

# Investigating Future Worlds with Google Earth (Part 2) Student Guide

**Driving Question: How will predicted sea level rise affect our coastal environments?**

In this activity, you will use Google Earth to explore future climate scenarios that may happen by the year 2100. You will...

1. Use the Google Earth elevation profile tool to understand the effects of sea level rise in 5 low lying coastal areas.
2. Use Google Earth to explore changes in sea level in the Chesapeake Bay region.
3. Understand that climate change will continue to affect our planet into the future.



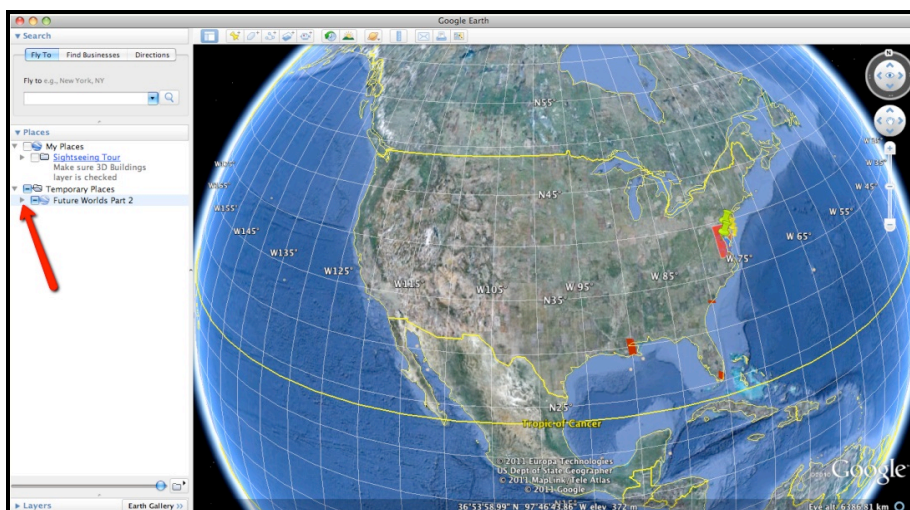
## Step 1: Download Data

- a. Open your Web browser. Go to **[www.ei.lehigh.edu/learners/cc/](http://www.ei.lehigh.edu/learners/cc/)**.
- b. Under Future Worlds, click on **Future Worlds Part2.kmz**.

The file is displayed in Google Earth.

**Note:** If the file download does not automatically launch Google Earth, double-click on the downloaded file **futureworldspart2.kmz** to launch Google Earth.

- c. Click the arrow to the left of **“Future Worlds Part 2”** in the left panel (see red arrow below).



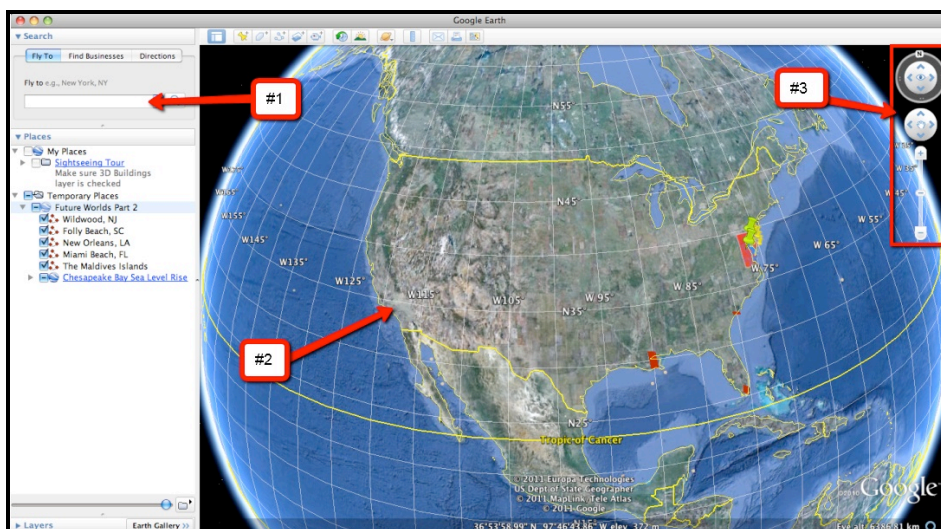
d. The “Future Worlds Part 2” drop-down list will extend (see below). If you cannot see the whole list, scroll down.



## Step 2: Basic Features of Google Earth

Note the following Google Earth features, tools, and navigation controls in the figure below.

1. **Search Panel** (arrow #1) – Type in the white box to find a location.
2. **3-dimensional (3D) Viewer** (arrow #2) – This window shows the Earth and its terrain.
3. **Navigation Controls** (arrow #3) – Use these controls to zoom, look, and move around. If the navigation controls are not visible, click on View>Show Navigation>Always.

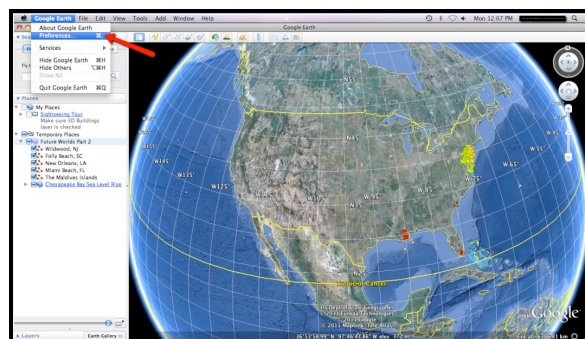




### Step 3: Elevation Profile Tool

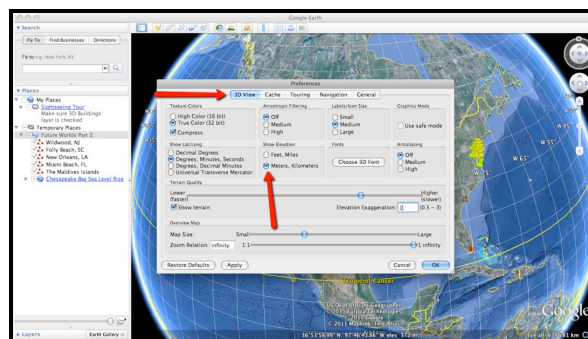
#### Macintosh Directions

Before beginning this activity, make sure that Google Earth is set to metric units. To do this on a Macintosh computer, select **Preferences** from the Google Earth drop-down menu bar. Click the **3D View** tab as shown in the image below. In the dialogue box under **Show Elevation**, select the check box next to **Meters, Kilometers**. Then click **OK**. This can be followed in the images below.



#### PC Directions

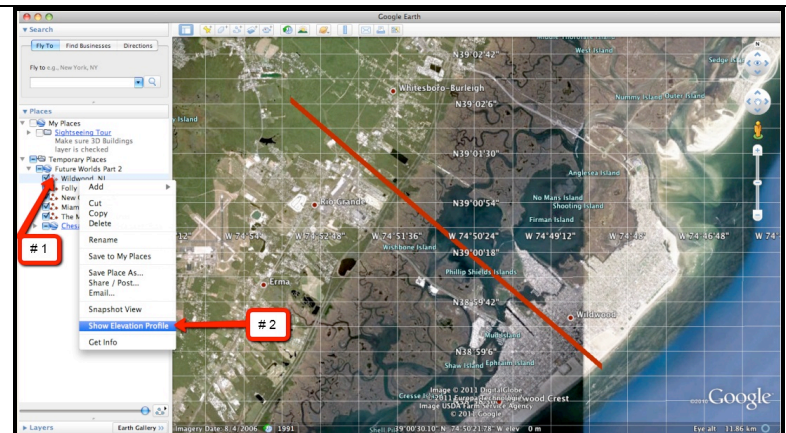
Before beginning this activity, make sure that Google Earth is set to metric units. To set metric units on a PC computer, go to the **Tools** menu bar and select **Options**. Click the **3D View** tab as shown in the image below. In the dialogue box under **Show Elevation**, select the check box next to **Meters, Kilometers**. Then click **OK**.



