GEO 826 Lab 2

Obtaining Aerial Imagery

Because you are expected to have a sufficient background in remote sensing I expect that you have a strong background in the use of popular products, such as Landsat. Instead of using these coarser image products, for this class it is more useful to utilize high-resolution images. While you can use any imagery you like for your final project, the tutorials will be conducted using aerial imagery.

The main geospatial product that we will use in this course is aerial imagery produced by the USDA National Aerial Imagery Program. This imagery is useful for exploring the process of GEOBIA for three reasons, (1) it is freely available for all 50 states, (2) it has a high spatial resolution (between 4-2m depending on the date of capture), and (3) more recent imagery includes for spectral bands- Red, Near Infrared, Green and Blue.

In this first lab you will learn how to use USGS Earth Explorer. The Earth Explorer web portal provides researchers with free access to many different geospatial products, including many historical products. It can be a great resource for change analysis.

Learning Objectives

- Obtain and investigate the metadata for a NAIP imagery product via Earth Explorer
- Display and manipulate a multispectral NAIP image using Python
- Understand the history of the aerial photography programs in the US

NAIP and other aerial imaging programs in the U.S.

Aerial photography was first carried out by the Farm Security Agency (FSA), capturing the earliest image in 1937. A variety of programs exist through the US government for the capture of aerial imagery. The National Digital Orthophoto Program (NDOP) is a consortium of federal and civil agencies that coordinates the capture of such imagery.

The first program, National High-Altitude Photography (NHAP) program was developed in 1978, Through this program, imagery was captured at scales of 1:80,000 (panchromatic) and 1:58,000 (color infrared).

The next evolution of aerial photography was the National Aerial Photography Program (NAPP) program. This program began in 1987. Imagery captured at a scale of 1:40,000 in either panchormatic or color infrared imagery. Complete coverage of the lower 48 states was intended at a cycle of 5 to 7 years.

The National Aerial Imaging Program (NAIP) was established in order to capture images during the agricultural growing season for the lower 48 states. Beginning in 2003, imagery was acquired at 5 year intervals, however, this was improved in 200 to three year intervals and

The tiling format of the NAIP imagery is based on a 3.75' x 3.75' quarter quadrangle (based on the USGS topo quads) with a 300 pixel buffer on all four sides. NAIP quarter quads are formatted to the UTM coordinate system using the North American Datum of 1983. NAIP imagery may contain as much as 10% cloud cover per tile.

EARTH EXPLORER

The USGS Earth Explorer portal is one of the most useful places for gathering geospatial data about the United States. The basic steps for acquiring data through this web portal are to identify your location of interest, set the date range that you are interested in, determine the data set that fits your need, and then filter the results. You can then login and download or order the data you request.

Demonstration

1. Navigate to Earth Explorer at https://earthexplorer.usgs.gov/
2. In order to download images you will need to create an account. You can do this through the link at the top right of the window.
3. Under Search Criteria, input New York, NY Feature Name. Click on the link that results. You will see a point marker pop up on the map.
4. Set the date range for your search. You should use June 1, 2020 as the start date and August 31, 2021 as the end date.
5. Click on the “Data Sets” button at the bottom of the window.
6. Scroll through the list of data sets available.
    a. You will find the NAIP imagery set under Aerial Images.
7. To download, click on the download button next to the most recent image.
    a. the image you will need to download the full resolution image.

On your own

1. Using Earth Explorer, download a NAIP image for the location Sleepy Hollow, Illinois (Populated Place) taken in 2019. When you do the search for this location, note that you will need to just enter “Sleepy Hollow” and choose from the list of available places. For some reason, it is not recognized when entered as “Sleepy Hollow, IL” directly.
2. Write a brief paragraph about the metadata (capture date, etc.) and resolutions (spatial, temporal, spectral, and radiometric) for this image.
3. Add a screen capture of the image and this writeup and upload it to the form.