

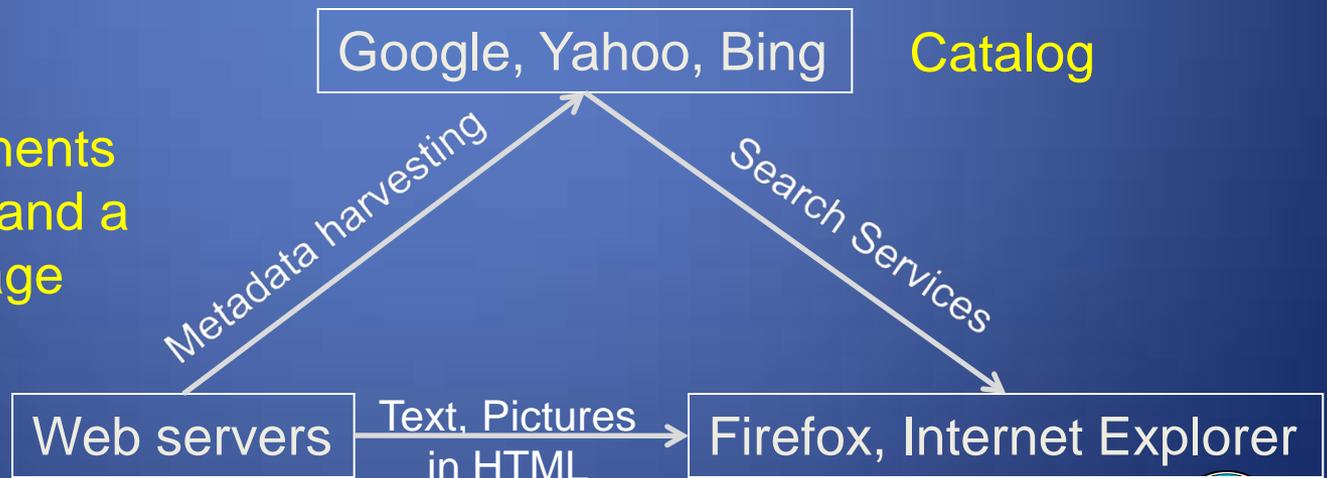
How does the internet work?

This is how it got started



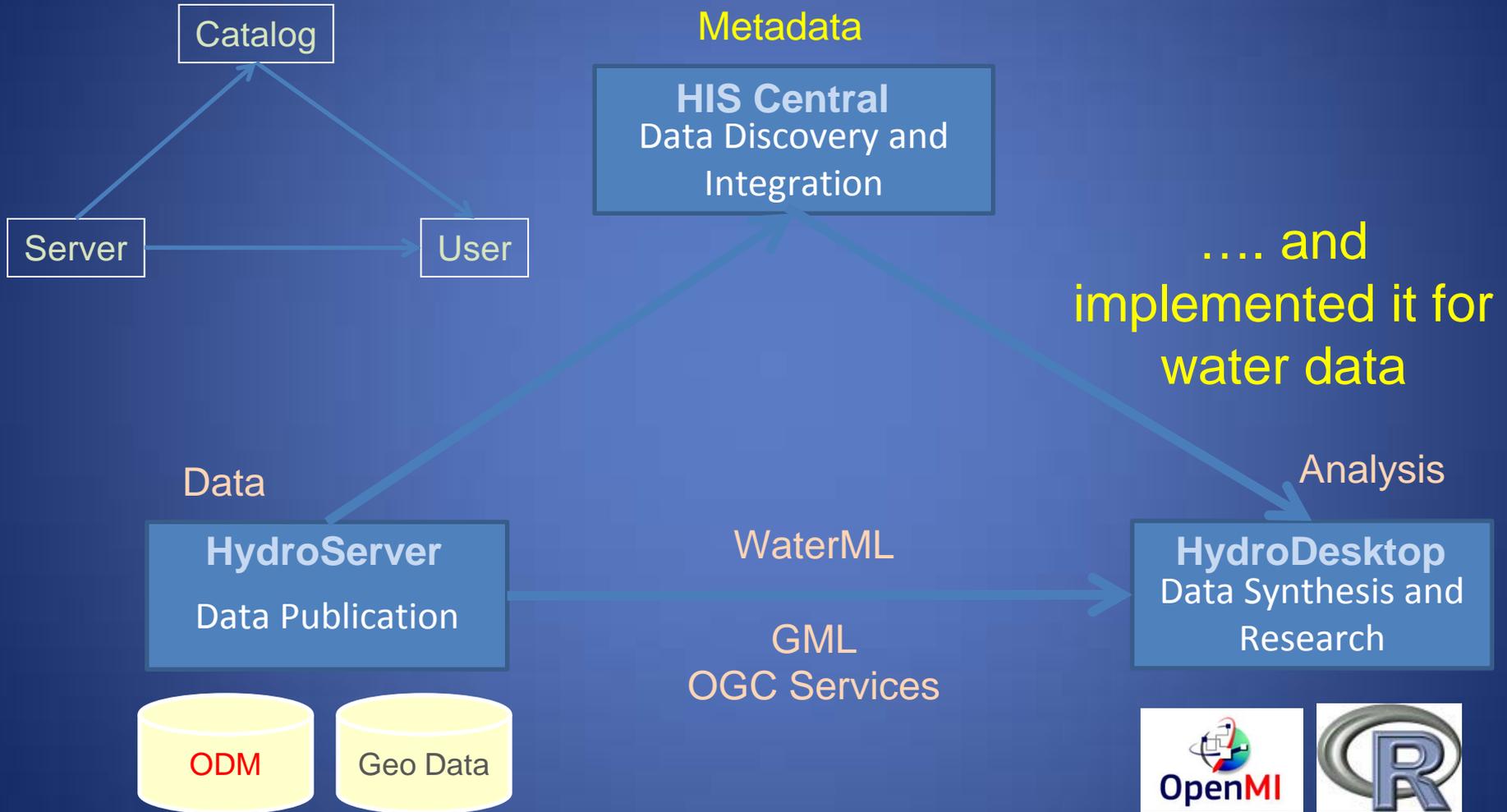
.....this is how it works now

Three key components linked by services and a common language



What has CUAHSI Done?

Taken the internet services model....



HIS Central – Catalog and Search



CUAHSI
HIS

Sharing hydrologic data

Login Register

Home All Data Services

All Registered Data Services

| Data Service Title | Observation Network Name | WSDL | CreatedDate | Organization | Contact | Status | Earliest Start Date | Latest End Date |
|--|--------------------------|------|-------------|--------------|-----------------|--------|---------------------|-----------------|
| NWIS Daily Values | NWISDV | WSDL | 10/30/2008 | USGS | David Valentine | | 01/01/1861 | 12/08/2008 |
| NWIS Instantaneous Irregular Data | NWISIID | WSDL | 10/30/2008 | USGS | David | | 09/01/1867 | 12/13/2231 |
| NWIS Unit Values | NWISUV | | | | | | | |
| EPA STORET | EPA | | | | | | | |
| Chesapeake Bay Information Management System | CIMS | | | | | | | |
| Mud Lake Idaho | MudLake | | | | | | | |

hydroseek^{Beta} search engine

Keyword Go!

e.g. Streamflow, Precipitation, Temperature, Nitrogen...

HELP ABOUT Map Styles

Where & When?