### Step 4: Future Worlds Part 2 Investigation

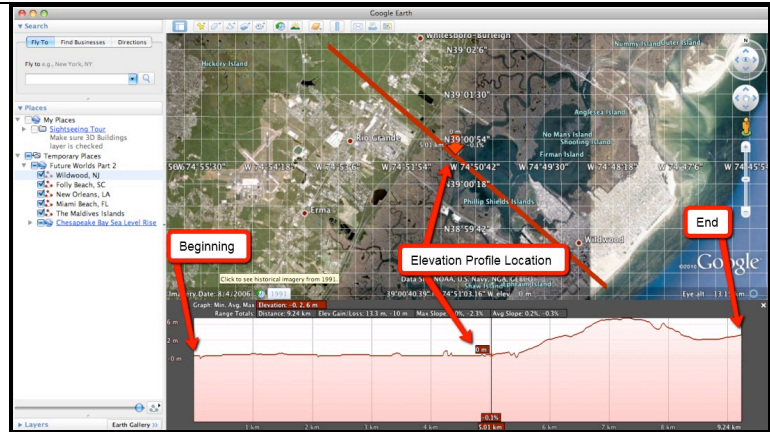
You will explore the effects of a 2 meter rise in sea level on the existing landscape over the next 100 years. This investigation will help you understand how changes in climate over the next 100 years could alter our coastal areas in the future.

1. Begin the investigation with **Wildwood, NJ**. Navigate to the Wildwood, NJ path by double-clicking on **Wildwood, NJ** in the Places window. Click the check box to display the red-lined path. Press **Ctrl+mouse click** (Mac) or **right click** on a PC over the Wildwood, NJ name. In the menu that opens, select **Show Elevation Profile**.



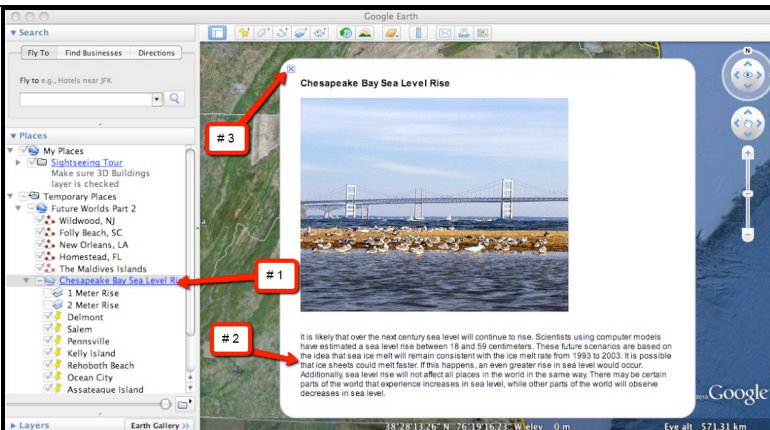


- Observe the elevation profile drawn across Wildwood, NJ. The red arrow on the map indicates the location in the profile as shown in the image to the right.
- Determine the furthest distance inland in kilometers (km) that the water would travel if there were a 2 meter rise in sea level. Record this distance in the data table on the **Student Investigation Sheet**.
- Use Google Earth to determine the type of land cover that this water will cover and record this information on the data table on the **Student Investigation Sheet**. This may include farmland area, residential area (houses), or marsh areas (low-lying vegetated areas located in coastal areas that are often affected by tides). More than one landscape can be recorded in the data table.
- You may need to zoom in to the landscape with Google Earth to observe the land use type.



- When finished close the elevation profile box by selecting the "x" in the corner of the Elevation Profile.
- Navigate to the four other path line locations in Google Earth (Folly Beach, SC; New Orleans, LA; Homestead, FL area; and the Maldives Islands). Similar to the Wildwood, NJ location, you should determine the furthest distance inland in kilometers (km) that the water would travel if there were a 2 meter rise in sea level and determine the type of land cover that would be affected. Record this data in the data table in the **Student Investigation Sheet**.
- Answer **analysis questions # 1-2** on the Student Investigation Sheet.

