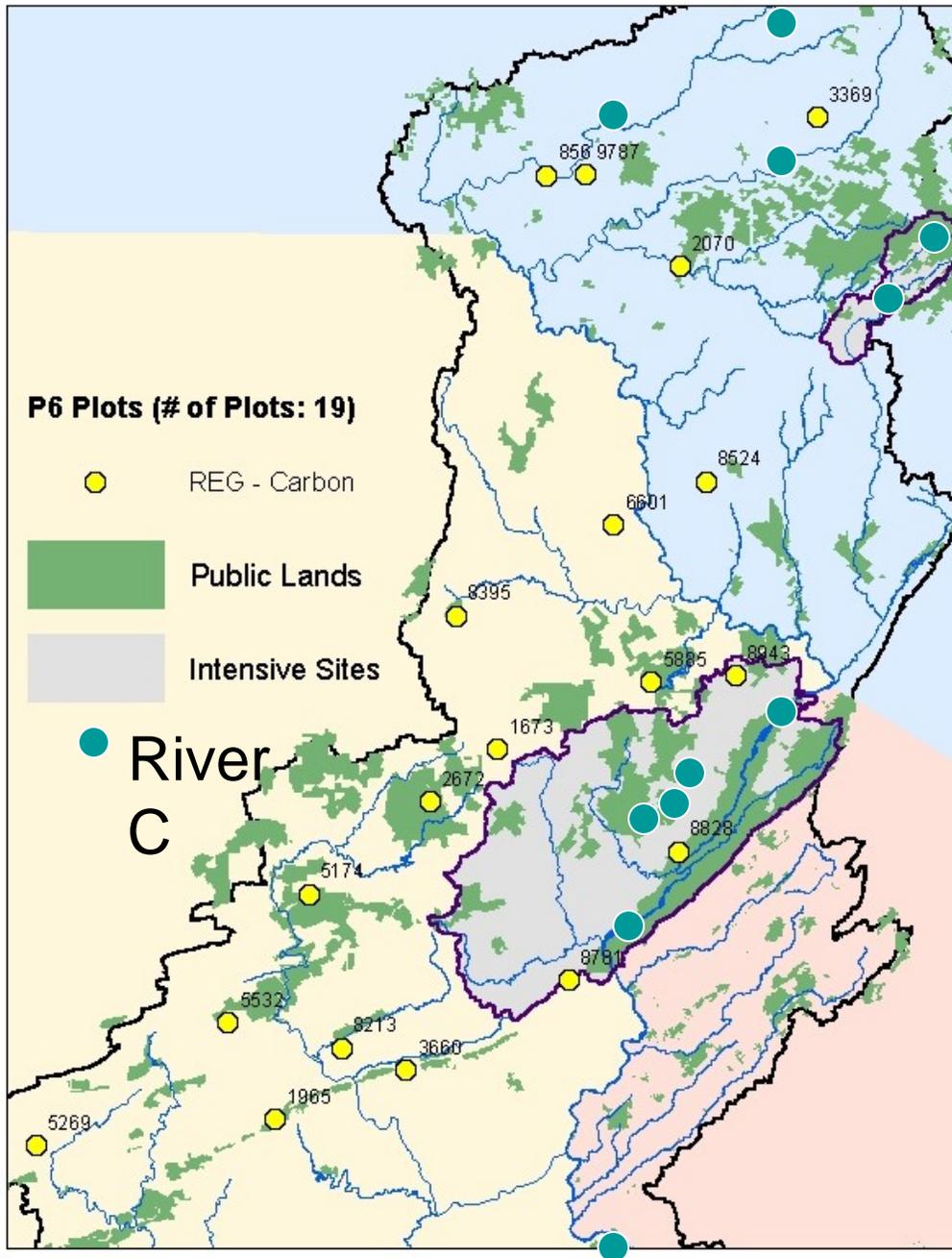




Delaware River Basin Example

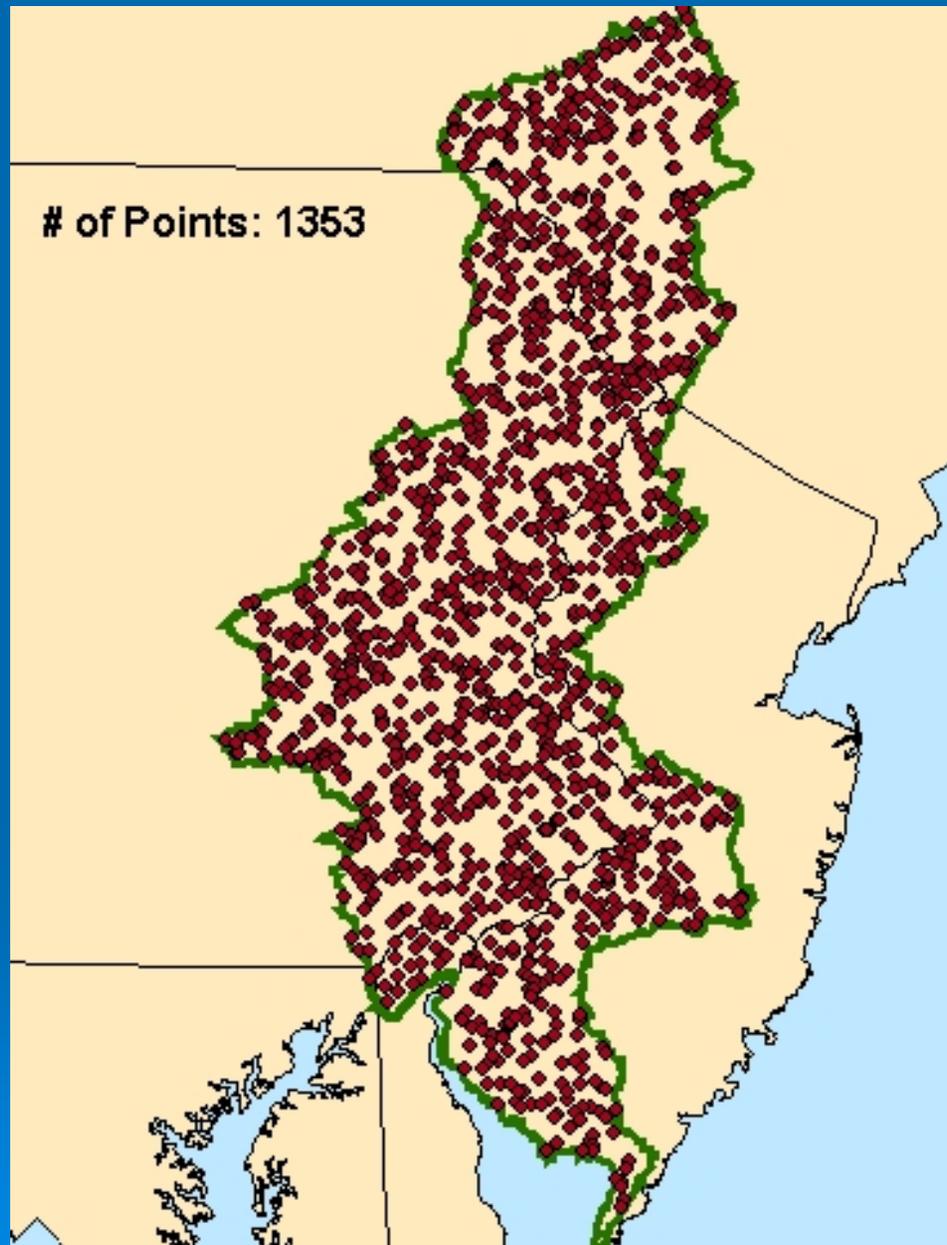
Built on US Forest Service, USGS, and Park Service infrastructure and





Tier 2: Regional Validation Plots

Independent validation of estimates to test scaling methods.
 Other climate research in the region can be captured at this Tier for gradient assessments



