FL Peninsular Collier County/ FL Southeast 2018 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 Collier County (acquired late 2018 and early 2019) ties spatially to preexisting lidar data produced for the USGS Florida Southeast project. The lidar data acquired for FL Southeast was originally acquired in mid to late 2018. Dewberry has compared the new Collier County lidar data to the existing FL Southeast lidar data where the two datasets overlap.

Edge-Tie Analysis

There are 47 FL Peninsular 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. Each pixel in the difference raster represents a value of elevation change between the two overlapping datasets.

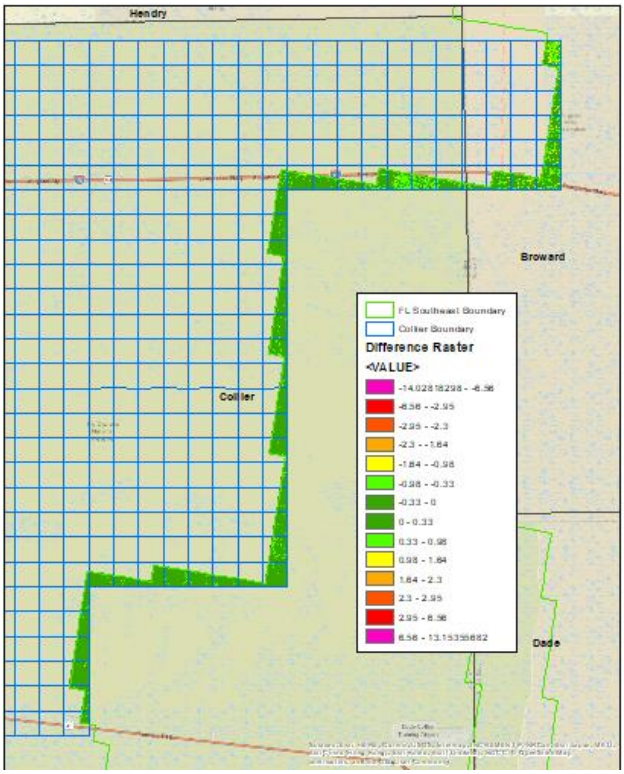

Figure 1-Forty seven tiles overlap between the FL Peninsular AOI and previously collected FL Southeast AOI.

DIFFERENCE RASTER

The FL Southeast DEMs were first re-sampled to match the 2.5 ft DEM size specified for FL Peninsular so that the data were consistent. Reprojections and vertical unit conversions were performed if the two

datasets had different Coordinate Reference Systems and/or different vertical units. Using the 2.5 ft bare-earth DEMs for each dataset, Dewberry created a difference raster by subtracting FL Southeast data from FL Peninsular (FL Peninsular [new]-FL Southeast[old]) . This difference raster is binned according to pre-determined threhsolds, shown in Figure 2.

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.

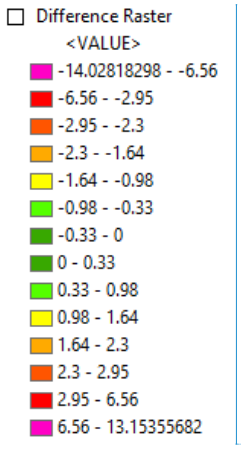

Figure 2-Symbology key, in feet showing the values and colors used for each bin. These bins were used to symbolize the difference raster for visual review and quantitaive analysis.

Commented [MM1]: Delete if difference raster is in meters

Commented [MM2]: Delete if difference raster is 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 3 shows the full difference raster symbolized with the key outlined above.

Figure 3-Difference raster, binned using thesymbology key outlined above, created for the FL Peninsular-FL Southeast overlap.

All hydrographic features breaklined in FL Peninsular 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 4 below.

Figure 4-Breaklined hydrographic features, shown in blue, were removed from statistical analysis generated from the difference raster as water levels may vary between the different lidar acquisition years.

EDGE-TIE RESULTS

When looking at all overlap areas consisting of all slopes and all land cover types, 87.9% 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 98.5% 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 result from vegetation changes. The differences greater than +/- 30 cm (0.98 ft) are described in the sections below.

Vegetation

The majority of areas with larger vertical differences between these two datasets occur within vegetated areas. These types of changes are due to the ~1 year temporal difference between the two lidar acquisitions as there are clearly changes in the vegetation height.

The figures below show examples of these temporal changes.

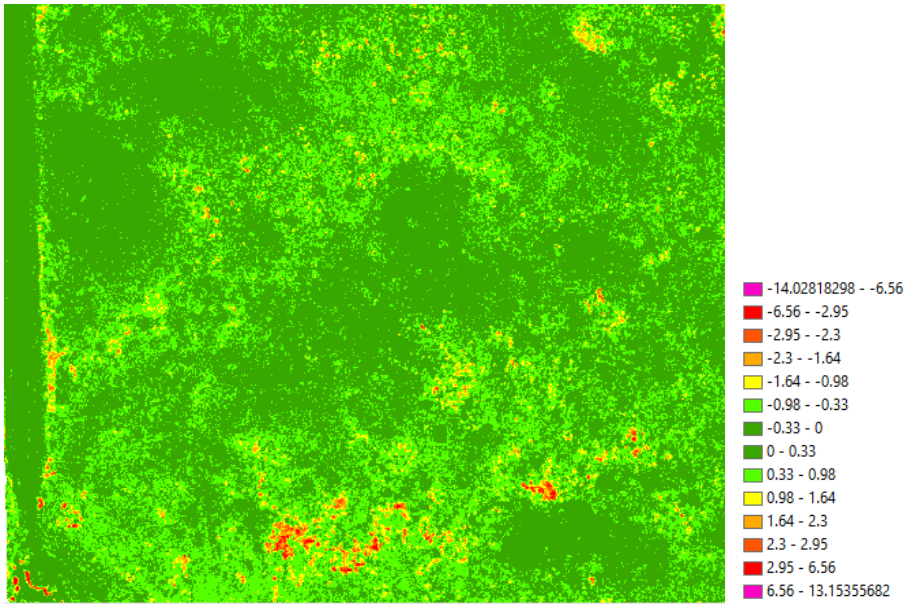

Figure 5-The image above shows the difference raster. Larger elevation differences exist in vegetated areas. The difference raster symbology key, in feet, is shown to the right.

Summary

Overall the FL Peninsular and FL Southeast lidar data match well with 87.9% of the overlap data matching within ±10 cm and 98.5% of the overlap data matching within ±30 cm. The areas of largest vertical elevation change occur due to temporal differences in vegetated areas.