Photo Science, Inc.

Unpublished Material

State of Conneticut UTM Zone 19 (Classified LAS): LIDAR for the North East – ARRA and LiDAR for the North East Part II. (USGS Contract: G10PC00026, ARRA LIDAR Task Order Numbers) USGS Contract: G10PC00026 Task Order Number: G10PD02143 Task Order Numbers: G10PD01027 (ARRA) and G10PD02143 (non-ARRA)

model

The LiDAR for the North East Project, funded in large part by the American Recovery and Reinvestment Act (ARRA) of 2009, as well as, other funding sources was designed to help stimulate the U.S. economy and provide for more accurate floodplain mapping in the North East representing the start of a regional LiDAR collection program that served as a test case for a national elevation program. Lead by the United States Geological Survey's (USGS) National Geospatial Program Office and the State of Maine's Office of GIS with active collaboration and participation by other federal, state and local agencies resulted in LiDAR acquisition and processing of over 8,000 sq. miles of (LiDAR) data of a coastal zone spanning six North Eastern states, including Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, and New York. USGS's National Geospatial Technical Operations Center (USGS NGTOC) in Rolla, MO provided project management and quality control oversight for the project which consisted of two Task Orders issued to USGS contractor, GMR Aerial Surveys inc. d/b/a Photo Science (contractor), for task order execution through the use of USGS's Geospatial Products and Services Contract (USGS Contract: G10PC00026). Task Order specifications included state/area specific vertical accuracy, nominal post spacing and tide coordinated acquisition requirements. Specific to the State of Conneticut UTM Zone 19, LiDAR was collected in the Winter and Spring 2011 at a 2 meter or better nominal post spacing (2m GSD) for approximately 141 square miles of Conneticut UTM Zone 19, while no snow was on the ground and rivers were at or below normal levels. In order to post process the LiDAR data to meet task order specifications, Photo Science subcontractor, The James W. Sewall Company, established a total of 4 control points that were used to calibrate the LIDAR to known ground locations established throughout the Conneticut UTM Zone 19 project area. Additionally, Sewall established twenty (20) quality control "blind" check points using survey grade, dual frequency GPS receivers throughout the Conneticut UTM Zone 19 project area and the contractor supplied the coordinate and elevation data values for each point to USGS to independently validate theses required vertical accuracies. These points were not used by the Contractors production team duing any phase of the project. Conneticut UTM Zone 19 data was developed based on a horizontal projection/datum of UTM NAD83 (2007), UTM Zone 19, meters and vertical datum of NAVD1988 (GEOID09), meters. LiDAR data was delivered in RAW flightline swath format, processed to create Classified LAS 1.2 Files formatted to 205 individual 1500m x 1500m tiles, Hydro Flattening Breaklines in Esri shape file format, and corresponding 2.0 meter gridded Raster DEM Files tiled to the same 1500m x 1500m schema. LiDAR Data was originally delivered to USGS for quality control validation under USGS Delivery Lot 8b. The lineage (metadata), positional, content (completeness), attribution, logical consistency, and accuracies of all digital elevation data produced conform to the specifications stipulated in USGS Task Orders G10PD01027 (ARRA) and G10PD02143 (non-ARRA) and the U.S. Geological Survey National Geospatial Program Base LiDAR Specification, Version 12.

Classified LAS files are used to show the manually reviewed bare earth surface. This allows the user to create Intensity Images, Breaklines and Raster DEM.

20110422

20110426

20110429

20110430

20110501

20110502

20110506

ground condition

In Work

Unknown

-71.936942

-71.931654

41.424207

41.419444

254575.00

255000.00

4589485.0

4590000.0

none

model

LiDAR

LAS Point Cloud

remote sensing

None

CT

US

None

None. However, users should be aware that temporal changes may have occurred since this data set was collected and that some parts of this data may no longer represent actual surface conditions. Users should not use this data for critical applications without a full awareness of it's limitations. Acknowledgement of the U.S. Geological Survey would be appreciated for products derived from these data.

Photo Science, Inc. flew the LiDAR and processed the data. Northrop Grumman/3001 helped with the acquisition of the LiDAR data.

MicroStation Version 8; TerraScan Version 11; ALS Post Processor 2.70 Build#15; TerraModeler Version 11; GeoCue Version 7.0.34.5; Optech DashMAP 5.1000; Windows XP Operating System

Photo Science, Inc.

Unpublished Material

State of Conneticut UTM Zone 19 (Raster DEM): LIDAR for the North East – ARRA and LiDAR for the North East Part II. (USGS Contract: G10PC00026, ARRA LIDAR Task Order Numbers) USGS Contract: G10PC00026 Task Order Number: G10PD02143 Task Order Numbers: G10PD01027 (ARRA) and G10PD02143 (non-ARRA)

model

Photo Science, Inc.

Unpublished Material

State of Conneticut UTM Zone 19 (Hydro Breaklines): LIDAR for the North East – ARRA and LiDAR for the North East Part II. (USGS Contract: G10PC00026, ARRA LIDAR Task Order Numbers) USGS Contract: G10PC00026 Task Order Number: G10PD02143 Task Order Numbers: G10PD01027 (ARRA) and G10PD02143 (non-ARRA)

model

Photo Science, inc.

Unpublished Material

State of Conneticut UTM Zone 19: LIDAR for the North East – ARRA and LiDAR for the North East Part II. (USGS Contract: G10PC00026, ARRA LIDAR Task Order Numbers) USGS Contract: G10PC00026 Task Order Number: G10PD02143 Task Order Numbers: G10PD01027 (ARRA) and G10PD02143 (non-ARRA)

model

The project area required LiDAR to be collected on 2.0 meter GSD or better and processed to meet a bare earth vertical accuracy of 15.0 centimeters RMSEz or better.

