SWAT LUU is a geospatial tool that ingests multiple land use/land cover geospatial datasets and other associated information interactively and prepares the input files necessary for activating the land use update (LUU) module in SWAT.

https://saraswat-swat.rcac.purdue.edu

SWAT LUU

User Manual

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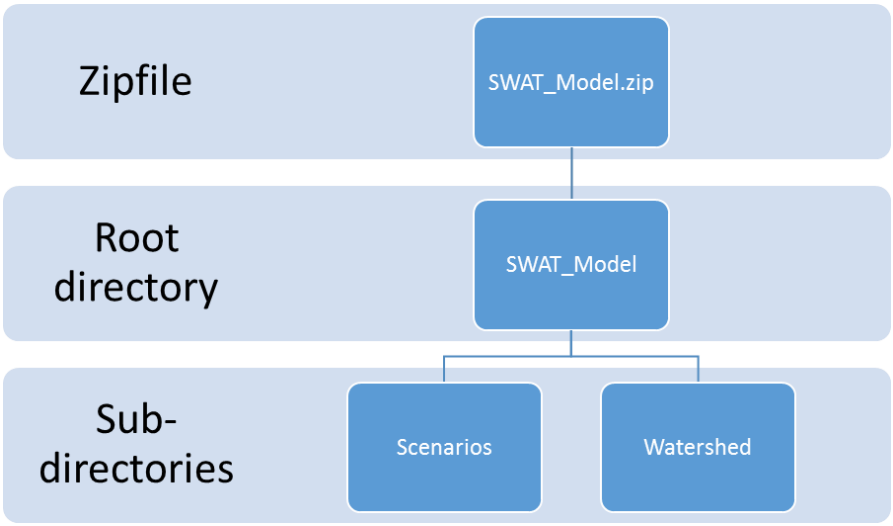
PURDUE UNIVERSITY®

ARKANSAS NATURAL RESOURCES COMMISSION

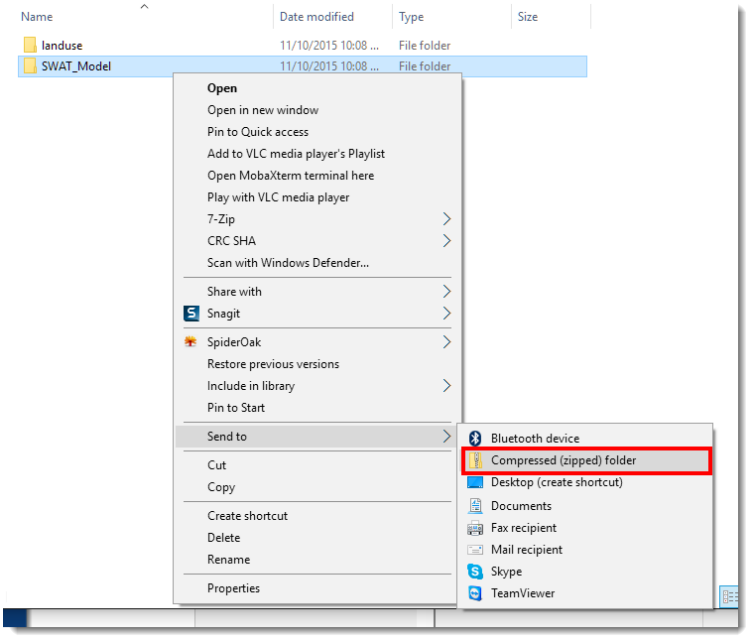
Step 1 – SWAT Model Input

1. The first file you will need to upload is a zipped copy of your SWAT model. The zipfile should be provided with the same name as the directory containing the SWAT model. For example, if your SWAT model is in a directory named "SWAT_Model", the zipfile should be named "SWAT_Model.zip." It is necessary that the SWAT model directory has the "Scenarios" and "Watershed" sub-directories and that those two directories contain all of their associated sub-directories and files. The next step will demo how to create a zipfile.

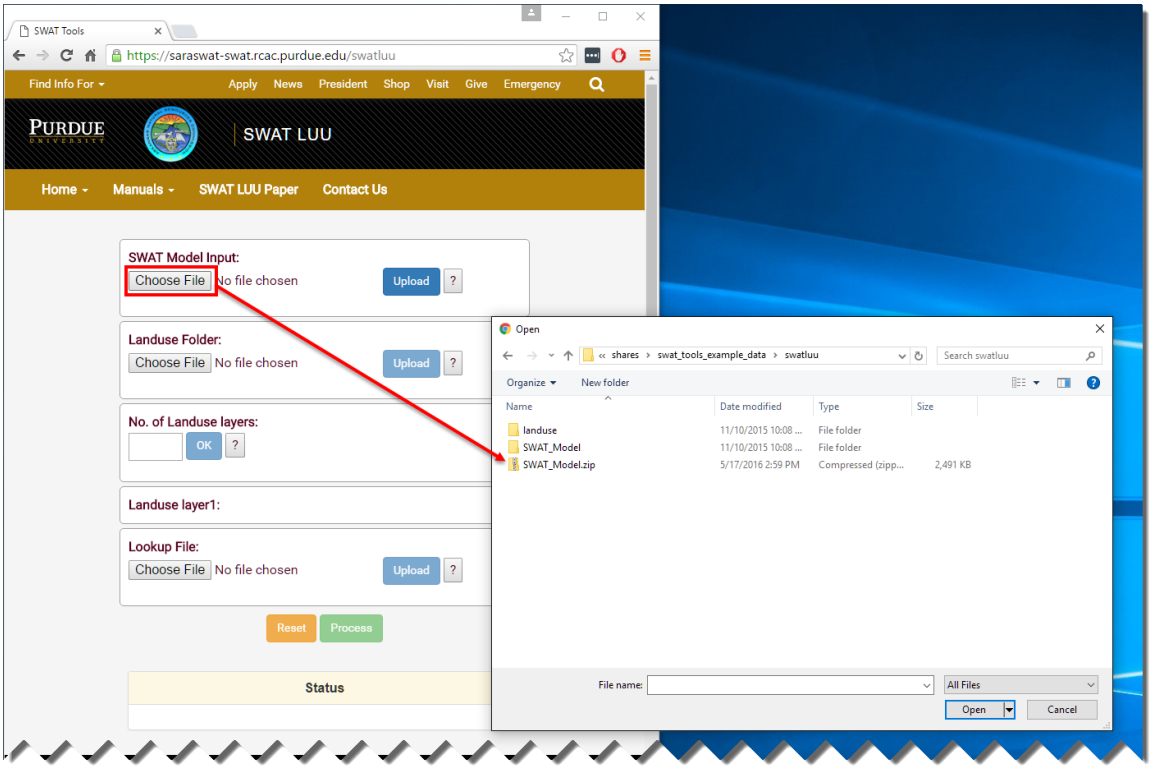
Caution: Your landuse rasters must have the same resolution as the hrus1 raster in your SWAT Model. They must have the same number of rows and columns for proper analysis.



