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Spatio-temporal visualization of SWAT Outputs using SWATShare

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What is SWATShare

- SWATShare enables
  - Searching for existing SWAT models
  - 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 simulations, sensitivity analysis and calibration runs
  - Visualization of outputs
- Computaitons are enabled by using XSEDE /Cloud resources

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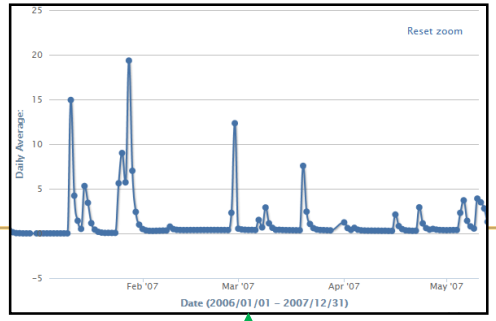
Climate Change and hydrology

Agriculture and hydrology



User A

User B

User C

XSEDE / FutureGrid

Model execution and visualization

Upload

Upload

SWATShare

Search and Download

Model Sharing and collaboration

Model Sharing and collaboration

Model parameter sensitivity to processes in semi-arid and agricultural watersheds
Evaluation of model uncertainty under different geographic and climate settings

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Why SWATShare?

- Saves time and money
- Facilitates collaboration among all users
- Can bring rewards and recognition in the form of publications and community access
- Provides a platform for your model repository
- May provide avenue to keep your models updated by other users
- Provides access to HPC resources for your SWAT models

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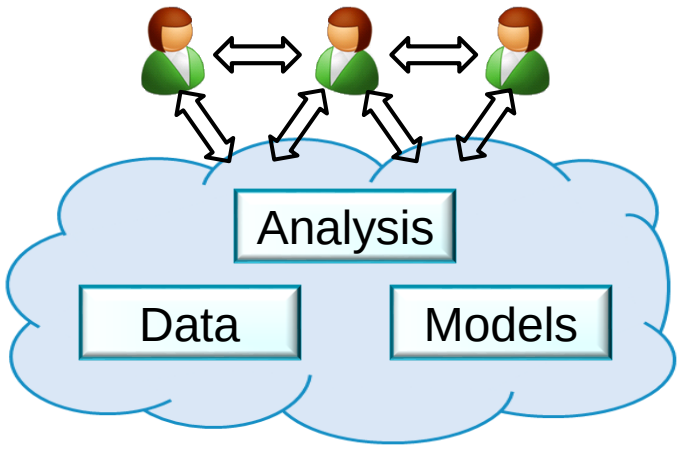
SWATShare will be part of HydroShare

- HydroShare will be a community collaboration website that enables users to easily discover and access data and models, retrieve them to a desktop computer or perform analyses in a distributed computing environment that includes grid, cloud, or high performance computing model instances as necessary.
- Understanding will be advanced through the ability to integrate information from multiple sources.
- Products (data, results, models) can then be published as new resources that can be shared with collaborators.



