FL Peninsular 2018 Lidar Project

Palm Beach County –

FL Southeast Tie Analysis

Report Produced for the United States Geological Survey

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SUBMITTED BY:

Dewberry
1000 North Ashley Drive Suite 801
Tampa, FL 33602

Point of Contact:
Elise MacPherson, Project Manager
813.421.8647

SUBMITTED TO:
United States Geological Survey

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Introduction

Dewberry was tasked to evaluate how well the newly produced FL Peninsular Palm Beach County (acquired in early 2019) ties spatially to preexisting lidar data produced for the Florida Southeast lidar project. The lidar data for the FL Southeast project was acquired for United States Geological Survey (USGS) in late 2018. Dewberry has compared the new Palm Beach County lidar data to the existing FL Southeast data where the two datasets overlap.

Edge-Tie Analysis

There are 21 Palm Beach tiles which overlap with the FL Southeast lidar data, shown in Figure 1 below. A difference raster was produced to analyze elevation differences between the two datasets in areas of overlap. Profiles and visual reviews were used to compare the two datasets where the datasets are adjacent, but do not overlap. This review of the adjacent, non-overlapping areas was to ensure no obvious feature discontinuities exist between the datasets. Dewberry has determined that no gross feature discontinuities were identified.

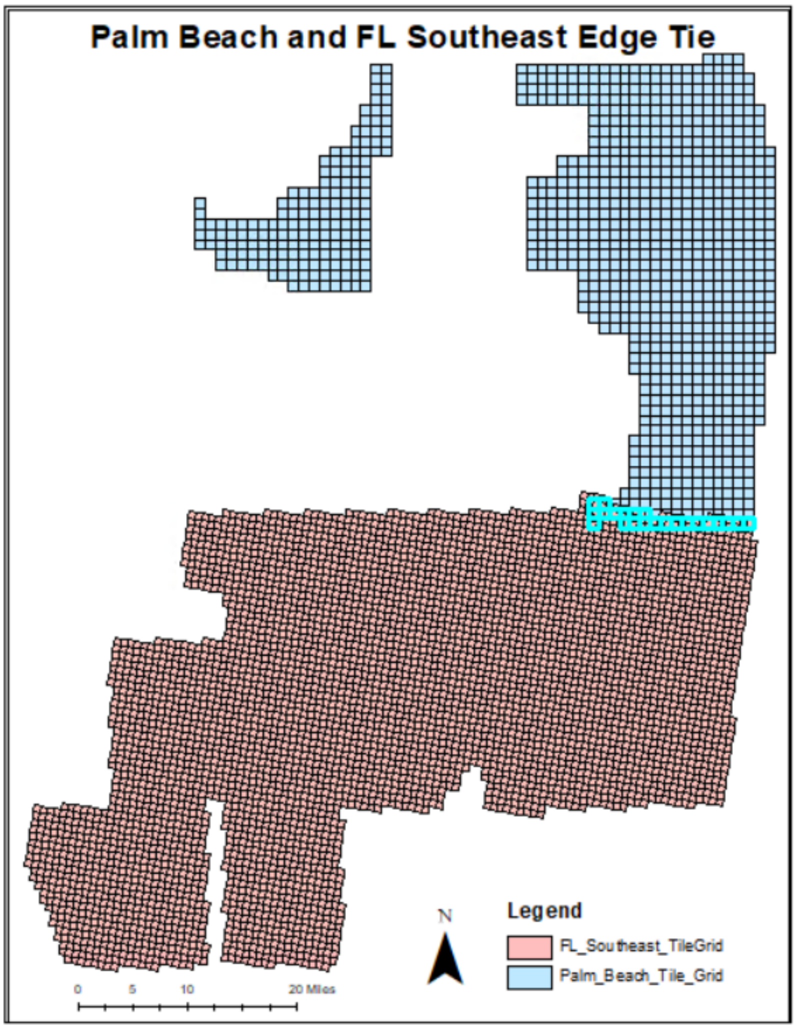

Figure 1 - Twenty one tiles overlap between the Palm Beach County AOI and previously collected FL Southeast.

