Remote Sensing Sediment

Analyzing how sediment changes seasonally in the coastlands of Southeastern United States

REU Presentation 2021 by Carter Williams

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The Importance of the Wetlands of Louisiana

- The Louisiana wetlands play an integral role in supporting wildlife
- Tampering with the wetlands (albeit for good reason) may result in many unforeseen and harsh consequences
- The wetlands need to be monitored closely and studied

Remote Sensing!

- Satellites imagery enables us to monitor the changes of the wetlands, and the effects that they have.
- Areas with low sediment in the summer can become rich with sediment in the winter
- What might this figure look like if there were only pictures taken from high tides or low tides???

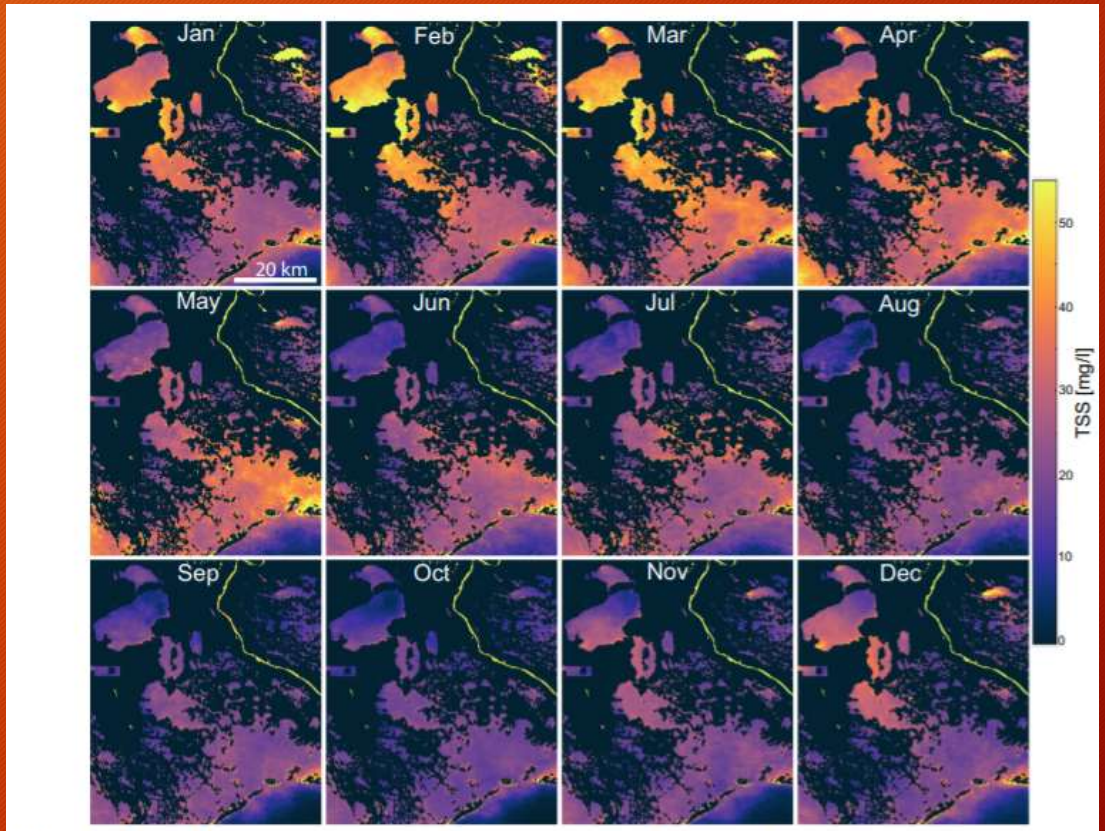
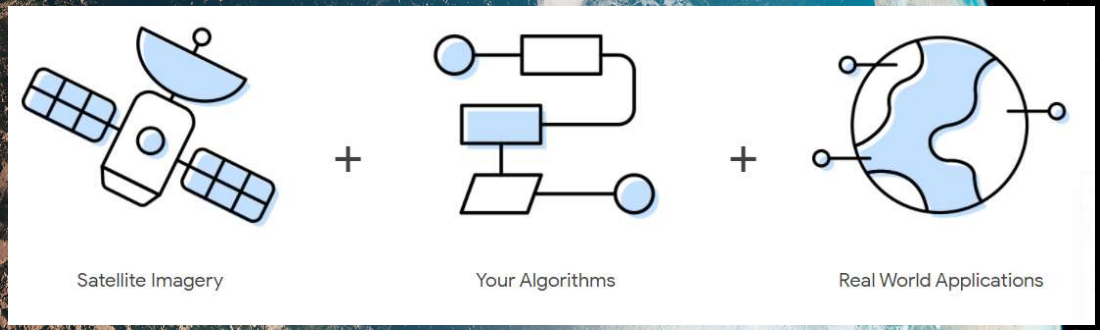


