Determining Optimal Post Spacing for Lidar DEM Creation Using Open Source and Commercial Software

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ABSTRACT

A Digital Elevation Model (DEM) has bare-earth elevation or z-values at regularly spaced intervals in the horizontal directions. These intervals, known as point spacing or grid resolution, become pixel size in raster data representations. Although DEMs contain a constant grid resolution, the grid spacing, datum, coordinate systems, data formats, and other characteristics may vary widely. There is no consistent, clear methodology to determine optimal post spacing from the nominal point spacing (NPS) of raw lidar data. The consensus from the literature is that the DEM point spacing size (grid resolution) should be at least equal to if not greater than the NPS. This presentation reports on methods used to help determine post spacing primarily using open source software.

Raw lidar point clouds over the Great Smoky Mountains and Grand Canyon National Parks were used to test DEM spacing scenarios gleaned from the literature. Ground points were filtered using LP360 software. Approximately 5% of these points were reclassified to act as control points and create a shapefile (using open source *lasthin* and *las2shp*). DEMs were created from the ~95% remaining points using Global Mapper. Then the DEM and shapefile z-values were used to calculate root mean square error (RMSE). The results show a general relationship of RMSE to DEM post size that generally follow a power law curve. This analytical approach can shed light on the NPS/DEM problem by empirically deriving a recommended scalar from various published techniques and two different study areas.