

Lab 08: Analyzing LIDAR Data

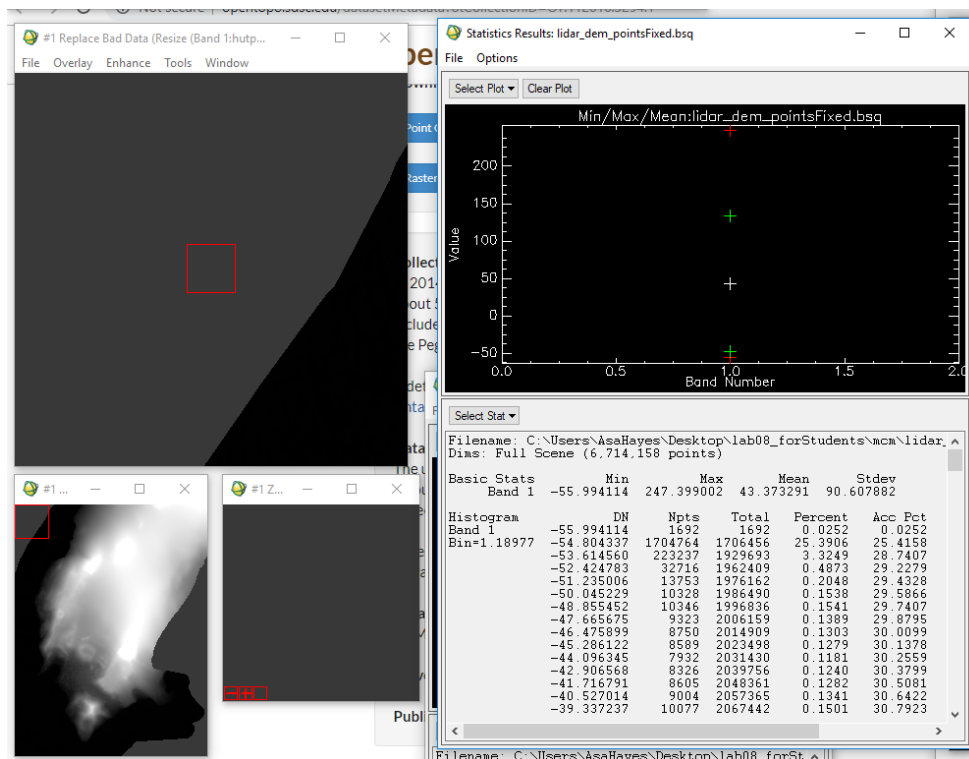
Question 1. What is the spatial resolution of the LIDAR DEM for McMurdo Station?

The resolution is lidar_dem.bsq is 2m/px.

Question 2. Visually inspect the McMurdo LIDAR DEM and use the Cursor Location/Value Tool and Compute Statistics to examine the actual elevation values. Do you notice any potential problems with the data in its raw form? If so what are the problems and why might these errors exist in the original data set.

The main issue with the data is that ~17% of the pixels have no values. However, due to the formatting, that is represented as each null point having a DN of -9999 (not possible) instead of just having a null value, which heavily skews the file's statistics. This can be attributed to both signal dropoff from the sensor and a poor implementation of null values.

