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GEDI L2A Relative Height Visualization

Introduction

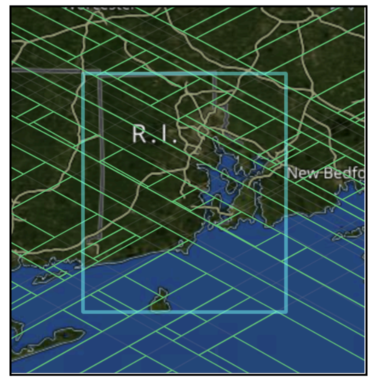
This project creates a visualization of the rh_0 and rh_98 measures from GEDI L2A products. I do this by subsetting and processing a portion of the GEDI data and generating an isosurface visualizer.

GEDI L2A Data

Thanks to NASA's extensive resources available online, I was able to develop an understanding of the GEDI dataset. GEDI L2A data is taken from one of NASA's satellites, with 8 tracks of data optimized for detecting vegetation (for our uses, canopy height). The data is collected in 25m footprints, with ~600m between tracks.

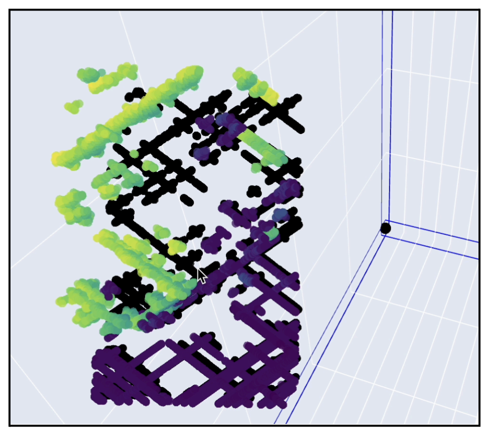
Relevant Footprint Measurements Include

- Quality Flag: 1 if the data is believed to be accurate, 0 otherwise.
- Latitude and Longitude: Latitude and longitude for the footprint.
- Rh Measure (Array with length 101): relative canopy heights.



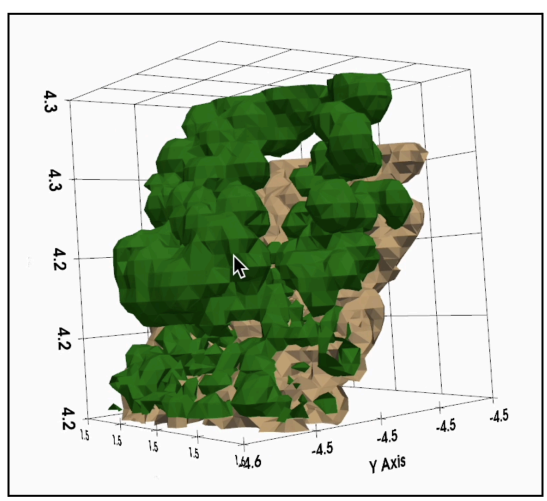
Data Subsetting

I chose to limit the amount of data that I was working with to an 18 month period from January 2022 to June 2023 in Rhode Island, taking only data from Beam 0110. This was able to provide comprehensive coverage over Rhode Island, as shown to the right.



Data Pre-Processing

I used the RH measures, along with the latitude and longitude, to create subsets of the data for rh2 and rh98. Each subset contains 4 values per footprint—x,y,z, and rh—where x, y, and z are in km from Earth's Center. Nearest Neighbor Clustering was used to reduce data size and add robustness. This allowed for the visualization shown here. Yellower values indicate higher rh_98 values, while purple points represent lower values. The rh_2 values are set to black as a baseline.



Isosurface Generation

To generate the isosurfaces, I experimented with different interpolation methods, and settled on a gaussian interpolation function from Scipy's RBF interpolation library. This was able to best capture the variation in the data. The visualization and final isosurface creation was done with the PyVista library, which allowed me to simultaneously export the triangle meshes as .plt files. In order to import these meshes into Unity for further visualization, I used an online converter to create .obj files for the rh2 and rh98 isosurfaces, respectively.