Courtesy: David Tarboton, Utah State University

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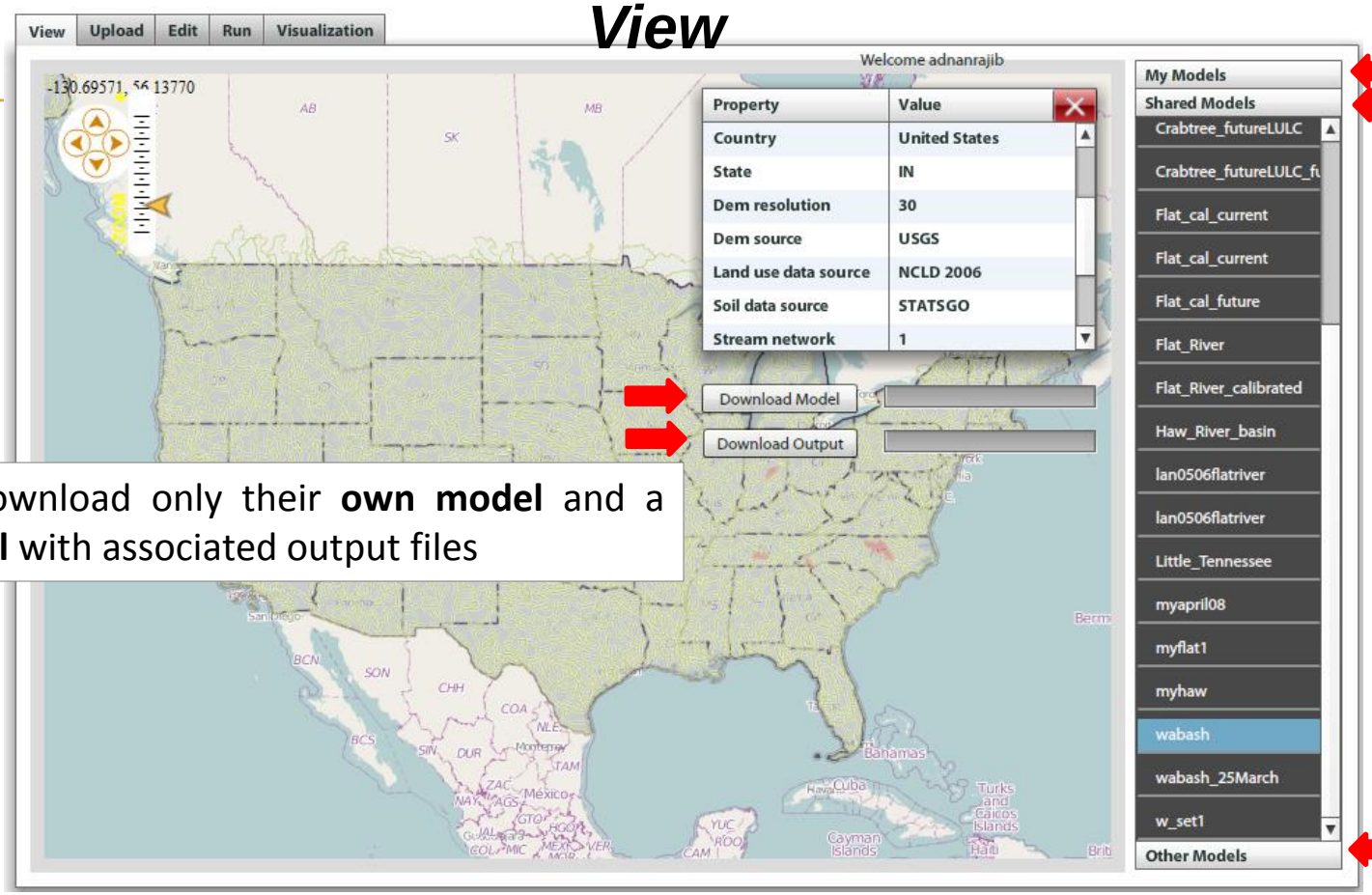
SWATShare Demo

www.water-hub.org/swatshare

SWATShare User Interfaces

View



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

The uploaded models are displayed in 3 groups

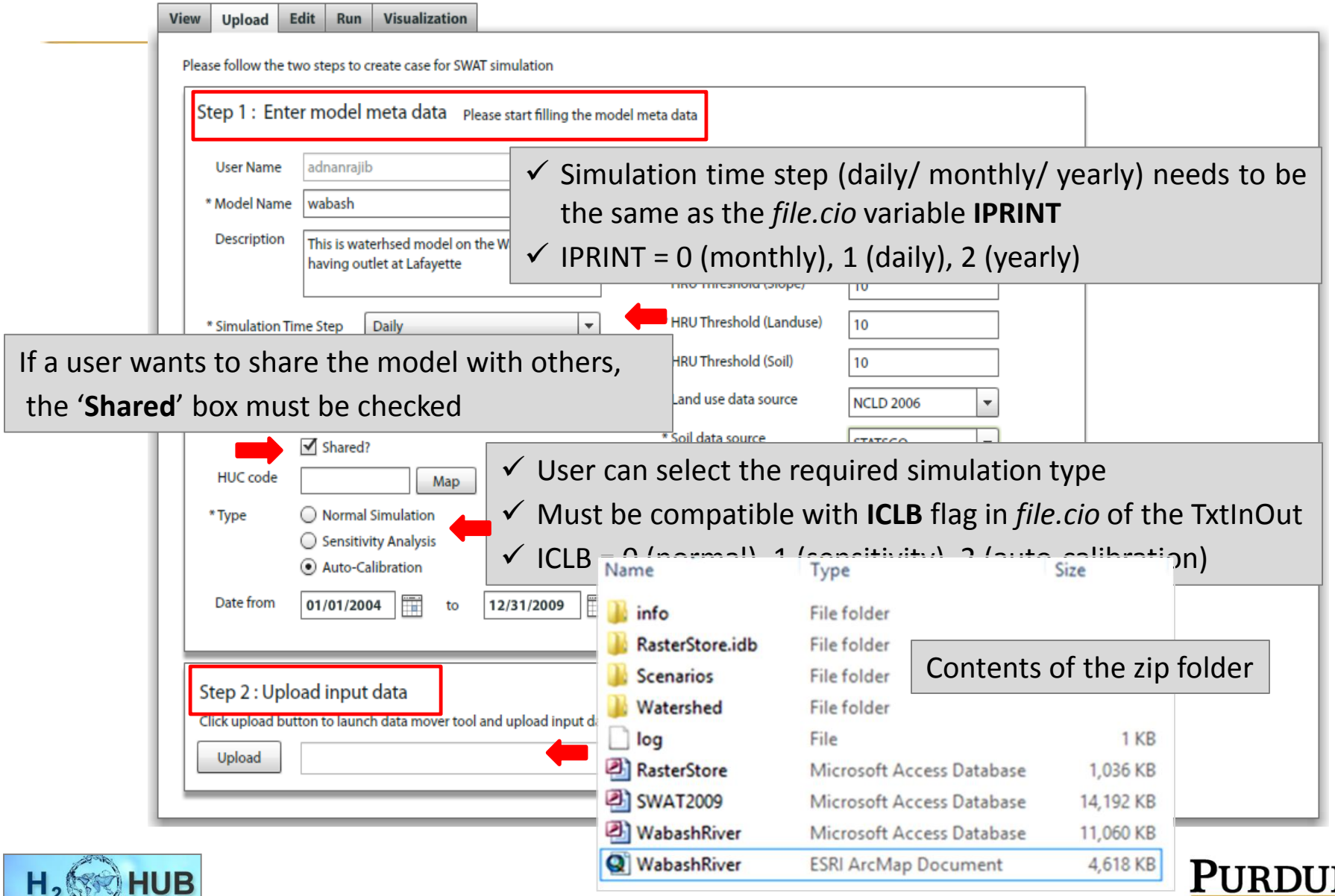
(i) **My Models**: models that are uploaded by the current user

