



North Carolina Department of Public Safety

Emergency Management North Carolina Geodetic Survey

Roy Cooper, Governor
Erik A. Hooks, Secretary

Michael A. Sprayberry, Director

LiDAR Quality Control Report – Statewide LiDAR Project Phases Four (4) and Five (5)

The North Carolina Geodetic Survey performed a vertical quality control (QC) survey in Phases 4 and 5 of the statewide LiDAR elevation project. The purpose of the survey was to test the elevation points contained in a dataset that was obtained by utilizing airborne Light Detection And Ranging (LiDAR) technology. The attached report contains the results of the vertical QC survey.

The QC test points were collected utilizing the North Carolina Real Time Network (NCRTN), and with conventional survey methods in areas unsuitable for GNSS observations.

The field survey data that was used to generate the attached report was performed by the North Carolina Geodetic Survey (NCGS) under the supervision of James Gay (L-3851). The review of the field data and the generation of the final QC report were performed under the supervision of Gary W. Thompson (L-2694).

The GNSS portion of the survey (performed by NCGS) was performed to the following parameters:

Class of survey:	Class B
Positional accuracy:	Vertical 0.04 USft Horizontal 0.02 USft
Type of field procedure used:	NCRTN, OPUS, and traditional trigonometric leveling
Dates of survey:	Phase Four:4/19/2016-6/27/2018, Phase Five:12/3/2019-4/3/2019
Horizontal datum/epoch	North American Datum 83(2011) epoch 2010.0
Vertical datum/epoch	North American Vertical Datum of 1988 (NAVD88)
Published fixed control used:	North Carolina Continuously Operating Reference Station (CORS) Network and NCRTN
Geoid model:	Geoid 12B
Combined grid factor:	See control datasheets
Units:	US Survey Feet

Trigonometric leveling was performed to Class C (56.1605) standards at any QC point that was in a location not suitable for GNSS observations.

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2018 Phase 5 NC LiDAR Independent Quality Control Summary - DEM20 Data

Non-Vegetated Area

County	NVA Type	NVA Minimum DZ	NVA Maximum DZ	NVA Mean DZ	NVA Mean Magnitude DZ	NVA Observations	NVA Standard Deviation DZ	NVA RMSE Z	95% Confidence Level Z
Ashe	2U, 2B	-2.114	0.949	-0.053	0.564	62	0.506	0.505	0.990
Avery	2U, 2B	-0.785	0.886	0.069	0.534	61	0.360	0.363	0.712
Buncombe	2U, 2B	-1.166	2.884	0.152	0.606	102	0.553	0.570	1.118
Burke	2U, 2B	-0.773	0.950	0.067	0.555	57	0.398	0.401	0.785
Caldwell	2U, 2B	-1.124	1.312	0.018	0.507	73	0.371	0.369	0.723
Cherokee	2U, 2B	-1.646	2.037	0.162	0.642	86	0.552	0.572	1.121
Clay	2U, 2B	-2.100	2.740	0.210	0.680	91	0.631	0.662	1.297
Graham	2U, 2B	-2.020	1.653	-0.058	0.623	78	0.564	0.564	1.105
Haywood	2U, 2B	-1.475	2.353	0.039	0.655	71	0.611	0.608	1.192
Henderson	2U, 2B	-1.926	1.247	0.140	0.599	89	0.484	0.502	0.983
Jackson	2U, 2B	-1.267	1.791	-0.032	0.604	72	0.494	0.492	0.963
Macon	2U, 2B	-1.301	0.784	-0.165	0.621	68	0.462	0.488	0.956
Madison	2U, 2B	-1.161	1.238	-0.098	0.661	34	0.532	0.533	1.045
Mcdowell	2U, 2B	-1.168	0.965	-0.025	0.553	58	0.403	0.400	0.784
Mitchell	2U, 2B	-1.006	0.658	-0.037	0.547	60	0.372	0.371	0.727
Polk	2U, 2B	-1.591	1.603	0.105	0.640	73	0.538	0.544	1.066
Rutherford	2U, 2B	-1.242	1.520	0.182	0.622	62	0.484	0.514	1.007
Swain	2U, 2B	-10.297	3.310	-0.142	0.790	65	1.446	1.442	2.826
Transylvania	2U, 2B	-1.092	1.417	0.065	0.612	80	0.468	0.470	0.921
Watauga	2U, 2B	-0.992	2.191	0.243	0.645	61	0.566	0.612	1.199
Yancey	2U, 2B	-5.660	0.800	-0.220	0.625	61	0.788	0.812	1.591

Vegetated Area

County	VVA Class	VVA Minimum DZ	VVA Maximum DZ	VVA Mean DZ	VVA Mean Magnitude DZ	VVA Observations	VVA Standard Deviation DZ	VVA RMSE Z	95th Percentile
Ashe	2L, 2M, 2H	-7.633	4.178	0.177	1.003	82	1.531	1.532	2.858
Avery	2L, 2M, 2H	-2.795	4.467	0.049	0.898	87	1.114	1.109	2.305
Buncombe	2L, 2M, 2H	-4.390	5.378	0.123	0.968	100	1.375	1.374	2.846
Burke	2L, 2M, 2H	-1.611	2.264	0.142	0.710	86	0.653	0.665	1.338
Caldwell	2L, 2M, 2H	-3.254	3.854	0.075	0.737	86	0.905	0.902	2.367
Cherokee	2L, 2M, 2H	-2.977	3.175	0.274	0.890	85	1.032	1.062	2.129
Clay	2L, 2M, 2H	-2.406	3.243	0.556	0.928	73	0.972	1.114	2.406
Graham	2L, 2M, 2H	-11.573	3.652	-0.102	1.043	85	1.845	1.837	3.383
Haywood	2L, 2M, 2H	-7.038	5.236	0.176	1.197	86	2.052	2.047	3.943
Henderson	2L, 2M, 2H	-3.144	2.023	0.203	0.770	84	0.766	0.788	1.338
Jackson	2L, 2M, 2H	-6.083	3.937	-0.134	1.047	85	1.623	1.619	3.864
Macon	2L, 2M, 2H	-4.229	5.626	0.010	1.032	85	1.481	1.472	3.165
Madison	2L, 2M, 2H	-6.616	4.865	-0.225	1.108	31	1.963	1.944	3.937
Mcdowell	2L, 2M, 2H	-4.499	3.662	0.048	0.836	86	1.112	1.107	2.900
Mitchell	2L, 2M, 2H	-6.762	4.924	-0.270	1.057	83	1.680	1.691	3.408
Polk	2L, 2M, 2H	-3.144	2.141	0.079	0.789	77	0.837	0.835	1.754
Rutherford	2L, 2M, 2H	-1.446	2.332	0.245	0.727	92	0.655	0.696	1.417
Swain	2L, 2M, 2H	-6.629	3.326	-0.145	0.944	84	1.361	1.360	2.843
Transylvania	2L, 2M, 2H	-2.374	4.323	0.296	0.932	84	1.161	1.191	2.374
Watauga	2L, 2M, 2H	-6.197	4.326	0.284	1.091	84	1.669	1.683	3.790
Yancey	2L, 2M, 2H	-2.219	5.653	0.084	0.913	90	1.253	1.249	2.493

All values except observations in US Feet

Phase 5 Overall Results			
Non-Vegetated Area	Vegetated Area		
Minimum DZ:	-10.297	Minimum DZ:	-11.573
Maximum DZ:	3.310	Maximum DZ:	5.653
Mean DZ:	0.042	Mean DZ:	0.100
Mean Magnitude DZ:	0.617	Mean Magnitude DZ:	0.938
Observations:	1464	Observations:	1735
Standard Deviation DZ:	0.602	Standard Deviation DZ:	1.333
RMSE Z:	0.603	RMSE Z:	1.337
95% Confidence Level Z:	1.182	95th Percentile:	2.942

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: ashe_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	1.314		
2H	41		3.991	
2L	30		1.682	
2M	11		1.994	
2U	38	0.713		
Total	144			

Units: US Survey Feet

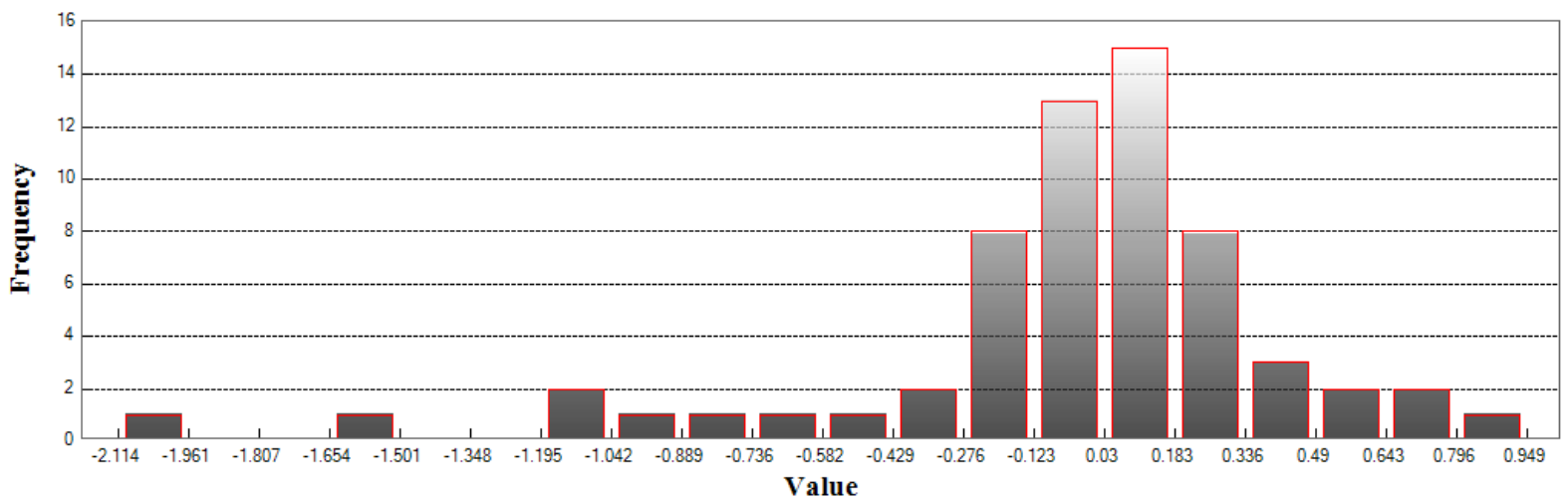


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -2.114
Maximum DZ: 0.949
Mean DZ: -0.053
Mean Magnitude DZ: 0.564
Number Observations: 62
Standard Deviation DZ: 0.506
RMSE Z: 0.505
95% Confidence Level Z: 0.99
Units: US Survey Feet

Histogram



Min: -2.114

Max: 0.949

Number Of Bins: 20

Bin Interval: 0.153

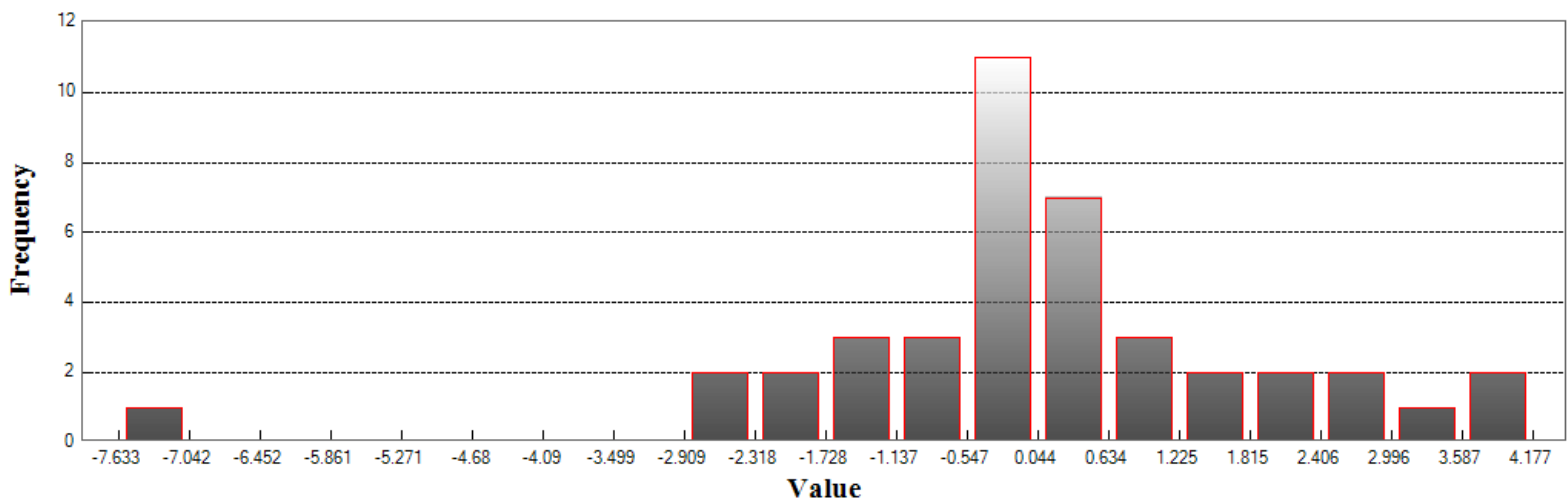


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -7.633
Maximum DZ: 4.178
Mean DZ: 0.064
Mean Magnitude DZ: 1.145
Number Observations: 41
Standard Deviation DZ: 1.994
RMSE Z: 1.971
95th Percentile: 3.991
Units: US Survey Feet

Histogram



Min: -7.633
Max: 4.178
Number Of Bins: 20
Bin Interval: 0.591

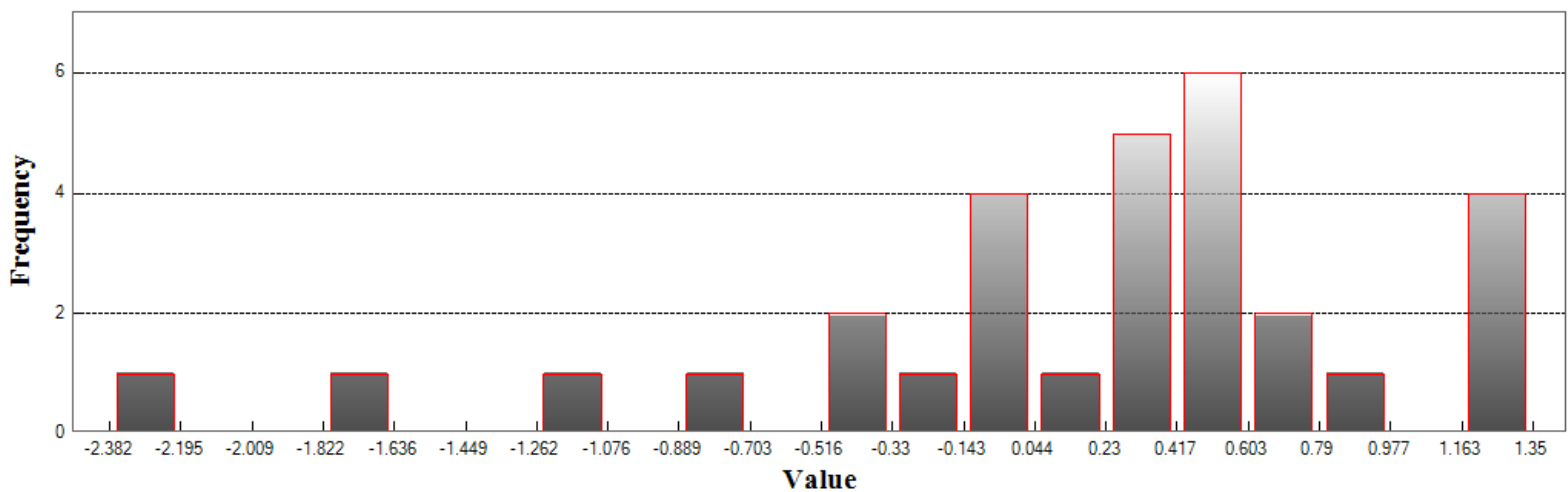


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -2.382
Maximum DZ: 1.35
Mean DZ: 0.151
Mean Magnitude DZ: 0.805
Number Observations: 30
Standard Deviation DZ: 0.841
RMSE Z: 0.841
95th Percentile: 1.682
Units: US Survey Feet

Histogram



Min: -2.382

Max: 1.35

Number Of Bins: 20

Bin Interval: 0.187

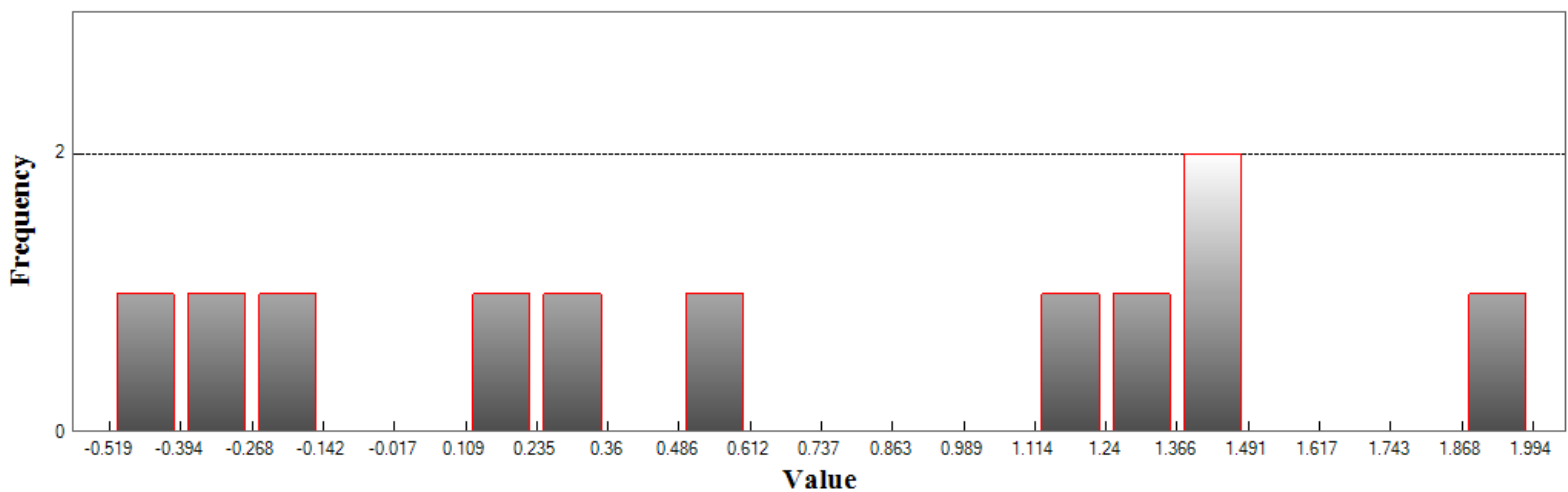


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.52
Maximum DZ: 1.994
Mean DZ: 0.667
Mean Magnitude DZ: 0.925
Number Observations: 11
Standard Deviation DZ: 0.848
RMSE Z: 1.048
95th Percentile: 1.994
Units: US Survey Feet

Histogram



Min: -0.52

Max: 1.994

Number Of Bins: 20

Bin Interval: 0.126

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
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Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: avery_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.882		
2H	43		2.402	
2L	22		1.284	
2M	22		2.305	
2U	39	0.596		
Total	148			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.785

Maximum DZ: 0.886

Mean DZ: 0.069

Mean Magnitude DZ: 0.534

Number Observations: 61

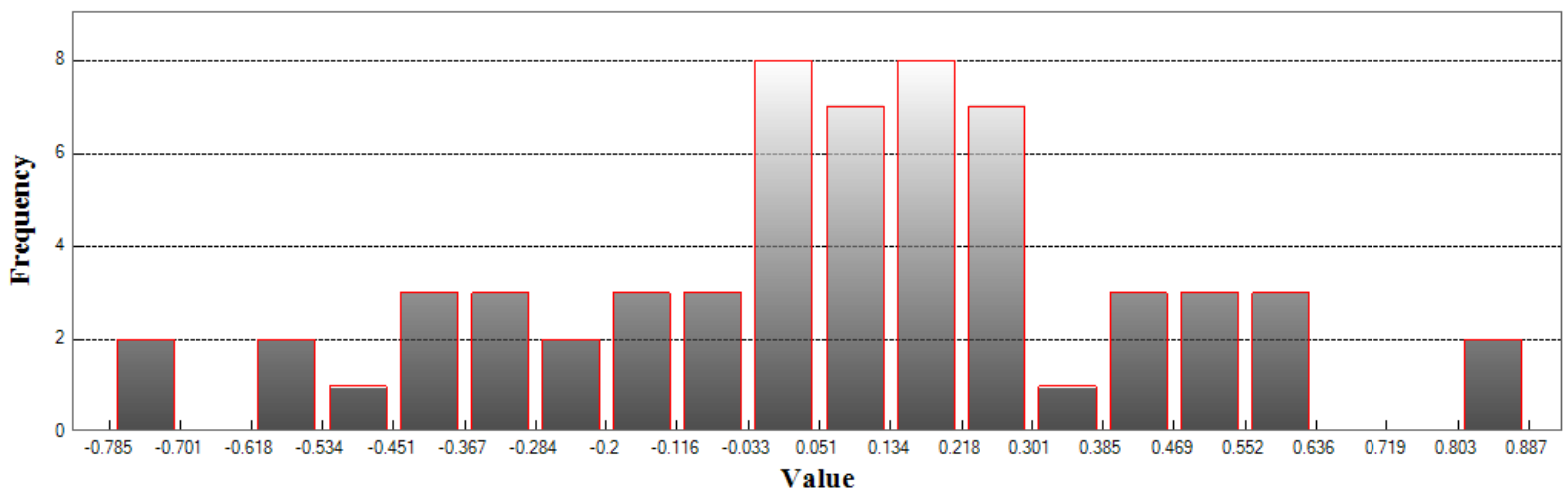
Standard Deviation DZ: 0.36

RMSE Z: 0.363

95% Confidence Level Z: 0.712

Units: US Survey Feet

Histogram



Min: -0.785

Max: 0.886

Number Of Bins: 20

Bin Interval: 0.084

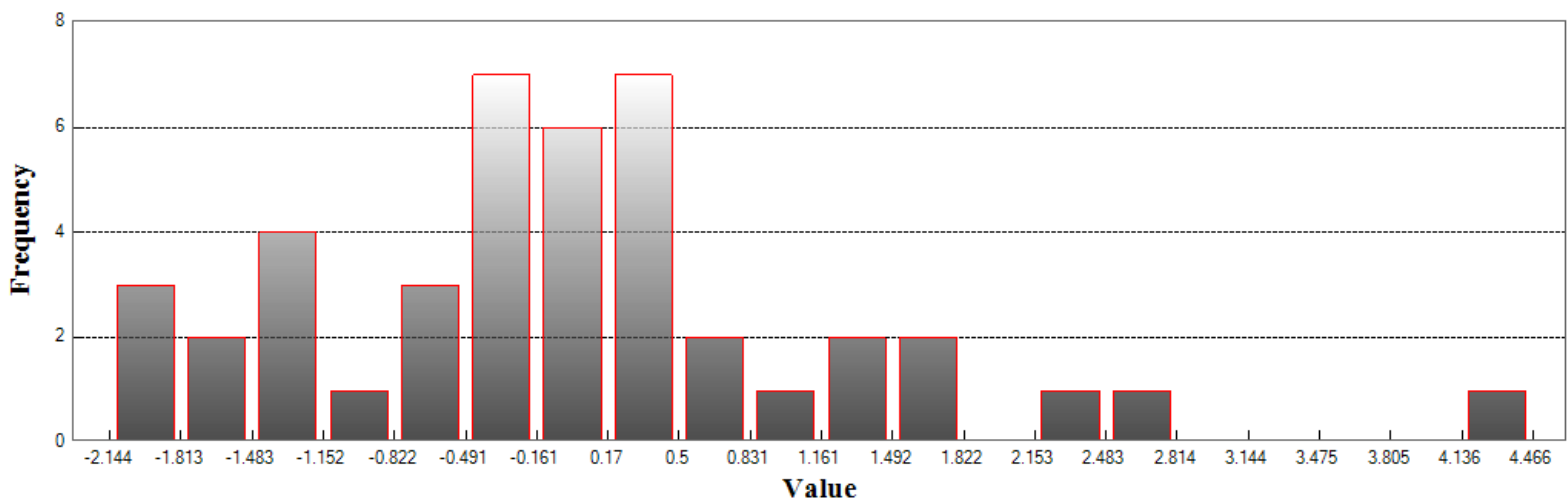


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.144
Maximum DZ: 4.467
Mean DZ: 0.022
Mean Magnitude DZ: 0.953
Number Observations: 43
Standard Deviation DZ: 1.279
RMSE Z: 1.264
95th Percentile: 2.402
Units: US Survey Feet

Histogram



Min: -2.144

Max: 4.467

Number Of Bins: 20

Bin Interval: 0.331

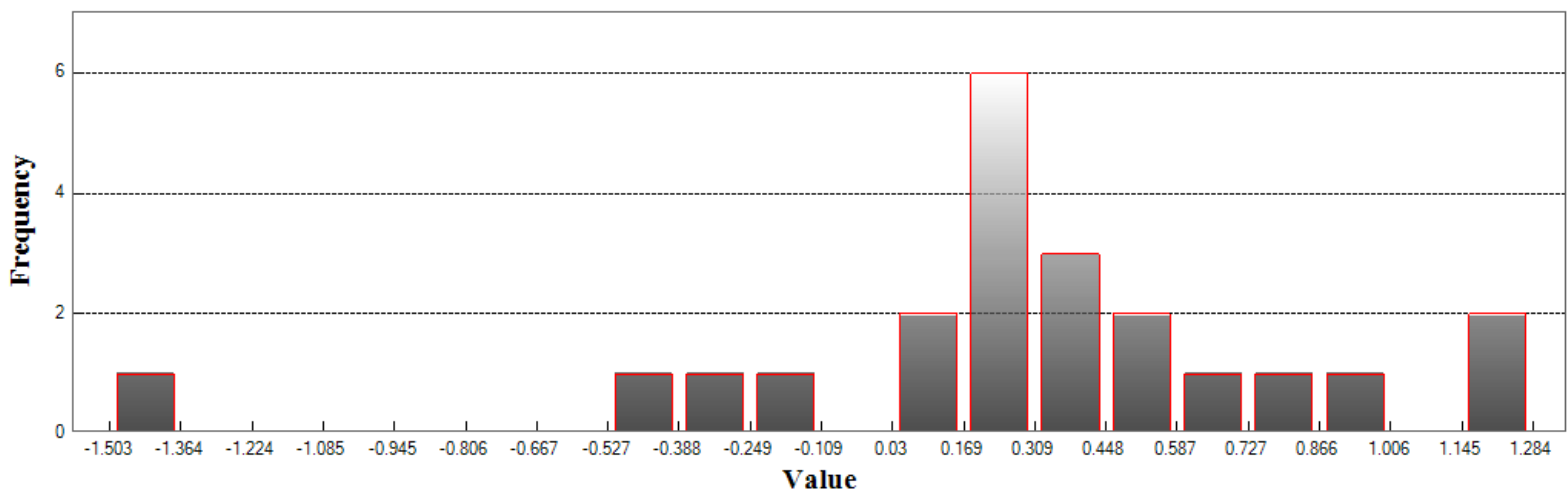


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.503
Maximum DZ: 1.284
Mean DZ: 0.289
Mean Magnitude DZ: 0.711
Number Observations: 22
Standard Deviation DZ: 0.588
RMSE Z: 0.643
95th Percentile: 1.284
Units: US Survey Feet

Histogram



Min: -1.503

Max: 1.284

Number Of Bins: 20

Bin Interval: 0.139

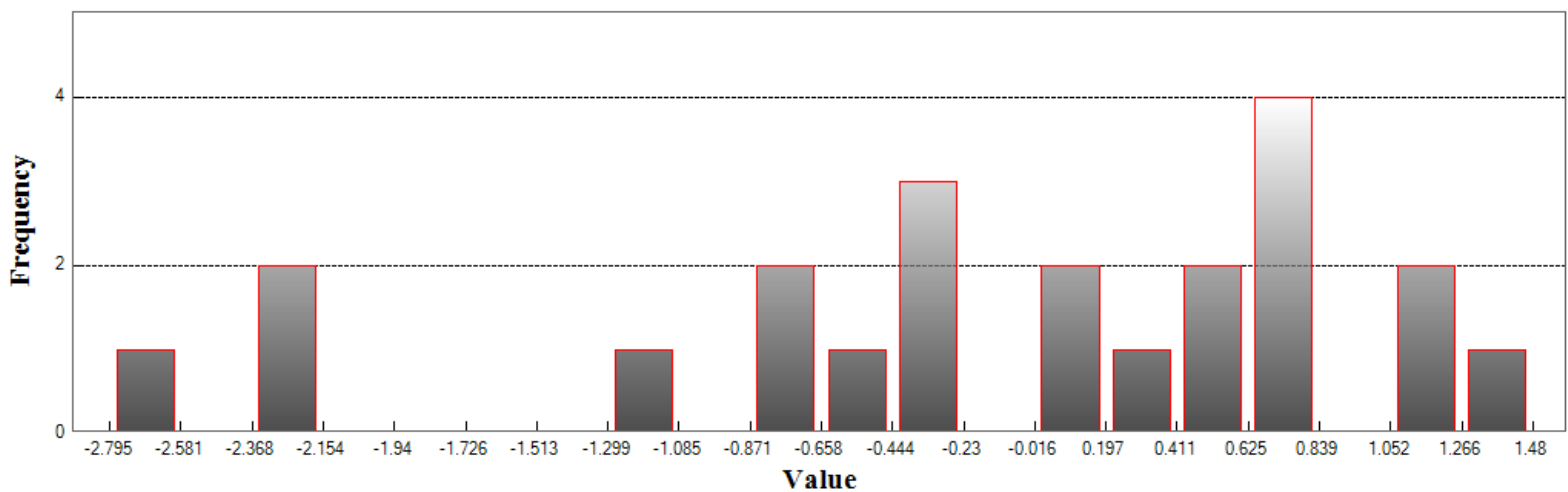


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -2.795
Maximum DZ: 1.48
Mean DZ: -0.139
Mean Magnitude DZ: 0.954
Number Observations: 22
Standard Deviation DZ: 1.171
RMSE Z: 1.152
95th Percentile: 2.305
Units: US Survey Feet

Histogram



Min: -2.795

Max: 1.48

Number Of Bins: 20

Bin Interval: 0.214

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Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: buncombe_tiles.shp
Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified
Data Filename: Not Specified
Number of Data Files Matching Attribute: Not Specified

DEM:

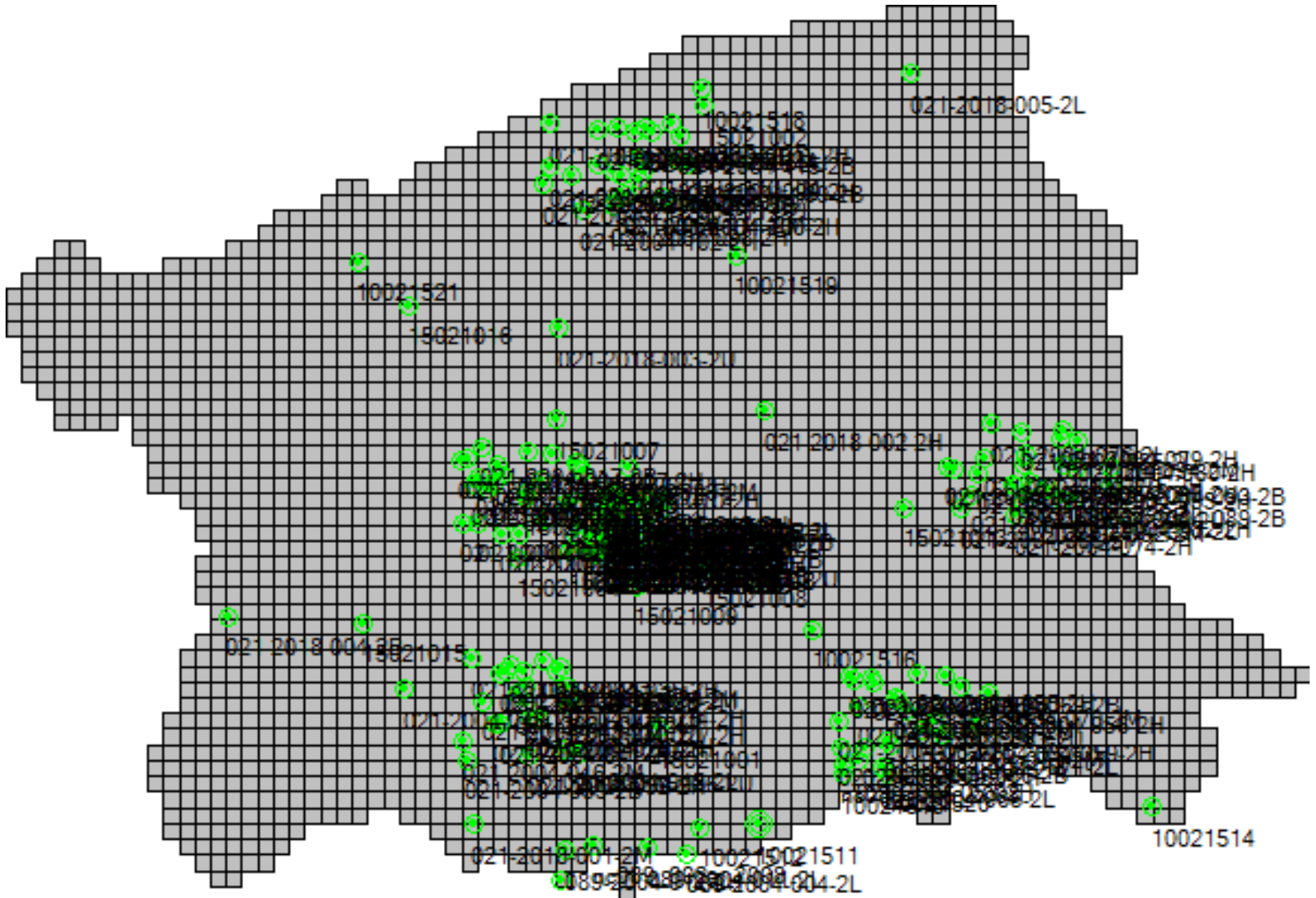
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Data Filename: DEM20
Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:
Data Filename:
Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
DEM			
2B	39	1.474	
2H	47		2.326
2L	26		2.613
2M	27		4.390
2U	63	0.824	
Total	202		

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.166

Maximum DZ: 2.884

Mean DZ: 0.152

Mean Magnitude DZ: 0.606

Number Observations: 102

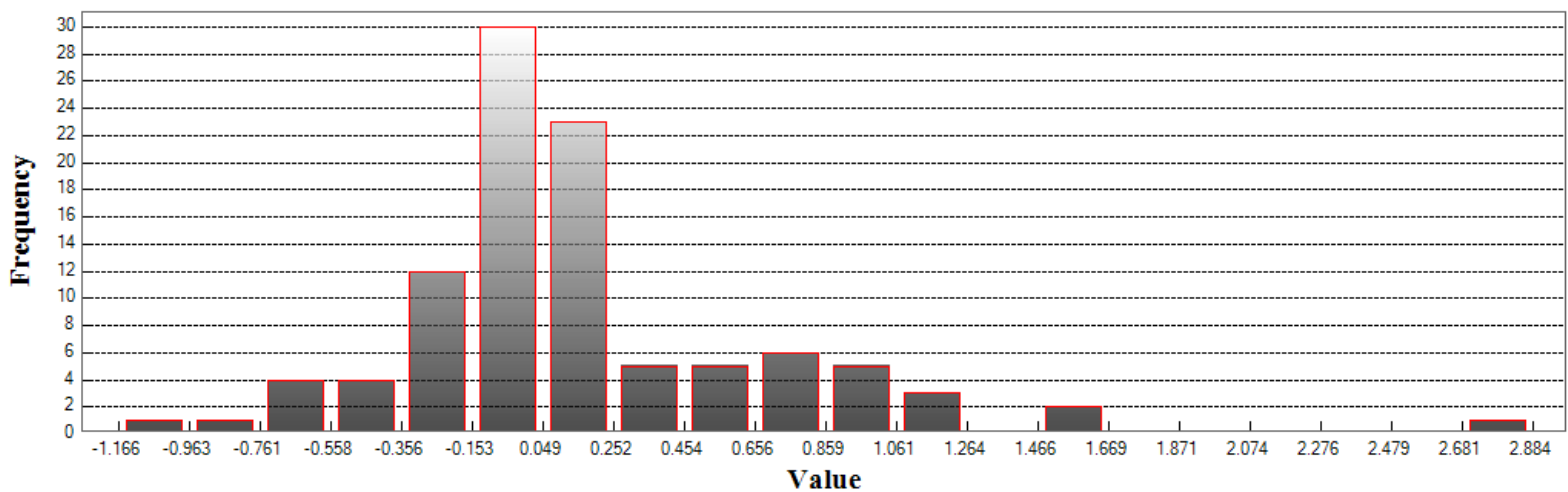
Standard Deviation DZ: 0.553

RMSE Z: 0.57

95% Confidence Level Z: 1.118

Units: US Survey Feet

Histogram



Min: -1.166

Max: 2.884

Number Of Bins: 20

Bin Interval: 0.202

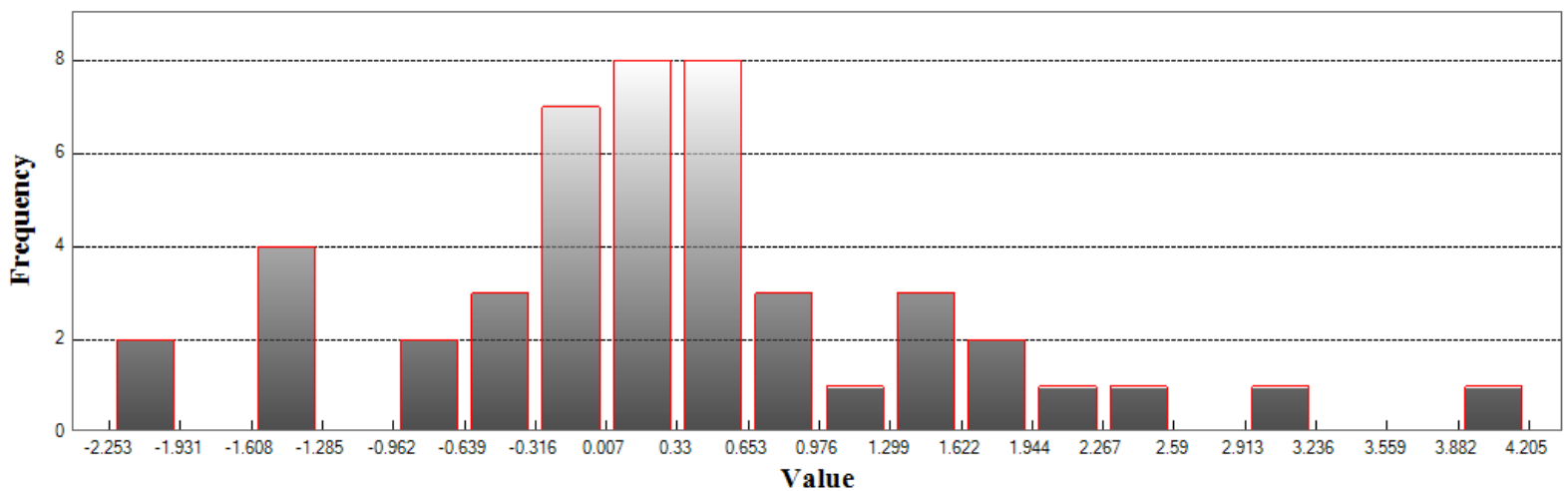


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.253
Maximum DZ: 4.205
Mean DZ: 0.305
Mean Magnitude DZ: 0.946
Number Observations: 47
Standard Deviation DZ: 1.228
RMSE Z: 1.253
95th Percentile: 2.326
Units: US Survey Feet