DIFFERENCE RASTER

The USGS FL Southeast DEMs were 0.5 meter DEM cell size. The Palm Beach County DEMs are 2.5 feet. The FL Southeast DEMs were re-scaled and projected to match the 2.5 foot DEM cell size and State Plane East from Albers_Conus projection. Using the 2.5 ft bare-earth DEMs for each dataset, Dewberry created a difference raster by subtracting FL Southeast data from Palm Beach county data (Palm Beach-FL Southeast). This difference raster is shown in Figure 2 below.

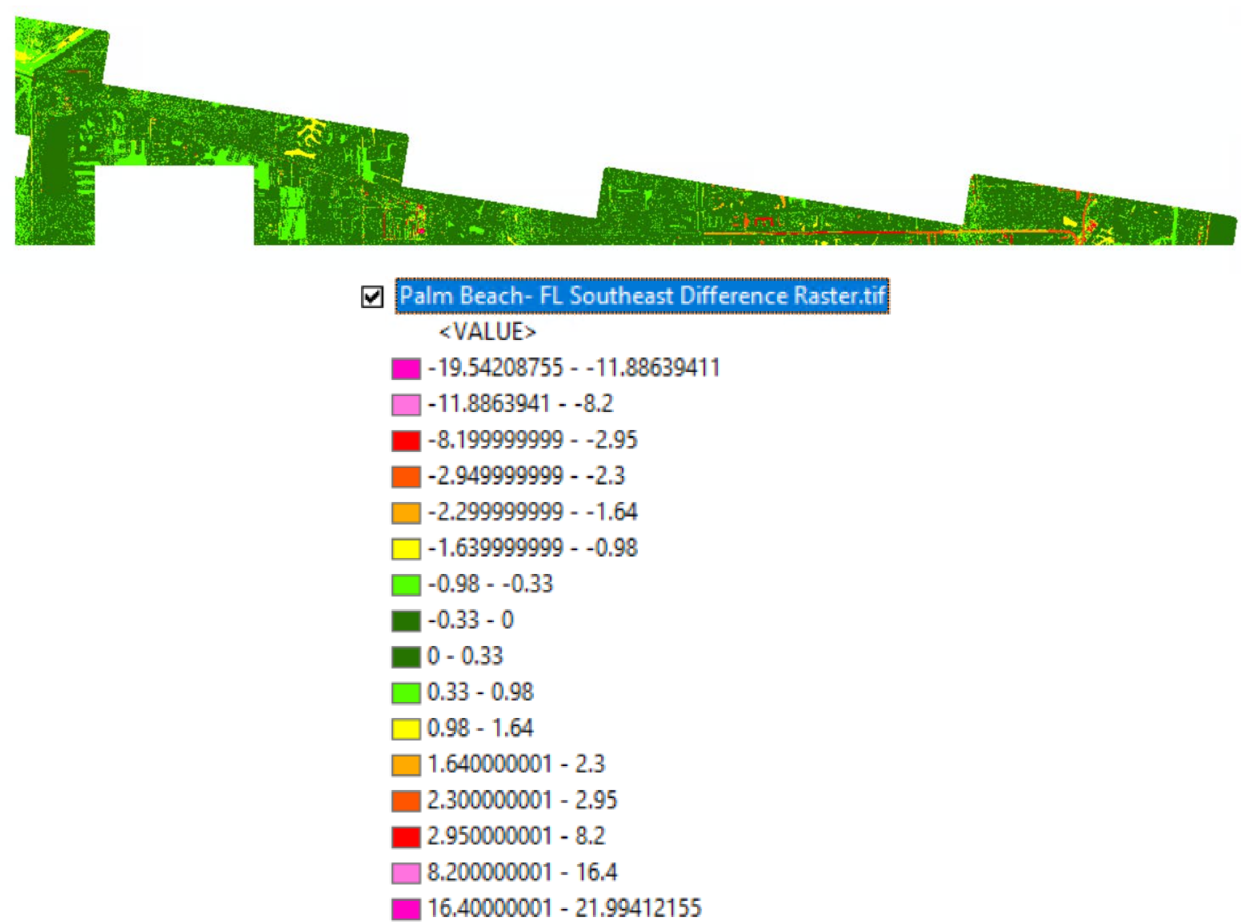

Figure 2 -Difference raster and symbology key created for the Palm Beach – FL Southeast overlap.

All hydrographic features breaklined in Palm Beach and FL Southeast including streams, rivers, ponds, and lakes were excluded from analysis as water levels varied between the two lidar acquisitions. Hydrographic features, overlaid on the difference raster, are shown in blue in Figure 3 below.