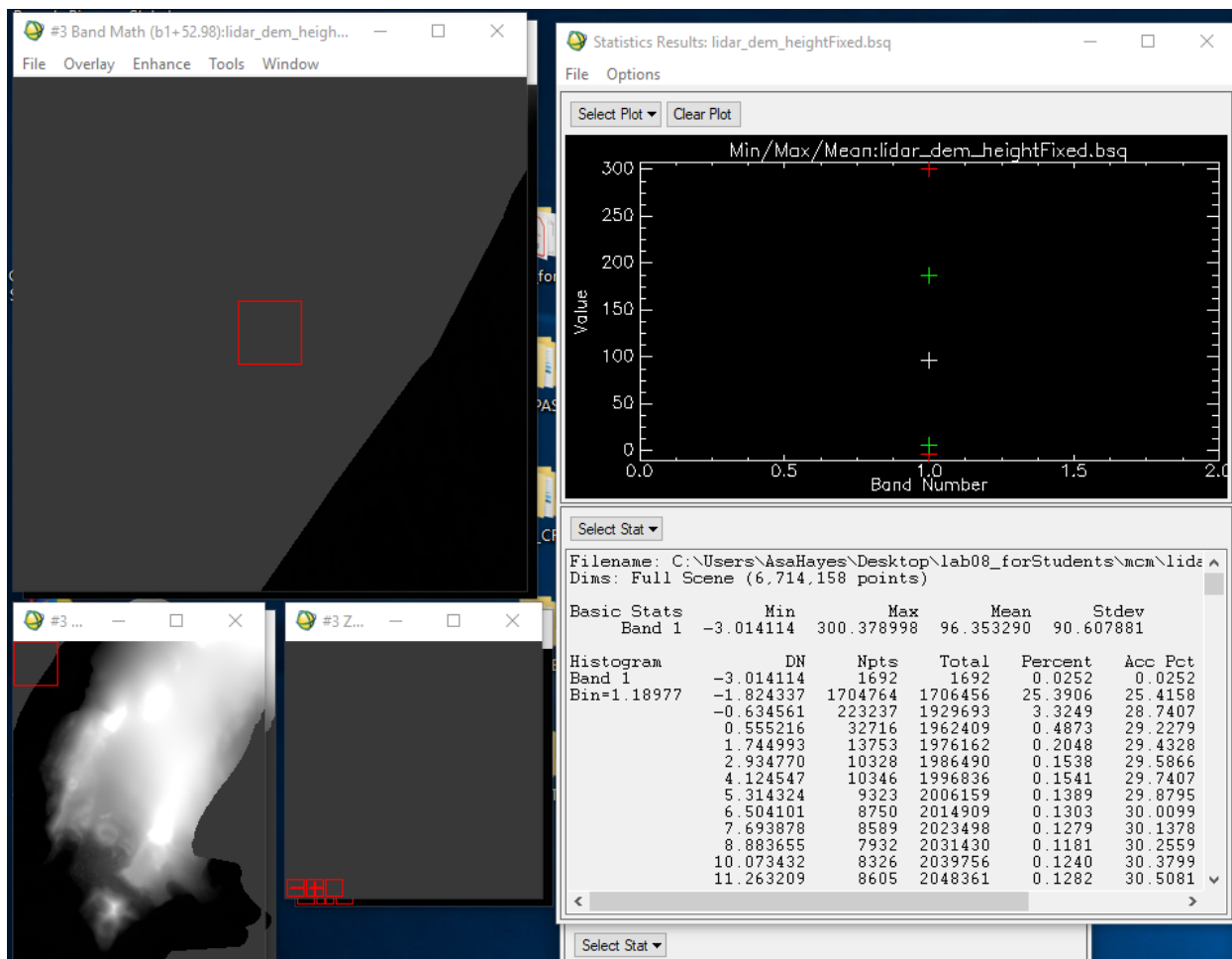
Question 3. Use ENVI to fix these bad elevation values. Once you have repaired the bad data values and instructed ENVI to ignore certain elevations, please recompute the statistics and include a screenshot of your statistics window in your assignment.



