

Please provide the following information, and submit to the NOAA DM Plan Repository.

Reference to Master DM Plan (if applicable)

As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

1. General Description of Data to be Managed**1.1. Name of the Data, data collection Project, or data-producing Program:**

2016 - 2019 USGS Lidar: Alabama 25 County

1.2. Summary description of the data:

This data set is tiled lidar point cloud LAS files v1.4, for the 2016 Alabama 25 County lidar area of interest (AOI).

USGS NGTOC task order G17PD00243 required Spring 2017 LiDAR surveys to be collected over 18,845 square miles covering part or all of 25 counties in Alabama. These counties are Autauga, Baldwin, Barbour, Bullock, Butler, Chambers, Cherokee, Clarke, Conecuh, Covington, Crenshaw, Elmore, Etowah, Henry, Houston, Lamar, Limestone, Macon, Monroe, Pike, Randolph, Russell, Shelby, Tallapoosa, and Winston. Aerial LiDAR data for this task order was planned, acquired, processed, and produced at an aggregate nominal pulse spacing (ANPS) of 0.7 meters and in compliance with USGS National Geospatial Program LiDAR Base Specification version 1.2.

The data are divided up in 8 blocks. Please see the kmz provided in the URL section of this metadata record for the block footprints.

Block 1 - Lamar, Limestone, Winston Counties

Block 2 - Cherokee, Etowah, Shelby Counties

Block 3 - Chambers, Randolph, Tallapoosa (partial) Counties

Block 4 - Autauga, Barbour (partial), Bullock (partial), Elmore, Macon, Russell Counties

Block 5 - Barbour (partial), Bullock (partial), Henry, Houston Counties

Block 6 - Barbour (partial), Bullock, (partial), Butler (partial), Conecuh (partial), Covington, Crenshaw, Pike Counties

Block 7 - Baldwin (partial), Butler (partial), Clarke, Conecuh (partial), Monroe Counties

Block 8 - Baldwin County (partial)

Isolated gaps in GPS data were identified in several missions covering this project. As both, the IMU data and pulse data, were present across these gaps, using the fixed positions of the GPS on either end, the aircraft velocity across the gaps, and the IMU data, LiDAR calibration staff were able to reach an effective solution to address the GPS voids. Because these gaps were not uniform in size or correction, this extended the iterative LiDAR calibration efforts on this project. Subsequent rigorous data checking confirmed adequate results to meet the required accuracy specs. The USGS QA Team already reviewed affected data (blocks) for this project and found no QA/QC discrepancies to report regarding those gaps.

Geographic Extent: This data set is consisting of lidar point cloud, classified lidar, digital elevation model, and lidar intensity images which all pieces encompasses the 2016 Alabama 25 County lidar (Pilot) area of interest (AOI), approximately 18,845 square miles or 48,408 square kilometers.

Data set Description: This data set consists of lidar point cloud LAS swath files and tiled LAS files. Each LAS file contains lidar point information, which has been calibrated, controlled, and classified. Each file represents a separate swath of lidar.

Ground Conditions: water at normal levels; no unusual inundation; no snow; leaf off

How the Withheld Points are Identified: Withheld (ignore) points were identified in the files using the standard LAS Withheld bit.

Class Code:1

Class Item:Unclassified

Class Code:2

Class Item:Ground

Class Code:7

Class Item:Low Noise

Class Code:9

Class Item:Water

Class Code:10

Class Item:Ignored Ground

Class Code:17

Class Item:Bridges

Class Code:18

Class Item:High Noise

The NOAA Office for Coastal Management (OCM) downloaded the laz files from these USGS sites and processed the data to the Data Access Viewer (DAV) and to <https://viewer.usgs.gov/lidar/>. The

total number of files downloaded and processed was 23,054.

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B1_2017/ Number of files: 2305

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B2_2017/ Number of files: 2500

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B3_2017/ Number of files: 2243

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B4_2017/ Number of files: 3765

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B5_2017/ Number of files: 2505

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B6_2017/ Number of files: 3778

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B7_2017/ Number of files: 3879

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B8_2017/ Number of files: 2075

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/AL_25_County_Lidar_2017_B17/ Number of files: 4

The hydro breaklines were also downloaded from these USGS sites and are available for download at the link provided in the URL section of this metadata record. Please note that these products have not been reviewed by the NOAA Office for Coastal Management (OCM) and any conclusions drawn from the analysis of this information are not the responsibility of NOAA or OCM.

