

NCGS: Positioning NC today and for the future!



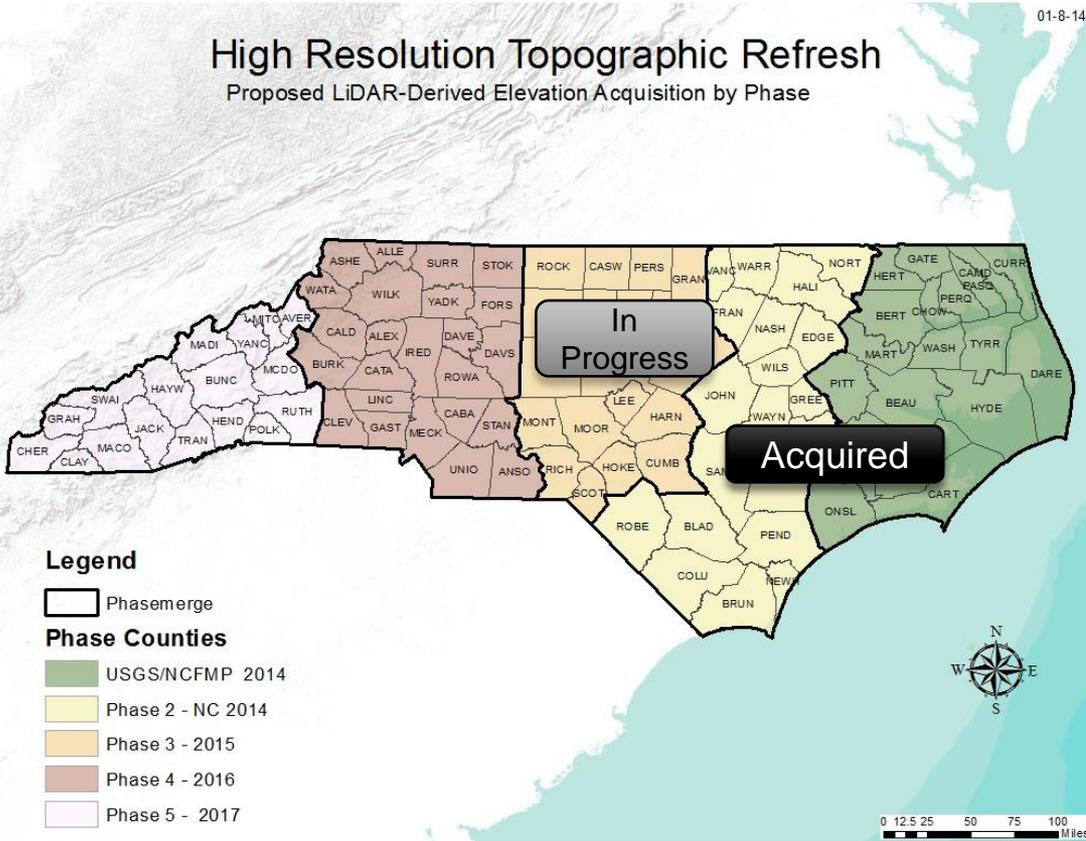
North Carolina Geodetic Survey

Establishing and Maintaining
the Official Survey Base
in North Carolina

STATEWIDE PHASES

Original Plan

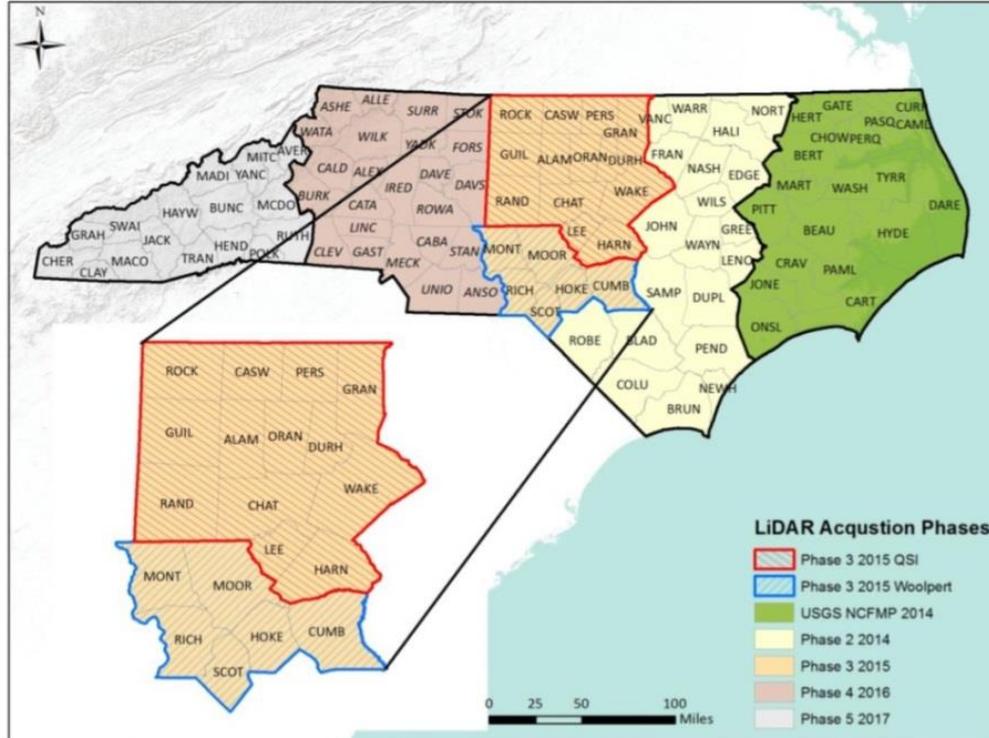
- The Plan put forward was a 5 phase 4 year plan
- Phase 1- USGS
- Phase 2- NC
 - Both occurred in 2014
- Phase 3 – NC (2015)