Northbound Latitude

Westbound Longitude

Southbound Latitude

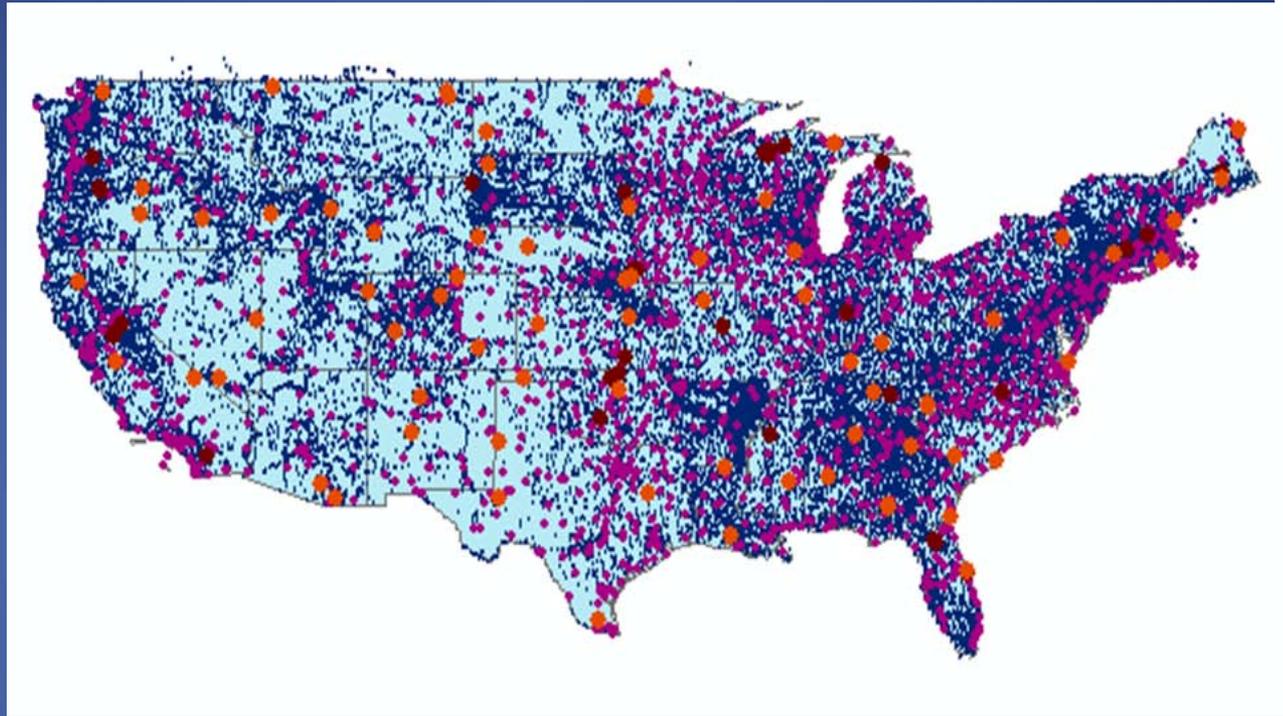
Eastbound Longitude

Start Date:

End Date:

Or search by watershed

The CUAHSI Water Data Catalog



47 services

15,000 variables

1.8 million sites

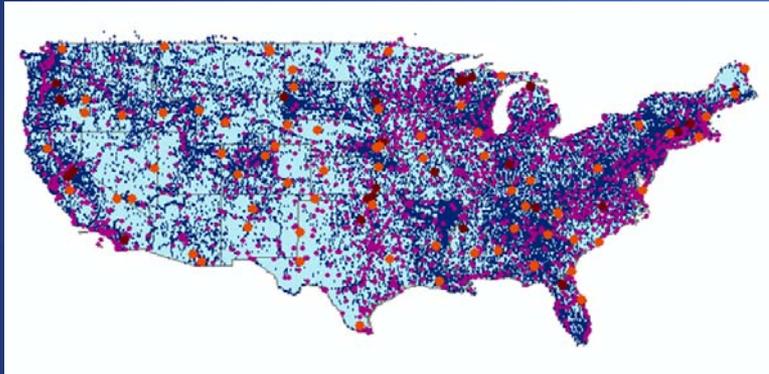
9 million series

4.3 billion data Values

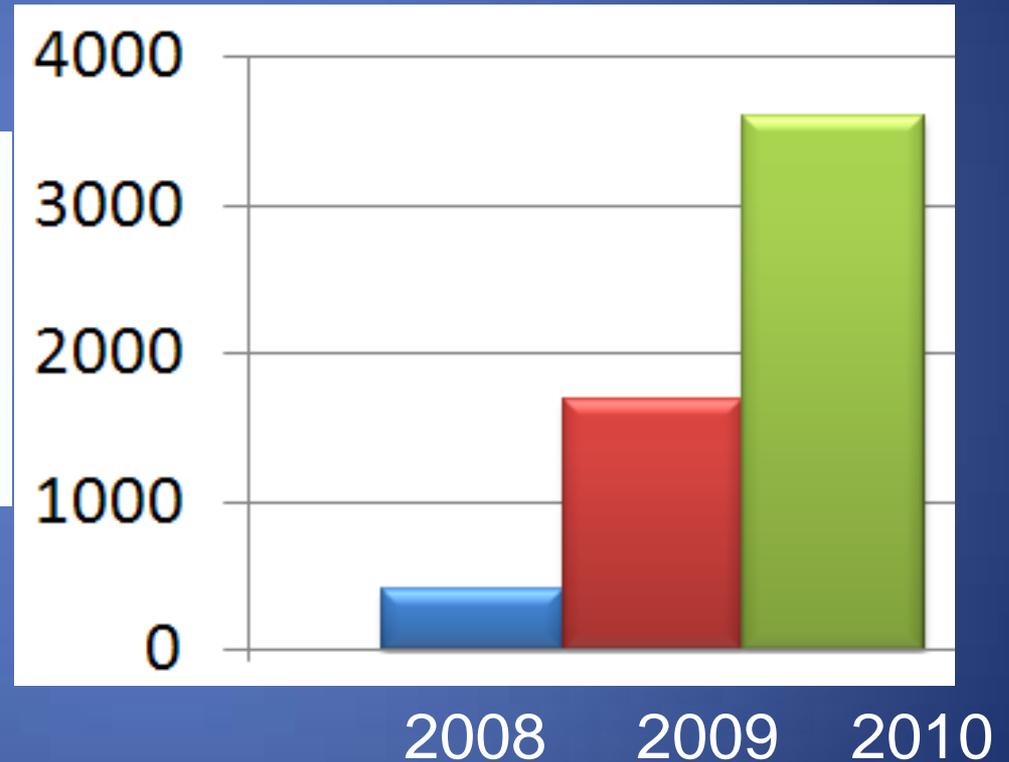
... All the data is accessible in WaterML