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_County_Lidar_2017_B17/AL_25Co_B1_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_County_Lidar_2017_B17/AL_25Co_B2_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_County_Lidar_2017_B17/AL_25Co_B3_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_County_Lidar_2017_B17/AL_25Co_B4_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_County_Lidar_2017_B17/AL_25Co_B5_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_County_Lidar_2017_B17/AL_25Co_B6_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/
AL_25_County_Lidar_2017_B17/AL_25Co_B7_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/
AL_25_County_Lidar_2017_B17/AL_25Co_B8_2017/breaklines/

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/metadata/AL_25_20County
20Lidar_2017_B17/AL_25Co_TL_2017/breaklines/

1.3. Is this a one-time data collection, or an ongoing series of measurements?

One-time data collection

1.4. Actual or planned temporal coverage of the data:

2016-12-02 to 2019-11-12, 2016-12-02 to 2017-02-15, 2016-12-28 to 2017-03-09, 2017-02-26
to 2017-11-20, 2017-02-17 to 2017-04-02, 2017-03-16 to 2017-04-02, 2017-03-19 to 2018-12-
18, 2018-01-02 to 2018-01-19, 2018-01-14 to 2018-12-17

1.5. Actual or planned geographic coverage of the data:

W: -88.29664, E: -84.82097, N: 34.999031, S: 30.20865

1.6. Type(s) of data:

(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
Model (digital)

1.7. Data collection method(s):

*(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy,
research vessel, autonomous underwater vehicle, animal tagging, manual surveys,
enforcement activities, numerical model, etc.)*

1.8. If data are from a NOAA Observing System of Record, indicate name of system:

1.8.1. If data are from another observing system, please specify:

2. Point of Contact for this Data Management Plan (author or maintainer)

2.1. Name:

NOAA Office for Coastal Management (NOAA/OCM)

2.2. Title:

Metadata Contact

2.3. Affiliation or facility:

NOAA Office for Coastal Management (NOAA/OCM)

2.4. E-mail address:

coastal.info@noaa.gov

2.5. Phone number:

(843) 740-1202

3. Responsible Party for Data Management

Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.

3.1. Name:

3.2. Title:

Data Steward

4. Resources

Programs must identify resources within their own budget for managing the data they produce.

4.1. Have resources for management of these data been identified?

Yes

4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):

Unknown

5. Data Lineage and Quality

NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.

5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

(describe or provide URL of description):

Lineage Statement:

Atlantic collected lidar data for the USGS Alabama 25 County data set. This data was made available on the USGS rockyftp site. NOAA OCM downloaded the laz data to process to the Data Access Viewer to make available for free custom and bulk downloads.

Process Steps:

- 2019-11-10 00:00:00 - Ground Control Survey A total of 761 ground survey points were collected in support of this project, including 136 LiDAR Control Points (LCP), 340 Non-vegetated Vertical Accuracy (NVA) and 285 Vegetated Vertical Accuracy (VVA). Point cloud data accuracy was tested against a Triangulated Irregular Network (TIN) constructed from LiDAR points in clear and open areas. A clear and open area can be characterized with respect to topographic and ground cover variation such that a minimum of five (5) times the Nominal Pulse Spacing (NPS) exists with less than 1/3 of the RMSEZ deviation from a low-slope plane. Slopes that exceed ten (10) percent were avoided. Each land cover type representing ten (10) percent or more of the total project area were tested and reported with a VVA. In land cover categories other than dense urban areas, the tested points did not have

obstructions forty-five (45) degrees above the horizon to ensure a satisfactory TIN surface. The VVA value is provided as a target. It is understood that in areas of dense vegetation, swamps, or extremely difficult terrain, this value may be exceeded. The NVA value is a requirement that must be met, regardless of any allowed “busts” in the VVA(s) for individual land cover types within the project. Checkpoints for each assessment (NVA and VVA) are required to be well-distributed throughout the land cover type, for the entire project area.

- 2019-11-10 00:00:00 - Aerial Lidar Acquisition: Atlantic acquired 882 passes of the AOI as a series of perpendicular and/or adjacent flight-lines executed in 83 flight missions conducted between December 28, 2016 and November 10, 2019. Onboard differential Global Navigation Satellite System (GNSS) unit(s) recorded sample aircraft positions at 2 hertz (Hz) or more frequency. LiDAR data was only acquired when a minimum of six (6) satellites were in view.

- 2019-11-10 00:00:00 - LiDAR Point Cloud Generation Atlantic utilized Leica software products to download the IPAS ABGNSS/IMU data and raw laser scan files from the airborne system. Waypoint Inertial Explorer is used to extract the raw IPAS ABGNSS/IMU data, which is further processed in combination with controlled base stations to provide the final Smoothed Best Estimate Trajectory (SBET) for each mission. The SBETs are combined with the raw laser scan files to export the LiDAR ASCII Standard (*.las) formatted swath point clouds.

- 2019-11-10 00:00:00 - Smooth Surface Repeatability (Interswath) Departures from planarity of first returns within single swaths in non-vegetated areas were assessed at multiple locations with hard surface areas (parking lots or large rooftops) inside the project area. Each area was evaluated using signed difference rasters (maximum elevation – minimum elevation) at a cell size equal to 2 x ANPS, rounded to the next integer. The following figure depicts a sample of the assessment.