Histogram



Min: -2.253

Max: 4.205

Number Of Bins: 20

Bin Interval: 0.323

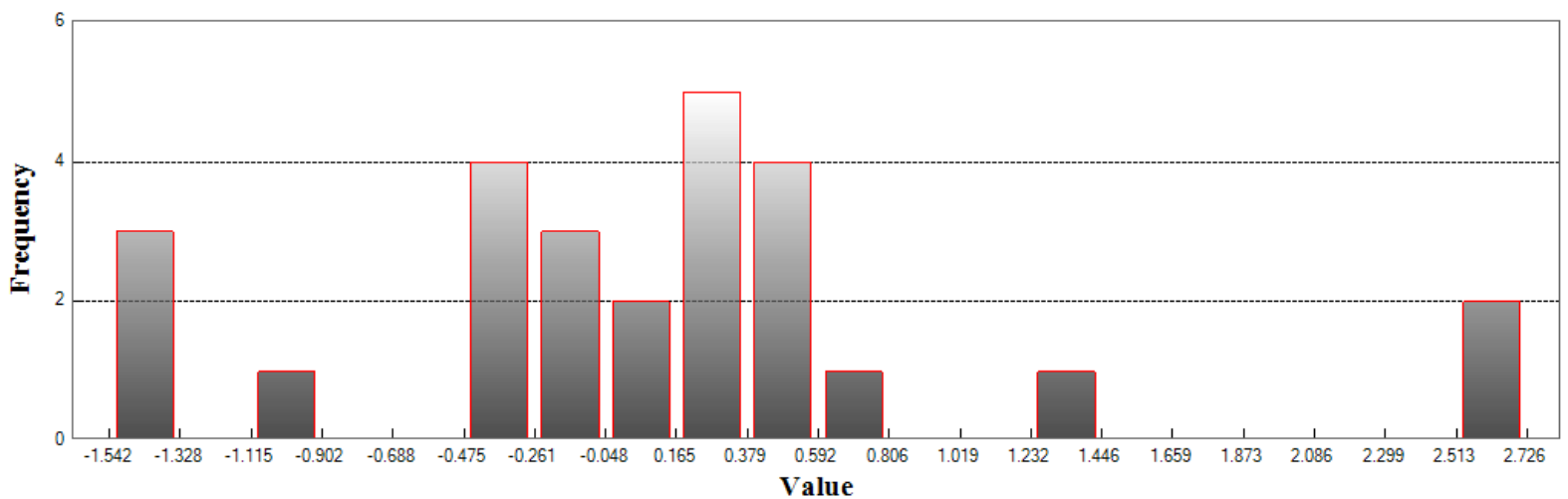


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.542
Maximum DZ: 2.726
Mean DZ: 0.133
Mean Magnitude DZ: 0.835
Number Observations: 26
Standard Deviation DZ: 1.01
RMSE Z: 0.999
95th Percentile: 2.613
Units: US Survey Feet

Histogram



Min: -1.542
Max: 2.726
Number Of Bins: 20
Bin Interval: 0.213

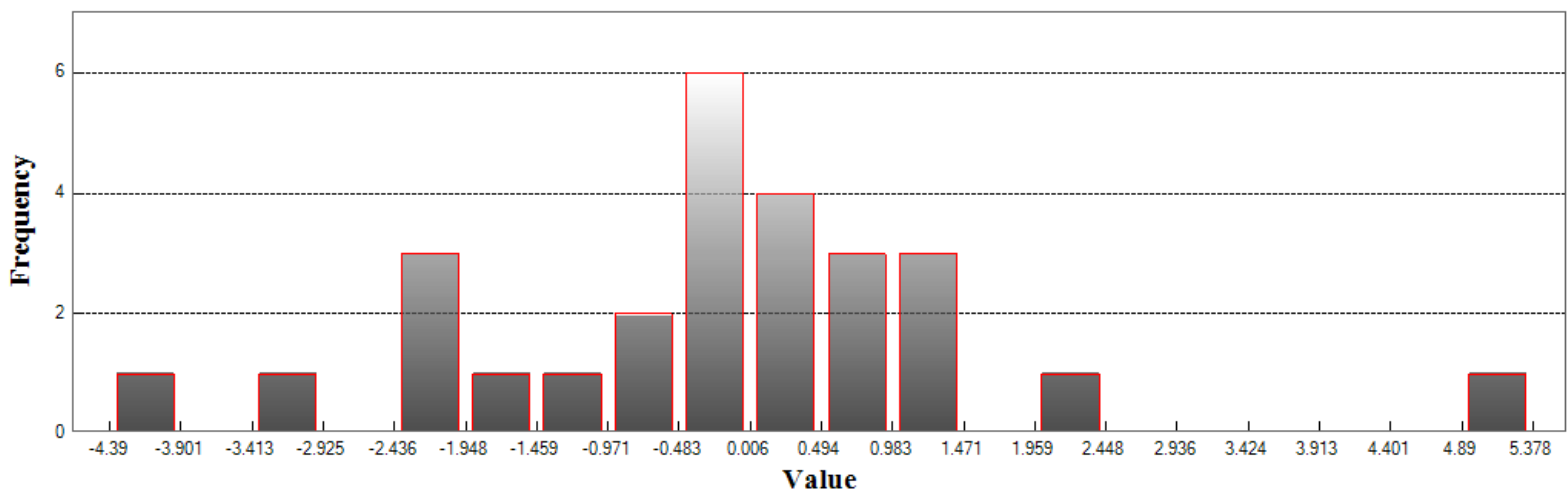


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -4.39
Maximum DZ: 5.378
Mean DZ: -0.204
Mean Magnitude DZ: 1.115
Number Observations: 27
Standard Deviation DZ: 1.838
RMSE Z: 1.815
95th Percentile: 4.39
Units: US Survey Feet

Histogram



Min: -4.39

Max: 5.378

Number Of Bins: 20

Bin Interval: 0.488

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Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: burke_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

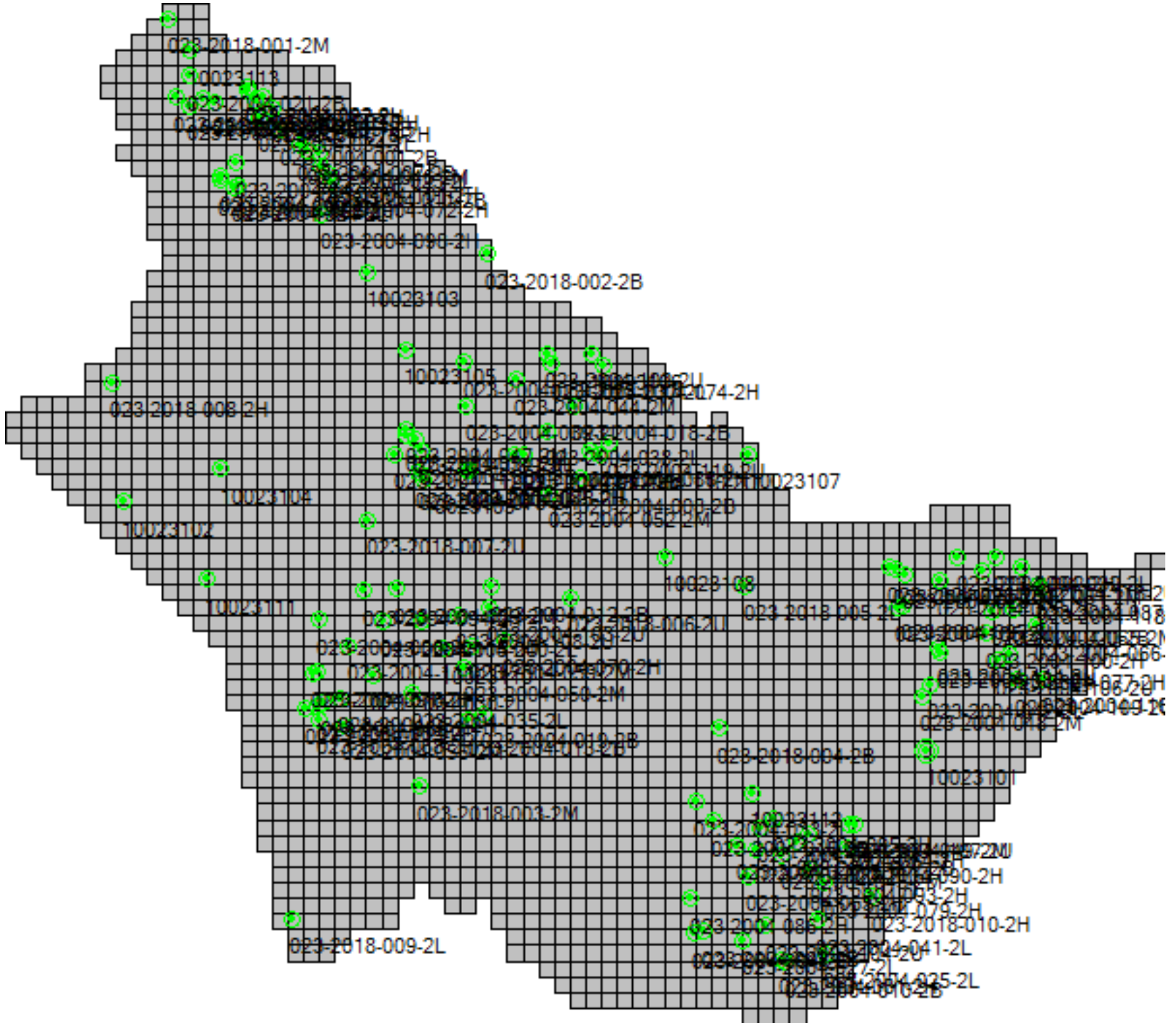
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 2333 out of 2333



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	23	0.949		
2H	42		1.281	
2L	23		0.964	
2M	21		1.474	
2U	34	0.651		
Total	143			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.773

Maximum DZ: 0.95

Mean DZ: 0.067

Mean Magnitude DZ: 0.555

Number Observations: 57

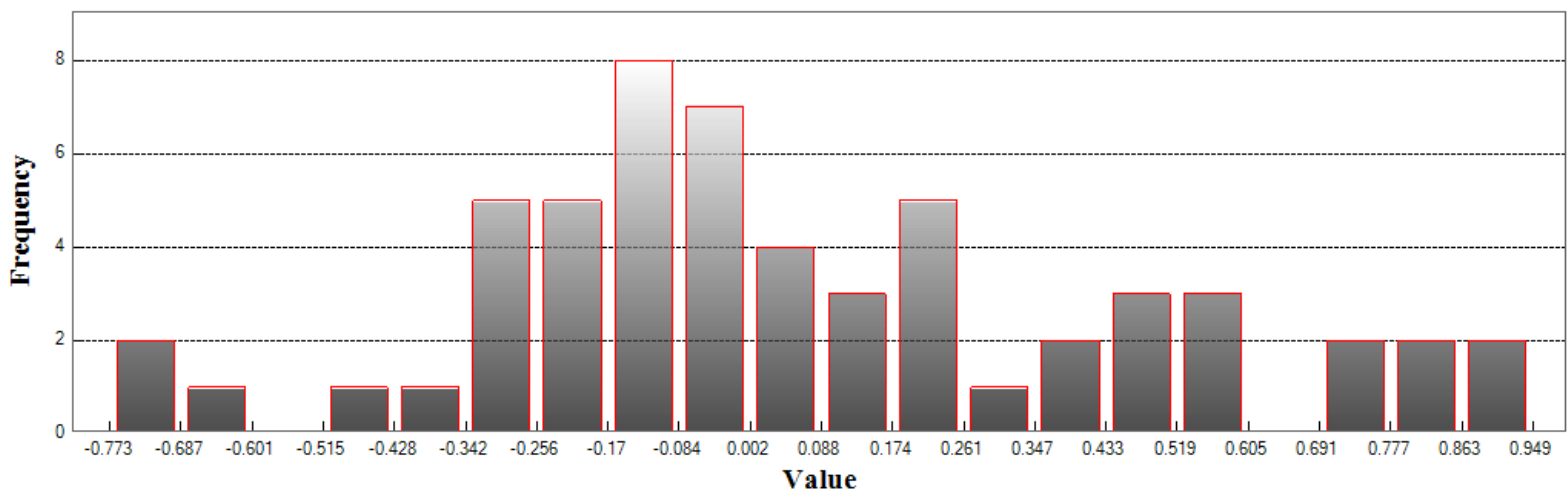
Standard Deviation DZ: 0.398

RMSE Z: 0.401

95% Confidence Level Z: 0.785

Units: US Survey Feet

Histogram



Min: -0.773

Max: 0.95

Number Of Bins: 20

Bin Interval: 0.086

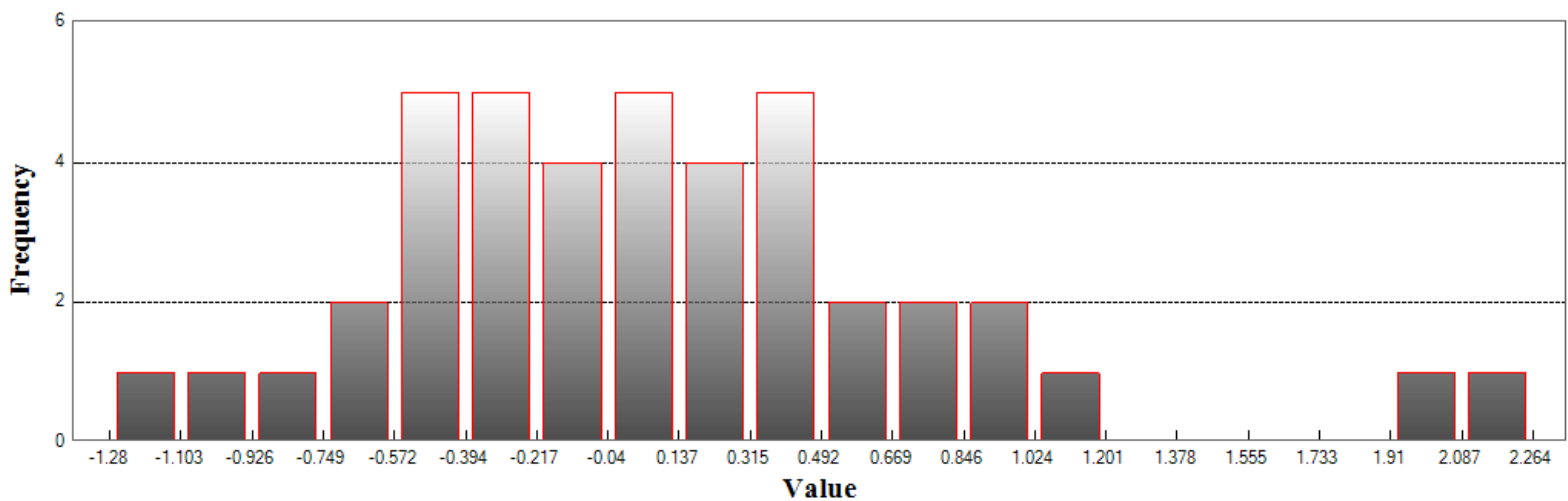


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.281
Maximum DZ: 2.264
Mean DZ: 0.093
Mean Magnitude DZ: 0.724
Number Observations: 42
Standard Deviation DZ: 0.707
RMSE Z: 0.704
95th Percentile: 1.281
Units: US Survey Feet

Histogram



Min: -1.281

Max: 2.264

Number Of Bins: 20

Bin Interval: 0.177

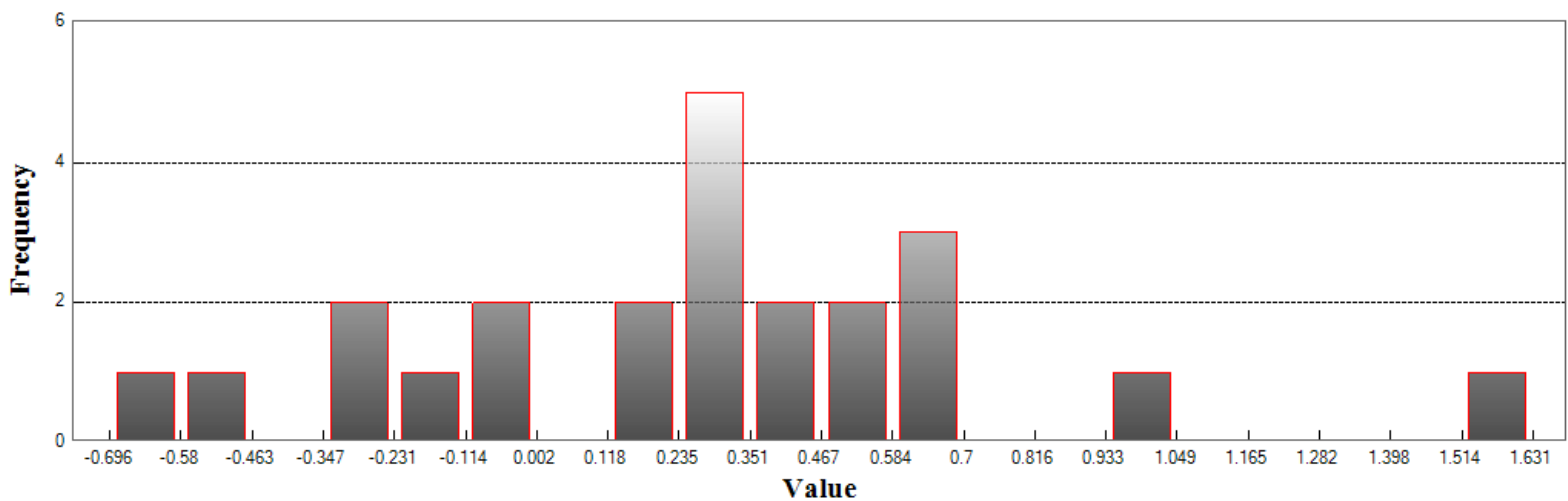


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.696
Maximum DZ: 1.631
Mean DZ: 0.259
Mean Magnitude DZ: 0.657
Number Observations: 23
Standard Deviation DZ: 0.495
RMSE Z: 0.549
95th Percentile: 0.964
Units: US Survey Feet

Histogram



Min: -0.696

Max: 1.631

Number Of Bins: 20

Bin Interval: 0.116

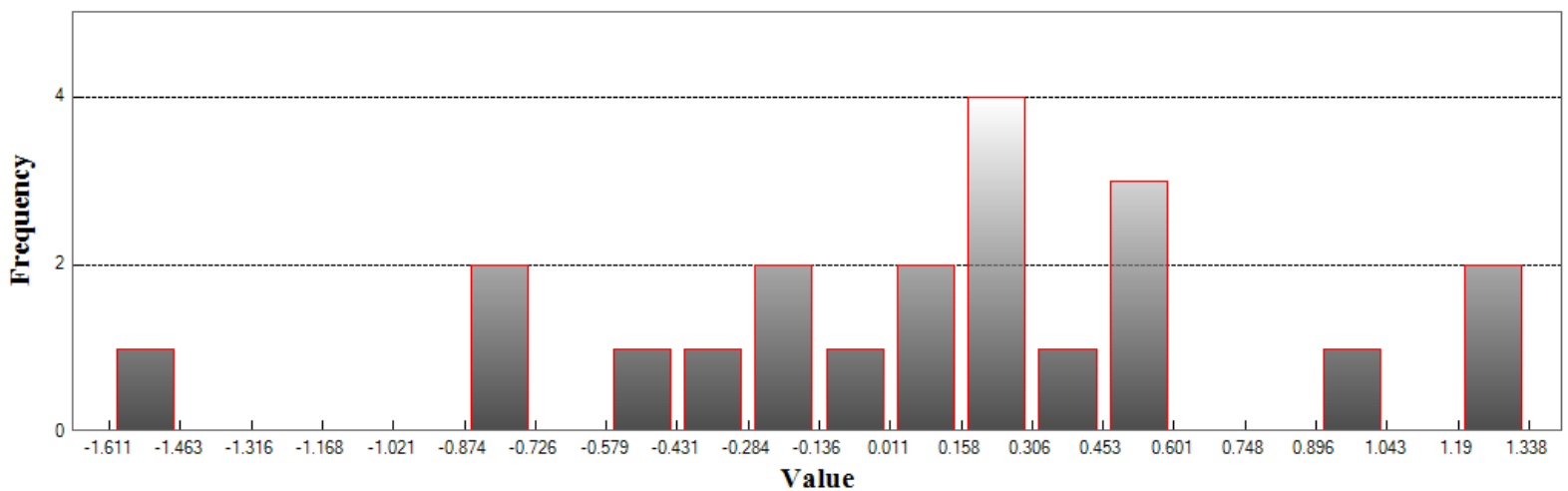


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.611
Maximum DZ: 1.338
Mean DZ: 0.114
Mean Magnitude DZ: 0.736
Number Observations: 21
Standard Deviation DZ: 0.705
RMSE Z: 0.698
95th Percentile: 1.474
Units: US Survey Feet

Histogram



Min: -1.611

Max: 1.338

Number Of Bins: 20

Bin Interval: 0.147

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: caldwell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

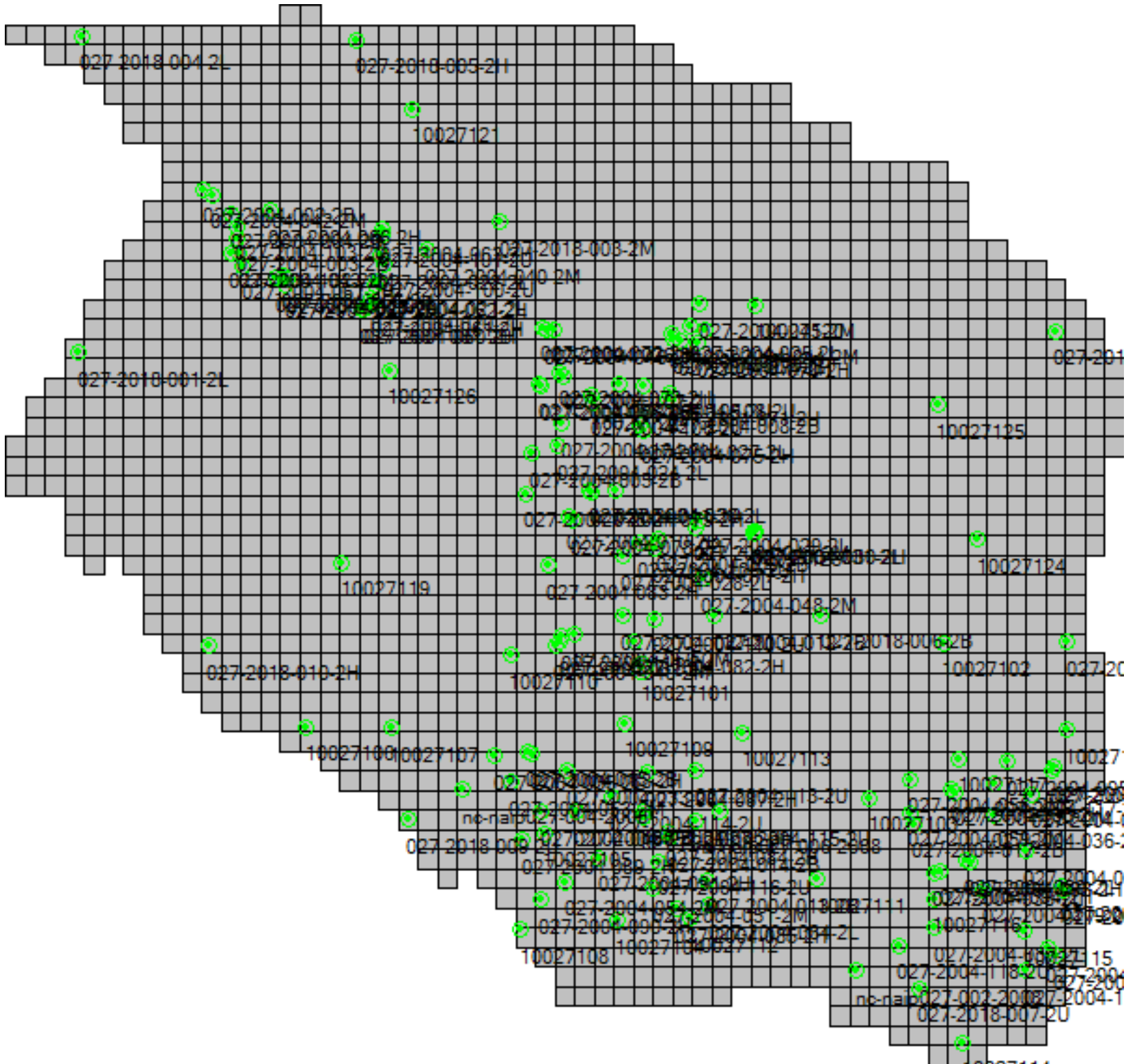
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 2153 out of 2153



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	21	0.782		
2H	42		3.135	
2L	22		0.676	
2M	22		0.898	
2U	52	0.698		
Total	159			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.124

Maximum DZ: 1.312

Mean DZ: 0.018

Mean Magnitude DZ: 0.507

Number Observations: 73

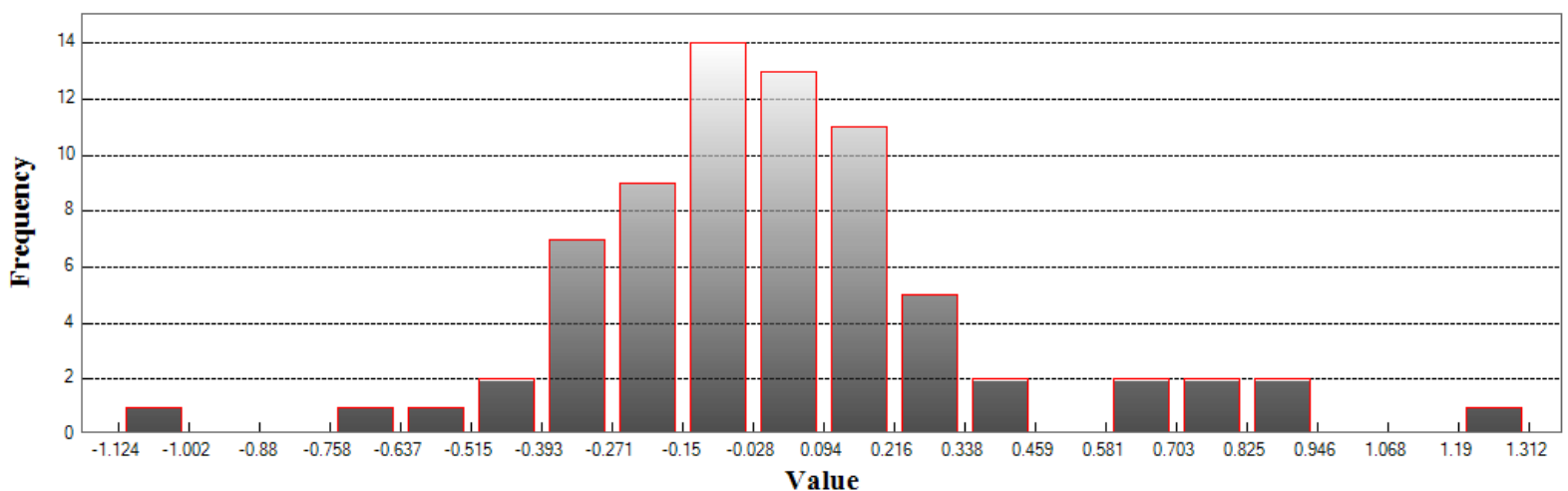
Standard Deviation DZ: 0.371

RMSE Z: 0.369

95% Confidence Level Z: 0.723

Units: US Survey Feet

Histogram



Min: -1.124

Max: 1.312

Number Of Bins: 20

Bin Interval: 0.122

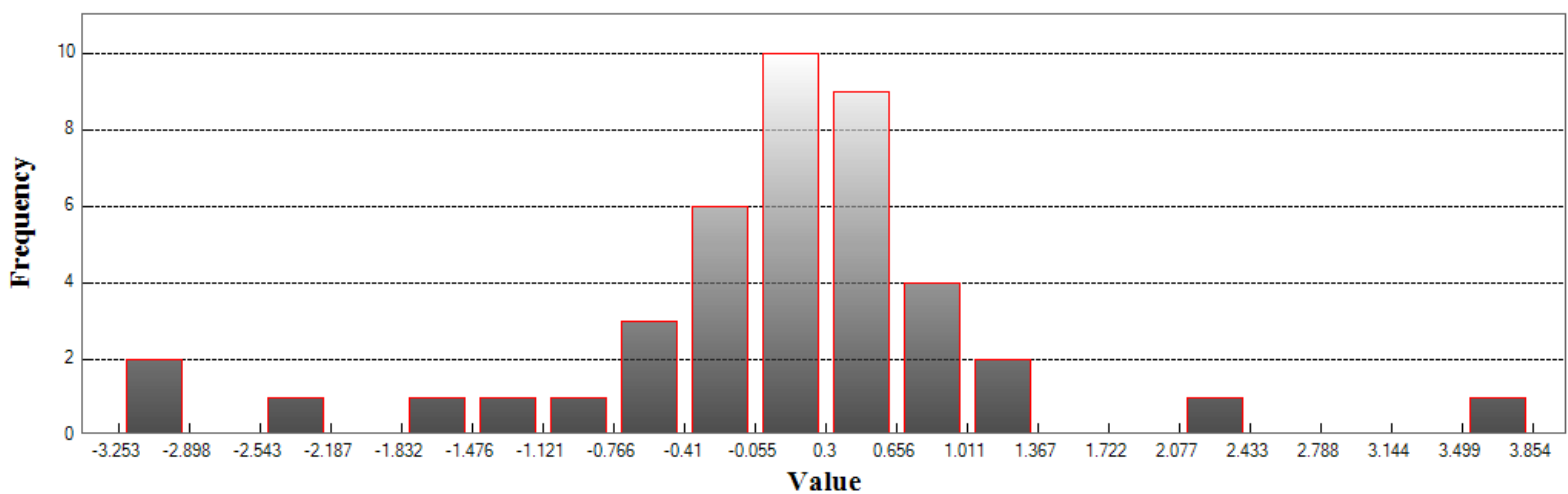


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -3.254
Maximum DZ: 3.854
Mean DZ: 0.027
Mean Magnitude DZ: 0.893
Number Observations: 42
Standard Deviation DZ: 1.232
RMSE Z: 1.217
95th Percentile: 3.135
Units: US Survey Feet

Histogram



Min: -3.254

Max: 3.854

Number Of Bins: 20

Bin Interval: 0.355

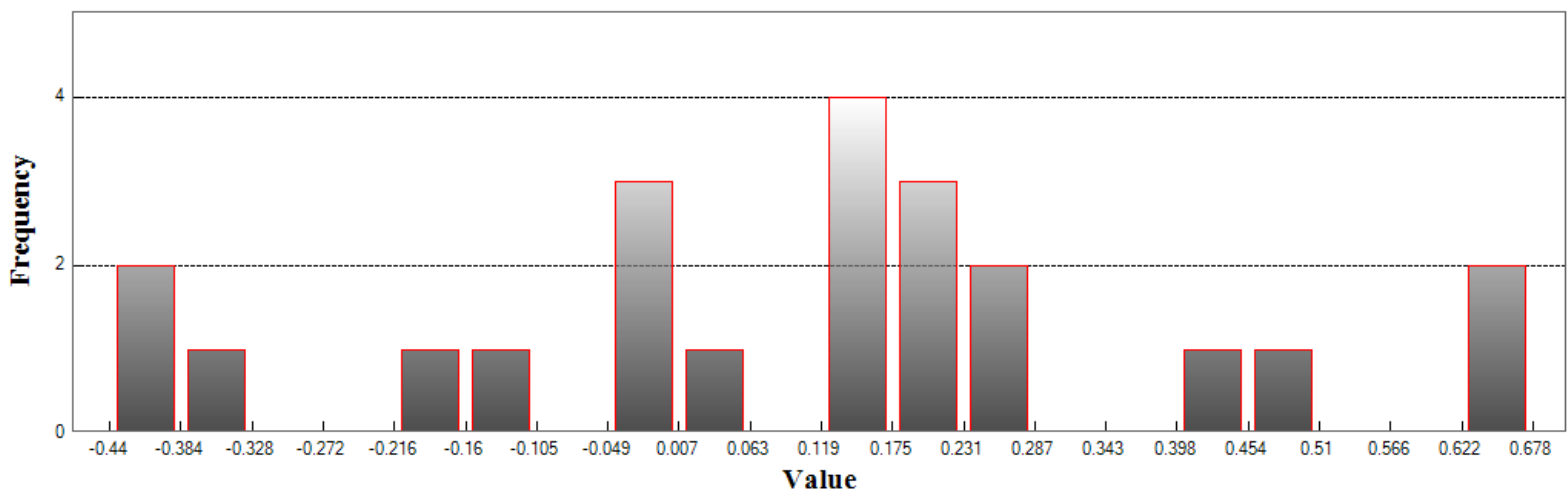


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.44
Maximum DZ: 0.678
Mean DZ: 0.112
Mean Magnitude DZ: 0.508
Number Observations: 22
Standard Deviation DZ: 0.308
RMSE Z: 0.321
95th Percentile: 0.676
Units: US Survey Feet

Histogram



Min: -0.44

Max: 0.678

Number Of Bins: 20

Bin Interval: 0.056

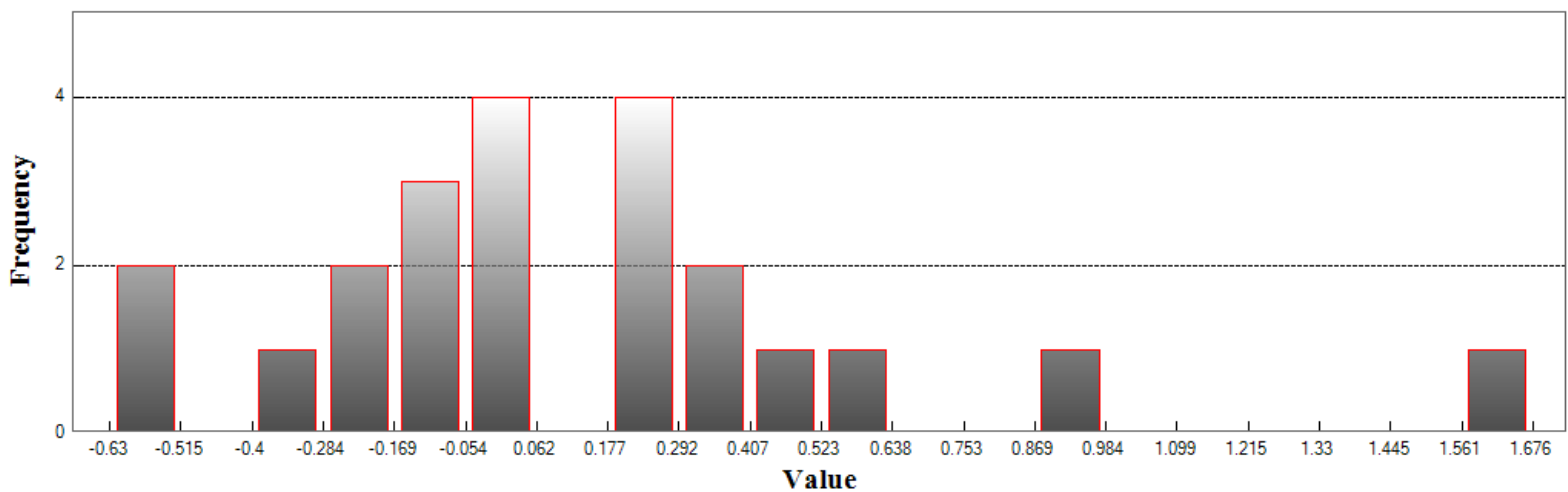


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.631
Maximum DZ: 1.675
Mean DZ: 0.129
Mean Magnitude DZ: 0.585
Number Observations: 22
Standard Deviation DZ: 0.495
RMSE Z: 0.501
95th Percentile: 0.898
Units: US Survey Feet

Histogram



Min: -0.631

Max: 1.675

Number Of Bins: 20

Bin Interval: 0.115

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: cherokee_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

