

## Landsat Data Processing

### Introduction:

Within ADMS there are different types of data that can be used for site specific field management. Among this data is satellite imagery. Landsat 5, 7, 8 and 9 data is available for download from the USGS and can be utilized for creating management zones.

### Landsat 5 & 7 (TM & ETM+)

- 16 bit images
- Values from 0-65,535
- File sizes – roughly 600 MB to 900 MB per image
- 7 bands of raw data (8 bands - LS7 ETM+)
- 30 meter resolution / band (120 meter on band 6)
- Fairly broad spectrum band widths
- Revisit time—16 days per satellite (same area will be collected)









### Landsat 8 & 9 (OLI/TIRS)

- 16 bit images
- Values from 0-65,535
- File sizes – roughly 920 MB to 1,020 MB per image
- 11 bands of raw data
- 30 meter resolution / band (100 meter on band 10 & 11)
- Tighter band widths per spectrum
- Revisit time—16 days per satellite (8 & 9 are 180 degrees apart, so images every 8 days)

### Processing the Data

Once the xxx.tar files are downloaded. Data structure can make things go easier.

-If downloaded correctly  
They should look like the top .tar file.  
- .txt / .xml / .tif is  
NOT correct.

 LC08_L2SP_030027_20230731_20230805_02_T1.tar	TAR File		989,530 KB
 LC08_L2SP_030027_20230731_20230805_02_T1_MTL.txt	Text Document		16 KB
 LC08_L2SP_030027_20230731_20230805_02_T1_MTL.xml	XML File		23 KB
 LC08_L2SP_030027_20230731_20230805_02_T1_QA_PIXEL.TIF	TIF File		3,527 KB

Suggest saving all the xxx.tar files in the **C:/GKData/Imagery/USGS-Raw** folder. The "USGS-Raw" folder will need to be created.

GK Staff— suggests using ADMS 64 bit version for processing Landsat data.

## Landsat Data Processing—Merging Images

### Merging Landsat Images

Open ADMS 64 bit. Make sure you are in the correct UTM zone for the imagery you are processing.

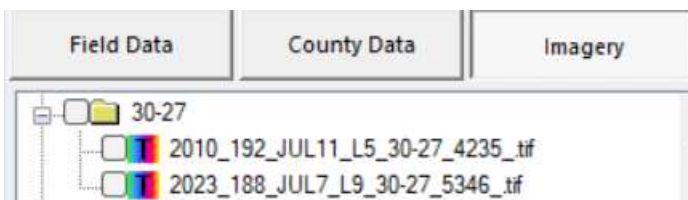
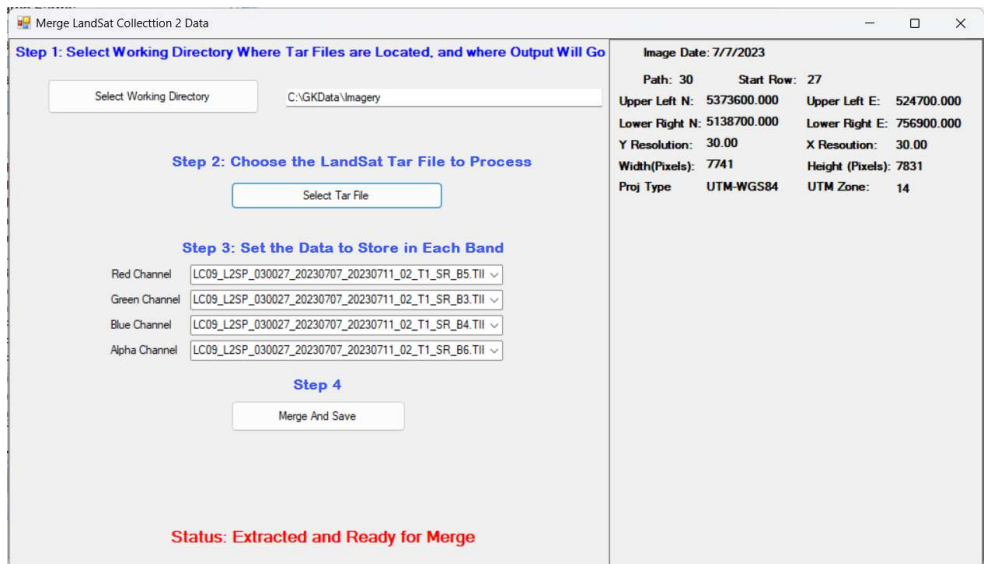
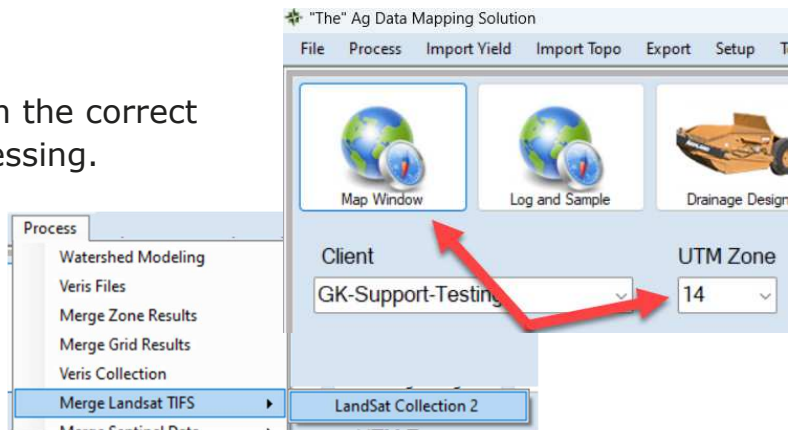
Click on:  
Map Window—go to Process & Merge Landsat TIFS & LandSat Collection 2