Web Services Data Requests per Day



Observations
Networks Indexed at
HIS Central



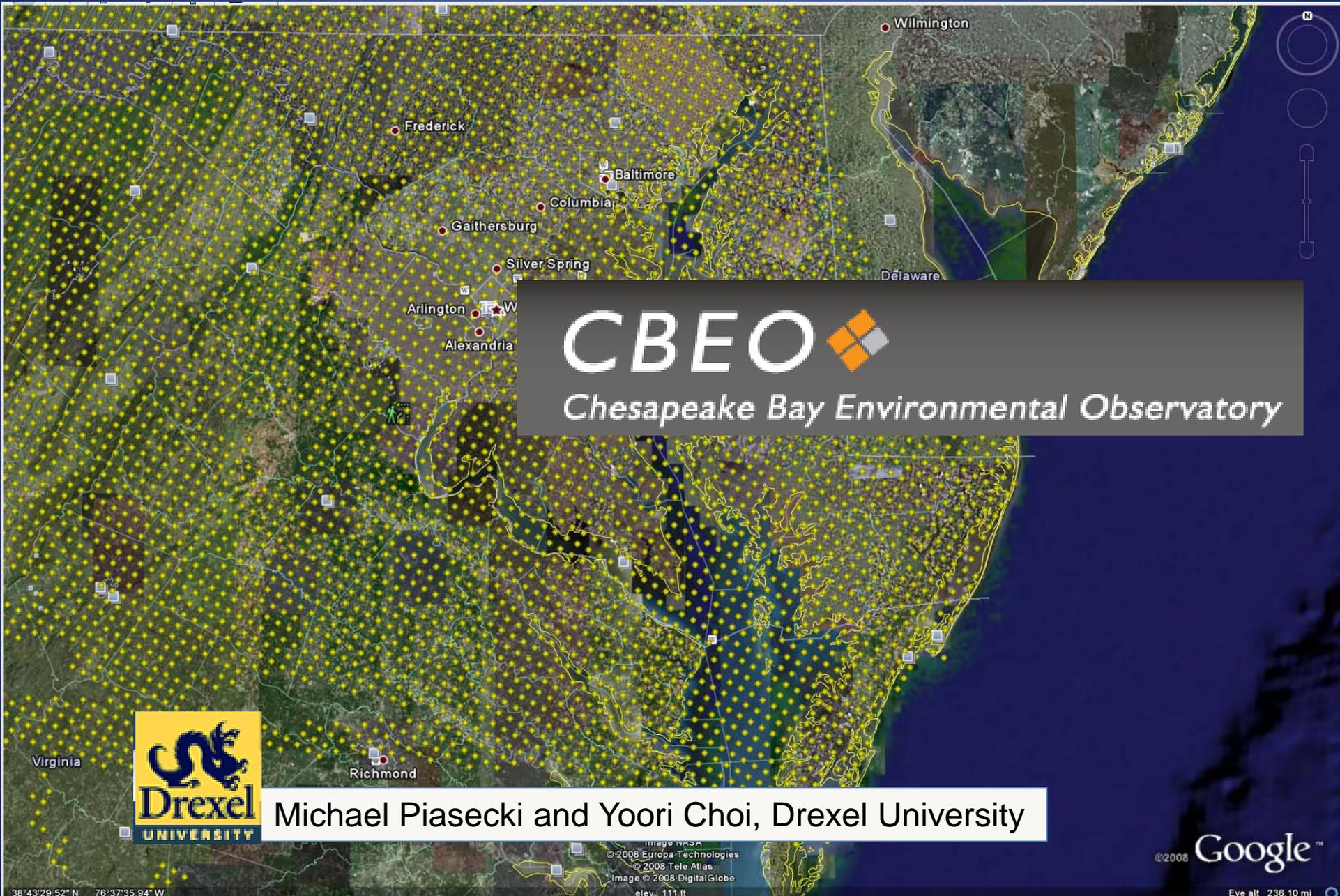
Federal Agency Water Data Services at HISCentral (10/09)

| Network Name | Site Count | Value Count | Earliest Observation | Notes |
|--------------|------------|-------------|----------------------|--|
| NWISDV | 29894 | 274762525 | 1/1/1900 | WaterML-compliant GetValues service from NWIS, catalog ingested |
| EPA | 362645 | 94349967 | 1/1/1900 | SOAP wrapper over WQX services, catalog harvested |
| NWISUV | 11185 | 77935488 | 60 DAYS | WaterML-compliant GetValues Service, catalog ingested |
| NCDC ISH | 11555 | 3000000* | 1/1/2005 | WaterML-compliant GetValues service from NCDC, catalog harvested |
| NCDC ISD | 24770 | 18165478 | 1/1/1892 | WaterML-compliant GetValues service from NCDC, catalog harvested |
| NWISIID | 369148 | 15501245 | 1/9/1867 | SOAP wrapper over NWIS web site, catalog harvested |
| NWISGW | 827200 | 8325633 | 1/1/1900 | SOAP wrapper over NWIS web site, catalog harvested |
| RIVERGAGES | 2206 | 263101295 | 1/1/2000 | WaterML compliant REST services from Army Corps of Engineers |



MultiSensor Precipitation Estimator MPE for Chesapeake Bay Watershed

Temporal Scale: daily from 2005 – 2008, GeoSpatial Scale: 4*4 km on HRAP grid



CBEO
Chesapeake Bay Environmental Observatory



Michael Piasecki and Yoori Choi, Drexel University

NCDC Integrated Station Hourly Data

**National Climatic
Data Center**

Hourly weather data up
to 36 hours ago

13,628 sites across globe

34 variables

Published by **National
Climate Data Center**
and populated with
weather observations
from national weather
services



