Examine spheroids

In this exercise, you will examine the geography of Long Island, New York, using different spheroids.

Estimated completion time: 25 minutes

To complete exercises, you need the following:

- ArcGIS Pro 3.1 (Basic, Standard, or Advanced)

1 Download the data

To complete the exercise, you must download the data. If you have already downloaded and installed the data, continue to the next step.

Unable to find the data you downloaded?

After you have downloaded the data ZIP file, extract it to the C:\EsriTraining folder. The unzipped folder will have the same name as the ZIP file.

If you unzipped the data to a location other than C:\EsriTraining, browse to that location and locate the folder. You can also try searching for the folder in one of the following ways:

- Start > Search Programs And Files (Windows 7)
- Start > File Explorer (Windows 8, 10 or 11)

2 Open a project

a. Start ArcGIS Pro.

b. If necessary, sign in to ArcGIS Pro using your ArcGIS Online organizational account.

c. Near Recent Projects, click Open Another Project.

> **Note:** If you have configured ArcGIS Pro to start without a project template or with a default project, you will not see the Start page. On the Project tab, click Open, and then click Open Another Project.

d. Browse to **C:\EsriTraining\CoordSystemsIntro**, and then double-click CoordSystemsIntro.aprx.

View result →

Step 2d: Open a project.

The project opens, showing the ExamineSpheroids map.

Two of the five data layers in the map are currently displayed:

- The Countries layer shows the generalized outlines of world countries using the WGS 1984 spheroid.
- The World30 layer consists of 30-degree latitude by 30-degree longitude lines using the WGS 1984 spheroid.

The three layers that are not currently displayed provide detailed outlines of New York using different spheroids:

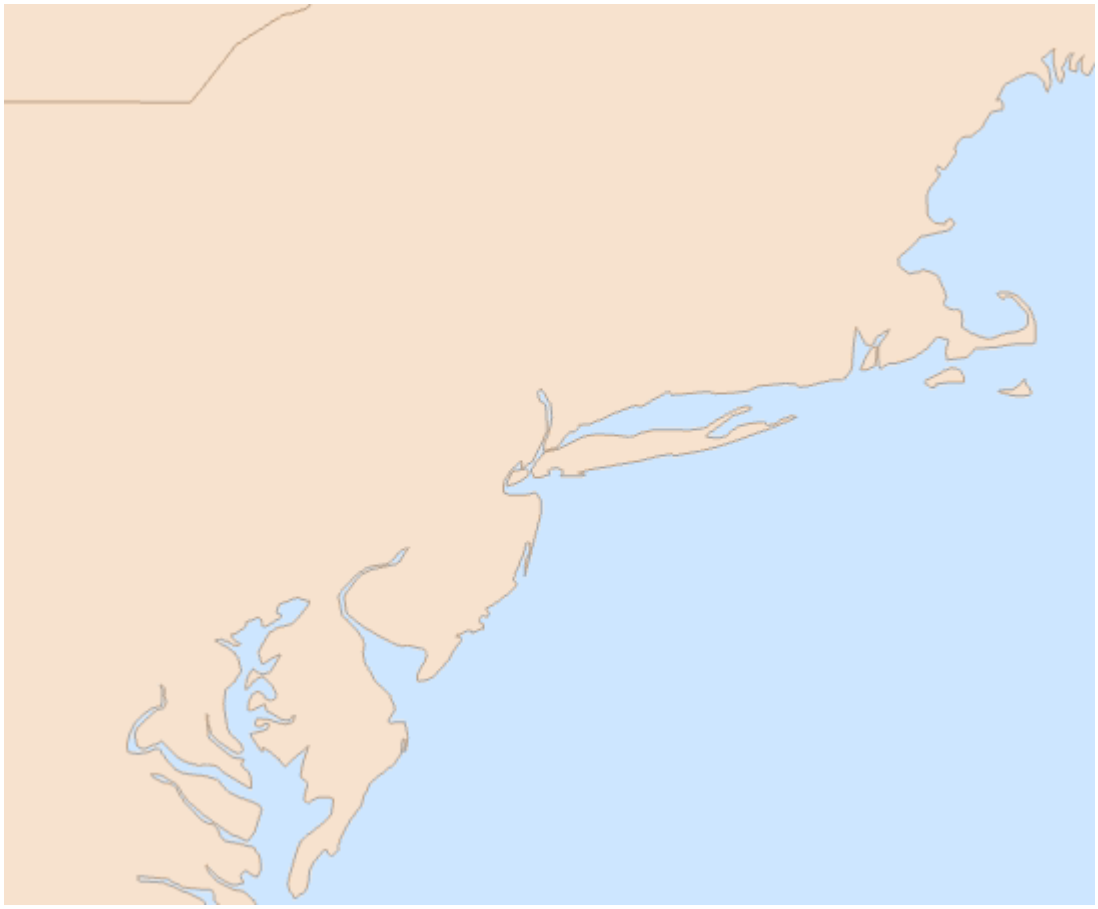
- The WGS 1984 layer uses the WGS 1984 spheroid.
- The International 1924 layer uses the International 1924 spheroid.
- The Clarke 1866 layer uses the Clarke 1866 spheroid.