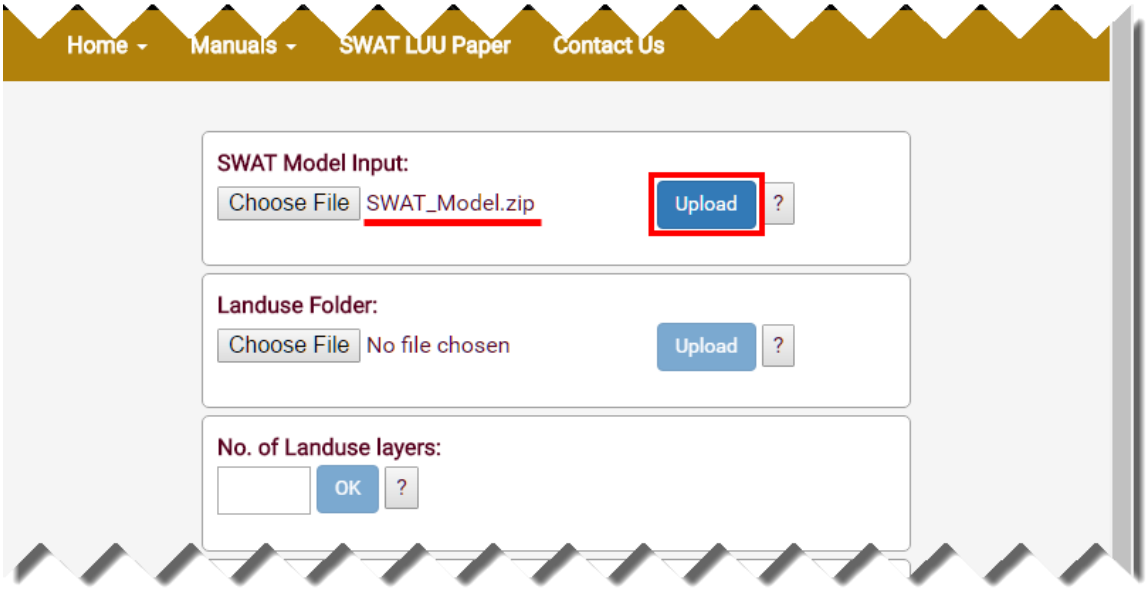
2. Make sure your SWAT model directory matches the above requirements. You can use any software you like to create the zipfile. In Windows 7 and up, you can simply right-click the directory and then select **Send to -> Compressed (zipped) folder** in the menu that appears. The zipfile name should match the SWAT model directory name.



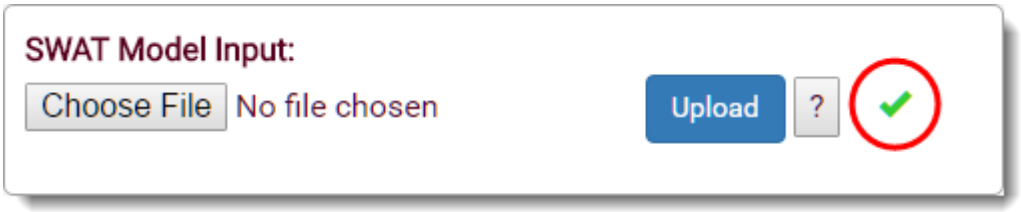
3. Click the **Choose File** button in the **SWAT Model Input** section to start the process of uploading your zipped SWAT model. Navigate to the location of your zipped SWAT model and double-click it, or click it once and click the **Open** button.



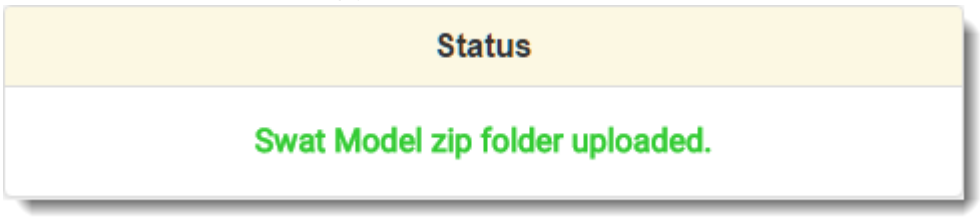
4. After selecting the zipped SWAT model, click the **Upload** button.



5. The speed it takes to upload and unzip the file will be dependent on the transfer speed and the size of the file. A green checkmark will appear when the upload has successfully finished.

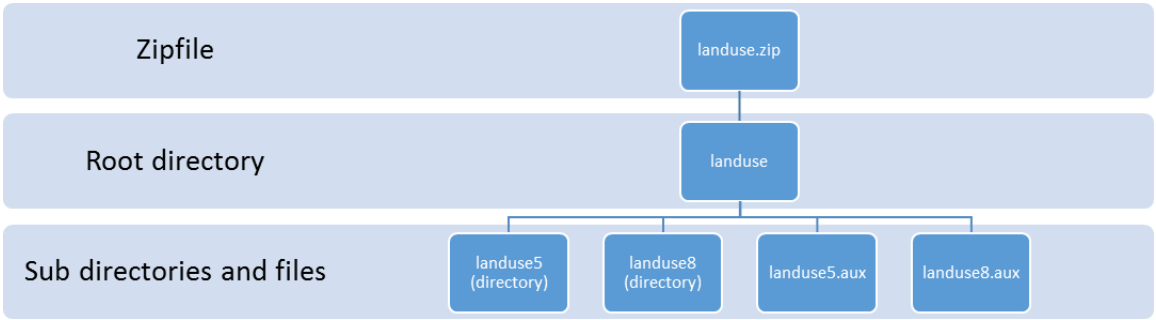


The **Status** frame located at the bottom of the page will be updated with relevant information as you use the tool. If there had been a problem with the shapefile, a message would have appeared in the **Status** frame informing you of the issue.



