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GEOG 419

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Lab 4

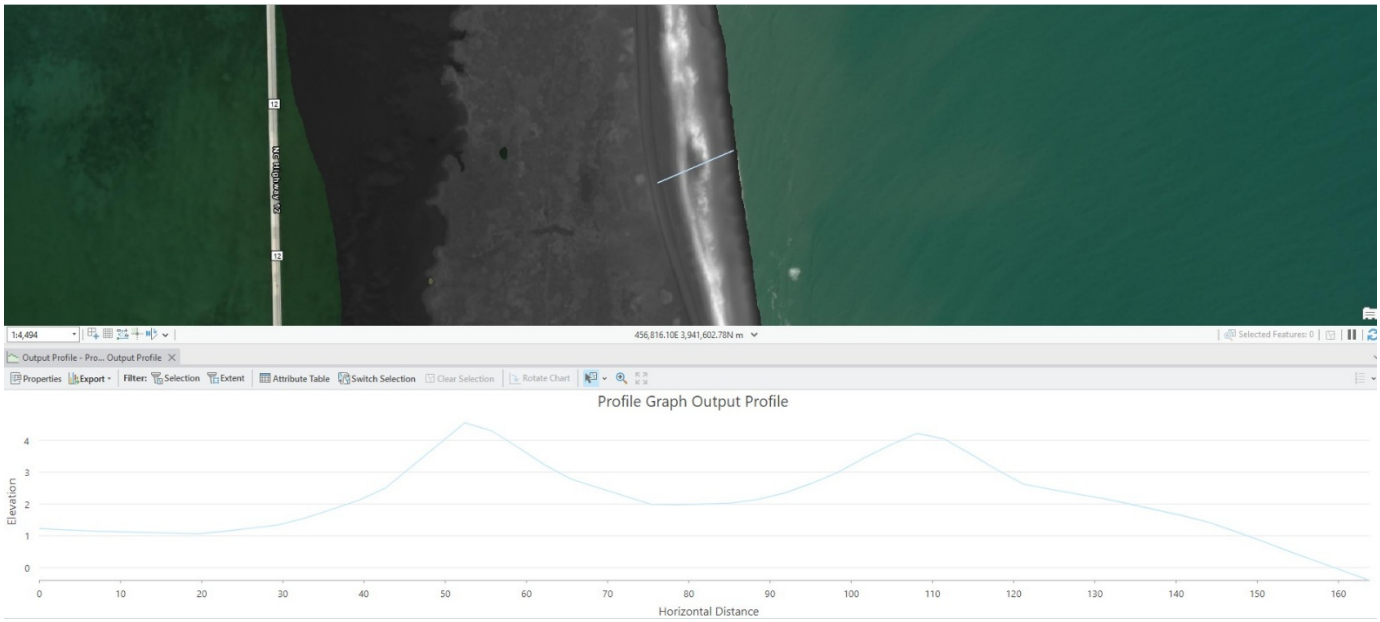
1: Compare and contrast the LiDAR DEM data from the datasets. What are the typical common parameters and what apparently different (improving?) between 1996-2019 available data? (Hint: evaluate the resolution, spatial extent, voids, and how the Lidar apparently handles buildings.)

All datasets are LiDAR-derived DEMs in the UTM zone 18, NAD83 coordinate system, using airborne LiDAR technology in raster grid formats. Older datasets (1996, 2008) have coarser resolution, while newer ones (2016, 2019) feature finer resolution with clearer details. Spatial coverage has expanded, with recent datasets encompassing larger areas with fewer voids. Enhanced classification algorithms in the latest datasets (2016, 2019) improve building removal, producing more accurate "bare earth" DEMs.

2: Visually inspect the DEMs for the Rodanthe Village and/or New Inlet areas. Describe 3 evident coastal changes that are apparent in the DEMs over time. Support your inference with measurements or annotation.