The Plan added Onslow County to Phase 1 with the Coordination effort of NRCS

Therefore moving the NC collection Phase 2 to add Robeson County

Phase 3 NC Collection 2015



- 3.5 million appropriated by the General Assembly based on value to the state
- 1 million paid by NCDOT.

State Specifications

Collection

- The 2014 LiDAR data collection will meet 2 points per square meter standard with nominal post spacing of 0.7 meters.
- All data will include multi-return and intensity values.
- Data collected will support a 9.25 cm (3.36 inches) RMSEz and 18.13 cm FVA based on NDEP guidelines.

State Specifications

- Classification

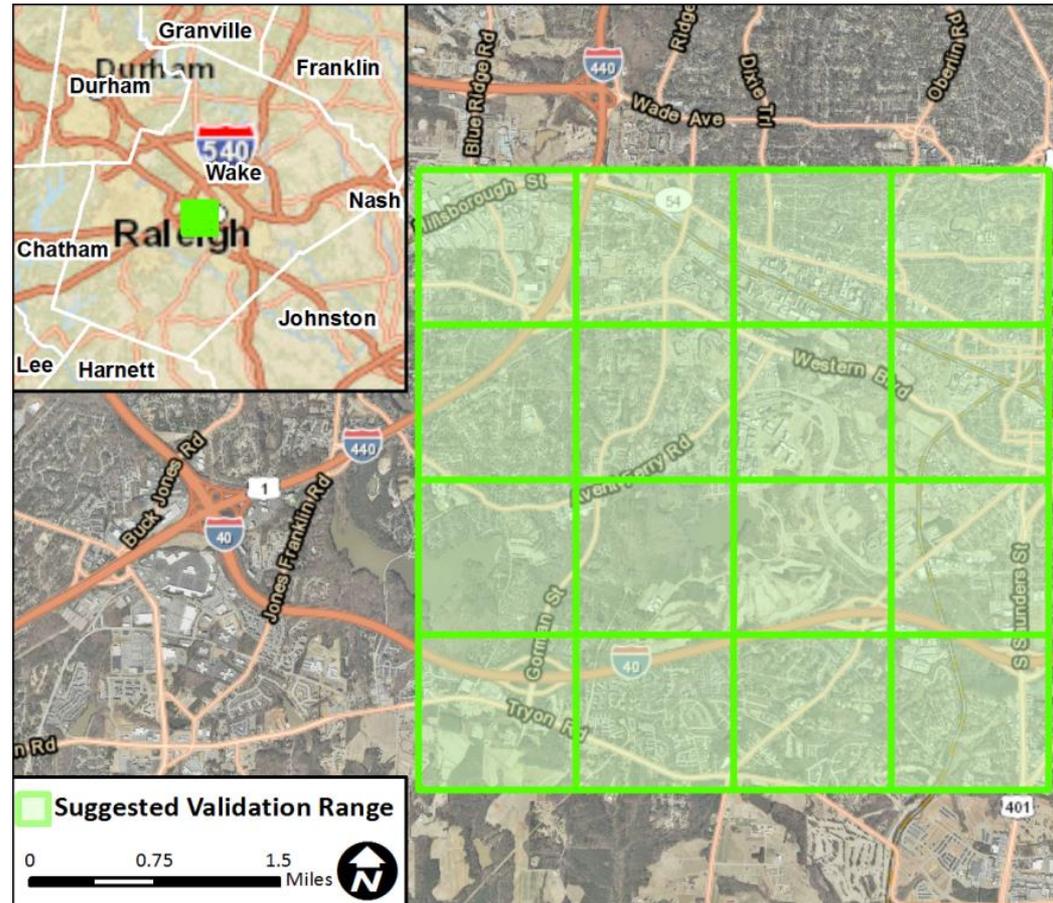
Class	Description
1	Processed Unclassified
2	Ground
3	Low Veg/Strata
4	Medium Veg/Strata
5	High Veg/Strata
6	Buildings (Automated)
7	Noise (High/Low)
9	Water (Hydro Cleaned Areas)
12	Flight Line Overlap
13	Roads
14	Bridges
17	Overlap Default
18	Overlap Ground
25	Overlap Water

