FL Peninsular Flagler County/ City of Palm Coast 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 Flagler County (acquired in early 2019) ties spatially to preexisting lidar data produced for the City of Palm Coast project. The lidar data acquired for the City of Palm Coast was originally acquired for SJRWMD in late 2017. Dewberry has compared the new Flagler County lidar data to the existing City of Palm Coast lidar data where the two datasets overlap.

Edge-Tie Analysis

There are 43 Flagler tiles which overlap with the City of Palm Coast 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.

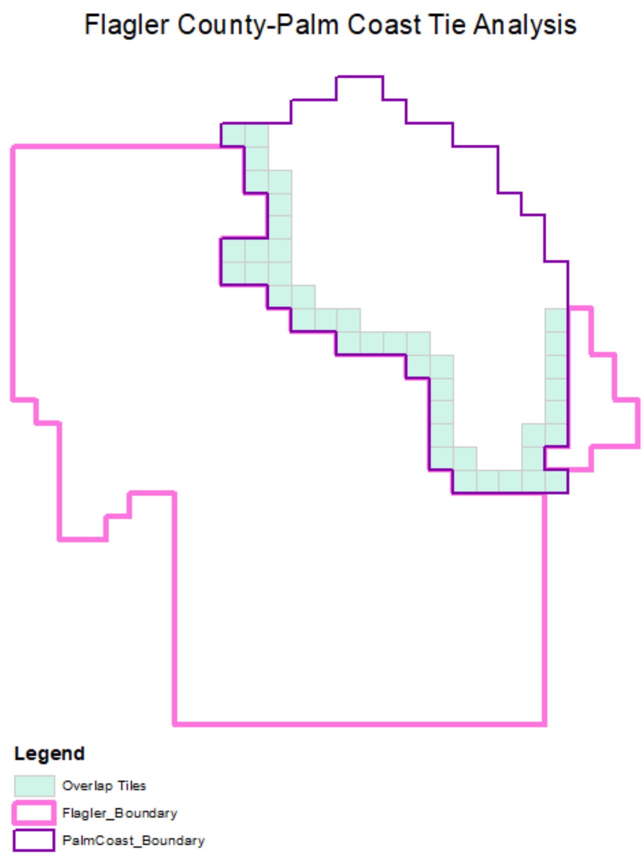


Figure 1- Fourty-three tiles overlap between the Flagler AOI and previously collected City of Palm Coast AOI.

DIFFERENCE RASTER

The SJRWMD City of Palm Coast DEMs match the 2.5 ft DEM size specified for Flagler county, the data was consistent. Using the 2.5 ft bare-earth DEMs for each dataset, Dewberry created a difference raster by subtracting SJRWMD City of Palm Coast data from Flagler county data (Flagler-City of Palm Coast). This difference raster is shown in Figure 2 below.