Tier 3 – USFS FIA and FHM

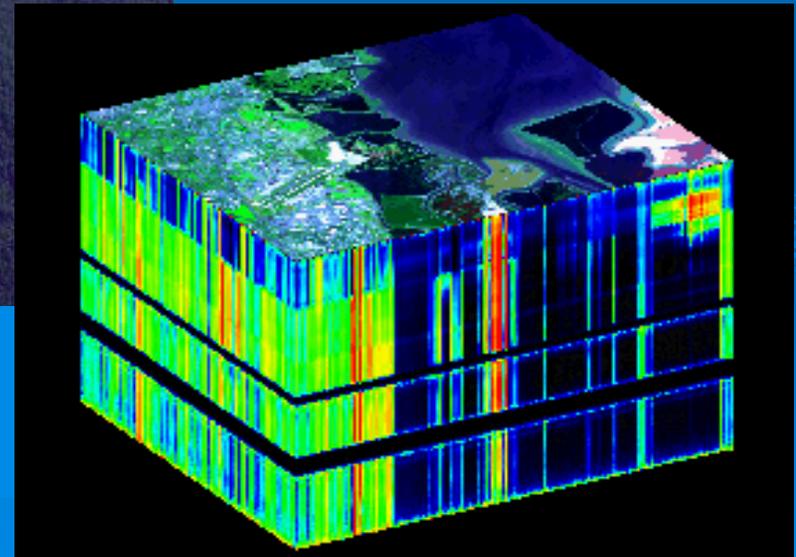
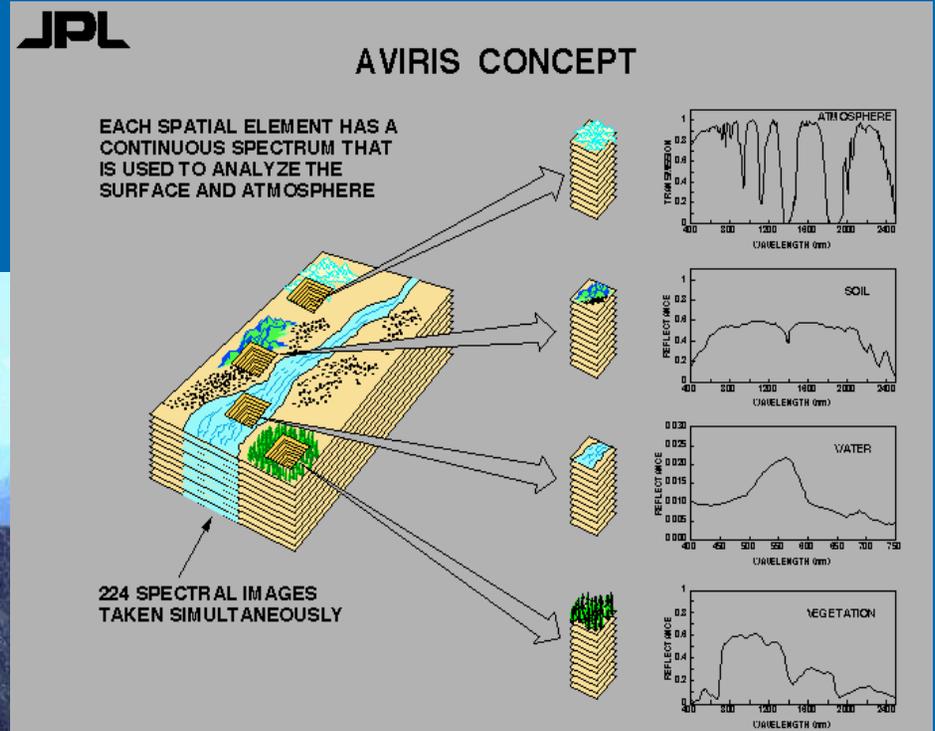
Plots measured with a 5-year panel system to characterize forests of the Delaware River Basin.

Added 3 soil samples at 3 depths to each forested plot, + stream survey.

Remote Sensing: Building new tools through an integrated ground-truthing network



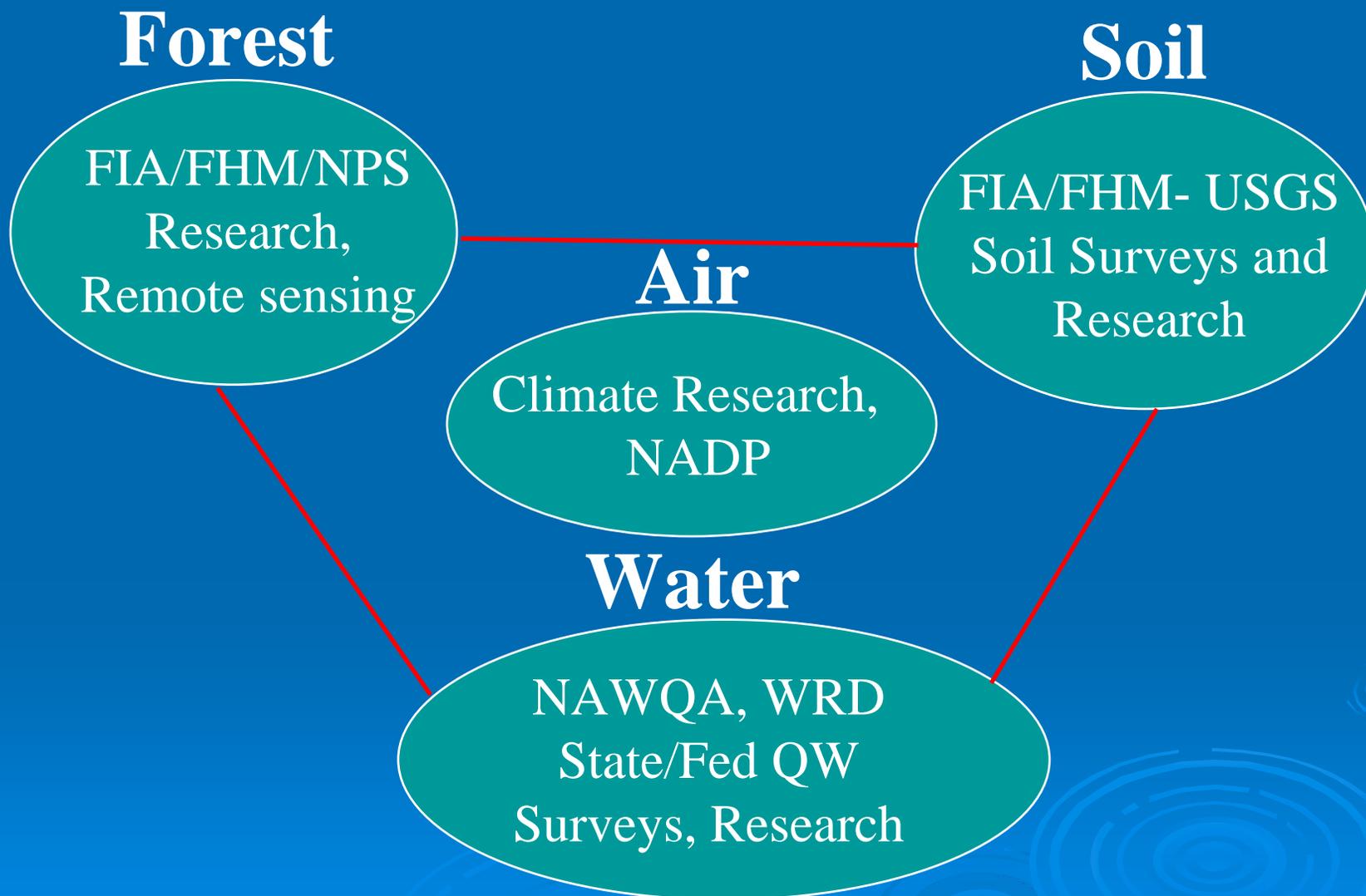
AVIRIS
Airborne Visible/InfraRed
Imaging Spectrometer



The resulting 224 band layer image is known as an "image cube". When the data from each band is plotted on a graph, it yields a



Integrated Regional Assessment of Climate Effects on Vegetation, Soil, and Water in Forested Landscapes



What can we do together?

Co-locate
New Data
Collection
for Study
of Whole
Systems



In-situ DOC probes and sediment
monitoring for C flux to the
coastal ocean

Integrate the Integration Efforts

We will need data sharing,
management, assessment, and
access at an unprecedented
scale.

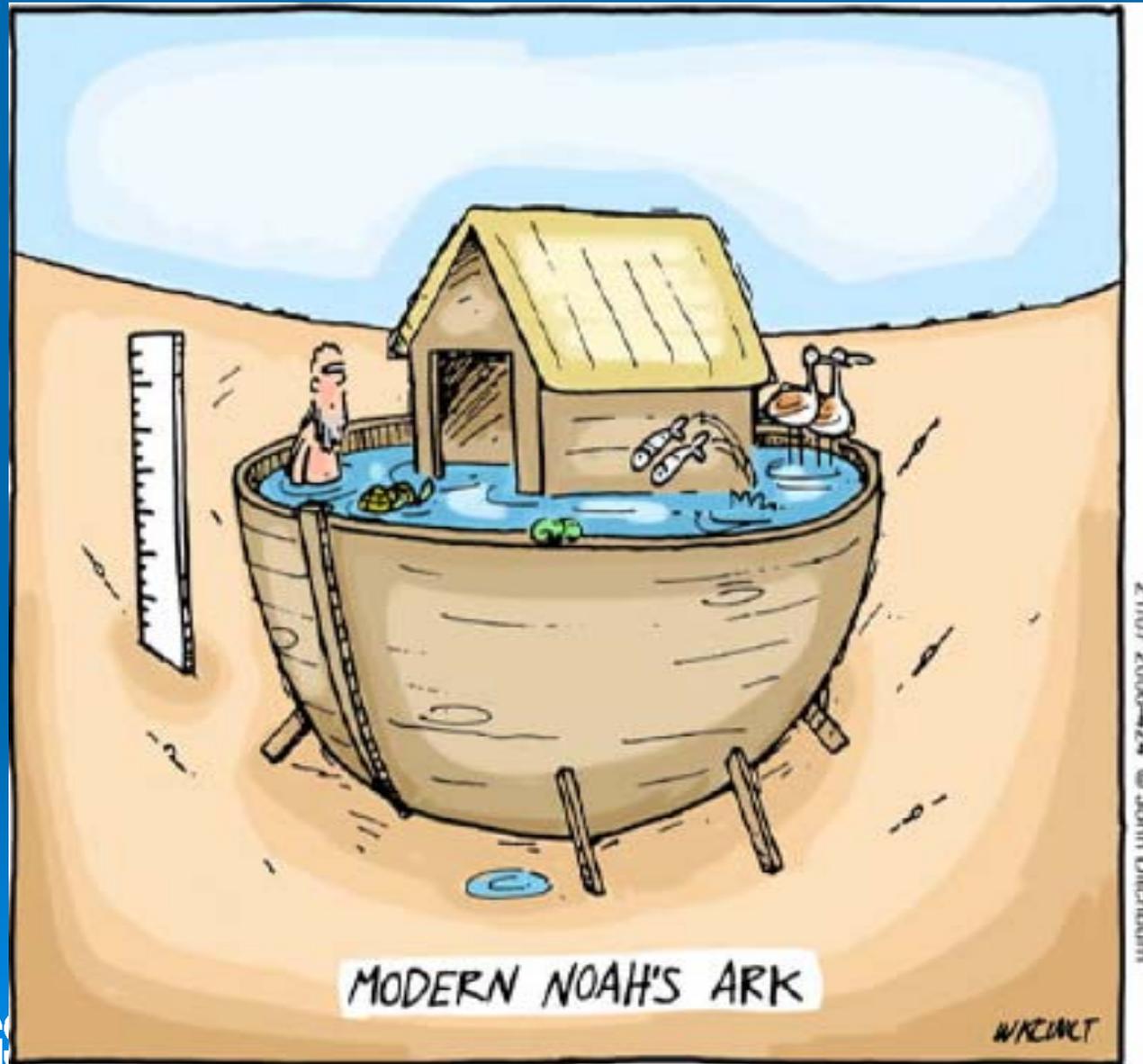


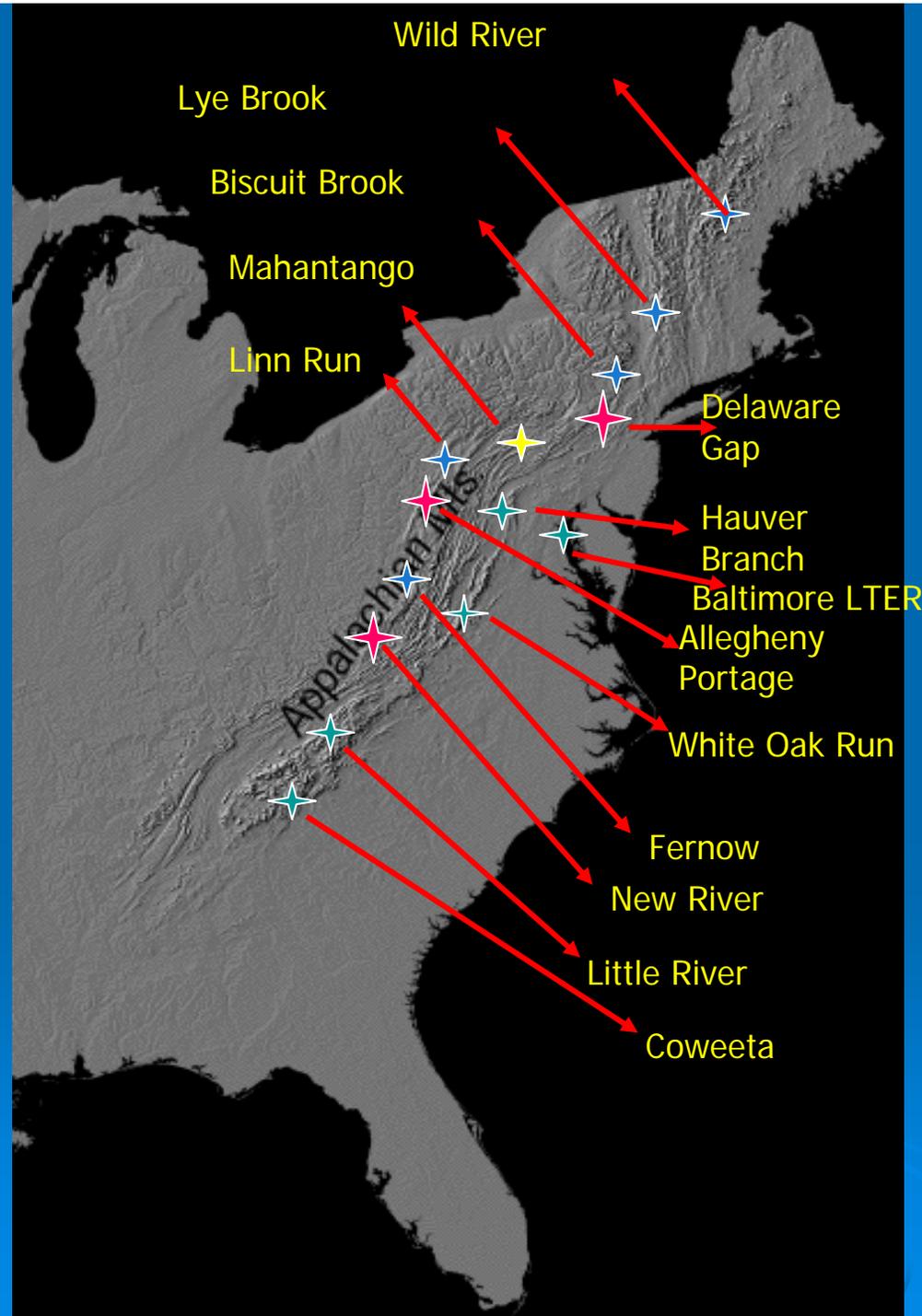
DOI Data Integration and Dissemination Working Group