Fig. 4 MODIS-derived TSS maps. Each map represents the median monthly value for the period 2001–2020

Figure 1 Seasonal sediment levels over the course of 20 yrs. *Mariotti, G. (2021)*

Google Earth Engine

- A free resource that compiles thousands of satellite images that have been taken for decades
- Coding can be done in either Python or Javascript
- Great for those studying Geomorphology, Meteorology, etc.



Taken from Google Earth Engine's Website: https://earthengine.google.com/

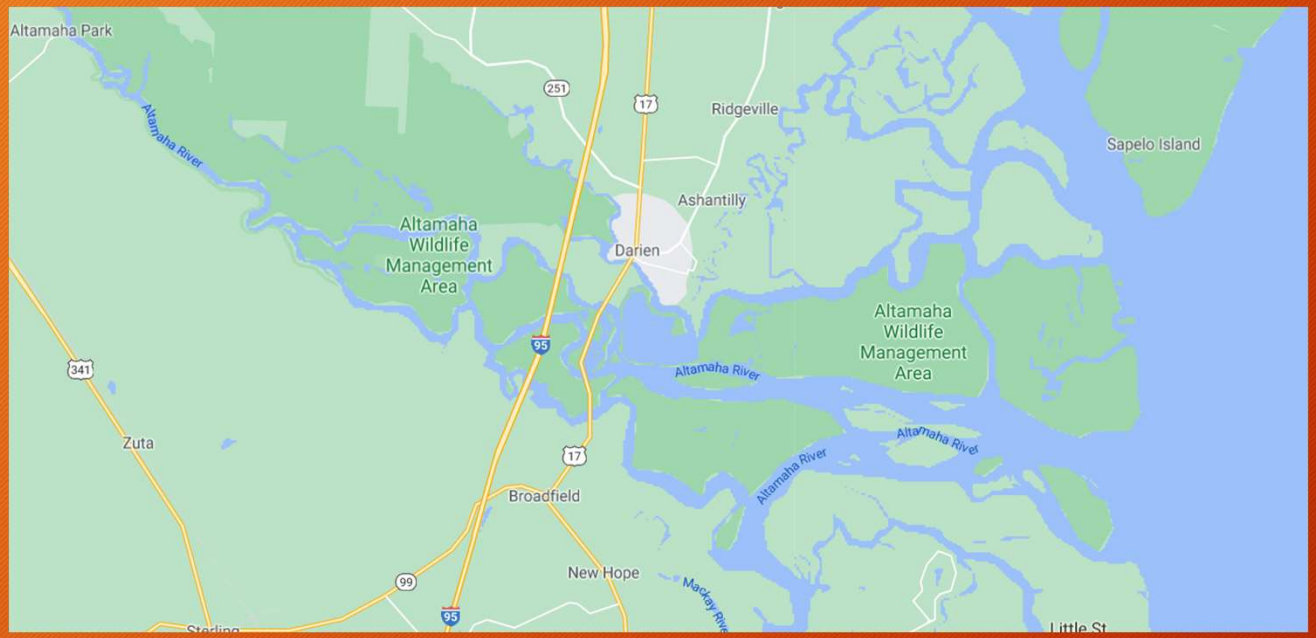


Figure 2 Mouth of the Altamaha River. Map. *Google*, 27 June 2021, https://www.google.com/maps/@31.3571632,-81.4344968,12z

The Altamaha River

Located on the Coast of Georgia

Quick Process Overview

Gather	Gather MODIS data from both the EOS-AM-1 satellite and EOS-PM-1 satellite.
Filter	Filter the data based off the time the data was captured, whether the pixel was cloudy, and whether the pixel is over landmass.
Sort	Sort the data into two categories of high tide and low tide.
Export	Export the data into Google Collaboratory where the data can be further filtered and visualized by matplotlib, a python library.