Step 2 – Upload landuse folder

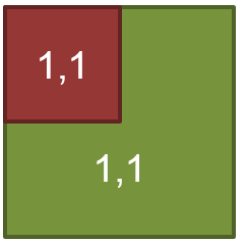
1. The **Landuse Folder** section will be activated after you have completed step 1. You will need to provide your landuse data in a zipfile. The zipfile should have a root directory that contains only the landuse data you are interested in analyzing. For example, if you have a 2005 landuse layer named "landuse5" and a 2008 landuse layer named "landuse8", you would need to include the "landuse5" and "landuse8" directories as well as their corresponding ".aux" files. These files should be placed into the same directory. The next step will demo how to create a zipfile.



Important:

You must meet the following two criteria before proceeding with your landuse raster upload.

A) Your landuse rasters must have the **same resolution** as your SWAT model's hrus1 raster. You can find the hrus1 raster at: swat_model_directory/Watershed/Grid/hrus1. Any GIS software capable of importing raster data should be able to tell you the resolution of your datasets. If the landuse rasters have a different resolution than hrus1, you will need to resample them to match hrus1. SWAT LUU needs to be able to use the location of hrus1 raster cells to pull information from the landuse rasters. If the cell resolutions are different, it cannot correctly extract information only relevant to the hrus1 cell's area. See the image below for a visual representation of the problem.



hrus1 – 12.5 m^2

landuse – 50 m^2

Each cell in the example represents the first index position of their respective rasters. It shows that hrus1 has a higher resolution (4x) than the landuse raster,. It shows that the sample index (1,1) on the landuse raster is from a much larger area than the area covered by hrus1 (1,1) cell.

B) Your landuse rasters must have either the same or a greater extent than your hrus1 raster. You can find the hrus1 raster at: swat_model_directory/Watershed/Grid/hrus1. Any GIS software capable of importing raster data should be able to tell you the number of rows and columns in your datasets. If the landuse rasters have a smaller extent than hrus1, you will need to go back to your source landuse data and re-clip the landuse data to at least the same extent of your hrus1 raster. SWAT LUU needs to be able to extract landuse data at the location of each cell in the hrus1 raster. If the landuse raster has a smaller extent than hrus1, there will be areas where it is unable to extract landuse info. See the image below for a visual representation of the problem.

hrus1

1,1	1,2	1,3	1,4	1,5	1,6
2,1	2,2	2,3	2,4	2,5	2,6
3,1	3,2	3,3	3,4	3,5	3,6
4,1	4,2	4,3	4,4	4,5	4,6
5,1	5,2	5,3	5,4	5,5	5,6
6,1	6,2	6,3	6,4	6,5	6,6

landuse

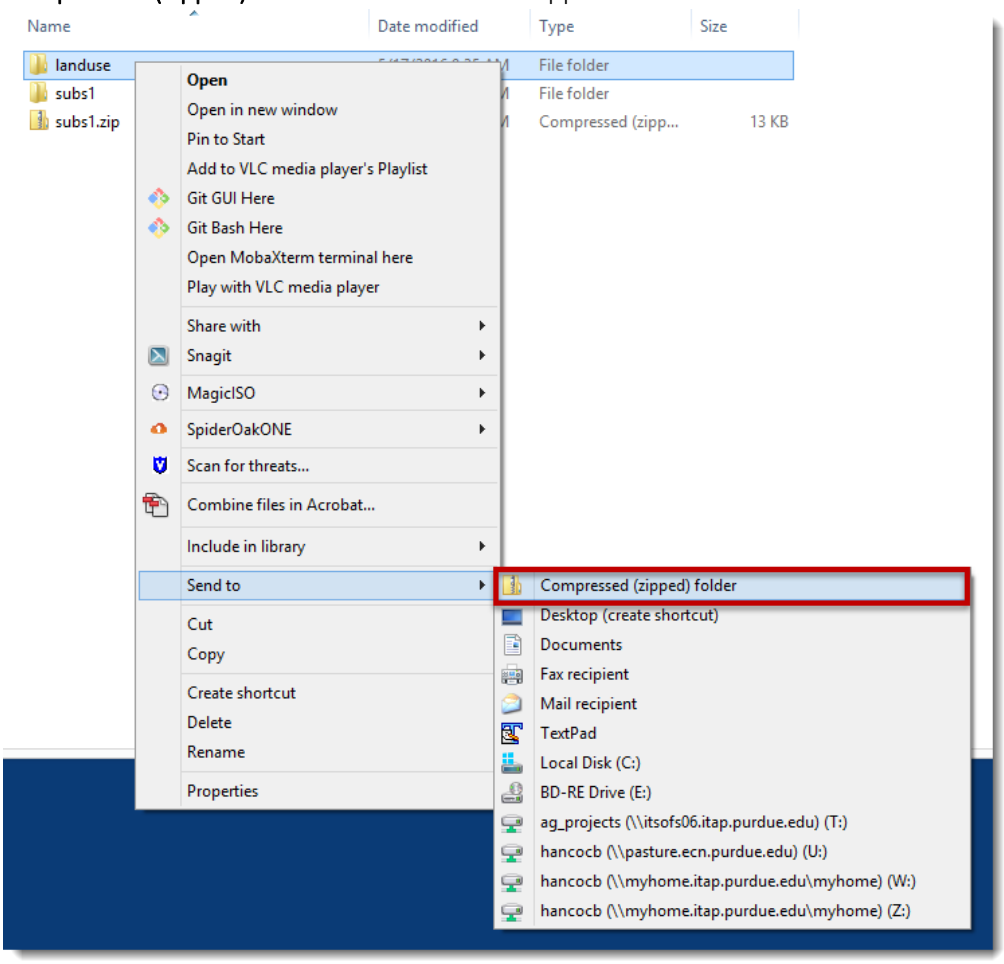
1,1	1,2	1,3	1,4	1,5
2,1	2,2	2,3	2,4	2,5
3,1	3,2	3,3	3,4	3,5
4,1	4,2	4,3	4,4	4,5
5,1	5,2	5,3	5,4	5,5

In this example, the landuse raster has a smaller extent than hrus1. As a result, hrus1 is not able to retrieve landuse values at its locations that are beyond the landuse layers extent (row 6 and column 6). This scenario will generate an error that prevents the user from proceeding on the SWAT Tools frontend.

