Preston Hudlow

GEOG 419

Tom Allen

Lab 5

1: What part of the spectrum does bathymetric LiDAR such as the RIEGL sensor use, and how is Secchi disk depth only an approximation of how successful it can be used? What are the highest and lowest points in the digital bathymetric model (DBM) depth file (see layer job61232_003_002.tif)? (Hint: rt-click the layer and open its properties to find the statistics… Note: The vertical reference in our lab data is NAVD88 vertical datum in units of meters, which was requested in the download step using Digital Coast Data Access Viewer. https://www.fisheries.noaa.gov/inport/item/60170

Bathymetric LiDAR, like the RIEGL sensor, uses a green wavelength for better water penetration. Secchi disk depth approximates LiDAR effectiveness but is based on visual water clarity, while LiDAR also depends on laser power, angle, and water composition. The low values is -8.3 whereas the high is 6.7.

2: If it takes a strong laser light pulse to penetrate the water column and still yield a reflectance, why not just pump up the strength of the laser?

This could cause extra noise by using excessive energy which can produce multiple scattering. It also could affect the environment which could be unsafe to humans and marine life. nicely done

3: We know water refracts light, so how does this angular change in bathy lidar get corrected?

Refraction is corrected using Snell's Law, which adjusts for light's speed and direction change from air to water. LiDAR software applies correction algorithms to refine depth calculations.

need to correct for refraction by having a measurement of the top of water and

4: What is the vertical positional accuracy of the LiDAR data?

LiDAR's vertical positional accuracy varies by sensor and conditions, typically ranging from ±10 cm to ±30 cm for bathymetric LiDAR.

5: Does bathymetric LiDAR work in the surf zone of a beach? Why/why not?

Bathymetric LiDAR struggles in the surf zone due to turbulence, bubbles, and high wave energy, which scatter laser pulses and hinder bottom detection.

6. **What is the approximate swath width and post-spacing of the LiDAR in meters? 0-1m, 1-10m, 100+m Explain.**

The pulses are range from 0-1m apart and can be due to the altitude at which the drone is sending the pulses. Lower altitude could result in ultra fine resolution and a higher amount of pulse returns.

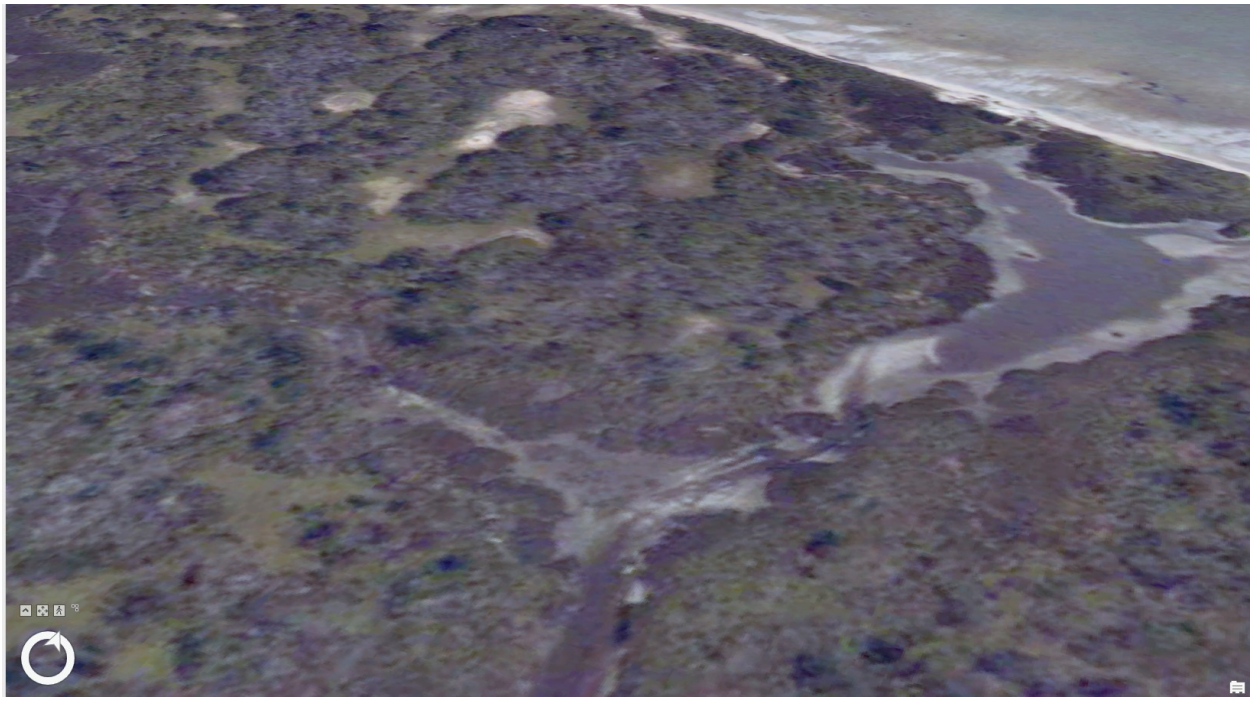
7. Visually examine the all-returns LiDAR points. Are any data voids evident? Explain possible causes of these (keep in mind the difference between the topo and bathy laser measurement systems and the surface features.)

