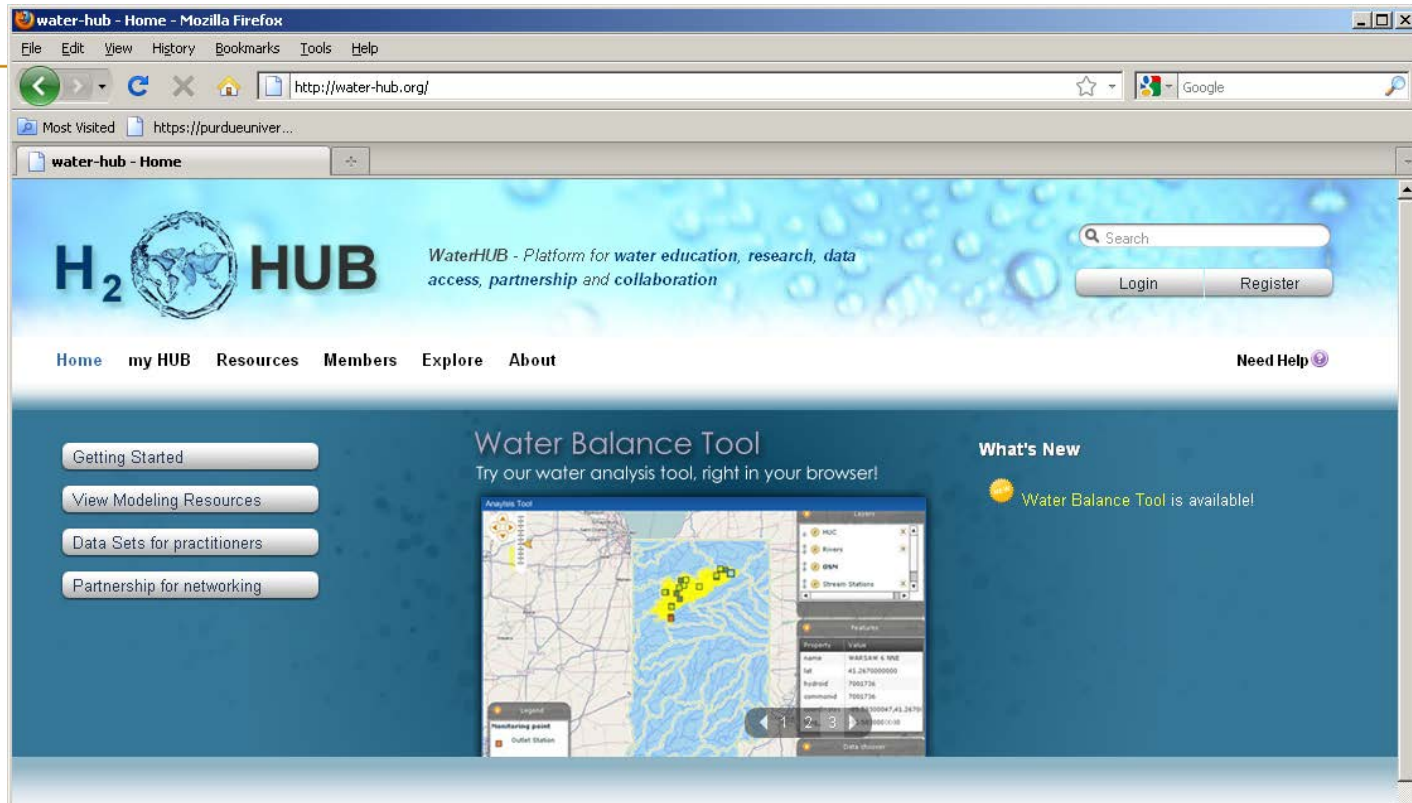




Enabling computational modeling and geospatial data analysis through HUBzero

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WaterHUB

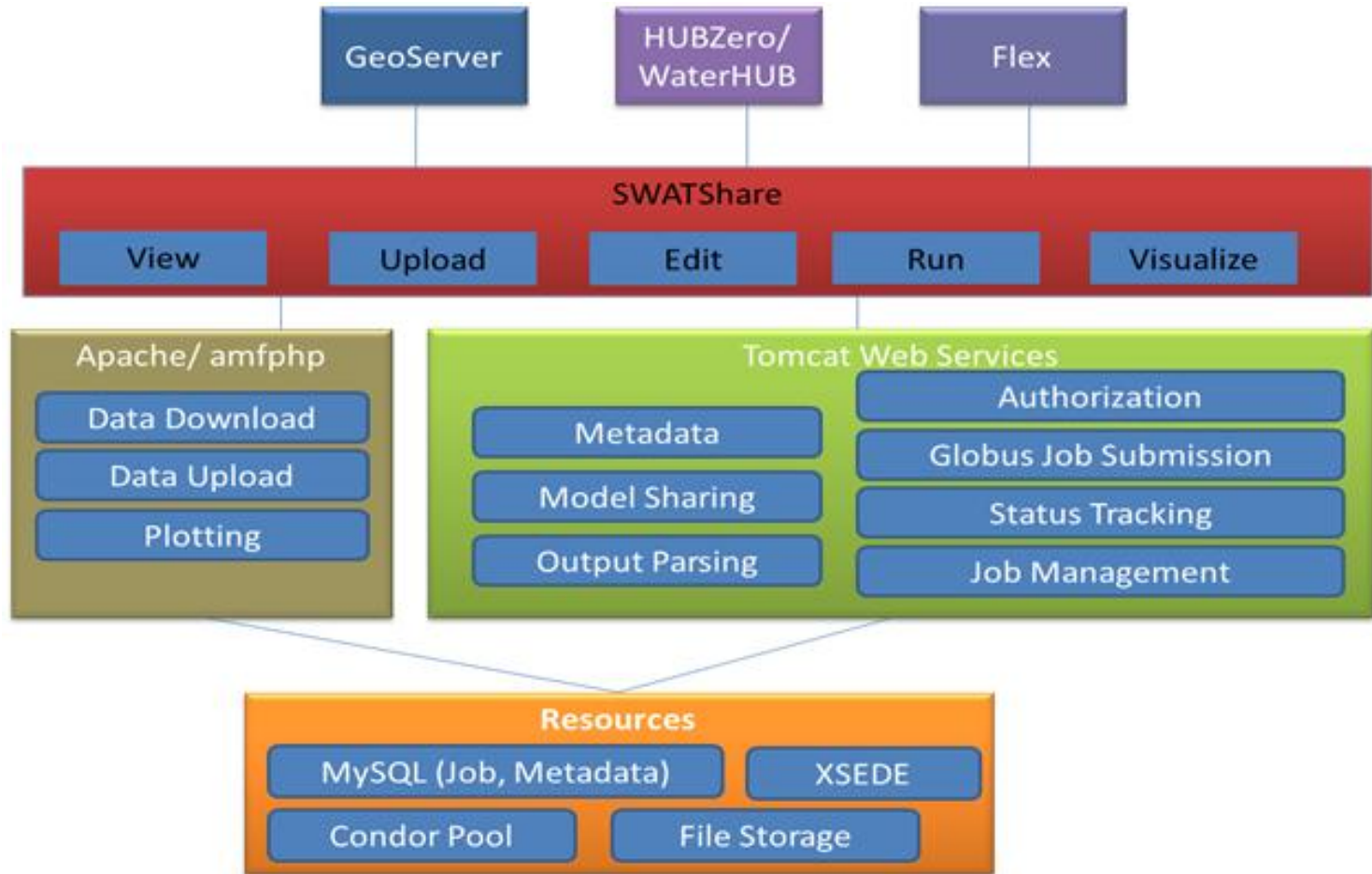


- Based on HUBzero technology at Purdue, WaterHUB uses open source packages to create an environment in which researchers, educators, and students can access tools and share information

SWATShare

- One of the tools on WaterHUB
- SWATShare enables
 - Searching for existing SWAT models on WaterHUB
 - Downloading of previously created SWAT models and their outputs by the community
 - Publishing and sharing of your own SWAT models with the community
 - Execution of single or multiple normal, sensitivity analysis and calibration runs
 - Visualization of outputs
- Everything is enabled by using XSEDE resources

SWATShare Architecture



View

The screenshot shows the 'View' tab of the SWATShare interface. At the top, there are menu options: View, Upload, Edit, Run, and Visualization. The main area features a map of the United States with a coordinate display (-130.69571, 54 13770) and a navigation tool. A 'Property' table is overlaid on the map, showing details for a selected model. Below the map are 'Download Model' and 'Download Output' buttons. On the right side, there is a 'My Models' panel with a list of models categorized into 'Shared Models' and 'Other Models'. Red arrows point to the 'Download Model' and 'Download Output' buttons, and the 'My Models' panel.