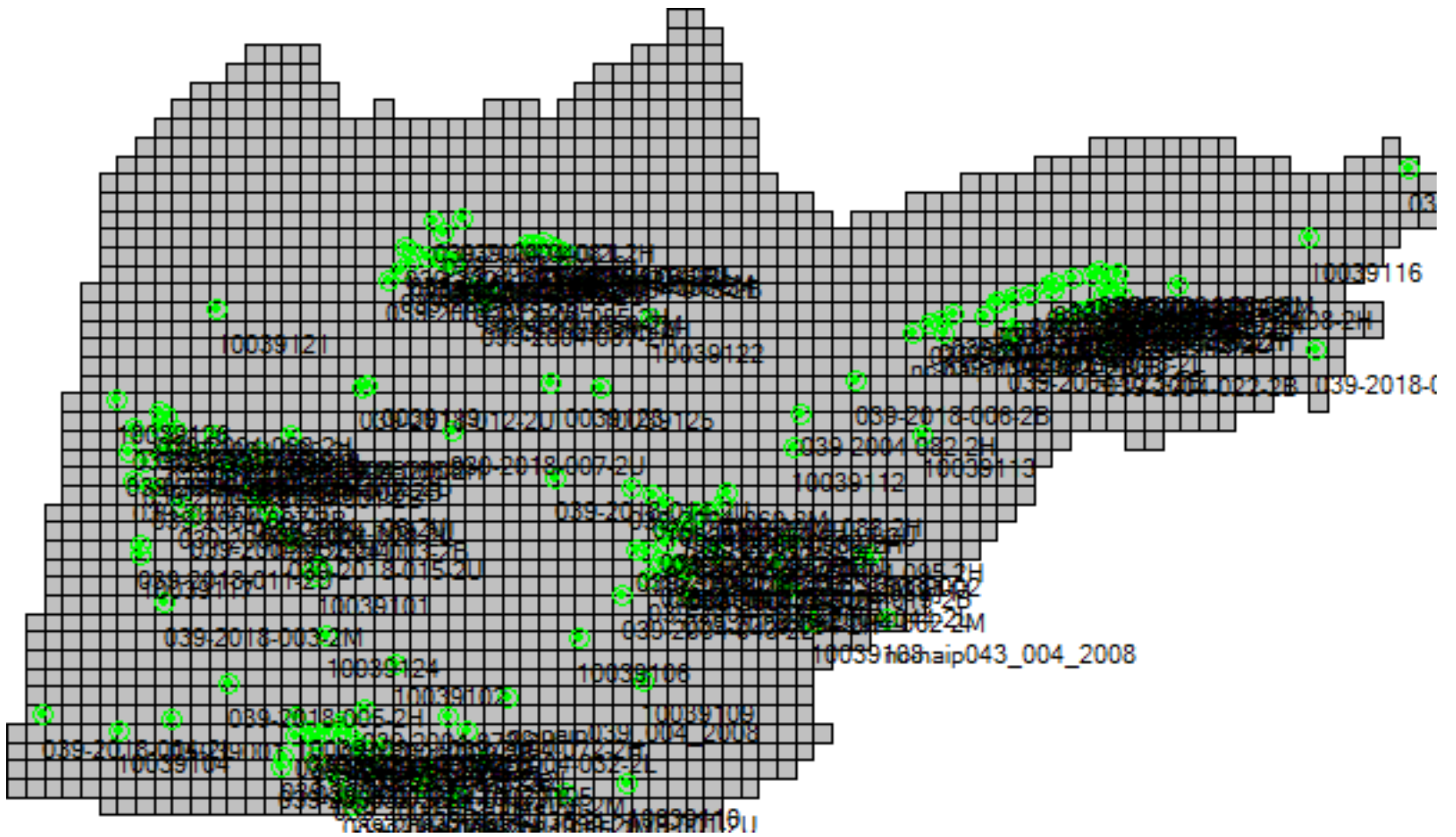
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 1749 out of 1749



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	28	1.013		
2H	42		1.921	
2L	25		2.124	
2M	18		2.129	
2U	58	1.169		
Total	171			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.646

Maximum DZ: 2.037

Mean DZ: 0.162

Mean Magnitude DZ: 0.642

Number Observations: 86

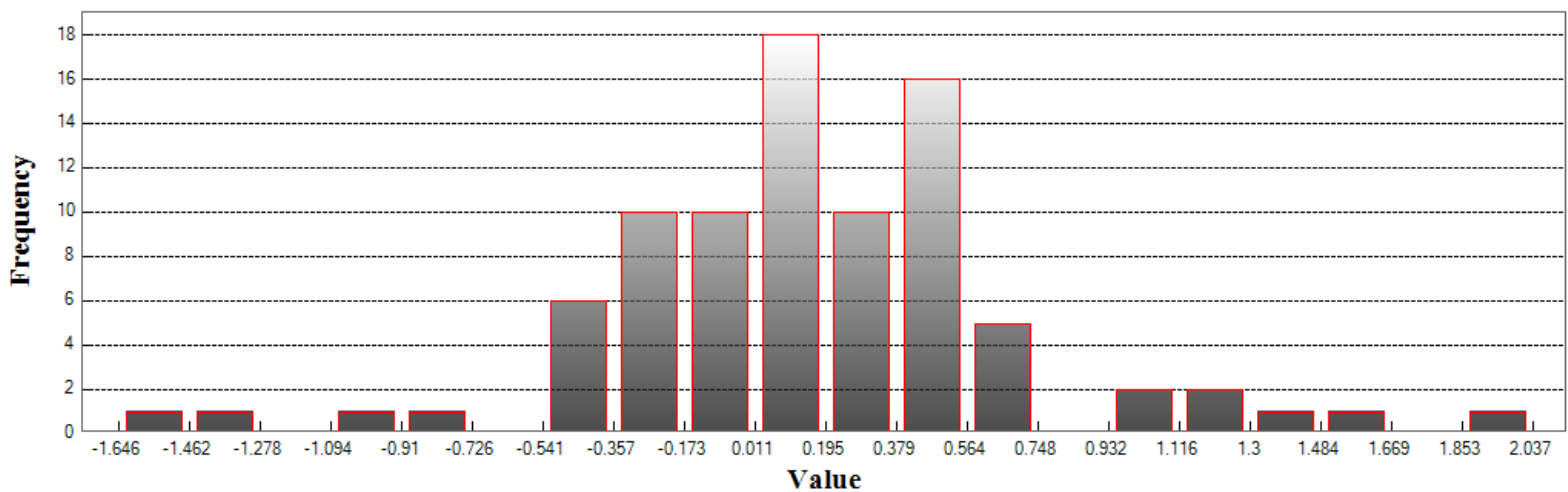
Standard Deviation DZ: 0.552

RMSE Z: 0.572

95% Confidence Level Z: 1.121

Units: US Survey Feet

Histogram



Min: -1.646

Max: 2.037

Number Of Bins: 20

Bin Interval: 0.184

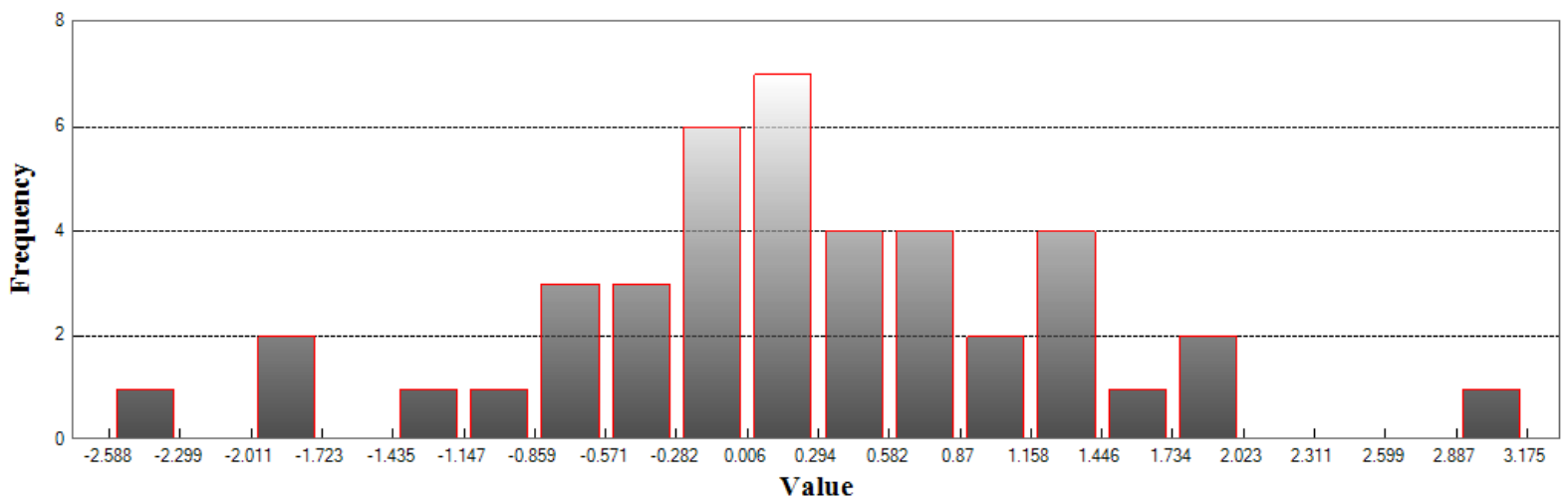


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.588
Maximum DZ: 3.175
Mean DZ: 0.206
Mean Magnitude DZ: 0.913
Number Observations: 42
Standard Deviation DZ: 1.09
RMSE Z: 1.097
95th Percentile: 1.921
Units: US Survey Feet

Histogram



Min: -2.588

Max: 3.175

Number Of Bins: 20

Bin Interval: 0.288

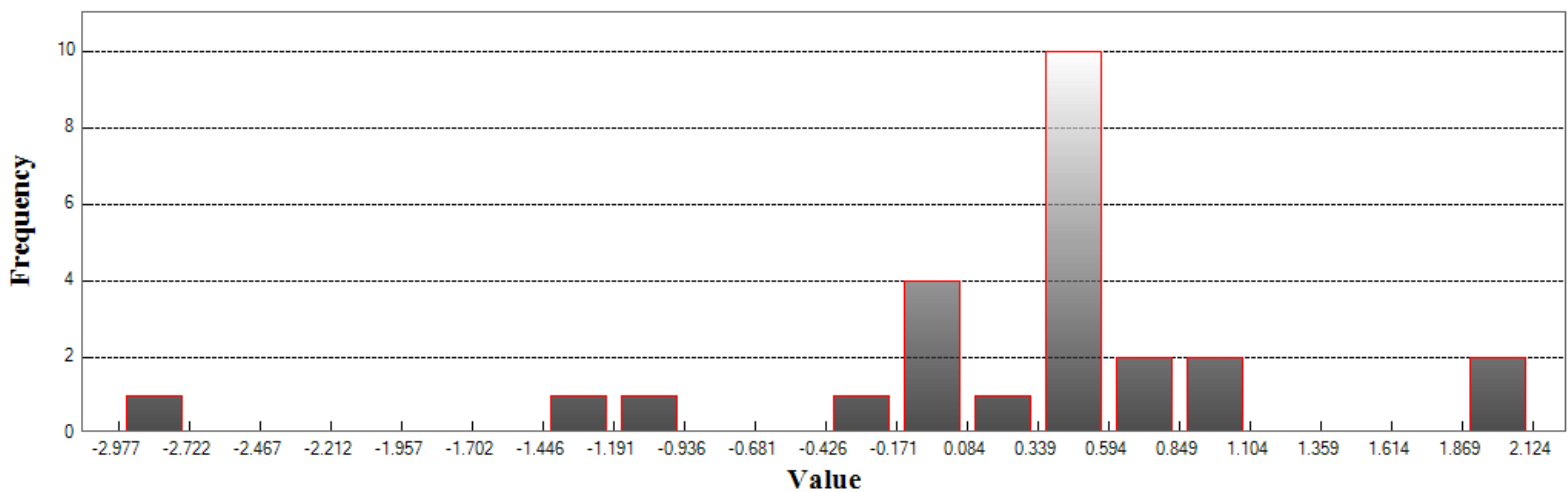


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -2.977
Maximum DZ: 2.124
Mean DZ: 0.282
Mean Magnitude DZ: 0.851
Number Observations: 25
Standard Deviation DZ: 0.99
RMSE Z: 1.01
95th Percentile: 2.124
Units: US Survey Feet

Histogram



Min: -2.977

Max: 2.124

Number Of Bins: 20

Bin Interval: 0.255

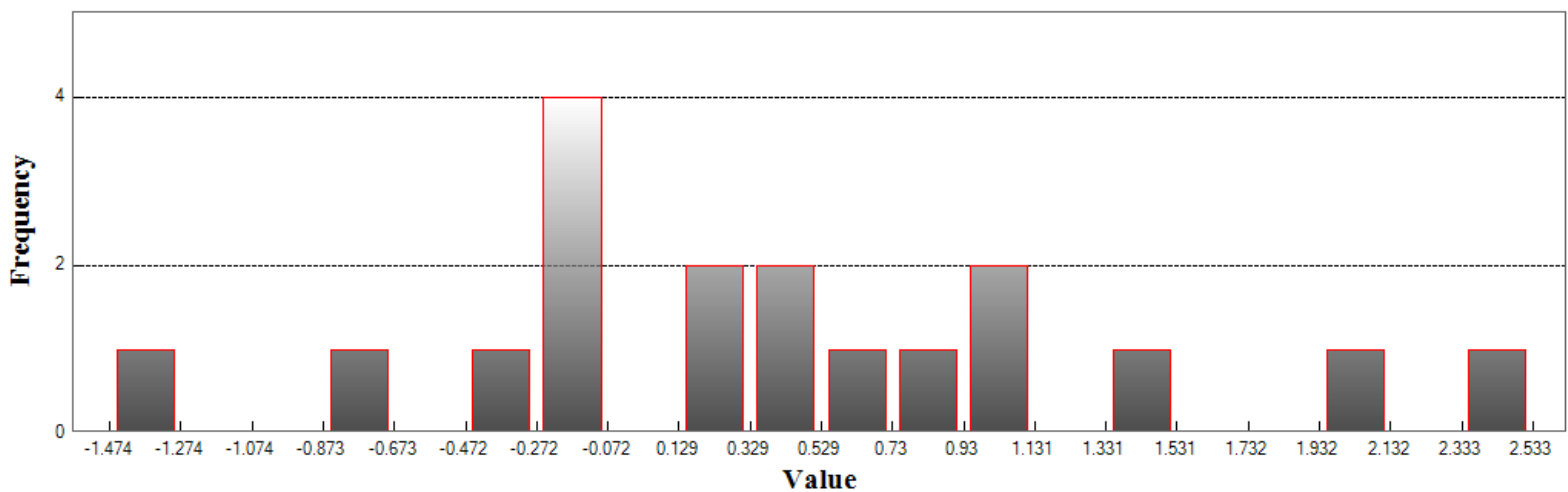


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.474
Maximum DZ: 2.533
Mean DZ: 0.423
Mean Magnitude DZ: 0.889
Number Observations: 18
Standard Deviation DZ: 0.988
RMSE Z: 1.049
95th Percentile: 2.129
Units: US Survey Feet

Histogram



Min: -1.474

Max: 2.533

Number Of Bins: 20

Bin Interval: 0.2

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: clay_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

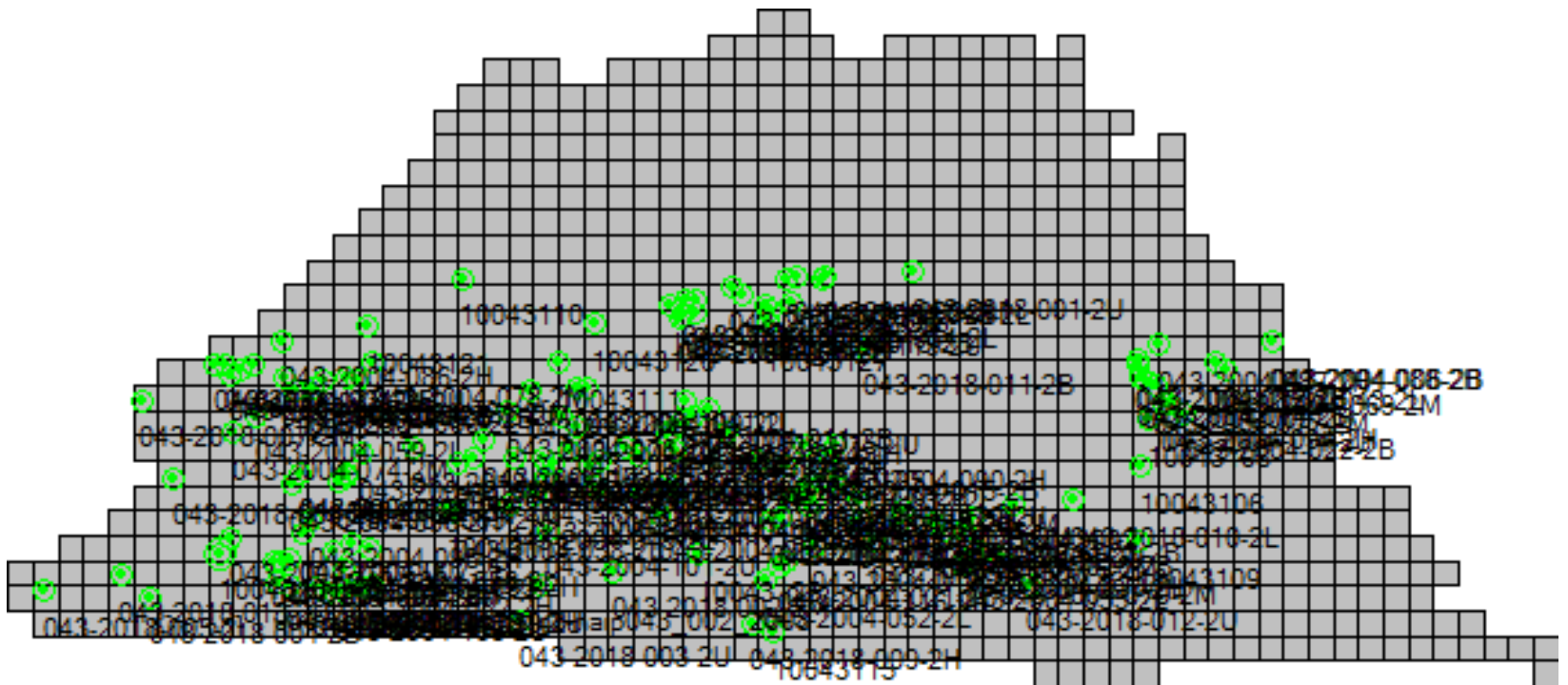
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: 1749 out of 1749



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	34	1.596		
2H	21		2.913	
2L	33		1.173	
2M	19		2.522	
2U	57	1.080		
Total	164			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -2.1

Maximum DZ: 2.74

Mean DZ: 0.21

Mean Magnitude DZ: 0.68

Number Observations: 91

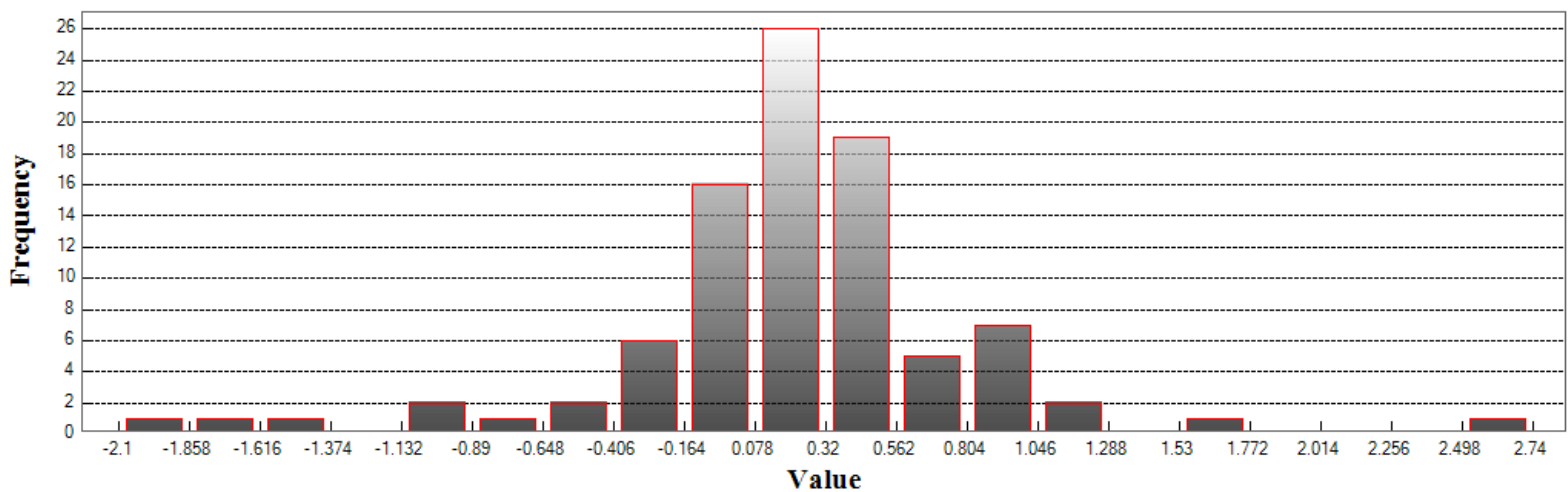
Standard Deviation DZ: 0.631

RMSE Z: 0.662

95% Confidence Level Z: 1.297

Units: US Survey Feet

Histogram



Min: -2.1

Max: 2.74

Number Of Bins: 20

Bin Interval: 0.242

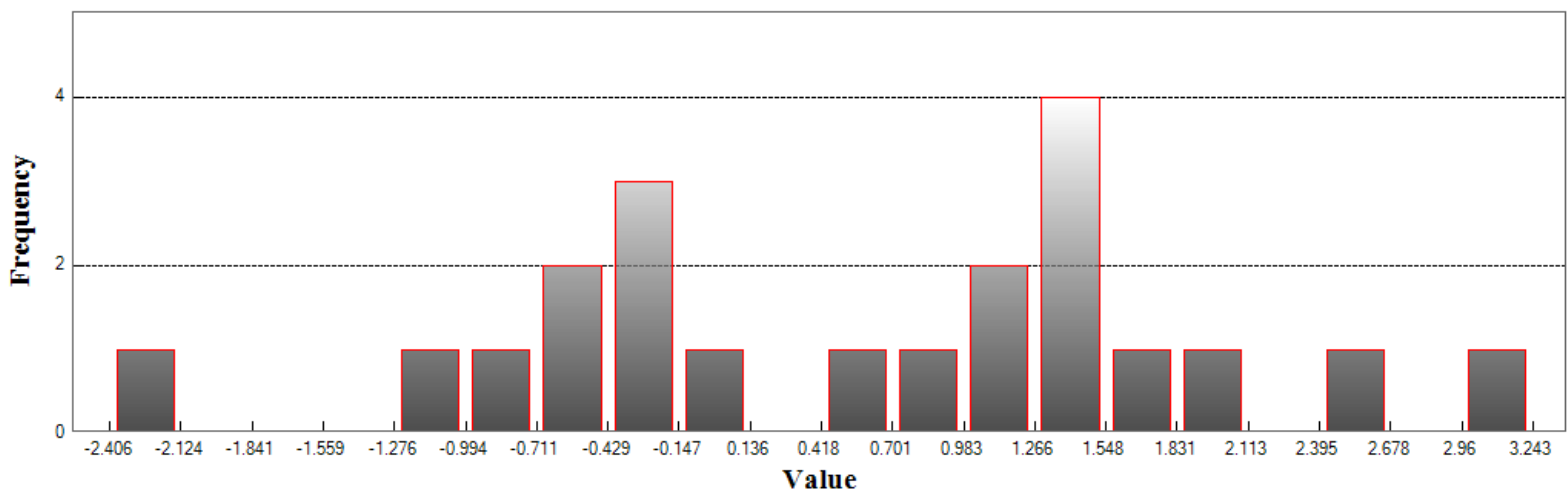


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.406
Maximum DZ: 3.243
Mean DZ: 0.588
Mean Magnitude DZ: 1.088
Number Observations: 21
Standard Deviation DZ: 1.347
RMSE Z: 1.441
95th Percentile: 2.913
Units: US Survey Feet

Histogram



Min: -2.406

Max: 3.243

Number Of Bins: 20

Bin Interval: 0.282

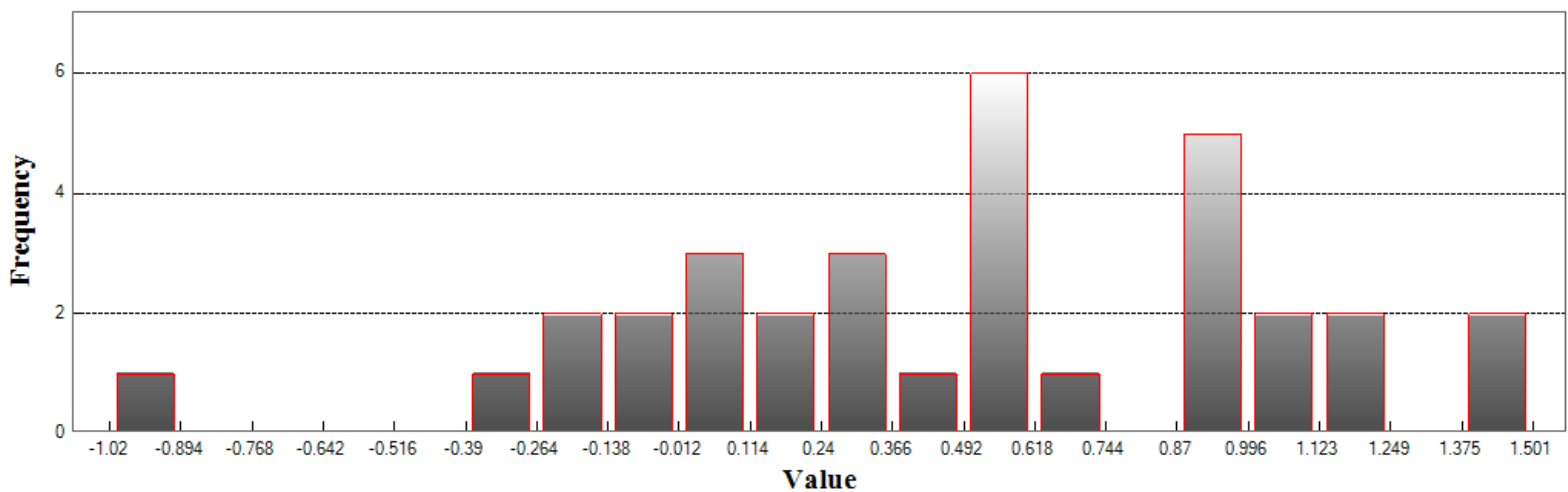


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.02
Maximum DZ: 1.501
Mean DZ: 0.484
Mean Magnitude DZ: 0.774
Number Observations: 33
Standard Deviation DZ: 0.558
RMSE Z: 0.732
95th Percentile: 1.173
Units: US Survey Feet

Histogram



Min: -1.02

Max: 1.501

Number Of Bins: 20

Bin Interval: 0.126

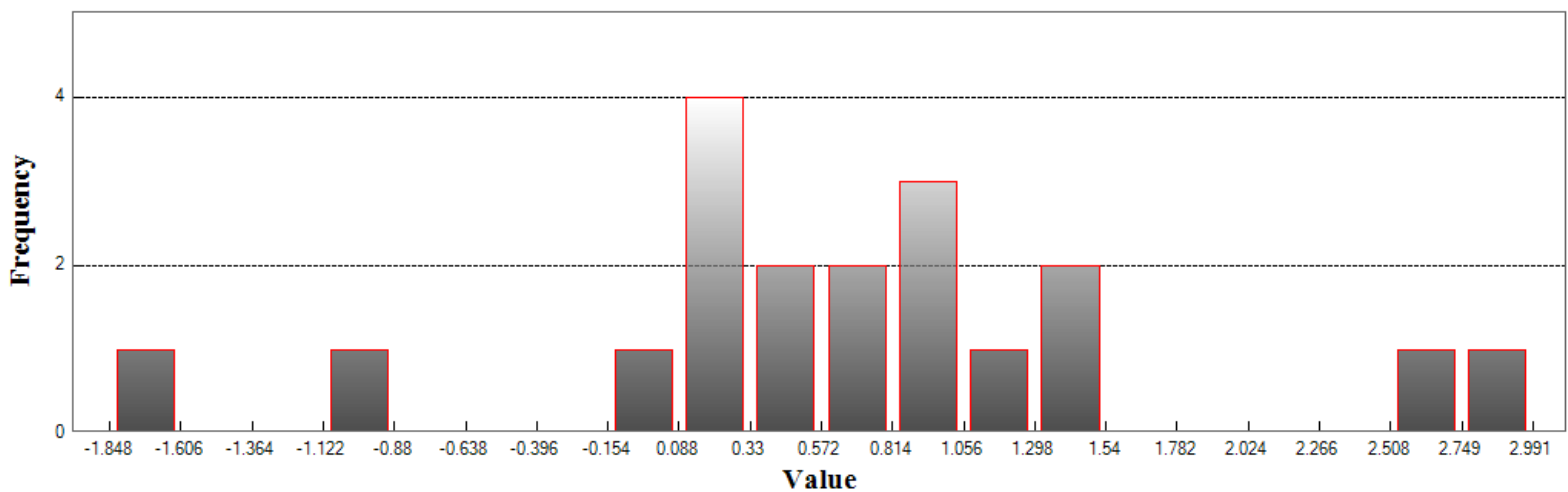


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.848
Maximum DZ: 2.991
Mean DZ: 0.646
Mean Magnitude DZ: 0.979
Number Observations: 19
Standard Deviation DZ: 1.089
RMSE Z: 1.242
95th Percentile: 2.522
Units: US Survey Feet

Histogram



Min: -1.848

Max: 2.991

Number Of Bins: 20

Bin Interval: 0.242

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: graham_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.844		
2H	41		3.511	
2L	22		0.739	
2M	22		3.547	
2U	56	1.192		
Total	163			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -2.02

Maximum DZ: 1.653

Mean DZ: -0.058

Mean Magnitude DZ: 0.623

Number Observations: 78

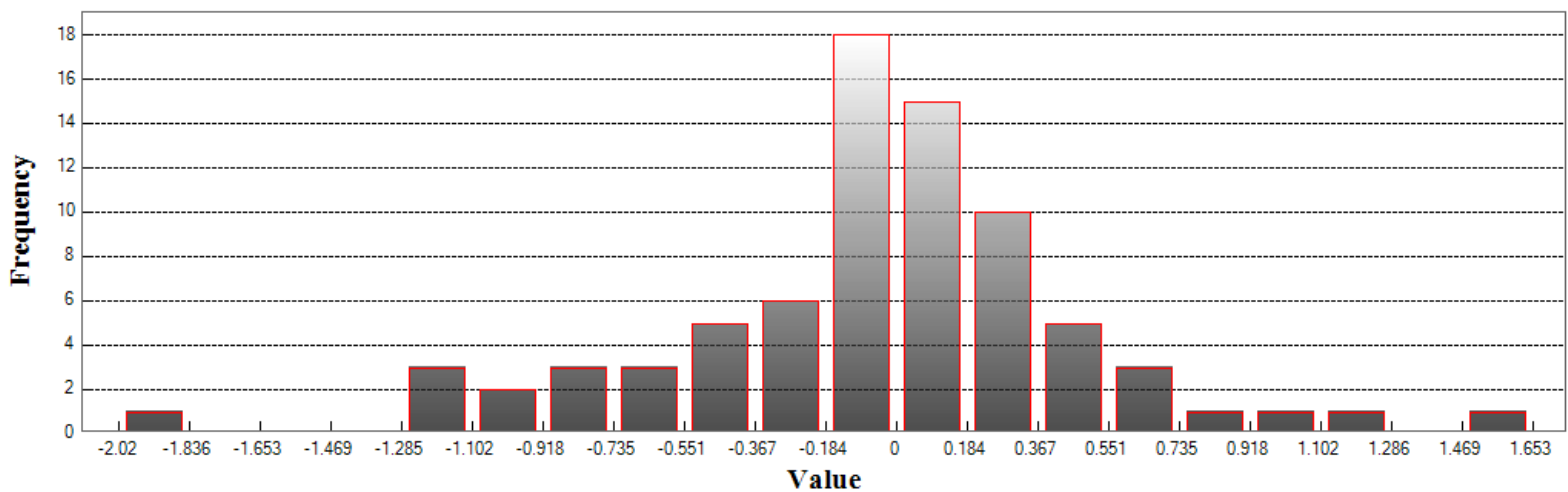
Standard Deviation DZ: 0.564

RMSE Z: 0.564

95% Confidence Level Z: 1.105

Units: US Survey Feet

Histogram



Min: -2.02

Max: 1.653

Number Of Bins: 20

Bin Interval: 0.184

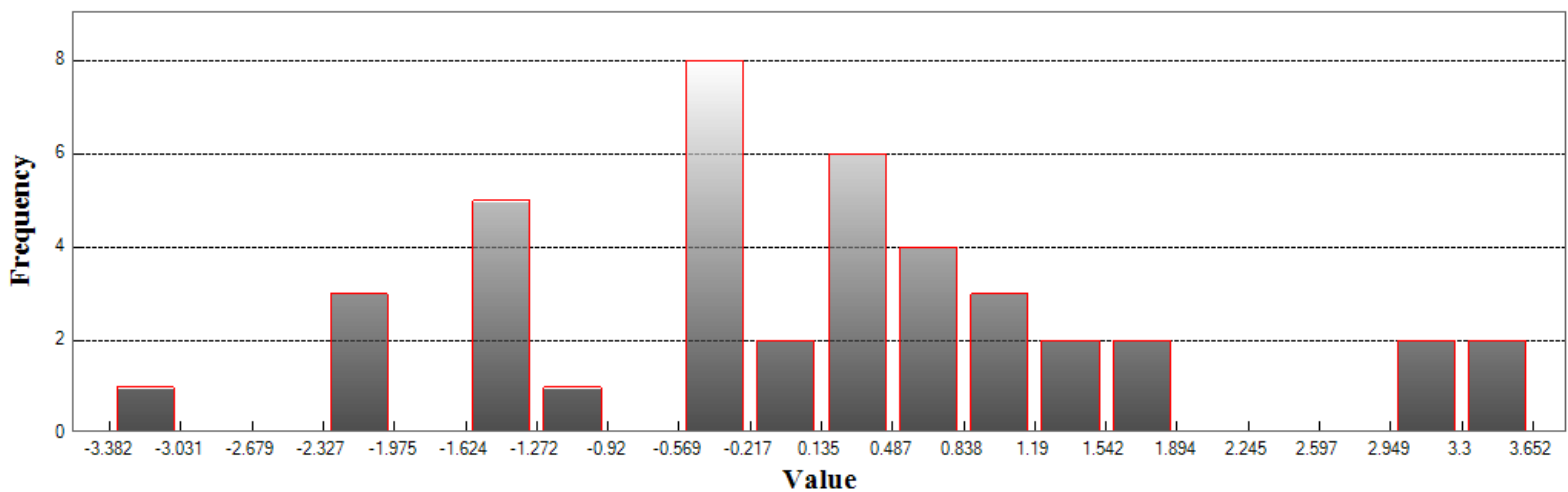


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -3.383
Maximum DZ: 3.652
Mean DZ: 0.142
Mean Magnitude DZ: 1.094
Number Observations: 41
Standard Deviation DZ: 1.588
RMSE Z: 1.575
95th Percentile: 3.511
Units: US Survey Feet

Histogram



Min: -3.383

Max: 3.652

Number Of Bins: 20

Bin Interval: 0.352

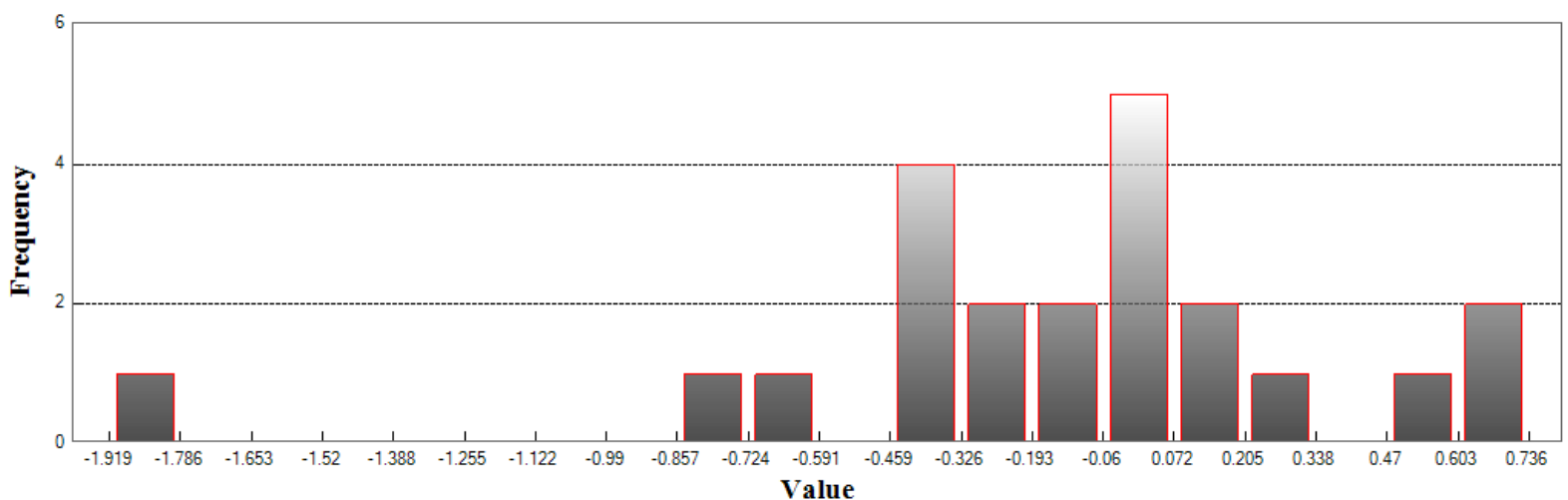


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.918
Maximum DZ: 0.736
Mean DZ: -0.141
Mean Magnitude DZ: 0.611
Number Observations: 22
Standard Deviation DZ: 0.554
RMSE Z: 0.559
95th Percentile: 0.739
Units: US Survey Feet

