SWATMOD-Prep:
A Graphical User Interface for Preparing Coupled **SWAT-MODFLOW simulations**

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Motivation Facilitate Construction of SWAT-MODFLOW Simulations

Method Create a Graphical User Interface that automates the linkage between SWAT and MODFLOW

Outline

- Brief overview of SWAT-MODFLOW
- Development of SWATMOD-Prep
- Application to Little River Watershed, Georgia

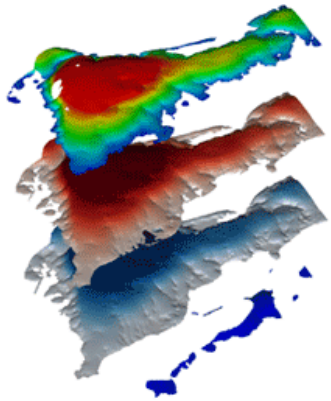
SWAT-MODFLOW

Linking Models:

Soil & Water Assessment Tool | SWAT

\+

MODFLOW



- Groundwater model
- 3D finite difference

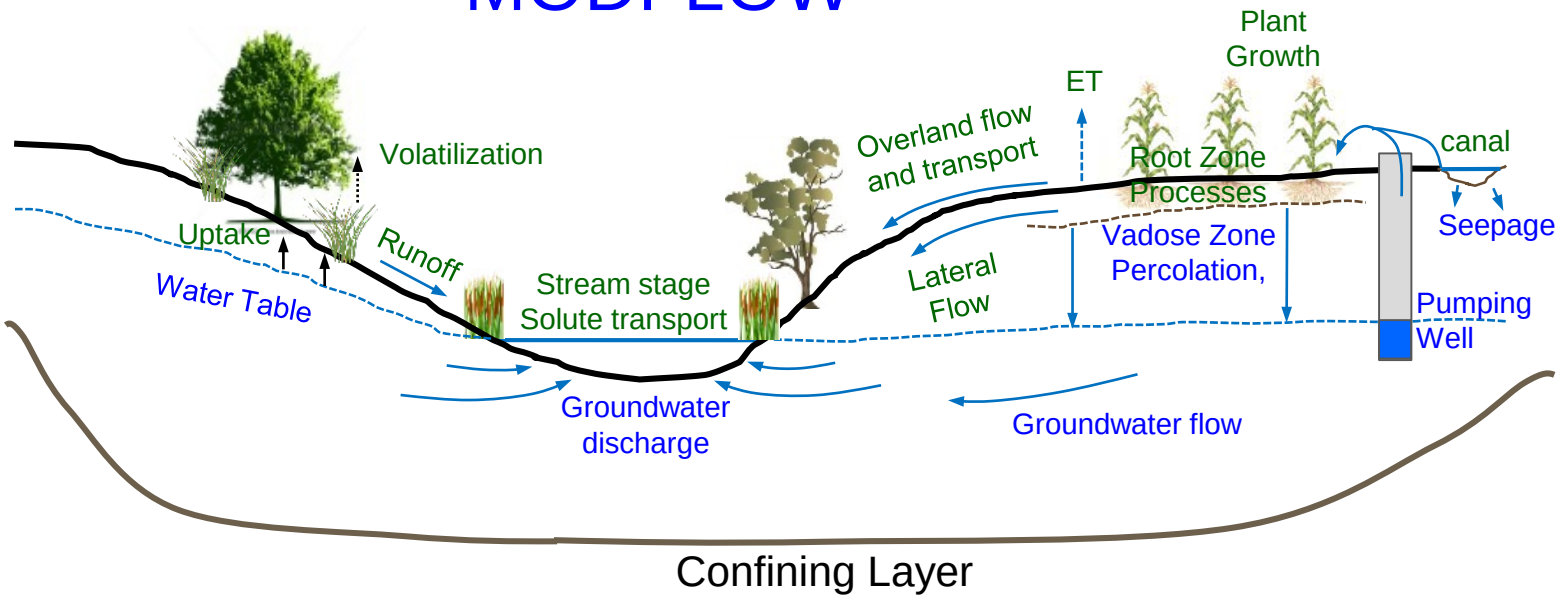
- More accurate groundwater flow dynamics
- Spatially-variable groundwater flow rates
- Spatially-variable groundwater discharge to streams
- Solute transport in aquifer system

SWAT-MODFLOW

Linking Models:

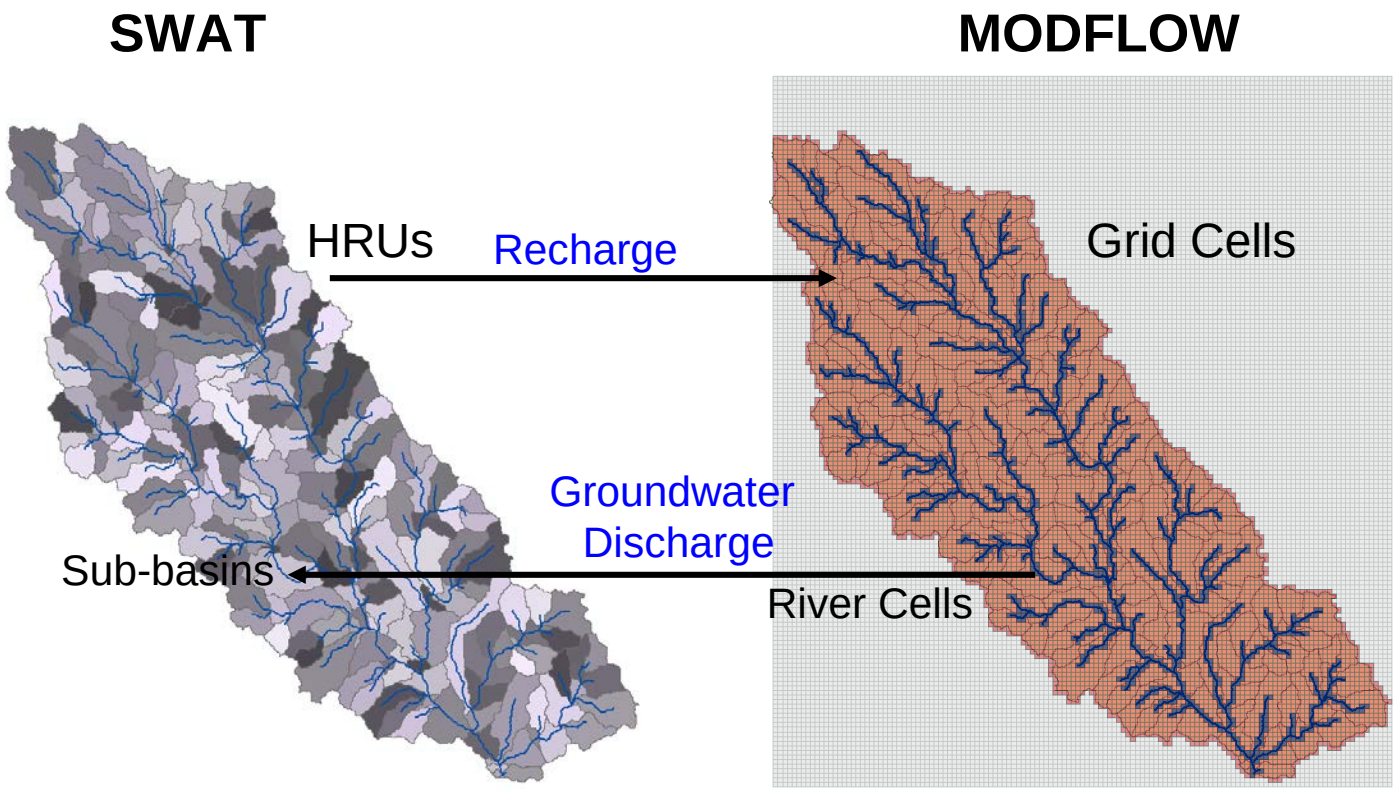
SWAT

MODFLOW



SWAT-MODFLOW

Linking Procedure:



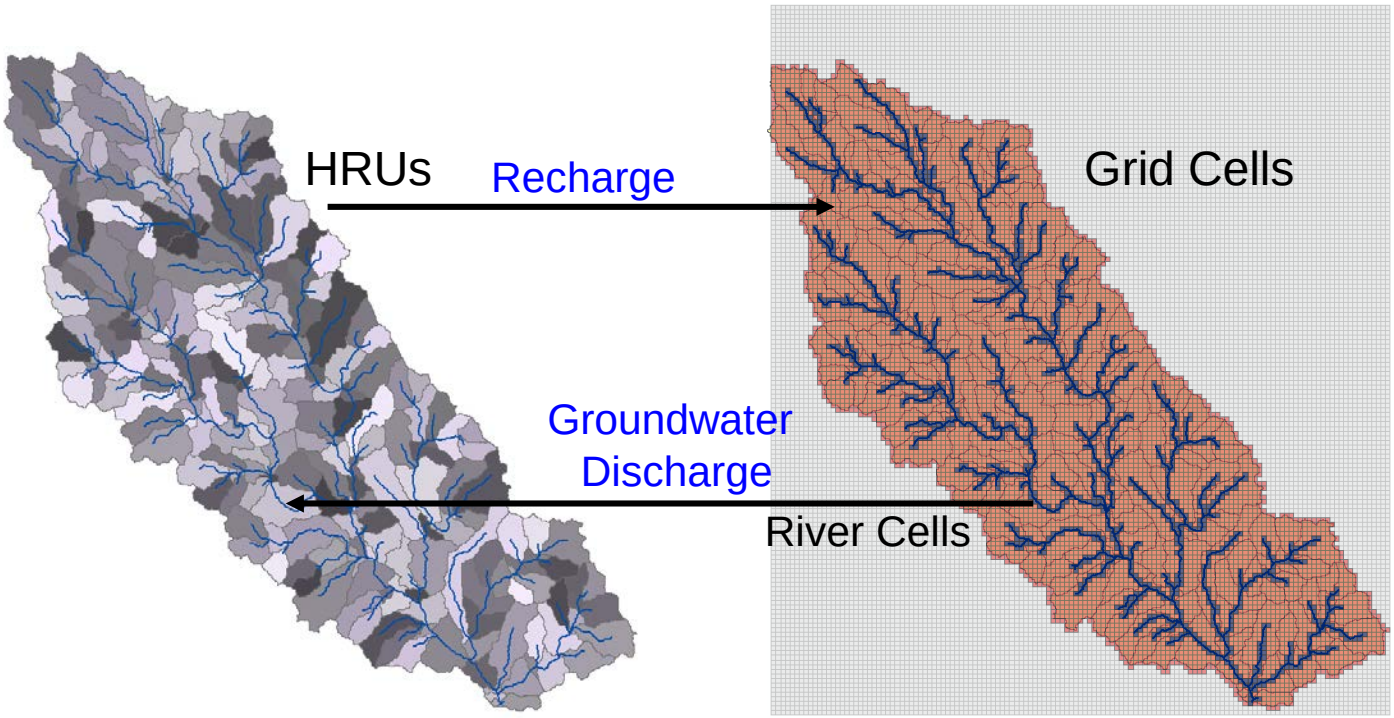
Interactions Occur on Daily Basis (Default) **or** as specified by user

SWAT-MODFLOW

1. HRUs → Split into Disaggregated HRUs (DHRUs)
2. Intersect DHRUs with MODFLOW Grid
3. Intersect Sub-basins with River Cells

GIS Processing → "Linking" Text Files

SWAT Files + MODFLOW Files + Linking Files + SWAT_MODFLOW.exe



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SWATMOD-Prep

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Overview of SWAT-MODFLOW

Development of *SWATMOD-Prep*

Application to Little River Watershed

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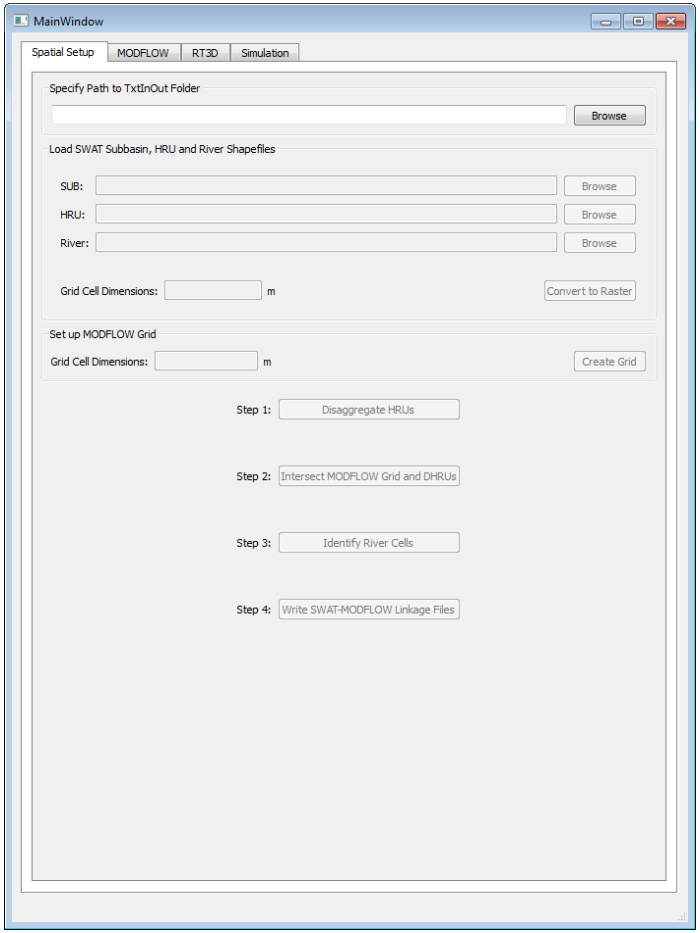