(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

SWATShare User Interfaces

Upload



✓ Simulation time step (daily/ monthly/ yearly) needs to be the same as the *file.cio* variable **IPRINT**

✓ IPRINT = 0 (monthly), 1 (daily), 2 (yearly)

If a user wants to share the model with others, the '**Shared**' box must be checked

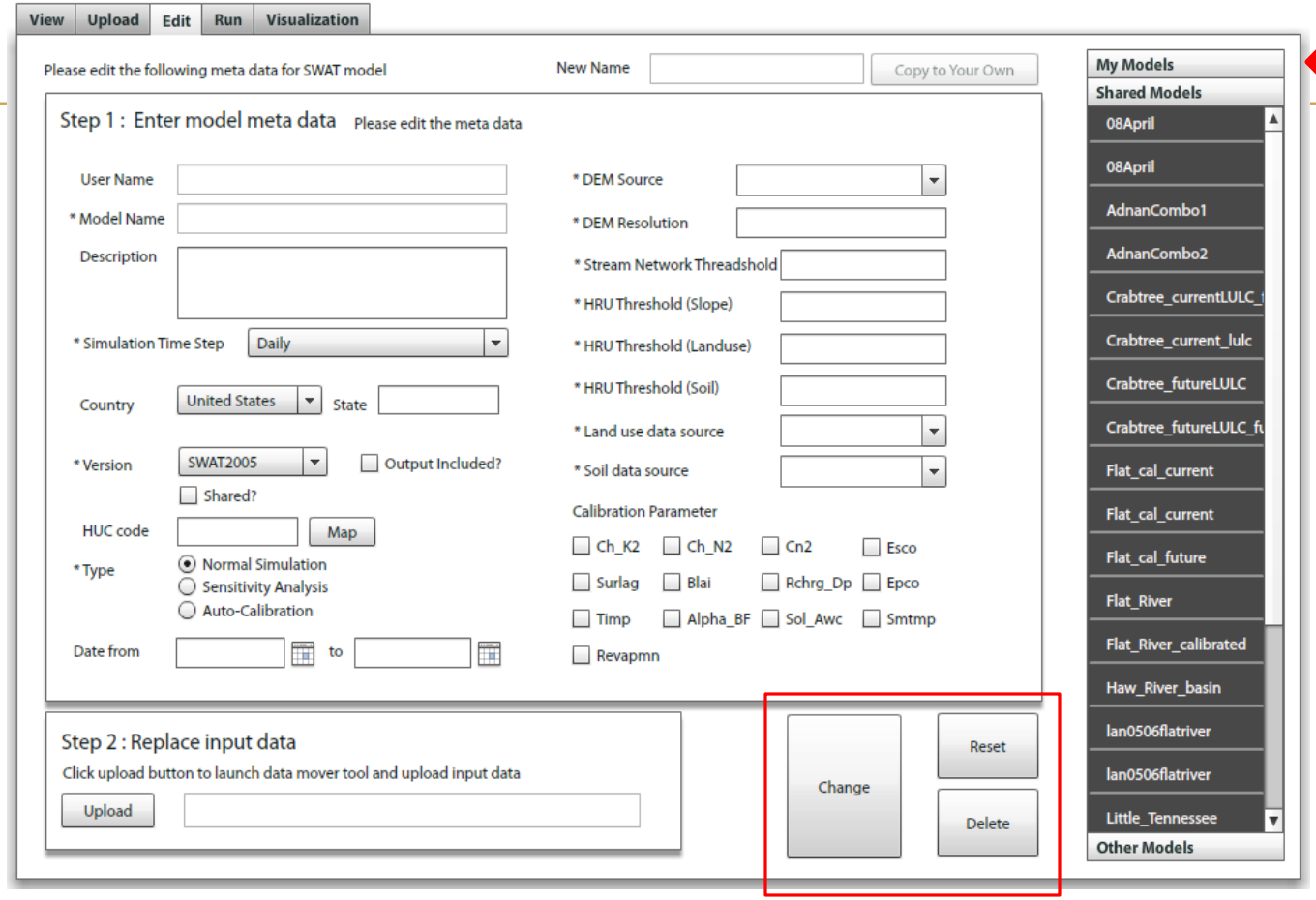
✓ User can select the required simulation type