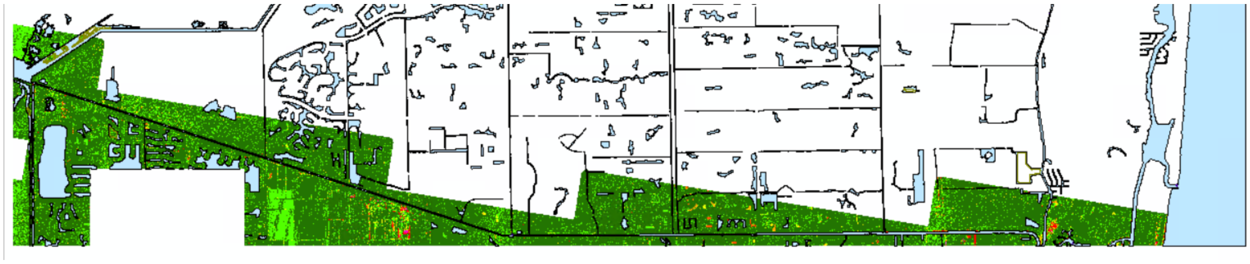

Figure 3 - Breaklined hydrographic features, coastal, dual line drains, and waterbodies, are shown in blue fill. These features were removed from statistical analysis generated from the difference raster as water levels may vary between the different lidar acquisition years.

ELEVATION DIFFERENCE THRESHOLDS

Per client discussions and requests, all overlapping data should be analyzed to show which areas have elevations within 10 cm (RMSEz requirements for USGS QL1 and QL2 data) of each other. As such, pixels in the difference raster representing 0 to+10 cm and 0 to -10 cm of elevation change between the two datasets are binned. From these initial bins, Dewberry then used thresholds of 20 cm up until +/-90 cm as this allows detailed analysis of changes occurring which are less than +/-1 m in difference. The 20 cm bins, starting from the required +/-10 cm bin also allows for analysis of change at +/-30 cm, which is the required VVA for USGS QL1 and QL2 data. Larger elevations differences tend to result from similar or consistent sources, so after the +/-90 cm bins, data are binned to +/-2.5 m, +/-5 m, and everything greater than +5 m or less than – 5 m. If the units of data are in feet, the metric values listed above are converted to feet for analysis.

Dewberry symbolized the difference rasters for this analysis using the binned values and color schema shown below. Values are in feet.

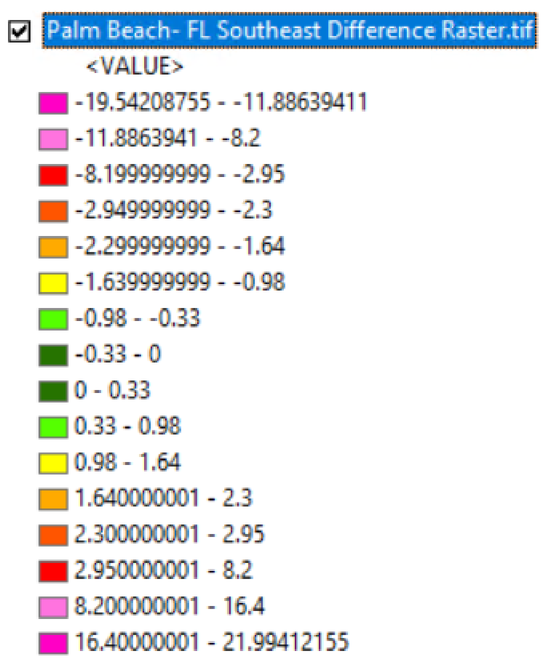

Figure 4- Pixels within the 0 to +/-30 cm (0.98 ft) threshold are colored as green. Dark green is used for pixels in the 0 to +/- 10 cm (0.33 ft) bin and light green is used for the +/-10 cm (0.33 ft) to +/- 30 cm (0.98 ft) bin.

EDGE-TIE RESULTS

Florida Southeast

When looking at all overlap areas consisting of all slopes and all land cover types, 82.34% of the overlapping points are within the 0 to +/10 cm (0.33 ft) threshold with the majority of these points being located in flat, open terrain. Additional analysis shows 97.62% of the overlapping points are within the 0 to +/-30 cm (0.98 ft) threshold with the majority of these points being located in vegetated areas. These variations are allowable elevation differences between the two datasets.