③ Add more detail to the map

Differences in spheroids are not noticeable at scales smaller than 1:5,000,000, so you will need to zoom to a specific area.

ⓐ On the Map tab, in the Navigate group, click Bookmarks and choose Long Island.

View result →



Step 3a: Add more detail to the map.

The map zooms to the region around Long Island, New York.

The feature shapes in the Countries layer are too generalized to allow you to see the differences between spheroids. You will need to use more detailed data.

b. In the Contents pane, check the WGS 1984 box to display the layer.

Step 3b: Add more detail to the map.

View result →

You see much more detail along the Long Island coastline and many smaller islands that were not visible before. The long, nearly horizontal strip of land at the south end of New York is Long Island.

4 Compare spheroids

In this step, you will examine the differences between the spheroids. The Swipe tool is one way to examine differences because it allows you to "swipe" a layer's visibility on and off.

a. In the Contents pane, check the boxes next to each layer to ensure that every layer is turned on.

b. Click the WGS 1984 layer to select it.

c. On the ribbon, click the Feature Layer contextual tab.

d. In the Compare group, click the Swipe tool .

The mouse pointer becomes a half arrow when it is in the mapping area.

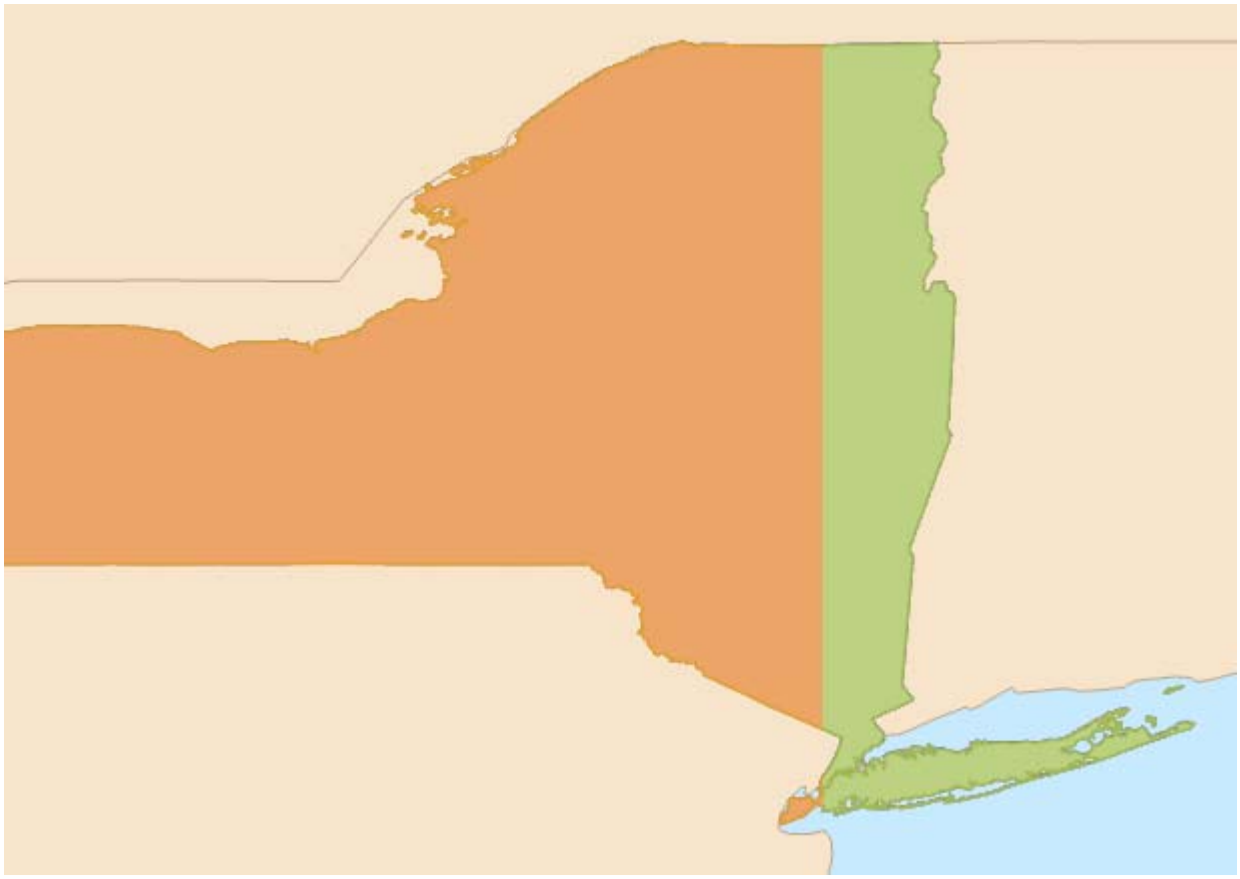
e. Move your pointer above the Long Island area (keep moving the cursor down until it changes to an up arrow).

(f) Click the mouse and swipe up and down (in a north–south direction).

(g) Point to the right of the Long Island area (keep moving the cursor to the right until it changes to a left arrow).

(h) Click the mouse and swipe left and right (in an east–west direction).

View result →



Step 4h: Compare spheroids.

(i) Notice any differences in alignment between the layers.

(j) Turn off the WGS 1984 layer, and then use the Swipe tool to examine the International 1924 layer.

Hint: Remember to first click the International 1924 layer to select it.

(k) Notice any differences in alignment between the layers.

Depending on the size of your window, the current display scale is around 1:5,000,000. At this scale, you should not see any differences among the three spheroids.

Next, you will examine the layers at a smaller scale and look for differences in each spheroid's representation of the landscape.

5 Explore data in more detail

In this step, you will take a closer look at the detailed feature shapes around Long Island.

a. In the Contents pane, turn off the Countries layer.

b. If necessary, turn on the WGS 1984, International 1924, and Clarke 1866 layers.