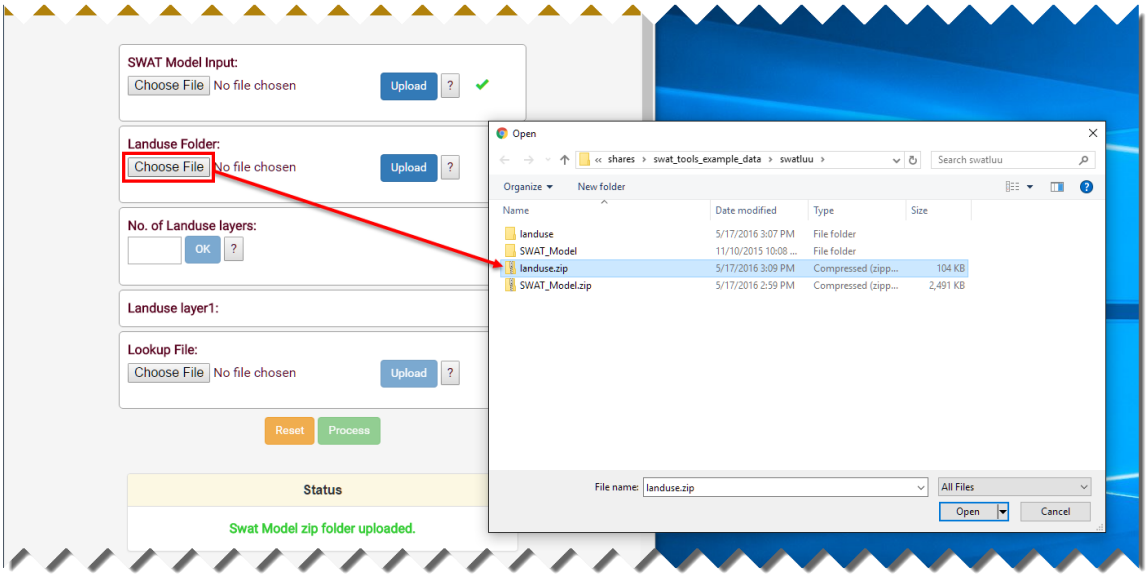
Until you have met both of these criteria, SWAT LUU will prevent you from moving beyond the landuse upload step.

2. Once you have placed your landuse data into a common directory, you will need to zip that directory. You can use any software you like to create the zip file. In Windows 7 and up, you can simply right-click the directory containing the landuse data and then select Send to ->

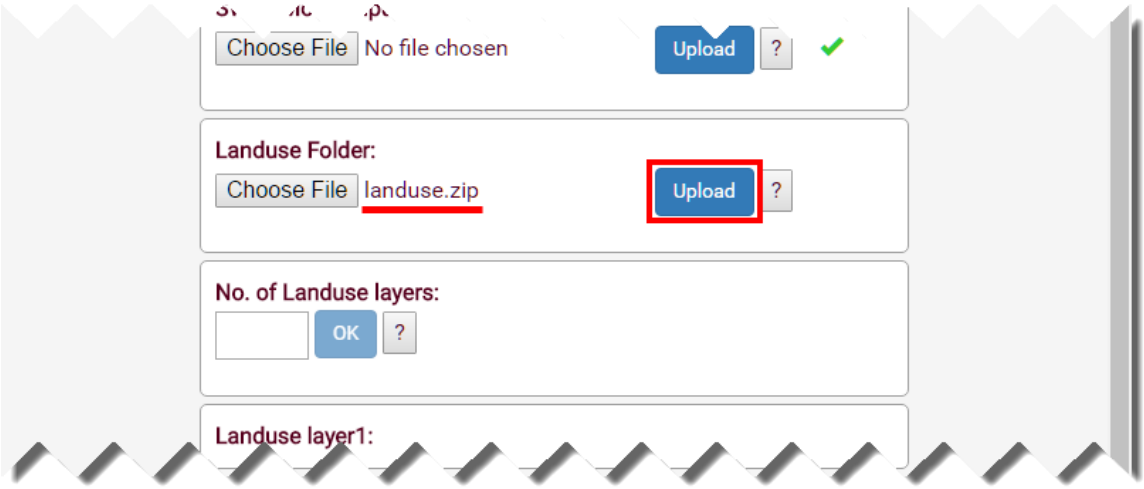
Compressed (zipped) folder in the menu that appears.



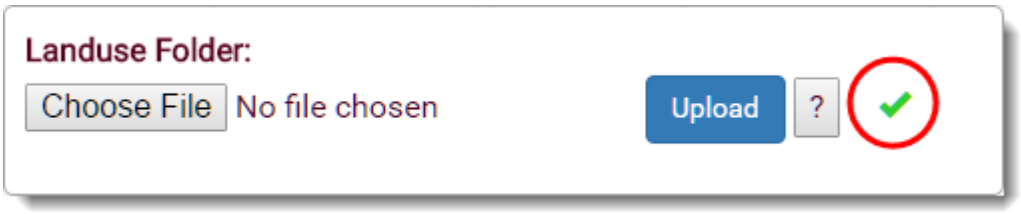
3. Click the **Choose File** button in the **Landuse Folder** section to start the process of uploading your zipped landuse data. Navigate to the location of your zipped landuse data and double-click it, or click it once and click the **Open** button.



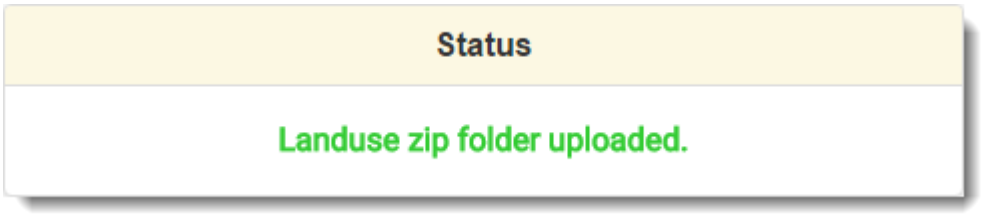
4. After selecting the zipped landuse file, click the **Upload** button.



5. The speed it takes to upload and unzip the file will be dependent on the transfer speed and the size of the file. A green checkmark will appear when the upload has successfully finished.