The remaining points that exceed +/-30 cm (0.98 ft) are located in areas with temporal offsets. The temporal offsets may occur in dynamic, non-static environments, such as wetlands, marsh, or floodplains, or may occur in less dynamic, upland areas due to man-made or cultural changes. The temporal offset cause in this overlap area are primarily located in wetland/marsh areas. The differences greater than +/-30 cm (0.98 ft) are described in the sections below.

WATER LEVELS, & CULTURAL CHANGES

The majority of areas with larger vertical differences between these two datasets occur within areas with changing water levels and construction areas where the ground has been changed over the time difference. In some areas cultural changes contributed to the vertical and horizontal differences between datasets. These types of changes are due to the few months temporal difference between the two lidar acquisitions.

The figures below show examples of these temporal changes.

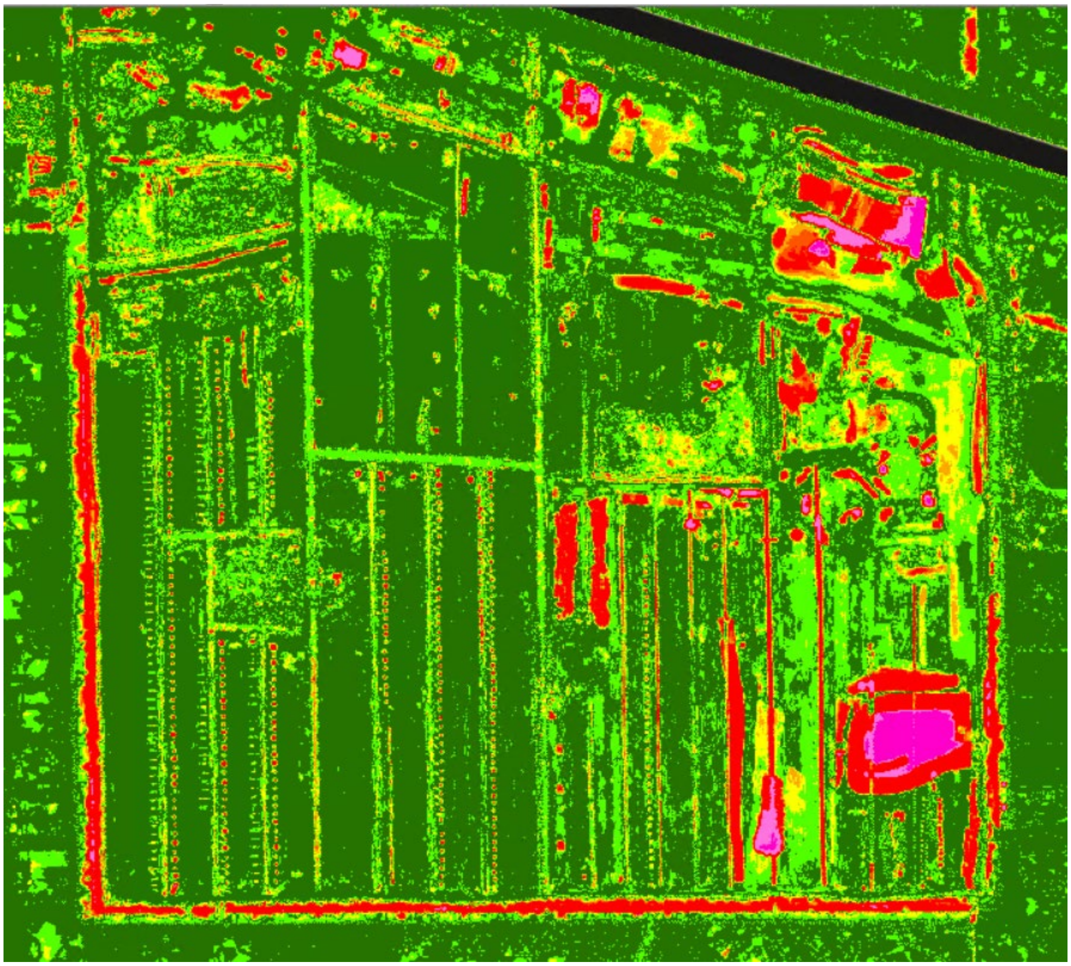

Figure 5- The image on top shows an area in the basemap between the overlap of these two acquisitions. The bottom image shows that same area of the difference raster with a temporal difference in the dynamic, non-static environments (wetland marsh) as well as man made changes of mounds from construction or upland site changes.