Property	Value
Country	United States
State	IN
Dem resolution	30
Dem source	USGS
Land use data source	NCLD 2006
Soil data source	STATSGO
Stream network	1

Users can download only their **own model** and a **shared model** with associated output files

The uploaded models are displayed in 3 groups

- (i) **My Models:** models that are uploaded by the current user
- (ii) **Shared Models:** models that uploaded by other users, but are shared with all users
- (iii) **Other models:** models that are uploaded by other users but not shared

Upload

View Upload Edit Run Visualization

Please follow the two steps to create case for SWAT simulation

Step 1 : Enter model meta data Please start filling the model meta data

User Name:

* Model Name:

Description:

* Simulation Time Step:

Country: State:

* Version: Output Included? Shared?

HUC code:

* Type: Normal Simulation Sensitivity Analysis Auto-Calibration

Date from: to:

* DEM Source:

* DEM Resolution:

* Stream Network Threshold:

* HRU Threshold (Slope):

* HRU Threshold (Landuse):

* HRU Threshold (Soil):

* Land use data source:

* Soil data source:

Calibration Parameter

Ch_K2 Ch_N2 Cn2 Esco Surlag Blai Rchrg_Dp Epco

Step 2 : Upload input data

Click upload button to launch data mover tool and upload input data

Name	Type	Size
info	File folder	
RasterStore.idb	File folder	
Scenarios	File folder	
Watershed	File folder	
log	File	1 KB
RasterStore	Microsoft Access Database	1,036 KB
SWAT2009	Microsoft Access Database	14,192 KB
WabashRiver	Microsoft Access Database	11,060 KB
WabashRiver	ESRI ArcMap Document	4,618 KB

Contents of the zip folder

Please edit the following meta data for SWAT model

New Name

Step 1 : Enter model meta data Please edit the meta data

User Name

* Model Name

Description

* Simulation Time Step

Country State

* Version Output Included?
 Shared?

HUC code

* Type
 Normal Simulation
 Sensitivity Analysis
 Auto-Calibration

Date from to

* DEM Source

* DEM Resolution

* Stream Network Threshold

* HRU Threshold (Slope)

* HRU Threshold (Landuse)

* HRU Threshold (Soil)

* Land use data source

* Soil data source

Calibration Parameter

Ch_K2 Ch_N2 Cn2 Esco
 Surlag Blai Rchrg_Dp Epco
 Timp Alpha_BF Sol_Awc Smtmp
 Revapmn

Step 2 : Replace input data
Click upload button to launch data mover tool and upload input data

My Models

Shared Models

- 08April
- 08April
- AdnanCombo1
- AdnanCombo2
- Crabtree_currentLULC_1
- Crabtree_current_lulc
- Crabtree_futureLULC
- Crabtree_futureLULC_fu
- Flat_cal_current
- Flat_cal_current
- Flat_cal_future
- Flat_River
- Flat_River_calibrated
- Haw_River_basin
- Ian0506flatriver
- Ian0506flatriver
- Little_Tennessee

Other Models

- ✓ Select any model from My Model section. Related information will show up in left panel
- ✓ Manually edit or replace information including the model input file. Click on **Change**
- ✓ The **Reset** button will restore all the original information previously saved

Please select the case from model list at your left and press run.

Owner: adnanrajib Model Name: Adnan_Fat Version: SWAT2009
 Time Step: Daily Model Type: normal HUC ID: Shared?: false
 Description:
 Input data: Adnan_Fat

Run

Refresh

Job ID	Model Name	Job Type	Job Status	Submission Time	Actions
508	Adnan_Fat	normal	ACTIVE	2013-05-11-17:11:21 EST	Output Delete
371	Adnan_Haw	sensitivity	PENDING	2013-04-03-20:04:04 EST	Output Delete
370	wabash	calibration	DONE	2013-01-25-00:05:05 EST	Output Delete
368	Adnan_Try1	normal	FAILED		
367	Adnan_Try1	normal	FAILED		