http://water.sdsc.edu/wateroneflow/NCDC/ISH_1_0.asmx?WSDL

U n i v e r s i t i e s a l l i e d f o r w a t e r r e s e a r c h



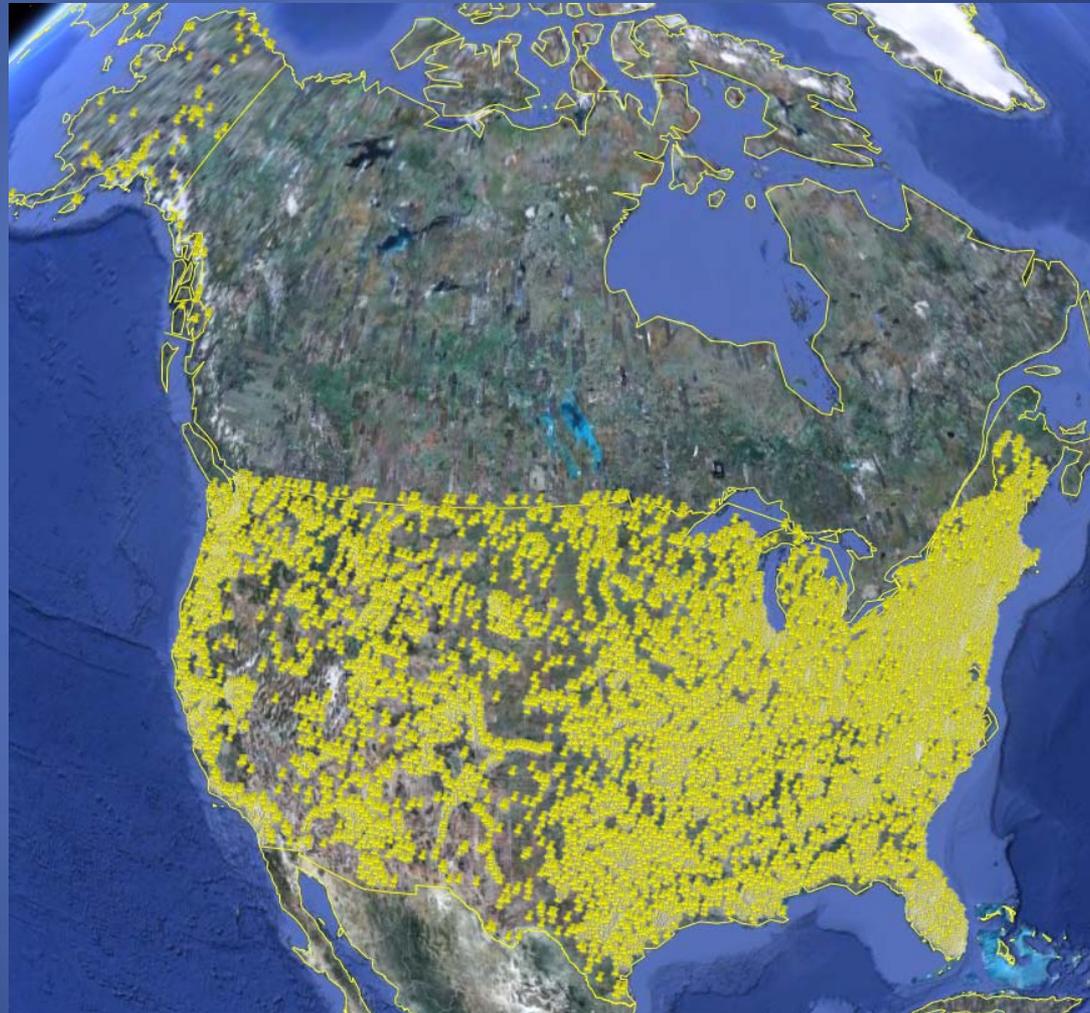
USGS Instantaneous Data



Real time,
instantaneous data over
the last 60 days

11188 sites, nationally
for the US

80 variables



Published by **USGS**
National Water
Information System



Corps of Engineers Water Observations



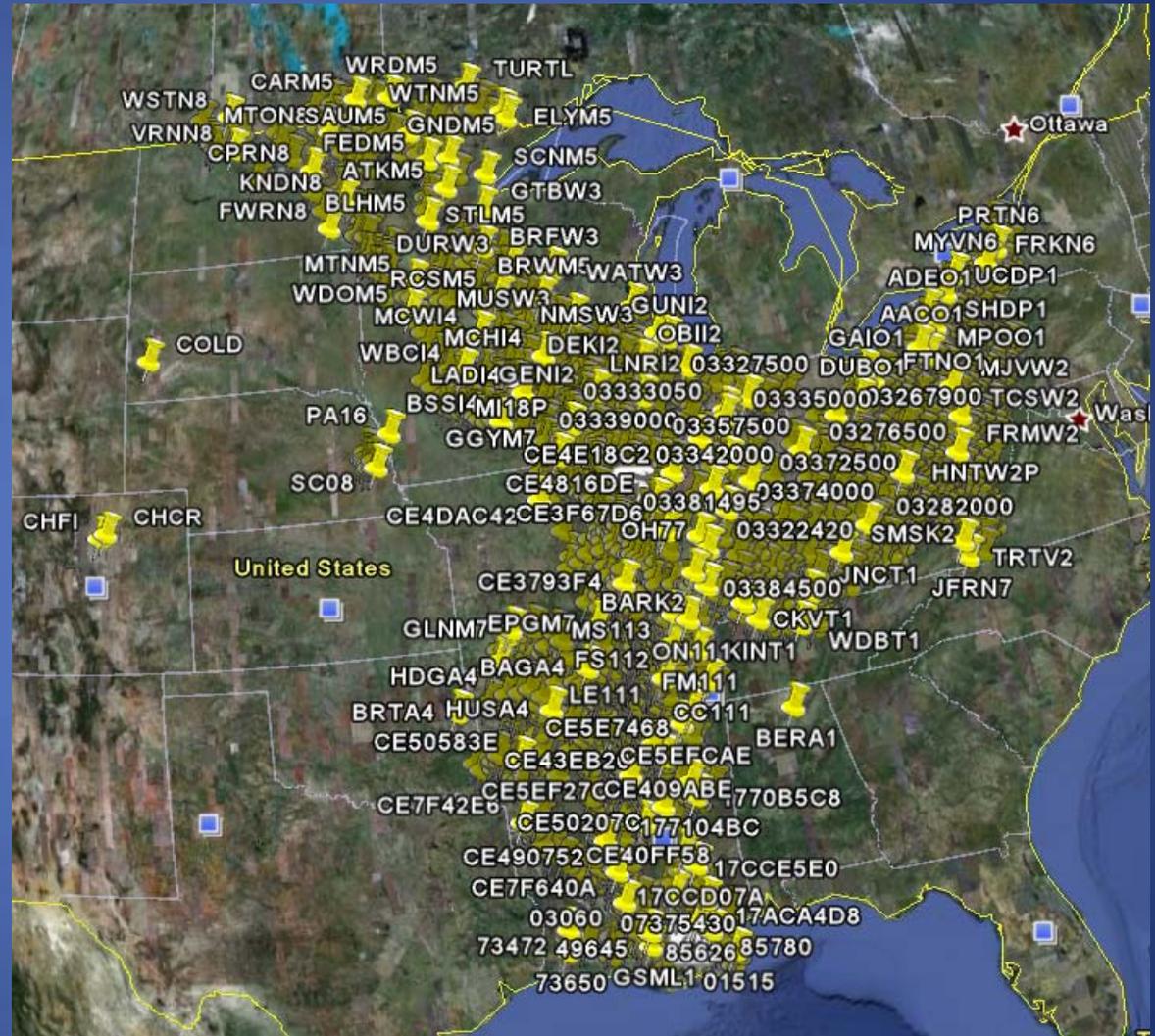
Time series at Corps gages

2210 sites, mainly in Mississippi Basin

80 variables

4954 series

Published by **Corps of Engineers, Rock Island District** to support their WaterML plugin to **HEC-DSS**



http://www2.mvr.usace.army.mil/watercontrol/SOAP/WaterML_SOAP.cfc?wsdl
Universities allied for water research

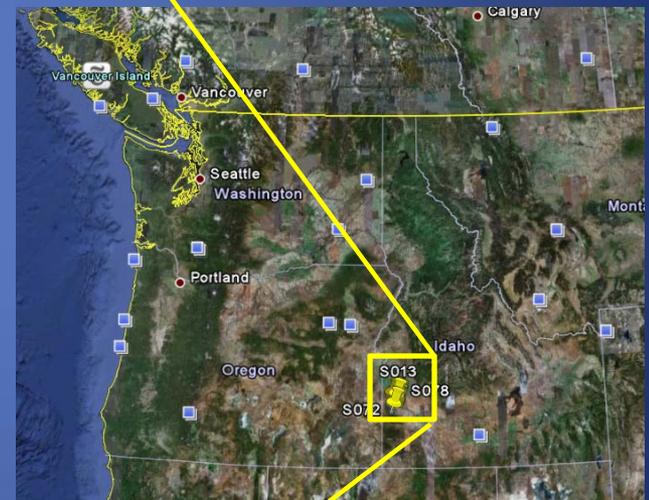
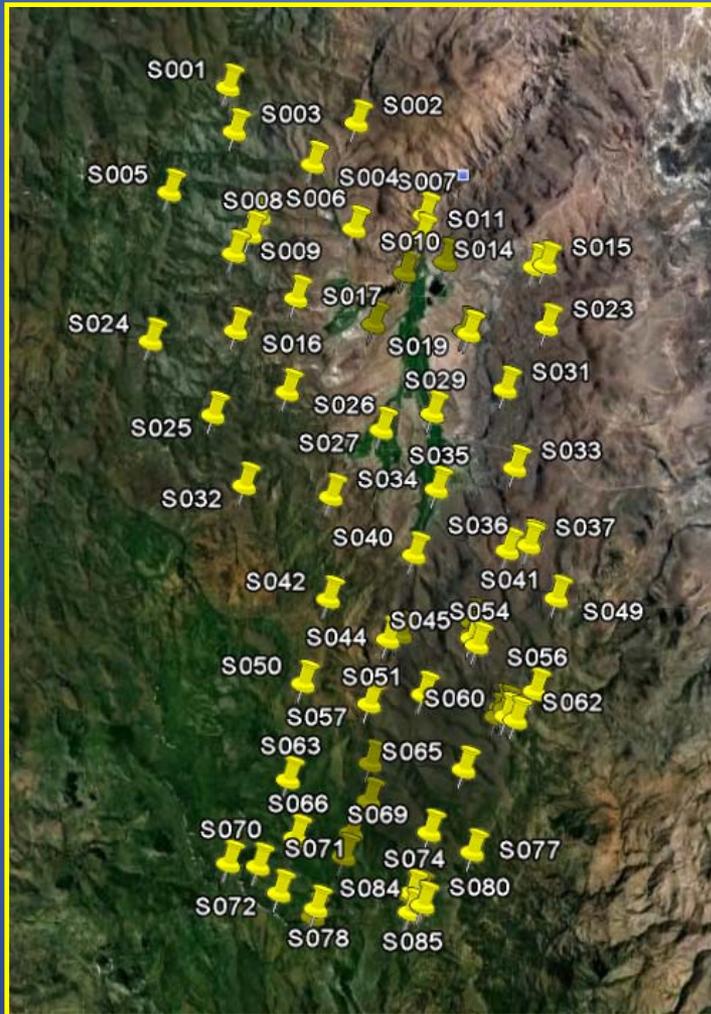