Histogram



Min: -1.918
Max: 0.736
Number Of Bins: 20
Bin Interval: 0.133

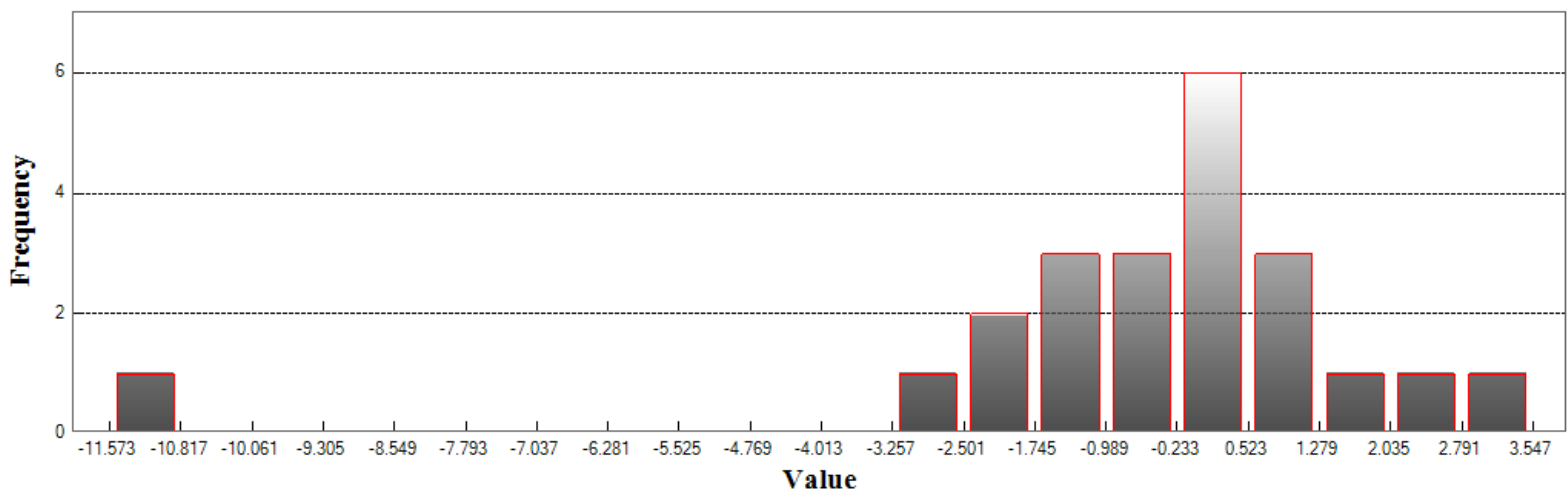


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -11.573
Maximum DZ: 3.547
Mean DZ: -0.519
Mean Magnitude DZ: 1.266
Number Observations: 22
Standard Deviation DZ: 2.864
RMSE Z: 2.846
95th Percentile: 3.547
Units: US Survey Feet

Histogram



Min: -11.573

Max: 3.547

Number Of Bins: 20

Bin Interval: 0.756

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: haywood_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: 2221 out of 2221



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	1.705		
2H	42		3.830	
2L	22		3.507	
2M	22		5.236	
2U	49	0.868		
Total	157			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.475

Maximum DZ: 2.353

Mean DZ: 0.039

Mean Magnitude DZ: 0.655

Number Observations: 71

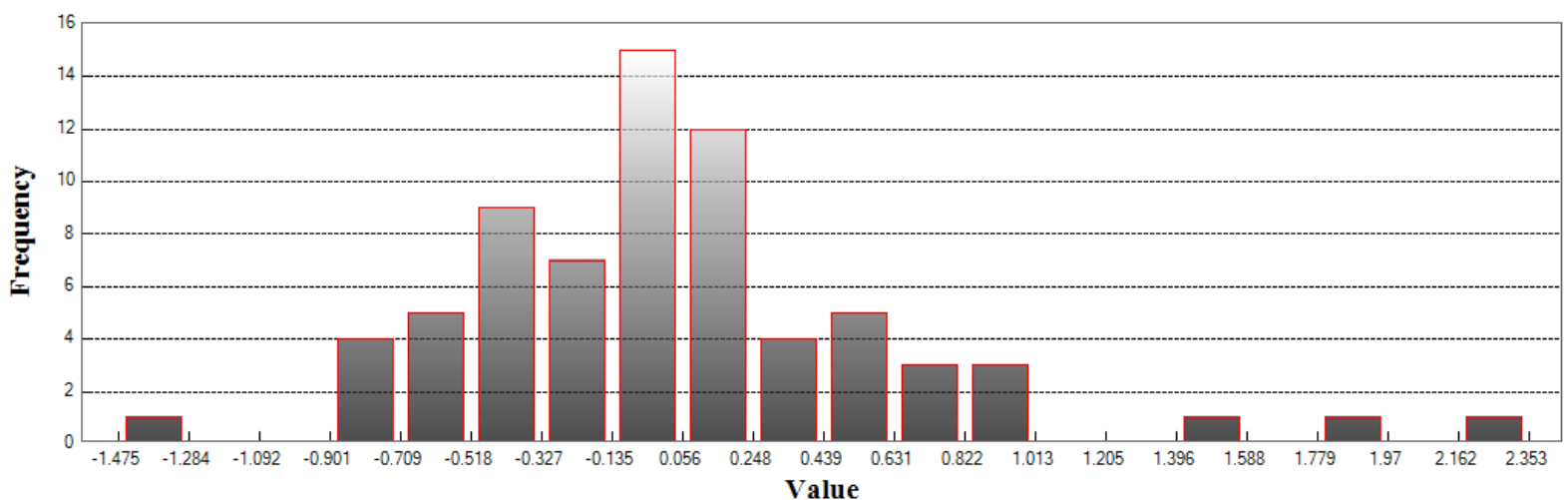
Standard Deviation DZ: 0.611

RMSE Z: 0.608

95% Confidence Level Z: 1.192

Units: US Survey Feet

Histogram



Min: -1.475

Max: 2.353

Number Of Bins: 20

Bin Interval: 0.191

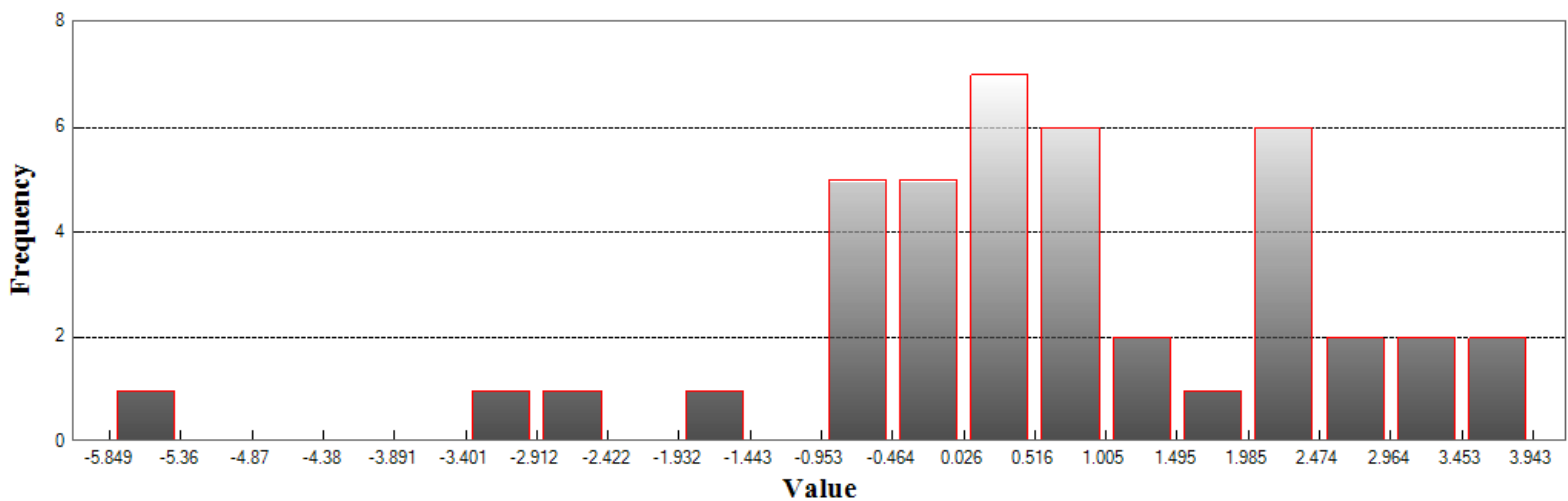


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -5.85
Maximum DZ: 3.943
Mean DZ: 0.602
Mean Magnitude DZ: 1.202
Number Observations: 42
Standard Deviation DZ: 1.906
RMSE Z: 1.977
95th Percentile: 3.83
Units: US Survey Feet

Histogram



Min: -5.85

Max: 3.943

Number Of Bins: 20

Bin Interval: 0.49

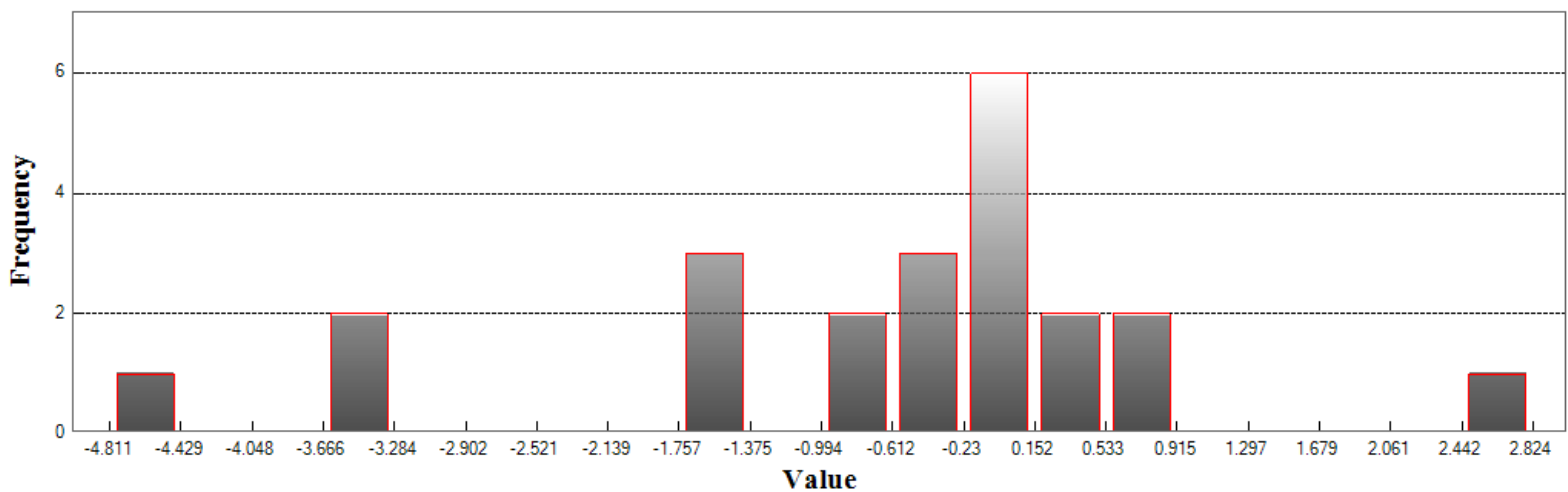


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -4.811
Maximum DZ: 2.824
Mean DZ: -0.664
Mean Magnitude DZ: 1.053
Number Observations: 22
Standard Deviation DZ: 1.635
RMSE Z: 1.73
95th Percentile: 3.507
Units: US Survey Feet

Histogram



Min: -4.811

Max: 2.824

Number Of Bins: 20

Bin Interval: 0.382

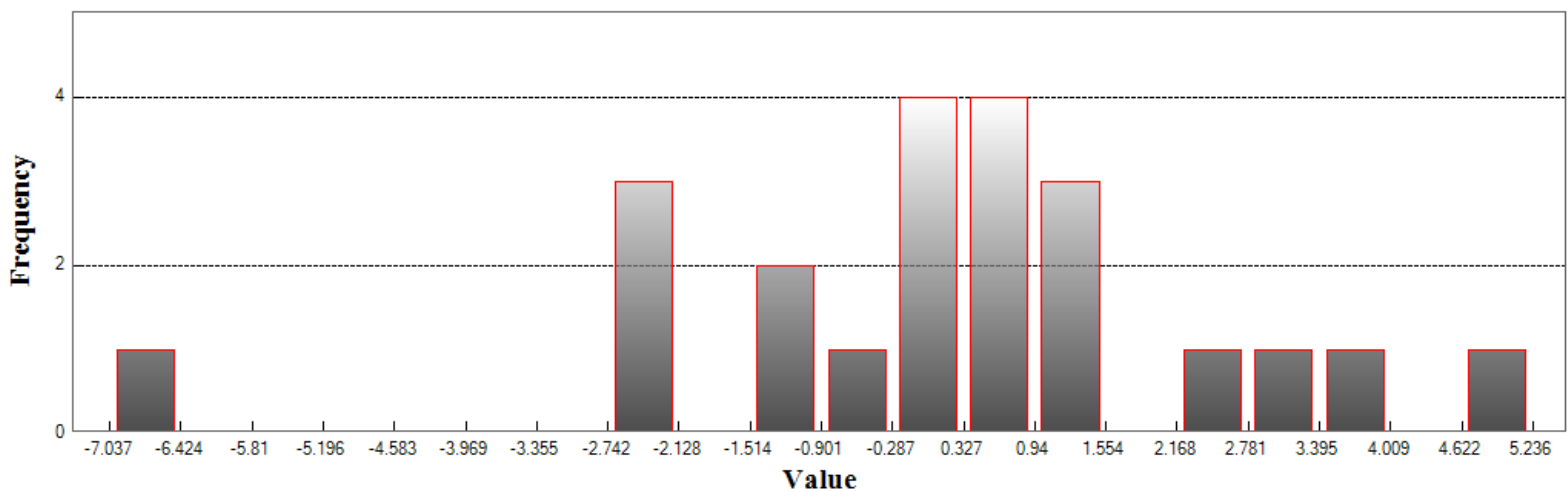


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -7.038
Maximum DZ: 5.236
Mean DZ: 0.202
Mean Magnitude DZ: 1.316
Number Observations: 22
Standard Deviation DZ: 2.485
RMSE Z: 2.436
95th Percentile: 5.236
Units: US Survey Feet

Histogram



Min: -7.038

Max: 5.236

Number Of Bins: 20

Bin Interval: 0.614

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: henderson_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

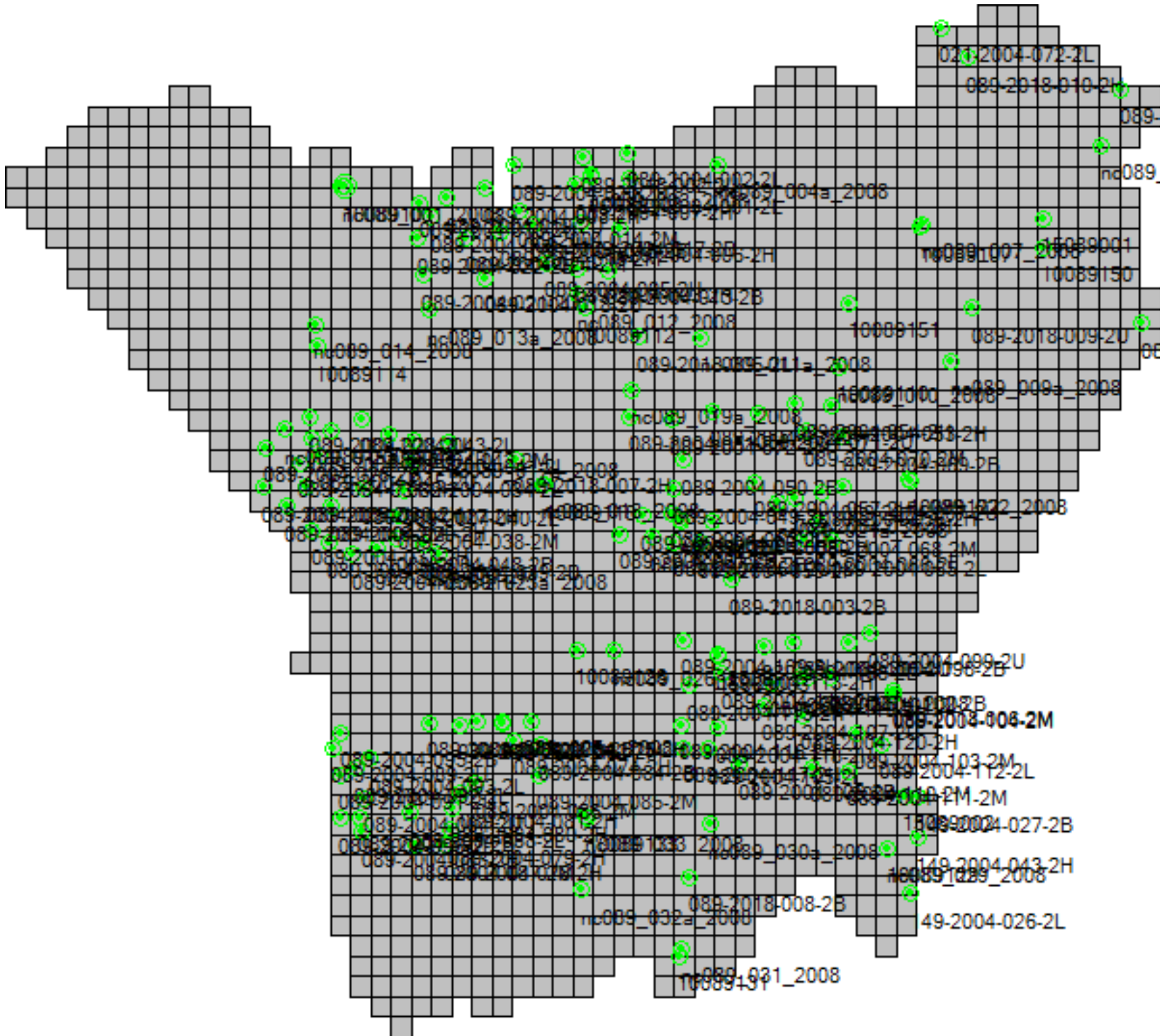
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	0.925		
2H	42		1.288	
2L	21		1.370	
2M	21		2.332	
2U	67	1.002		
Total	173			

Units: US Survey Feet

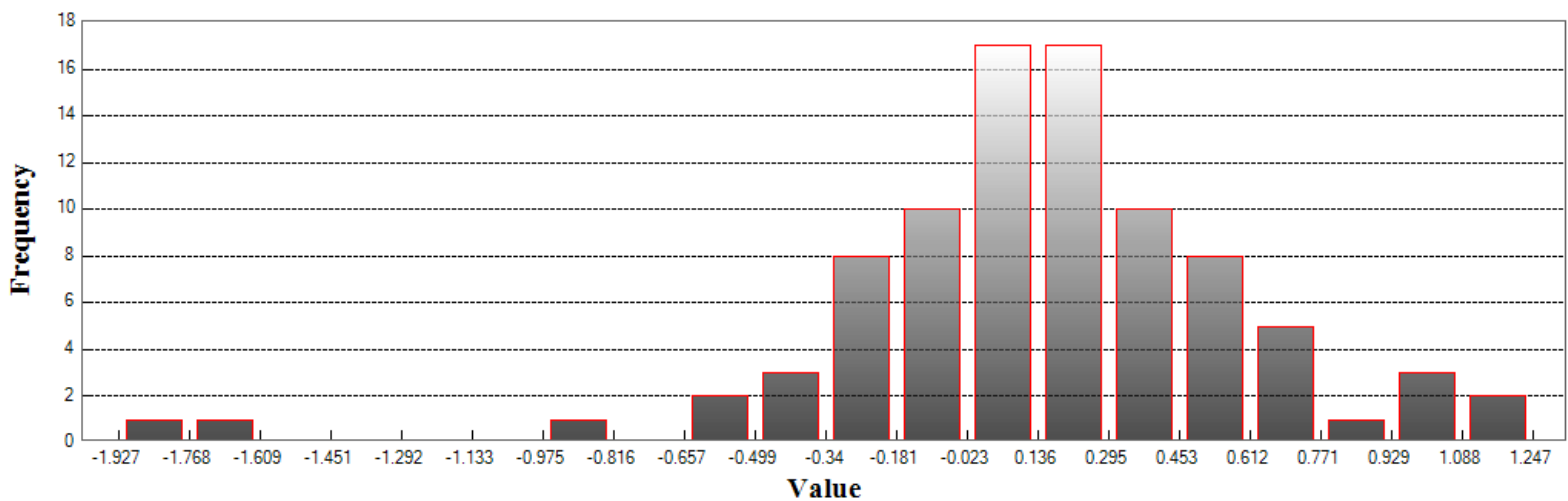


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -1.926
Maximum DZ: 1.247
Mean DZ: 0.14
Mean Magnitude DZ: 0.599
Number Observations: 89
Standard Deviation DZ: 0.484
RMSE Z: 0.502
95% Confidence Level Z: 0.983
Units: US Survey Feet

Histogram



Min: -1.926
Max: 1.247
Number Of Bins: 20
Bin Interval: 0.159

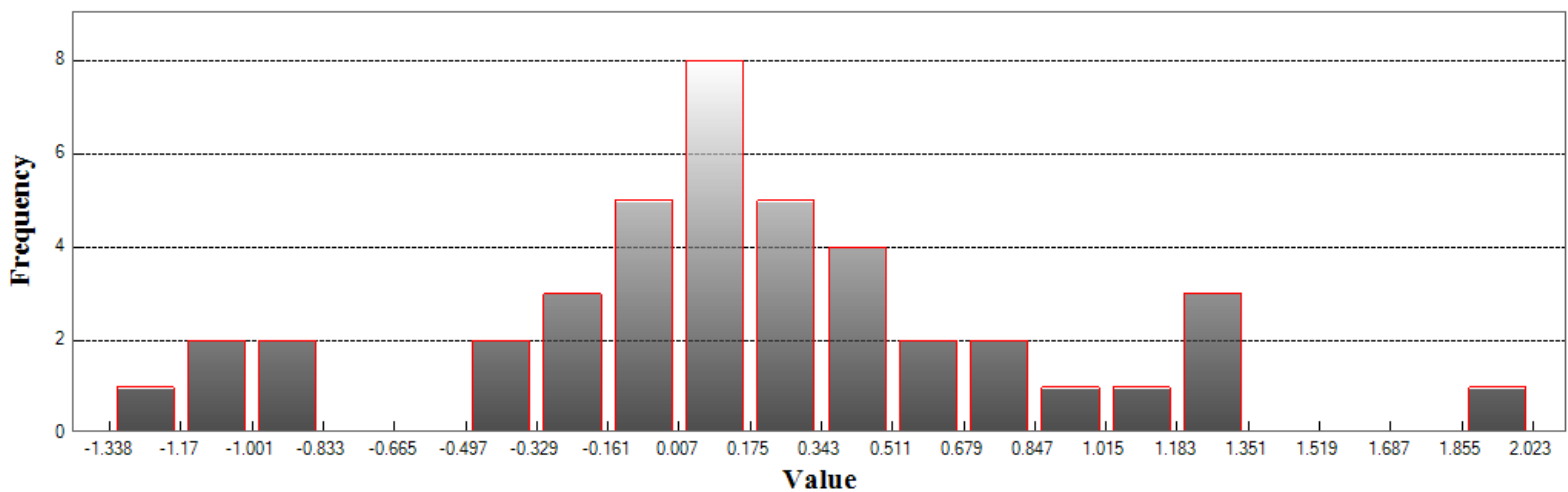


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -1.338
Maximum DZ: 2.023
Mean DZ: 0.16
Mean Magnitude DZ: 0.713
Number Observations: 42
Standard Deviation DZ: 0.684
RMSE Z: 0.695
95th Percentile: 1.288
Units: US Survey Feet

Histogram



Min: -1.338

Max: 2.023

Number Of Bins: 20

Bin Interval: 0.168

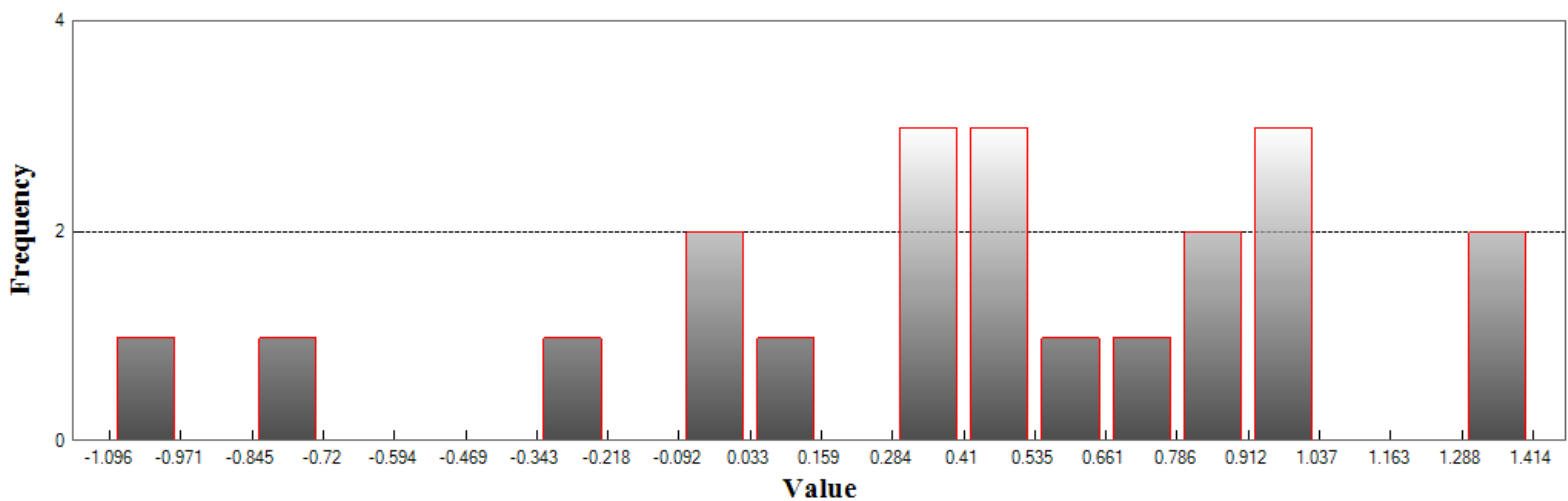


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.096
Maximum DZ: 1.413
Mean DZ: 0.437
Mean Magnitude DZ: 0.8
Number Observations: 21
Standard Deviation DZ: 0.622
RMSE Z: 0.748
95th Percentile: 1.37
Units: US Survey Feet

Histogram



Min: -1.096

Max: 1.413

Number Of Bins: 20

Bin Interval: 0.125

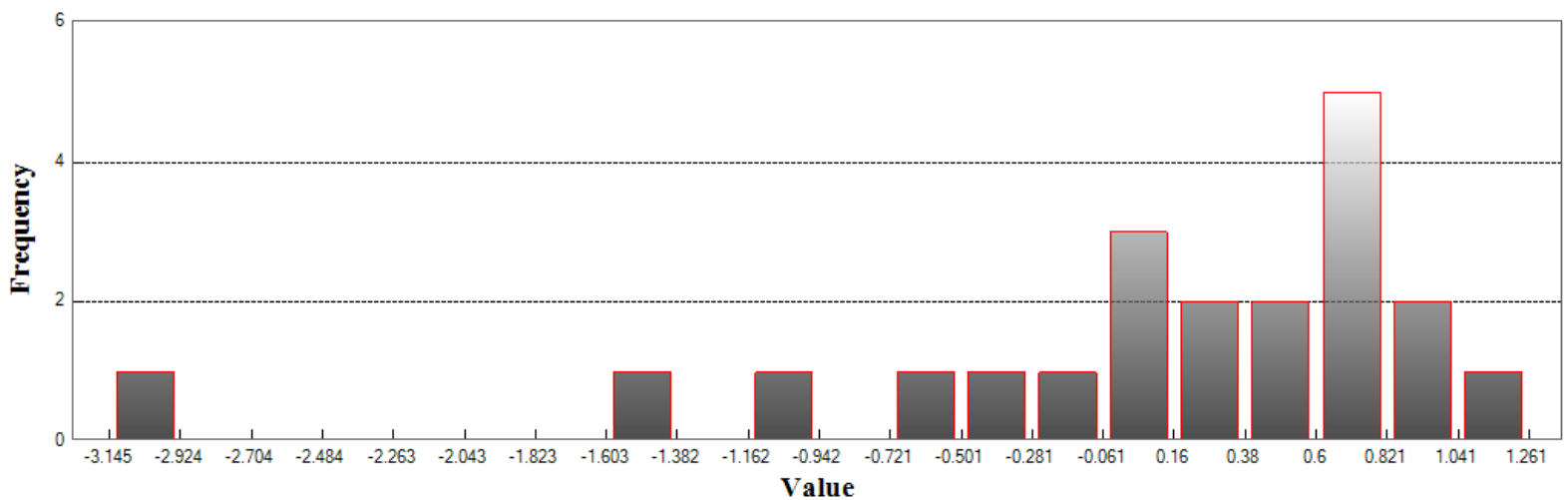


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -3.144
Maximum DZ: 1.261
Mean DZ: 0.053
Mean Magnitude DZ: 0.847
Number Observations: 21
Standard Deviation DZ: 1.002
RMSE Z: 0.98
95th Percentile: 2.332
Units: US Survey Feet

Histogram



Min: -3.144
Max: 1.261
Number Of Bins: 20
Bin Interval: 0.22

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: jackson_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

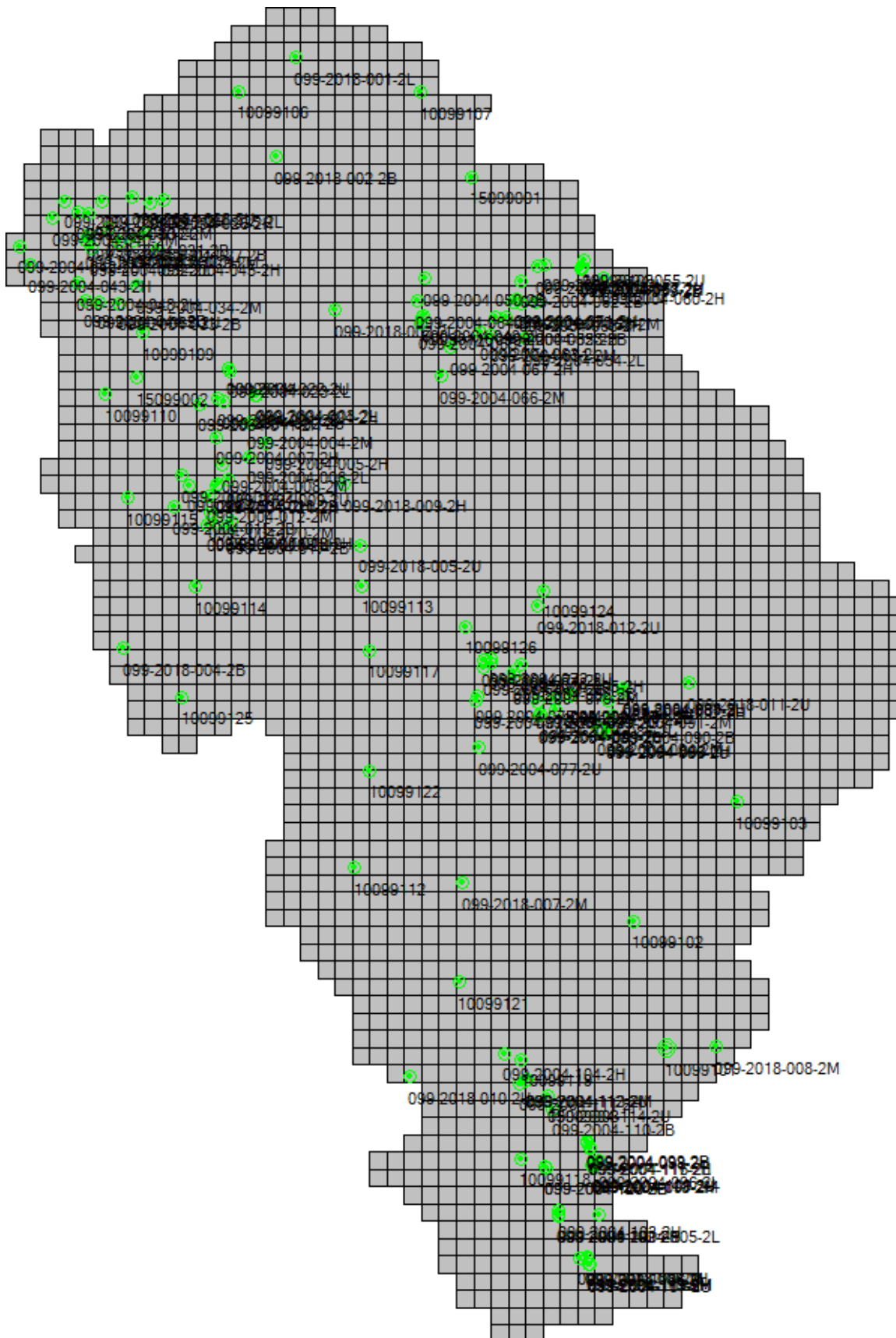
Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: 2221 out of 2221



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	1.192		
2H	42		4.742	
2L	21		1.815	
2M	22		1.867	
2U	50	0.843		
Total	157			

Units: US Survey Feet

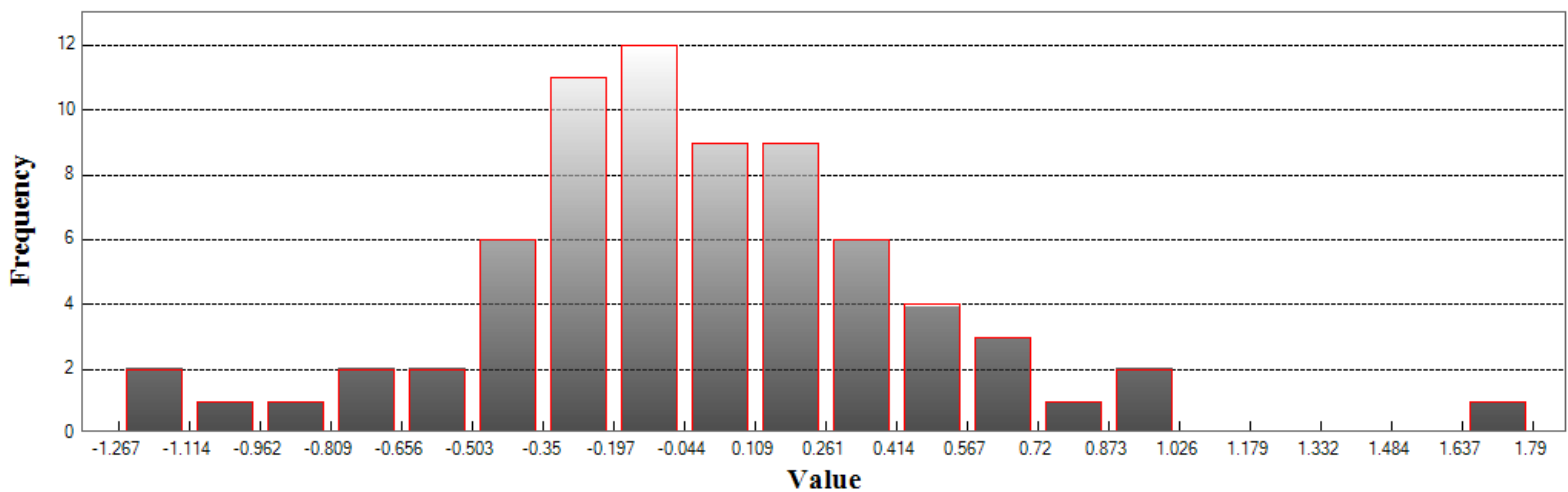


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -1.267
Maximum DZ: 1.791
Mean DZ: -0.032
Mean Magnitude DZ: 0.604
Number Observations: 72
Standard Deviation DZ: 0.494
RMSE Z: 0.492
95% Confidence Level Z: 0.963
Units: US Survey Feet

Histogram



Min: -1.267

Max: 1.791

Number Of Bins: 20

Bin Interval: 0.153

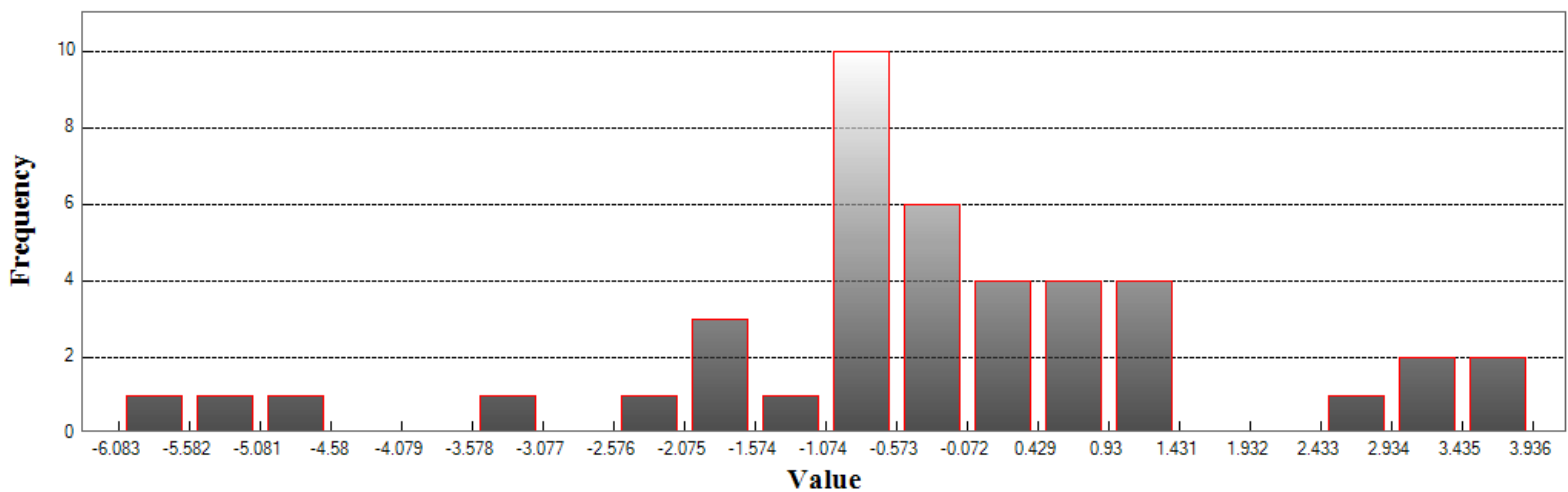


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -6.083
Maximum DZ: 3.937
Mean DZ: -0.332
Mean Magnitude DZ: 1.227
Number Observations: 42
Standard Deviation DZ: 2.106
RMSE Z: 2.107
95th Percentile: 4.742
Units: US Survey Feet