My Models

- Adnan_Fat
- Adnan_Haw
- Adnan_Try1
- Adnan_Try1
- Adnan_Try3
- wabash
- w_set1

Shared Models

Other Models

Selecting a model and clicking the **Run** button will submit the model to run on one of the XSEDE clusters

Log Information

```

2013-05-11-17:11:21 EST : Log history entry has been inserted to database.
2013-05-11-17:11:21 EST : Created the RSL file for globus run
2013-05-11-17:11:21 EST : Credential File location is /grp/tgportal/waterhub/swat/run/x509up_u318864
2013-05-11-17:11:21 EST : GlobusCredential has been created.
2013-05-11-17:11:21 EST : Created GSS credential.
2013-05-11-17:11:21 EST : Resource Specification RSL String =

&(executable=/grp/tgportal/waterhub/swat/run/swat_run_zip.csh)(arguments = '/grp/tgdata/waterhub/swat/users/adnanrajib/input/Adnan_Fat.zip' '/grp/tgdata/waterhub/swat/users/adnanrajib/output/Adnan_Fat-508-out.tar' '/grp/tgdata/waterhub/swat/users/adnanrajib/jobs/Adnan_Fat' 'SWAT2009' 'Adnan_Fat' '/grp/tgdata/waterhub/swat/users/adnanrajib/output/Adnan_Fat-out.tar' 'normal' '/grp/tgdata/waterhub/swat/users/adnanrajib/jobs/Adnan_Fat/swat-508.out' '/grp/tgdata/waterhub/swat/users/adnanrajib/jobs/Adnan_Fat/swat-508.err')(stdout=/grp/tgdata/waterhub/swat/users/adnanrajib/jobs/Adnan_Fat/swat-pbs.out)(stderr=/grp/tgdata/waterhub/swat/users/adnanrajib/jobs/Adnan_Fat/swat-pbs.err)(project="TG-ATM090060")
    
```

- ✓ A user can import a shared model, and run it in **My Models** section
- ✓ SWATShare selects run option (normal/sensitivity/calibration) depending on model's *file.cio* and information provided in the Upload interface

Visualization

View Upload Edit Run Visualization

Pick the job that you want to visualize
wabash

Generate some fresh plots

* Plot Type: Simulation

* Output File: output.rch

Title of the Plot: Total Streamflow (optional)