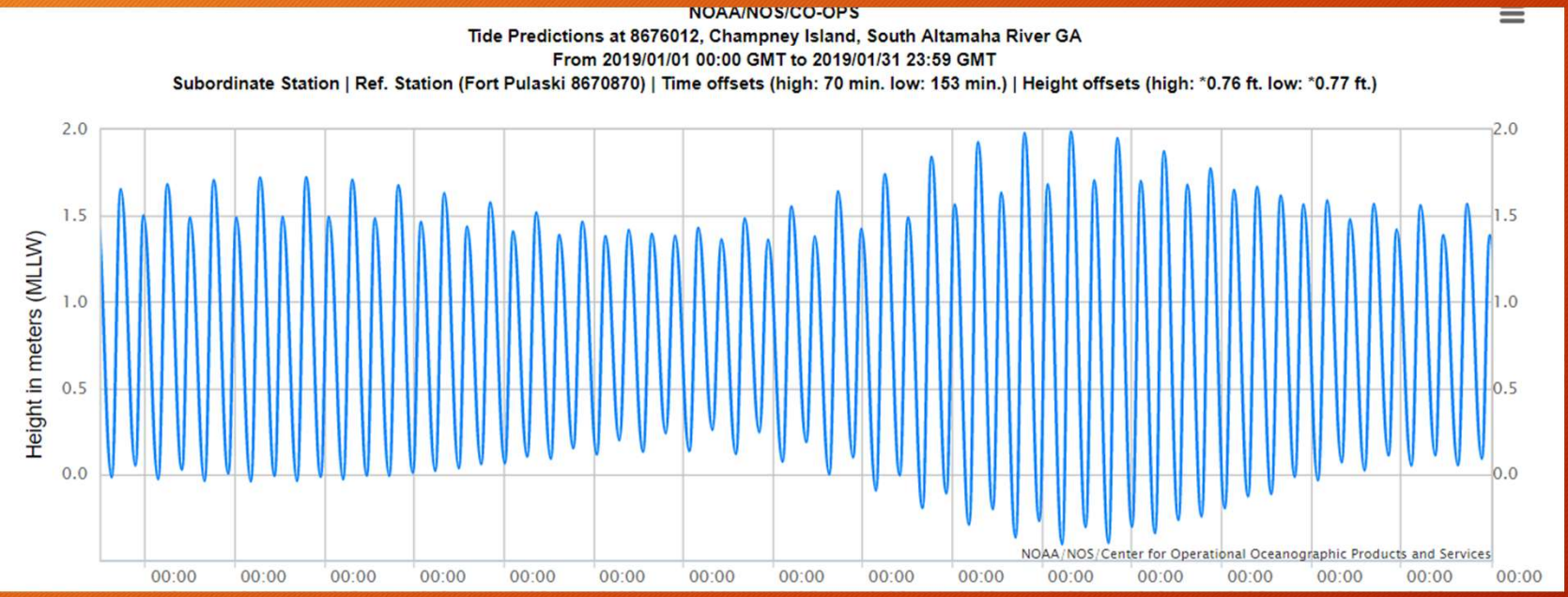
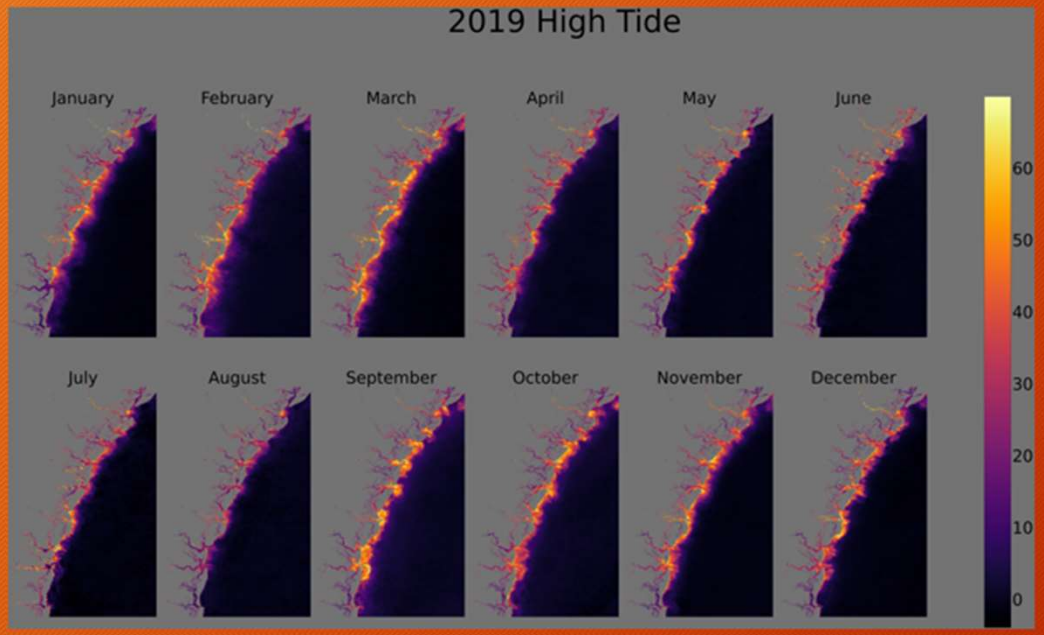