✓ Must be compatible with **ICLB** flag in *file.cio* of the TxtInOut

✓ ICLB = 0 (normal), 1 (sensitivity), 2 (auto-calibration)

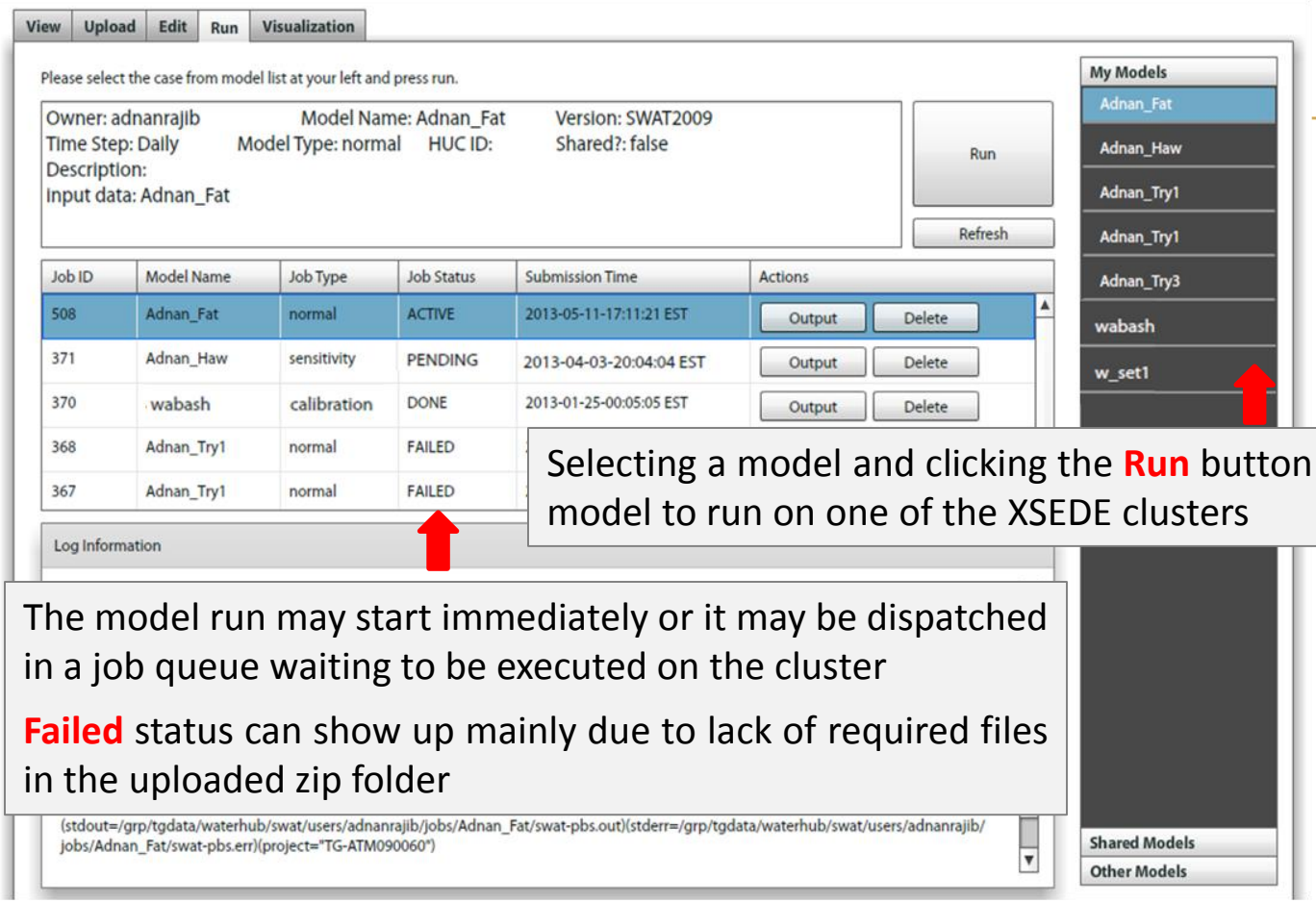
Contents of the zip folder

SWATShare User Interfaces



- ✓ 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

SWATShare User Interfaces



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

The model run may start immediately or it may be dispatched in a job queue waiting to be executed on the cluster