Histogram



Min: -6.083

Max: 3.937

Number Of Bins: 20

Bin Interval: 0.501

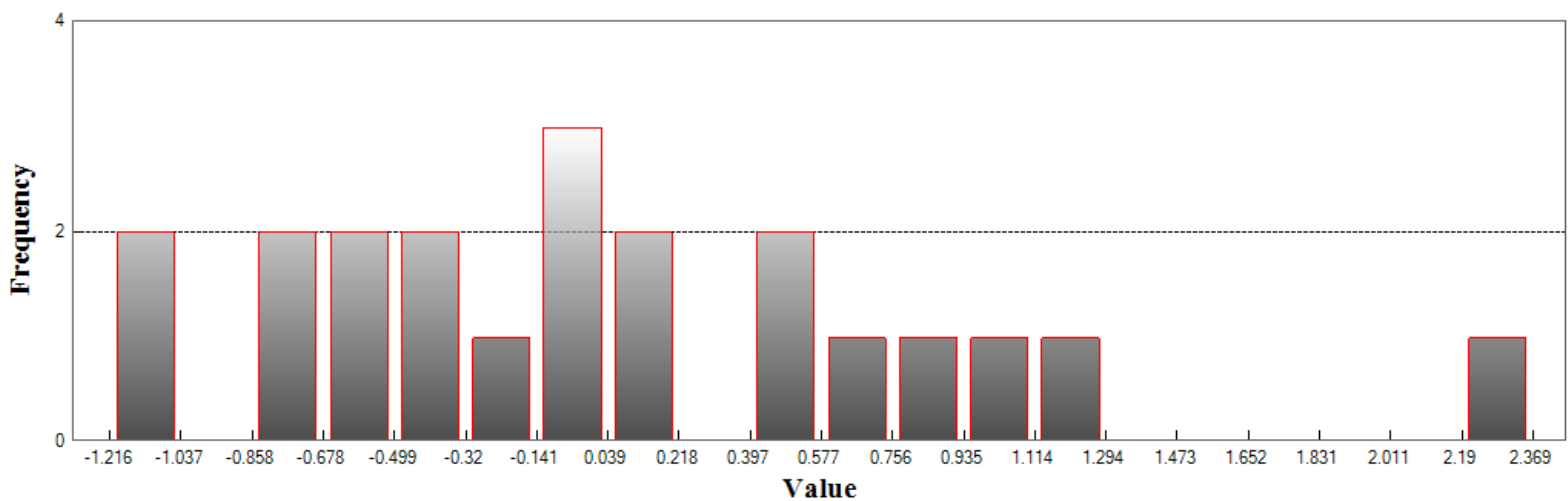


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.217
Maximum DZ: 2.369
Mean DZ: 0.055
Mean Magnitude DZ: 0.805
Number Observations: 21
Standard Deviation DZ: 0.855
RMSE Z: 0.836
95th Percentile: 1.815
Units: US Survey Feet

Histogram



Min: -1.217

Max: 2.369

Number Of Bins: 20

Bin Interval: 0.179

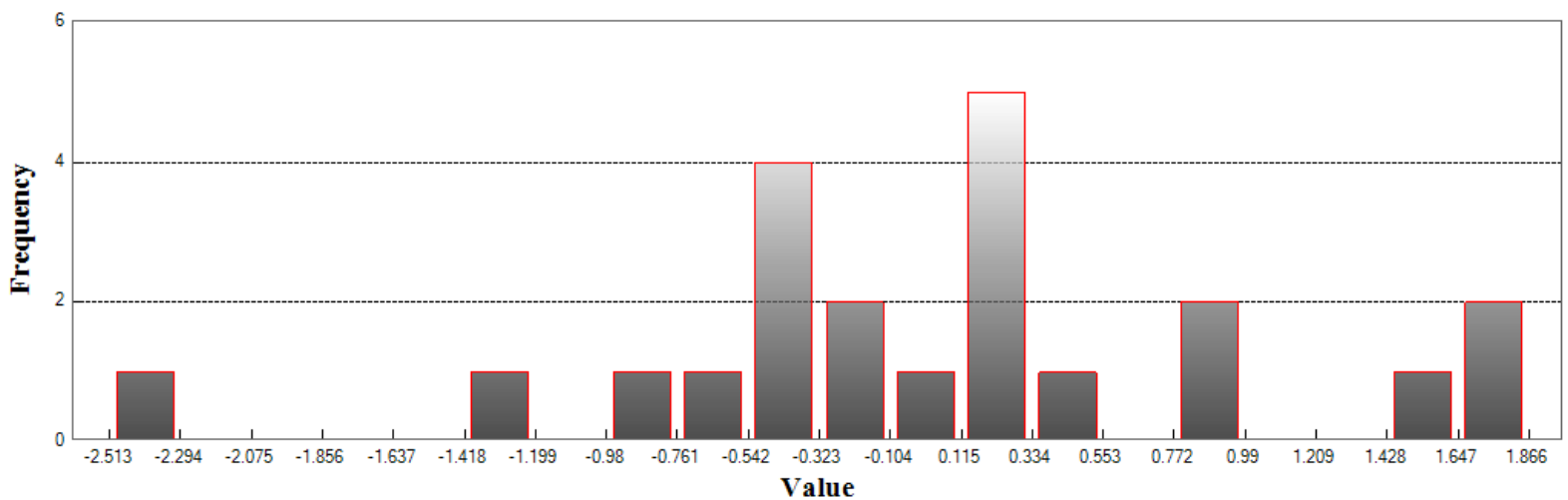


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -2.513
Maximum DZ: 1.867
Mean DZ: 0.063
Mean Magnitude DZ: 0.86
Number Observations: 22
Standard Deviation DZ: 1.011
RMSE Z: 0.989
95th Percentile: 1.867
Units: US Survey Feet

Histogram



Min: -2.513

Max: 1.867

Number Of Bins: 20

Bin Interval: 0.219

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: macon_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

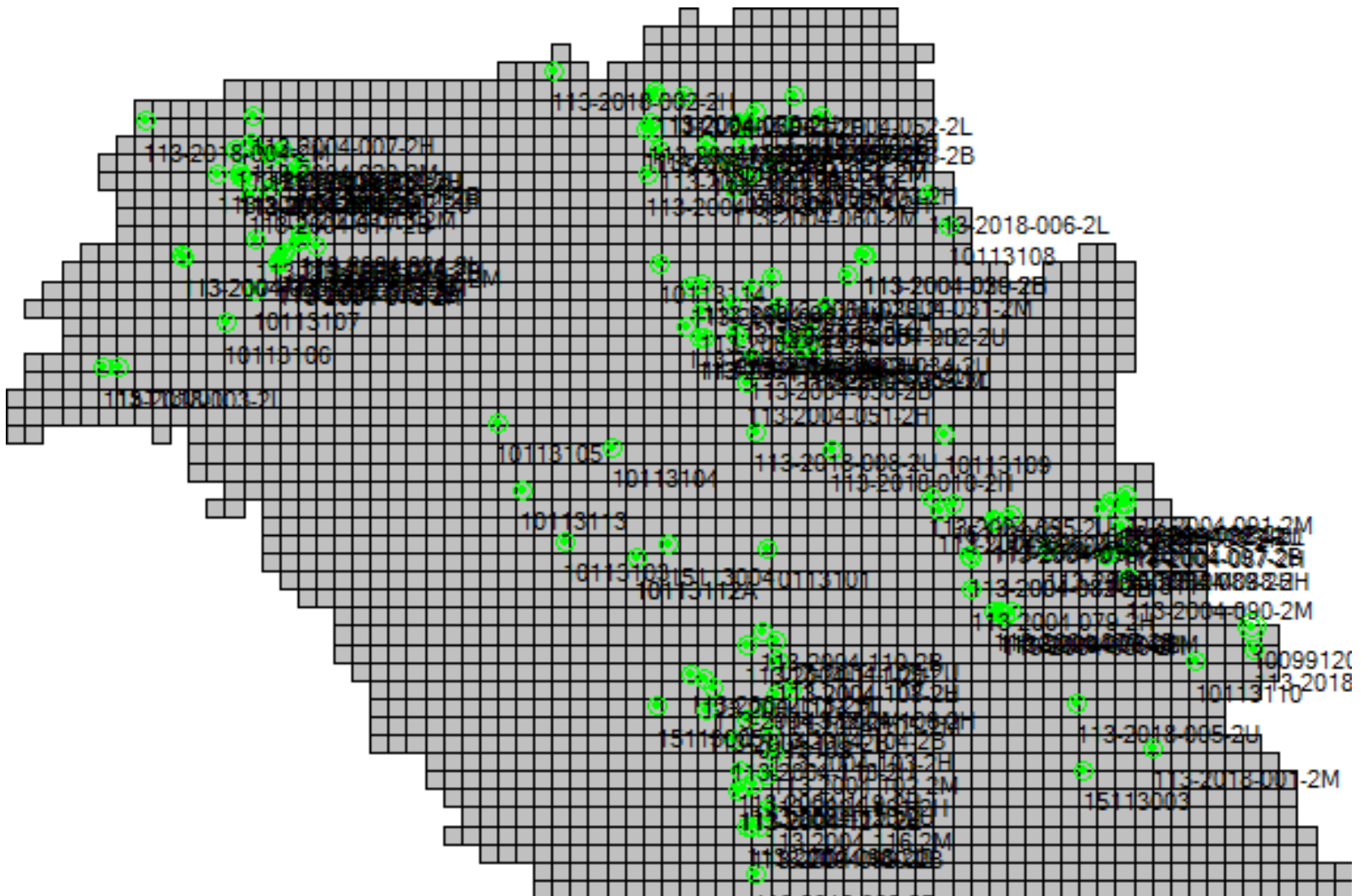
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	0.991		
2H	39		3.620	
2L	22		1.620	
2M	24		1.812	
2U	44	0.936		
Total	153			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.301

Maximum DZ: 0.784

Mean DZ: -0.165

Mean Magnitude DZ: 0.621

Number Observations: 68

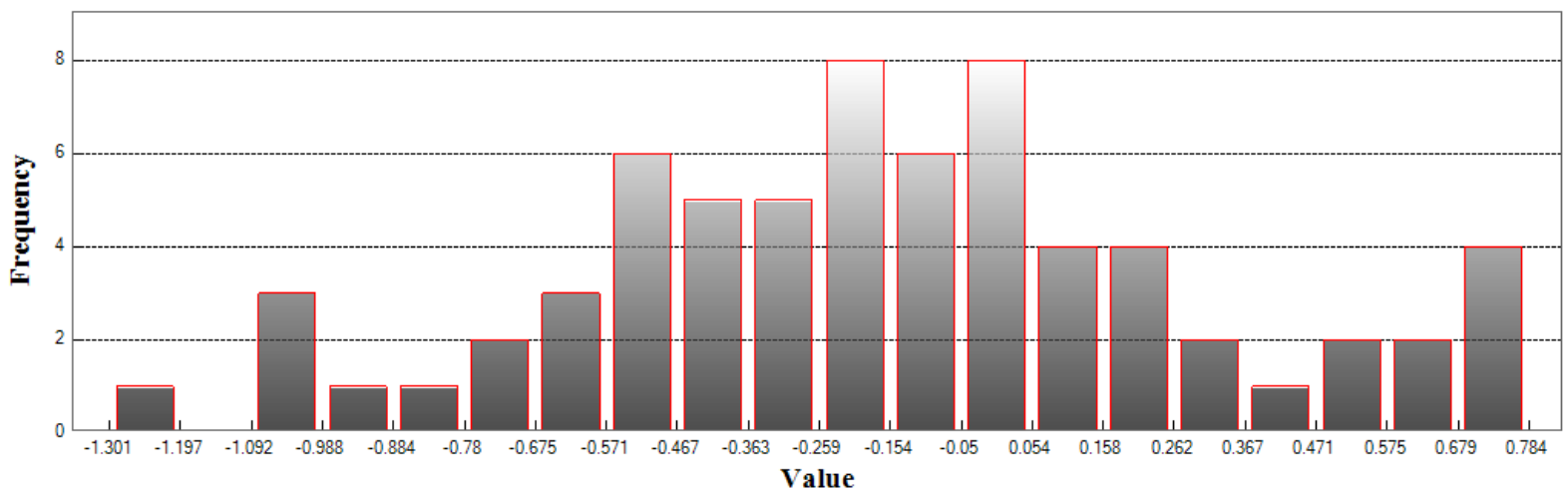
Standard Deviation DZ: 0.462

RMSE Z: 0.488

95% Confidence Level Z: 0.956

Units: US Survey Feet

Histogram



Min: -1.301

Max: 0.784

Number Of Bins: 20

Bin Interval: 0.104

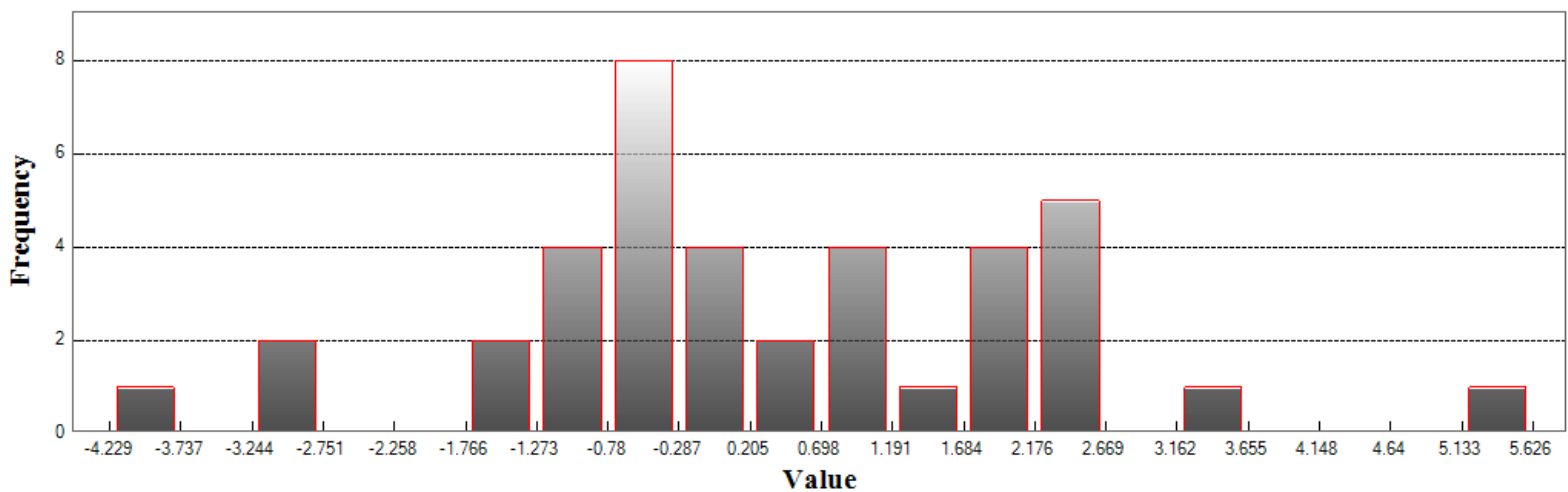


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -4.229
Maximum DZ: 5.626
Mean DZ: 0.307
Mean Magnitude DZ: 1.217
Number Observations: 39
Standard Deviation DZ: 1.906
RMSE Z: 1.906
95th Percentile: 3.62
Units: US Survey Feet

Histogram



Min: -4.229

Max: 5.626

Number Of Bins: 20

Bin Interval: 0.493

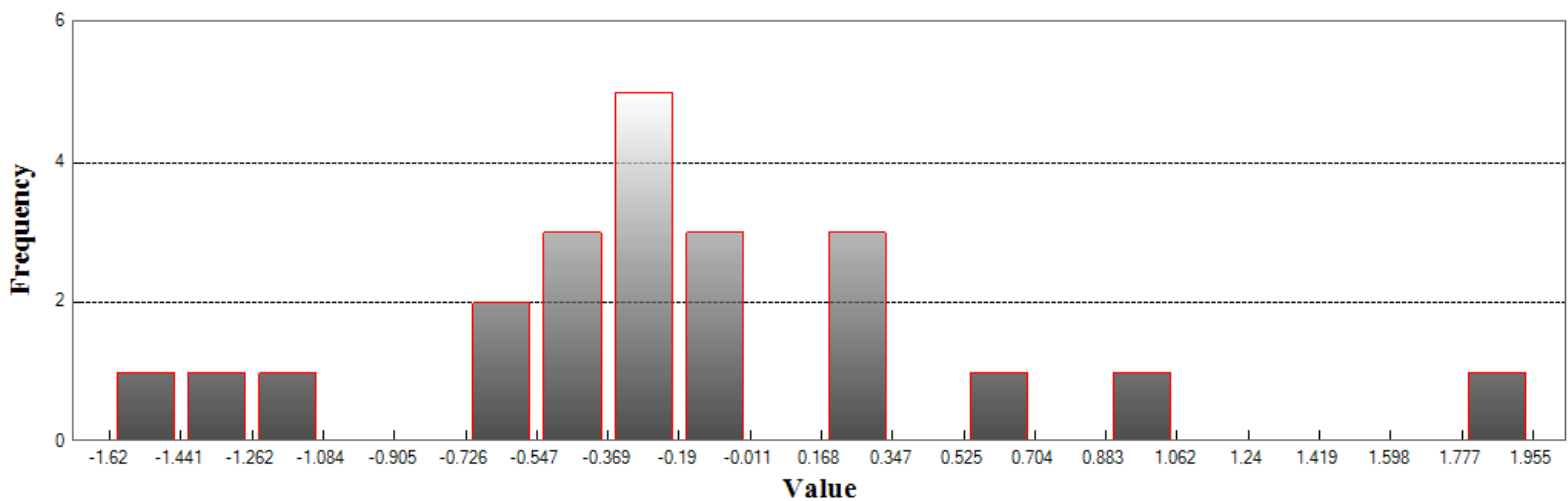


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.62
Maximum DZ: 1.956
Mean DZ: -0.204
Mean Magnitude DZ: 0.767
Number Observations: 22
Standard Deviation DZ: 0.76
RMSE Z: 0.77
95th Percentile: 1.62
Units: US Survey Feet

Histogram



Min: -1.62

Max: 1.956

Number Of Bins: 20

Bin Interval: 0.179

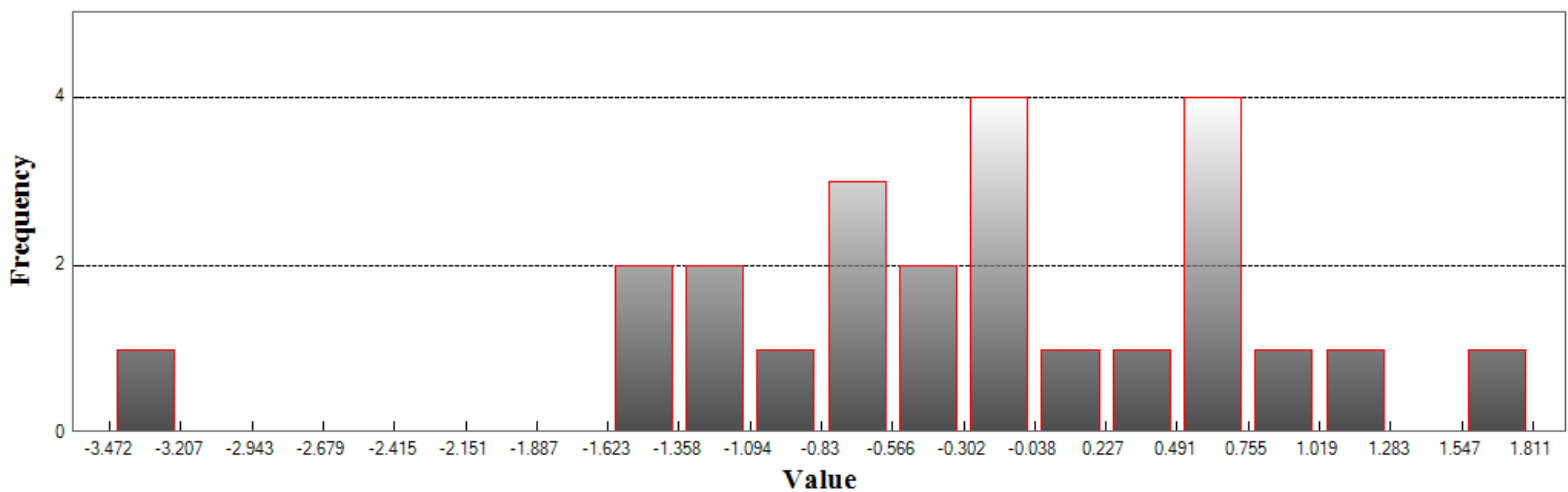


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -3.472
Maximum DZ: 1.812
Mean DZ: -0.274
Mean Magnitude DZ: 0.911
Number Observations: 24
Standard Deviation DZ: 1.098
RMSE Z: 1.109
95th Percentile: 1.812
Units: US Survey Feet

Histogram



Min: -3.472

Max: 1.812

Number Of Bins: 20

Bin Interval: 0.264

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: madison_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

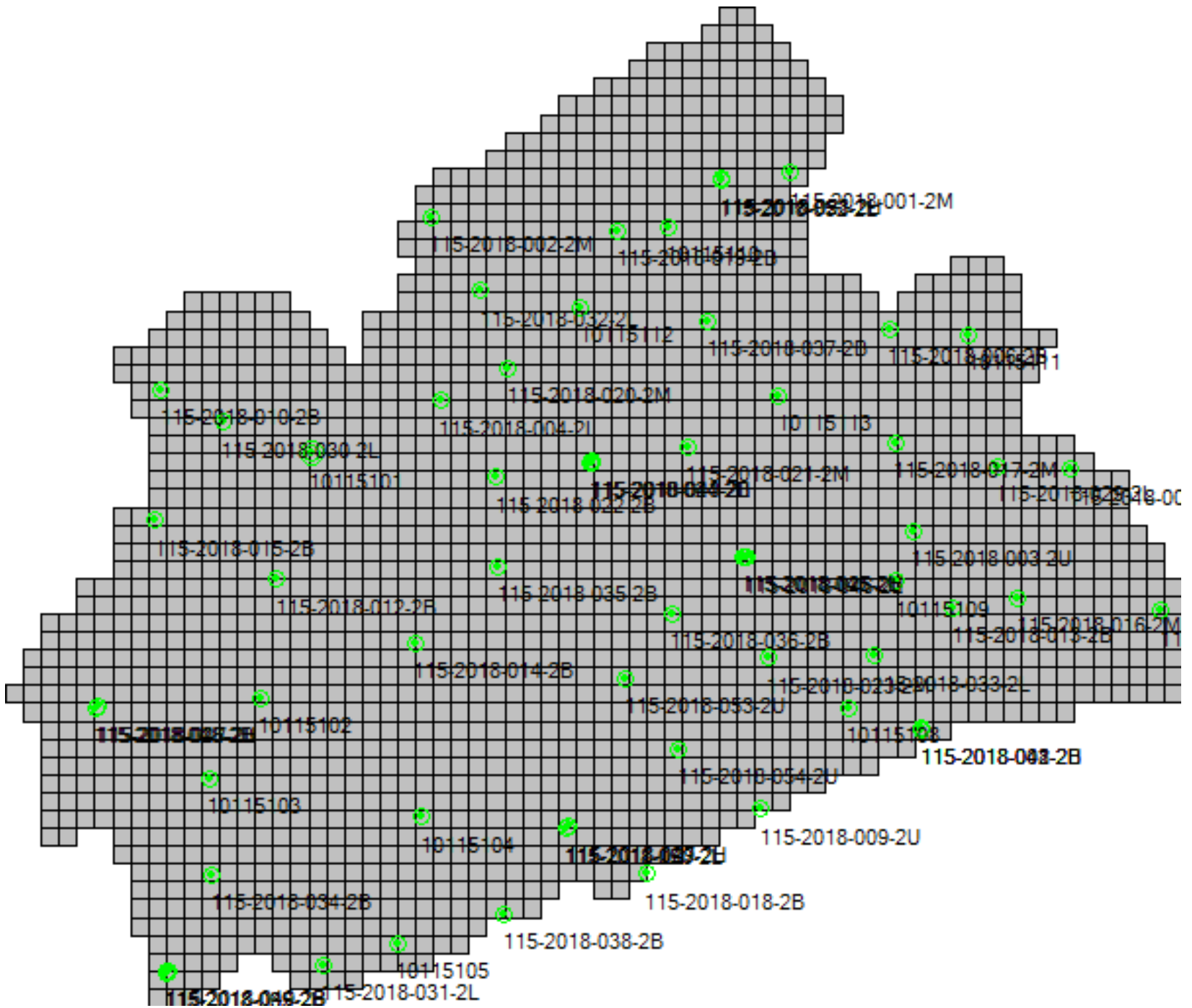
Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	19	0.995		
2H	7		6.616	
2L	17		2.266	
2M	7		4.865	
2U	15	1.105		
Total	65			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.161

Maximum DZ: 1.238

Mean DZ: -0.098

Mean Magnitude DZ: 0.661

Number Observations: 34

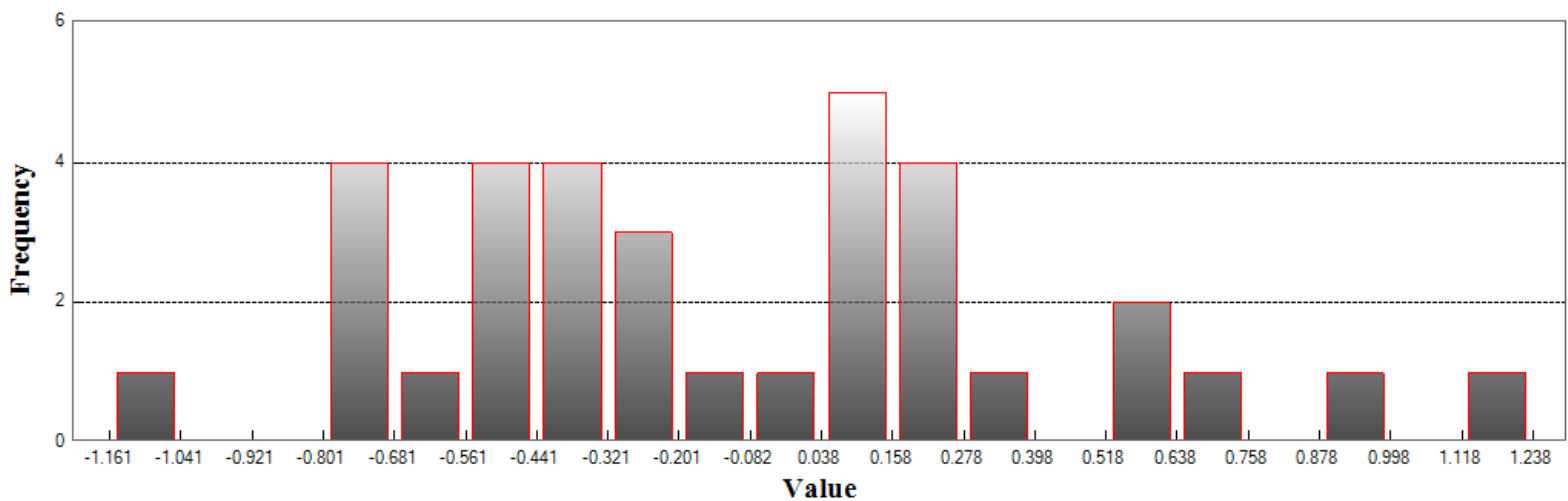
Standard Deviation DZ: 0.532

RMSE Z: 0.533

95% Confidence Level Z: 1.045

Units: US Survey Feet

Histogram



Min: -1.161

Max: 1.238

Number Of Bins: 20

Bin Interval: 0.12

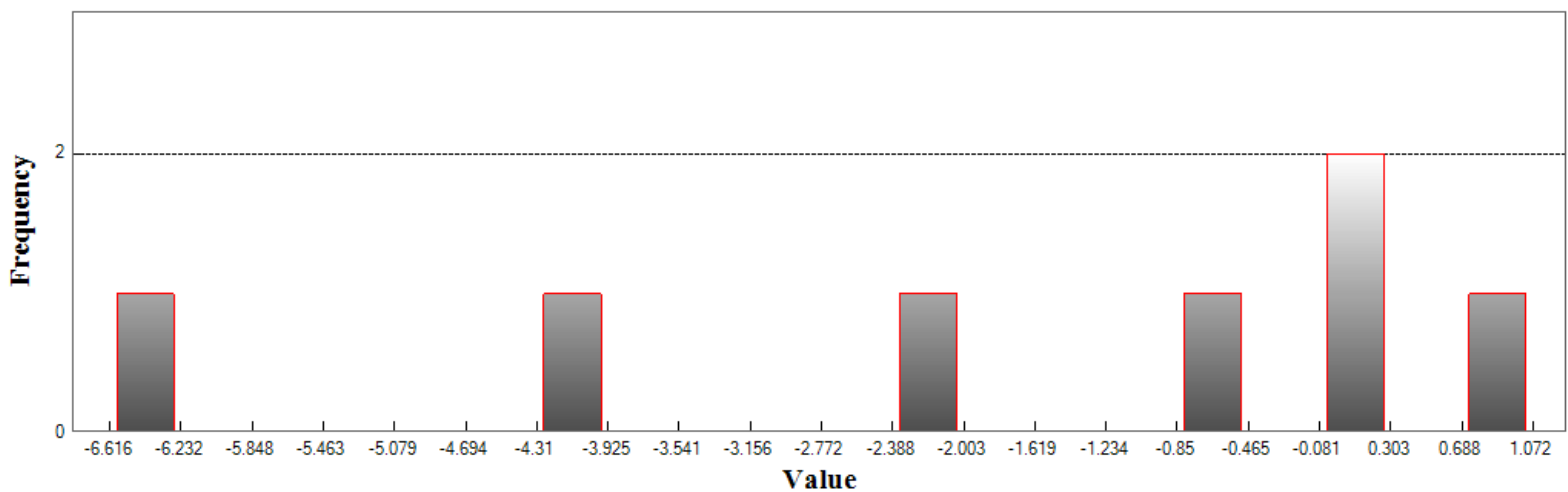


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -6.616
Maximum DZ: 1.073
Mean DZ: -1.73
Mean Magnitude DZ: 1.437
Number Observations: 7
Standard Deviation DZ: 2.711
RMSE Z: 3.048
95th Percentile: 6.616
Units: US Survey Feet

Histogram



Min: -6.616

Max: 1.073

Number Of Bins: 20

Bin Interval: 0.384

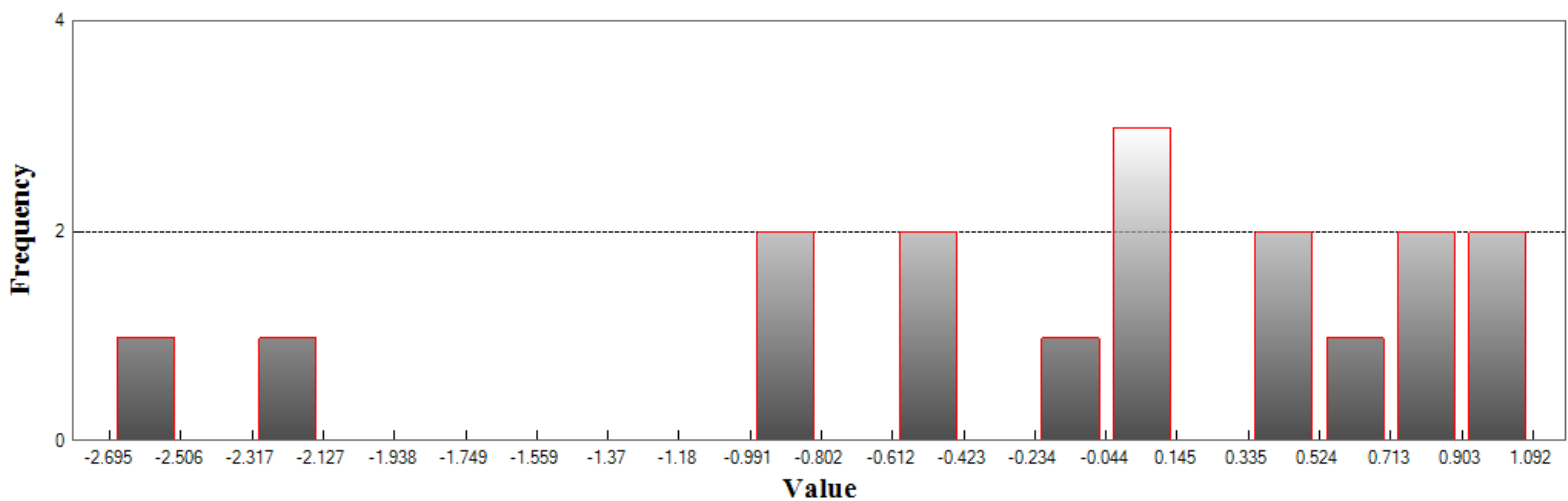


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -2.696
Maximum DZ: 1.092
Mean DZ: -0.152
Mean Magnitude DZ: 0.885
Number Observations: 17
Standard Deviation DZ: 1.078
RMSE Z: 1.056
95th Percentile: 2.266
Units: US Survey Feet

Histogram



Min: -2.696
Max: 1.092
Number Of Bins: 20
Bin Interval: 0.189

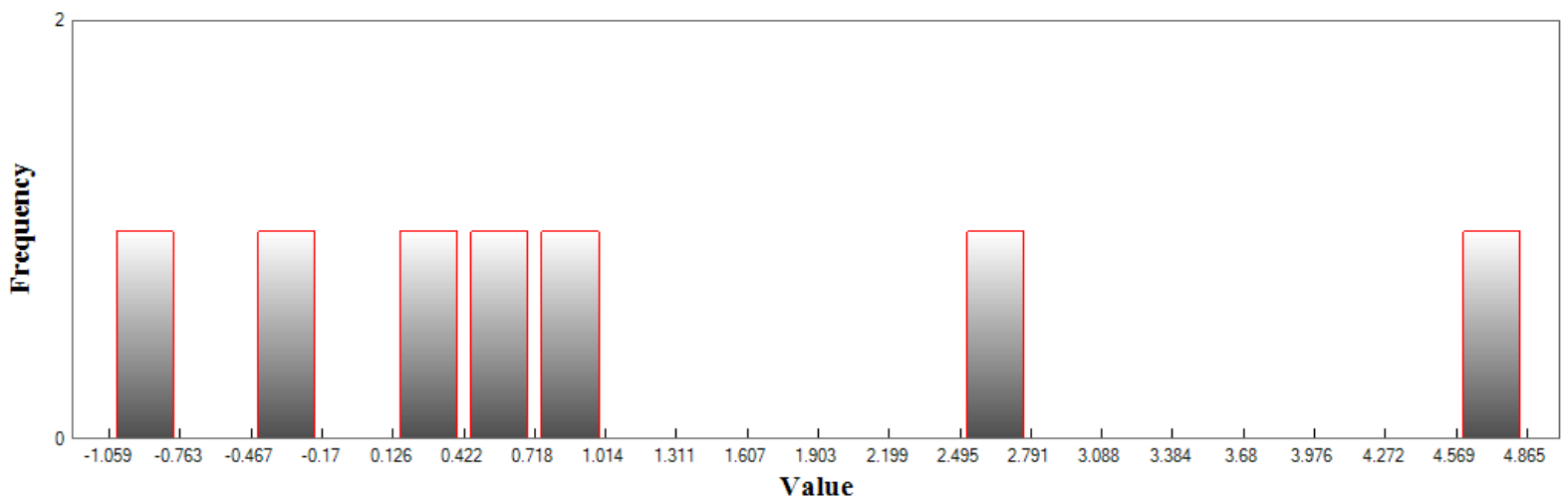


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.059
Maximum DZ: 4.865
Mean DZ: 1.103
Mean Magnitude DZ: 1.214
Number Observations: 7
Standard Deviation DZ: 2.026
RMSE Z: 2.176
95th Percentile: 4.865
Units: US Survey Feet

Histogram



Min: -1.059

Max: 4.865

Number Of Bins: 20

Bin Interval: 0.296

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: mcdowell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	23	0.792		
2H	42		2.900	
2L	22		1.011	
2M	22		1.744	
2U	35	0.778		
Total	144			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.168