Reynolds Creek Experimental Watershed

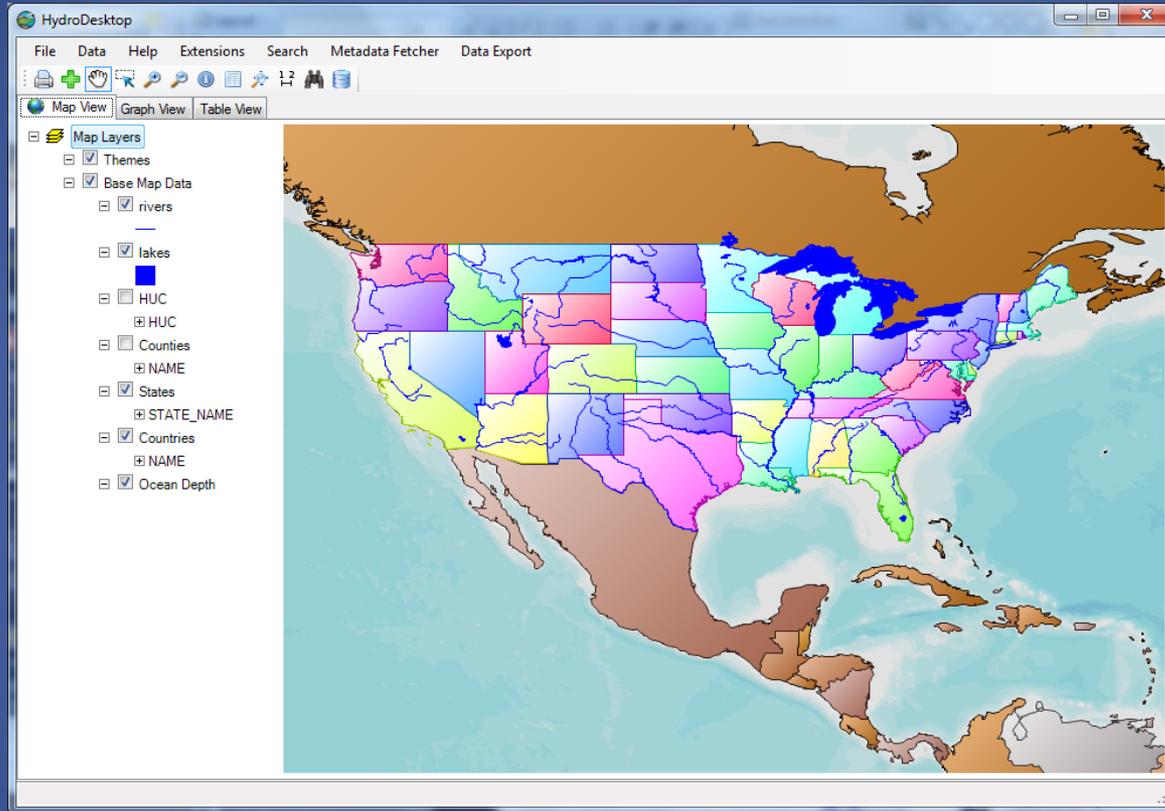


1 data service
84 sites
65 variables
372 series
17.8 million data

Published by **USDA-ARS** as part of an Idaho Waters project



HydroDesktop



Open Source Project:
www.hydrodesktop.org

Universities allied for water research



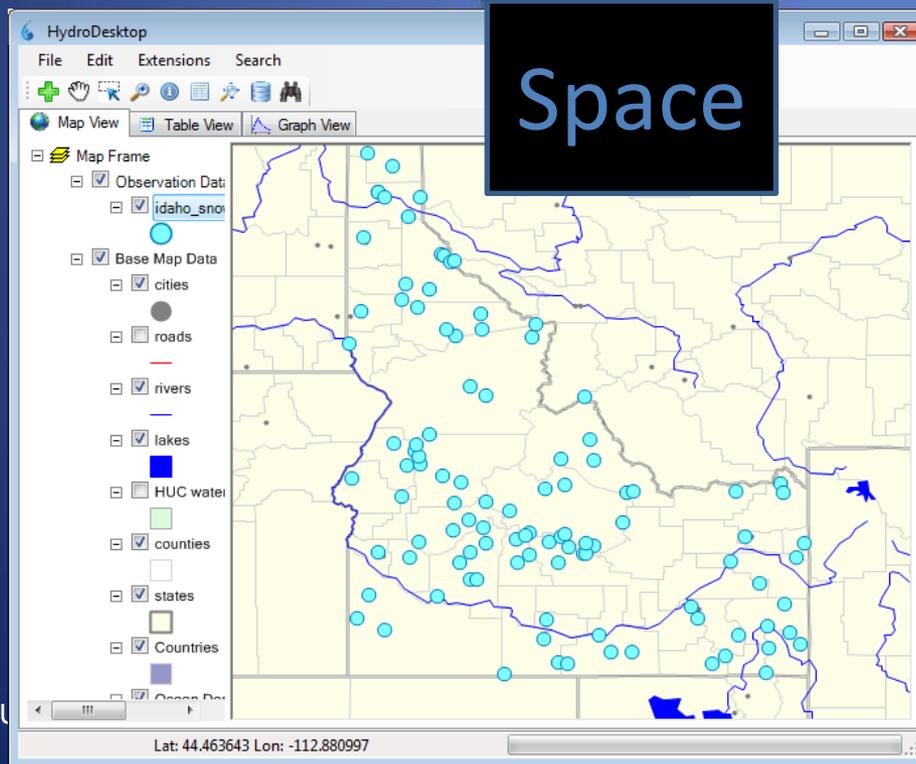
HydroDesktop HIS Capabilities

GIS

- Add shapefiles to map
- Change symbology and labels
- Print and export map
- GIS toolbox and Modeler

Hydrology

- Search for data
- Download data
- Display time series
- Export data



The screenshot shows the Advanced Search interface. A large black arrow with the word "Time" in white text points to the right. The interface displays search results in a table format. The table has columns for FID, SiteName, VariableName, SiteCode, and VariableCode. The results list various sites and their associated variables, such as "ATLANTA SUMMIT" with "Snow Pillow" and "SNOTEL:15F04S".

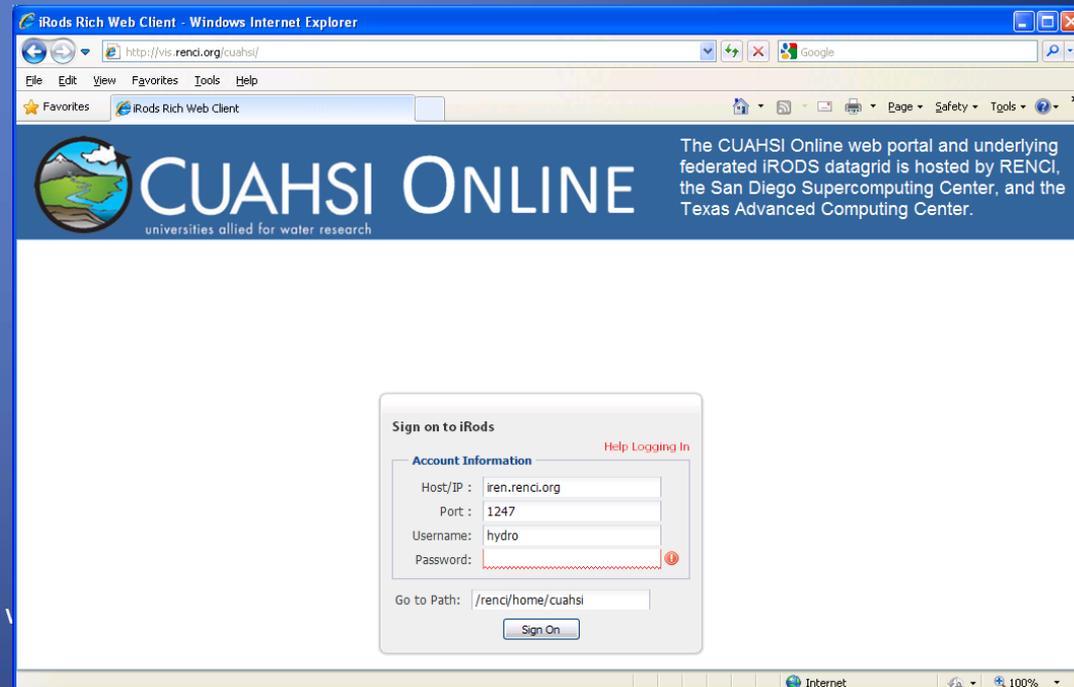
| FID | SiteName | VariableName | SiteCode | VariableCode |
|-----|-----------------------|----------------|------------------|--------------|
| 31 | ATLANTA SUMMIT | Snow Pillow | SNOTEL:15F04S | |
| 61 | BANNER SUMMIT | Snow Pillow | SNOTEL:15E11S | |
| 54 | BEAR BASIN | Snow Pillow | SNOTEL:16E11S | |
| 42 | BEAR CANYON | Snow Pillow | SNOTEL:13F03S | |
| 102 | BEAR MOUNTAIN | Snow Pillow | SNOTEL:16A08S | |
| 53 | BEAR SADDLE | Snow Pillow | SNOTEL:16E10S | |
| 56 | BIG CREEK SUMMIT | Snow Pillow | SNOTEL:15E02S | |
| 23 | BOGUS BASIN | Snow Pillow | SNOTEL:16F02S | |
| 30 | BOISE AIR TERMINAL | SNOW-DEPTH ... | NCDCISD:72681... | NCDCISD:AJ1 |
| 6 | BOSTETTER R.S. | Snow Pillow | SNOTEL:14G01S | |
| 74 | BRUNDAGE RESERVOIR | Snow Pillow | SNOTEL:16D09S | |
| 8 | BURLEY MUNICIPAL ARPT | SNOW-DEPTH ... | NCDCISD:72586... | NCDCISD:AJ1 |
| 22 | CALDWELL (AWOS) | SNOW-DEPTH ... | NCDCISD:72681... | NCDCISD:AJ1 |
| 25 | CAMAS CREEK DIVIDE | Snow Pillow | SNOTEL:15F09S | |
| 69 | CHALLIS | SNOW-DEPTH ... | NCDCISD:72214... | NCDCISD:AJ1 |
| 34 | CHOCOLATE GULCH | Snow Pillow | SNOTEL:14F19S | |
| 91 | COEUR D'ALENE(AWOS) | SNOW-DEPTH ... | NCDCISD:72783... | NCDCISD:AJ1 |