1. Choose—Select Working Directory  
-Ex.- C:\GKData\Imagery

2. Select Tar File  
-Having files in USGS-Raw make things move smoothly

Bands auto select  
-NOTES below

3. Click Merge And Save  
-When done the .tar file is automatically moved to a Processed folder in Working Directory



ADMS will create a Path Row folder (Ex. 30-27) and store the images .tif in that location. Files are ready to be used, clipped or reprojected as needed.

### Landsat 8 & 9 (5,3,4,6)



### Landsat 5 & 7 (4,2,3,5)



\*NOTE: It is recommended saving the original .tar file. This will always allow you to go back and make new band combinations if new processes come along.

## Landsat Data Processing—Cutting Images by Shapefile



### Introduction:

Due to the fact that Landsat scenes are very large files (~200 MB, and 120 Miles<sup>2</sup>), it is helpful to manage them on a smaller scale. This is most often done on a county basis similar to the county data. However, do not confuse the two.

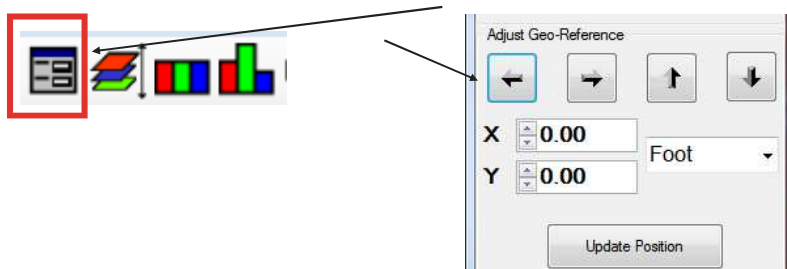
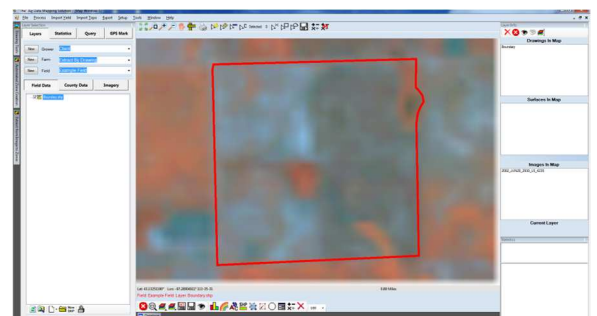
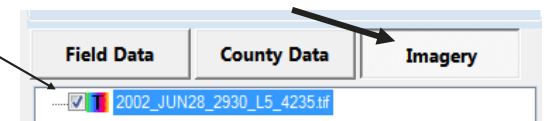
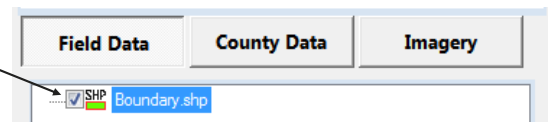
There are several advantages to doing it this way:

1. It allows the software to handle more images being loaded at once.
2. Images can be managed on a county by county basis.
3. Landsat scenes that overlap UTM zones can be easily re-projected so image processing is more consistent.

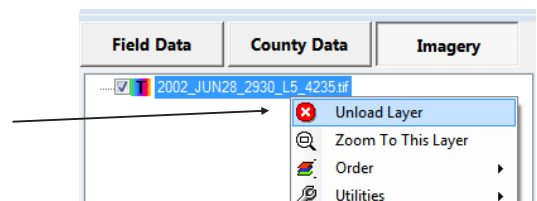
### Preparing the Data For Clipping

This is a very important step in this process. Each of the Landsat scenes are saved as GeoTiffs after they are merged together. Each file will have to have it's location updated and re-saved. This is done to each scene individually.

1. Make sure the imagery folder is set in the correct directory. (Settings, Browse to Folder)
2. Open up the map window. (Make sure the correct UTM zone is selected)
3. Turn on a boundary that is located in the scene.
4. Select the "Imagery" tab.
5. Turn on the Landsat scene that is going to be clipped.
6. The Landsat scene and boundary should be close to lining up with each other.
7. With the TIF file being the active layer, adjust the image according to the field boundary. Do this with the arrows located in "Image Properties."



8. When the image lines up close to the boundary, click "**Update Position**" This will save and update coordinates of the GeoTiff.
9. If more images will need clipping, right click on the current TIF file and select unload layer. Repeat the process for any additional images.

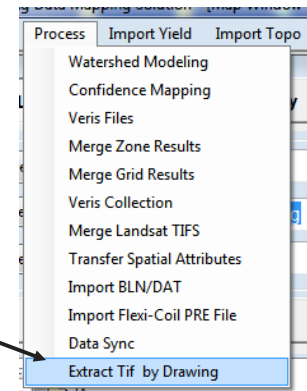
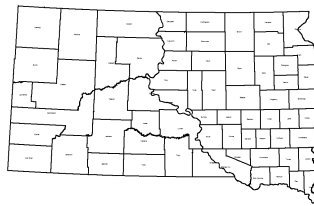
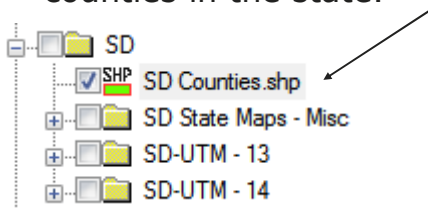


## Landsat Data Processing—Cutting Images by Shapefile



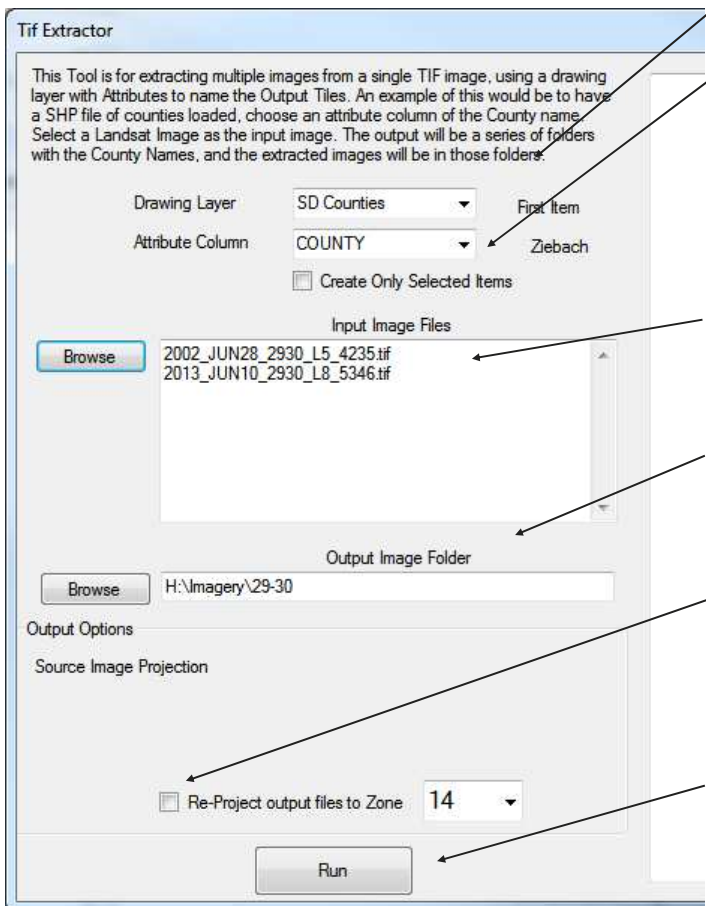
After all the images have had their coordinates updated, the tiff extractor utility may be used to clip them to a shape file. (This example will use a county shape file. Refer to downloading instructions to get it.)

1. Open the Map Window.
2. From the county data, select a shape file of the entire state containing all the counties in the state.



3. From the top of the screen, select "Process" and "Extract Tif by Drawing."
4. The tif extractor tool will open. This utility will clip the Landsat scene by the shape file that is loaded. Additionally, it will create a folder structure which is named by the database column that is selected.

5. Select the drawing layer that will be used for clipping.



6. Select the database column to which the output folder(s) will be named. (*So with the attribute column selected as "COUNTY" it will create a folder for each county that the Landsat TIF covers and put it in that folder*).

7. Browse to the folder containing the images, select either one or multiple files. Click OK.

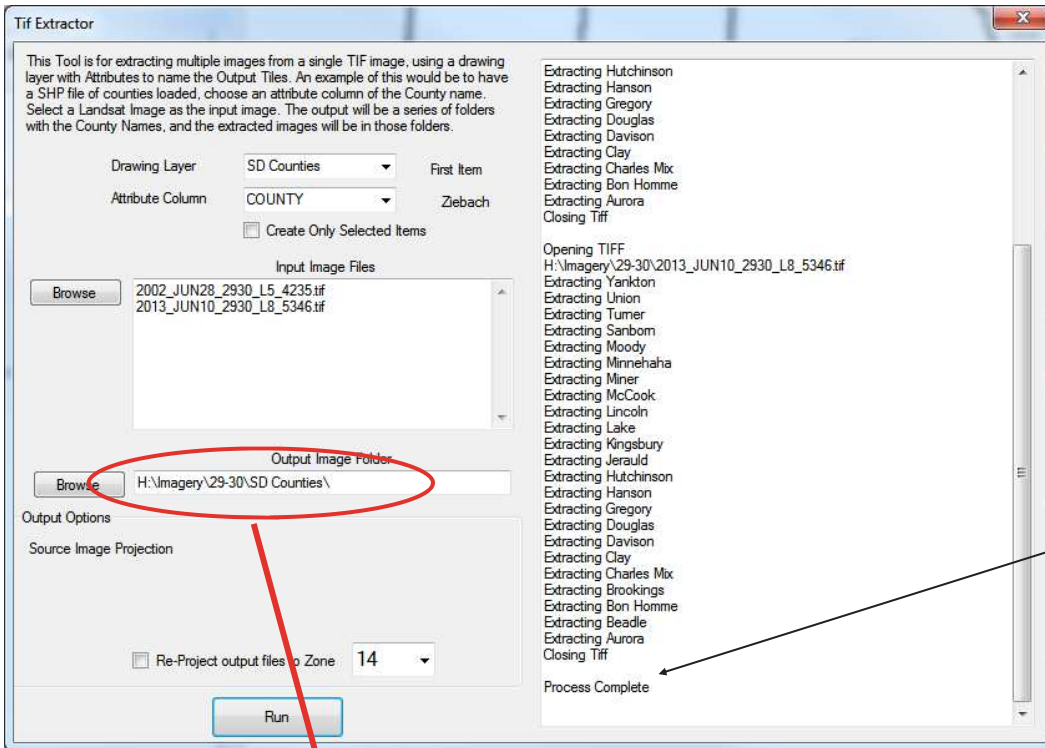
8. Browse to the Output Image Folder. (*This is where all the clipped images will be saved.*)

9. The desired output files may be re-projected to a different UTM zone. To do this, put a check by "Re-Project output files to Zone" and select the desired UTM zone.

10. Click "Run."

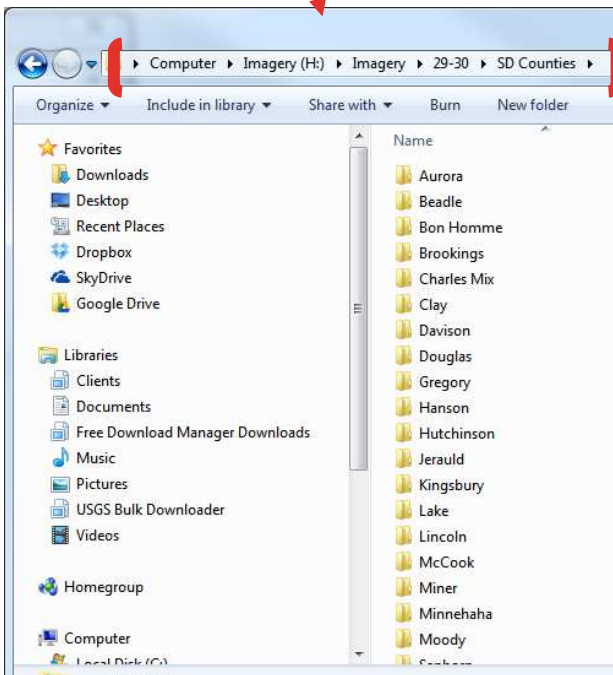
11. This utility will cycle through each image, create a folder for each county that it covers, and save it in the selected output directory. The progress will be indicated on the right side of the window.

# Landsat Data Processing—Cutting Images by Shapefile



The extractor utility will cut an image out for each county that the Landsat scene covers and then creates and places them in a folder structure.

When all the files are finished being processed, "Process Complete" will be displayed at the bottom of the window.



A file structure will appear in the directory that the output image folder was pointed at. Inside each of the counties will have a folder containing the extracted Landsat tiff images.

**Additional Notes:**

If only certain areas need to be processed, the function "Create Only Selected Items" can be used.

To utilize this function, the polygon(s) must first be selected before the Tif Extractor is opened.

1. With the polygon as the active layer, use the selection tools on the top toolbar.
2. Select the polygons to be extracted.
3. Open the Tif Extractor
4. Follow the process above and put a check in "Create Only Selected Items."

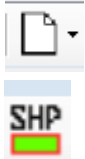
## Landsat Data Processing—Cutting to Trade Territory



As stated earlier, this process can be used with any shape file, not just a county file. Often there is not just a single county that is covered in a trade territory. Therefore, a custom polygon can be made to cover a multi county region, or an irregular area.

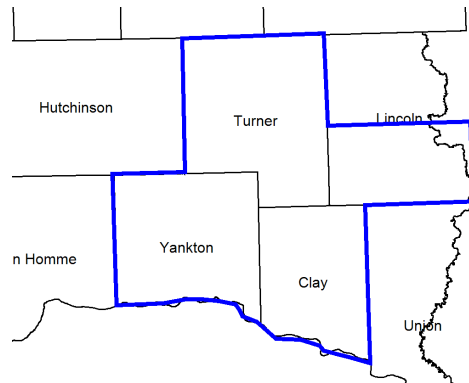
For this example, a county file will be used as a guide to draw the custom polygon.

1. Turn on a county file so all the counties are visible.
2. From the bottom toolbar below the layer selection window, select "Create a New Layer From Template." Select Boundary.
3. With the new boundary file checked on and set as the active layer, select "Draw a New Object" on the bottom toolbar.
4. Using the county file as a guide, draw a polygon that covers the desired area.

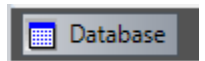


Example: I am an agronomist that covers Clay, Yankton, Turner, and the South Half of Lincoln Counties in SE SD.

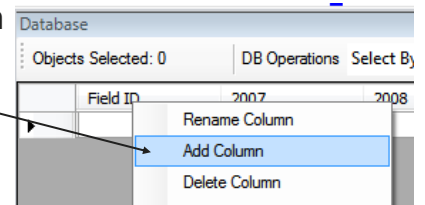
A polygon is created to represent the area covered. The Landsat scenes will be cut out to the specified area. (Represented in blue)



5. A column must be created and named in the database of the newly created shape file. This will tell the Tif Extractor how to name the output folder when the Landsat scenes are extracted.

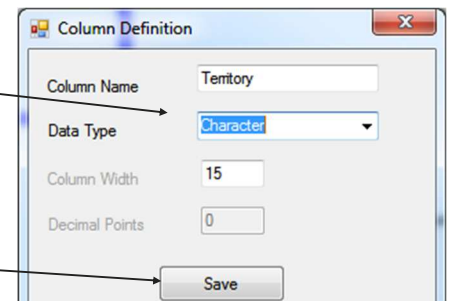


6. With the newly created shape file as the *Active Layer*, open the database tab on the bottom of the map window.



7. With the database open, right click on any column header and select "Add Column."

8. A column name will need to be entered, data type will be **Character**.

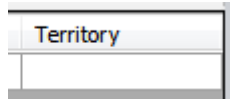


9. When the new column name is entered and data type is selected, click **Save**.

## Landsat Data Processing—Cutting to Trade Territory



10. After clicking Save, a new column with the entered name will appear in the database.



A name will have be entered in the column to define the output folder.

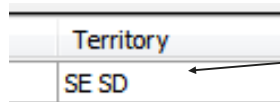
11. Double Click in the cell under the new column (Territory). This will allow for a name to be typed in.

12. Type the desired name, but keep it shorter than 15 characters. Hit the enter key on the keyboard and save the shape file.



13. A shape file will exist that:

1. Defines a specified area.
2. Has a character column added.



The output folder will be named SE SD.

3. A name will be in the character column under 15 characters. This will define the output folder.

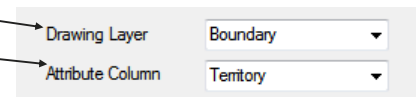
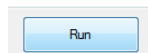
14. With the new shape file turned on, open the Tif Extractor.

15. Select the new boundary as the **Drawing Layer** and the newly created column as the **Attribute Column**.

16. Browse to the Landsat scenes that will be extracted.

17. Browse to the Output Folder.

18. Select "Run"



19. A folder will be created in the Output Folder with the name entered in the database column.



20. When the images are turned on, they will cover the specified area as long as it is part of the Landsat scene.