Failed status can show up mainly due to lack of required files in the uploaded zip folder

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

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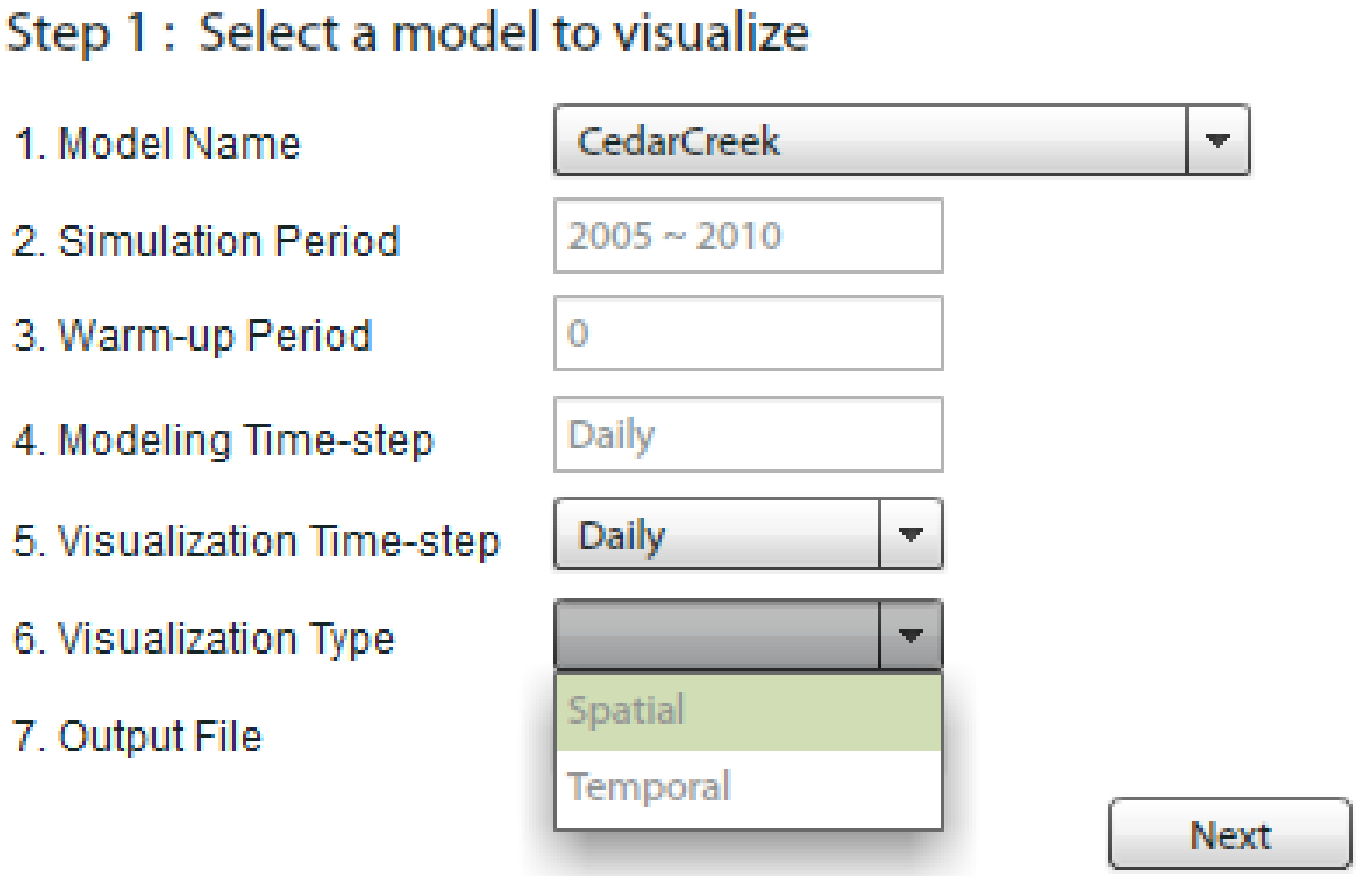
Visualization Tab



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Temporal Visualization

Model Name: CedarShort2 Simulation Period: 2009 ~ 2009 Modeling Time-Step: Daily Visualization Time-Step: Daily Visualization Type: Temporal Output File: output.rch

