**Title: Introduction to EARDAS IMAGINE**

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**Objectives**: This exercise is designed to introduce students 1) how to prepare an image for Chemung County, Elmira, NY using one Landsat scene downloaded from USGS Global Visualization Viewer (<http://glovis.usgs.gov/>); and 2) how to display and acquire basic image information with Erdas Imagine.

**Total Possible points**: 50.

**Part I: Image Preparation**

1. **Understand Landsat images downloaded from the Internet**

In Lab 1, you have learned that USGS provides all archived Landsat scenes at NO charge to all users. To save your time, one Landsat scene covering northern PA and southern NY has been downloaded and it is available in G:\Remote Sensing\Data as a .tar zip file named “LT50160312002216EDC01”. You are asked to use the data contained in the zip file to finish the whole lab.

1. On the **C** drive, create a folder with your name as the folder name (e.g., C:\Bliang\Lab3). Next, Go to **My Computer** to access **G** Drive – **Remote Sensin**g – **Data**. Copy ALL files to your folder on the **C** drive**.**

**\*\*\* Important to remember**: for the whole semester, when you are working on the lab, you are asked to put the data on the C drive. However, you are also asked to back up your data on the G drive (you can create a folder with your name as the folder name on the G drive) or your personal flash drive before you leave the classroom, ALWAYS!!! Since all computers in the lab will be rebooted **EVERY** day to their original **CLEAN** state, it is extremely important you have backed up your data. For some labs, you may need to use the data created early by yourself.

1. Right click on the zip file that has been copied to the C drive, select **7-zip** – **Extract to “LT5016031200**

**2216EDC01\”**. A new folder contained all the unzip files appears in your folder with exactly the same name as the zip file. Open that folder, you will see seven .TIF files, two .txt files, and one .GTF file, and all of them are for just one Landsat scene.

1. To get some ideas of the function of these files, right click **README.GTF** – **OPEN**. In the new window, click **Select the program from a list**, then select **Microsoft Office Word** in the **Open With** window – **OK**. Click **OK** again in the popup **File Converstion-README.GIT** window. The README file is thus opened in the *Word*.
2. Read the **README** file in *Word* and answer question 1:

*Question 1*: Use the information provided in README to fill the following table: (6 points)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Satellite name: |  | Sensor name: |  | Path #: |  |
| Rows #: |  | Acquisition date: |  | # of Image Bands: |  |

1. **Getting to Know Erdas Imagine**

For the rest of this semester, we will be using **Erdas Imagine**, the most advanced image processing software, to view, alter, analyze, and export digital images.

1. To launch this software, go to **Start** and click **ERDAS IMAGINE 9.3** on the top. Wait for a second until the **ERDAS IMAGINE 9.3** icon panel appears along the top of the monitor screen. Click **OK** from the popup window asking “**Select Viewer Type**” to bring out the first Viewer window - “**Viewer #1**”.
2. Examine the options on the icon panel along the top of the screen. These icons represent the various components and add-on modules purchased with the system. You have the option of displaying the icon panel horizontally on the top of the screen or vertically down the left side of the screen using the **Session**– **File** **Icons** menu item.
3. Familiarize yourself with the five menus located along the top of the icon panel in the left corner: **Session, Main, Tools, Utilities,** and **Help**.
4. **Session**: controls many of the session settings such as user preferences and configuration.
5. **Main**: allows access to all the modules located along the icon panel. The modules we will use the most for this semester are **Viewers**, **Import**, **DataPrep**, **Interpretaer**, and **Classifier**.
6. **Tools**: allows you to display and edit annotation, image, and vector information, access surface draping capabilities, manage post script and true type fonts, convert coordinates, and view Erdas macro language (EML) script files.
7. **Utilities**: allows access to a variety of compression and conversion algorithms including JPEG, ASCII, image to annotation, and annotation to raster.
8. **Help**: brings up the online help documentation as well as icon panel and version information.

**3. Image imported to Erdas Imagine**

1. To better make use of Erdas Imagine for images processing, you need to make sure the images on hand are in the default **Files of type** specified as Imagine Image (\***.img**). However, the Landst data provided are in TIFF format (.TIF). Hence, it is needed to convert the TIFF files into Imagine Image files. To do so, we will use the **Import** module.
2. Click the **Import** icon from the top icon panel, a **Import/Export** window will pop up. In that window, click **Import**. Next, for **Type:**,select **TIFF (Direct Read)**; for **Media:**, select **File** from the corresponding drop-down menu.
3. On the window left, look for **Input File:** and click the **Open file** icon to bring the **Input File:** window. At the bottom of this window, make sure the **Files of type:** is set to **TIFF**. The icon next to the drop-down menu  allows you to change the file type.
4. Navigate the data directory to where you store your data (e.g. C:\Bliang\Lab3\ Lt50160312002216edc

01.tar\ LT50160312002216EDC01) and locate all the TIFF files. Click on the first TIFF file (should be **L5016031\_03120020804\_b10.TIF**), then **OK**, which brings you back to the **Import/Export** window.

