THE GEO PROJECT
GEOSPATIAL EDUCATION & OUTREACH

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GEO Tutorial

HOW TO CUSTOM DOWNLOAD A DEM

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The Geospatial Education and Outreach Project (GEO Project) is a collaborative effort among the Geosystems Research Institute (GRI), the Northern Gulf Institute (a NOAA Cooperative Institute), and the Mississippi State University Extension Service. The purpose of the project is to serve as the primary source for geospatial education and technical information for Mississippi.

The GEO Project provides training and technical assistance in the use, application, and implementation of geographic information systems (GIS), remote sensing, and global positioning systems for the geospatial community of Mississippi. The purpose of the GEO Tutorial series is to support educational project activities and enhance geospatial workshops offered by the GEO Project. Each tutorial provides practical solutions and instructions to solve a particular GIS challenge.

HOW TO CUSTOM DOWNLOAD A DEM

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REQUIRED RESOURCES
- ArcGIS Pro (v. 3.0 or higher)
- Internet access

FEATURED DATA SOURCES
- NOAA Data Access Viewer: https://coast.noaa.gov/dataviewer/#/
  - > 2020 USACE NCMP Post Sally Topobathy Lidar DEM: Gulf Coast (AL, FL, MS)

OVERVIEW

The objective of this tutorial is to demonstrate the process of downloading a Digital Elevation Model (DEM) from the NOAA Digital Coast Data Access Viewer, adding the data to a project geodatabase, and adjusting the symbology for visualization purposes.

The data used in this tutorial is topobathymetric lidar of the barrier islands along the Mississippi Gulf Coast. Topobathymetric lidar allows a laser to penetrate water and simultaneously map bathymetric points in addition to topographic data. This type of lidar allows for a seamless transition from land to underwater environments, specifically in moderately clear water column conditions. It is quite valuable and allows for a relatively quick assessment of coastal and riverine environments. The data used for this tutorial can be found in the Featured Data Sources section.

STEP 1. DOWNLOAD THE DATA

In this step, you will access and download the data. The following steps will take you through the process of a custom download from the NOAA Digital Coast Data Access Viewer.

    A. **Access the NOAA Digital Coast Data Access Viewer** via the link in the Featured Data Sources section and **select Elevation/Lidar**.
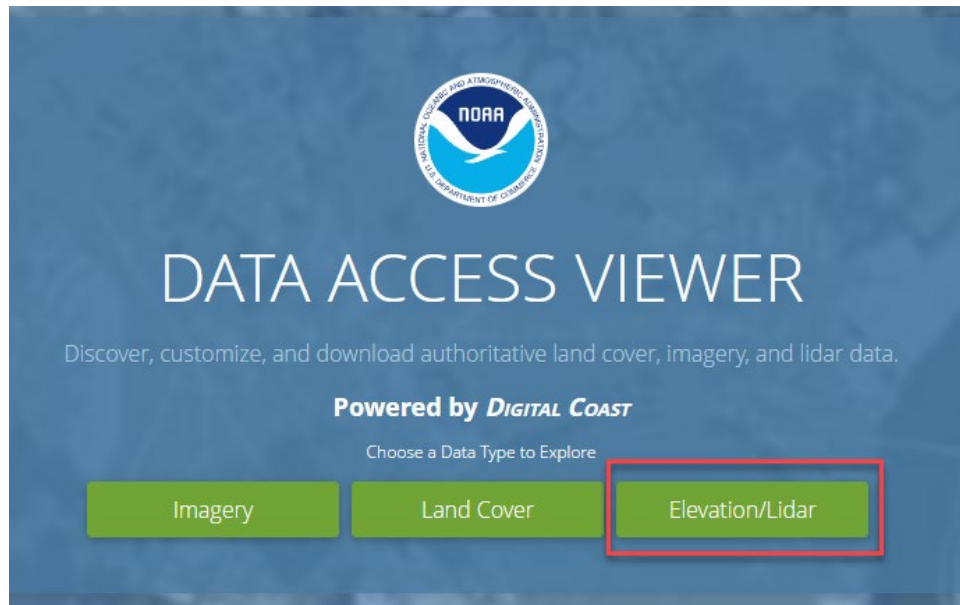
    B. Using the Draw button, **draw a search box** around the Mississippi and Alabama barrier islands.