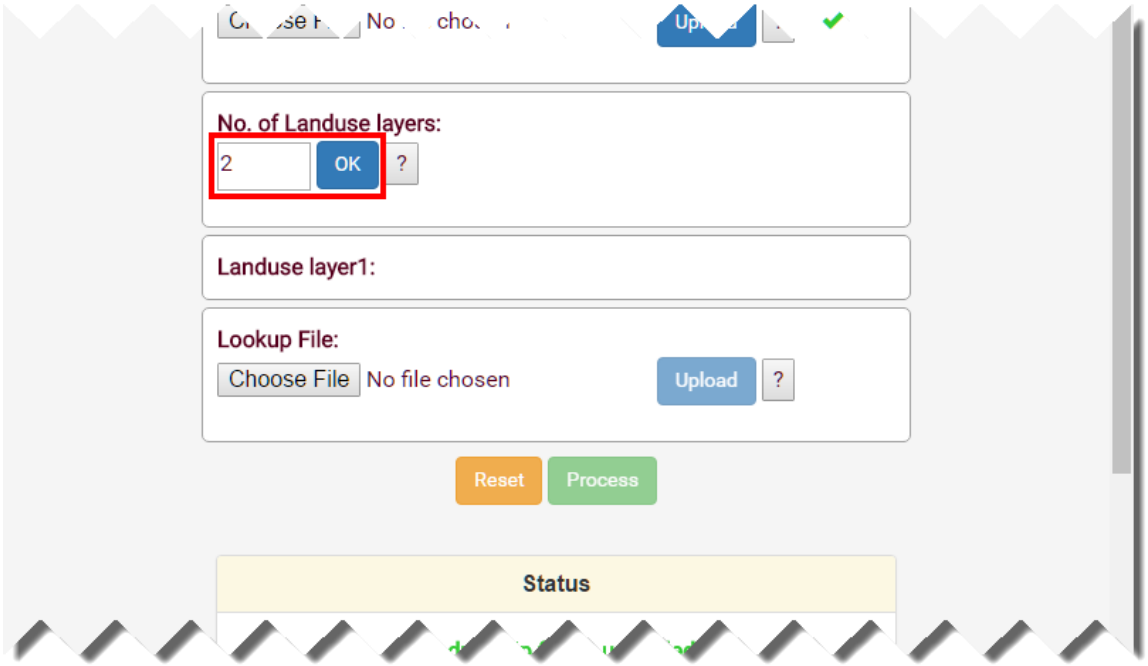
The **Status** frame located at the bottom of the page will be updated with relevant information as you use the tool. If there had been a problem with the landuse data, a message would have appeared in the **Status** frame informing you of the issue.



Step 3 – No. of Landuse layers

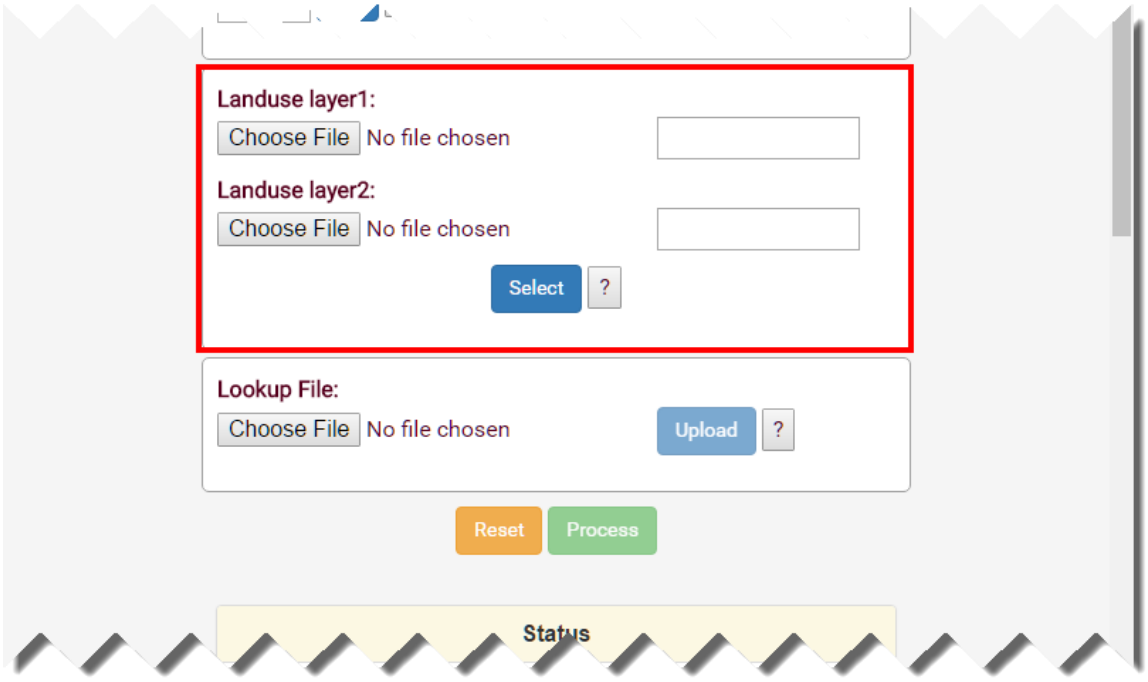
1. For this step you will simply need to enter the number of landuse layers from your uploaded landuse folder that you would like to process. The example data shown in this guide contained two landuse layers, “landuse5” and “landuse8” which means “1” or “2” can be entered in the input box.

Enter the number of landuse layers and click the **OK** button.