- 2019-11-10 00:00:00 - LiDAR Calibration Using a combination of GeoCue, TerraScan and TerraMatch; overlapping swath point clouds are corrected for any orientation or linear deviations to obtain the best fit swath-to-swath calibration. Relative calibration was evaluated using advanced plane-matching analysis and parameter corrections derived. This process was repeated interactively until residual errors between overlapping swaths, across all project missions, was reduced to $\leq 2\text{cm}$. A final analysis of the calibrated LiDAR is preformed using a TerraMatch tie line report for an overall statistical model of the project area. Individual control point assessments for this project can be found in Section VI of this report. Upon completion of the data calibration, a complete set of elevation difference intensity rasters (dZ Orthos) are produced. A user-defined color ramp is applied depicting the offsets between overlapping swaths based on project specifications. The dZ orthos provide an opportunity to review the data calibration in a qualitative manner. Atlantic assigns green to all offset values that fall below the required RMSDz requirement of the project. A yellow color is assigned for offsets that fall between the RMSDz value and 1.5x of that value. Finally, red values are assigned to all values that fall beyond 1.5x of the RMSDz requirements of the project.

- 2019-11-10 00:00:00 - Lidar Classification: The calibrated Lidar data was run

through automated classification routines and then manually checked and edited. The data was classified into the following classes: 1-unclassified*, 2-ground, 7-low noise, 9-water, 10-ignored ground, 17-bridges, and 18-high noise

- 2019-11-10 00:00:00 - Lidar Intensity Imagery Creation: All lidar intensity imagery was created from the final calibrated and classified lidar point cloud. Intensity images were produced from all classified points and are posted to a 1 meter cell size. Intensity images were cut to match the tile index and have corresponding names to match tile names.

- 2021-02-22 00:00:00 - The NOAA Office for Coastal Management (OCM) downloaded the laz files from these USGS sites and processed the data to the Data Access Viewer (DAV) and to https. The total number of files downloaded and processed was 23,054.

ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B1_2017/ Number of files: 2305 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B2_2017/ Number of files: 2500 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B3_2017/ Number of files: 2243 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B4_2017/ Number of files: 3765 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B5_2017/ Number of files: 2505 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B6_2017/ Number of files: 3778 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B7_2017/ Number of files: 3879 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/USGS_LPC_AL_25Co_B8_2017/ Number of files: 2075 ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/LPC/Projects/AL_25_County_Lidar_2017_B17/ Number of files: 4 The data were in UTM Zone 16 (NAD83 2011), meters, coordinates and NAVD88 (Geoid12B) elevations in meters. The data were classified as: 1 - Unclassified, 2 - Ground, 7 - Low Noise, 9 - Water, 10 - Ignored Ground, 17 - Bridge Decks, 18 - High Noise. OCM processed all classifications of points to the Digital Coast Data Access Viewer (DAV). Classes available on the DAV are: 1, 2, 7, 9, 10, 17, 18. OCM performed the following processing on the data for Digital Coast storage and provisioning purposes: 1. An internal OCM script was run to check the number of points by classification and by flight ID and the gps and intensity ranges. This script found a file (USGS_LPC_AL_25Co_B2_2017_16S_FC_2160.laz) in Block 2 that had a bad point. The point had a bad longitude value. The point was deleted from the file before processing. 2. Internal OCM scripts were run on the laz files to convert from orthometric (NAVD88) elevations to ellipsoid elevations using the Geoid12B model, to convert from UTM Zone 16 (NAD83 2011) coordinates in meters to geographic coordinates, to assign the geokeys, to sort the data by gps time and zip the data to database and to http.

5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other

plan:

5.2. Quality control procedures employed (describe or provide URL of description):

6. Data Documentation

The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.

6.1. Does metadata comply with EDMC Data Documentation directive?

No

6.1.1. If metadata are non-existent or non-compliant, please explain:

Missing/invalid information:

- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 5.2. Quality control procedures employed
- 7.1.1. If data are not available or has limitations, has a Waiver been filed?
- 7.4. Approximate delay between data collection and dissemination
- 8.3. Approximate delay between data collection and submission to an archive facility

6.2. Name of organization or facility providing metadata hosting:

NMFS Office of Science and Technology

6.2.1. If service is needed for metadata hosting, please indicate:

6.3. URL of metadata folder or data catalog, if known:

<https://www.fisheries.noaa.gov/inport/item/64305>

6.4. Process for producing and maintaining metadata

(describe or provide URL of description):

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive: https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf

7. Data Access

NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.

7.1. Do these data comply with the Data Access directive?

Yes

7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?

7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:

7.2. Name of organization of facility providing data access:

NOAA Office for Coastal Management (NOAA/OCM)

7.2.1. If data hosting service is needed, please indicate:

7.2.2. URL of data access service, if known:

http://coast.noaa.gov/htdata/lidar2_z/geoid18/data/9174

<https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=9174/details/9174>

7.3. Data access methods or services offered:

Data is available online for bulk and custom downloads.

7.4. Approximate delay between data collection and dissemination:

7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:

8. Data Preservation and Protection

The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.

8.1. Actual or planned long-term data archive location:

(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)

NCEI_CO

8.1.1. If World Data Center or Other, specify:

8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:

8.2. Data storage facility prior to being sent to an archive facility (if any):

Office for Coastal Management - Charleston, SC

8.3. Approximate delay between data collection and submission to an archive facility:

8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection

Data is backed up to tape and to cloud storage.

9. Additional Line Office or Staff Office Questions

Line and Staff Offices may extend this template by inserting additional questions in this section.