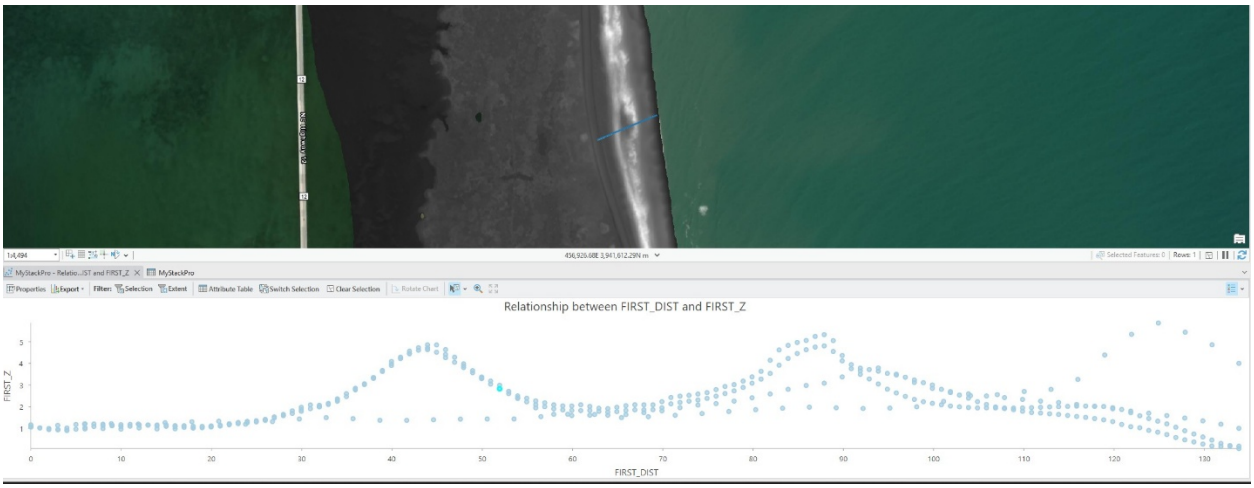
- The 1996 DEM depicts continuous dunes, while later DEMs (2016, 2019) show scarped or eroded dunes.
- Over wash fans increase in later DEMs, appearing as new deposits landward of the beach.
- The shoreline shifts westward between the 1996 and 2019 DEMs, with measurable retreat distances in ArcGIS.

3: Interpret the profile graph and included a supporting screenshot. The units (horizontal and vertical) should match the UTM metric and vertical MHW (meters) values in our data description. Describe the features and their topographic measures.