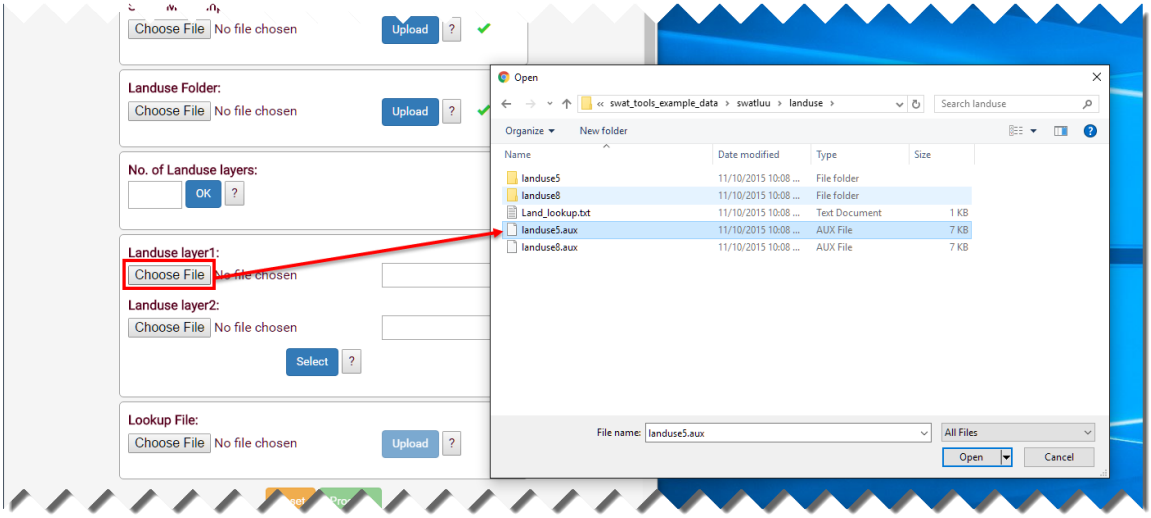


Step 4 – Landuse layer1

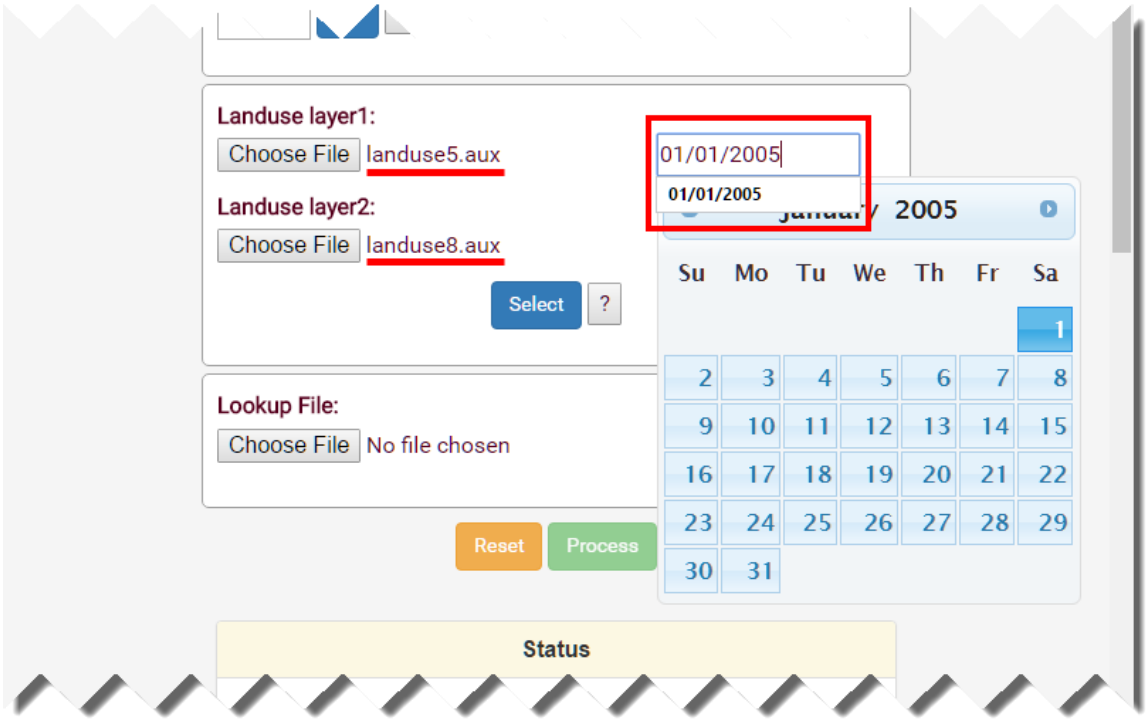
1. In this section you should see **Choose File** buttons matching the number of landuse layers entered in the previous step. For example, if you had two landuse layers there would be two **Choose File** buttons. The buttons would be labeled "Landuse layer1" and "Landuse layer2." There will also be an input box located to the right of each button that allows you to enter the start date for each landuse layer.



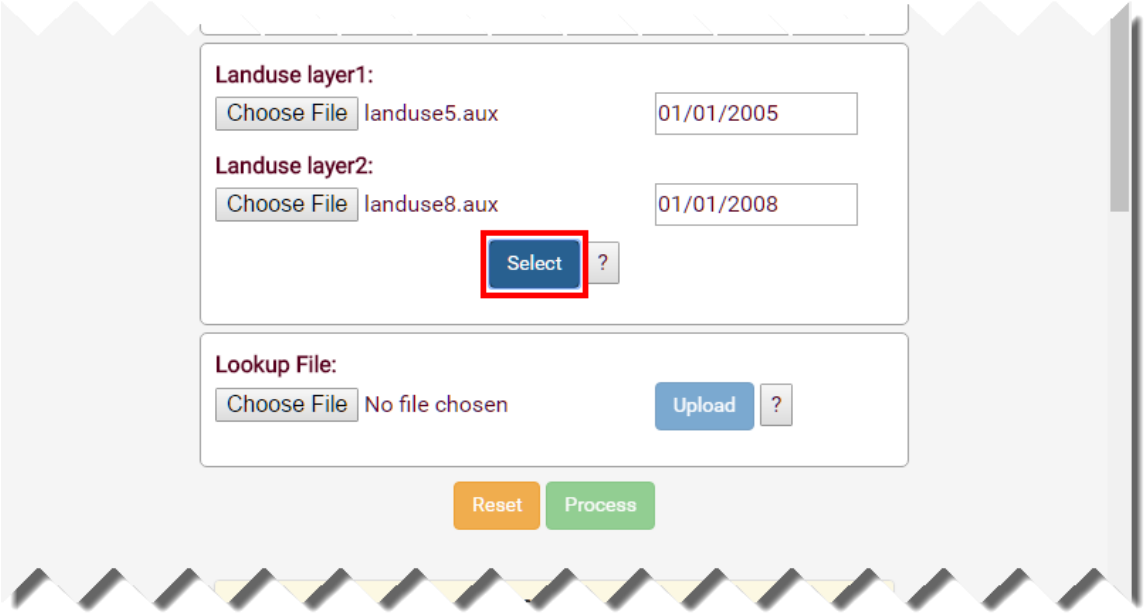
2. Click the **Choose File** button and navigate to the directory containing your landuse data. Either double-click the ".aux" file associated with your first landuse layer or left-click it and then click the **Open** button. Repeat the process for the other landuse layers.



3. After selecting the landuse layers, enter the start date for each layer.

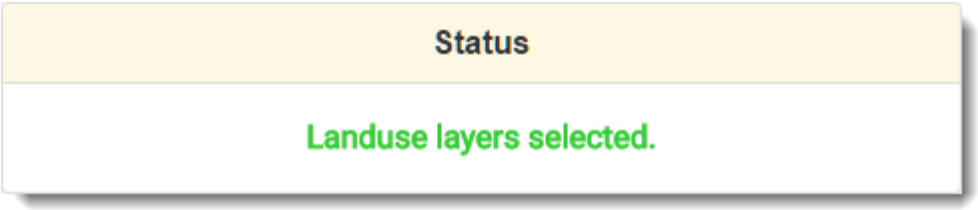


4. Once the landuse layer files have been chosen and the dates entered, click the **Select** button.



5. The **Landuse layer1** section will revert back to its original state after you click the **Select** button. A green checkmark should appear in the **No. of Landuse layers** section indicating you successfully selected the landuse layers.

The **Status** frame will also indicate the landuse layers were successfully selected.

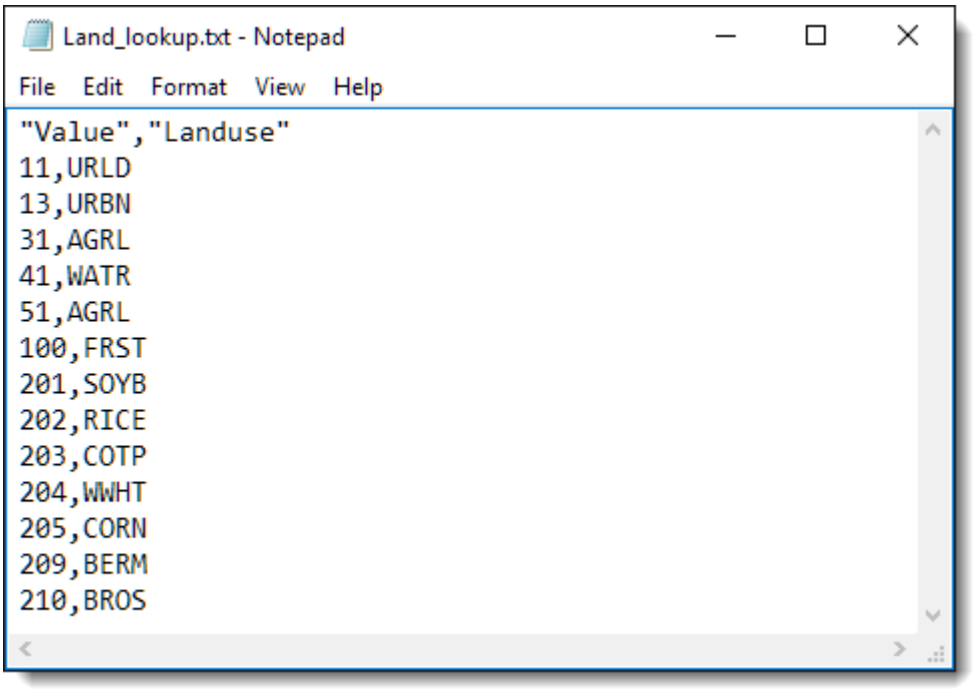


Step 5 – Lookup File

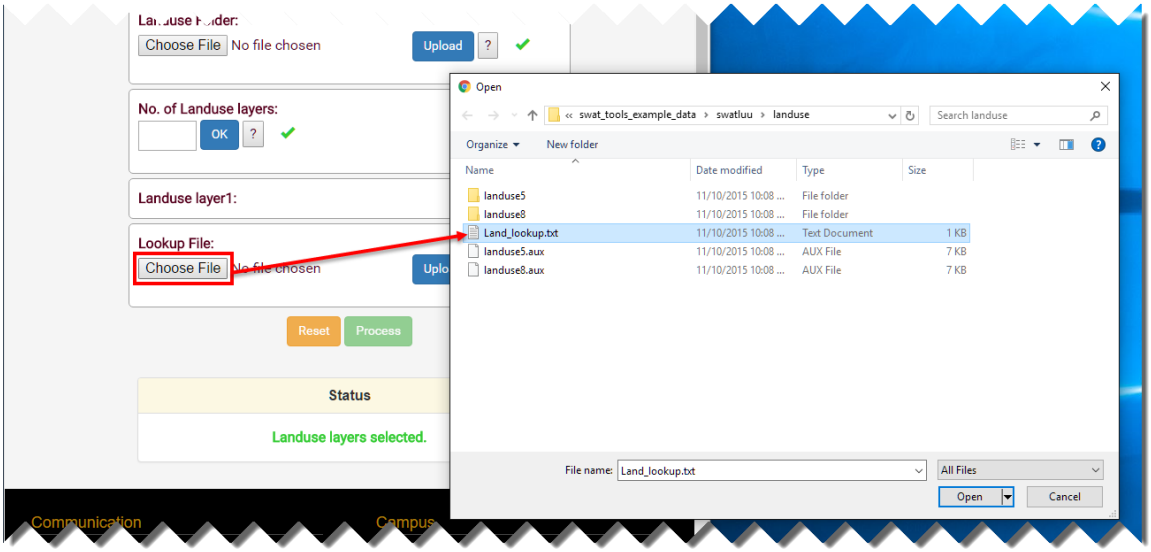
1. The lookup file should be a text file that follows a specific format. It should have the following line as its header: **"Value", "Landuse"**

   The subsequent rows should contain an integer value and landuse description used in your SWAT model separated by a comma. For example, "41,WATR" or "100,FRST" – an example lookup file

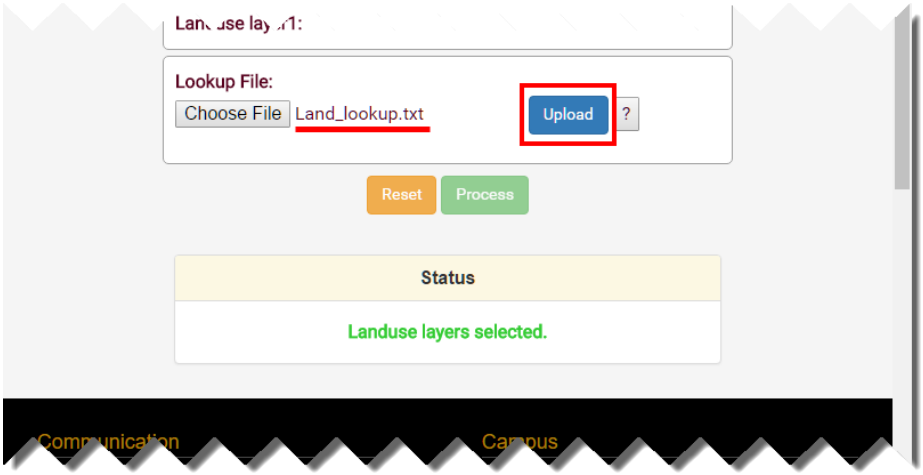
can be seen in the below screenshot:



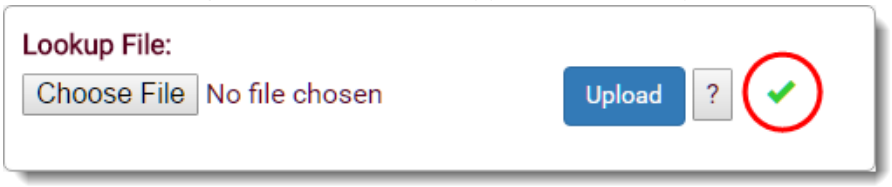
2. Once your lookup file is in the correct format, click the **Choose File** button in the **Lookup File** section to start the process of uploading the lookup file. Navigate to the location of your lookup file and double-click it, or click it once and click the **Open** button.



3. After selecting the lookup file, click the **Upload** button.



4. The speed it takes to upload and unzip the file will be dependent on the transfer speed and the size of the file. A green checkmark will appear when the upload has successfully finished.



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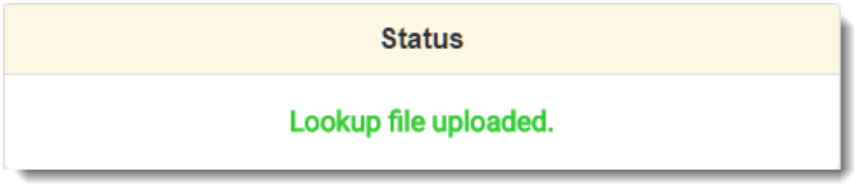
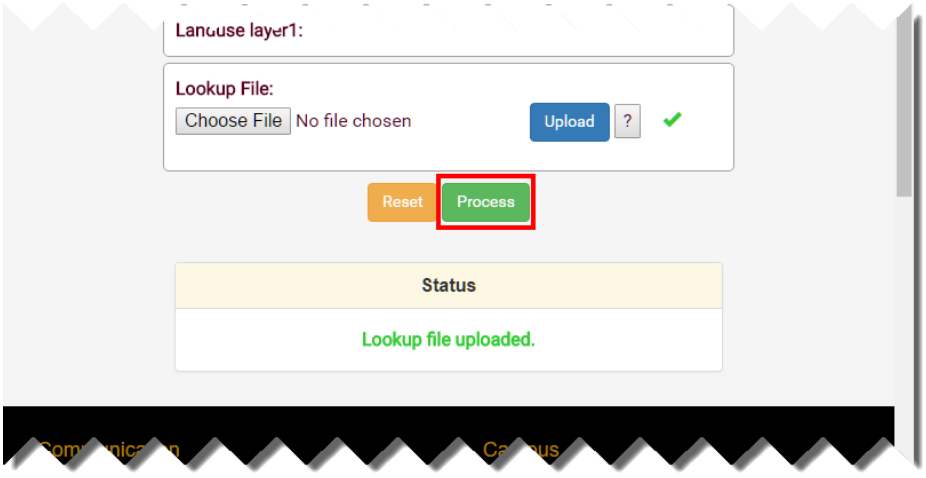
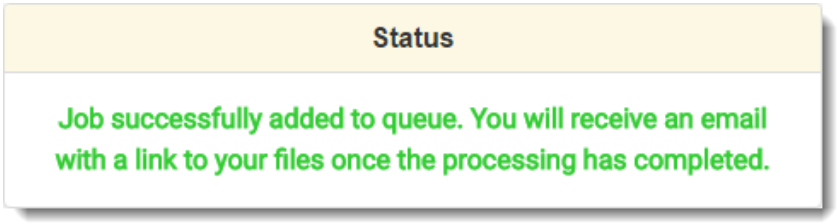


Step 6 – Process

1. Once all of the inputs have been entered, click the **Process** button to submit the job request.



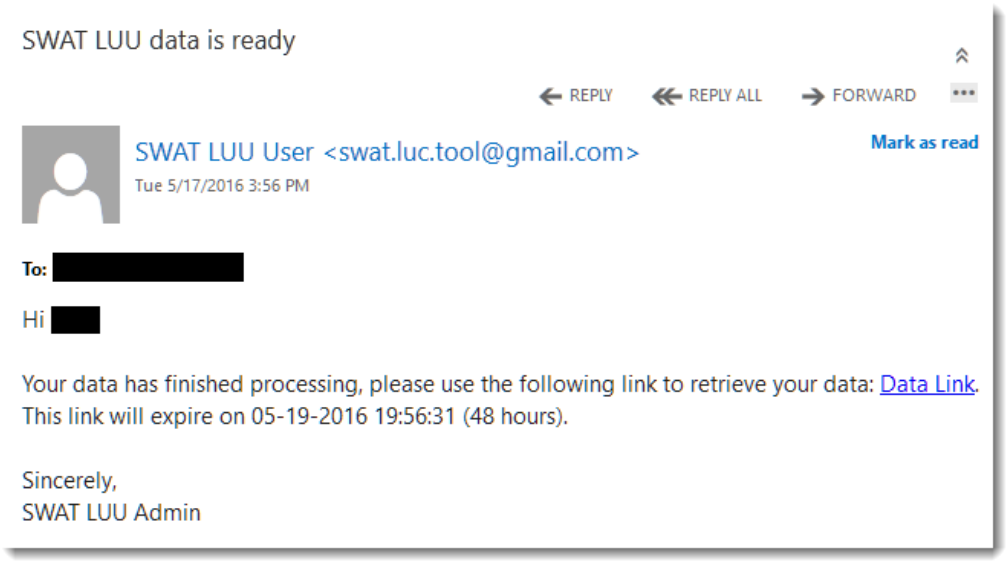
2. Once the job has been successfully added to the queue, the **Status** frame will update to the following message:



At this point you can either click the **Reset** button (clears the form) and start uploading a new dataset or leave the page. When the job has finished running, an email will be sent to you containing a link to your results.

Step 7 – Downloading your data

1. You will receive an email when your data is ready for download. It will look similar to the below screenshot:



2. As indicated by the email message, you will have 48 hours to download your results before the results are permanently deleted. Click the "Data Link" to start the download. If you are not signed in to the site, you will be asked to do so before the download begins.

If you have any questions, please contact us at swat.luc.tool@gmail.com or saraswat@purdue.edu.