Graphical User Interface (GUI) to create necessary linkage and input files for SWAT-MODFLOW simulations

Created using **Python**, **NumPy**, and **SciPy**

Also an option to include RT3D (reactive nitrate transport in groundwater)

SWATMOD-Prep

SWATMOD-Prep

Overview of SWAT-MODFLOW

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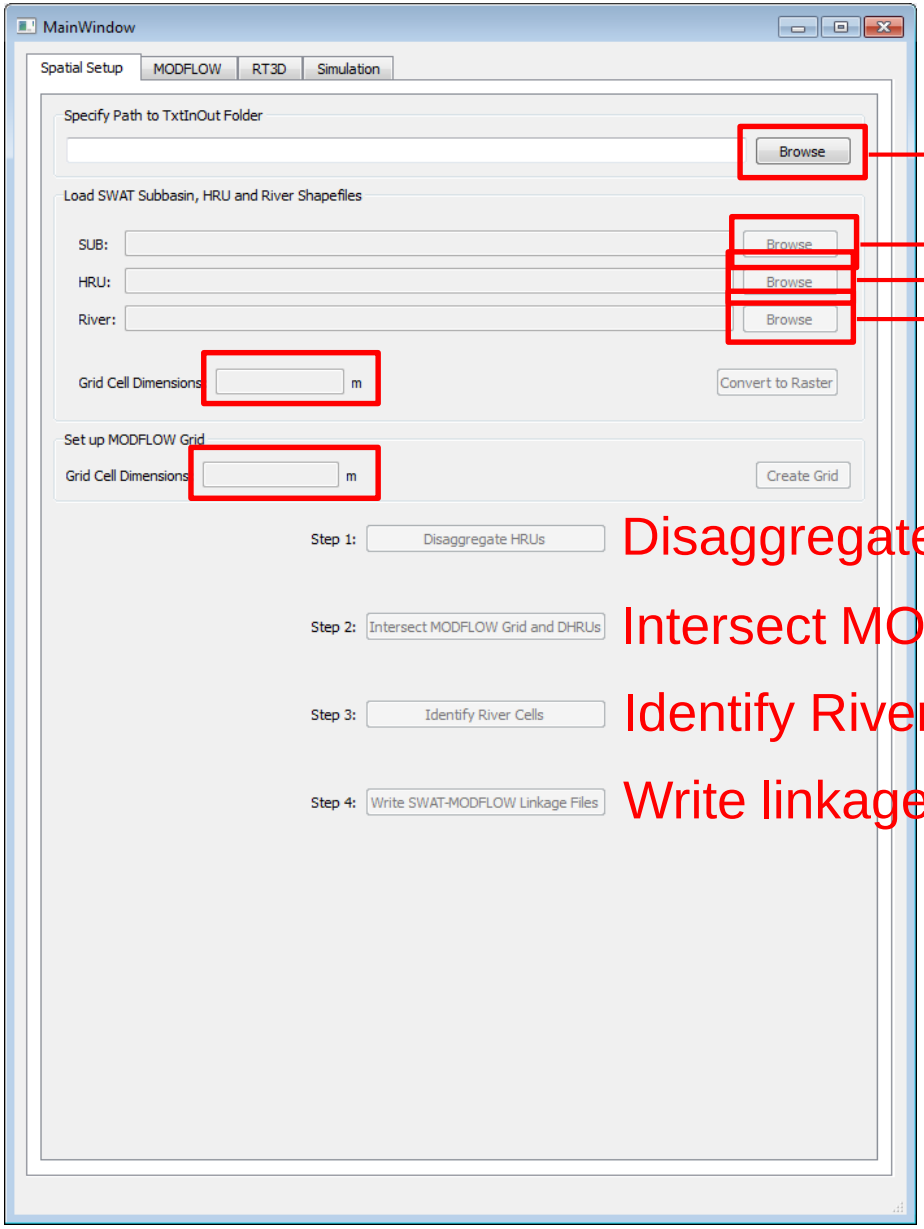

Path to SWAT model

Subbasin Shape file

HRU Shape file

River Shape file

Specify raster cell size (to convert shape files)

Specify cell size for the MODFLOW grid

Disaggregate HRUs

Intersect MODFLOW Grid with DHRUs

Identify River Cells in MODFLOW grid

Write linkage files!