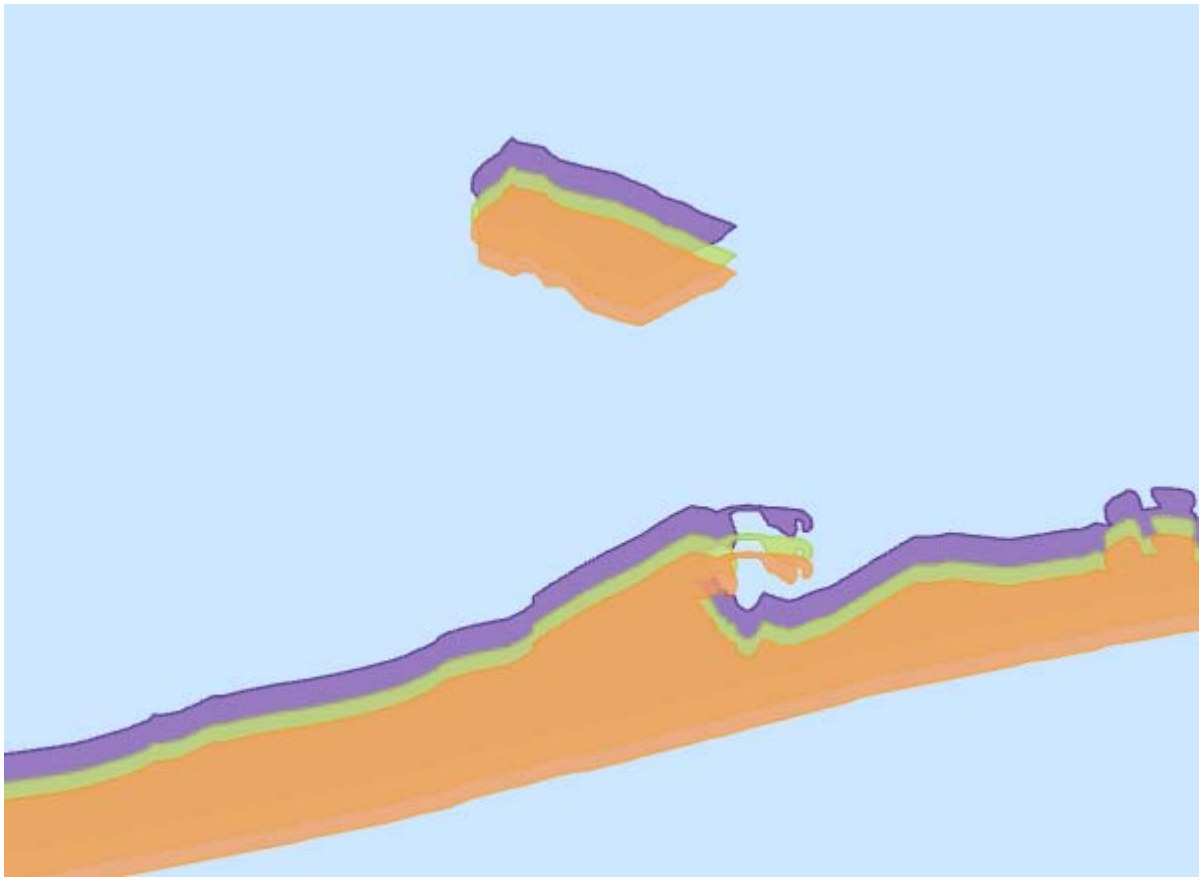
c. On the Map tab, click Bookmarks and choose Detail 1.

View result →

Step 5c: Explore data in more detail.

Your map scale is now around 1:300,000. You should begin to be able to see some differences between features as represented by the three spheroids, without needing to use the Swipe tool.

d. Click Bookmarks and choose Detail 2.



Step 5d: Explore data in more detail.

View result →

Your map scale is now around 1:30,000. The differences between spheroids should be clearly visible. The Clarke 1866 and the WGS 1984 spheroids vary the most, with the International 1924 spheroid lying approximately halfway between them.

6 Measure the differences between spheroids

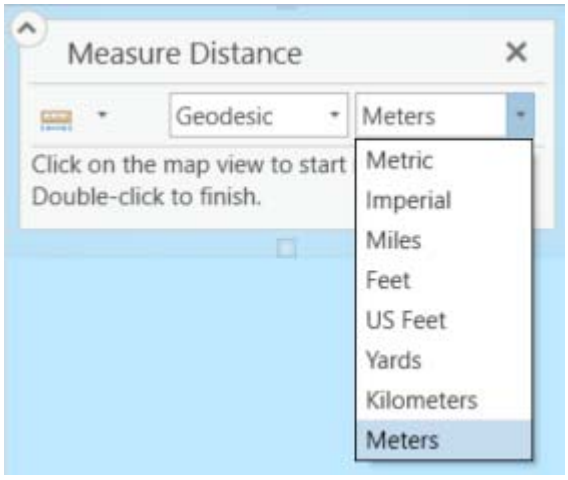
a. Click Bookmarks and choose Detail 3.

b. On the Map tab, in the Inquiry group, click the Measure down arrow and choose the Measure Distance tool 📏.