5) On the window right look for **Output File: (\*.img)**. You now see the output image is automatically named the same as the input image. Move your mouse to the **Open file** icon  next to it, wait for a few seconds and a message will pop up showing where your output will be stored (e.g., C:/users/ l5016031\_031200208

04\_b10.img).

1. By default, all the data are stored at C:/users. However, you are asked to place all your outputs to your own folder on the C drive. Click on the **Open file** icon  and a **Output Files** window pops up. Click the drop-down menu of **Look in:**, select **(C:)** and double click your folder.
2. On the bottom of the window, type **B1** next to **File name:** and hit ENTER, you then see the IMAGINE Image extension **.img** is added behind **B1** you just type. Click **OK** to bring you back to the Import/Export window. Click **OK** and **OK**, a new **Importing TIFF Data** window pops up, illustrating the progress of the task. Click **OK** to close this window when progress completes.
3. Let the **Import/Export** window remain open, repeat steps 3) – 5) to convert the TIFF files for Bands 2 – 5, and 7 as **.img** files and name them ***B2***, ***B3***, and ***B4*** so on accordingly. When you are done, click **Close** to close the **Import/Export** window.

**Part II: Image Analysis in Erdas Imagine**

1. **Image display**

Now you are ready to display the first image.

1. Move your mouse to the viewer window – “**Viewer #1**” that was opened right after you launch the software early. If you accidently close it before, click the **Viewer** Icon  from the ERDAS Imagine Icon Panel to get a new view window. Click “**File – Open – Raster Layer**” from **Viewer #1** to bring out a popup window “**Select Layer To Add**” (this can also be done by typing **Ctrl R** or clicking the **Open Layer** icon).
2. The “**Select Layer To Add**” popup window contains three tabs and the first tab– “**File**” is activated. Choose **C** drive from the “**Look in**” drop-down list. If you still do not see the correct image file, you are either not looking in the correct directory or you do not have the **Files of type** (on the bottom of the **File** tab) specified as **IMAGINE Image (\*.img)**.
3. Navigate the data directory to where you store your .img data (e.g. C:\Bliang\Lab3) and locate and then click on the **B1.img**. The image will appear in the **Viewer**. Right click the mouse within the **Viewer**, and select **Fit Image to Window** in the popup menu. You are able to see the entire black-and-white B1 image displaying in the Viewer window now.
4. To find out additional information about this image, click the **ImageInfo** icon  on the menu bar. The **ImageInfo** dialog appears. This dialog enables you to view and edit many elements of an image file (.img).
5. The **General** Tab in the **ImageInfo** dialog contains basic information about this image. Read the information carefully and answer Questions 2- 6 below. If you cannot understand what these parameters mean for your image, click **Help** on the menu and read the information in the popup window.
6. Examine other Tabs in the **ImageInfo** dialog. The **Projection** Tab displays the projection information if it is added to the image. The **Histogram** Tab shows the image histogram. The last tab, **Pixel Data**, contains a table showing all the digital pixel values for the current image.
7. To exit the **ImageInfor** dialog box, choose **Close** under the **File** drop-down menu or click  directly and return to the **Viewer #1** window.
8. To remove the image displayed in the **Viewer**, click **Clear** from **File** drop-down menu in that **Viewer** or simply click on the **Eraser** icon .

*Question 2:* What is the **Data Type** for this image? (1 points)

*Question 3:* What is the **Pixel Size** in the X and Y direction? (2 points)

*Question 4*: What are the **Units** of measurement? (1 point)

*Question 5*: What is the image **georeferenced** to? (3 points)

*Question 6*: What are the **Max** and **Min** digital values indicated in the **Statistics Info?** (2 points)

1. Repeat steps 1) – 8) to display your B2 – B4 images in the **Viewer #1** window and answer Questions 7 – 8.

*Question 7*: Name these spectral bands and specify the bandwidth for each: (24 points)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bands** | **Name of Bands** | **Bandwidth/**  **Wavelength Range** | **Radiometric Resolution** | **Spatial Resolution** |
| Band 1 |  |  |  |  |
| Band 2 |  |  |  |  |
| Band 3 |  |  |  |  |
| Band 4 |  |  |  |  |
| Band 5 |  |  |  |  |
| Band 7 |  |  |  |  |

*Question 8*: What are the **Max** and **Min** digital values for the **green**, **red**, and **NIR** bands? (6 points)

|  |  |  |  |
| --- | --- | --- | --- |
| **Bands** | **Green** | **Red** | **NIR** |
| **Max** |  |  |  |
| **Min** |  |  |  |

1. **Layer stacking**

As you may realize the **Landsat** image on hand is offered as individual bands and all bands cover almost exactly the same area on the ground. This is true for all satellite images. However, color images rather than single B/W ones are always preferred for better image interpretation. To do so, it is necessary to have at least three images combined together.

Layer Stacking is a procedure that takes individual bands or layers of an image and stacks them on top of each other to produce a single multi-band image. The order in which you enter/add the individual bands to the layer stack is important. The first layer added will be band 1 in the resulting image. The second layer will become band 2, and so forth. Thus, if you are dealing with a Landsat image, for example, the band containing the blue visible light (normally band 1) must be the first layer entered into the layer stack. The green visible light band must be the second layer entered, and so forth.

1. To start the Layer Stacking procedure, click on the **Interpreter** icon, then select **Utilities** – **Layer Stack.** A **Layer Selection and Stacking** window appears.
2. Start adding the layers to the stack. Navigate to the folder containing the files and select the first layer to be entered into the stack. Select the first band **B1.img** and click **Add**. You will notice that the first layer was added into the stack list.
3. Repeat the procedure and add the rest six bands in the sequences of B2, B3, B4, B5, and B7.When you finish, you need to name the output file as ***stack\_123457.img*** and save it to your folder. Click **OK** toexecutethefunction.
4. After the procedure has finished running, open the new image in **Viewer #1** window to ensure everything works. As you are doing it, on the **Select Layer to Add:** window, do NOT click **OK** on the right side after you click the image file ***stack\_123457.im****g*, since you need to assign the spectral bands of the image to the color planes Red, Green, and Blue (RGB).
5. Click on the **Raster Options** tab and assign Band **4** to **Red**, Band **3** to **Green**, and Band **2** to **Blue**. Make sure that the **Display as:** option is set to **True Color**. You can also choose to let the image fit to the **Viewer** frame by checking the small box next to **Fit to Frame**. Click **OK** and now you are ready to examine the Landsat scene with colors. However, the analysis seems a little hard to get started as with the full extent, the image scale is too large (area coverage is 185x185km2) to show the details. As a result, it is recommended to focus on just a small part of the image.
6. **Create a image subset for Chemung County, Elmira, NY**

In most cases, we usually work on just a portion of the area covered by one Landsat scene. In this task we will prepare a subset of the image for Chemung County, Elmira, NY.

1. Open a new **Viewer** (**Viewer #2**). Click **File** – **Open** – **Vector Layer**. A **Select Layer To Add** dialog displays. Navigate to your folder. Change the **Files of type** to **Shapefile (\*.shp)** and you will see a file named **Elmira.shp** (This is a GIS data illustrating the boundaries of Chemung County and we will use this data to clip the stacked image). Click the **Elmira.shp** and **Ok**. The country boundary displays in the viewer.
2. With your mouse cursor, click once inside the polygon to selects it (indicated by the yellow color).
3. From the menu of **Viewer #2**, click **AOI** – **Copy Selection to AOI**. You will notice the yellow polygon is circled by dash lines.
4. From the menu bar, click **File** – **Save** – **AOI Layer As**. A **Save AOI As** dialog displays. Navigate it to your folder on the **C** drive. Type ***county\_bndy*** as the file name and click **OK** twice. Close the **Viewer #2** window.
5. Move your mouse back to **Viewer #1** with the stacked image opened. From the menu, click **File** – **Open** – **AOI Layer**. A **Select Layer To Add dialog** displays. Navigate to your folder and select **county\_bndy.aoi** and click **OK**. You will see the AOI layer displays on top of the image. Click inside the AOI layer to active it.
6. From the Erdas Imagine icon panel, click the **DataPrep** icon. From the **Data Preparation** dialog that opens, select **Subset Image**.
7. In the **Subset** dialog **Input File** textbox, browse to your folder and select the **stack\_123457.img**.
8. In the **Output File** textbox, browse to your folder and name your output image as **yourlastname\_**

**Elmira.img**. Click **OK** twice for the name to be accepted. **(Note: You will need this data for future labs, so make sure you save it in a safe place.)**

1. Back in the **Subset** dialog, accept all defaults and click on the **AOI** button located along the bottom of the dialog window. In the **Choose AOI** dialogthat pops up, select the **Viewer** button. Click **OK** to dismiss the **Choose AOI** dialog. Now click **OK** in the **Subset** dialog, and the process of clipping the Landsat image will begin.
2. Once the process completes, click the **OK** button to dismiss the **Modeler** status box.
3. Open the subset image in a new Viewer. From the menu of viewer displaying the subset image, click **File** – **Print**. A **Print** dialog displays.
4. Select **Portrait** as **Map Template** then click **OK**.
5. A **Print Map Composition** dialog displays. In the **Print Destination**, select the **Adobe PDF** and then click **OK**. Save your PDF file in your folder. (5 points)

When you are done, follow the directions listed below to end an IMAGEING session.

* Close all the Viewers as well as the **ERDAS IMAGINE 9.3** icon panel
* Click **Yes** when asking **Are you sure you want to quit IMAGINE?**
* Chose **No** when asking **Do you want to print the Log File?**
* Back up all your data to your **flash drive** or your folder on the **G** **drive**.

Note: part of this lab is adopted from the Erdas Imagine User Manual.