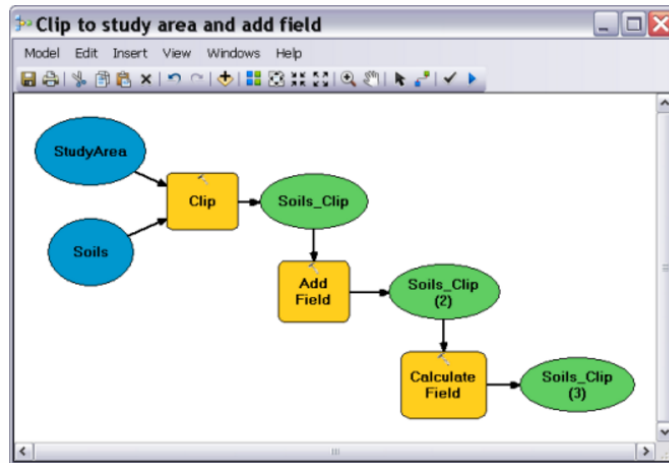


ModelBuilder – Automate Processing

ModelBuilder is an ArcMap application that you can use to create processing workflows and tools. You can create something like a flowchart on a ModelBuilder canvas, with placeholders for data, connected by operations, and resulting in some output.

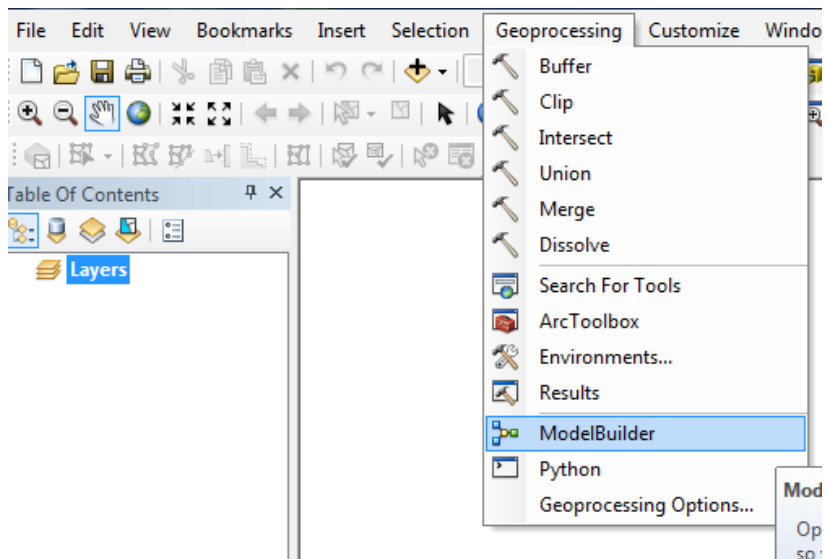
The figure at right shows an example model that clips soils data by a study area, and then adds and calculates a field.



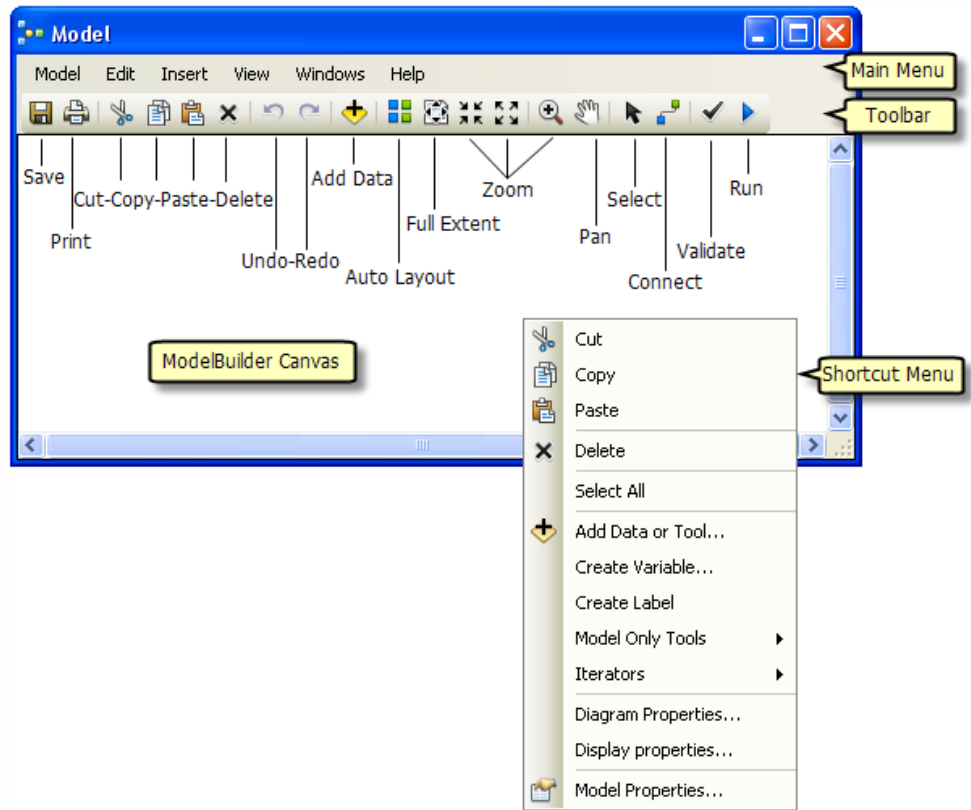
Model builder can be used to automate and improve the repeatability for spatial processing, create custom tools for oft-applied steps, and provide a record of the steps in an analysis. It can string together long-winded processes so that you may concentrate on other tasks while your spatial computations are done.

