WaterHUB – Enabling hydrological exploration, modeling and collaboration

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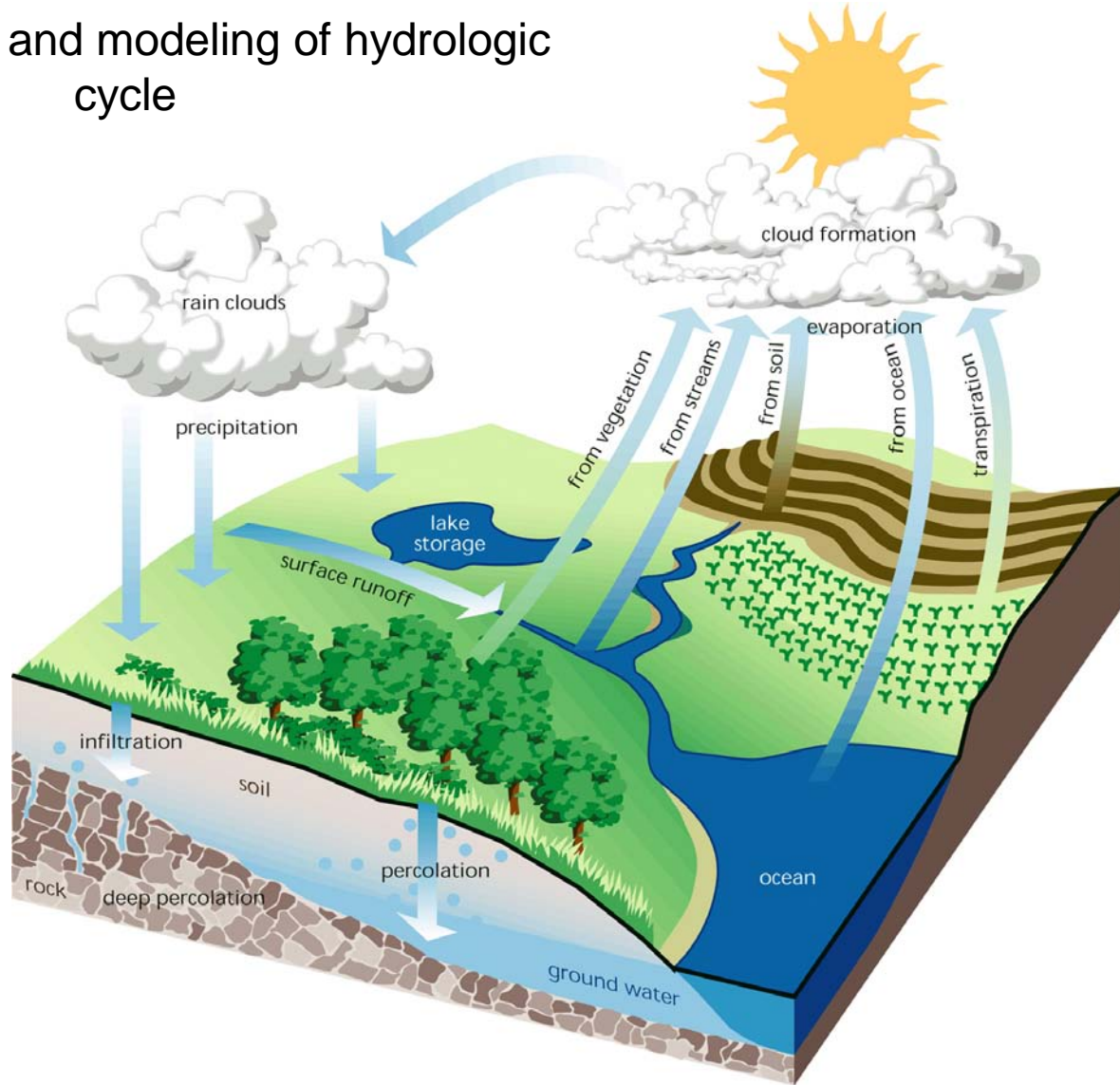
Acknowledgements

- National Science Foundation
- Purdue Engineering

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  - Ben Ruddell, Arizona State University
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What is Hydrology?