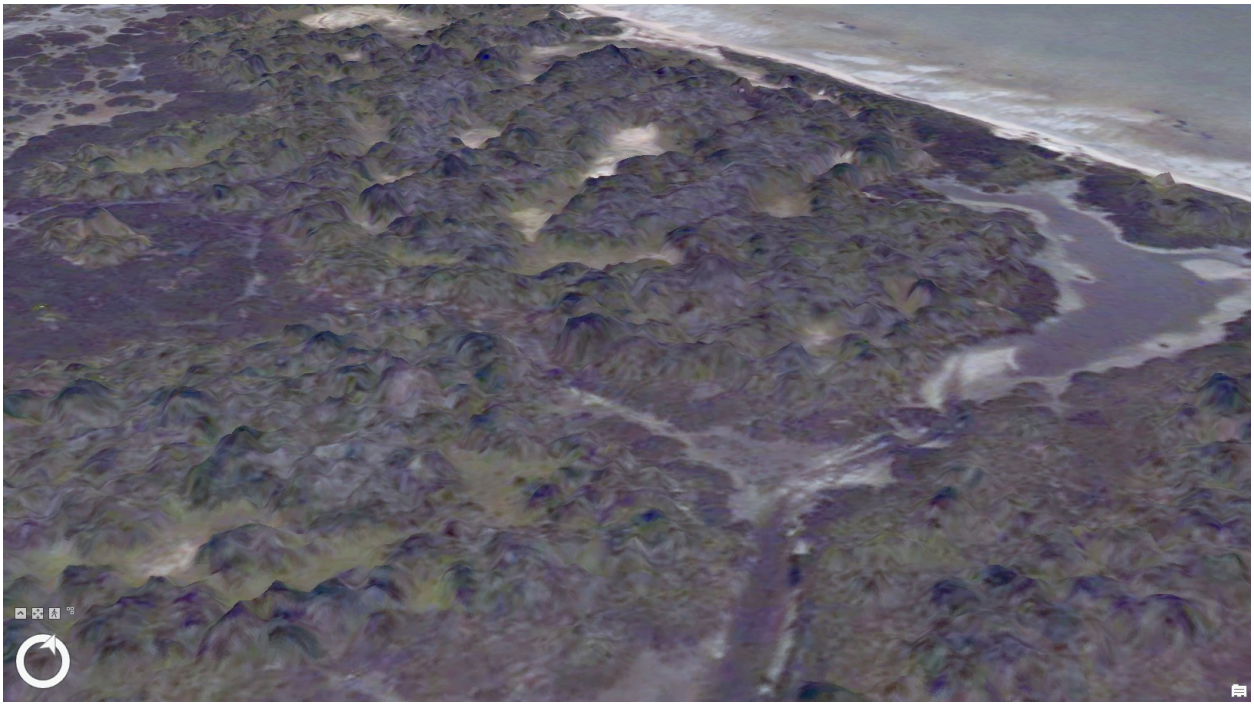
Yes, you can see data voids in this due to areas with strong wave action or turbid water. This prevents laser penetration and can scatter the signals.

8. Inspect the bare surface areas of the remains of Diamond City. What can you infer or even measure about the building sites? Which layer is the DEM and which is the DSM? Were these areas potentially 7 elevated on dunes or berms? Include a screenshot to support your interpretation. Annotate if helpful.

also some voids over the canopy of vegetati

One could infer that given the surfaces the building themselves were unstable and prone to disasters. The DEM would be the min layer showing the bare-earth whereas the DSM is the max layer showing the surfaces and elevation to the objects. I think these surfaces were elevated in dunes.