Maximum DZ: 0.965

Mean DZ: -0.025

Mean Magnitude DZ: 0.553

Number Observations: 58

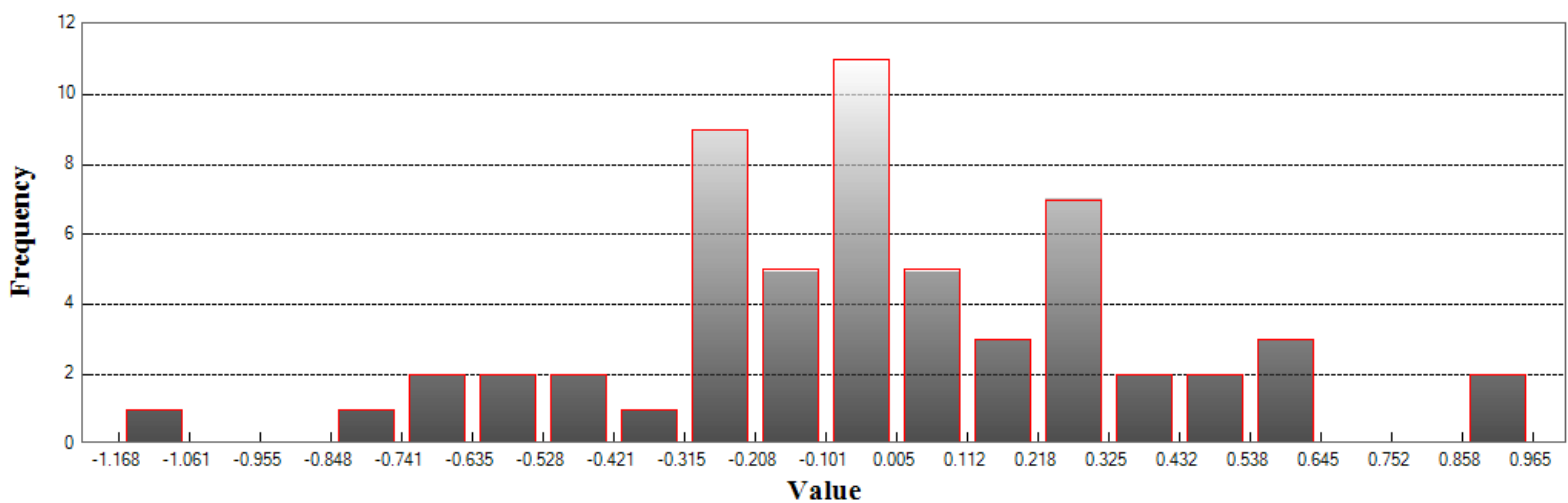
Standard Deviation DZ: 0.403

RMSE Z: 0.4

95% Confidence Level Z: 0.784

Units: US Survey Feet

Histogram



Min: -1.168

Max: 0.965

Number Of Bins: 20

Bin Interval: 0.107

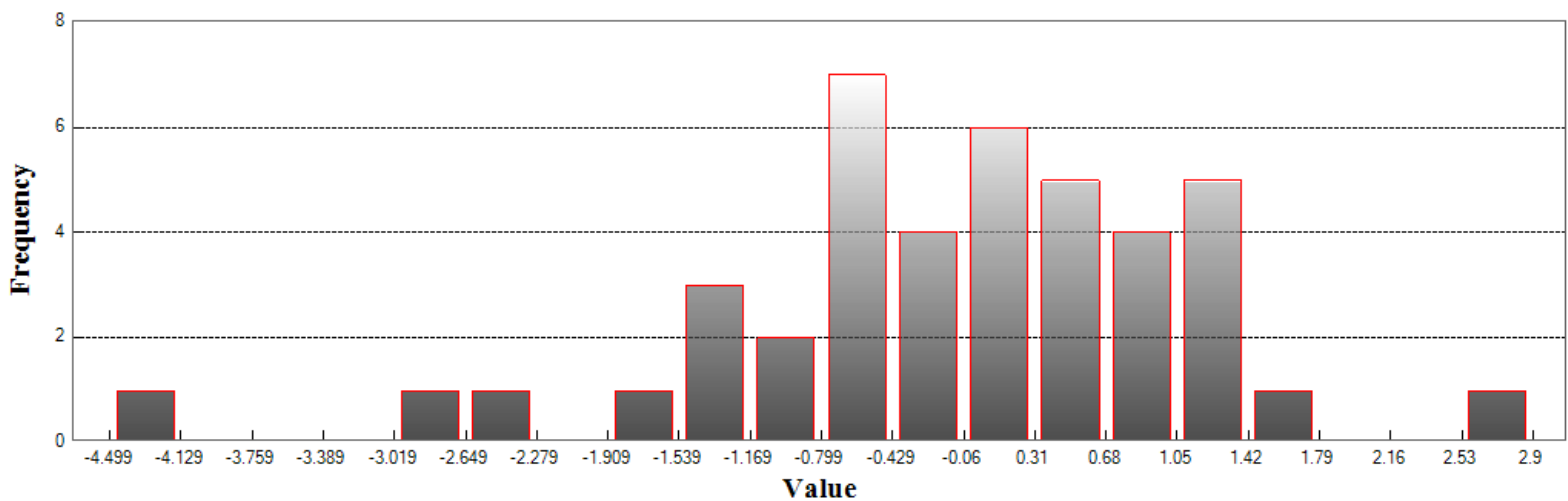


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -4.499
Maximum DZ: 2.9
Mean DZ: -0.146
Mean Magnitude DZ: 0.985
Number Observations: 42
Standard Deviation DZ: 1.305
RMSE Z: 1.297
95th Percentile: 2.9
Units: US Survey Feet

Histogram



Min: -4.499

Max: 2.9

Number Of Bins: 20

Bin Interval: 0.37

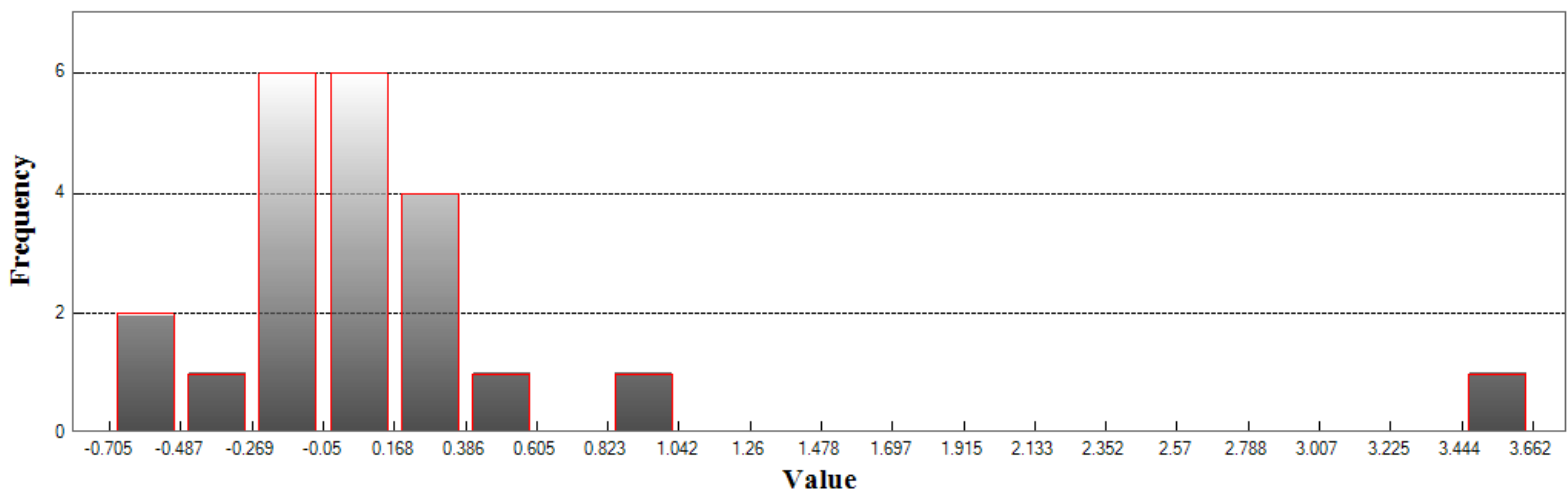


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.705
Maximum DZ: 3.662
Mean DZ: 0.175
Mean Magnitude DZ: 0.646
Number Observations: 22
Standard Deviation DZ: 0.861
RMSE Z: 0.859
95th Percentile: 1.011
Units: US Survey Feet

Histogram



Min: -0.705
Max: 3.662
Number Of Bins: 20
Bin Interval: 0.218

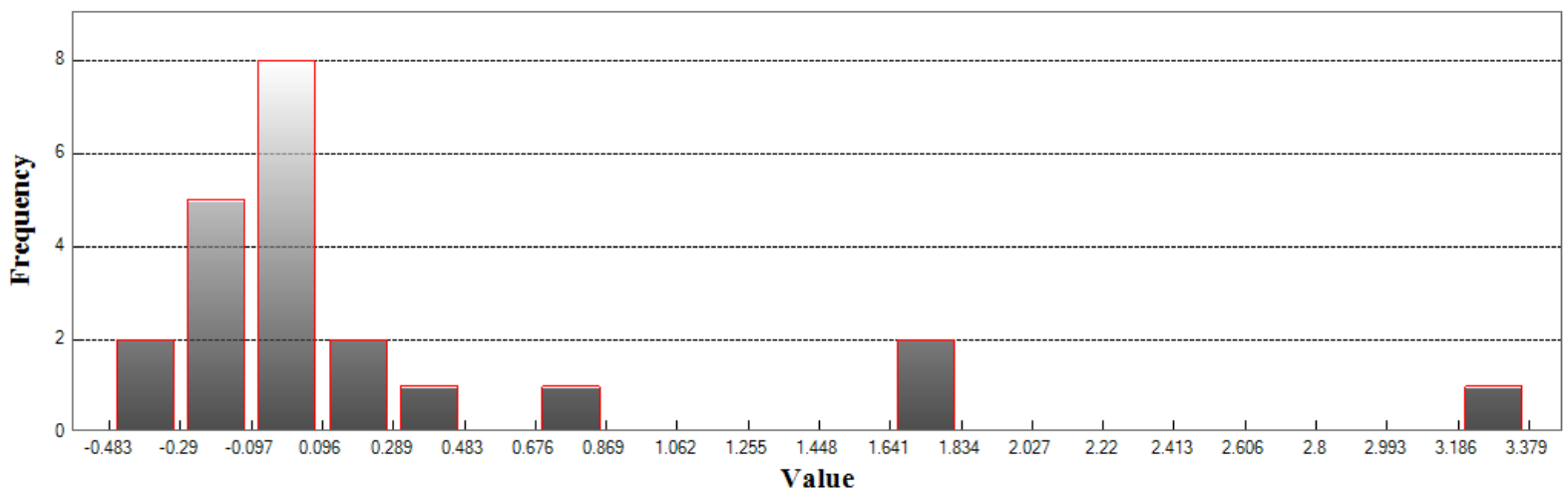


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.483
Maximum DZ: 3.378
Mean DZ: 0.293
Mean Magnitude DZ: 0.682
Number Observations: 22
Standard Deviation DZ: 0.889
RMSE Z: 0.917
95th Percentile: 1.744
Units: US Survey Feet

Histogram



Min: -0.483

Max: 3.378

Number Of Bins: 20

Bin Interval: 0.193

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: mitchell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

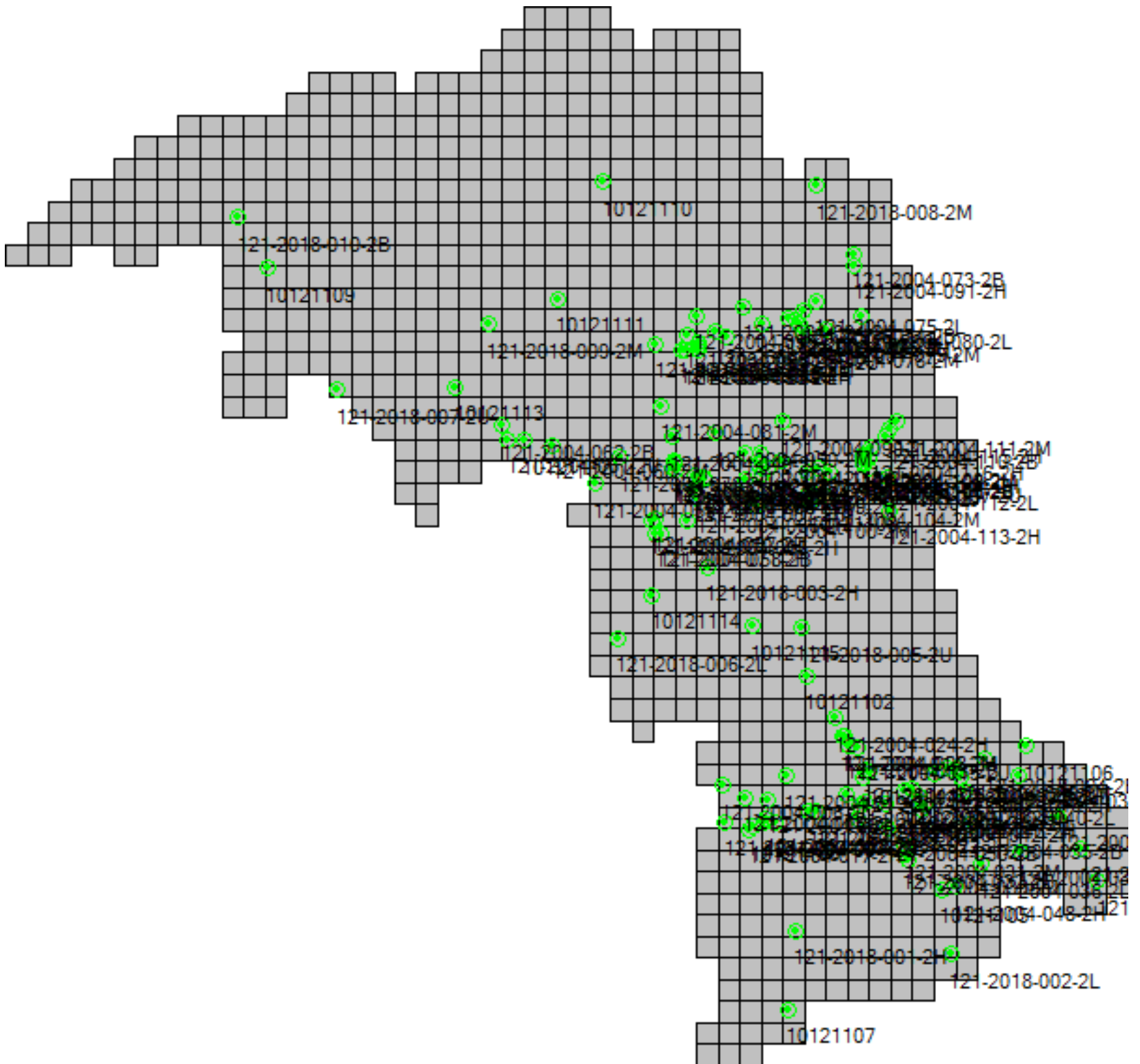
Tile Index Attribute: las_file

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
DEM			
2B	21	0.608	
2H	42		3.255
2L	20		0.940
2M	21		5.703
2U	39	0.784	
Total	143		

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.006

Maximum DZ: 0.658

Mean DZ: -0.037

Mean Magnitude DZ: 0.547

Number Observations: 60

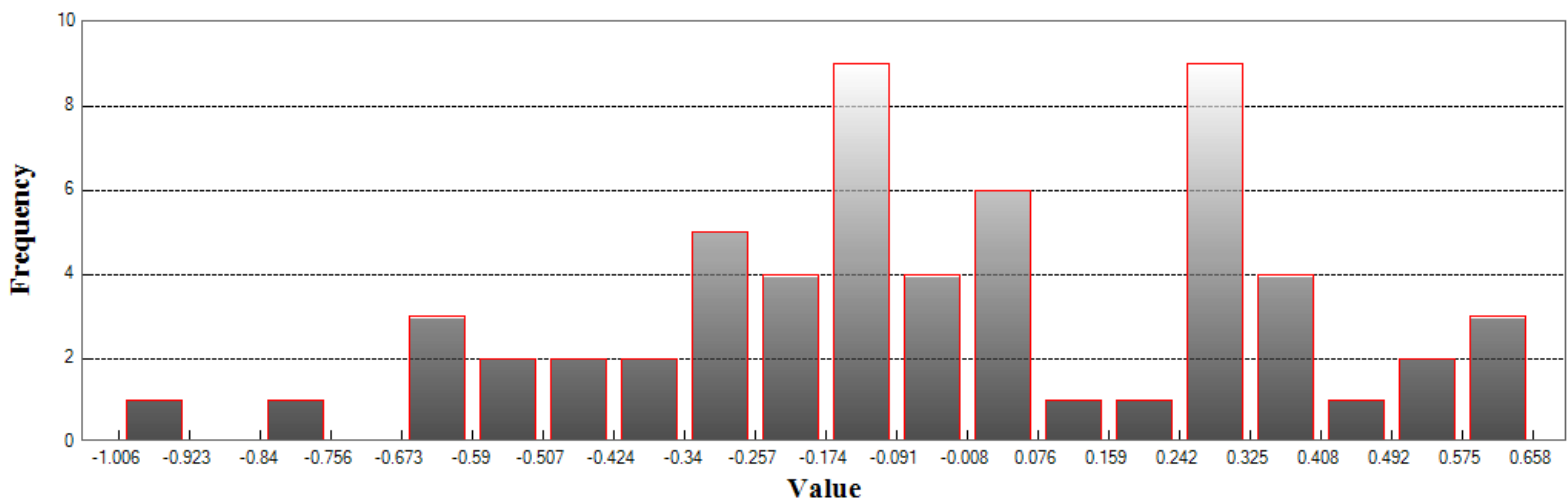
Standard Deviation DZ: 0.372

RMSE Z: 0.371

95% Confidence Level Z: 0.727

Units: US Survey Feet

Histogram



Min: -1.006

Max: 0.658

Number Of Bins: 20

Bin Interval: 0.083

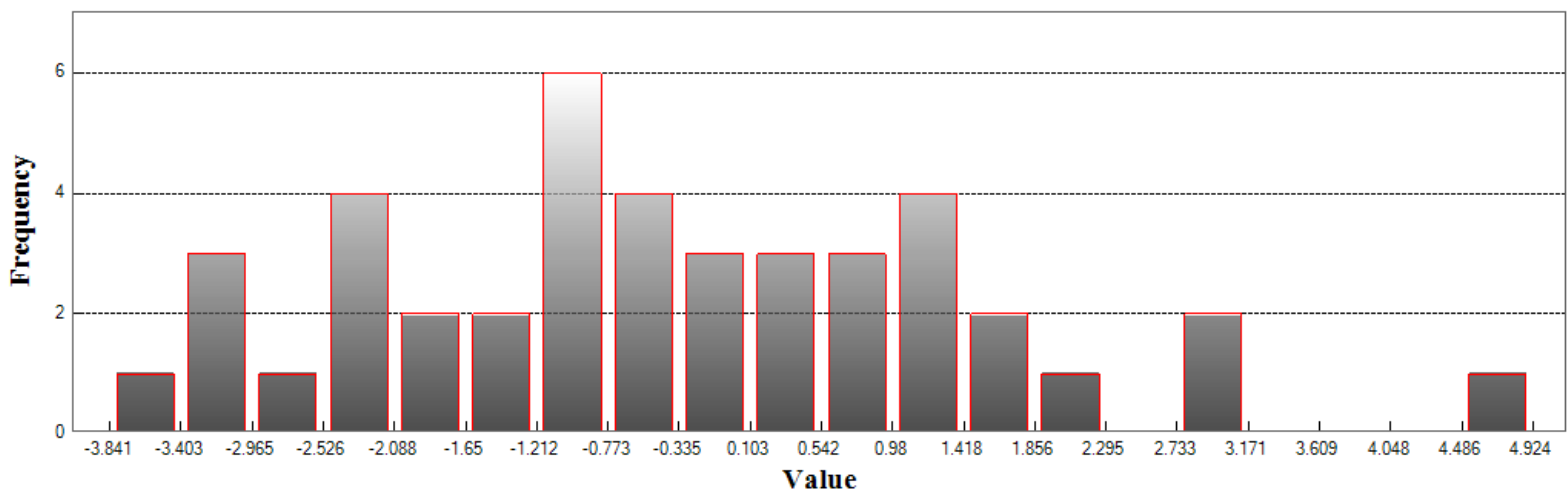


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -3.841
Maximum DZ: 4.924
Mean DZ: -0.37
Mean Magnitude DZ: 1.227
Number Observations: 42
Standard Deviation DZ: 1.86
RMSE Z: 1.875
95th Percentile: 3.255
Units: US Survey Feet

Histogram



Min: -3.841

Max: 4.924

Number Of Bins: 20

Bin Interval: 0.438

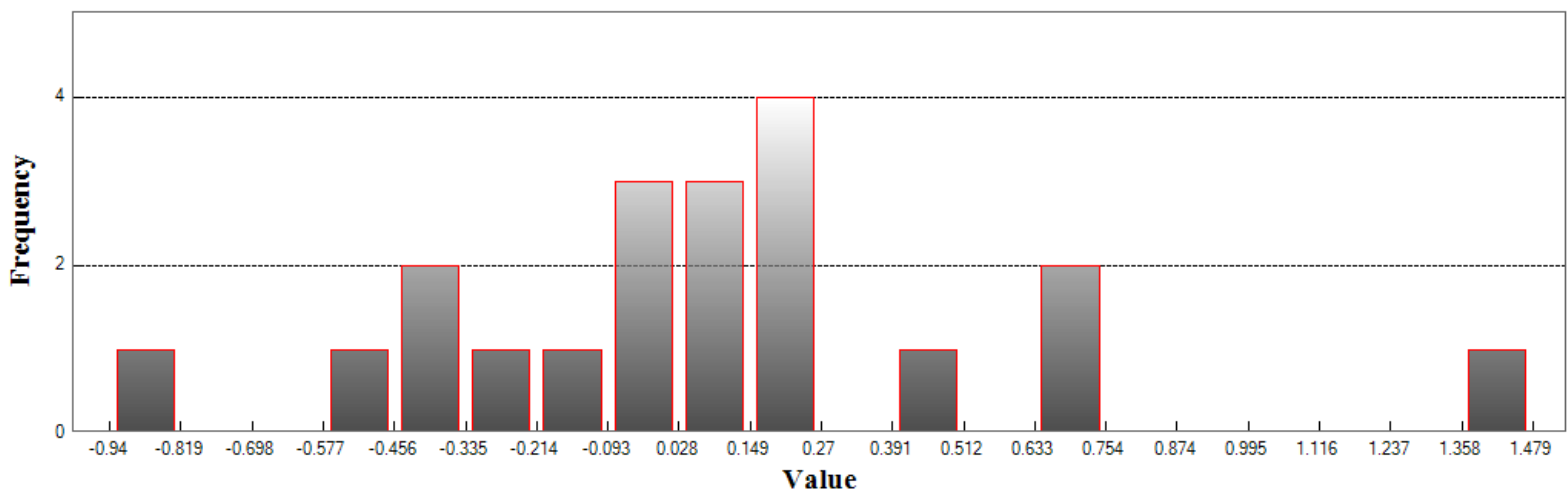


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.94
Maximum DZ: 1.48
Mean DZ: 0.081
Mean Magnitude DZ: 0.603
Number Observations: 20
Standard Deviation DZ: 0.515
RMSE Z: 0.509
95th Percentile: 0.94
Units: US Survey Feet

Histogram



Min: -0.94

Max: 1.48

Number Of Bins: 20

Bin Interval: 0.121

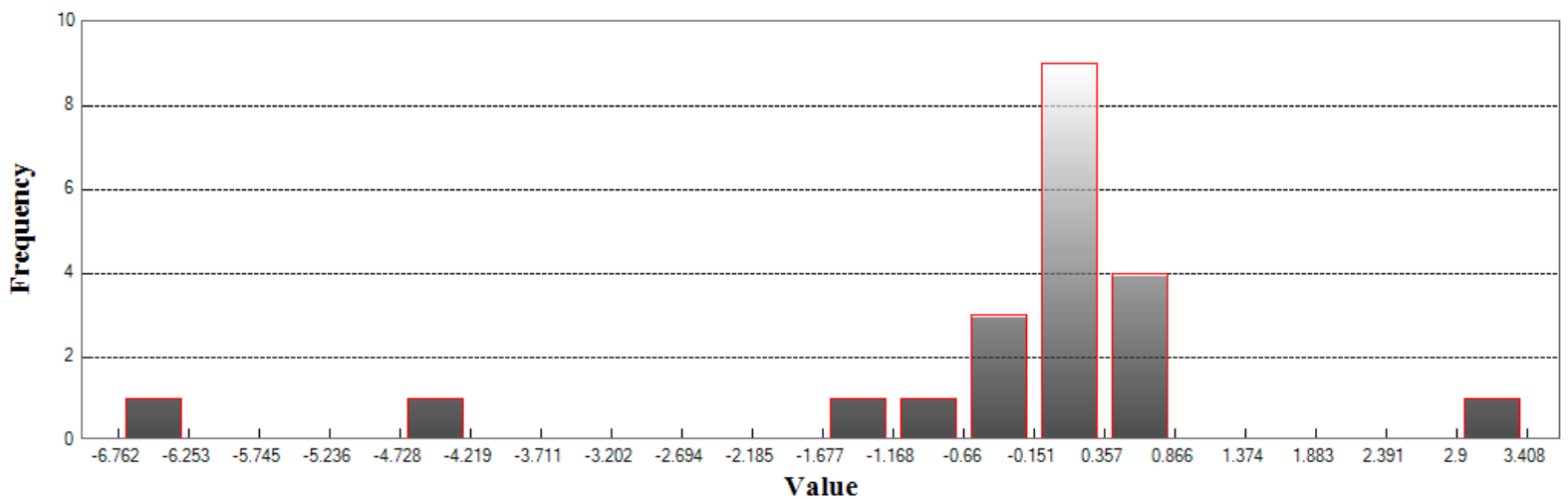


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -6.762
Maximum DZ: 3.408
Mean DZ: -0.405
Mean Magnitude DZ: 1.028
Number Observations: 21
Standard Deviation DZ: 2.014
RMSE Z: 2.007
95th Percentile: 5.703
Units: US Survey Feet

Histogram



Min: -6.762

Max: 3.408

Number Of Bins: 20

Bin Interval: 0.508

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: polk_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

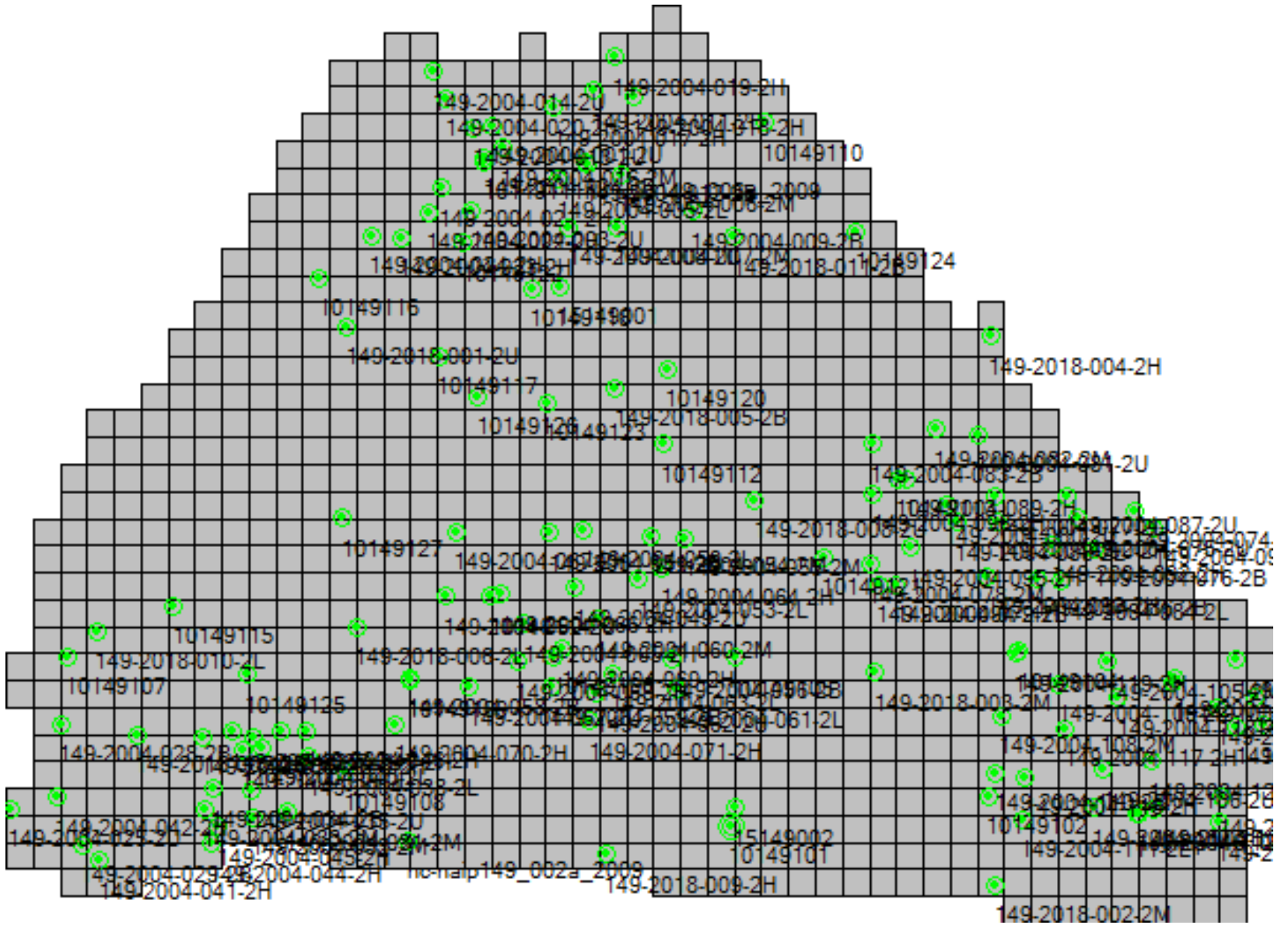
Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	20	1.294		
2H	40		1.754	
2L	18		0.993	
2M	19		1.860	
2U	53	0.967		
Total	150			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.591

Maximum DZ: 1.603

Mean DZ: 0.105

Mean Magnitude DZ: 0.64

Number Observations: 73

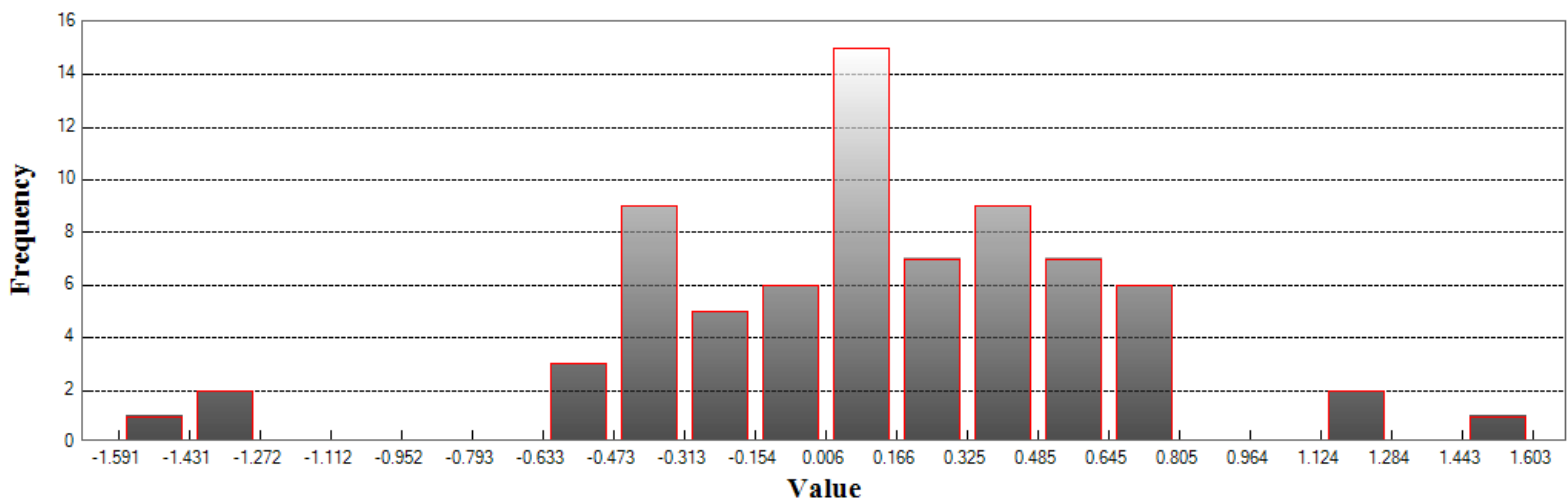
Standard Deviation DZ: 0.538

RMSE Z: 0.544

95% Confidence Level Z: 1.066

Units: US Survey Feet

Histogram



Min: -1.591

Max: 1.603

Number Of Bins: 20

Bin Interval: 0.16

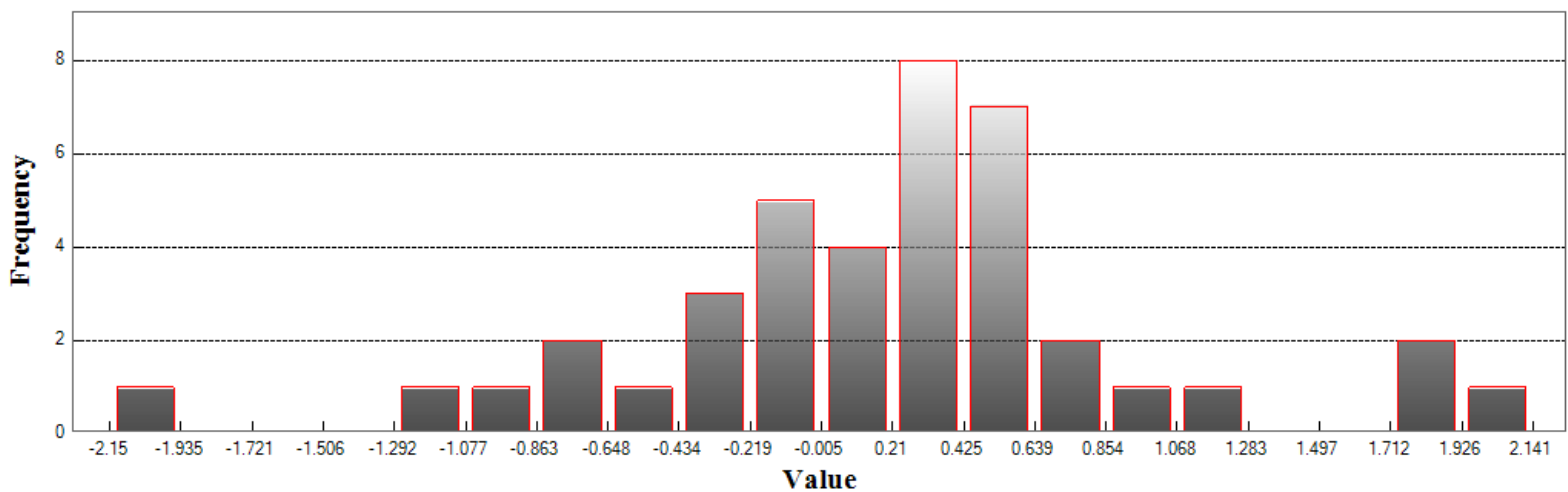


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.15
Maximum DZ: 2.141
Mean DZ: 0.198
Mean Magnitude DZ: 0.772
Number Observations: 40
Standard Deviation DZ: 0.787
RMSE Z: 0.802
95th Percentile: 1.754
Units: US Survey Feet

Histogram



Min: -2.15

Max: 2.141

Number Of Bins: 20

Bin Interval: 0.215

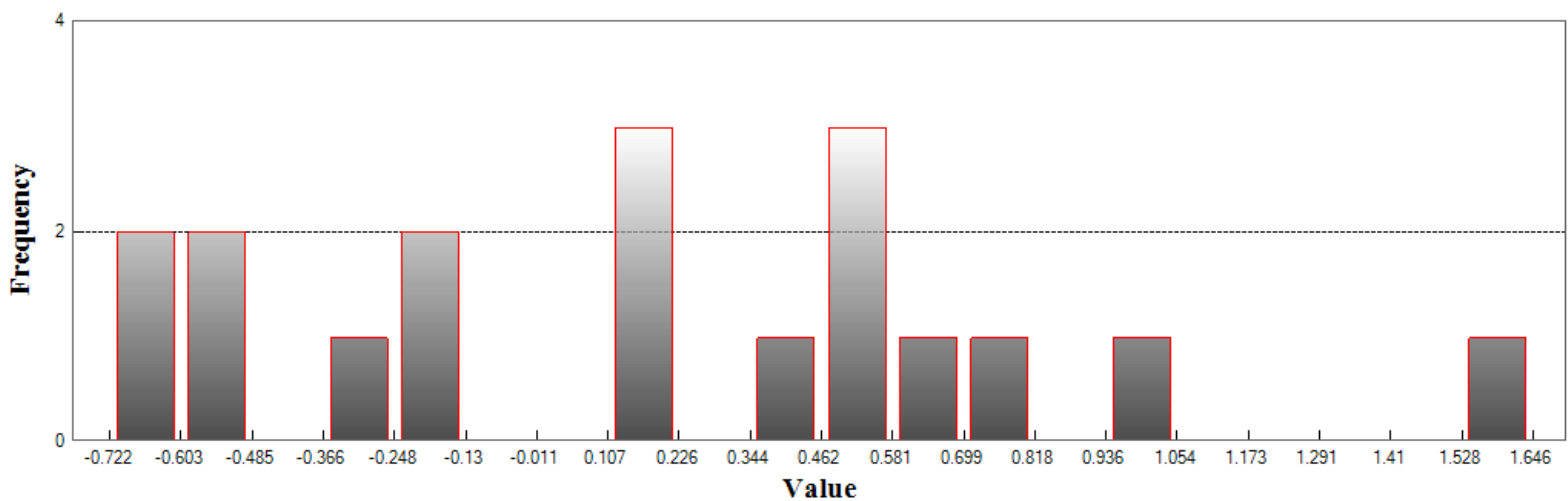


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.721
Maximum DZ: 1.647
Mean DZ: 0.185
Mean Magnitude DZ: 0.736
Number Observations: 18
Standard Deviation DZ: 0.636
RMSE Z: 0.645
95th Percentile: 0.993
Units: US Survey Feet