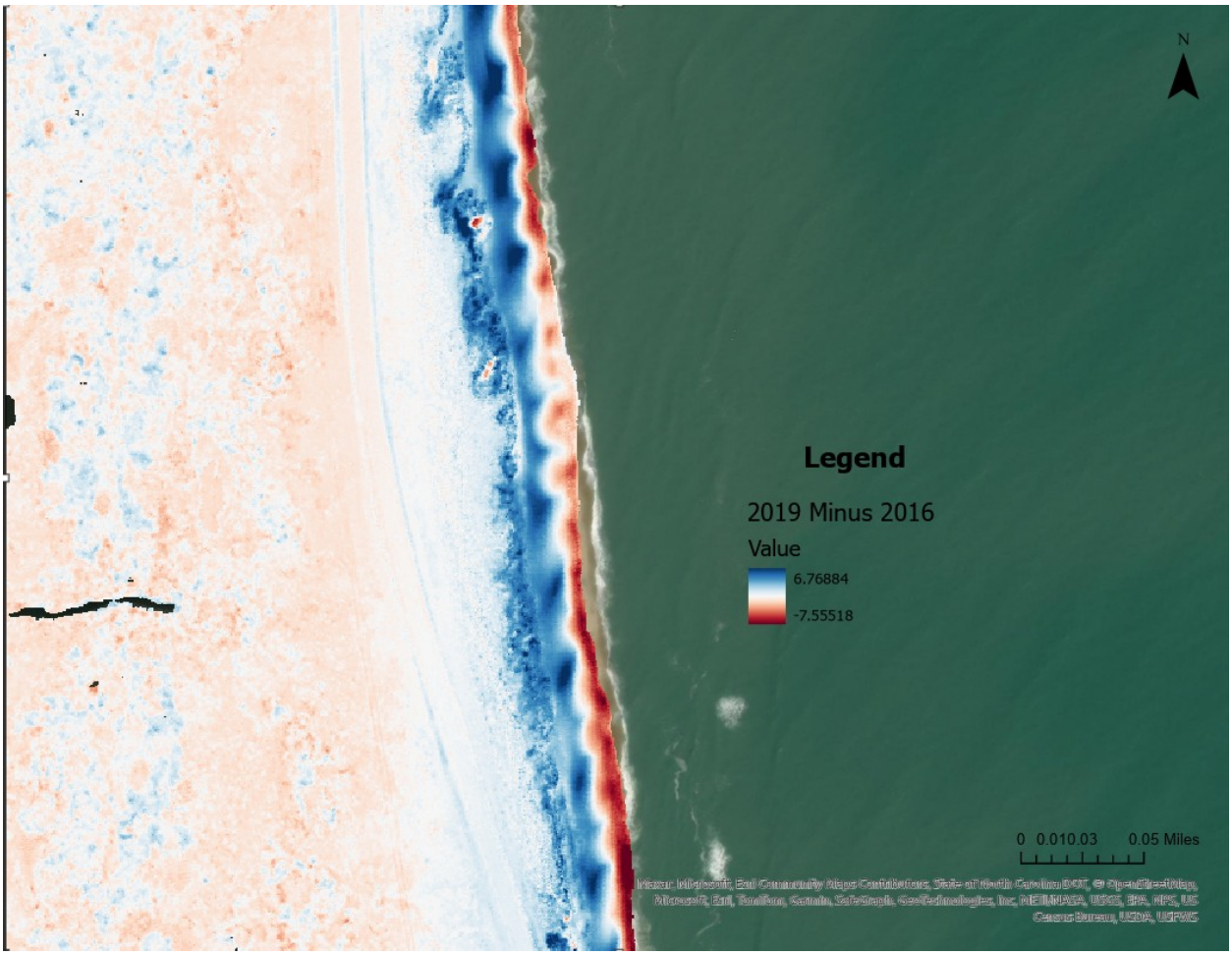
- The profile reveals elevation changes from the beach to the street and reveals two dunes.
- Measurements show that dunes reach approximately 3-4 meters in elevation, with lower beach slopes.

4-5: Interpret any apparent topographic changes in the profiles. While you may be limited to the inspection of values and don't have multiple individual prior graphs, what inferences and measurements can you estimate from the stacked profiles? Include a screenshot of your profile (map) and associated stacked profile graph.