    C. **Select** the following data layer from the list and **click "Add to Cart"**.

- 2020 USACE NCMP Post Sally Topobathy Lidar DEM: Gulf Coast (AL, FL, MS)

    D. In the cart, **verify the information** being downloaded, and **click "Next"**. On the next few pages, verify the information for the download and finally click "Submit".

    E. The last page you will see is the "Success" page and will have your order number. You will be directed to the inbox for the email address you provided and will receive multiple emails that will guide you through the rest of the download process. *This may take a few minutes.*

To use the newly downloaded data, you will need to *unzip* the files and save them in a place you will remember.

STEP 2. DATA PROCESSING

In this step, you will add the newly downloaded data to a new raster dataset withing a geodatabase. You will need to open a project in ArcGIS Pro.

    A. **Add a new raster dataset** to the project database. This creates a new raster dataset that we will load the downloaded DEM tiles into.

    B. **Right-click** the new raster dataset and **select "Load Data".** The Mosaic tool will open in the Geoprocessing pane.

    C. **Add the DEM tiles** by clicking the browse button and navigating to the folder in which they are saved. Select all the necessary files and click OK.

    D. **Click Run**. This will mosaic the DEM tiles into one dataset and may take a few minutes.

To help the user further visualize the barrier islands, the next step is to change the symbology of the DEM. This step will show the user the difference between common symbology options.

A. **Right-click the DEM** layer and **select Symbology**. You will notice that "Stretch" is automatically selected as the primary symbology. Stretch means that your data is stretched to fit within a set range of values.

B. **Change the Primary Symbology** to "Classify". This allows the user to set the number of classes and will adjust the values of the data within those classes. *A warning may pop up asking to compute histograms. Select Yes. This will split the data into number ranges or bins.*

C. **Update the number of classes** to "2" and choose the color scheme of your choice, making sure to select a darker and a lighter color.

D. **Change the upper values** to represent land and water by setting them to be above and below zero. This will also change the Method from Natural Breaks (Jenks) to Manual Interval.
   a. Double-click the upper value and update to "0.0" to represent water (below zero).
   b. Change the other value to "1.0" to represent land (above zero).
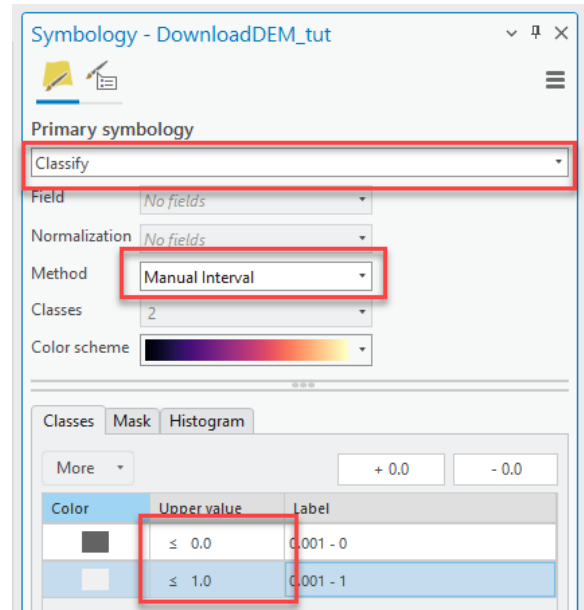
Now, the DEM should have two colors. An example is shown in the image below. Your image may be different from the image shown depending on zoom levels and area of interest. You can change the symbology to have a lighter color representing land (data points above 0) and a darker color representing water (zero or below).

This concludes our GEO Tutorial. You have successfully downloaded a DEM from an online source, loaded it into a newly created raster dataset, and updated the symbology. The newly classified raster dataset allows for a relatively quick identification and visualization of the shoreline. This skill can be useful in determining the extent and location of shorelines.