Classified LAS files were tested by Photo Science for both vertical and horizontal accuracy. All data is seamless from one tile to the next, no gaps or no data areas.

Datasets contain complete coverage of tiles.

Classified LAS files were tested by Photo Science for both vertical and horizontal accuracy. All data is seamless from one tile to the next, no gaps or no data areas. The vertical unit of the data file is in decimal meters with 2-decimal point precision. The reported RMSEz value was determined using the calibration control points, and not the Blind Control. The calibration control points are the same points that were used to remove any bias in the dataset before bare earth editing. The listed RMSEz value shown below was calculated from the ground (ASPRS Class 2) data in the final Classified LAS file.

0.049

RMSE in meters

James W. Sewall

2012

Control

digital data

hard drive

2011

2012

ground condition

CTRL

Control points are uses as a known elevation to adjust the LiDAR data to the surface.

Photo Science, Inc.

2012

LiDAR

digital data

hard drive

20110422

20110426

20110429

20110430

20110501

20110502

20110506

ground condition

LiDAR

LiDAR points were used to produce the deliverables.

Control Process: James W. Sewall Company was contracted by Photo Science, Inc. to locate a total of 4calibration control used in the post processing of the LiDAR data as well as 20 quality assurance check points for the state of Conneticut UTM Zone 19. The points were located on relatively flat terrain on surfaces that generally consisted of grass, gravel or bare earth. See Final Survey Reports for additional collection parameters and methodologies. Applanix software was used in the post processing of the airborne GPS and inertial data that is critical to the positioning and orientation of the sensor during all flights. POSPac MMS provides the smoothed best estimate of trajectory (SBET) that is necessary for Optech's post processor to develop the point cloud from the LiDAR missions. The point cloud is the mathematical three dimensional collection of all returns from all laser pulses as determined from the aerial mission. At this point this data is ready for analysis, classification, and filtering to generate a bare earth surface model in which the above ground features are removed from the data set. The point cloud was manipulated within the Optech software; GeoCue, TerraScan, and TerraModeler software was used for the automated data classification, manual cleanup, and bare earth generation from this data. Project specific macros were used to classify the ground and to remove the side overlap between parallel flight lines. All data was manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler. All ground (ASPRS Class 2) LiDAR data inside of the Lake Pond and Double Line Drain hydro flattening breaklines were then classified to water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 1 meter was also used around each hydro flattened feature to classify these ground (ASPRS Class 2) points to ignored ground (ASPRS Class 10). All Lake Pond Island and Double Line Drain Island features were checked to ensure that the ground (ASPRS Class 2) were reclassified to the correct classification after the automated classification was completed. A new class has been added to the dataset to represent the bare water of the ocean areas collected throughout the project area. ASPRS Class 14 is being used to represent the bare water ocean surface. While attempts were made to remove all extraneous features above the surface of the water, there may be above surface features classified to this class. Some islands below the required collection specifications have been classified to this class as well. This class was also used during the creation of the ERDAS Imagine Raster DEM files. The Ocean Shoreline and Ocean Island breaklines were used to complete the automated classification of these classes within the final LAS files. All overlap data was processed through automated functionality provided by TerraScan to classify the overlapping flight line data to approved classes by USGS. The overlap data was classified to Class 17 (USGS Overlap Default), Class 18 (USGS Overlap Ground), Class 25 (USGS Overlap Water), and Class 30 (USGS Overlap Bare Water). These classes were created through automated processes only and were not verified for classification accuracy. Due to software limitations within TerraScan, these classes were used to trip the Withheld bit within various software packages. These processes were reviewed and accepted by USGS through multiple conference calls and pilot study areas. Data was then run through additional macros to ensure deliverable classification levels matching the ASPRS LAS Version 1.2 Classification structure. GeoCue functionality was then used to ensure correct LAS Versioning. In-house software was used as a final QA/QC check to provide LAS Analysis of the delivered tiles. QA/QC checks were performed on a per tile level to verify final classification metrics and full LAS header information.

LiDAR

2012

LiDAR post-processed data

GCS\_North\_American\_1983

NAD\_1983\_UTM\_Zone\_19N\_Meters

Universal Transverse Mercator

19

0.99960000

-69.00000000

0.00000000

500000.00000000

0.0

coordinate pair

0.01

0.01

meters

North American Datum of 1983

World Geodetic System 1984

6378137.000000000000000000

298.257223563000030000

North American Vertical Datum of 1988

0.01

Meters

Explicit elevation coordinate included with horizontal coordinates

NAD\_1983\_UTM\_Zone\_19N\_Meters

LAS 1.2 files (ASPRS Classes (1,2,7,9,10,14,17,18,25,30)

All deliverables meet specifications in contract. LAS Files meet ASPRS and USGS Classification Standards.

The data are being provided on an 'as is' basis. The USGS specifically disclaims any warranty, expressed or implied, including, but not limited to, the implied warranties or merchantability and fitness for a particular use. The entire risk as to quality and performance is with the user. In no event will the USGS or its staff be liable for any direct, indirect, incidental, special, consequential, or other damages, including loss of profit, arising out of the use of these data even if the USGS has been advised of the possibility of such damages. All data are intended for resource management use.

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None

Varies

ASCII or LAS

None. Downloadable data only.

None

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The above is the contact information for EROS Data Center in Sioux Falls, SD. this is the digital data storage and distribution center for the USGS. For best service, identify your question as related to "CLICK Lidar Data".

20120329

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FGDC Content Standard for Digital Geospatial Metadata

FGDC-STD-001-1998