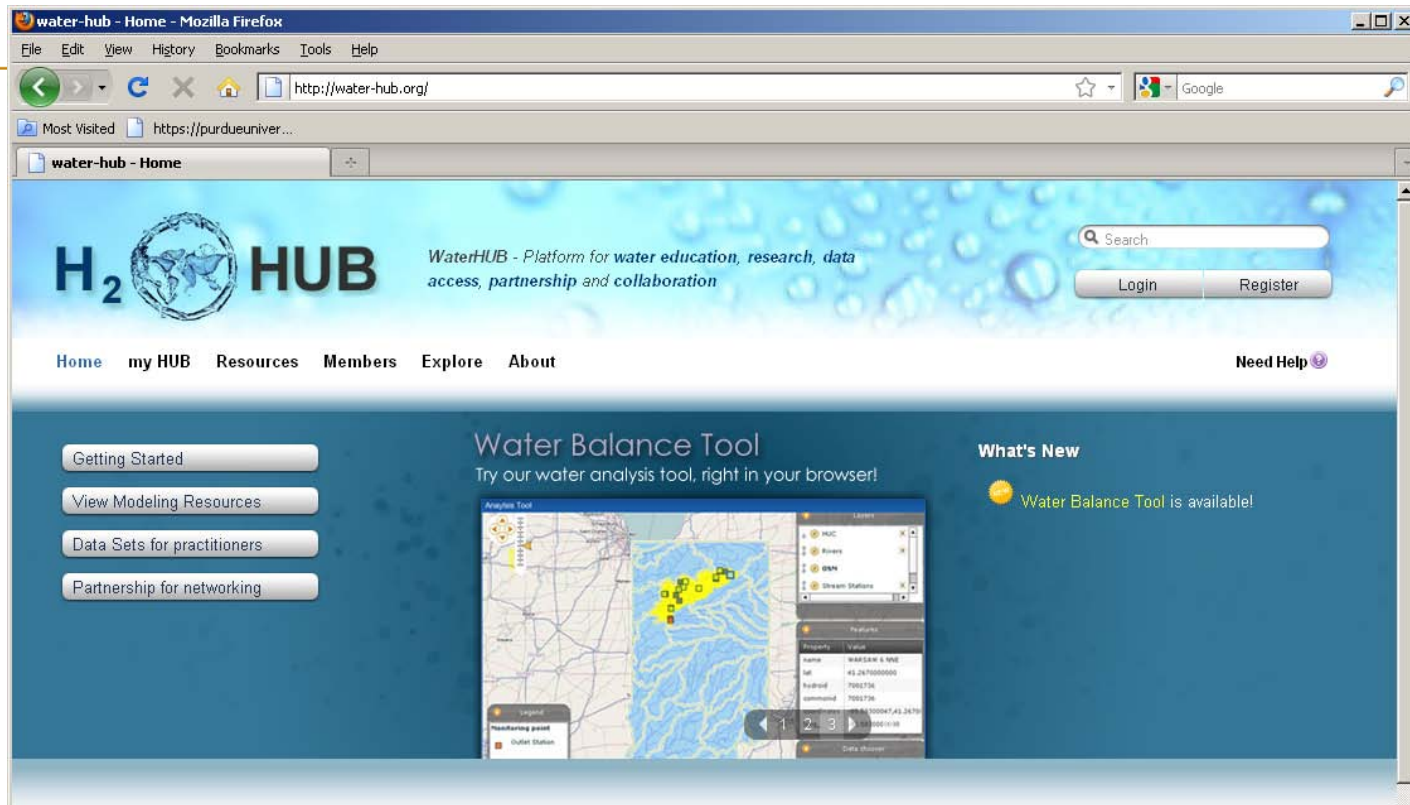Understanding and modeling of hydrologic cycle

Need of CI for Hydrology

- Understanding hydrology requires data - access, sources, heterogeneity, temporal and spatial domains

- Modeling requires computational tools – spatial and temporal scale, integration, applications

- Hydrologic problems – complex and interconnected across disciplines

What is WaterHUB

- Large scale geospatial data and modeling extensions
  - Geospatial services and middleware
  - TeraGrid/XSEDE computation/storage resources
  - Remote geospatial data providers (CUAHSI HIS, NCDC)
  - GIS software, community modeling tools