Step 2 : Select variables

Output variables

- [ ] FLOW_IN(cms): Average daily streamflow into reac
- [x] FLOW_OUT(cms): Average daily streamflow out of
- [x] EVAP(cms): Average daily rate of water loss by evap
- [ ] TLOSS(cms): Average daily rate of water loss by tra
- [ ] SED_IN(tons): Sediment transported with water int
- [x] SED_OUT(tons): Sediment transported with water
- [ ] SEDCONC(tons): Concentration of sediment
- [ ] ORGN_IN(kg): Organic nitrogen transported with v
- [ ] ORGN_OUT(kg): Organic nitrogen transported with
- [ ] ORGP_IN(kg): Organic phosphorus transported wit
- [ ] ORGP_OUT(kg): Organic phosphorus transported v
- [ ] NO3_IN(kg): Nitrate transported with water into re
- [ ] NO3_OUT(kg): Nitrate phosphorus transported wit
- [ ] NH4_IN(kg): Ammonium transported with water in
- [ ] NH4_OUT(kg): Ammonium transported with water

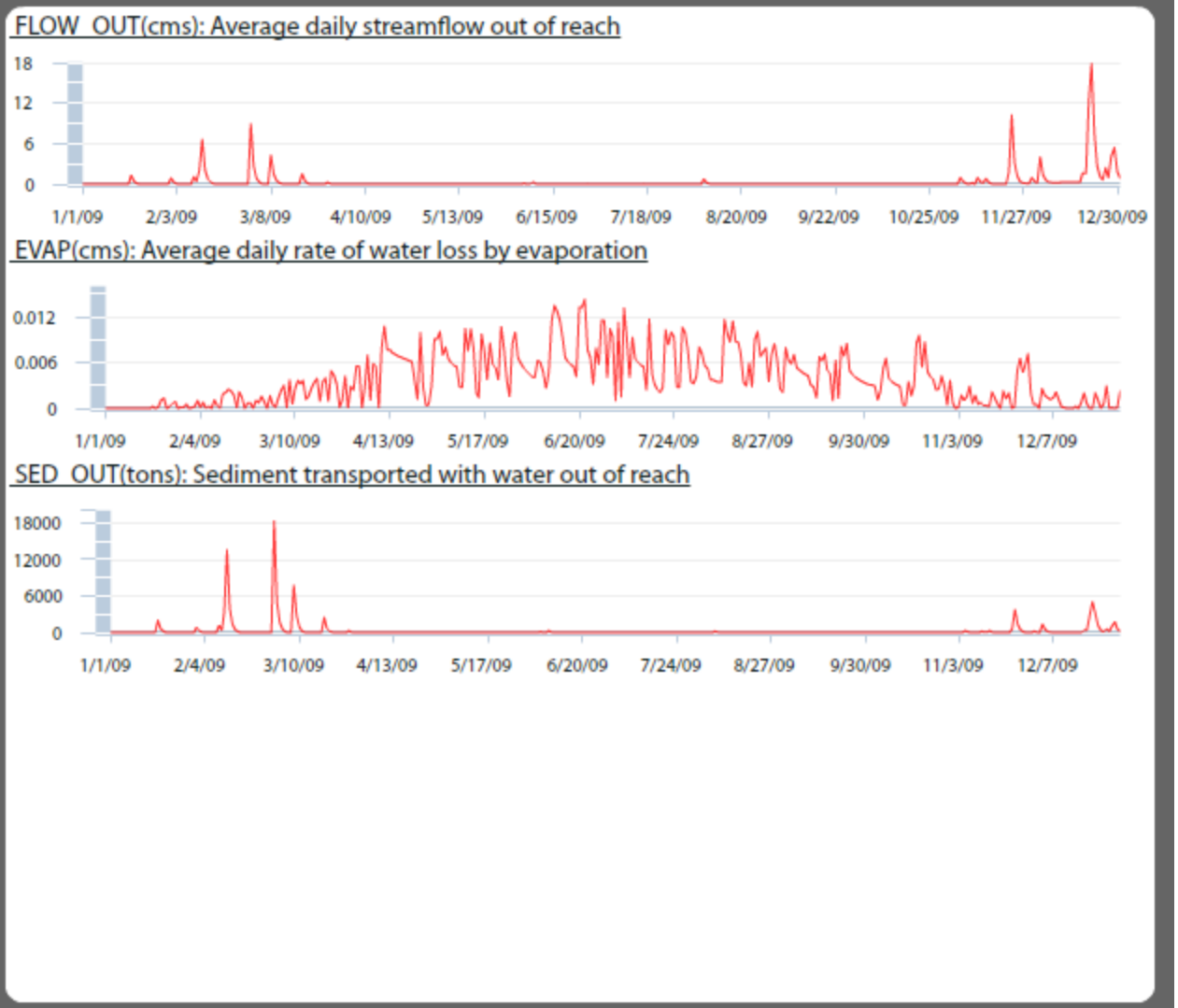
Step 3 : Set data range

Date range

1 / 1 / 2009 ~ 12 / 31 / 2009

mm dd yyyy mm dd yyyy

Draw Plots



Download Data

Close

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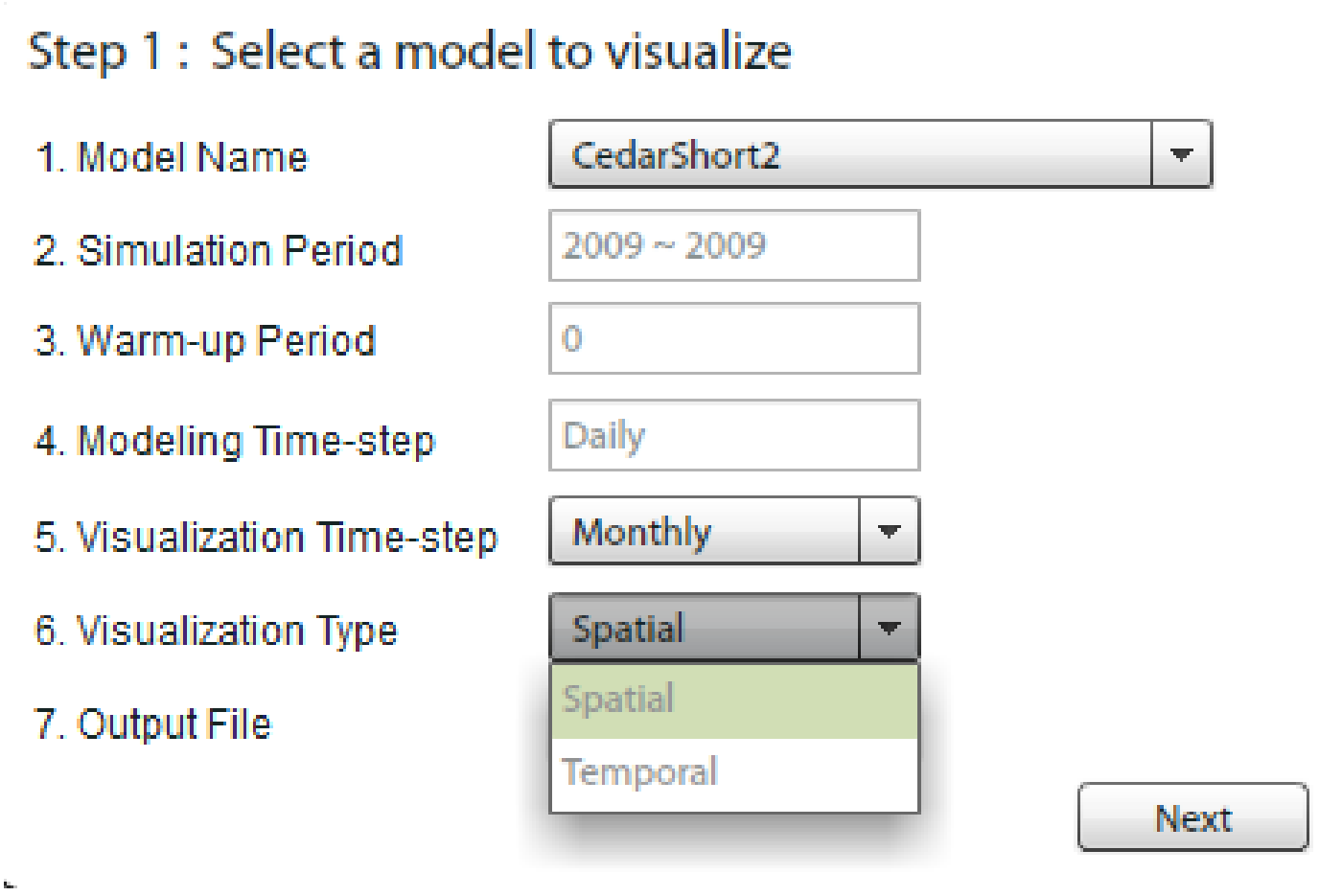
Spatio-Temporal Visualization



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Spatio-temporal visualization

View | Upload | Edit | Run | Visualization

Model Name: CedarShort2 Simulation Period: 2009 ~ 2009 Modeling Time-Step: Daily Visualization Time-Step: Monthly Visualization Type: Spatial Output File: output.sub