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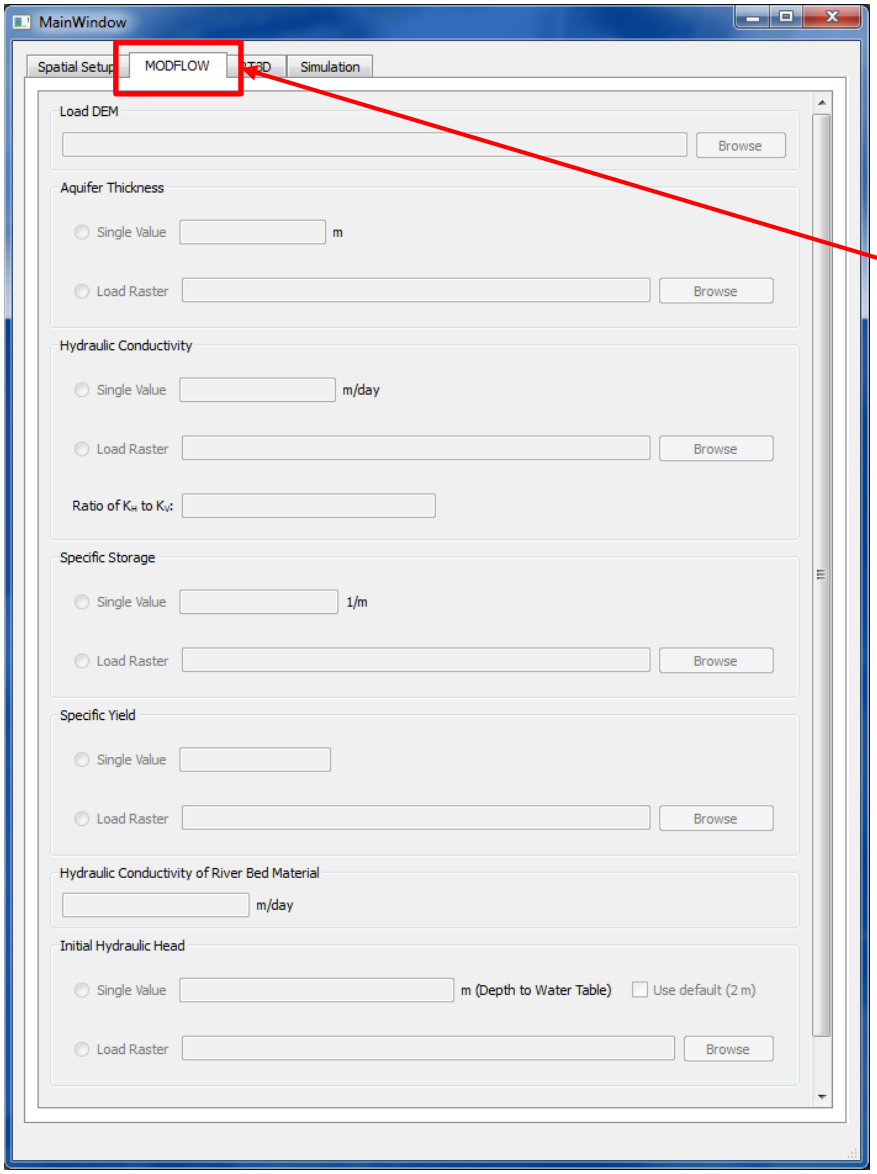

Options:

1. Use existing MODFLOW model
2. Create 1-layer MODFLOW model

MODFLOW tab

- Aquifer thickness
- Hydraulic conductivity
- Storage parameters
- River bed material conductivity
- Initial Conditions