- Next, navigate to the Chesapeake Bay by double clicking on Chesapeake Bay Sea Level Rise in the Places window (# 1). Read the associated text (# 2). When finished select the "x" in the upper corner of the box (# 3).





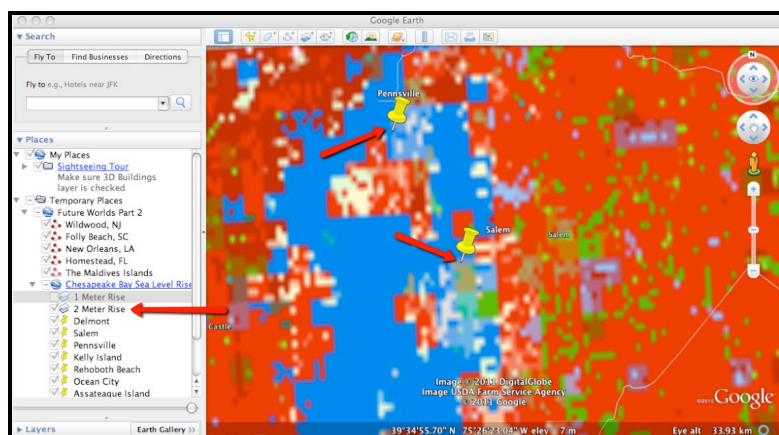
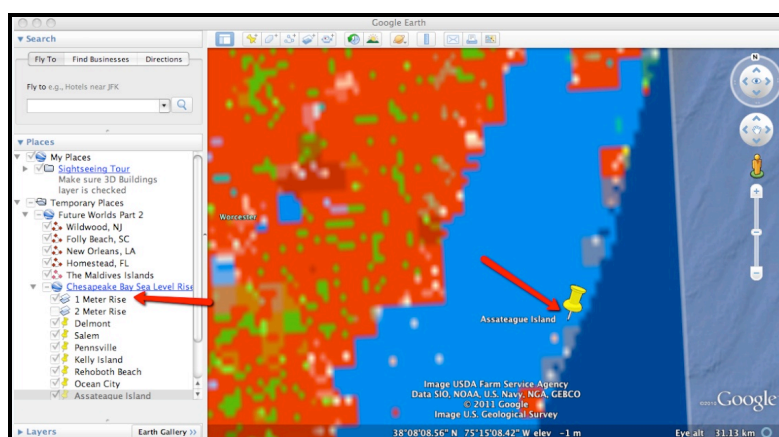
2. You will navigate to the 13 different cities in the Chesapeake Bay watershed to determine which cities will succumb to sea level rise in the event that it rises 1 meter or 2 meters. Navigate to **each city by double-clicking** on the city name or using the navigation tools to observe that city.

3. In the two Chesapeake Bay sea level rise layers, the color **blue** indicates water. All other colors indicate a form of land.

4. Once at a specific city or island location, activate the **1 Meter Rise** layer by selecting the check box next to that layer to see if that city would be under the water if sea level were to rise 1 meter. You should then uncheck the 1 Meter Rise layer and activate the **2 Meter Rise** layer.

5. In this manner, you can navigate to each location and toggle back and forth between the 1 meter and 2 meter rise layers to see which scenario would impact a particular location.

6. A city or island is considered underwater if it is mostly covered by blue color. An example of a city or island that sinks underwater during a 1 Meter Rise scenario can be found in the top image on the right. An example of a city that sinks underwater during a 2 Meter Rise scenario can be found in the bottom image on the right.



7. Record in the data chart on the **Student Investigation Sheet** which Sea Level Rise Scenario (1 Meter Rise or 2 Meter Rise) would place a location under water. Place an "X" in the appropriate box.

8. Answer **analysis questions # 3-6** on the **Student Investigation Sheet**.