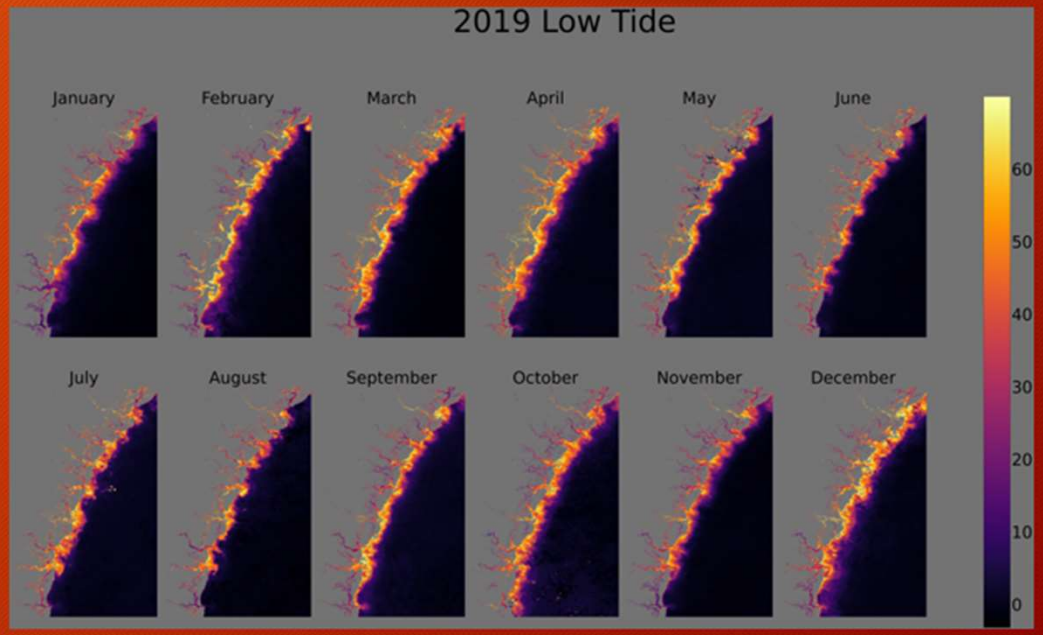