You typically first do an analysis manually, that is, applying a set of spatial operations to your input data sets in a sequence. You may manually subset the data set for this prototyping if they are large enough to cause long run times. You review intermediate and final results of this manual analysis for accuracy, and verify that your processing stream answers the target spatial question. If not, you alter the processes and steps until you have a correct analysis. You then replicate the sequence of steps in a spatial model in ModelBuilder.

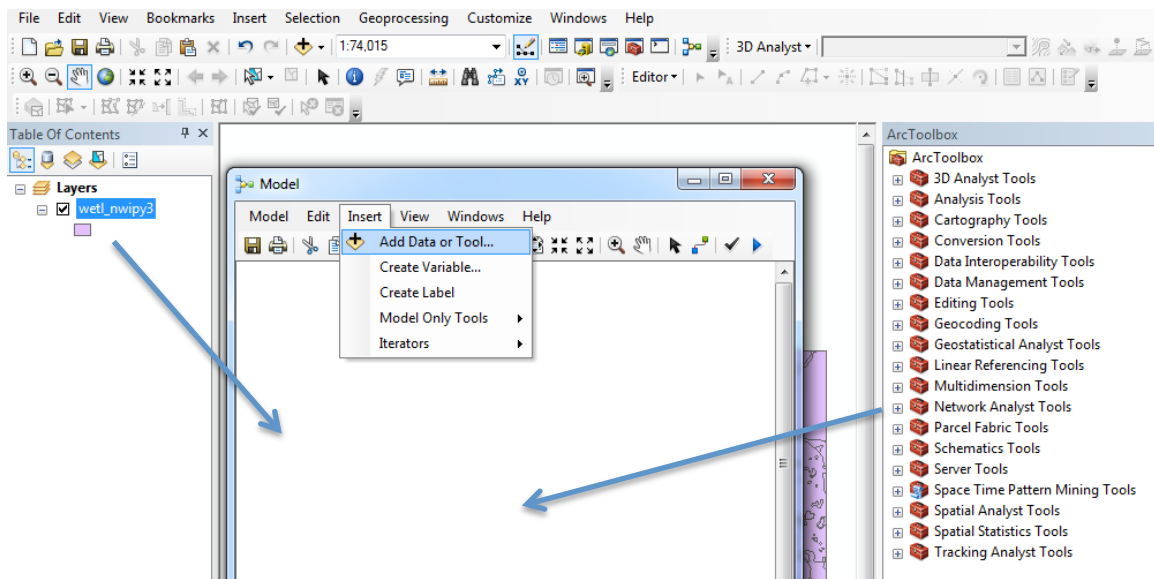
You start model builder through the Geoprocessing > ModelBuilder command:



This will open the ModelBuilder window:



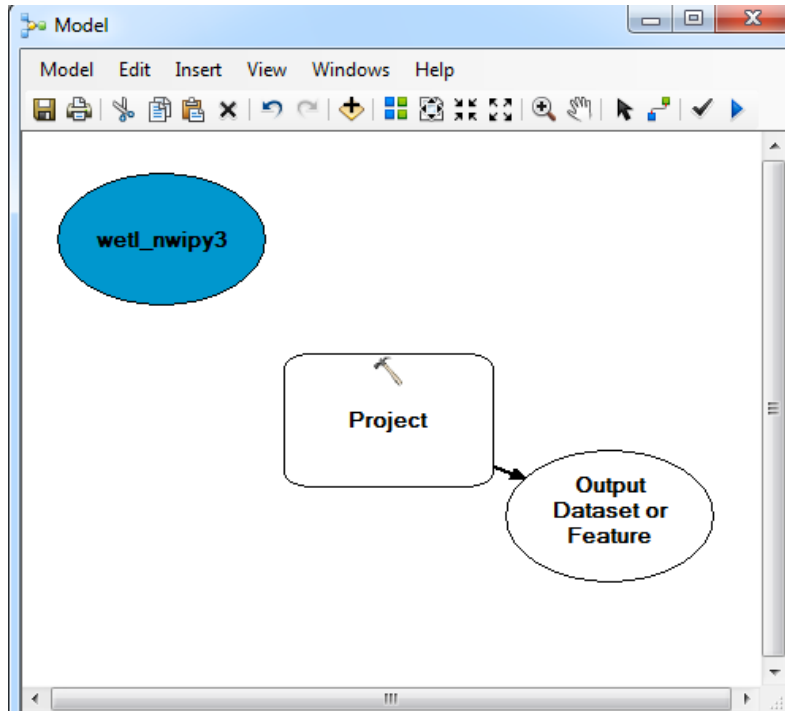
You build your model by adding data or tools. You can use the *Insert* label on the upper window ribbon, or you can drag and drop data from the Table of contents (TOC, left) and tools from the *Toolbox* menu (right):



For example, this results when I drag onto the canvas the *wetl_nwipy3* shapefile from the TOC, and the *Project* tool from the Projections and Transformations Toolbox:

Note that the data oval (*wetl_nwipy3*) is colored, meaning it's parameters are all set, and the *Project* is not.

Once I've added a spatial operation, I need to specify the inputs and parameters, here for the *Project* command.

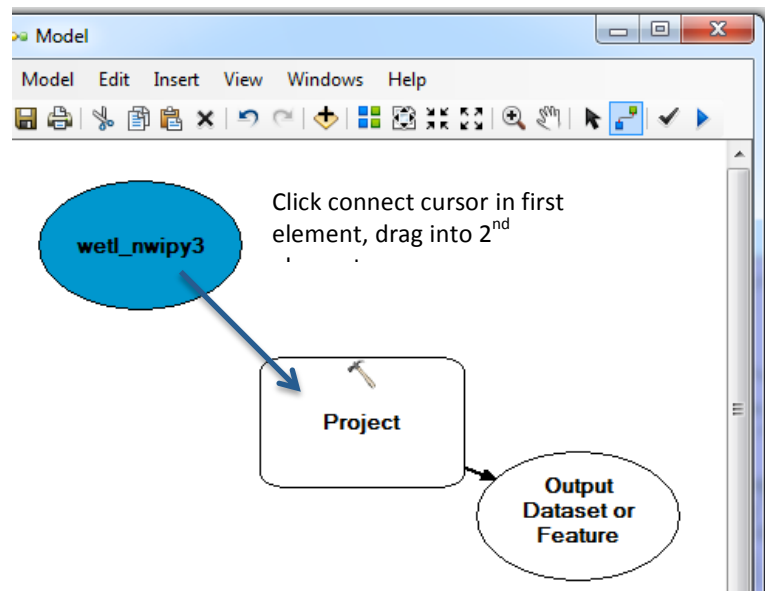


I do this by activating the *Connector* tool (near right end of icon bar along the top of the canvas), and dragging from the input data layer to the *Project* bubble:

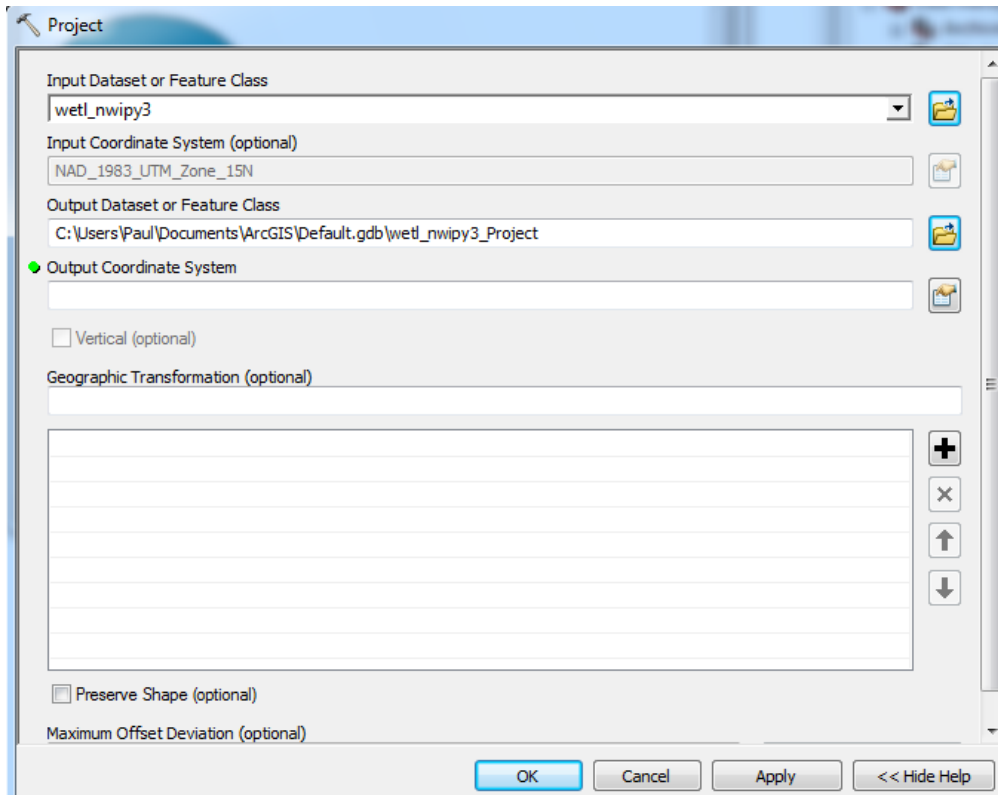
This should create an arrow connecting the two bubbles.

It will also rename the output feature data set.

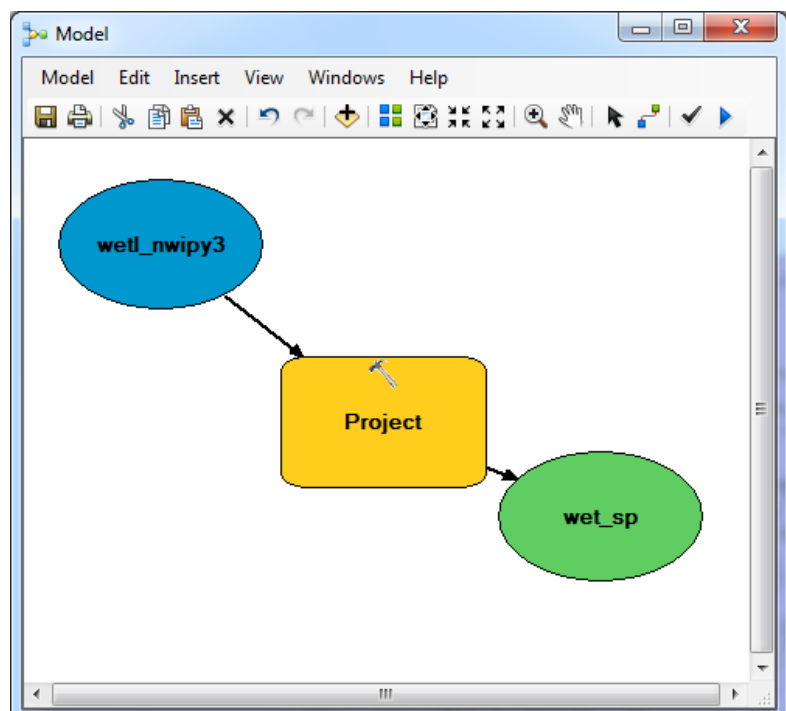
There are other parameters we need to set for the *Project* tool, like the output coordinate system, and perhaps the geographic transformation. Many spatial operations have a set of parameters we must specify.



You can set the parameters of a spatial operation by double left-clicking on spatial operation (here the Project) bubble on your canvas. This should display the familiar window for the Project tool, the same as when you invoke it from the Toolbox:



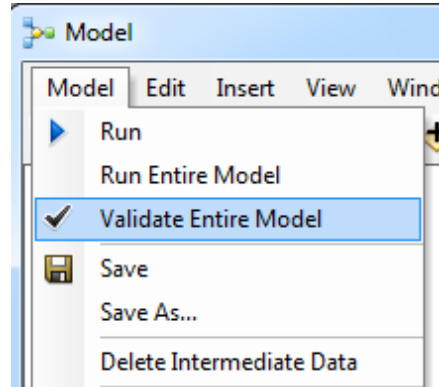
When you fill in the required parameters, here the output data set and coordinate systems, and the geographic transformation (if needed), and click o.k., the bubbles all become colored in, and any name changes reflected in data bubbles:



Once you've built your complete model, the next step is typically to *Validate the Entire Model*, accessed through the Model menu choice:

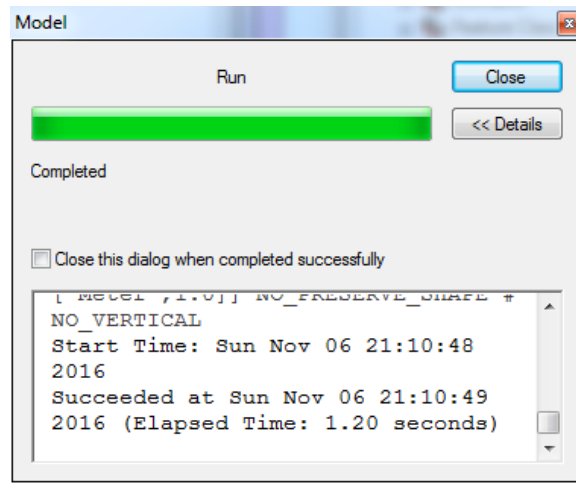
We'll describe validation fails later, for now, assume model is successfully validated.

The next step is to run the model, by clicking on the Run icon at the top of the Model sub-menu



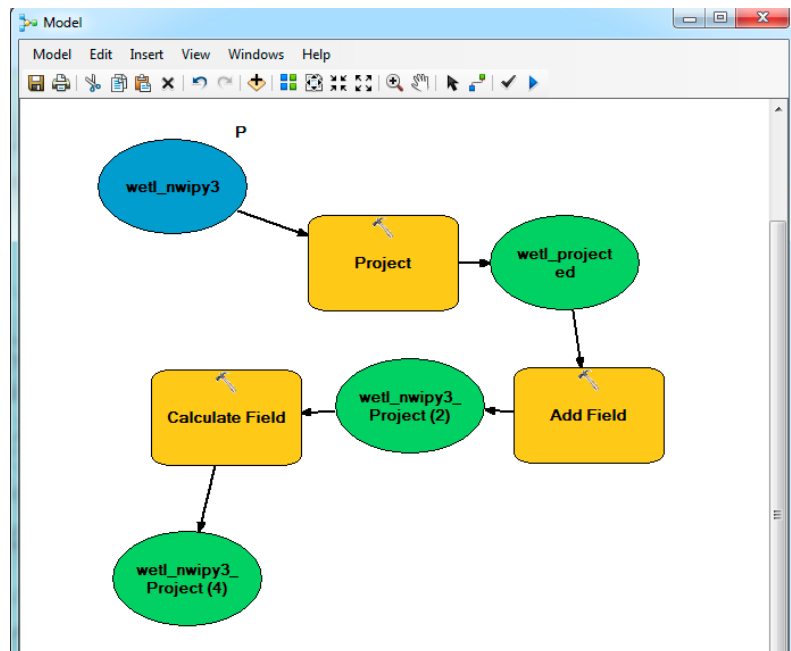
You should see new window pop up and ModelBuilder step through the elements of the model, with a progress message displayed in a bottom pane of this new window. When the model completes, you will see a Succeeded message if all ran well:

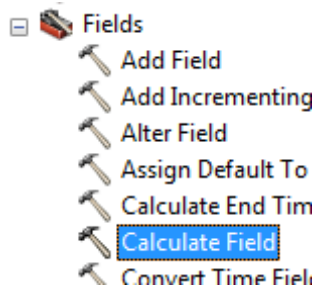
That's it. If you've done an example like this with a test dataset of your own, you've run your (first perhaps?) ModelBuilder model.



Modelbuilder wouldn't be very interesting if that were the extent of it, but the real utility comes from coding multi-step processing tasks. Suppose you have to process many wetlands files, projecting them to a new coordinate system, adding an area field, and recalculating areas in acres.

You can do this by building a model, using the *Add Field* and *Calculate Field* tools from Data Management > Fields toolbox:





This is the simplest of introductions, but these tools are remarkable time savers for simple, repetitive tasks. More advanced capabilities, include iteration, complex queries, and recursion, but these are probably better done in full-on Python, the subject of entire courses.

Your assignment is to build a simple model using ModelBuilder. It can be something you'll need to do in your project (e.g., fill DEM, flow direction, flow accumulation), or simply this exercise with wetlands data. Have at least three tools when you apply it.

Wetlands data are on the class L drive, and downloadable as a zip file.

Turn this in on the Moodle site, at the time identified.