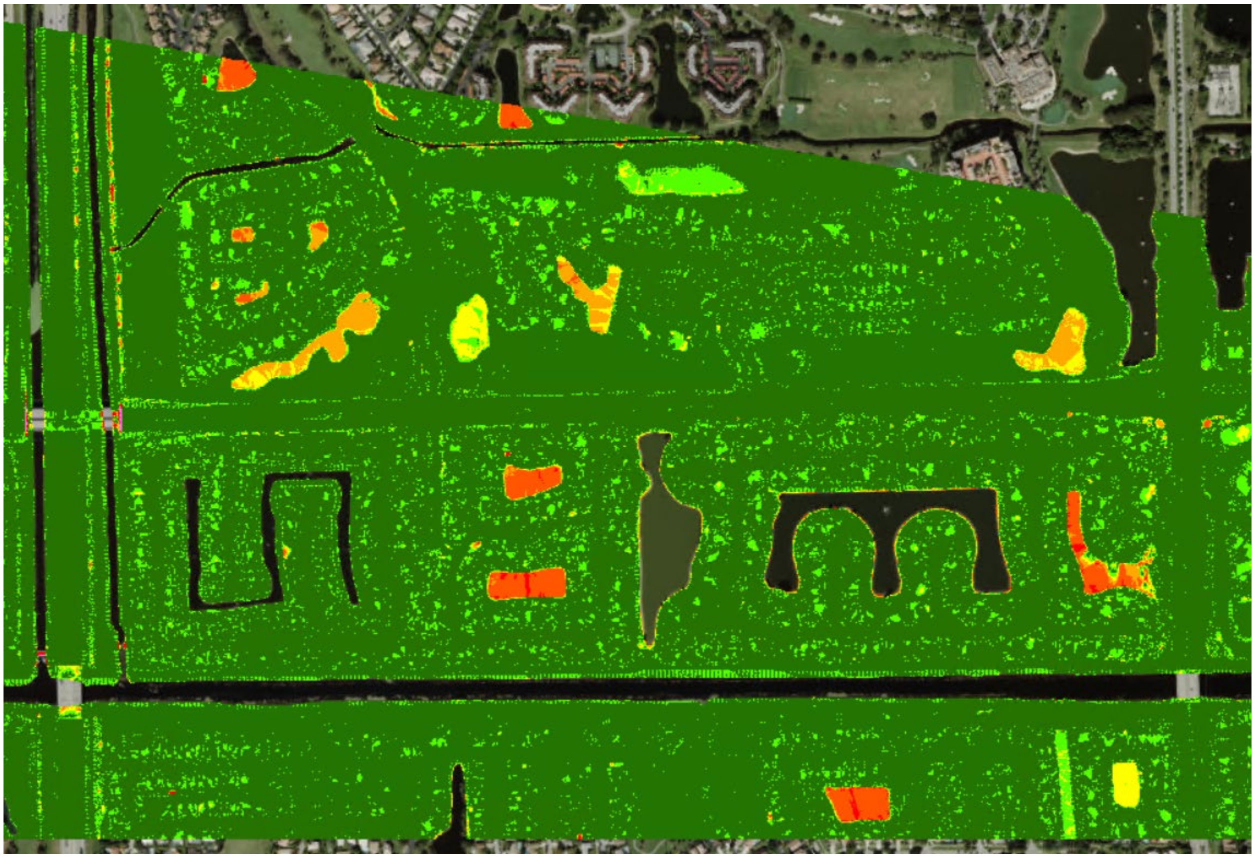

Figure 6- The image above shows an area with water level differences in waterbodies that did not meet specification and show a temporal difference.

Summary

Overall the Palm Beach County and FL Southeast lidar data match well with 82.34% of the overlap data matching within 0 to +/10 cm (0.33 ft) and 97.62% of the overlap data matching within +/-30 cm (0.98 ft). The areas of largest vertical elevation change occur due to temporal differences and include varying levels of water in hydrographic features and changes in wetlands/marsh areas. Cultural or man-made changes also contribute to larger elevation differences, including new hydrographic control structures, new reservoirs or impoundments, and likely construction/roadway improvements.