Figure 3 January 2019 Tide Level Data, Provided by NOAA Office of Coast Survey, nauticalcharts.noaa.gov

Georgia Coast Comparison

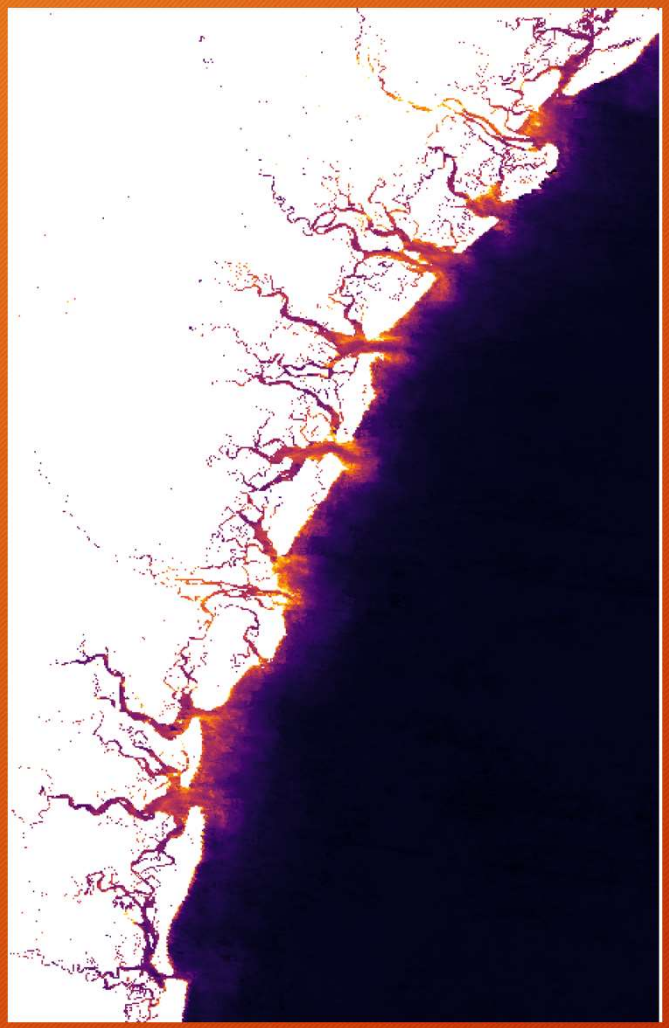




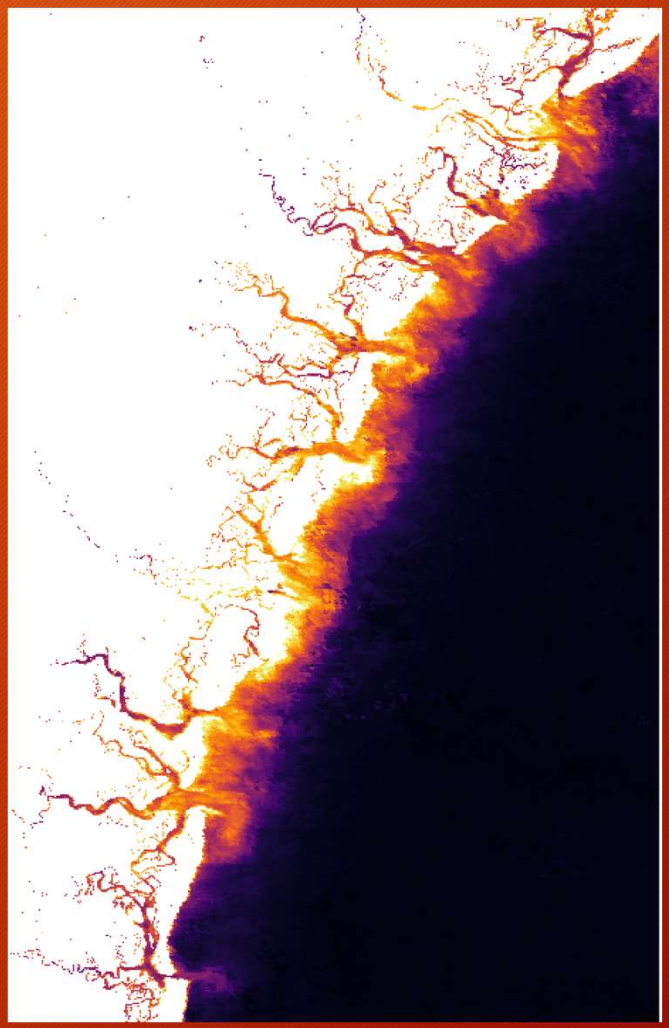
Let’s take a closer look…

January 2019

HIGH TIDE



LOW TIDE



Further Analysis

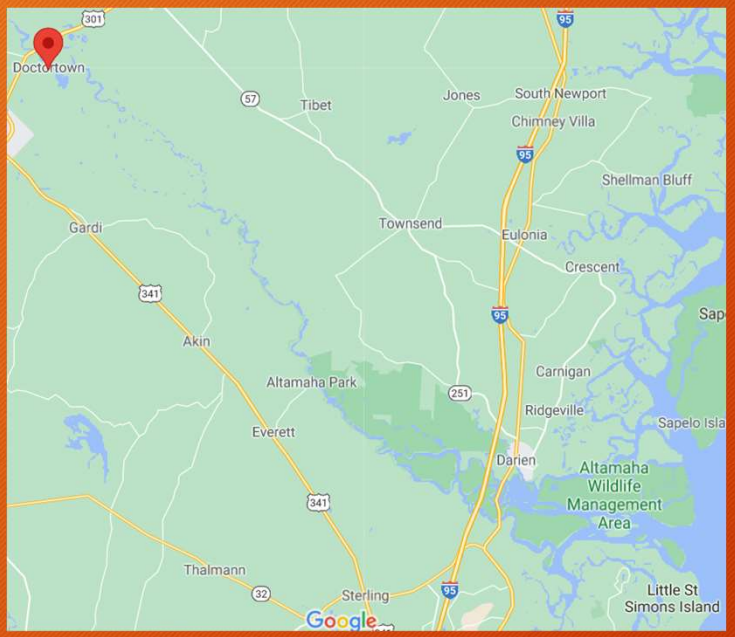


Figure 4 Doctortown, Georgia. Map. *Google*, 27 June 2021, https://www.google.com/maps/@31.3571632,-81.4344968,12z

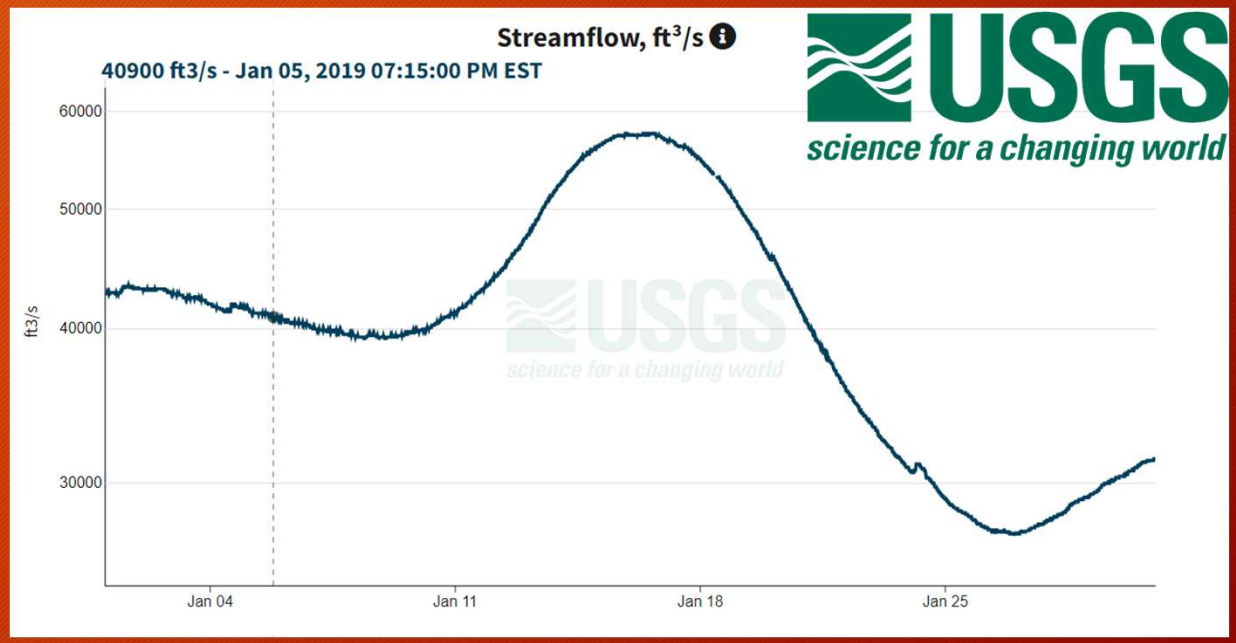
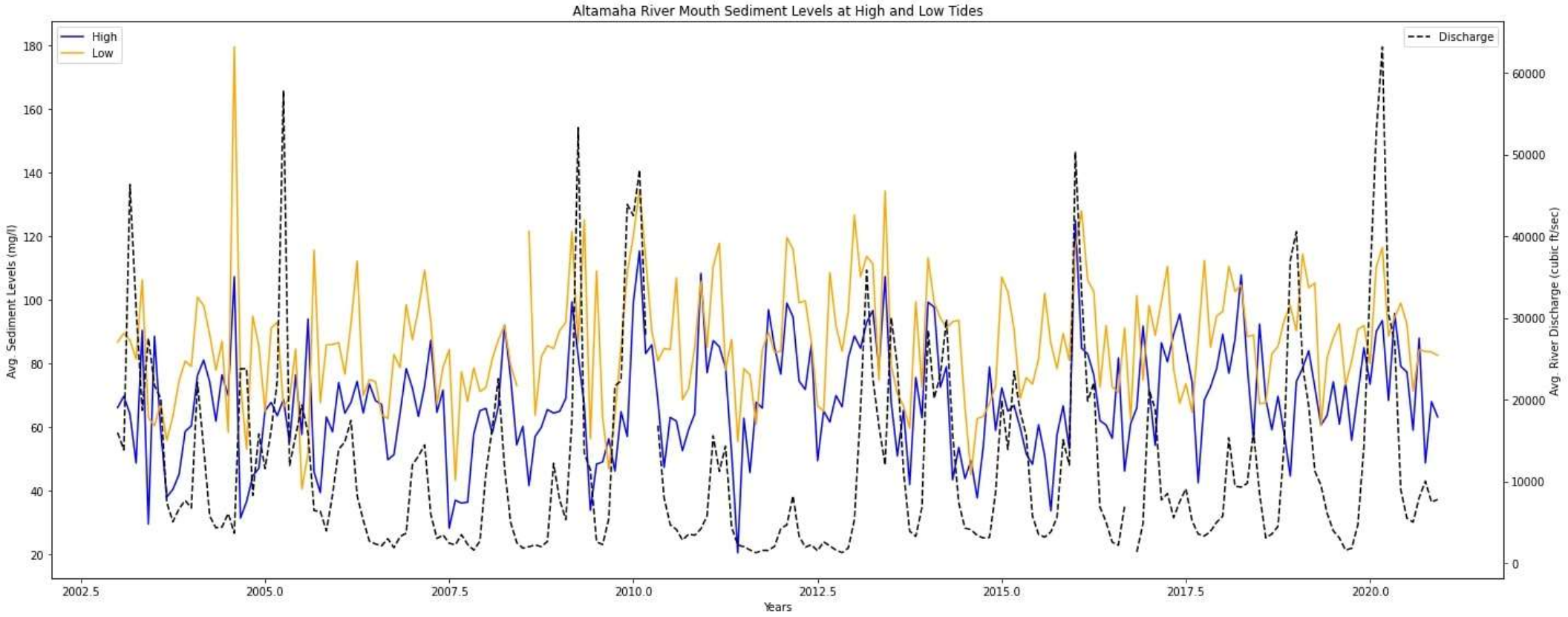
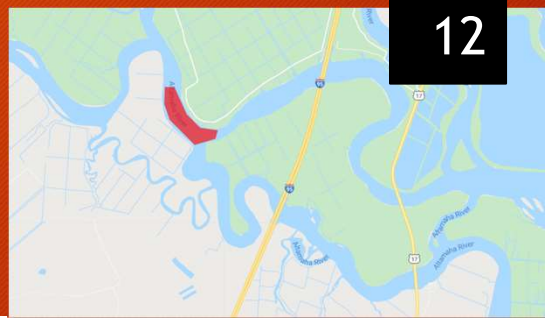


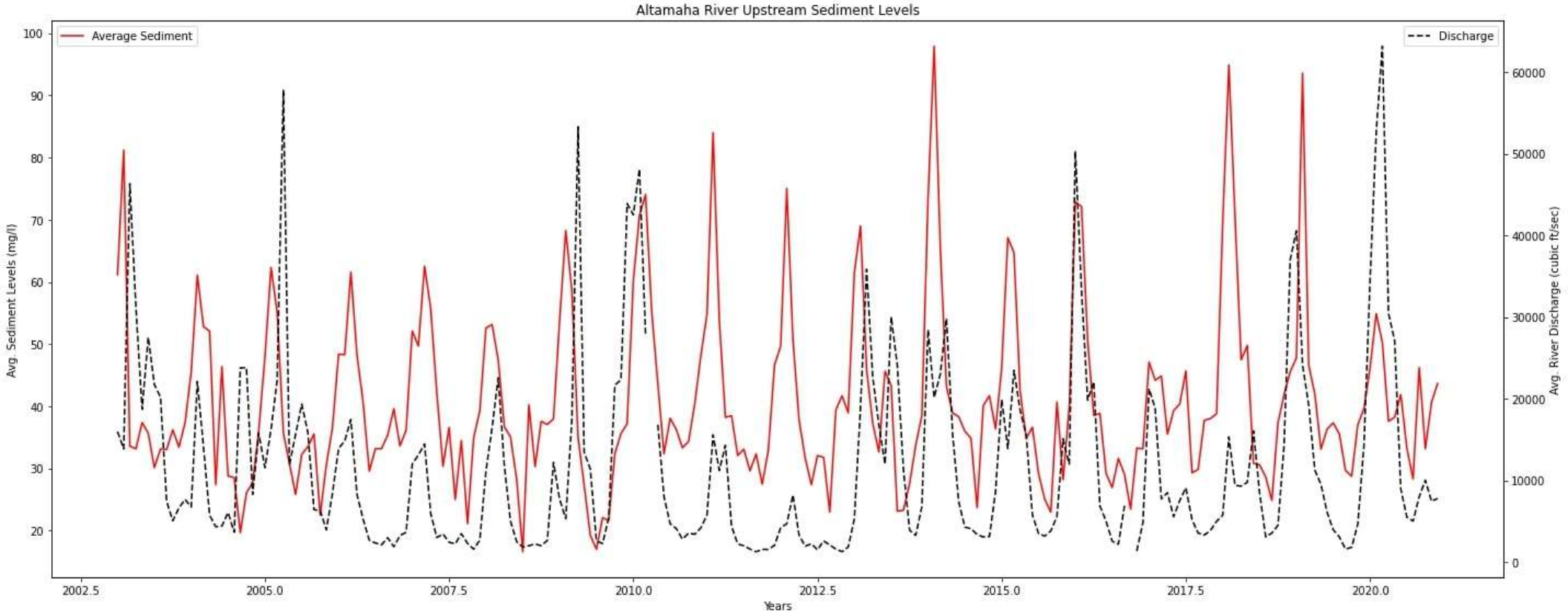
Figure 5 January 2019 Streamflow Data, U.S. Geological Survey. https://waterdata.usgs.gov/monitoring-location/02226000/#parameterCode=00060&startDT=2019-01-01&endDT=2019-01-31

Data Comparison for the Mouth of the Altamaha River



Data Comparison for the Altamaha River near Broadfield, GA





Thank you so much!

References:

https://earthengine.google.com/

https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=8676012&units=metric&bdate=20190101&edate=20190131&timezone=GMT&clock=12hour&datum=MLLW&interval=hilo&action=dailychart

https://waterdata.usgs.gov/monitoring-location/02226000/#parameterCode=00060&startDT=2019-01-01&endDT=2019-01-31