Generate New Plot
completed

Start Year: 2008 Month: 1

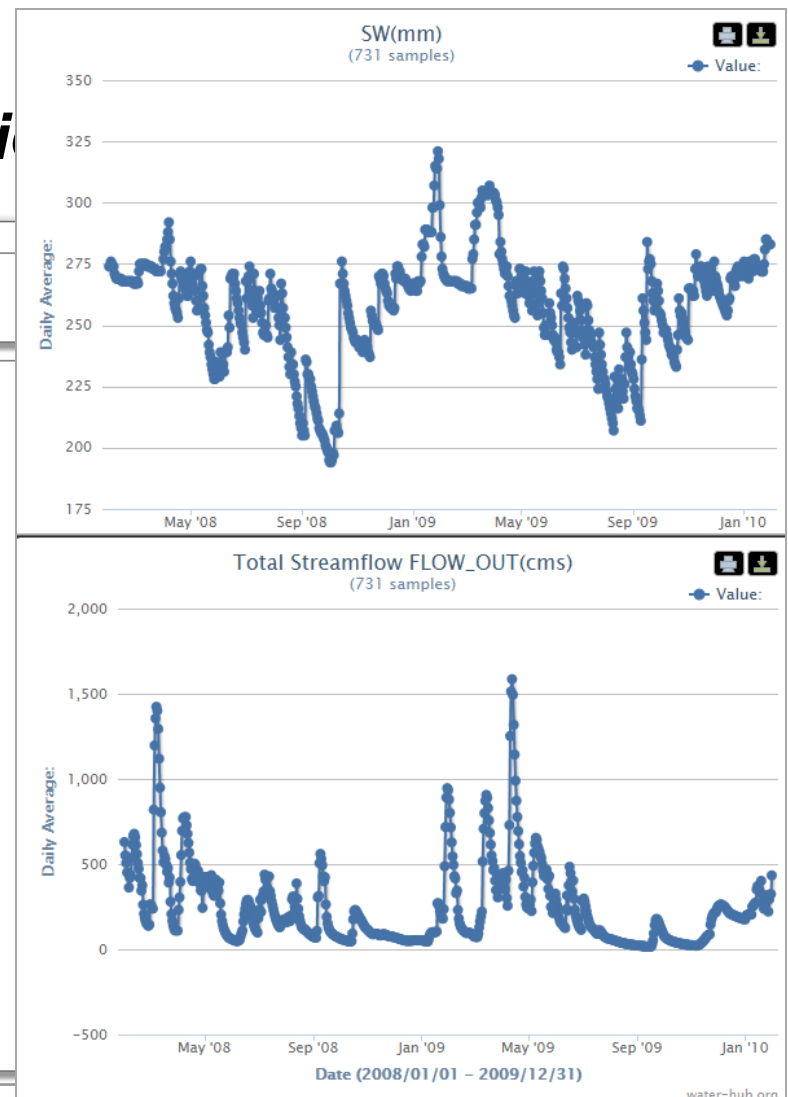
End Year: 2009 Month: 12

Time step: Daily

Primary Plot Variable

* Plot Variable: FLOW_OUT(cms): Average daily streamflow out of rea...

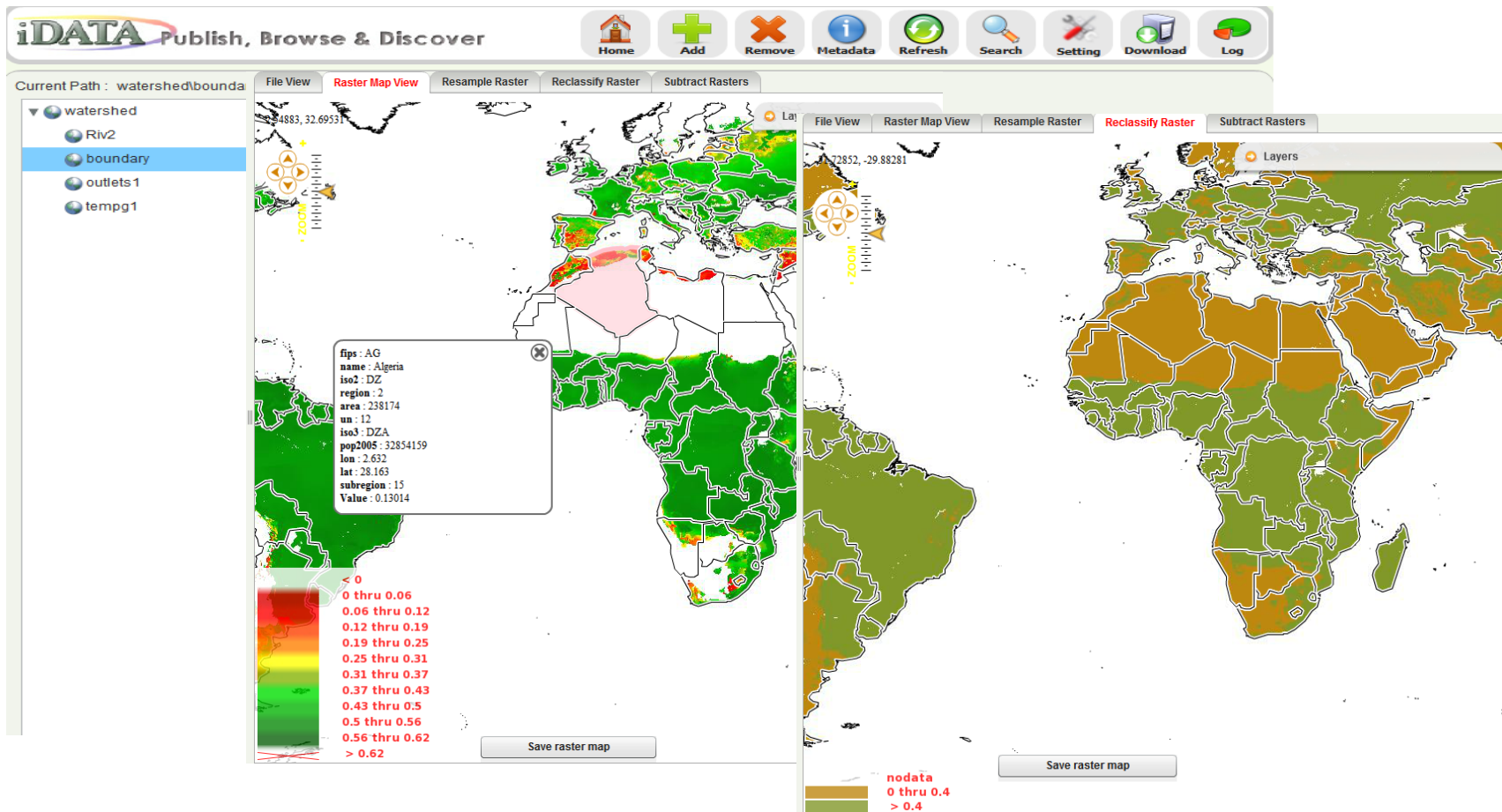
Y-Axis Unit: (optional) e.g. "(mm)"