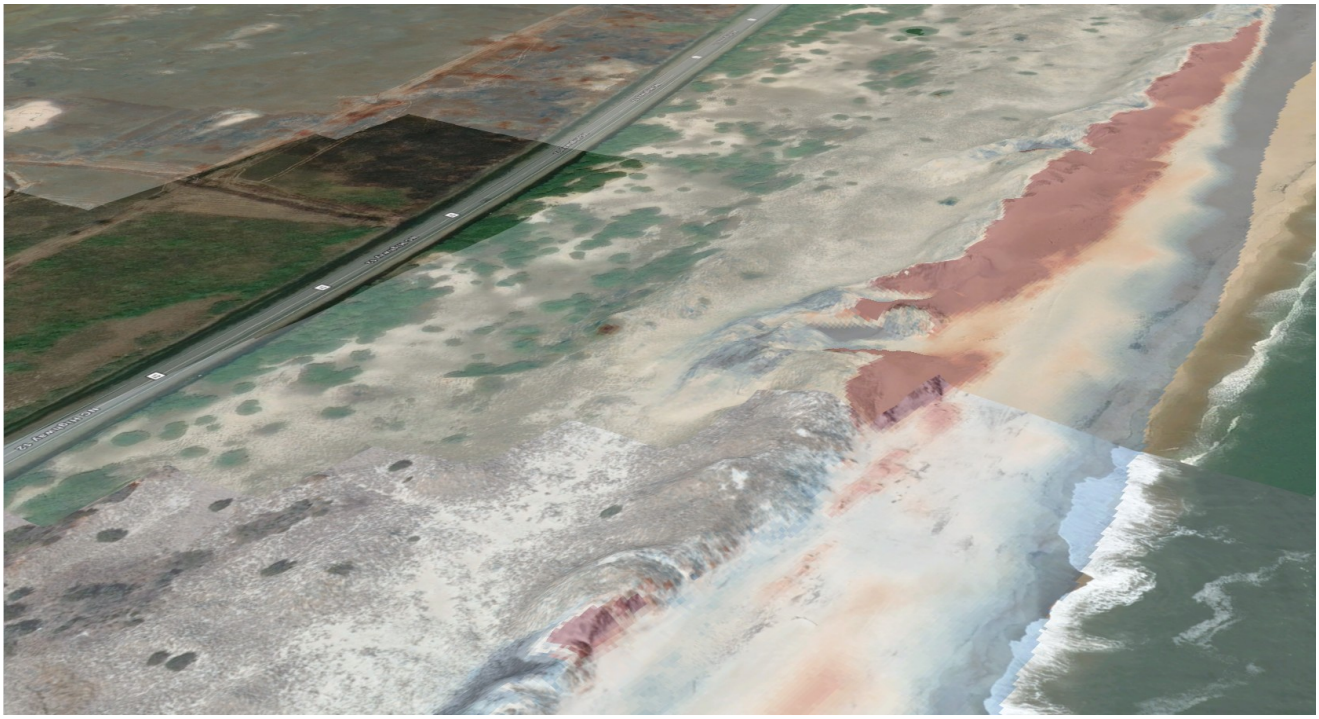
- The stacked profile graph shows a decrease in dune height over time, indicating erosion.
- Some profiles indicate beach narrowing, with shorelines migrating landward.
- The greatest difference appears between 1996 and 2019, showing overall dune lowering and position change. This could be man built or due to erosion and storm damage.

6-7: Make a screenshot of one of your change analysis results and include the legend from the map Contents in the view. Interpret the changes observed and any limitations or artifacts, if any, in the Lidar DEM layers you used.



- The 2019-2016 change raster indicates areas of beach accretion (blue) and erosion (red).
- The dune has not changed much but towards the beach slope there has been an increase whereas the shore line shows erosion.
- The 2019-1996 change raster shows dune replacement (green) and erosion(red).

8-10: Compose a perspective view that illustrates an area and some types of coastal change you are interested to interpret and describe. Make a screenshot and optionally annotate the changes, and highlight your findings in a short paragraph. Note any expected changes as well as surprises (or artifacts or discrepancies) while remembering that the imagery is a recent Esri sourced ortho and does not necessarily coincide with the DEM source.



The perspective view provides a detailed comparison of the 2019 and 2016 LiDAR imagery, highlighting significant coastal changes. The transparency adjustment enhances visualization by revealing both elevation differences and the underlying aerial imagery. The 3D perspective clearly illustrates the westward retreat of dunes and the formation of over wash deposits along the barrier island. Areas of erosion, marked in red, indicate dune and shoreline loss, while regions of accretion, shown in blue, reveal areas where sand has accumulated. This visualization offers a comprehensive view of coastal dynamics, emphasizing both the impacts of erosion and natural sediment deposition over time.

Extra Credit: