

CUAHSI: A University Consortium for Hydrologic Science

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CUAHSI
universities allied for water research

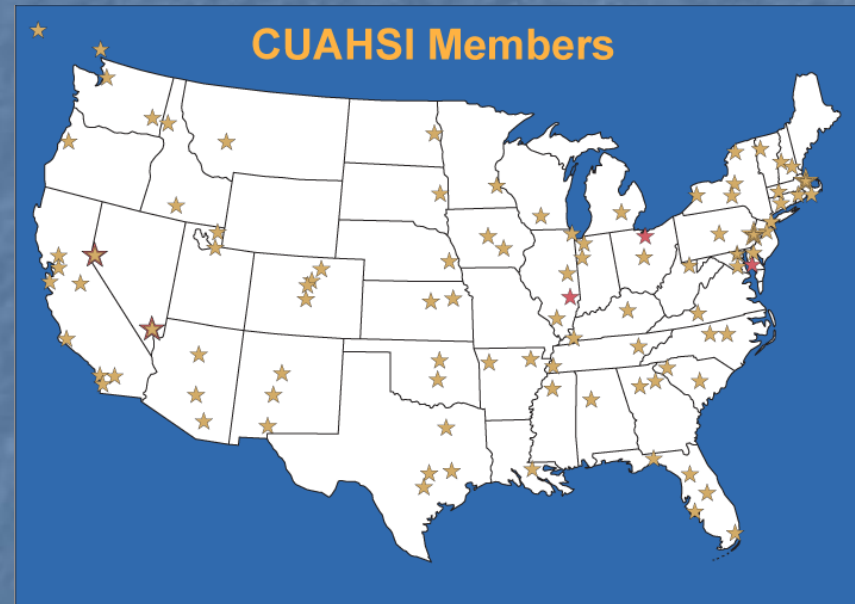
What is Hydrologic Science?

- Expands beyond traditional hydrology
- Focus on “why” the earth works as it does, like other earth sciences, moving beyond traditional problem-solving orientation
- Embraces parts of hydrology, geomorphology, hydrogeology, biogeochemistry, ...
- **Hydrologic cycle is central organizing principle**



Who is CUAHSI?

- A consortium of 98 research universities, 4 affiliate members, and 2 int'l affiliates
- Incorporated June, 2001 as a non-profit corporation in Washington, DC

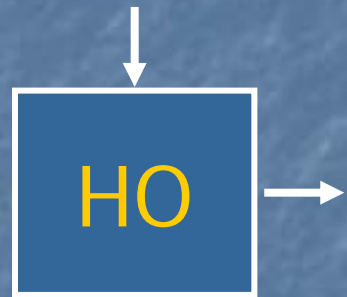


Purpose

- **Science Objective:** To further predictive understanding of the terrestrial hydrologic cycle and its linkages with climate and biogeochemical cycles
- **Societal Need:** Will there be enough water for the next century?
 - ...of appropriate quality
 - ...to meet society's needs
 - ...to maintain the integrity of our ecosystems



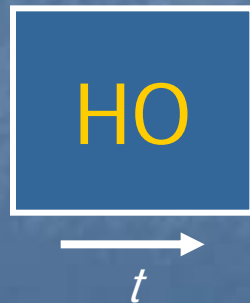
River Basin as Unit of Study



- Forcing
 - How does the basin respond to low-frequency precipitation forcings? How is the predictability of floods and droughts altered?



- Processing
 - How does the basin process precipitation and chemical inputs ?



- Evolution
 - How do changes to the land surface alter the hydrologic cycle?



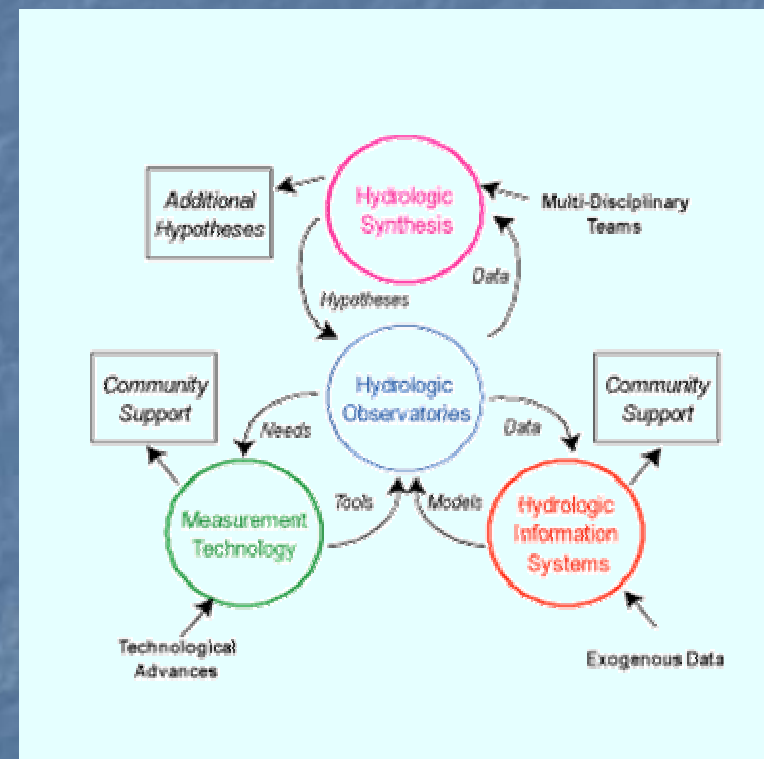
Need for CUAHSI

- Larger-scale, longer-term research to support researchers
- Enable research at disciplinary boundaries
- Support of larger research teams
- Improve efficiency and effectiveness of data collection and dissemination of research data



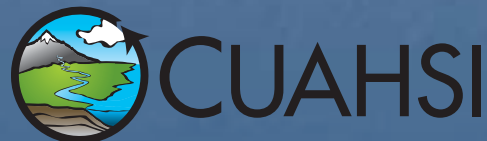
HydroView

- Initial infrastructure program
- Mutually supportive elements
 - Observatories
 - Instrumentation
 - Informatics
 - Synthesis



Today's Briefing

- Brief definition of Synthesis, Informatics, and Instrumentation
- Focus on HO's
 - Design Concepts
 - Status of Prototyping Efforts
 - Near-term Plans
- Collaboration opportunities



Design Concepts: National Center for Hydrologic Synthesis

- “Think tank” for hydrologic science
 - Neutral ground for scholarship
 - Includes academic, government and private sector scientists
- Emphasis on interdisciplinary, cutting edge ideas
- Modes:
 - Working groups (~2 yr duration)
 - Post-docs
 - Sabbatical visitors
- Products: journal articles



NCHS: Status

- Host Institution: Berkeley
- Interim Director: Yoram Rubin
- Submission of NSF proposal: March, 2005
- Operation: Fall, 2005
- Initial NSF Budget: ~\$500K/yr, ramping to \$2M over 4 years
- Substantial external partnering w/ industry, gov't agencies, int'l research org.



Hydrologic Information Systems Design Concept

- Provide common, convenient interface for users to retrieve HO data
- Federated digital library with DataViewer
- Metadata standards
- Advanced data systems technologies
- Automatic population with Federal Science Agency data (USGS, NWS, and others)



Informatics Approach

- Pilot design phase (through March, 2006) for initial product
- Operational Center to deliver data products
- Thematic Centers for software development



Instrumentation: Design Concepts

- Get instruments into scientists' hands with appropriate training
- Diffuse knowledge about state-of-the-art across disciplines
 - Handbook of Field Techniques
- Increase efficiency of instrument utilization
 - Leasing and sharing arrangements internally and with Federal science agencies (e.g., USGS HIF)



Hydrologic Observatory (HO) Design Concepts

- Large (~10,000 km²) instrumented basins
 - Permits exploration of all interfaces, including land surface/atmosphere
 - Provide **coherent, multi-disciplinary, multi-scale** data
 - Characterize stores, flux, flowpaths, and residence-time distributions of water, sediment, nutrients, and contaminants.
- Community facilities
 - Core data available to everyone
 - Site access by peer-reviewed competition
 - On-site professional staff
- Budget Estimates
 - \$3M annual operating cost and \$10M 5-yr capital budget

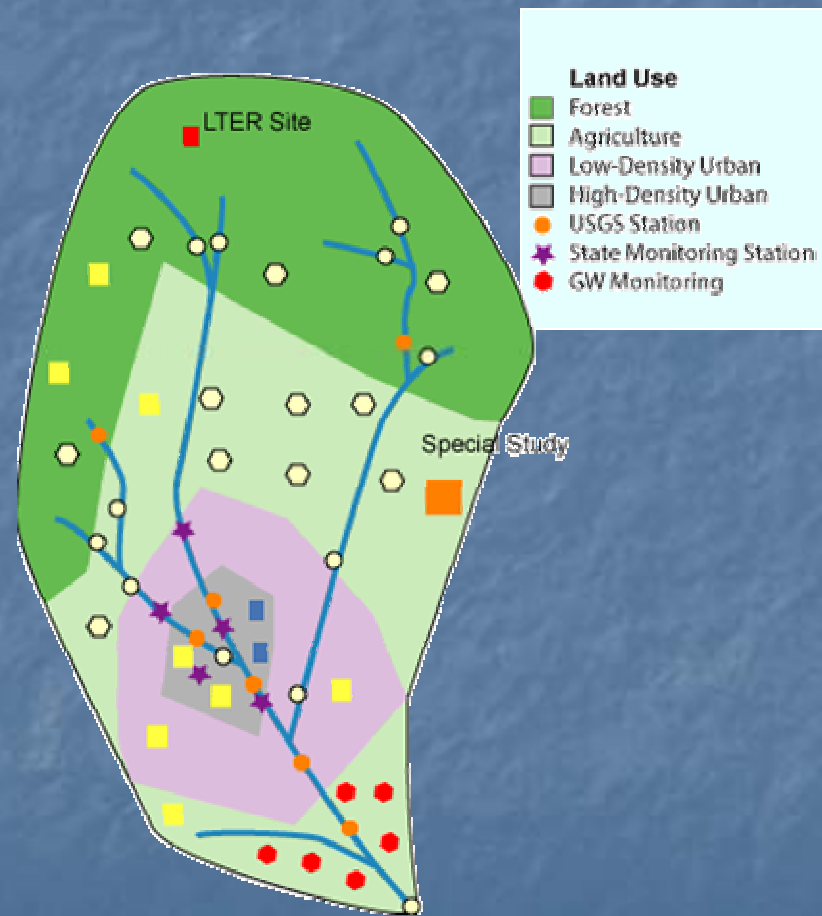
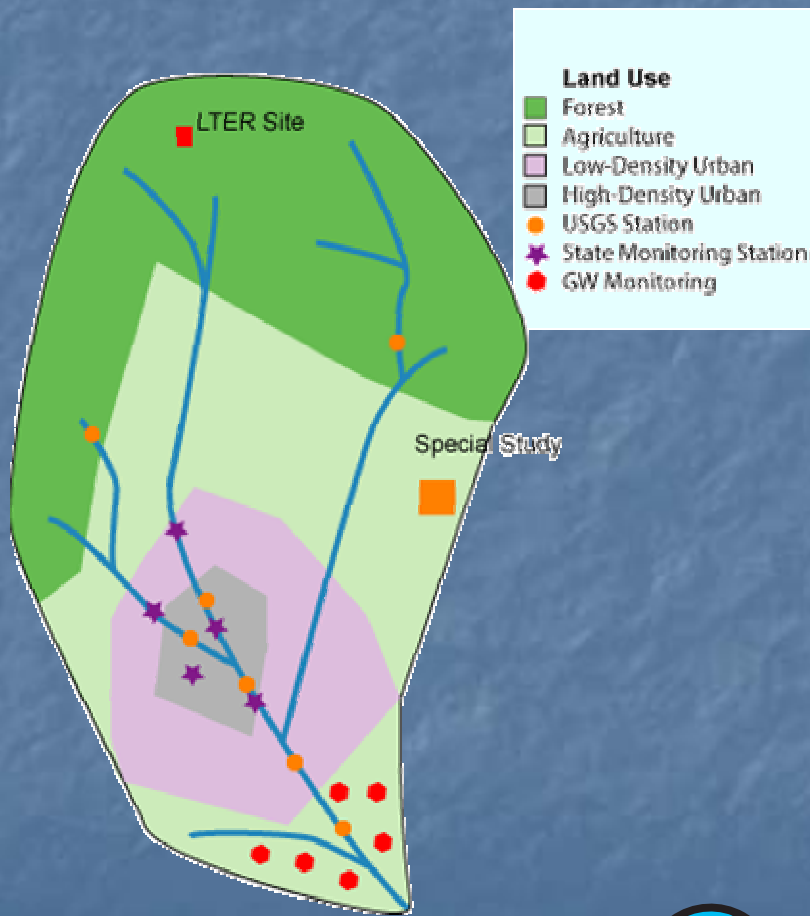


Evaluation Criteria

- Science
 - Hypotheses Posed
 - Utility of Core Data for Characterization
- Leveraging of Existing Data
 - Identify “gaps” preventing science
- Partnerships
- HOs must attract “outsiders” to do research



Leveraging Data



Strategic Collection of Data

- Hypothesis Driven
- Replication
- Balance
- Perspective: Understanding the terrestrial hydrologic and biogeochemical cycles and relation to climate

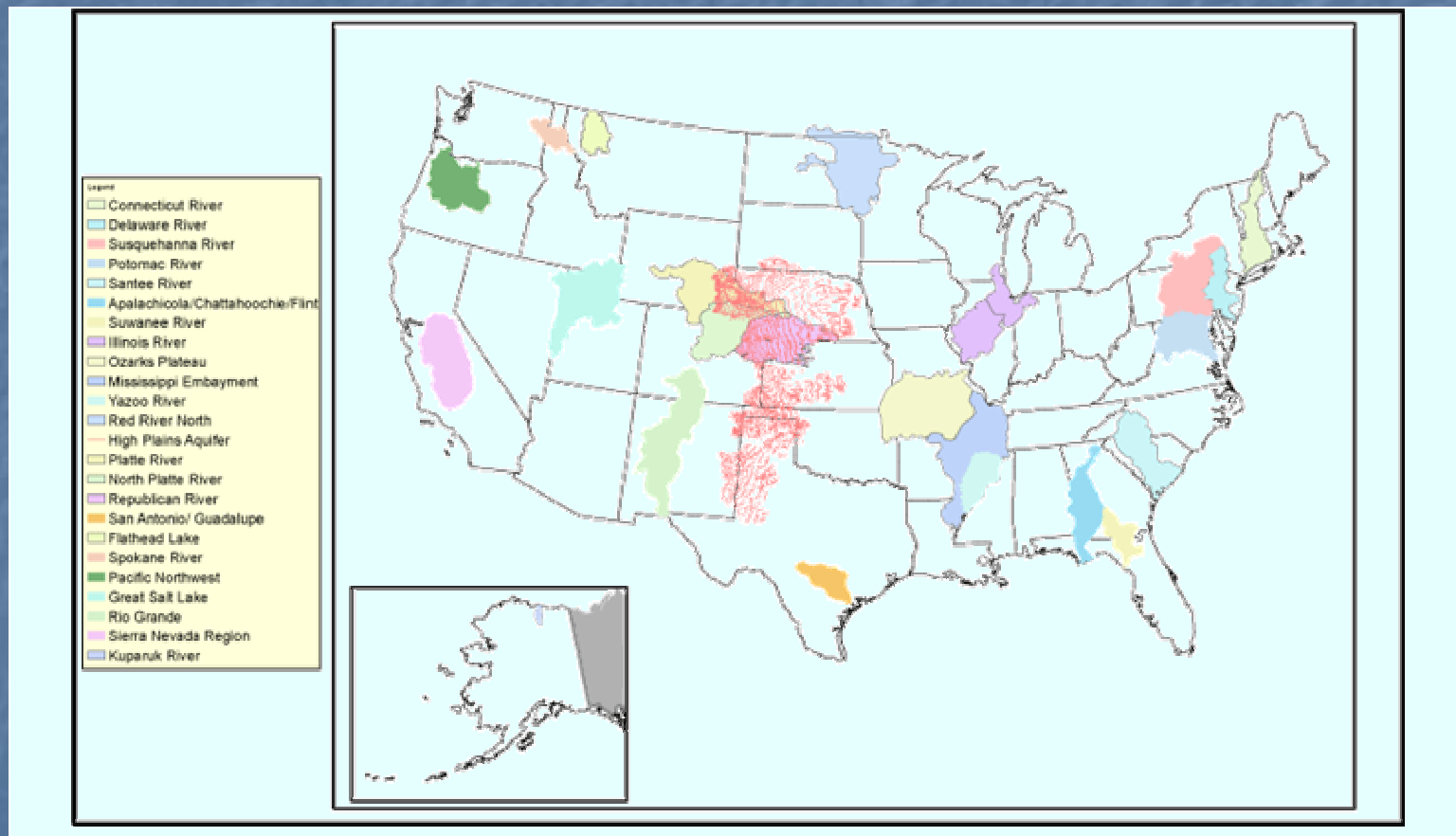


HO Status

- Neuse Paper Prototype Study—just completed
- National Workshop—August, 2004 Logan, UT
- NSF Program Announcement: Summer, 2005
- Selection of 2 HOs: March, 2006
- Further build-out dependent on funding strategy (MREFC/R&RA) and success of test-beds.
- Vision: ~15 HOs for conterminous US



HOs Under Design



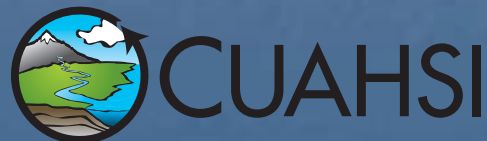
Collaboration Opportunities

- Research
 - HOs should attract a range of environmental scientists
 - HydroView facilities open to everyone
 - Operational collaboration
- Data
 - Leveraging existing monitoring, assessment and research programs
- Funding
 - Stretch agency dollars through investing in characterization of common sites



Education and Outreach

- Each HydroView element has large potential E&O component
- Pilot HOs first element with E&O component with support from CUAHSI HQ