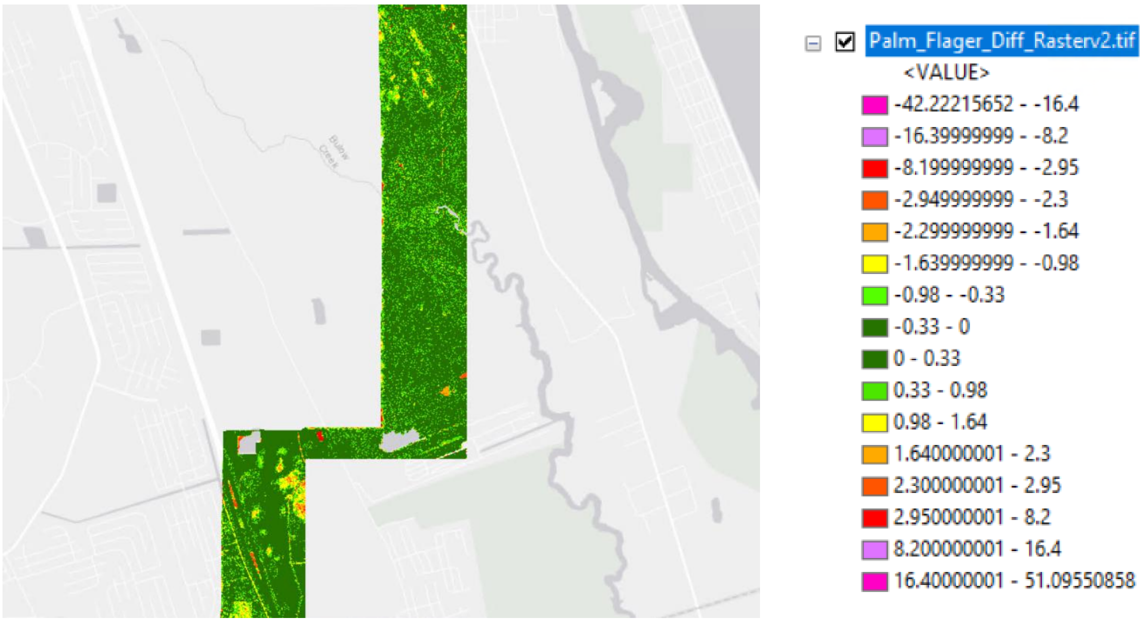


Figure 2-Difference raster and symbology key created for the Flagler- City of Palm Coast overlap.

All hydrographic features breaklined in Flagler and City of Palm coast 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.

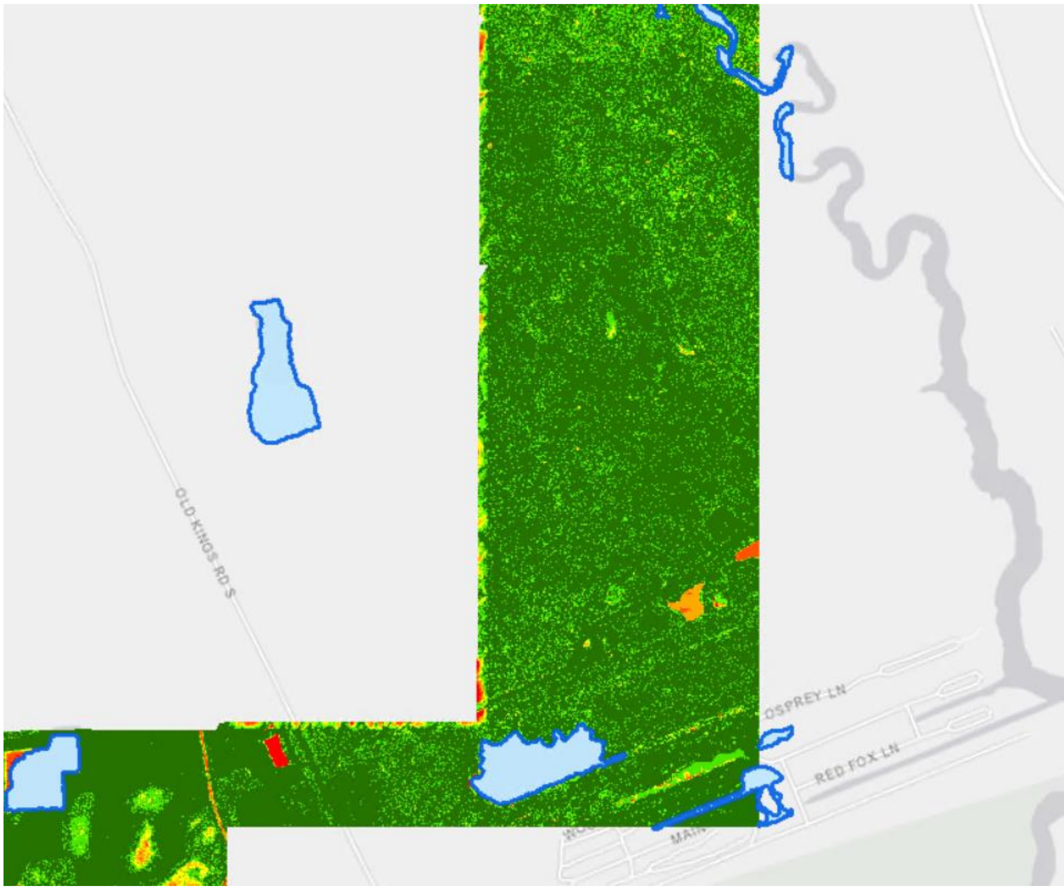
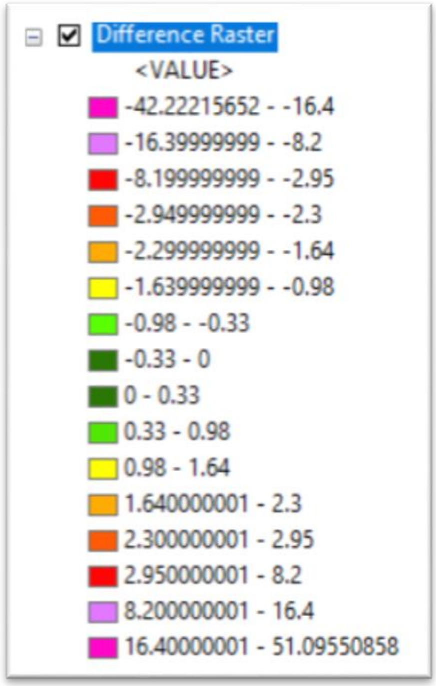


Figure 3-Breaklined hydrographic, shown in blue fill , were removed from statistical analysis generated from the difference raster as water levels may vary between the different lidar acquisition years.

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 occuring 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 raster for this analysis using the binned values and color schema shown below. Values are in feet.



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.

Figure 4 below shows the full difference raster symbolized with the key outlined above.

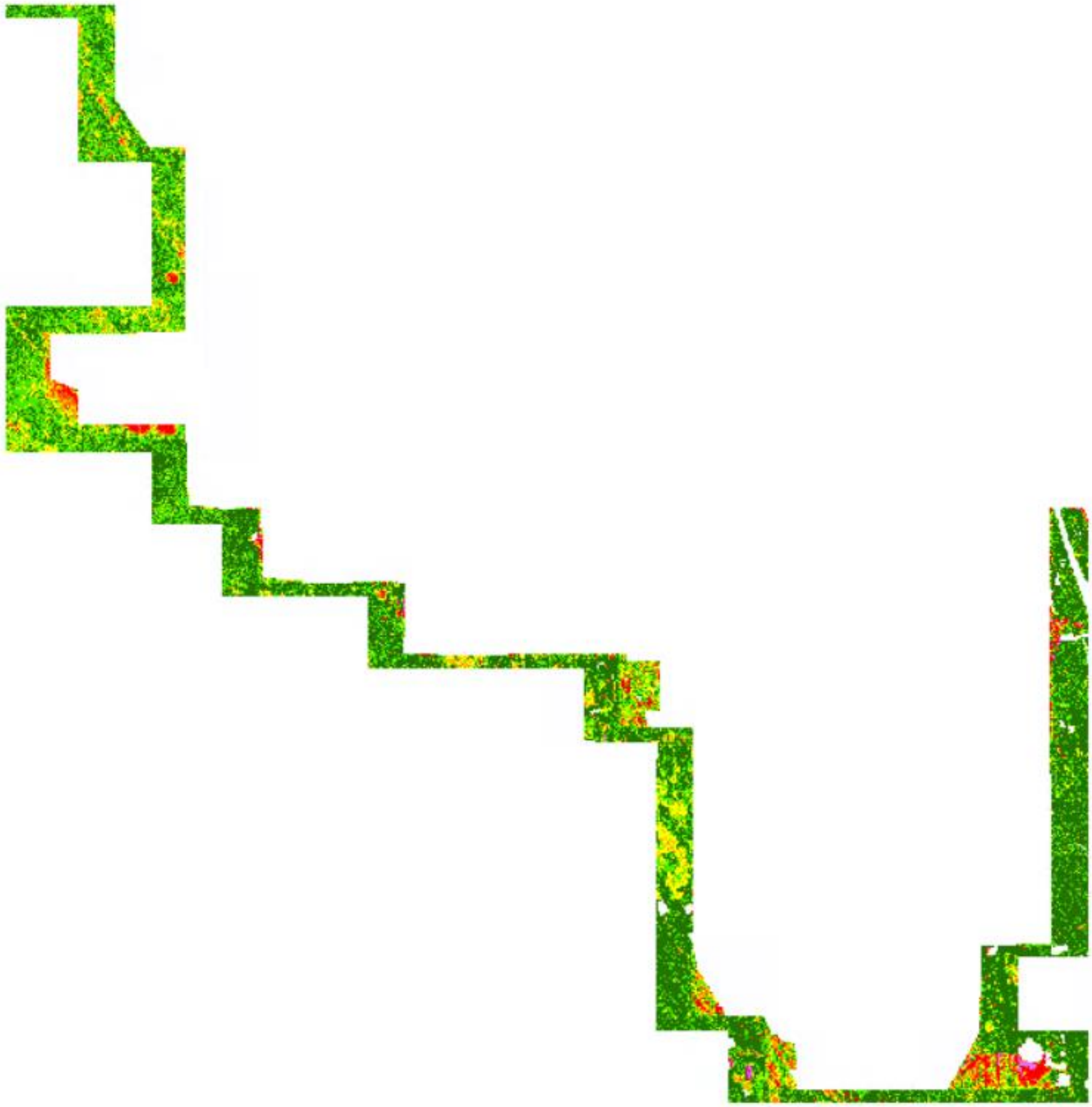


Figure 5- Full difference raster

EDGE-TIE RESULTS

When looking at all overlap areas consisting of all slopes and all land cover types, 51.31% 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 80.26% 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 located in wetland/marsh areas. The differences greater than +/- 30 cm (0.98 ft) are described in the sections below.