Selected Data Series: 0

Buttons: Back, Get Data!

CUAHSI HIS – looking ahead

- CUAHSI Online - A “social networking” site for hydrologic data **(and possibly models)**
- Simple and easy to use
- Find, create, share, connect, integrate, work together online
- **Value added for scientists**

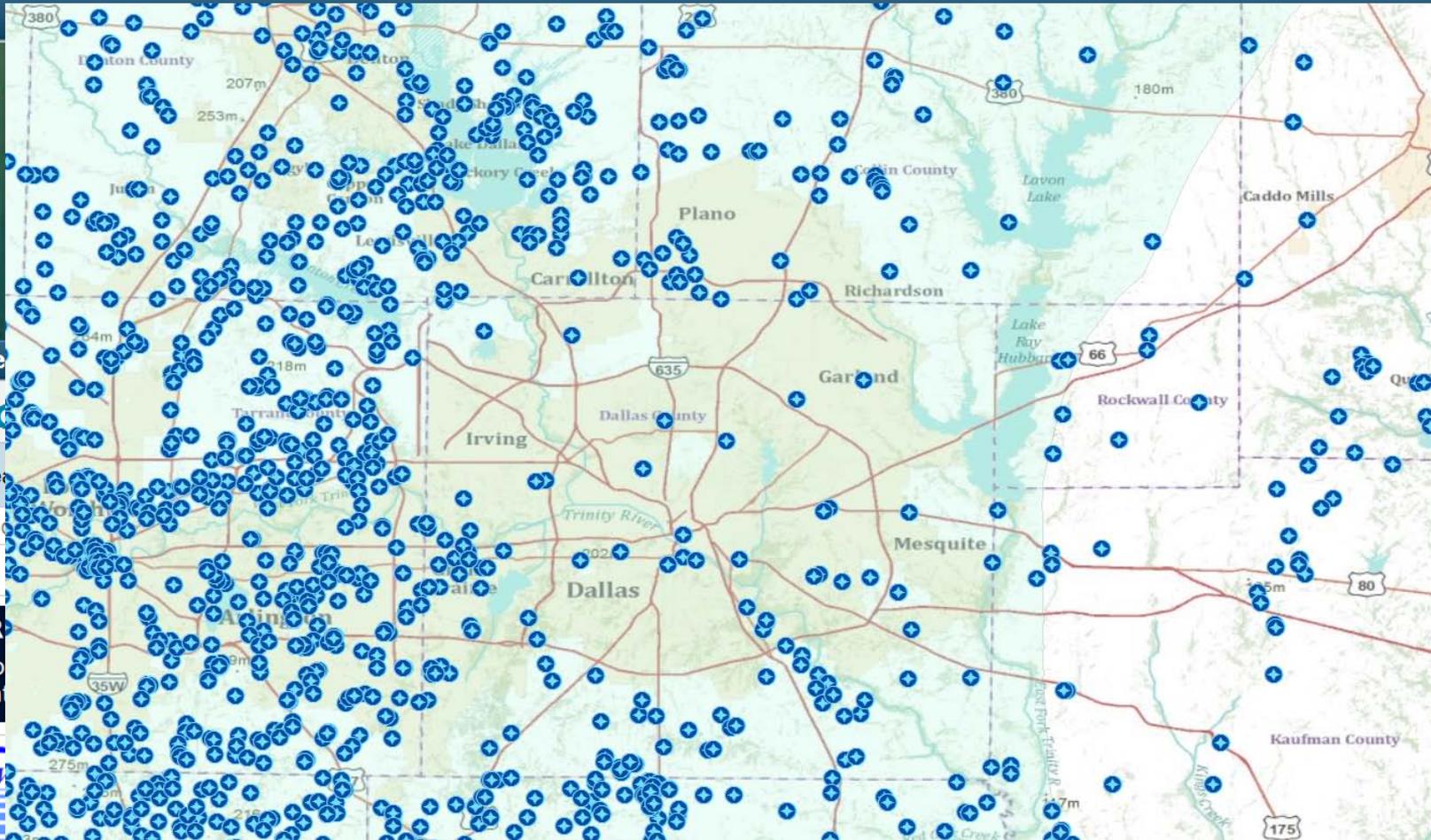




ArcGIS Online

BETA

<http://www.arcgisonline.com/home/>



Home

My Content

Create

To select

ESRI

Map Center



Tags: university of texas, au



CUAHSI

This group publishes maps and applications relevant to water research

Tags: CUAHSI, HIS, water data, Consortium of Universities for the

[Open in ArcGIS](#)