Data Vision Statement: *“To create a data management system through which DOI and its partners can access, assemble, and synthesize scientific data for natural resource management, delivering the right information to the right person at the right time using a standard means of access to authoritative ecological resources data.”*

Context Matters: Link LCC Science



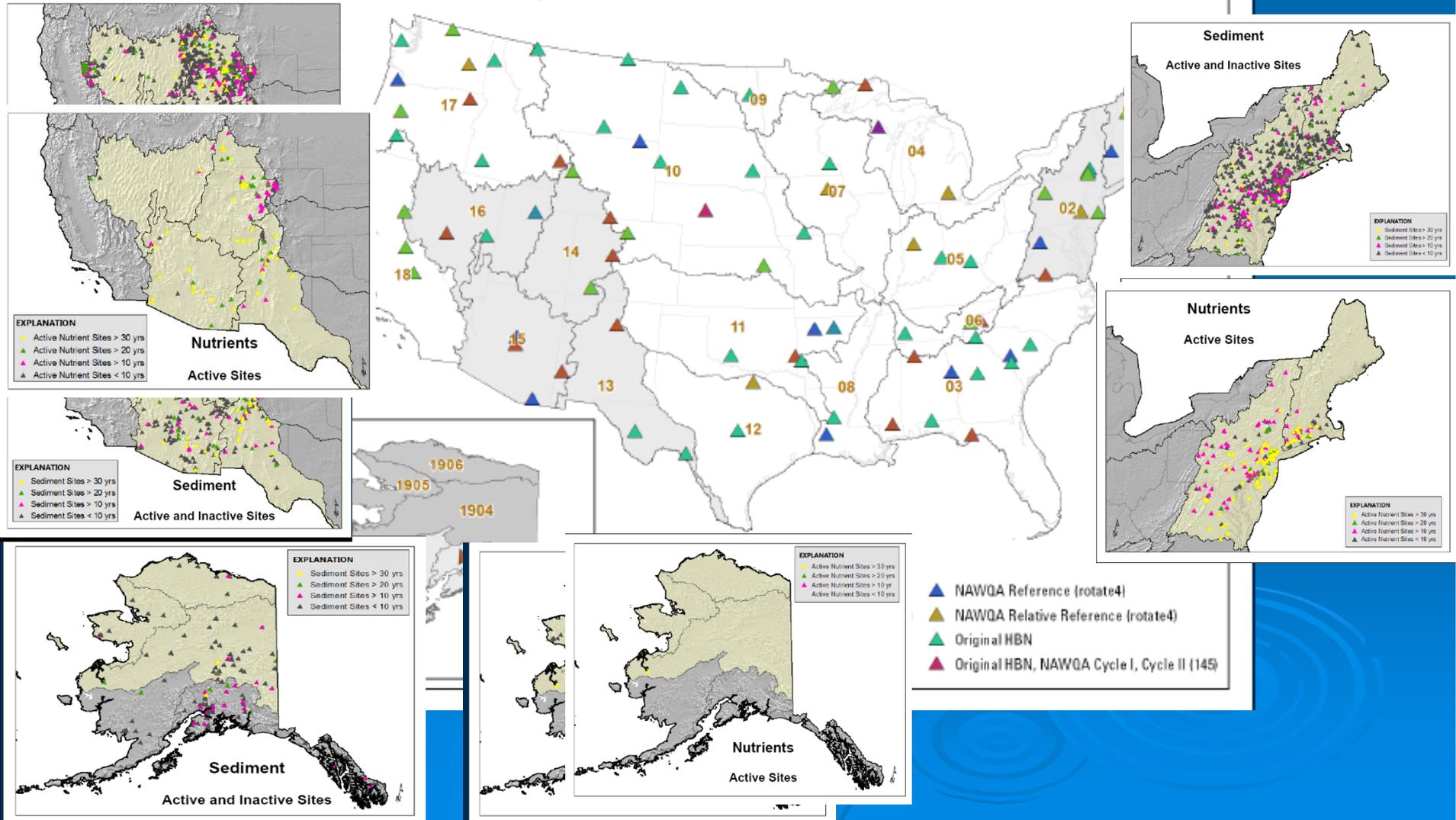


Leverage long-term observation stations

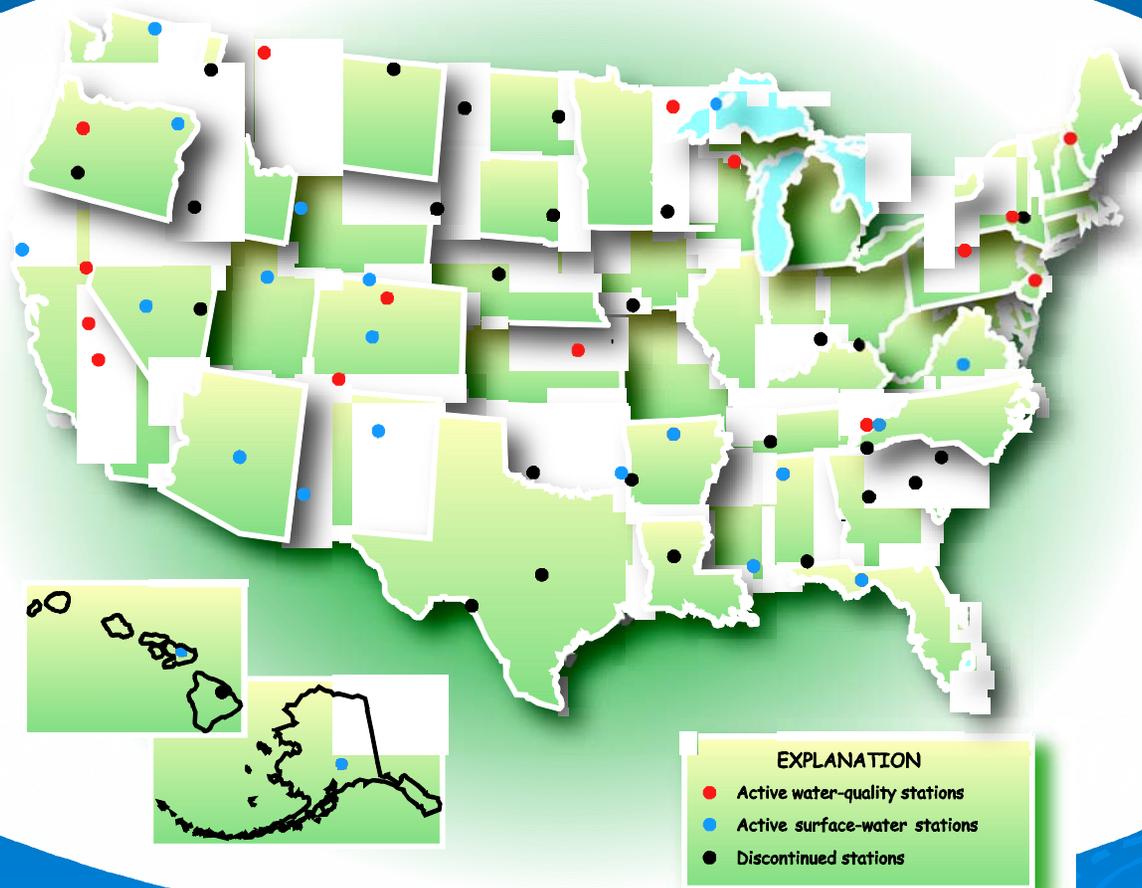
Location of existing research watersheds in the Appalachian Mountains Physiographic Province

Compile and understand what we have: Water Quality Metadata Analysis- Jeff Deacon

NAWQA and HBN Reference Sites



Protect and enhance endangered programs with critical long-term datasets



Hydrologic Benchmark Network (HBN)



What is CEN?