VEGETATION & WATER LEVELS

The majority of areas with larger vertical differences between these two datasets occur within vegetated areas and areas with changing water levels. These types of changes are due to the ~2 year temproal difference between the two lidar acquisitions as there are clearly changes in the vegetation height and water levels

The figures below show examples of these temporal changes.

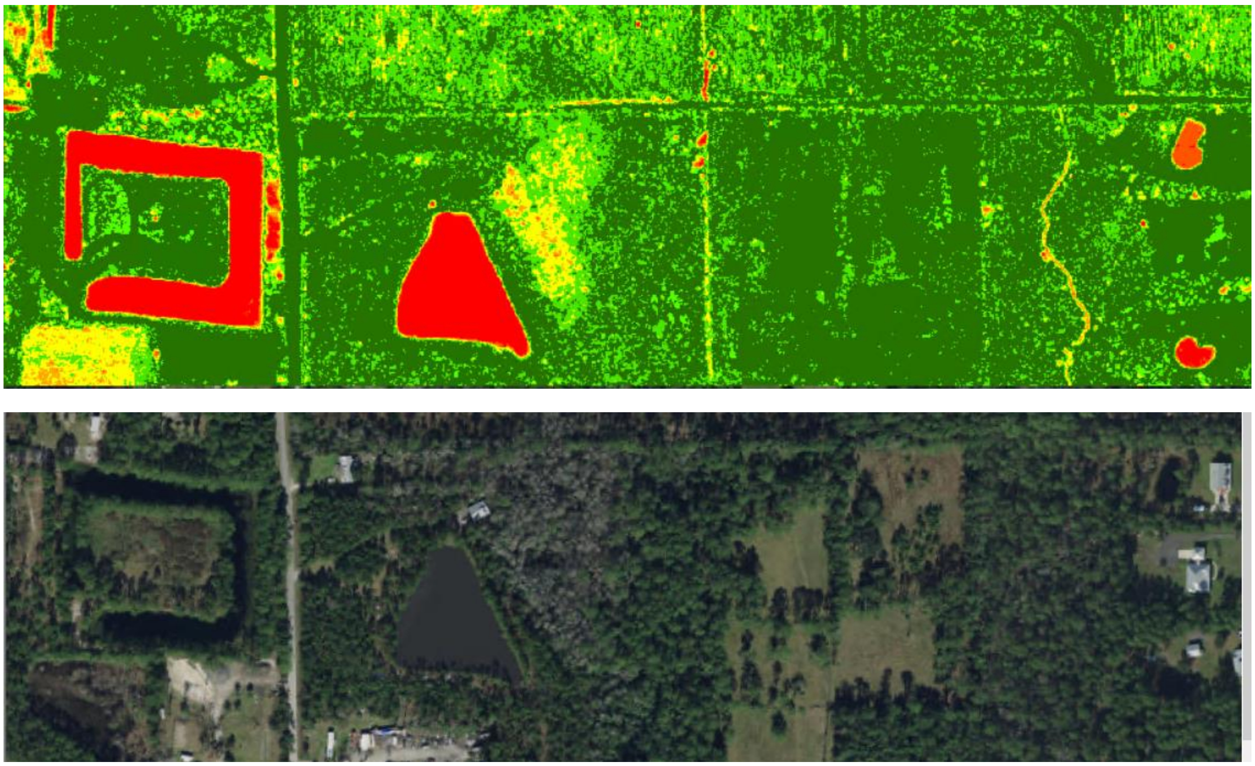


Figure 6- Top image shows difference raster of area with temporal difference. Bottom image shows this area in the Base Map Imagery.

Summary

Overall the Flagler and City of Palm Coast lidar data match well with 51.31% of the overlap data matching within 0 to +/10 cm (0.33 ft) and 80.26% 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.