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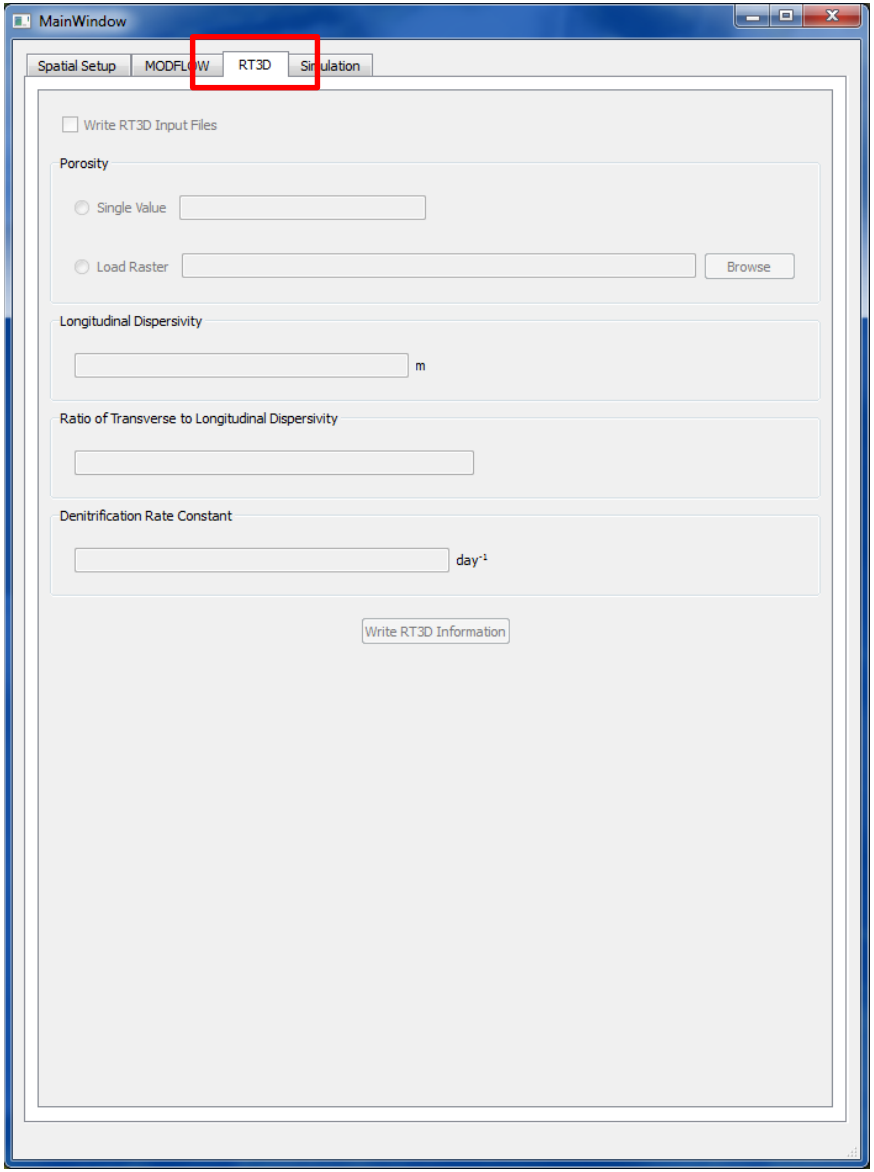

RT3D tab

- Porosity
- Dispersivity
- Denitrificaction
- Write RT3D input files

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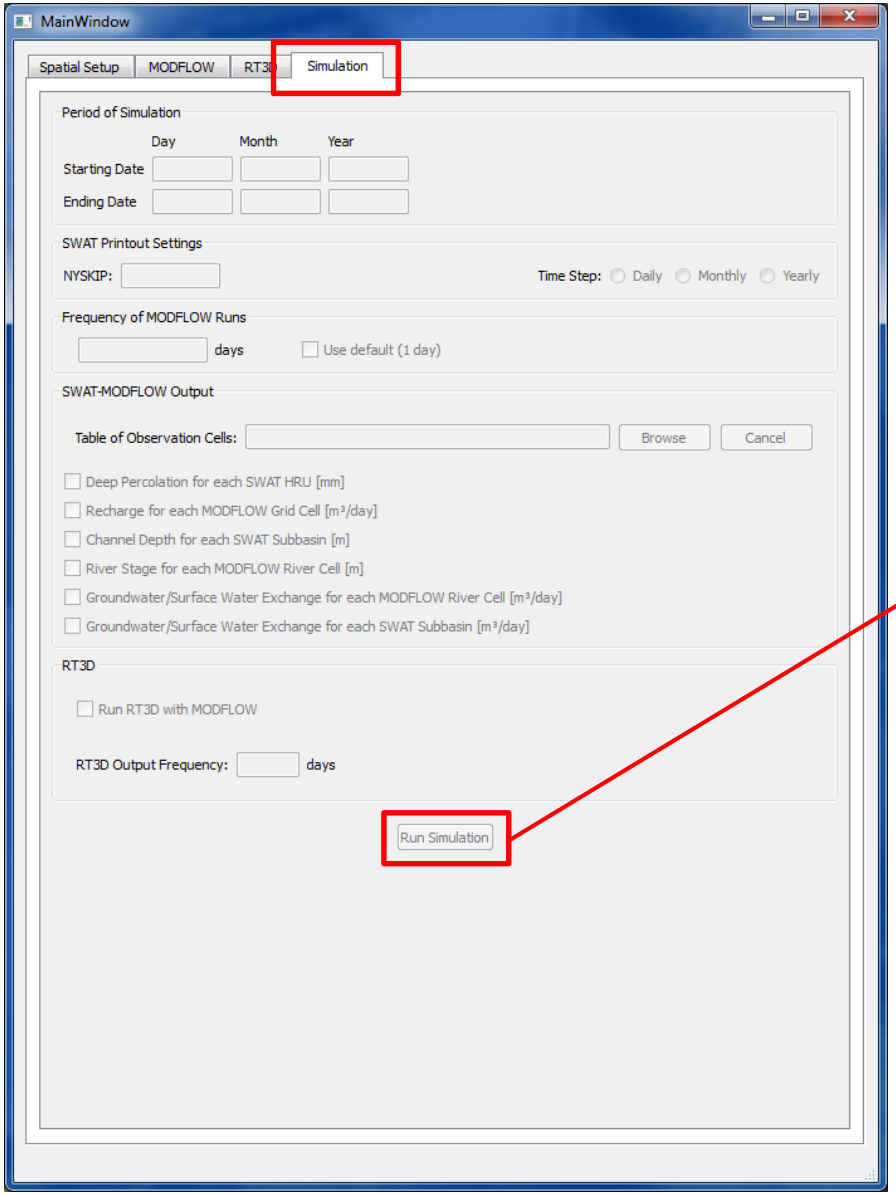