Time Series as Themes

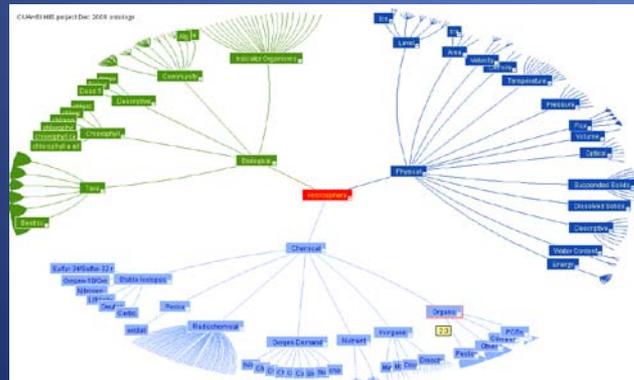
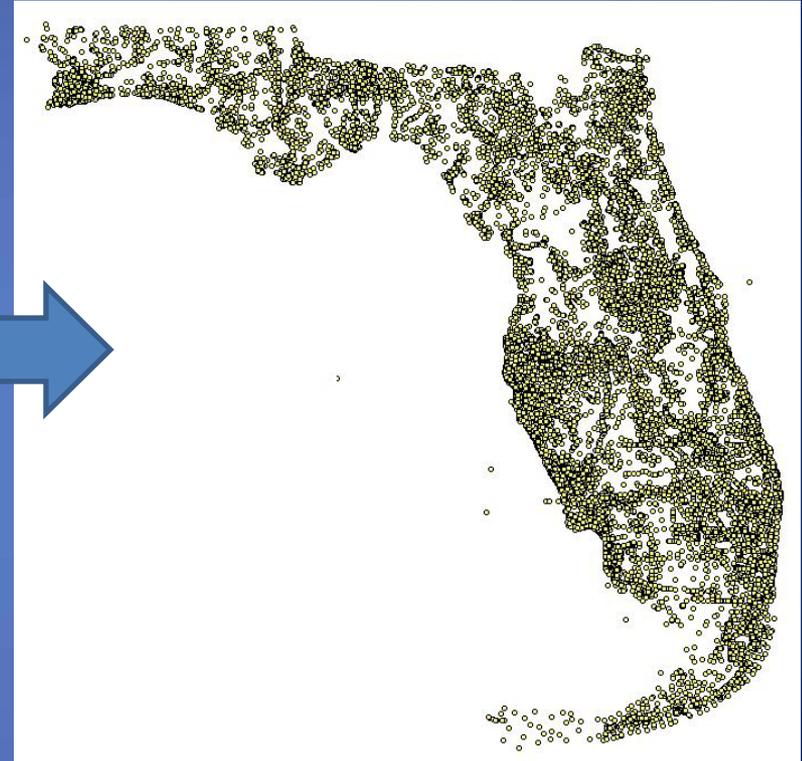
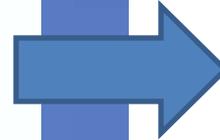
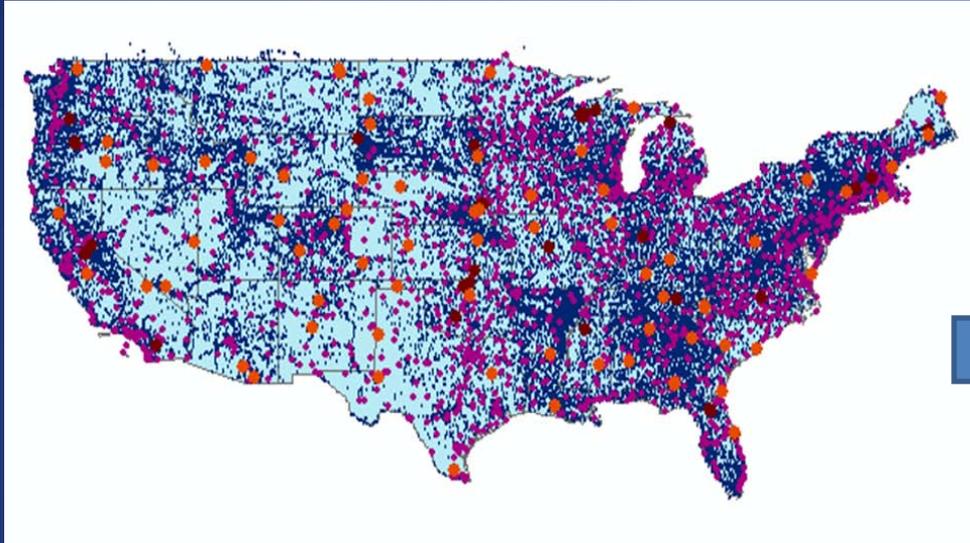
- A **time series** is like a feature
- Theme – a **collection of time series** describing a subject and region



Streamflow data provided as WaterML data services by USGS



Mapping Water “Themes”



Nutrients in Florida



Summary

- **Web services** open possibilities for new modes of collaboration and research
- **Metadata requirements** will be substantial to enable other disciplines to understand data
- **Data sharing** is required to realize the potential but barriers exist
 - Costs versus benefits of data publication
 - Tradition of holding data



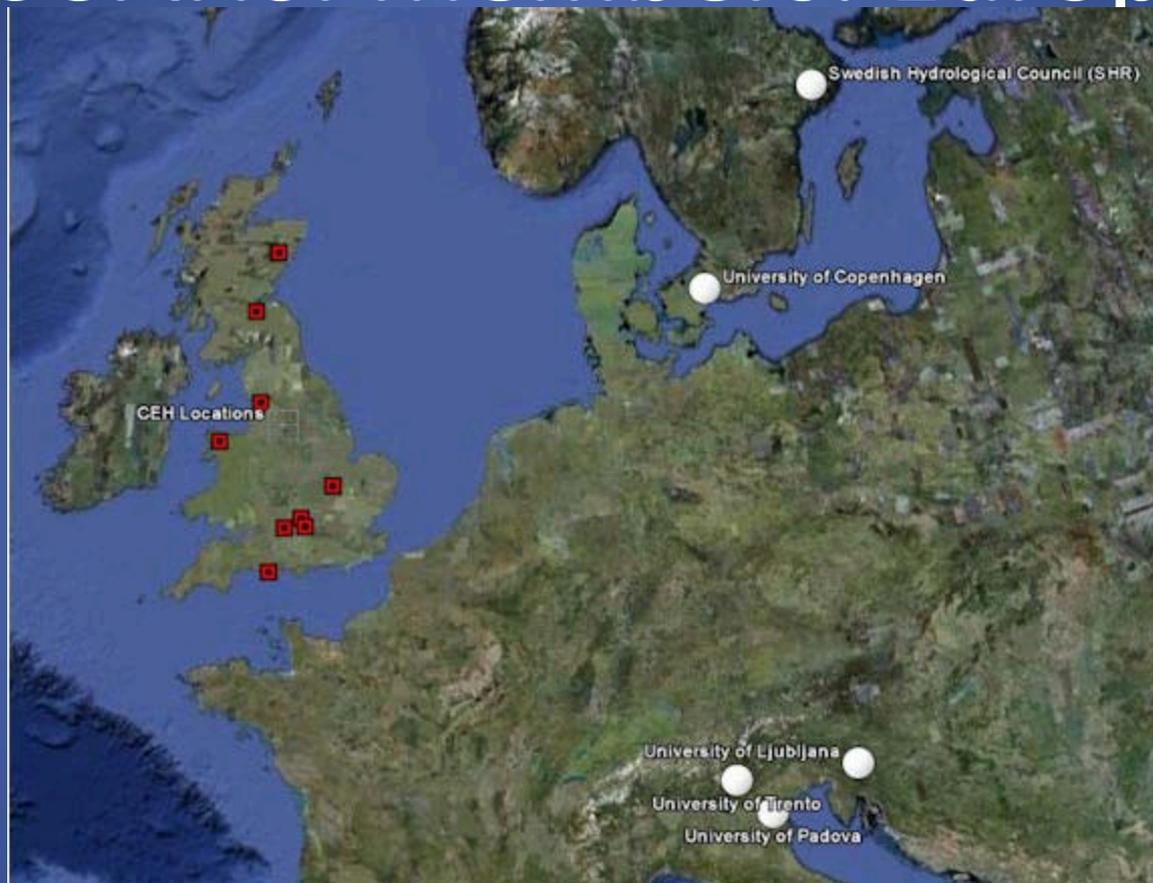
CUAHSI Member Universities: North America