Step 2 : Select variables

Output variables

- [ ] PRECIP(mm): Precipitation
- [ ] SNOMELT(mm): Snow or ice melt
- [ ] PET(mm): Potential evapotranspiration
- [x] ET(mm): Actual evapotranspiration
- [ ] SW(mm): Soil water content
- [ ] PERC(mm): Water that percolates past the root zon
- [x] SURQ(mm): Surface runoff contribution to streamf
- [ ] GW_Q(mm): Groundwater contribution to streamf
- [ ] WYLD(mm): Water yield
- [ ] SYLD(t/ha): Sediment yield
- [ ] ORGN(kg/ha): Organic N yield
- [ ] ORGP(kg/ha): Organic P yield
- [ ] NSURQ(kg/ha): Nitrate transported by the surface
- [ ] SOLP(kg/ha): Soluble P yield
- [ ] SEDP(kg/ha): Mineral P yield

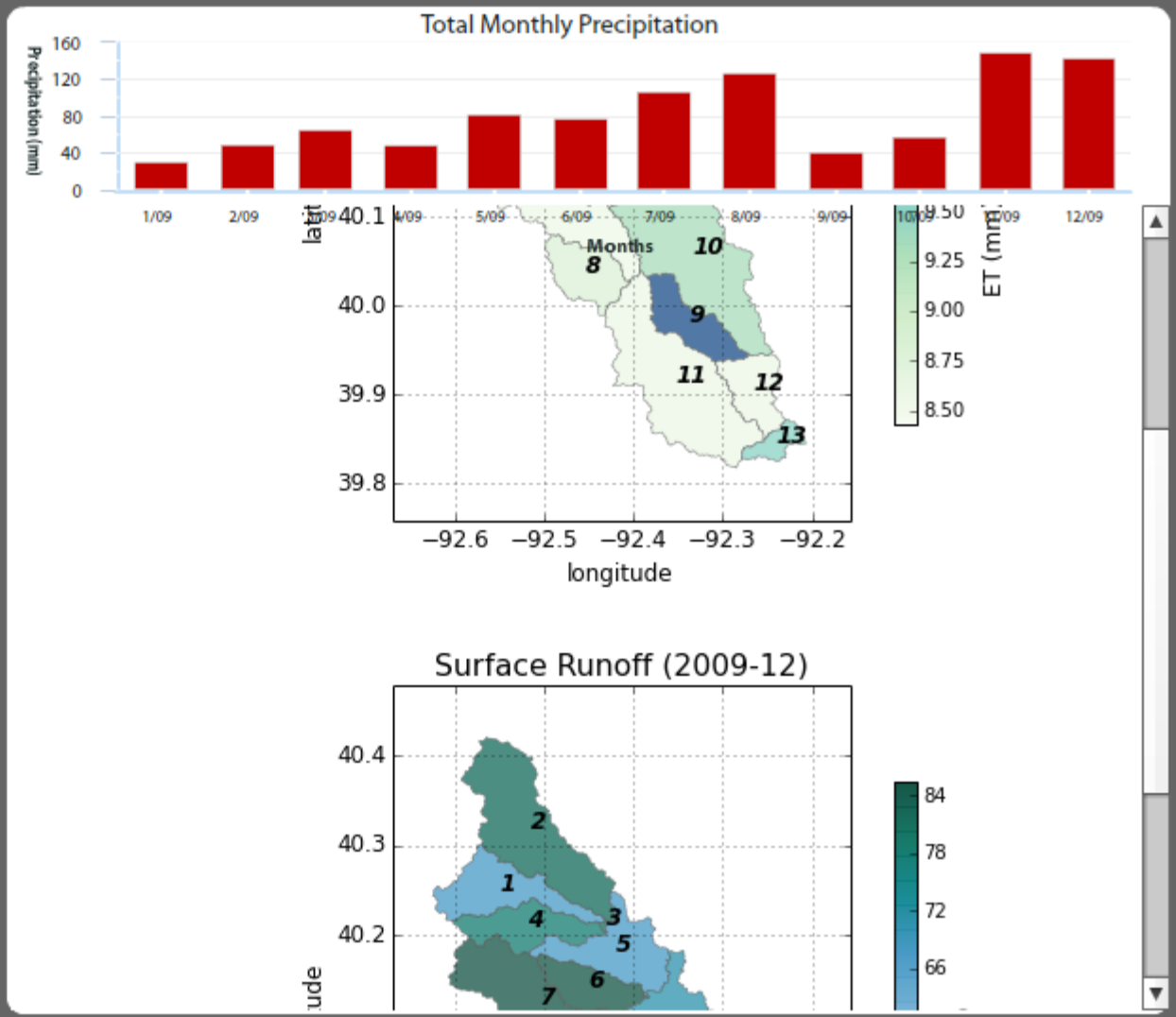
Step 3 : Set data range

Date range

1 / / 2009 ~ 12 / / 2009

mm dd yyyy mm dd yyyy

Draw Plots



Download Data | Prev | Start Animation | Next | Close

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Thank you!

www.water-hub.org/swatshare

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http://web.ics.purdue.edu/~vmerwade