Simulation tab

- Output file options
- Frequency of calls to MODFLOW
- **Run Simulation**

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TUTORIAL

SWATMOD-Prep User's Manual

SWATMOD-Prep: Interface for Preparing SWAT-MODFLOW Simulations

User's Manual

Written: June 2016

Developers
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Overview of SWATMOD-Prep

SWATMOD-Prep is a graphical user interface developed to create a fully linked SWAT-MODFLOW model based on an existing SWAT (version 2012) model that has been created with the ArcSWAT interface. The user defines a finite difference grid for a MODFLOW model, which is then linked with the HRUs and subbasins of the SWAT model through geoprocessing routines. Currently the software is available only for Windows.

Mandatory requirements:

- SWAT model version 2012
- Existing ArcSWAT project with zero threshold HRUs

Purpose of this User's Manual

The purpose of this user's manual is to describe the process of installing and using SWATMOD-Prep on any personal computer or laptop. The manual also describes the input data that need to be provided by the user and the output that might be helpful interpreting model results. Internal input/output dependencies are not listed.

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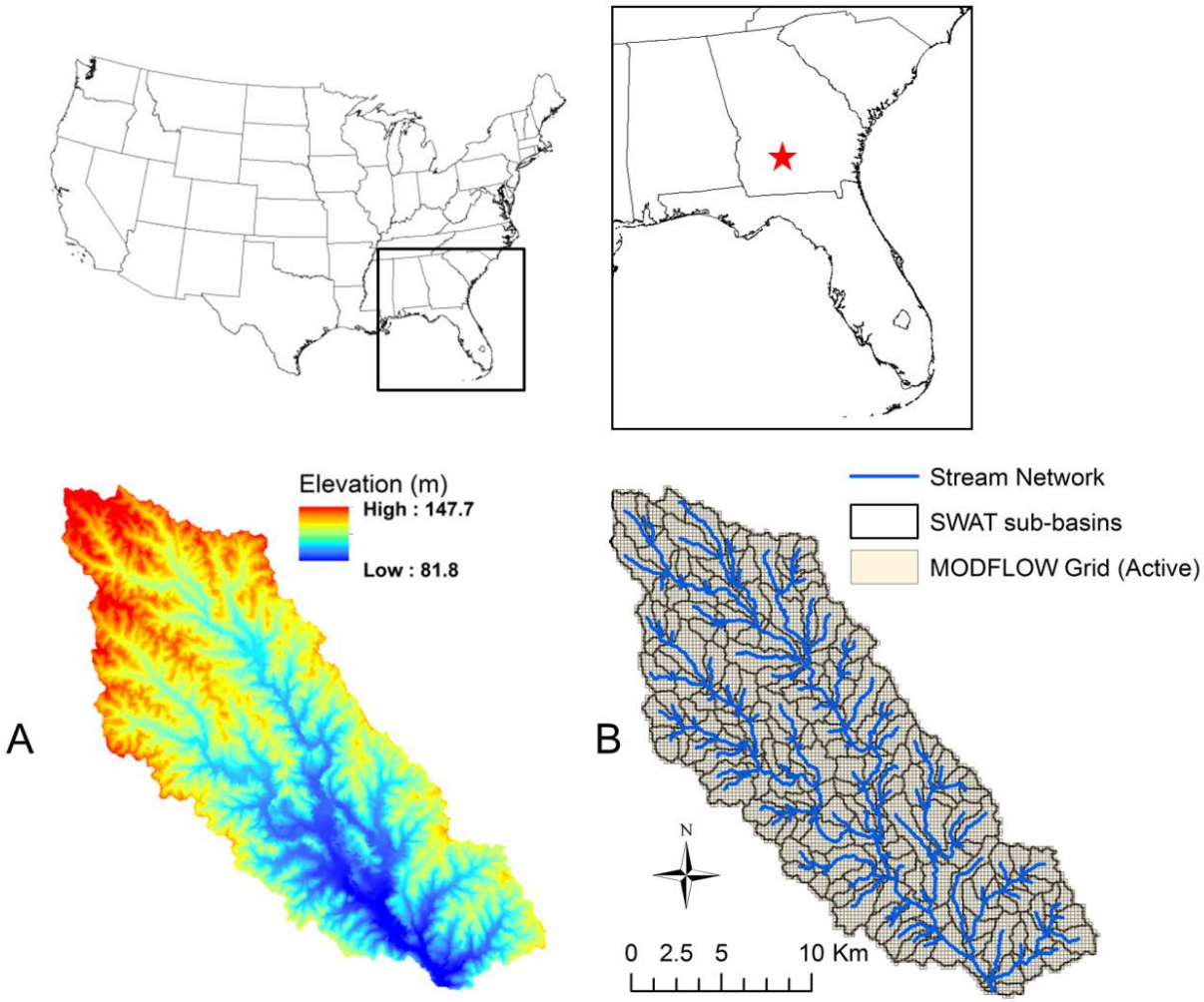