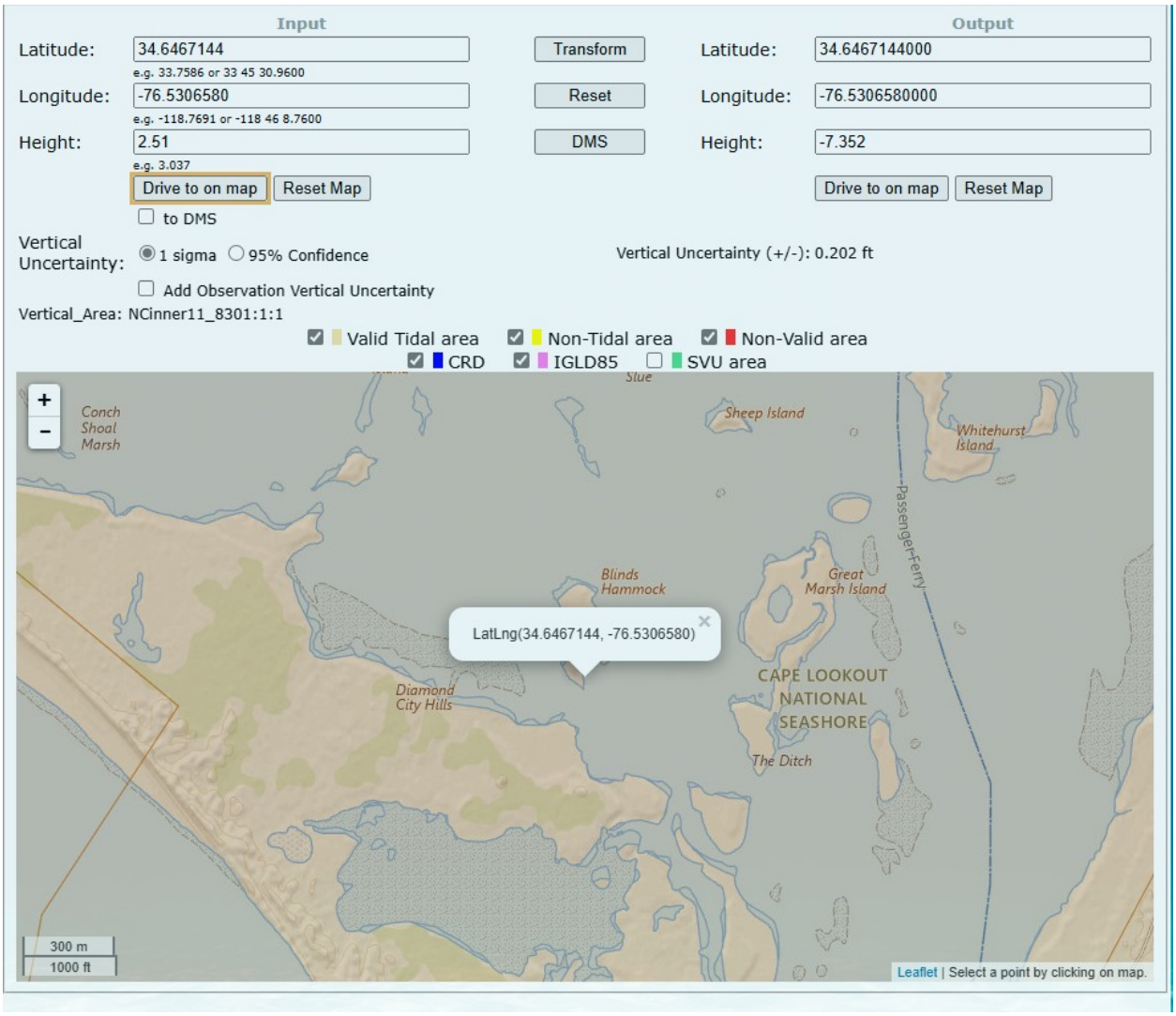
9-10: If Dr. Allen were to purchase his dream yacht, something like this 38ft Hunter 380 with a fixed 5ft (1.52m) keel, will he make it through the channel at the location above on a high tide OR will be grounded and forever marooned with the ghosts of Diamond City? Explain and include any supporting results. (You can also document your VDATUM calculation.)

7.352m-1.52m=5.832m

Safety margin

5.832-0.61= 5.222m

Since the depth available is 5.222m Dr. Allen would have more than enough clearance and would safely pass through the channel at high tide.


Input
Latitude:
34.6467144
e.g. 33.7586 or 33 45 30.9600
Longitude:
-76.5306580
e.g. -118.7691 or -118 46 8.7600
Height:
2.51
e.g. 3.037
Drive to on map
Reset Map
to DMS
Transform
Reset
DMS
Output
Latitude:
34.6467144000
Longitude:
-76.5306580000
Height:
-7.352
Drive to on map
Reset Map
Vertical Uncertainty:
1 sigma
95% Confidence
Vertical Uncertainty (+/-): 0.202 ft
Add Observation Vertical Uncertainty
Vertical_Area: NCinner11_8301:1:1
Valid Tidal area
Non-Tidal area
Non-Valid area
CRD
IGLD85
SVU area
Conch Shoal Marsh
Sheep Island
Whitehurst Island
Passenger Ferry
Blinds Hammock
Great Marsh Island
LatLng(34.6467144, -76.5306580)
Diamond City Hills
CAPE LOOKOUT NATIONAL SEASHORE
The Ditch
300 m
1000 ft
Leaflet | Select a point by clicking on map.