Histogram



Min: -0.721

Max: 1.647

Number Of Bins: 20

Bin Interval: 0.118

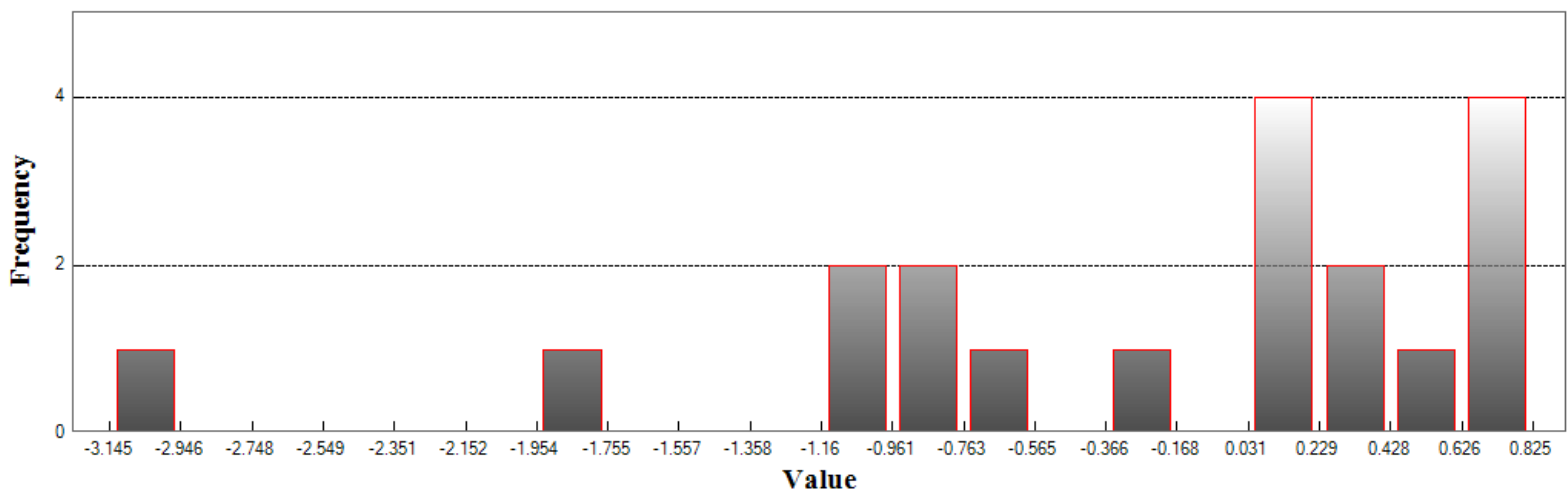


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -3.144
Maximum DZ: 0.825
Mean DZ: -0.272
Mean Magnitude DZ: 0.868
Number Observations: 19
Standard Deviation DZ: 1.029
RMSE Z: 1.038
95th Percentile: 1.86
Units: US Survey Feet

Histogram



Min: -3.144

Max: 0.825

Number Of Bins: 20

Bin Interval: 0.198

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: rutherford_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	1.015		
2H	43		1.352	
2L	25		1.067	
2M	24		1.446	
2U	38	1.001		
Total	154			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.242

Maximum DZ: 1.52

Mean DZ: 0.182

Mean Magnitude DZ: 0.622

Number Observations: 62

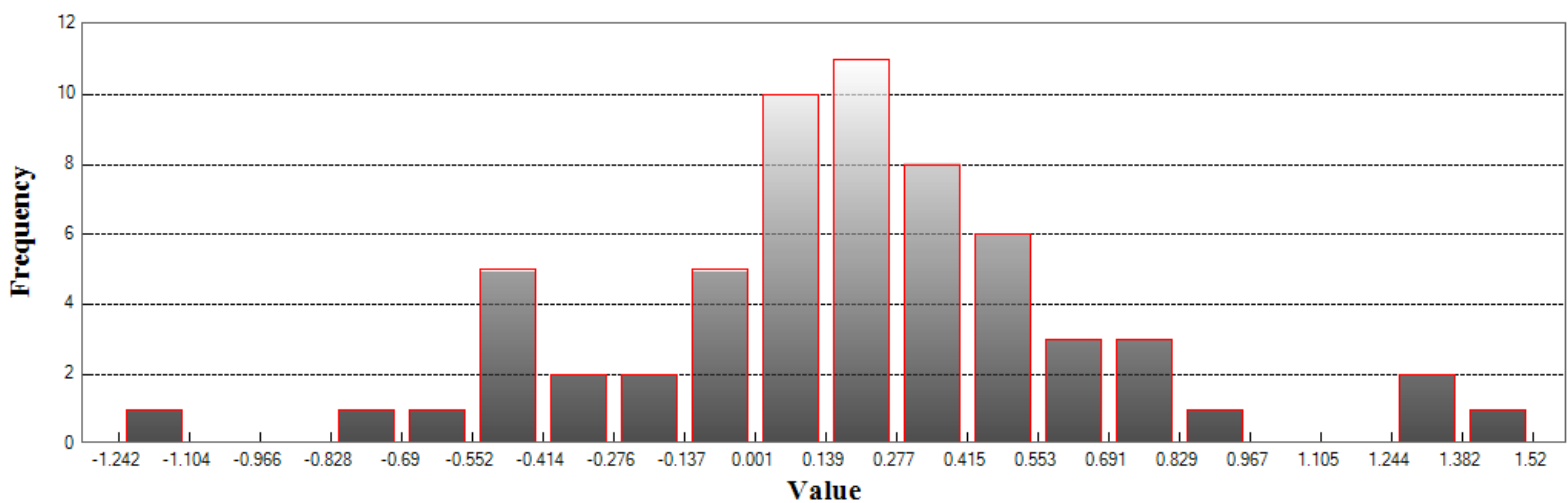
Standard Deviation DZ: 0.484

RMSE Z: 0.514

95% Confidence Level Z: 1.007

Units: US Survey Feet

Histogram



Min: -1.242

Max: 1.52

Number Of Bins: 20

Bin Interval: 0.138

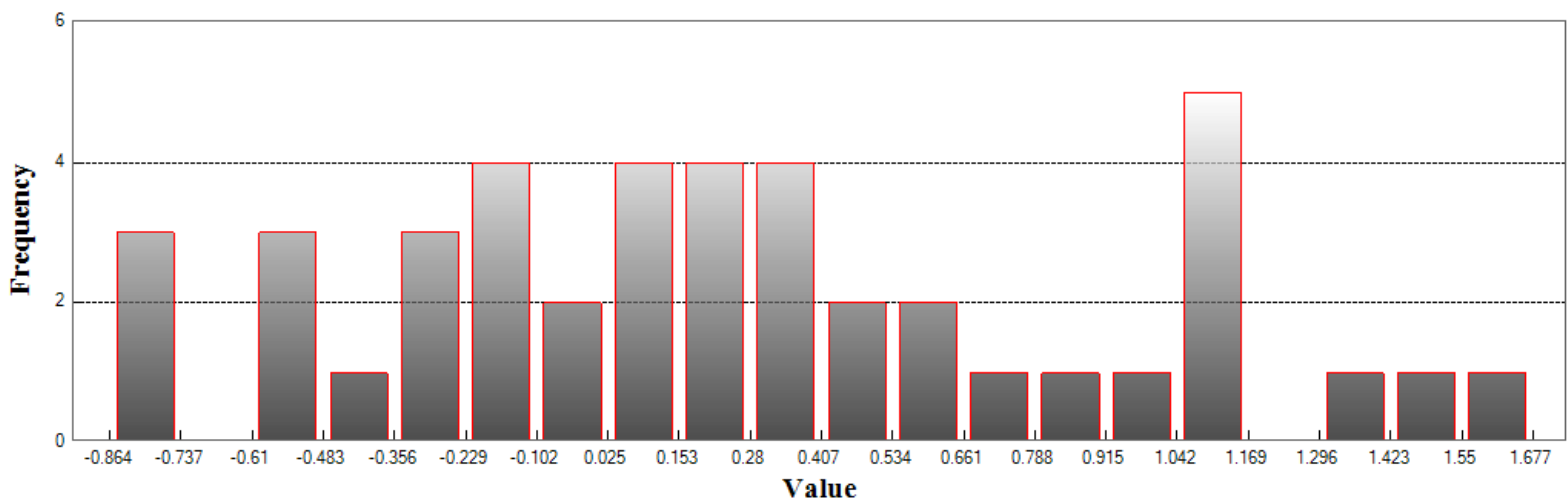


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.864
Maximum DZ: 1.677
Mean DZ: 0.254
Mean Magnitude DZ: 0.732
Number Observations: 43
Standard Deviation DZ: 0.64
RMSE Z: 0.682
95th Percentile: 1.352
Units: US Survey Feet

Histogram



Min: -0.864

Max: 1.677

Number Of Bins: 20

Bin Interval: 0.127

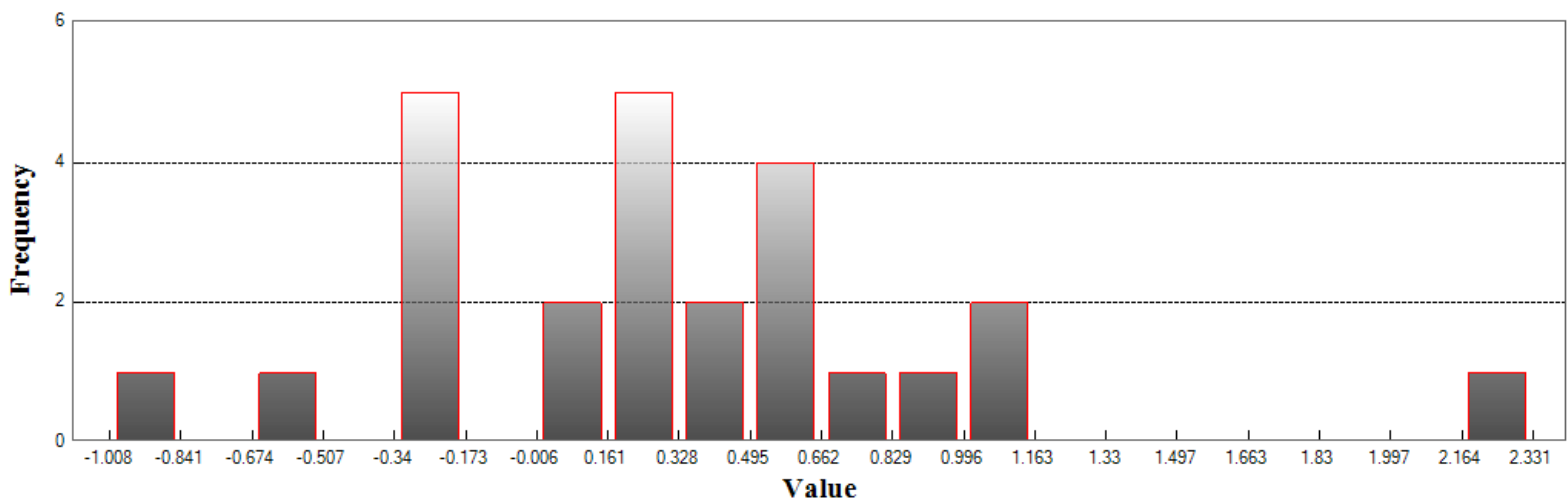


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.007
Maximum DZ: 2.332
Mean DZ: 0.304
Mean Magnitude DZ: 0.733
Number Observations: 25
Standard Deviation DZ: 0.66
RMSE Z: 0.715
95th Percentile: 1.067
Units: US Survey Feet

Histogram



Min: -1.007

Max: 2.332

Number Of Bins: 20

Bin Interval: 0.167

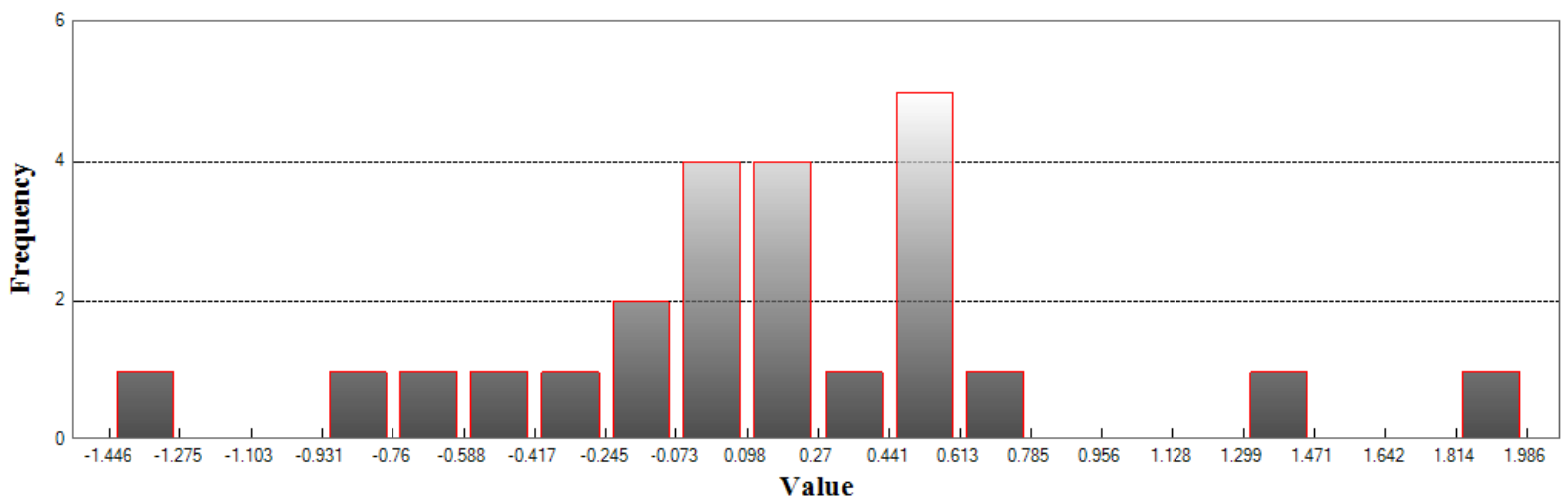


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.446
Maximum DZ: 1.985
Mean DZ: 0.167
Mean Magnitude DZ: 0.71
Number Observations: 24
Standard Deviation DZ: 0.695
RMSE Z: 0.701
95th Percentile: 1.446
Units: US Survey Feet

Histogram



Min: -1.446

Max: 1.985

Number Of Bins: 20

Bin Interval: 0.172

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: swain_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	22	1.169		
2H	42		2.228	
2L	22		0.844	
2M	20		2.960	
2U	43	3.372		
Total	149			

Units: US Survey Feet

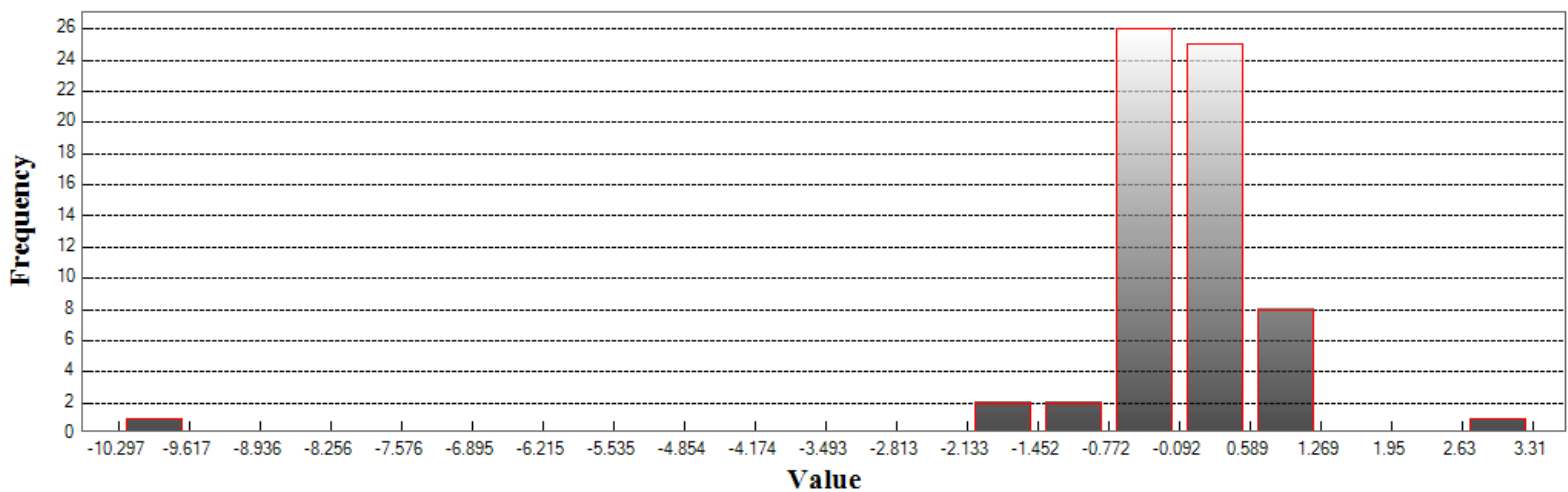


DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -10.297
Maximum DZ: 3.31
Mean DZ: -0.142
Mean Magnitude DZ: 0.79
Number Observations: 65
Standard Deviation DZ: 1.446
RMSE Z: 1.442
95% Confidence Level Z: 2.826
Units: US Survey Feet

Histogram



Min: -10.297

Max: 3.31

Number Of Bins: 20

Bin Interval: 0.68

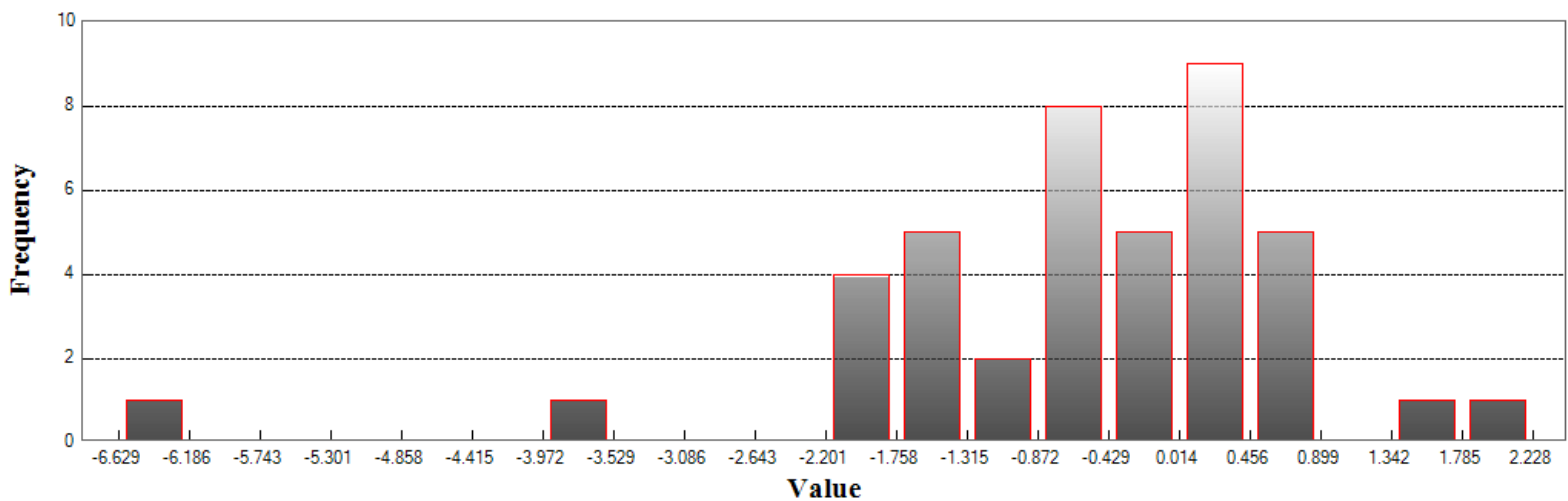


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -6.629
Maximum DZ: 2.228
Mean DZ: -0.614
Mean Magnitude DZ: 1.011
Number Observations: 42
Standard Deviation DZ: 1.437
RMSE Z: 1.547
95th Percentile: 2.228
Units: US Survey Feet

Histogram



Min: -6.629

Max: 2.228

Number Of Bins: 20

Bin Interval: 0.443

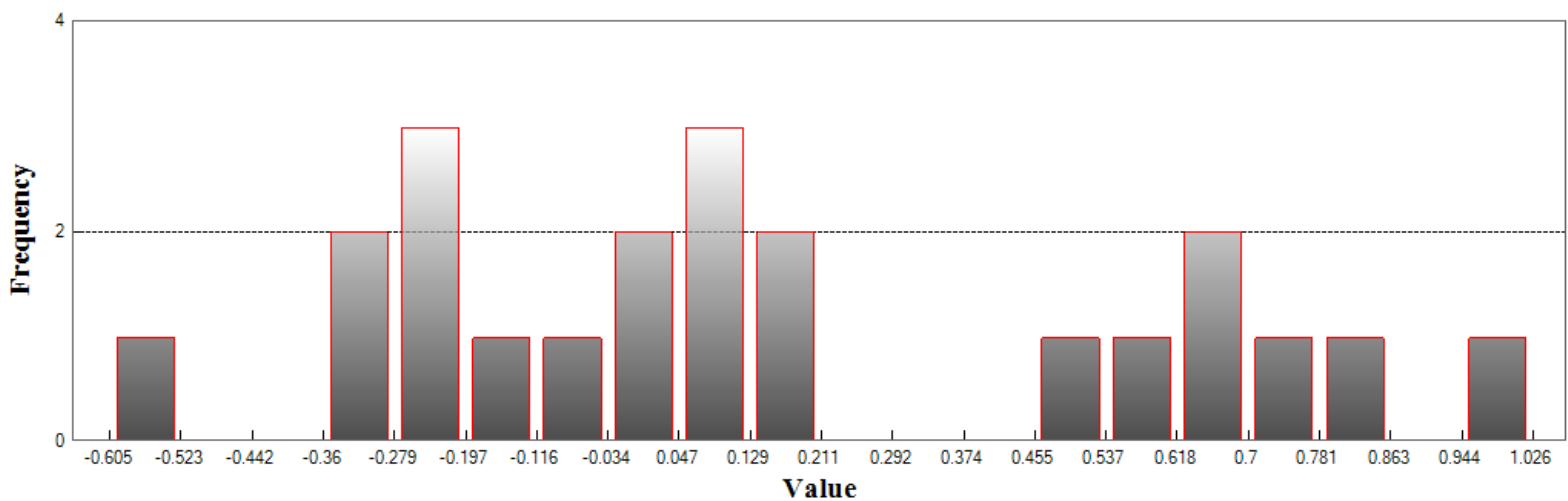


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.605
Maximum DZ: 1.026
Mean DZ: 0.151
Mean Magnitude DZ: 0.595
Number Observations: 22
Standard Deviation DZ: 0.441
RMSE Z: 0.457
95th Percentile: 0.844
Units: US Survey Feet

Histogram



Min: -0.605
Max: 1.026
Number Of Bins: 20
Bin Interval: 0.082

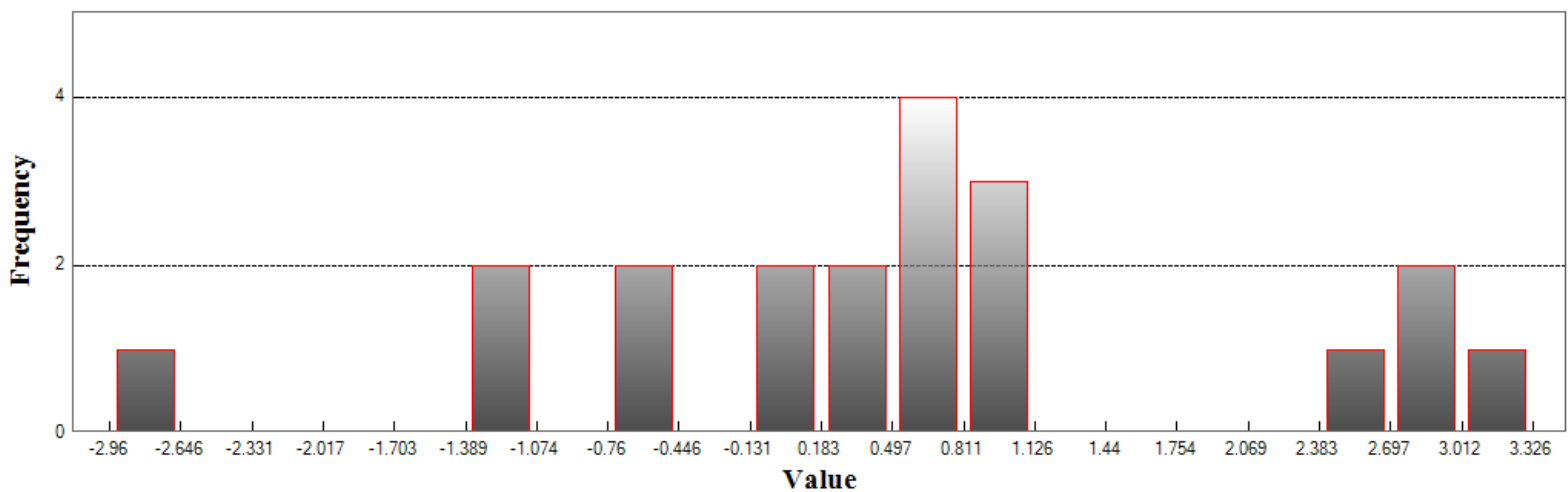


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -2.96
Maximum DZ: 3.326
Mean DZ: 0.515
Mean Magnitude DZ: 1.098
Number Observations: 20
Standard Deviation DZ: 1.539
RMSE Z: 1.586
95th Percentile: 2.96
Units: US Survey Feet

Histogram



Min: -2.96

Max: 3.326

Number Of Bins: 20

Bin Interval: 0.314

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: transylvania_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	1.240		
2H	49		3.050	
2L	19		2.153	
2M	16		0.970	
2U	56	0.745		
Total	164			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -1.092

Maximum DZ: 1.417

Mean DZ: 0.065

Mean Magnitude DZ: 0.612

Number Observations: 80

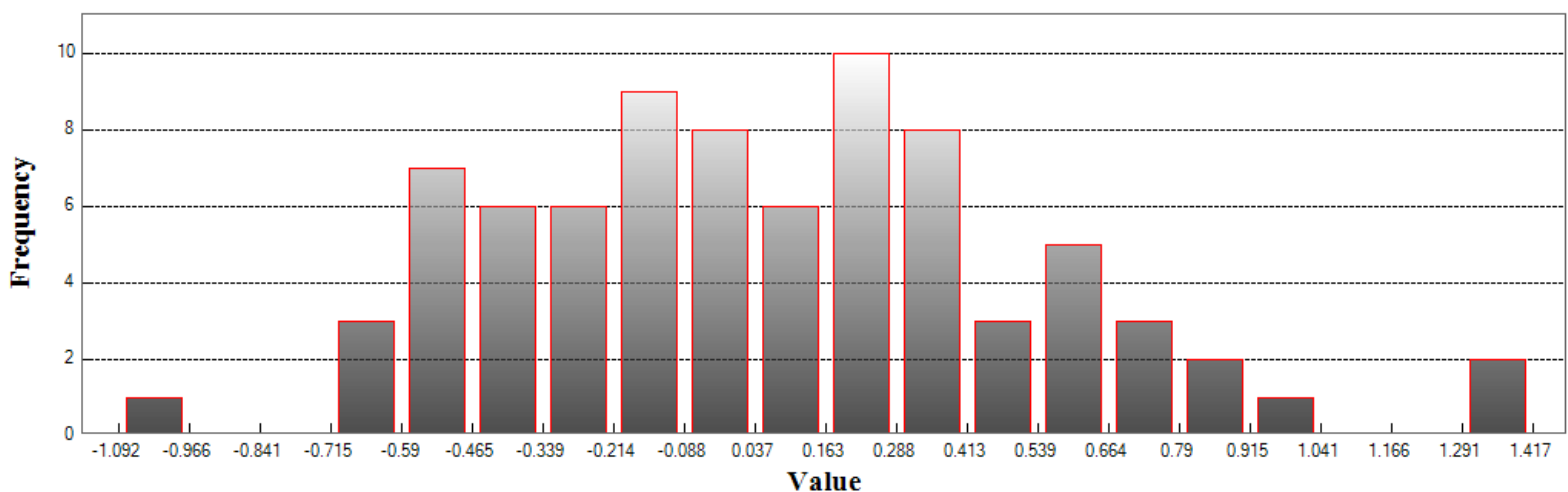
Standard Deviation DZ: 0.468

RMSE Z: 0.47

95% Confidence Level Z: 0.921

Units: US Survey Feet

Histogram



Min: -1.092

Max: 1.417

Number Of Bins: 20

Bin Interval: 0.125

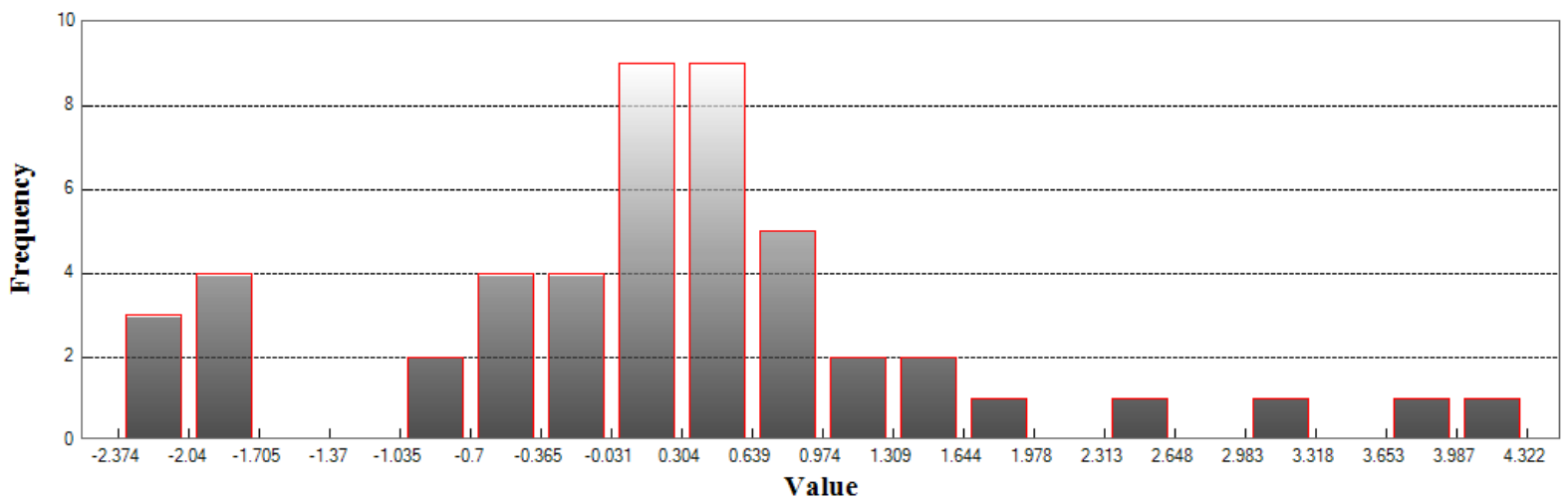


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.374
Maximum DZ: 4.323
Mean DZ: 0.237
Mean Magnitude DZ: 0.995
Number Observations: 49
Standard Deviation DZ: 1.385
RMSE Z: 1.391
95th Percentile: 3.05
Units: US Survey Feet

Histogram



Min: -2.374
Max: 4.323
Number Of Bins: 20
Bin Interval: 0.335

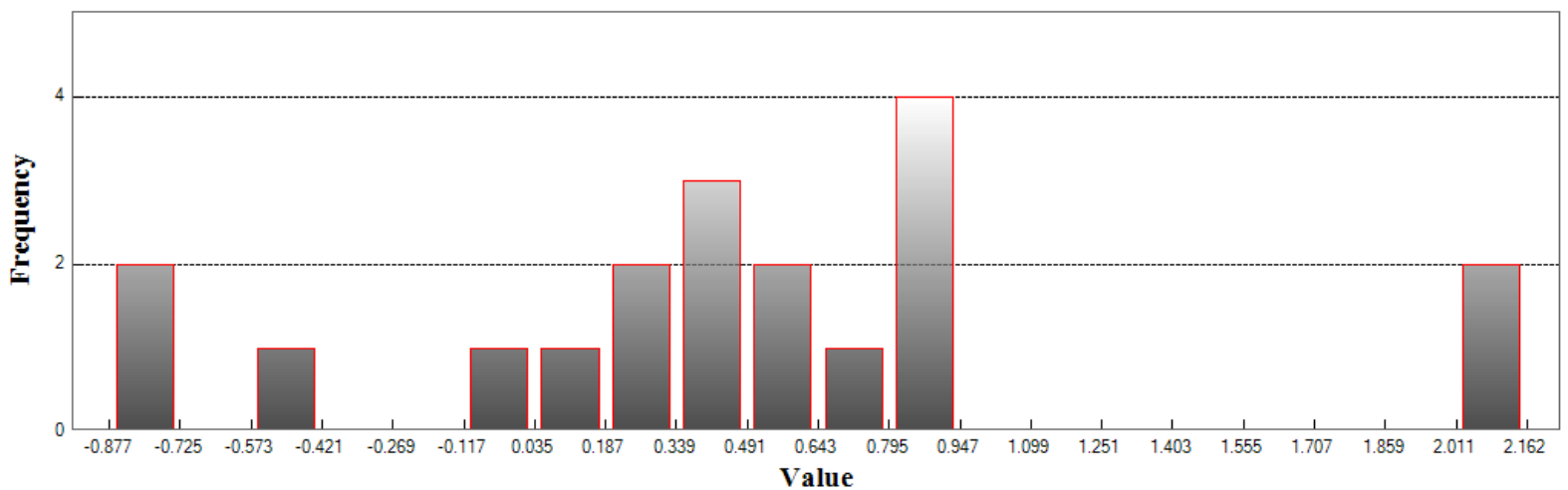


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.877
Maximum DZ: 2.162
Mean DZ: 0.498
Mean Magnitude DZ: 0.853
Number Observations: 19
Standard Deviation DZ: 0.788
RMSE Z: 0.914
95th Percentile: 2.153
Units: US Survey Feet

Histogram



Min: -0.877

Max: 2.162

Number Of Bins: 20

Bin Interval: 0.152

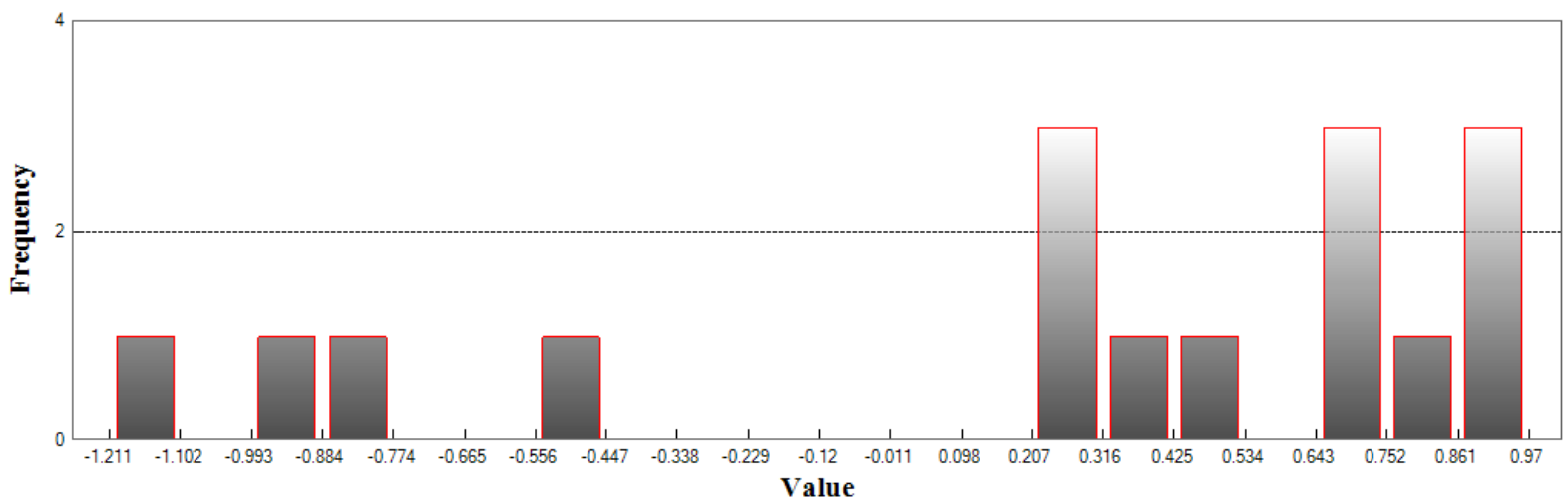


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.211
Maximum DZ: 0.97
Mean DZ: 0.239
Mean Magnitude DZ: 0.814
Number Observations: 16
Standard Deviation DZ: 0.709
RMSE Z: 0.727
95th Percentile: 0.97
Units: US Survey Feet

Histogram



Min: -1.211

Max: 0.97

Number Of Bins: 20

Bin Interval: 0.109

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: watauga_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
DEM				
2B	24	1.092		
2H	41		4.054	
2L	21		2.442	
2M	22		2.574	
2U	37	1.263		
Total	145			