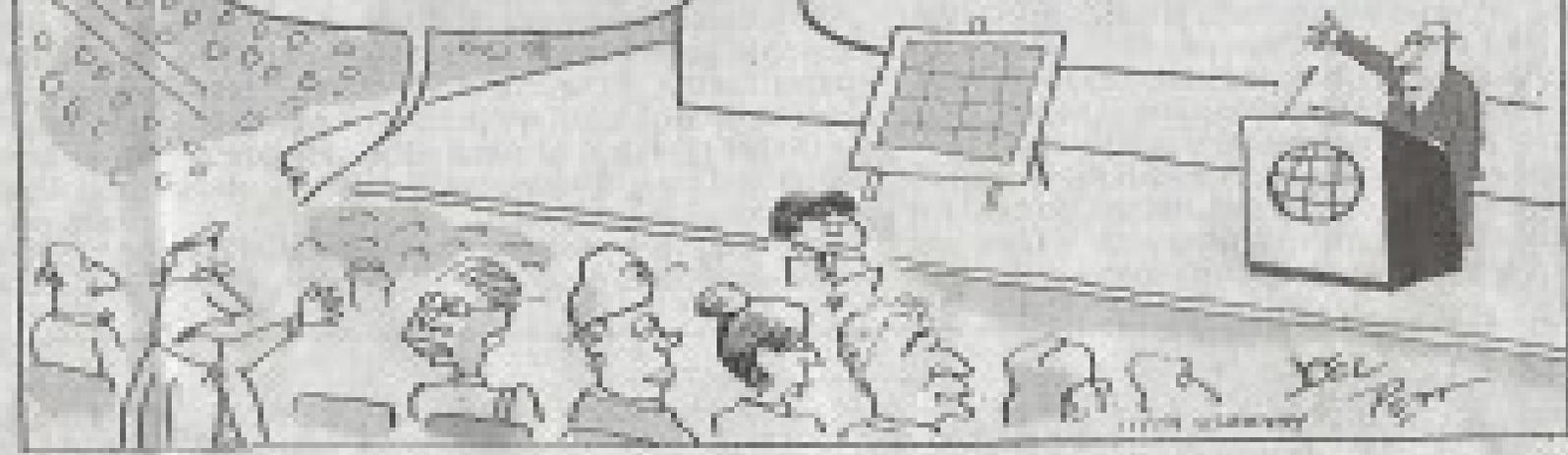
- A collaboration structure for linking science in support of resource management decisions
- “Network of Networks” building upon existing capabilities for status and trends detection
- Strategic research program to define optimal indicators, improve status and trends detection, and test adaptation strategies
- Protection plan for critical long-term monitoring
- Collaborative, distributed, data-management and dissemination support system
- Support Services (QA/QC, comparability testing, communications, etc)



CLIMATE SUMMIT

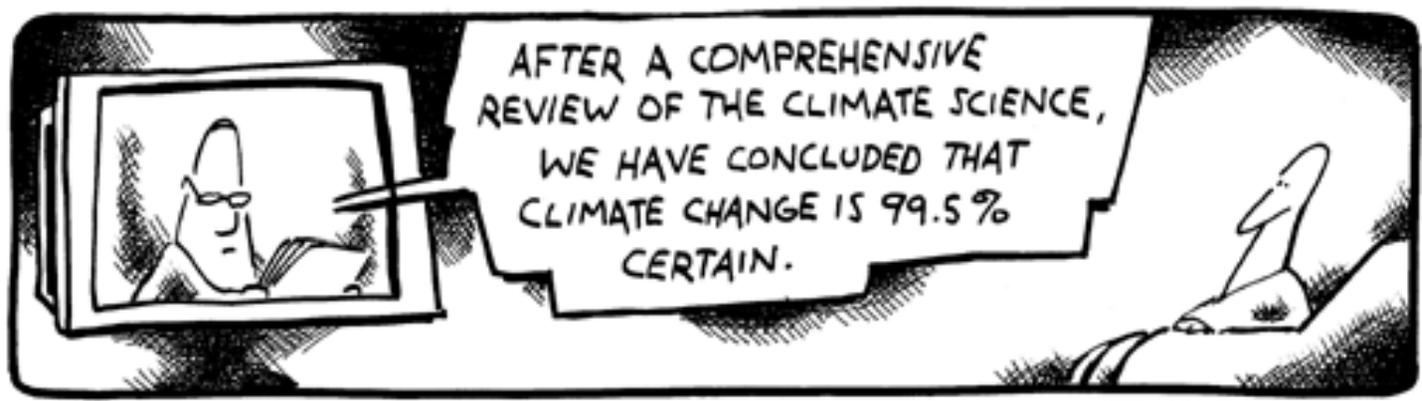
WHAT IF IT'S
A BIG HOAX AND
WE CREATE A BETTER
WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- ETC. ETC.



BY JAMES B. HANCOCK / THE FREDERICK LUDWIG FOUNDATION AND THE NEW YORK TIMES, 2009





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Please visit the CEN Poster