SWAT-MODFLOW

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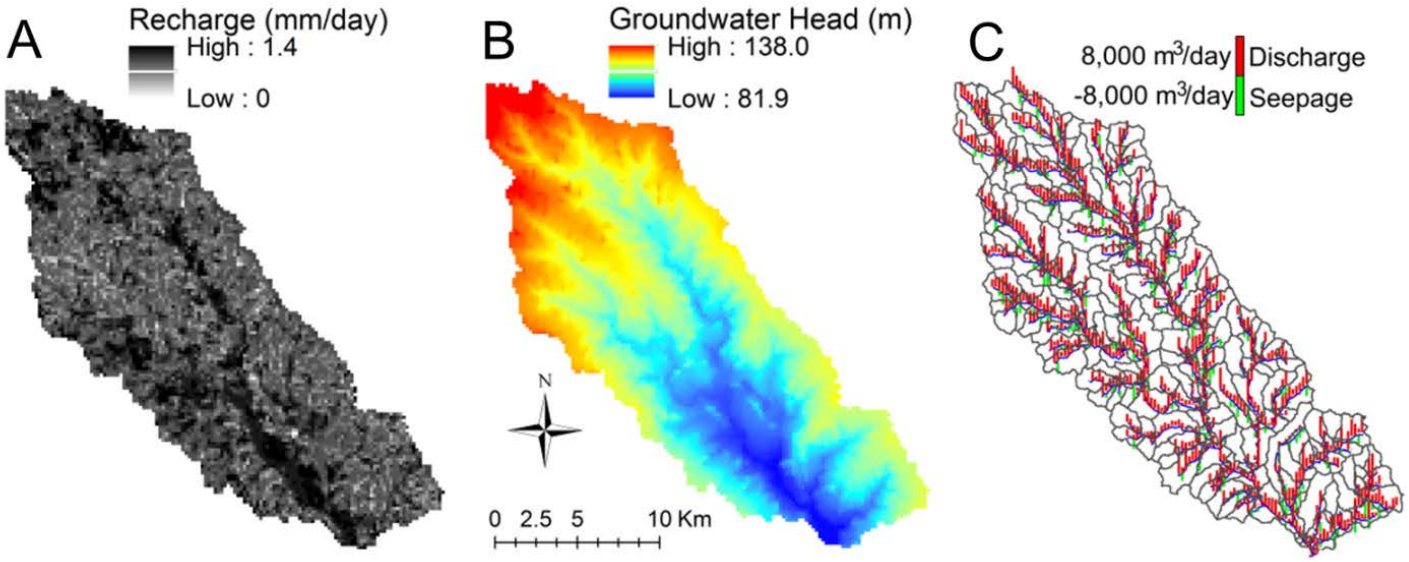
Results



Summary

- SWATMOD-Prep: GUI to create SWAT-MODFLOW simulations
- Tutorial: How to use SWATMOD-Prep
- Will be available on the SWAT website by October 2016 (http://swat.tamu.edu/software/swat-modflow/)
- Or: contact Ryan Bailey (rtbailey@engr.colostate.edu)

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