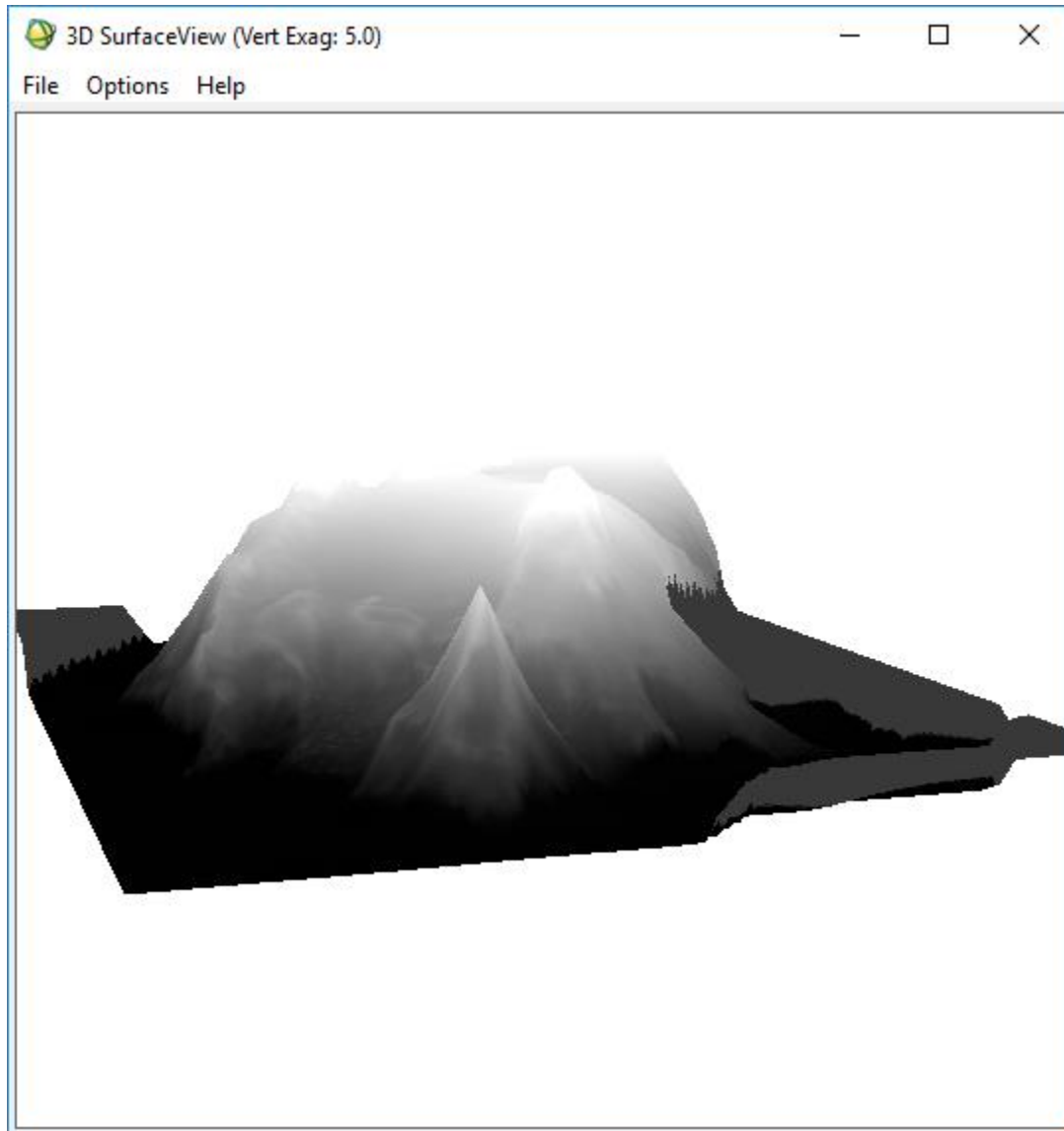
Question 4. Do these elevation values seem correct for an island, why or why not? You might also wish to use the Cursor Location/Value tool to examine individual elevations to see if they make sense.

No, the points seem to be categorized wrong, as the image parts that show sea (in black) have a negative value, despite their supposed value as 0 in sea level. This indicates that all the other values are likely off-point as well.

Question 5. Include a screenshot of the recomputed statistics window in your report. Have you corrected the elevations of this DEM to your satisfaction? Why or Why Not?



Question 6. Now for some fun... use your corrected DEM and the Quickbird image in the 3-D surface view function to create a nice 3-D perspective view of McMurdo Station. Include a copy of this image in your report.



Question 7. What part of Houston does the LIDAR DEM cover?

This image covers part of Northeast Houston.

Question 8. What is the spatial resolution of the LIDAR DEM? What is the maximum and minimum elevation range? Give correct units of height.

The spatial resolution is 1m/px. The minimum height is 12.084101m and the maximum height is 116.527786m.

Question 9. What features appear missing from the DEM? Is this a bare earth DEM?

There do not appear to be any buildings, which there would be were this not a bare earth DEM.

Question 10. What is the tall feature located in the northeastern portion of the DEM?

This raised feature is a landfill, indicated by both its shape and the adjacent “Bluebonnet Landfill” Road.

Question 11. Calculate the approximate volume of the tall feature in cubic meters. Show your work clearly.

2D measurements are 420m wide and 370m long, this gives a base area of ~155400m. From observations using the “Cursor Location/Value” tool, the landfill can be determined to be approximately shaped like a square pyramid. The peak height of the pyramid appears to be approx. 116ft, which converts to 35.3568m. The formula for volume for a square pyramid is $V = a^2 * (h/3)$. [V=volume, a=base area, h=peak height] From determined values, result of this has $V = 2.85 \times 10^{11} \text{ m}^3$.

Question 12. Do you think this calculated volume is an overestimate or underestimate?

Explain your reasoning.

I believe that this figure is likely an underestimate from the true value, as the landfill, when observed from a satellite image (Google Maps) does not appear to have a deep enough slope to be a perfect square pyramid.

Question 13. How do you think the flooded pit to the south of the tall feature was formed (e.g. for what purpose was it created)? How do you think the volume of the pit compares to the volume of the tall feature? Explain your reasoning.

This pit was likely excavated to obtain the soil to put over the contents of the landfill next to it. As it was an empty pit, it is reasonable to assume it was gradually filled rainwater, runoff, etc. to create a pond. I would estimate that the removed volume from the pit is a decent amount less than the calculated volume of the landfill from question 12 due to a large amount of the landfill's volume being buried waste.