Earth 103 Module 10 Lab: Impact of Sea Level Rise on Coastal Communities

There are two parts of this lab. In the first, you will look at recent trends in sea level from tidal gauge data going back to about 1940. This will allow you to determine the places where sea level is rising the fastest. In the second part of the lab, you will be looking at future sea level rise projections for certain areas. The first part of the lab is in Google Earth; the second part is in a web browser (the Google Earth files for this type of analysis don’t work well yet).

## Files to Download

[PSMSL Tide gauge file](file://localhost/earth103/sites/www.e-education.psu.edu.earth103/files/module10/PSMSL%2520Tide%2520guage.kml)

## Practice Questions

**Part 1.**

In this part of the lab, you will look at tide gauge data showing relative sea level rise data back to about 1940. The goal will be to determine trends from rather noisy data, determine places where relative sea level is rising faster than others, and the reason for the rapid rise. In the practice lab, we will focus on the West Coast of the US.

Load the [PSMSL Tide gauge file](file://localhost/earth103/sites/www.e-education.psu.edu.earth103/files/module10/PSMSL%2520Tide%2520guage.kml) in Google Earth. The file shows tide gauge data from around the world which will allow you to explore the rates of sea level rise. The dots show stations organized by the last reported year. Click on stations and you will see a PSMSL ID number, click on that and you will get tidal gauge data in mm (for several locations several dots appear, make sure you click on one of the dark green dots).

1. Go to Crescent city in Northern California. Is relative sea level rising or falling over time?

A. Rising

B. Falling

1. Roughly how much has relative sea level changed since the beginning of the record at Cresent City?

A. Over a meter

B. Over 0.25 m

C. Under 0.25 m

1. Now go to Neah Bay in Washington State in the tip of the Olympic Peninsula. Is relative sea level rising or falling over time?

A. Rising

B. Falling

1. Roughly how much has relative sea level changed since the beginning of the record at Neah Bay?

A. About 0.5 m

B. About 0.3 m

C. About 0.1 m

1. Based on just these two records what is the dominant process controlling relative sea level change in these locations?

A. Isostatic rebound (removal of ice)

B. Subsidence

C. Uplift due to tectonic activity

**Part 2**

Prediction of the extent of flooding that results from sea level rise is much simpler than predicting the absolute amount of sea level rise that will occur over coming decades. Flooding predictions are based on digital elevation maps that have great accuracy and resolution. The NOAA sea level rise and coastal flooding tool allows you to look at areas in detail and make predictions about the future under higher seas. At the top, you can enter an address to look closely at an area. For the practice, we will look at Tampa, FL so enter this in the search window. Note it can take a while for a clear image to come into view. Remember 1000 mm is a meter.

Go to this page: https://coast.noaa.gov/slr/ and click on Get Started. You will see a map focused on the US which is where we will be working. On the bottom left please make sure the elevation scale is in meters not feet. We will look at three different views: (1) sea level rise which allows you to see how the area floods as you move the slider up. (2) Flood frequency which shows the areas that currently flood frequently; and (3) vulnerability which is a comprehensive assessment on how vulnerable certain regions are to sea level rise (based on elevation as well as population density and demographics such as the percentage of people living under the poverty line).

Using these three maps answer the following questions:

1. At what sea level rise in meters does Davis Island begin to flood (give your answer as a number)?
2. At what sea level does St. Pete Beach begin to flood (give your answer as a number)?
3. Look at De Soto Park (southeast of downtown). Why is this area vulnerable to sea level rise?

A. Low elevation

B. Demographic factors

1. Look at Ybor City (northeast of downtown). Why is this area vulnerable to sea level rise?

A. Low elevation

B. Demographic factors (poorer residents)

Now go back out to St Petersburg. Compare downtown St. Petersburg with St. Pete Beach.

1. Which has higher flood frequency?

A. Downtown St. Petersburg

B. St. Pete Beach

1. Which has higher vulnerability?

A. Downtown St Petersburg

B. St. Pete Beach

1. Why is the vulnerability of St. Pete beach generally low?

A. Because it is close to sea level