- ✓ Visualization for (i) output.std, (ii) output.sub and (iii) output.rch
- ✓ One variable at a time needs to be selected to produce the visual plot
- ✓ All plots in output.rch and output.sub correspond to outputs at the watershed outlet

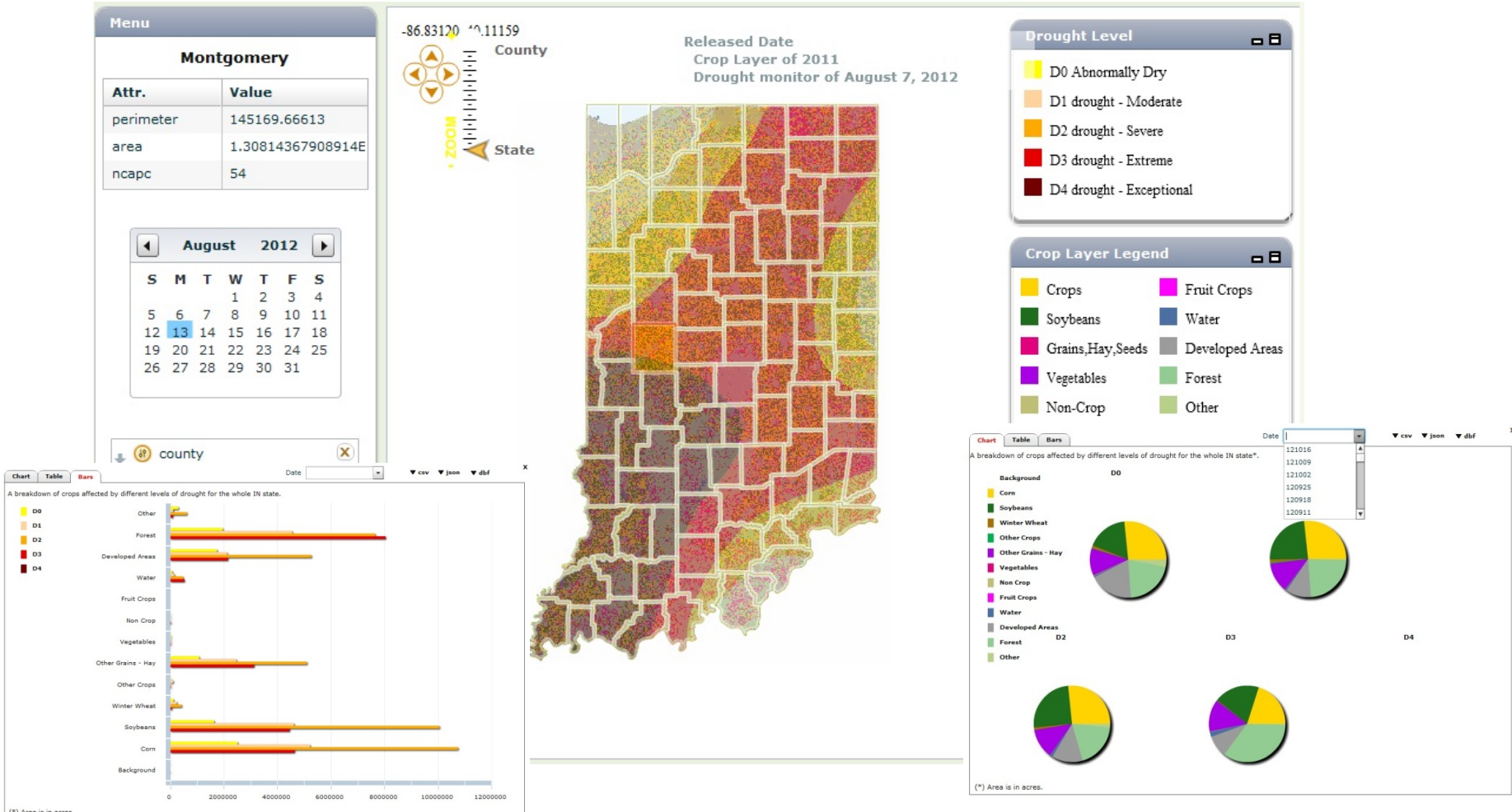
iData- A Community Geospatial Data Sharing Environment