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.992

Maximum DZ: 2.191

Mean DZ: 0.243

Mean Magnitude DZ: 0.645

Number Observations: 61

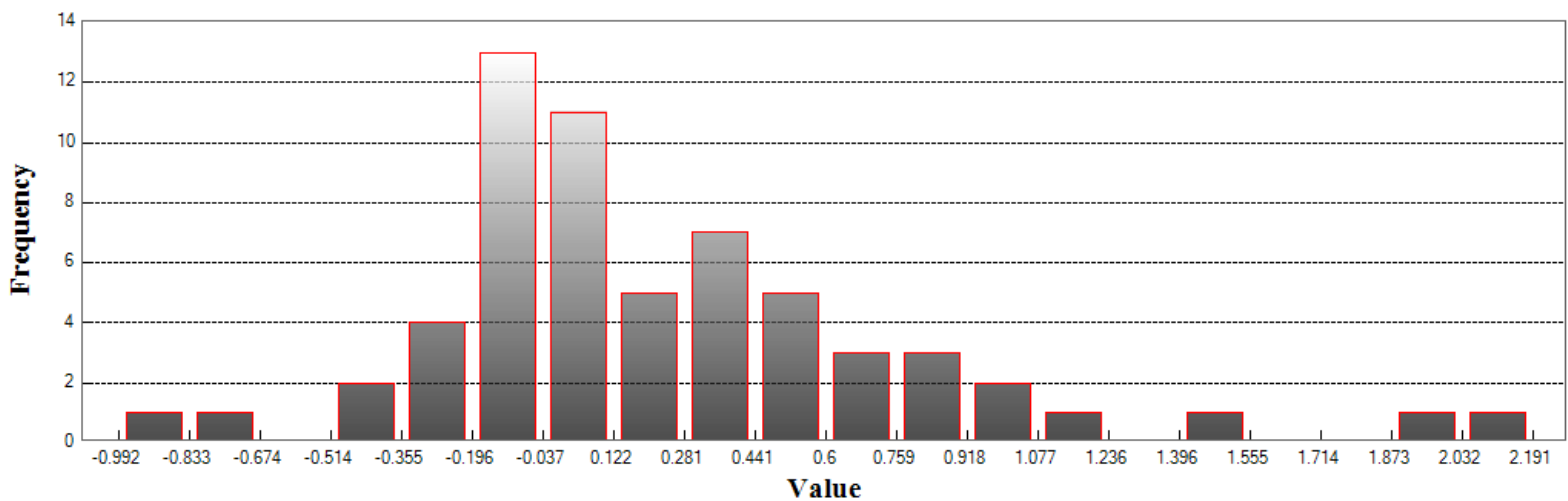
Standard Deviation DZ: 0.566

RMSE Z: 0.612

95% Confidence Level Z: 1.199

Units: US Survey Feet

Histogram



Min: -0.992

Max: 2.191

Number Of Bins: 20

Bin Interval: 0.159

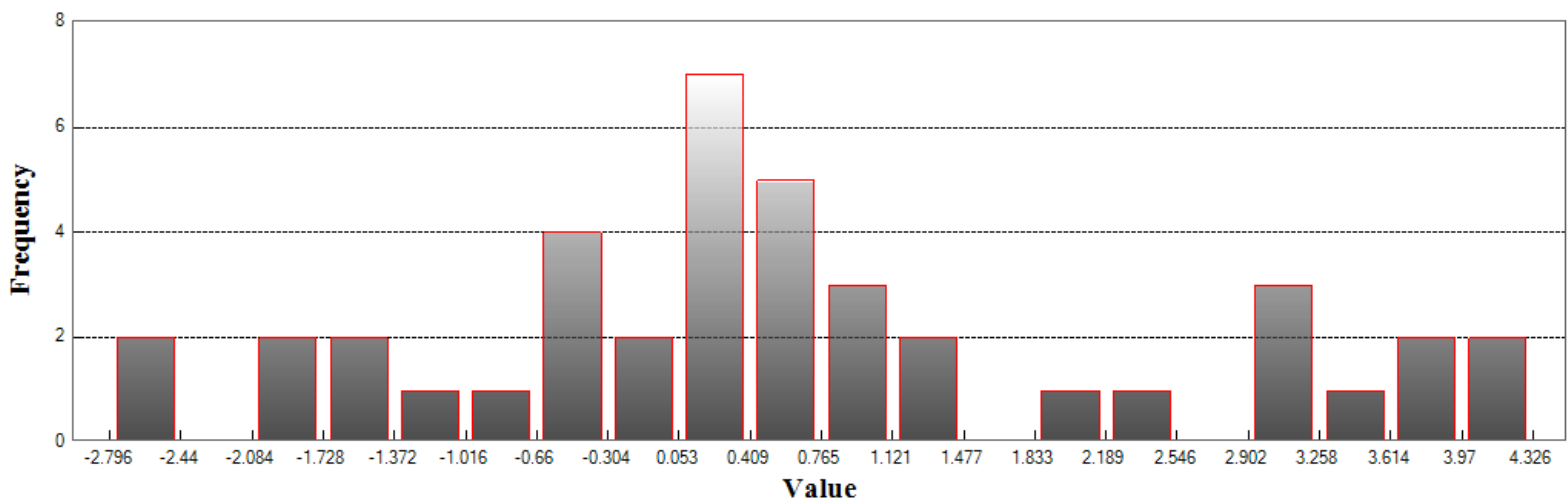


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.796
Maximum DZ: 4.326
Mean DZ: 0.665
Mean Magnitude DZ: 1.21
Number Observations: 41
Standard Deviation DZ: 1.856
RMSE Z: 1.95
95th Percentile: 4.054
Units: US Survey Feet

Histogram



Min: -2.796

Max: 4.326

Number Of Bins: 20

Bin Interval: 0.356

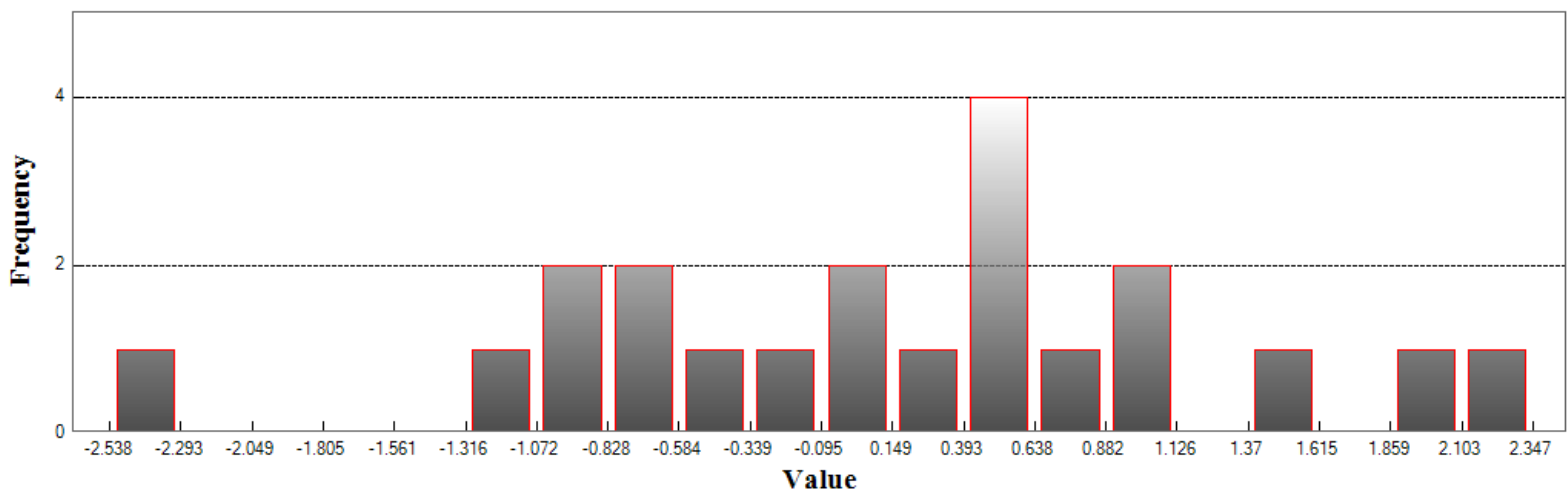


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -2.537
Maximum DZ: 2.347
Mean DZ: 0.169
Mean Magnitude DZ: 0.932
Number Observations: 21
Standard Deviation DZ: 1.112
RMSE Z: 1.098
95th Percentile: 2.442
Units: US Survey Feet

Histogram



Min: -2.537

Max: 2.347

Number Of Bins: 20

Bin Interval: 0.244

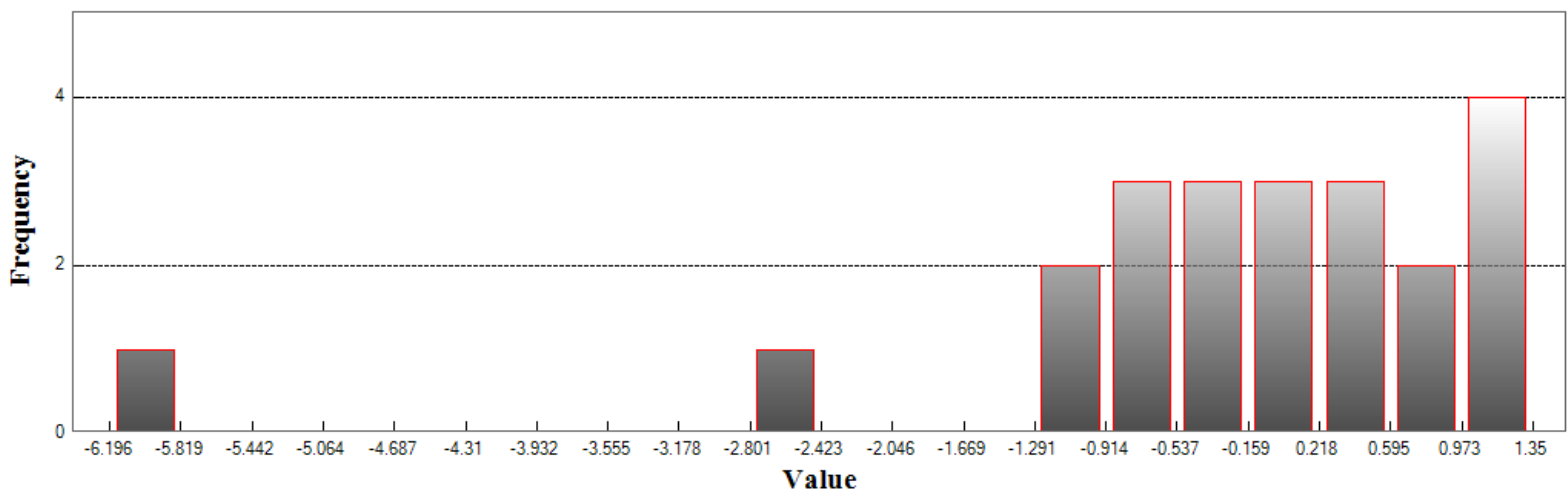


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -6.197
Maximum DZ: 1.35
Mean DZ: -0.316
Mean Magnitude DZ: 0.994
Number Observations: 22
Standard Deviation DZ: 1.611
RMSE Z: 1.605
95th Percentile: 2.574
Units: US Survey Feet

Histogram



Min: -6.197

Max: 1.35

Number Of Bins: 20

Bin Interval: 0.377



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: yancey_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: dem20_file

Data Filename: DEM20

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute:

Data Filename:

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
DEM			
2B	24	2.382	
2H	42		3.119
2L	25		1.020
2M	23		1.810
2U	37	0.701	
Total	151		

Units: US Survey Feet



DEM

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -5.66

Maximum DZ: 0.8

Mean DZ: -0.22

Mean Magnitude DZ: 0.625

Number Observations: 61

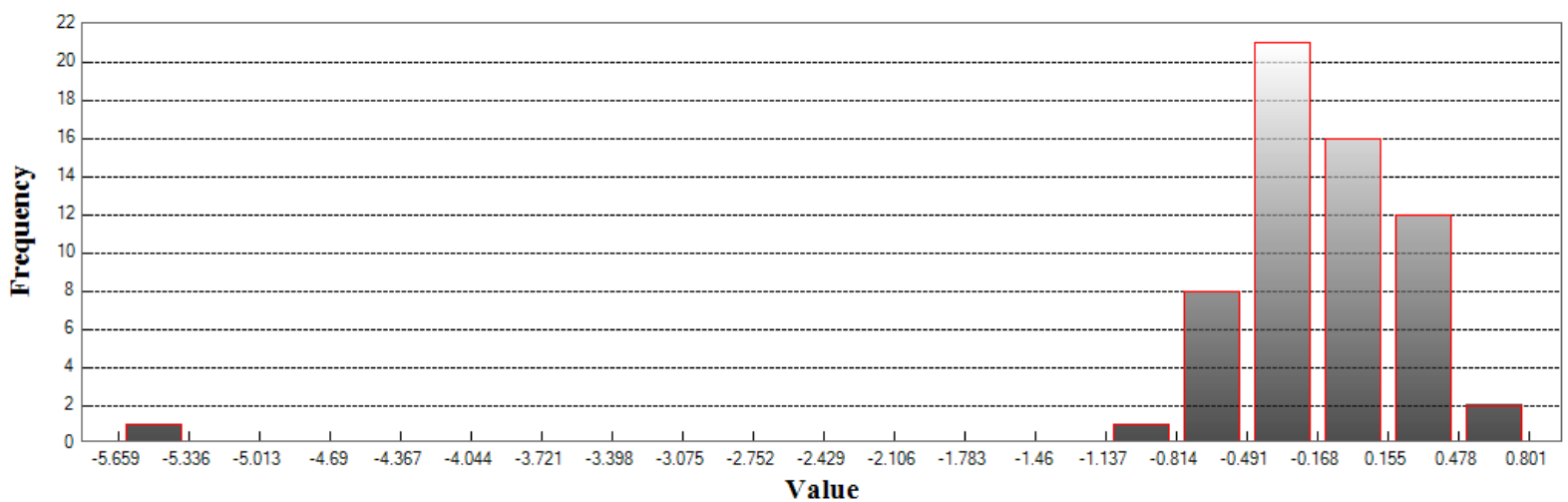
Standard Deviation DZ: 0.788

RMSE Z: 0.812

95% Confidence Level Z: 1.591

Units: US Survey Feet

Histogram



Min: -5.66

Max: 0.8

Number Of Bins: 20

Bin Interval: 0.323

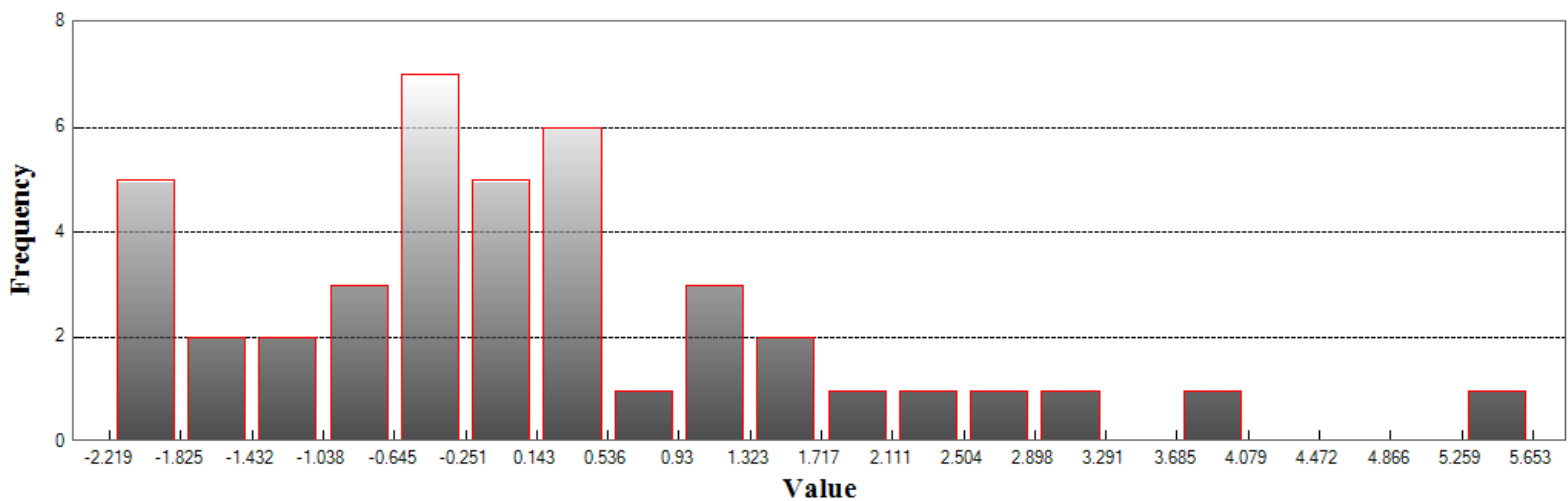


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -2.219
Maximum DZ: 5.653
Mean DZ: 0.141
Mean Magnitude DZ: 1.11
Number Observations: 42
Standard Deviation DZ: 1.692
RMSE Z: 1.677
95th Percentile: 3.119
Units: US Survey Feet

Histogram



Min: -2.219
Max: 5.653
Number Of Bins: 20
Bin Interval: 0.394

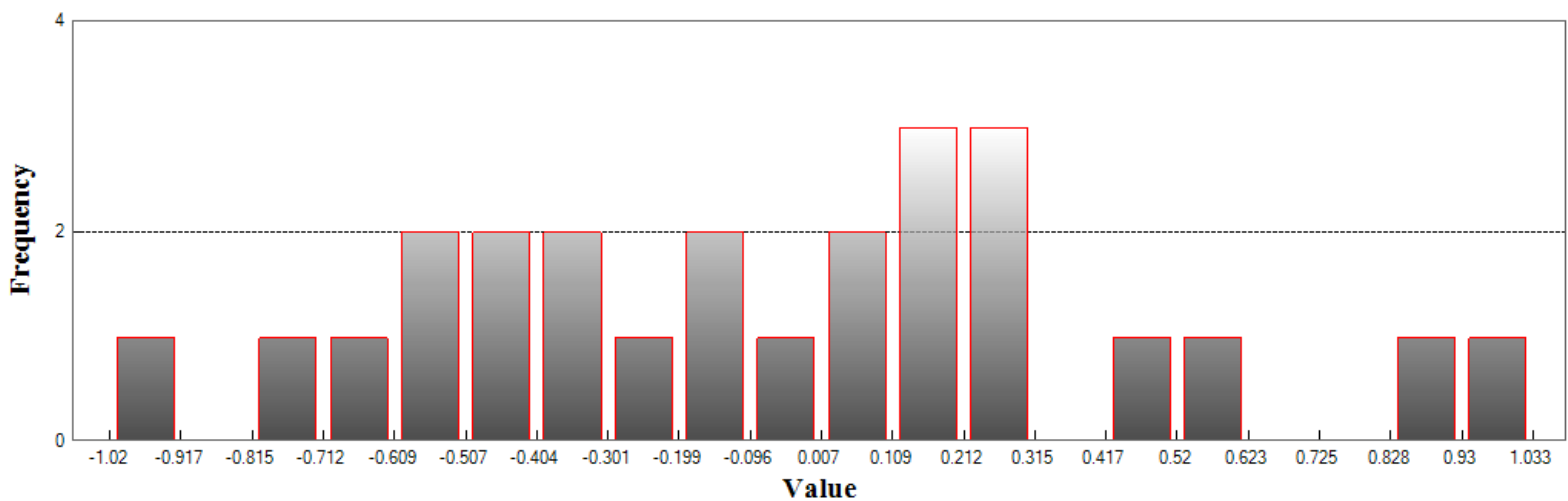


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -1.02
Maximum DZ: 1.033
Mean DZ: -0.053
Mean Magnitude DZ: 0.633
Number Observations: 25
Standard Deviation DZ: 0.5
RMSE Z: 0.492
95th Percentile: 1.02
Units: US Survey Feet

Histogram



Min: -1.02

Max: 1.033

Number Of Bins: 20

Bin Interval: 0.103

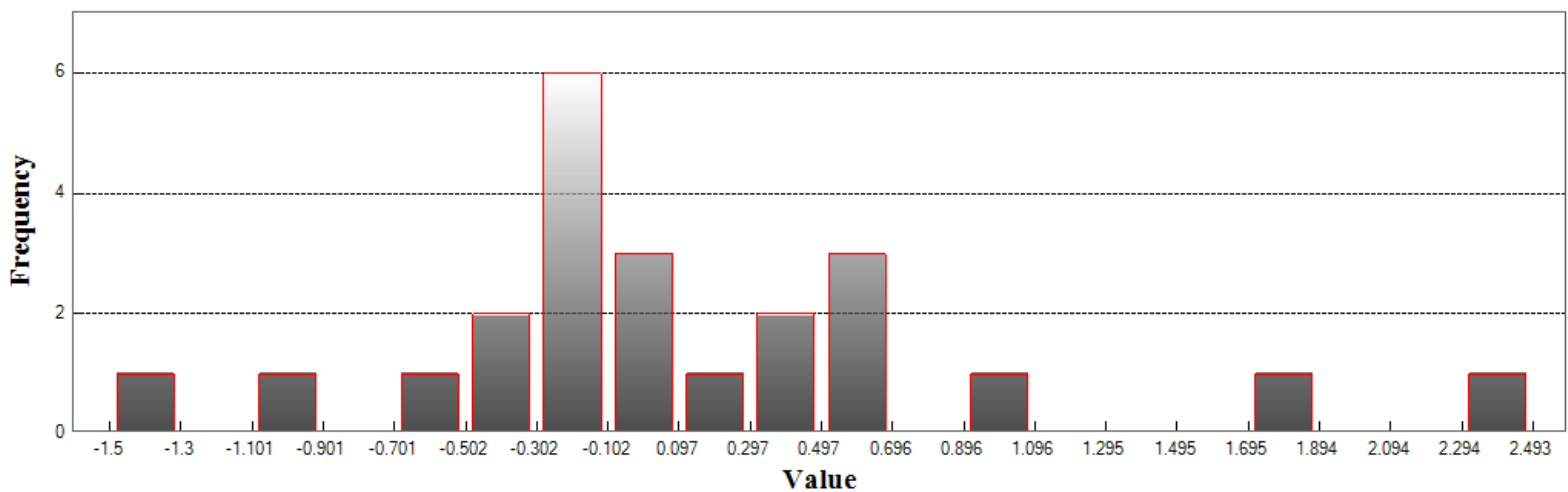


DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.5
Maximum DZ: 2.493
Mean DZ: 0.127
Mean Magnitude DZ: 0.76
Number Observations: 23
Standard Deviation DZ: 0.846
RMSE Z: 0.837
95th Percentile: 1.81
Units: US Survey Feet

Histogram



Min: -1.5

Max: 2.493

Number Of Bins: 20

Bin Interval: 0.2

Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0			SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS	SPC North (m)	SPC East (m)	
ALBEMARLE CORS ARP	DG5755	112.630	142.970	35 20 17.30339 N	080 12 48.52476 W	176846.600	499299.251	0.99985604
ASHEBORO 2 CORS ARP	DL6900	210.381	240.790	35 37 49.38501 N	079 45 53.75304 W	208859.939	540319.797	0.99986134
ASU-BOONE CORS ARP	DF4365	957.907	989.120	36 12 50.84473 N	081 40 54.64789 W	276616.959	368477.452	0.99986327
BEAUFORT CORS ARP	DK7561	-27.858	9.650	34 43 08.50895 N	076 40 18.99140 W	109995.822	822811.707	0.99991989
BODIE ISLAND CORS ARP	DO2877	-33.046	5.940	35 50 44.35730 N	075 33 48.94199 W	237848.248	919957.886	0.99993139
BRYSON CITY CORS ARP	DL2762	566.148	594.790	35 22 21.56251 N	083 30 23.37131 W	189293.916	200277.527	0.99978597
BURLINGTON CORS ARP	DF9213	173.401	203.610	36 05 29.58604 N	079 26 12.17620 W	259845.465	570271.809	0.99995269
BURNSVILLE 2007 CORS ARP	DL6201	748.693	778.830	35 54 29.30454 N	082 20 49.87834 W	244501.699	307532.708	0.99982060
BUXTON CORS ARP	DM5409	-25.445	13.270	35 15 58.08197 N	075 33 06.82885 W	173632.372	923246.647	0.99987661
CARTHAGE CORS ARP	DG5938	149.613	181.000	35 20 30.04880 N	079 23 05.08515 W	176632.942	574629.599	0.99985034
CASTLE HAYNE 2007 CORS ARP	DK7086	-22.806	13.900	34 20 40.22860 N	077 52 29.89892 W	66537.627	713112.699	1.00000500
CEDAR ISLAND CORS ARP	DL3071	-30.613	7.250	35 01 03.76013 N	076 18 55.28490 W	143939.877	854565.507	0.99988569
CLINTON CORS ARP	DK4041	23.862	58.490	34 59 25.65387 N	078 21 31.47816 W	137793.395	668139.845	0.99987918
CONCORD CORS ARP	DF7471	154.382	184.820	35 22 35.24392 N	080 33 51.11399 W	181542.684	467489.138	0.99985072
CRESWELL CORS ARP	DK7747	-28.220	8.918	35 54 56.93091 N	076 28 25.29176 W	243161.208	837585.924	0.99994407
DOBSON CORS ARP	DF5767	340.642	373.920	36 25 31.51455 N	080 43 11.71069 W	298143.588	455359.078	1.00002904
DUCK 3 CORS ARP	DK3334	-24.775	14.110	36 10 54.01098 N	075 45 04.79522 W	274539.934	901788.896	1.00000811
DURHAM COOP CORS ARP	DG9328	117.466	148.790	35 59 46.12942 N	078 53 58.03641 W	249177.805	618666.816	0.99993843
ELIZABETH CITY CORS ARP	DL6896	-29.750	7.600	36 20 28.79075 N	076 15 29.27386 W	290874.906	855730.326	1.00005810
ELIZABETHTOWN CORS ARP	DI1680	-9.537	25.460	34 39 13.60147 N	078 31 11.73447 W	100363.878	653606.669	0.99992817
FAYETTEVILLE 2006 CORS ARP	DH9594	16.914	50.450	35 02 02.48998 N	078 52 14.73160 W	142444.626	621393.108	0.99987712
FORT FISHER CORS ARP	DM3521	-29.165	8.320	33 57 38.26113 N	077 56 18.76581 W	23891.297	707718.933	1.00012861
FRANKLIN CORS ARP	DG4257	620.895	649.270	35 11 30.68622 N	083 23 41.74673 W	168802.916	209516.356	0.99977570
GASTON CORS ARP	DE8425	213.712	245.140	35 18 39.79151 N	081 11 19.54124 W	175361.640	410593.642	0.99983959
GATESVILLE CORS ARP	DL6898	-20.472	15.650	36 26 12.65517 N	076 43 16.51658 W	300420.808	813921.941	1.00008983
GOLDSBORO CORS ARP	DK5550	14.068	48.900	35 25 16.86892 N	078 03 30.57562 W	185808.939	695094.939	0.99987475
GREENVILLE NC CORS ARP	DL7337	4.907	40.810	35 36 18.30987 N	077 21 55.47952 W	207005.628	757690.324	0.99989078
HAYWOOD CORS ARP	DE8228	809.314	838.220	35 31 35.39633 N	082 55 30.12730 W	204104.221	253736.164	0.99975705
HENDERSONVILLE CORS ARP	DK7853	654.472	684.850	35 21 21.89173 N	082 30 03.99653 W	183772.967	291488.002	0.99977154
HICKORY CORS ARP	DM3523	326.299	358.470	35 44 31.01014 N	081 18 30.93483 W	223397.889	400811.751	0.99985789
HIGH POINT CORS ARP	AI4198	267.948	299.220	35 57 56.48686 N	080 00 48.93737 W	246260.723	518178.455	0.99990805
I77 WELCOME CNTR CORS ARP	DF6318	157.556	187.950	35 07 21.25422 N	080 54 58.46768 W	153944.753	434964.997	0.99985039
JACKSON NC CORS ARP	DH7133	13.257	47.680	36 24 30.56335 N	077 26 15.30879 W	296031.384	749749.096	1.00007439
JACKSONVILLE CORS ARP	DK6239	-26.125	10.950	34 44 46.81575 N	077 27 11.71789 W	111628.027	751216.799	0.99991534
JORDAN LAKE CORS ARP	DL3891	45.996	77.430	35 46 52.49646 N	079 02 03.92766 W	225330.877	606489.109	0.99990797
KENANSVILLE CORS ARP	DI1071	15.560	51.360	34 56 30.49763 N	077 58 49.94532 W	132685.360	702719.518	0.99988470
KINSTON CORS ARP	DM3989	-3.126	32.790	35 19 18.56728 N	077 36 49.27040 W	175242.563	735637.711	0.99987383
LEXINGTON CORS ARP	DG5757	194.102	225.340	35 48 53.14318 N	080 13 46.20206 W	229736.512	498497.891	0.99989030
LILLINGTON 2004 CORS ARP	DG5759	25.706	58.730	35 25 12.54674 N	078 48 40.33946 W	185286.626	626745.253	0.99987286
LUMBERTON CORS ARP	DI1682	15.824	49.560	34 37 36.33605 N	079 04 39.69481 W	97263.238	602477.201	0.99992918

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0		SPC North (m)	SPC East (m)	SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS				
MARION CORS ARP	DE8230	366.984	398.800	35 39 13.38510 N	081 57 16.17206 W	215162.325	342120.619	0.99983954	
MARSHALL CORS ARP	DG7400	560.633	590.850	35 48 47.31356 N	082 41 22.67321 W	235064.443	276250.707	0.99983251	
MONROE CORS ARP	DF5880	144.332	174.600	34 58 54.77687 N	080 31 25.79009 W	137720.671	470484.517	0.99986097	
MOORESVILLE CORS ARP	DH3838	266.205	297.570	35 34 46.87707 N	080 48 12.53662 W	204453.424	446161.276	0.99984714	
MORGANTON CORS ARP	DH7137	344.831	377.000	35 42 27.07386 N	081 39 23.99857 W	220367.093	369236.777	0.99985003	
MURPHY CORS ARP	DL1890	476.123	504.800	35 04 06.77760 N	083 57 59.36142 W	157594.804	156842.278	0.99980296	
NASHVILLE CORS ARP	DK7576	34.500	68.960	35 58 09.06797 N	078 01 11.34161 W	246618.195	698006.712	0.99994546	
NCSA SALISBURY CORS ARP	DN5840	174.906	206.250	35 42 41.69212 N	080 25 55.99488 W	218535.902	480015.188	0.99987726	
NCSO SWANQUARTER2 CORS ARP	DQ9090	-29.912	8.020	35 23 40.93853 N	076 19 31.76835 W	185719.856	852514.443	0.99988038	
NEW BERN NCGS CORS ARP	DN8739	-16.105	21.070	35 06 45.99769 N	077 06 14.29783 W	152823.201	782416.342	0.99987805	
NEWLAND 2007 CORS ARP	DM3991	1124.527	1155.410	36 04 39.95811 N	081 54 40.29398 W	262073.985	347419.061	0.99979994	
NORTH WILKESBORO CORS ARP	DK4047	270.426	303.570	36 09 59.27542 N	081 07 57.22423 W	270132.288	417741.217	0.99985750	
PARI_OBS_NC_2008 CORS ARP	DM6192	880.094	909.630	35 12 06.96417 N	082 52 20.90284 W	167939.378	257095.138	0.99973486	
PEA ISLAND CORS ARP	DG5313	-31.109	7.780	35 41 02.04056 N	075 28 56.35040 W	220170.749	927930.973	0.99990584	
PITTSBORO CORS ARP	DE8234	102.804	133.850	35 43 11.21331 N	079 10 38.62673 W	218525.196	593551.641	0.99988974	
POLKTON CORS ARP	DG7402	84.929	115.530	34 59 33.17297 N	080 10 37.85763 W	138473.153	502143.744	0.99986944	
RALEIGH CORS ARP	AJ2913	142.997	175.910	35 47 12.85298 N	078 38 19.41118 W	226017.117	642259.673	0.99989367	
RALEIGH DOT CORS ARP	DG4687	51.789	85.400	35 45 49.50795 N	078 34 44.39448 W	223469.874	647669.715	0.99990429	
REIDSVILLE CORS ARP	DM3525	234.815	266.700	36 21 42.71489 N	079 39 56.54007 W	289954.707	549851.005	1.00002348	
ROBBINSVILLE CORS ARP	DM3993	606.659	635.150	35 19 15.69235 N	083 47 48.68948 W	184808.885	173646.886	0.99977812	
ROCKINGHAM CORS ARP	DM3995	91.872	122.950	34 57 51.98780 N	079 47 47.74087 W	135010.039	536859.244	0.99987067	
ROXBORO CORS ARP	DM3527	194.654	225.650	36 23 28.05620 N	078 59 54.41890 W	293001.606	609740.318	1.00003983	
SANFORD CORS ARP	AM7024	95.450	127.140	35 28 24.67784 N	079 09 28.98436 W	191202.330	595258.352	0.99986507	
SHALLOTTE CORS ARP	DK3336	-10.002	25.750	33 58 57.20129 N	078 23 24.30664 W	25972.444	665965.745	1.00011715	
SHELBY CORS ARP	DG7404	264.465	296.210	35 16 53.64241 N	081 29 28.11569 W	172739.799	383023.692	0.99983123	
SMITHFIELD CORS ARP	DK6525	24.469	58.660	35 33 49.60980 N	078 20 10.80495 W	201405.073	669760.307	0.99988353	
SPARTA CORS ARP	DL1707	839.991	871.970	36 29 51.90632 N	081 06 52.93270 W	306852.726	420130.758	0.99997742	
SPINDALE CORS ARP	DK4043	302.765	334.650	35 21 55.83430 N	081 54 57.34807 W	183099.887	344671.752	0.99982704	
STATESVILLE CORS ARP	DK7549	228.842	261.190	35 51 19.72891 N	080 50 55.47790 W	235120.895	442629.732	0.99989208	
SW COMMUNITY COLL CORS ARP	DH3874	645.113	673.650	35 20 52.40748 N	083 12 23.38897 W	185353.255	227392.744	0.99977276	
SWANNANOVA CORS ARP	DG5311	659.842	689.830	35 35 46.03847 N	082 25 24.22964 W	210140.053	299464.372	0.99978706	
SWANQUARTER CORS ARP	DL1892	-30.398	7.510	35 23 40.86368 N	076 19 33.37884 W	185716.456	852473.883	0.99988046	
TARBORO CORS ARP	DK7578	-0.513	34.830	35 52 56.96198 N	077 34 21.39610 W	237489.266	738477.556	0.99993315	
TROY CORS ARP	DK4045	144.044	174.590	35 22 01.84517 N	079 52 12.77094 W	179740.437	530528.389	0.99985200	
WALNUT COVE CORS ARP	DL1894	276.319	309.540	36 22 19.68806 N	080 11 05.62514 W	291528.706	503266.558	1.00002046	
WARRENTON CORS ARP	DM3529	76.208	109.530	36 23 41.68571 N	078 10 13.74958 W	293732.691	684023.061	1.00005974	
WASHINGTON 2007 CORS ARP	DK7551	-25.416	11.220	35 33 34.78484 N	077 03 31.44193 W	202467.748	785569.672	0.99989097	
WASHINGTON CORS ARP	AJ2915	-25.317	11.260	35 33 34.80249 N	077 03 31.54255 W	202468.242	785567.128	0.99989095	
WEST JEFFERSON CORS ARP	DL2082	934.802	966.060	36 23 34.94821 N	081 28 42.26843 W	295989.718	387260.230	0.99992435	
WHITEVILLE CORS ARP	DJ8943	-2.342	32.360	34 16 49.59006 N	078 42 59.33169 W	58881.567	635708.028	1.00001544	
WILLIAMSTON 2 CORS ARP	DN8741	-21.901	14.180	35 49 49.75739 N	077 02 06.20973 W	232550.205	787120.808	0.99992694	
WILLIAMSTON CORS ARP	DF8715	-20.544	15.530	35 49 48.75037 N	077 02 04.93157 W	232519.811	787153.494	0.99992667	
WILMINGTON CORS ARP	AJ2917	-24.775		34 14 09.45795 N	077 55 45.16083 W	54442.078	708252.321	1.00003228	
WILSON CORS ARP	DK7563	11.179	46.030	35 42 26.29637 N	077 55 57.08393 W	217645.964	706192.128	0.99990236	
WINSTON SALEM CORS ARP	DH5853	254.046	286.560	36 04 15.67829 N	080 13 37.75017 W	258164.236	499061.500	0.99993484	

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Acronyms, Abbreviations, and Definitions

ARP – Antenna Reference Point

CORS – Continuous Operating Reference Station

DMS – Degrees Minutes Seconds

m – Meter

PID – Permanent Identifier

SPC – State Plane Coordinates

Statistical Definitions:

Nonvegetated Vertical Accuracy (NVA) – The vertical accuracy at the 95-percent confidence level in nonvegetated open terrain, where errors should approximate a normal distribution.

Supplemental Vertical Accuracy (SVA) – Term for reporting the vertical accuracy at the 95th percentile in each separate land cover category where vertical errors may not follow a normal error distribution.

Vegetated Vertical Accuracy (VVA) – An estimate of the vertical accuracy, based on the 95th percentile, in vegetated terrain where errors do not necessarily approximate a normal distribution.

Minimum DZ – This statistic represents the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The minimum of each simply represents the smallest value out of all of the analyzed locations. This component of the statistics can be used to show which locations most closely correspond to the surveyed points.

Maximum DZ – This statistic represents the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The maximum value of each represents the largest value out of all of the analyzed locations. Maximum values can be used to show which locations most closely correspond to the surveyed points.

Mean DZ - The statistic of the mean DZ is intended to show the average values of the DZ. These statistics show the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations

Mean Magnitude DZ - The statistic of the mean DZ is intended to show the average values of the DZ. These statistics show the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations.

Number Observations – Number of observations

Standard Deviation DZ - A measure of spread or dispersion of a sample of errors around the sample mean error. It is a measure of precision, rather than accuracy; the standard deviation does not account for uncorrected systematic errors.

RMSE Z - The square root of the average of the set of squared differences between dataset coordinate values and coordinate values from an independent source of higher accuracy for identical points. The RMSE is used to estimate the absolute accuracy of both horizontal and vertical coordinates when standard or accepted values are known, as with GPS-surveyed check points of higher accuracy than the data being tested. In the United States, the independent source of higher accuracy is expected to be at least three times more accurate than the dataset being tested. RMSE Z measures RMSE in the Z direction only.

95th Percentile – A measure used in statistics indicating the value below which a given percentage of observations (absolute values of errors) in a group of observations fall. For example, the 95th percentile is the value (or score) below which 95 percent of the observations may be found.