**Boston University**

**Electrical & Computer Engineering**

**EC464 Senior Design Project**

Second Prototype Test Report

**Coastline Predictor**

By

Team 18

Team Sea Rise



Team Members

Stacia Kolodziejski [skolodz@bu.edu](mailto:email1@bu.edu)

Wenyu (Jessica) Hu [wjhu@bu.edu](mailto:email1@bu.edu)

Saif Alblooshi [sjalbloo@bu.edu](mailto:email1@bu.edu)

**Equipment Setup**

To set up the correct files and software to work through the implementation process, the user will need a computer capable of running *MatLab R2022b* to process the correct *.tif* files downloaded from the United States Geological Survey (USGS) data website. To access the *.tif* files of the elevation data, you will need to go to the USGS 3D Elevation Program (3DEP) page where the user will be able to access elevation data files for all regions of the United States, as well as parts of Canada and Mexico. Once the user chooses which small 1x1 degree region they would like to view the elevation maps for, they can download the *.tif* file to their computer. Once the file is downloaded, they will need to import this file into the current folder they are working with in MatLab in order for MatLab to know which file to use for the scripts. Once the correct file is in the folder and in the script, the user can run the scripts to create the output figures. Once the script is run, the user will be able to see the correct elevation data for their selected region. The user can then edit the elevation data matrix variable to subtract whichever amount they prefer from the elevation and run the script again. This will create the second output for that region which will show a new figure of the new coastline depending on the subtracted amount they chose.

During our testing process, we chose the regions of Miami and Boston. The *.tif* files had already been downloaded from previous testing throughout our work process. The MatLab scripts have already been opened and it has all been set up accordingly in preparation for our testing.

**Process**

Our testing process consisted of running the MatLab script which:

1. Imports the *.tif* files into MatLab. One for the Boston region and one for the Miami region.
2. Displays the outputs by running the script with the Boston data file (N47-W71) and then with the Miami data file (N26-W81).

Each run of the script will output two images, one for the original elevation data of the specific region and one for the new coastline depending on how much the sea level rises. We used “fake data” for the test.

The elevation data had to be subtracted by a certain amount because we do not have the correct prediction data to test the image changes with yet. Therefore, we had to create “fake data” in some way that we could model just to know how we could then apply these changes using the prediction data.

This process will work for any region the user would like to see the changing coastline for. As long as the user is able to obtain the correct .*tif* file and change the title in the scripts to match the title of the .*tif* file, then the scripts will run successfully for any region of the United States.

**Outputs**

**Boston**

The output images for the elevation of the region of Boston we chose are shown below. In *Figure 1*, the dark blue indicates the ocean and the green indicates the land and coastline. The light blue indicates regions that are less than one meter below sea level. This can be shallow waters like rivers and ponds, or simply land that are below sea level, but are prevented from flooding by higher latitudes around. *Figure 2* represents what the coastline would look like if sea level rises by 1.99876 meters in Boston.

**Miami**

The outputs of our test for the Miami region we chose are shown below. This is a 1x1 degree area that can be found on the data website. In *Figure 4*, the green indicates the ocean and the blue indicates the land and coastline. *Figure 5* represents what the coastline would look like if sea level rises by 1.99876 meters in Miami.

**Boston**

 



**Miami**

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After the in-lab prototype testing, we realized that based on the color bar, green indicates land, meaning that the area around the light blue is actually wrong. To investigate this, we looked at the elevation matrix. also showed weird numbers. It showed -999999 instead of +/- decimal numbers for a very large area.

We took this problem to Professor Osama and:

* Looked at the code - Same code was used for Boston, which worked perfectly fine. Thus, the code should not be the problem
* Tried an older version of the elevation data file - It showed the same ElevationMap display. Thus the data file should not be the problem
* Tried another coastal region of Florida, Titusville - It showed the ElevationMap perfectly fine.

Prof. Osama then pointed out that the coast of Miami, Florida may be censored for security reasons. In this case, we will just avoid this area and do coastline prediction of Boston and Titusville.

**Conclusions**

Our second prototype test was completed for the entirety of our project to date and we were able to successfully show about half of the work for our project completely. The elevation data images along with the “fake data” new coastline images ultimately encompasses about half of the deliverables for our project.