U n i v e r s i t i e s a l l i e d f o r w a t e r r e s e a r c h



CUAHSI Members: Europe



Universities allied for water research





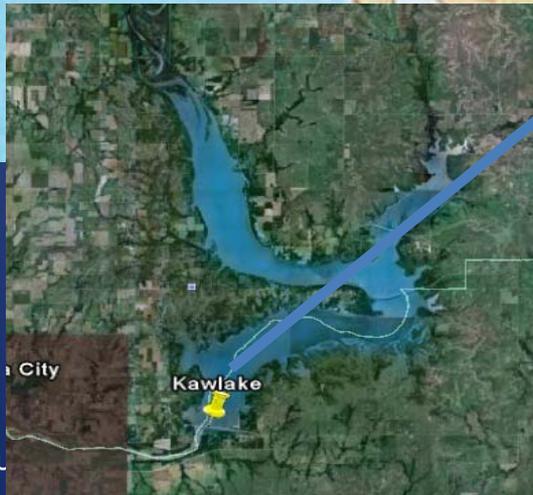
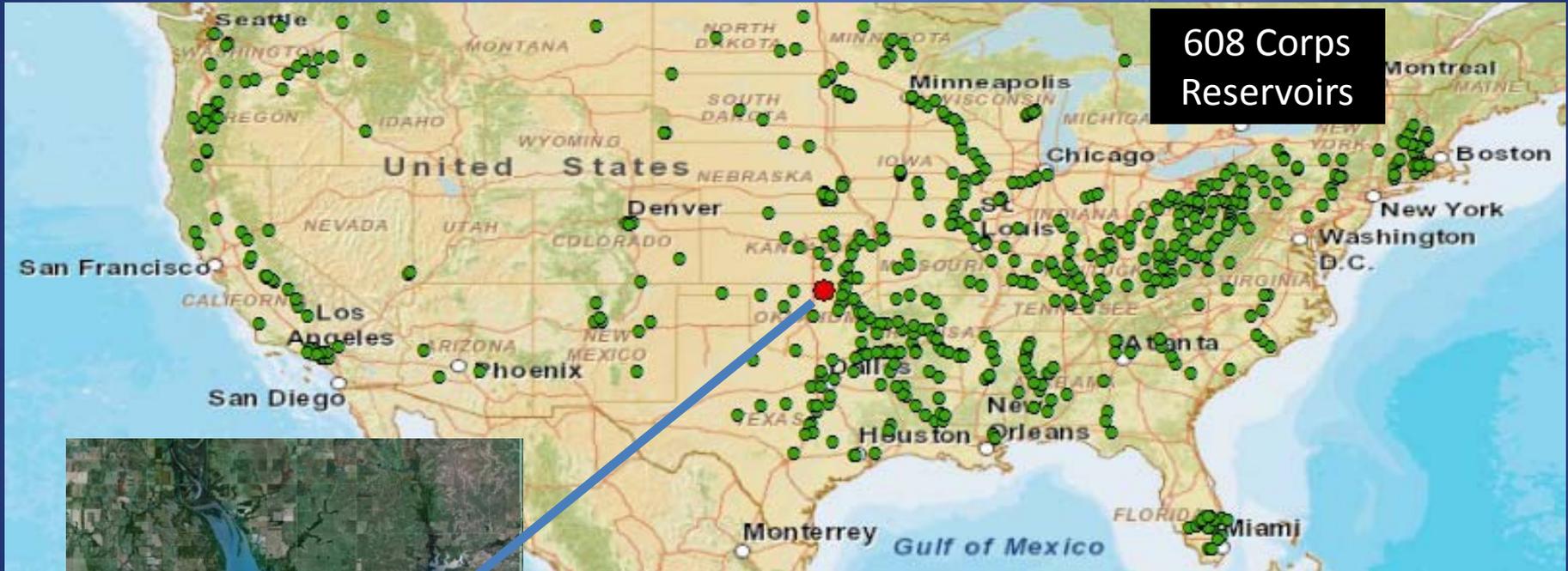
CUAHSI

universities allied for water research

<http://www.cuahsi.org>



Corps of Engineers Reservoirs



KawLake Reservoir

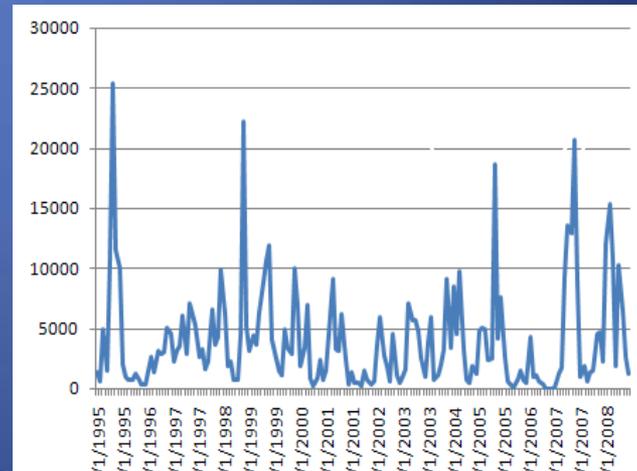
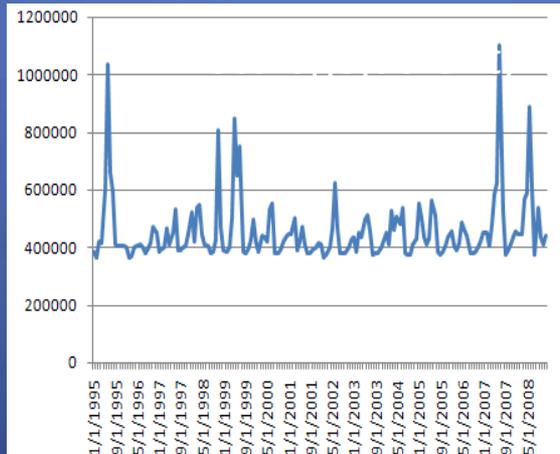
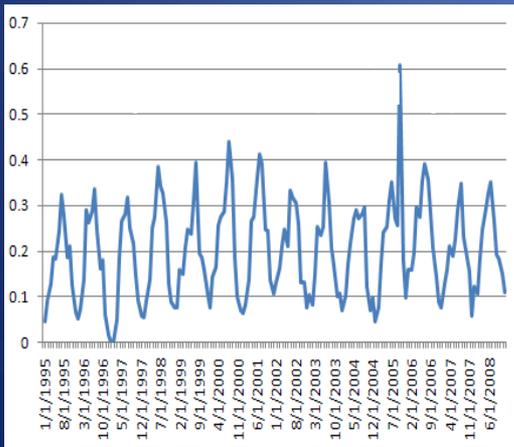
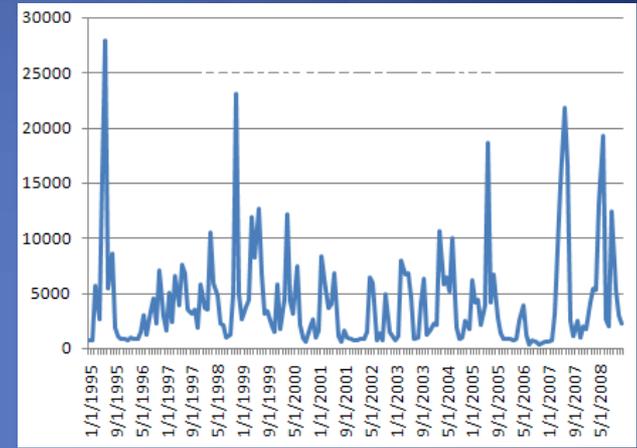
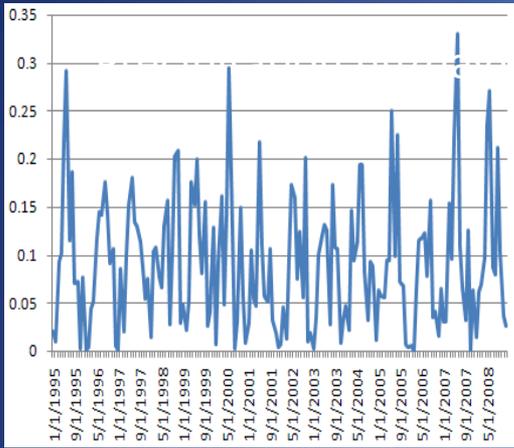
CUAHSI Water Data Service:

http://his.cwrw.utexas.edu/Corps_Reservoirs/cuahsi_1.0.aspx?W501

d for water research



KawLake Water Balance, 1995-2008



Corps and USBR Reservoirs

Water Resources Sustainability under Climate Change



Corps Reservoirs (608)



USBR Reservoirs (348)



Data is fragmented across 39 Corps District Offices and 24 USBR Field Offices

Universities allied for water research

Offices



Building Critical National Datasets

- National Reservoir Operations Dataset
- National Hydrogeologic Dataset
- National River Morphology Dataset