- Integrated data publishing, sharing, visualization, and processing for geospatial data collections



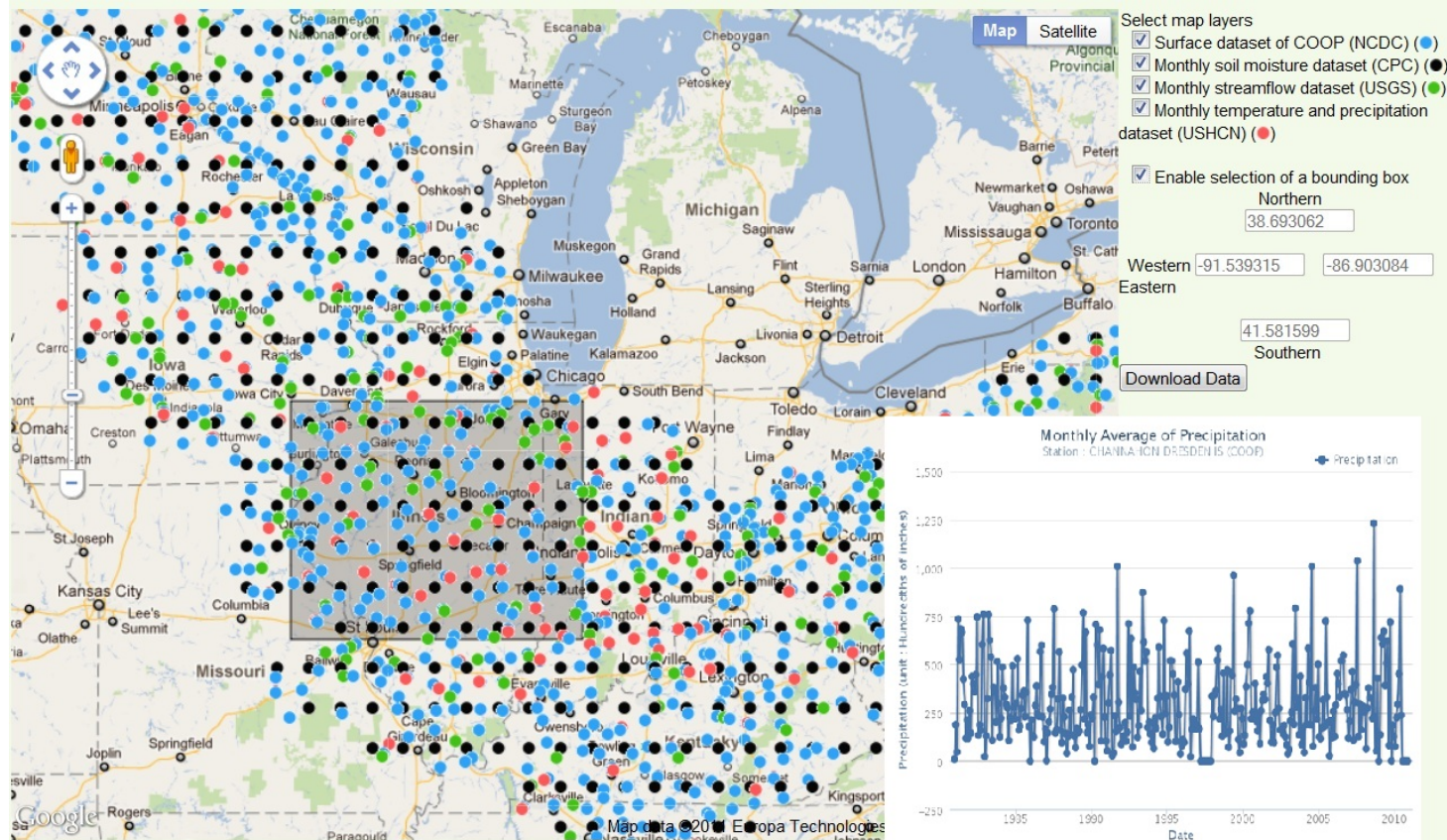
DRINET

- Drought Impact Viewer



DRINET Tools

- Upper Mississippi River and Ohio River Basin Data



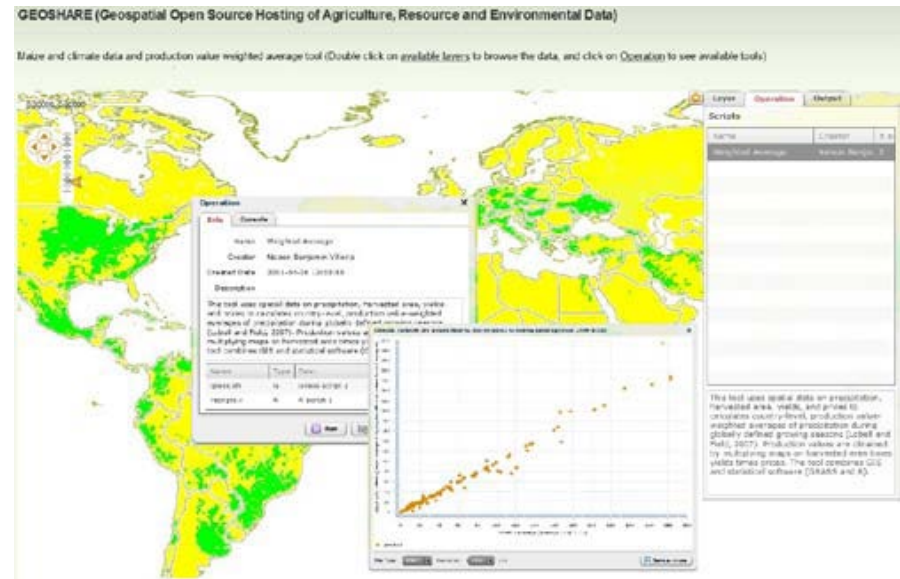
Pegasus

- A hub tool deployed on geoshare hub
- Configure, submit Pegasus crop model simulations to a cluster
- Manage and visualize model output

The screenshot displays the Pegasus Tool [1.0] interface. The window title is "Pegasus Tool [1.0]" and it has a menu bar with "File", "Edit", and "Help". Below the menu bar are tabs for "Welcome", "History", and a search box containing "0522". The main content area is titled "0522" and includes a "Finished" button and a "Cancel" button. On the left, there are navigation tabs for "Log & Statistics", "Output", and "Results". The "Output" tab is active, showing a tree view of "Output Files" under the "output" directory, with "yearly" sub-directory expanded. The file list includes: aet.nc, cbioag_harvest.nc, **aprec.nc** (selected), awr.nc, alpar.nc, tot_days.nc, aei.nc, agdd.nc, emerge.nc, ameantemp.nc, tot_gdd.nc, anpp.nc, cyield.nc, and dlai_max.nc. Below the file list are "Download File" and "Download Archive" buttons. On the right, the "File Contents (aprec.nc)" section shows a world map titled "Annual mean precip" with a color scale from 0 to 9700. A text box at the bottom right explains: "As output files become available, they will appear in the list to the left. Select a file to view its contents or to download the file. Archive of all files can also be downloaded."

Maize production tool

- A prototype system
 - Agriculture datasets for maize and climate variables
 - Weighted average module (GRASS and R)
 - Data processing, plotting, and download
 - Flex, Geoserver, GRASS, R, PHP



GABBS

- A new project expected to start soon!
- Develop geospatial data analysis and modeling building blocks for HUBzero
 - Data space supporting geospatial data processing, analysis and visualization
 - New Rappture geospatial APIs and renderers
 - Data services exposing APIs for the data space
 - Enable geospatial data driven workflows between data space and tool space

Summary

- Tools that support geospatial capabilities to enable simulation models are available for specific models
- Geospatial data analysis tools to process and visualize geospatial data are created for several ongoing project
- Efforts are underway to develop generic tools support computational modeling and geospatial capabilities within HUBZero to support geosciences applications

Thank you!

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