Architecture
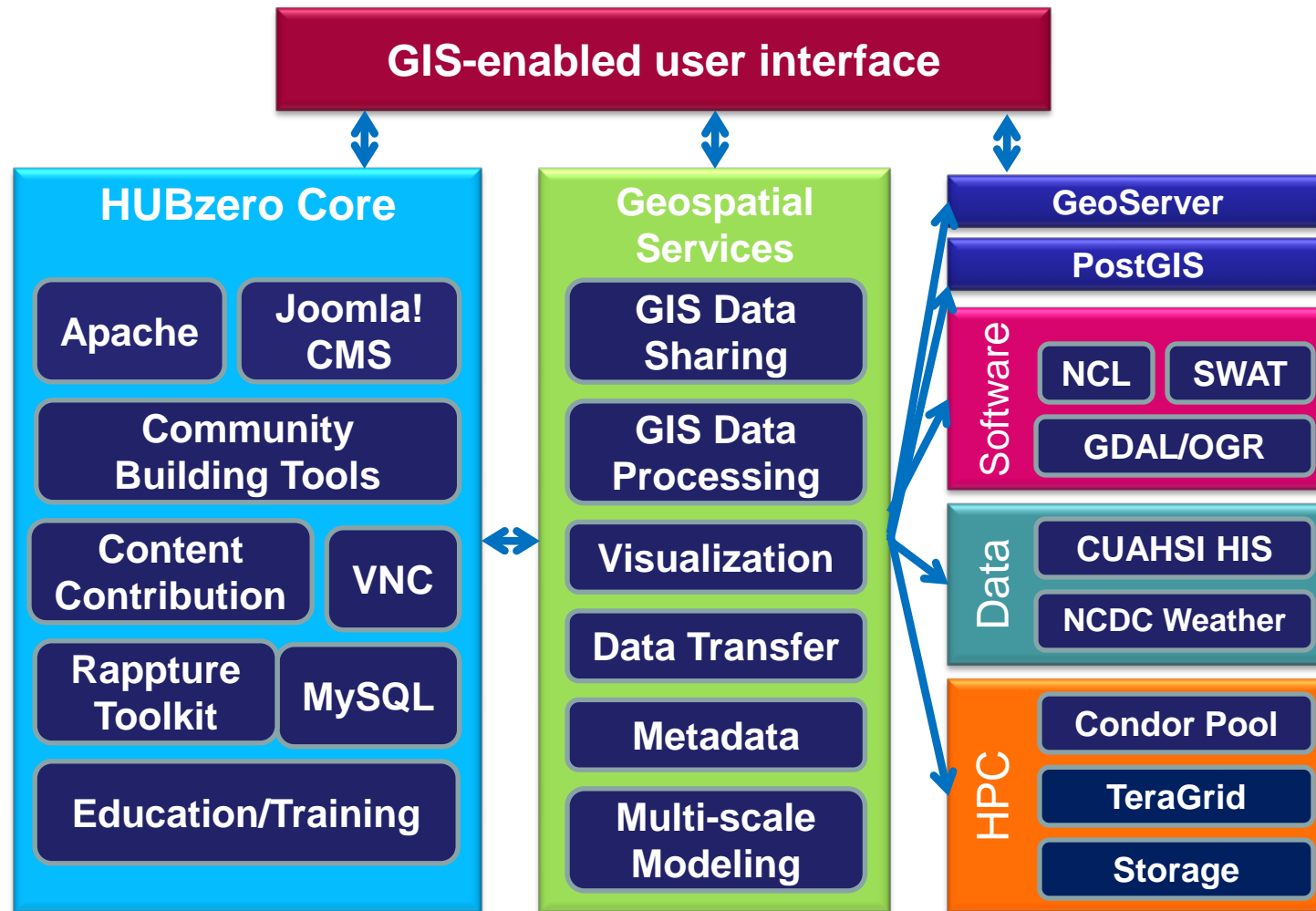
Why WaterHUB for Hydrology

- **Connecting hydrologists** : sharing of information, data and simulation tools
- **Connecting data and models**: use of CUAHSI HIS web services for running hydrologic models
- ***Connecting models and community****: models created by one person/organization can be used by multiple entities*
- **Connecting science and people**: policy makers can use model outputs and other information on waterHUB for making decisions

WaterHUB for Hydrology Education

Understanding contemporary hydrologic issues need more than text book knowledge!

- **Water availability –** change in watershed storage under various geographic and climatic settings

- **Water movement -** Quantifying fluxes of carbon, water, energy, and nutrients across the land surface?

- **Human impacts –** quantifying the impact of natural variability versus human actions on hydro-climatology

Hydrology Tools on WaterHUB

- SWATShare – A tool for sharing Soil Water Assessment Tool (fluxes)

- Water Balance – A tool for plotting inputs, outputs and losses from hydrologic system (storage)

- Hydrology Exploration – a tool for exploring the role of land use change on hydrology (human impacts)

SWATShare Modeling Environment

- Implementation
  - GIS interface using FLEX for rich UI and portability
  - Web services for metadata/data management, job submission, status tracking, visualization, and data transfer
  - Datamover: a secure FTP client that enables large data transfer
  - XSEDE computation and storage resources
    - PBS jobs at Steele for long running jobs
    - Condor jobs at Purdue for short jobs
    - Community account
    - Globus job submission

SWATShare Demo

www.water-hub.org

Hydrology Exploration Toolkit

- Dynamic data retrieval from remote data resources via web service
  - Rainfall and radiation data at NCDC
  - Streamflow data at CUAHSI HIS
- FLEX GIS client
- PostGIS database
- geoserver

Hydrology Exploration Toolkit Demo

https://drinet.hubzero.org/hydroexplorer

Summary and ongoing work

- Three tools are developed that uses public domain data and computational tools to address hydrologic issues
- These tools have potential to serve both research and educational audience in hydrology
- Actual testing and assessment in classrooms will be done over the next two years

Thank you!

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