The Measure Distance window opens, and you can move it as needed.

c. In the Measure Distance window, click the Imperial down arrow and choose Meters.

View result →



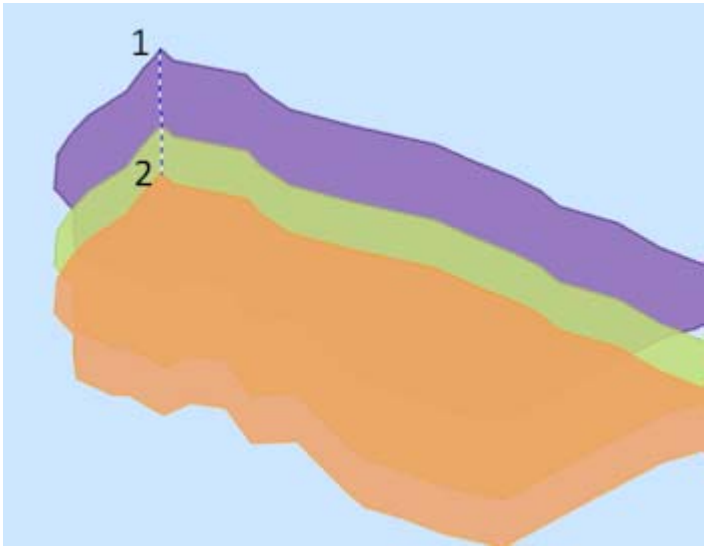
Step 6c: Measure the differences between spheroids.

Now all your measurements will be in meters.

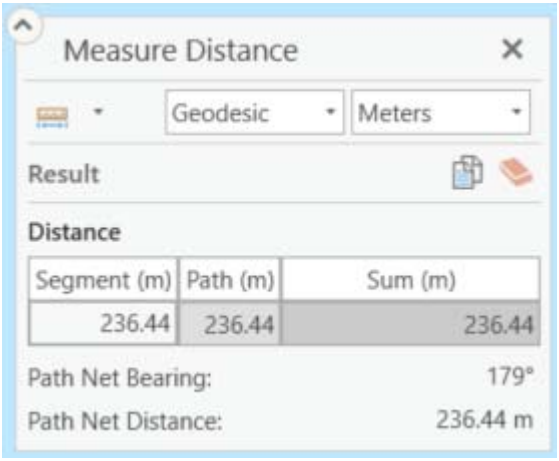
The map display shows a small island to the south of Long Island.

d. Point to the northernmost point on the small island in the Clarke 1866 layer (labeled "1" in the following graphic) and click one time.

e. Now, point to the northernmost point on the small island in the WGS 1984 layer (labeled "2" in the following graphic) and double-click.



The offset distance is reported in the Measure Distance window.



Step 6e: Measure the differences between spheroids.
Your results may vary slightly from this graphic.

View result →

f Click Bookmarks and choose Detail 2.

g On the Map tab, click the Explore tool .

Your pointer changes to a hand.

h Point to the top of the map display.

You will now pan the map to the north.

i Click your mouse button, drag to the bottom of the map display, and then release your mouse button.

The graphic area refreshes.

Step 6j: Measure the differences between spheroids.

j. Repeat the pan operation until a landmass comes into view.

View result →

This landmass is the coastline of Long Island.

k. Zoom in and use the Swipe and Measure tools to examine the coastline.

Are the differences uniform throughout the layer?

Show answer

The differences are uniform along the Long Island coastline. If this layer extended to other parts of the globe, you would see increasing differences between the Clarke 1866 spheroid and the WGS 1984 spheroid.

l. If you are continuing to the next exercise, leave ArcGIS Pro open; otherwise, exit ArcGIS Pro without saving your changes.

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