- Two additional initiatives:
 - Modular Hydrologic Field Camps
 - CUAHSI Cyberseminars



CUAHSI Cyberseminars

- Begun Fall, 2003 (3 seminars)
- Continued Spring, 2004 (5 seminars)
- Free and open to all interested parties
- Typically between 20 and 30 sites with 150-200 people signed on
- Low-tech approach
- <http://www.cuahsi.org>



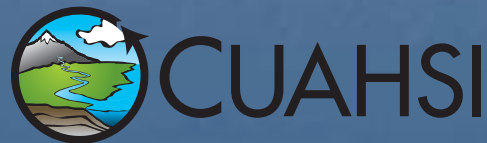
Current Series: Vision Papers

- CUAHSI provided travel grants to 14 groups to develop vision for hydrologic research
- 125 people from 50 universities involved
- Cyberseminars throughout fall with web discussion



Hydrology Field Camps

- Barriers to offering field camps
 - Traditionally not a part of CEE, but of Geology
 - Broad range of disciplines
 - Large amount of work for faculty
 - Expensive, need large student base to support



Field Camp Approach

- Develop series of 1-week modules
 - Vadose zone
 - Aquifers
 - Surface water
 - Shallow geophysics
 - Aquatic Chemistry and microbiology
 - OSHA Training
- CUAHSI Review, approval, and distribution
- Cooperative Project between Clemson and N. Illinois
- Test site: Clemson



Summary

- Many activities, centered around HydroView
- Large cast of universities involved
- NSF is making large commitment to HO's
 - New territory
 - Lots to learn
- Opportunities to advance science and serve the public