State Specifications

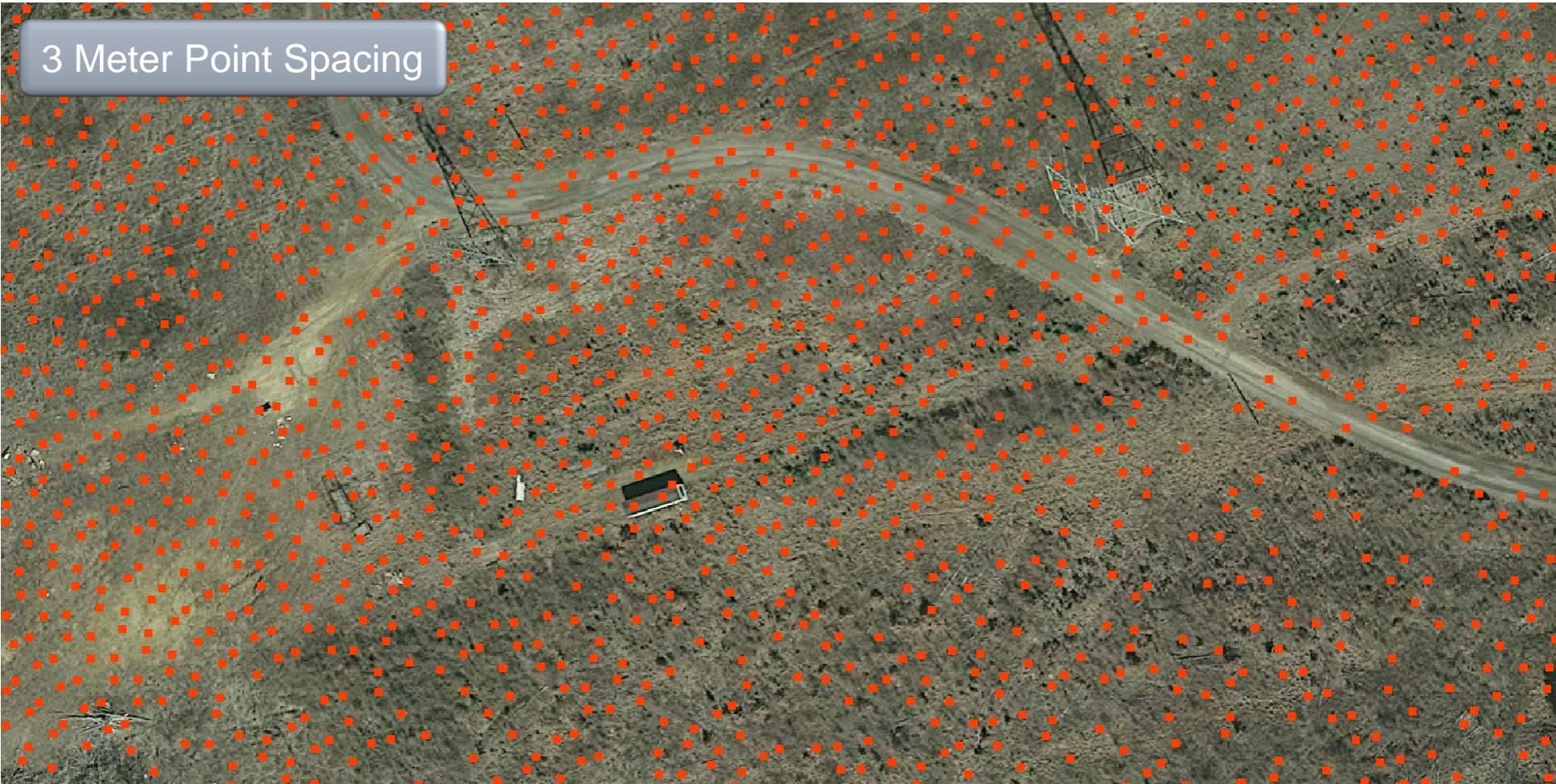
This project has set up an Validation Range

- Flown by each sensor to check horizontal and vertical Accuracy of the collection.
- Gives the teams the capability of adjusting the sensors to match on another
- USGS contractors utilized the validation range

Validation Range

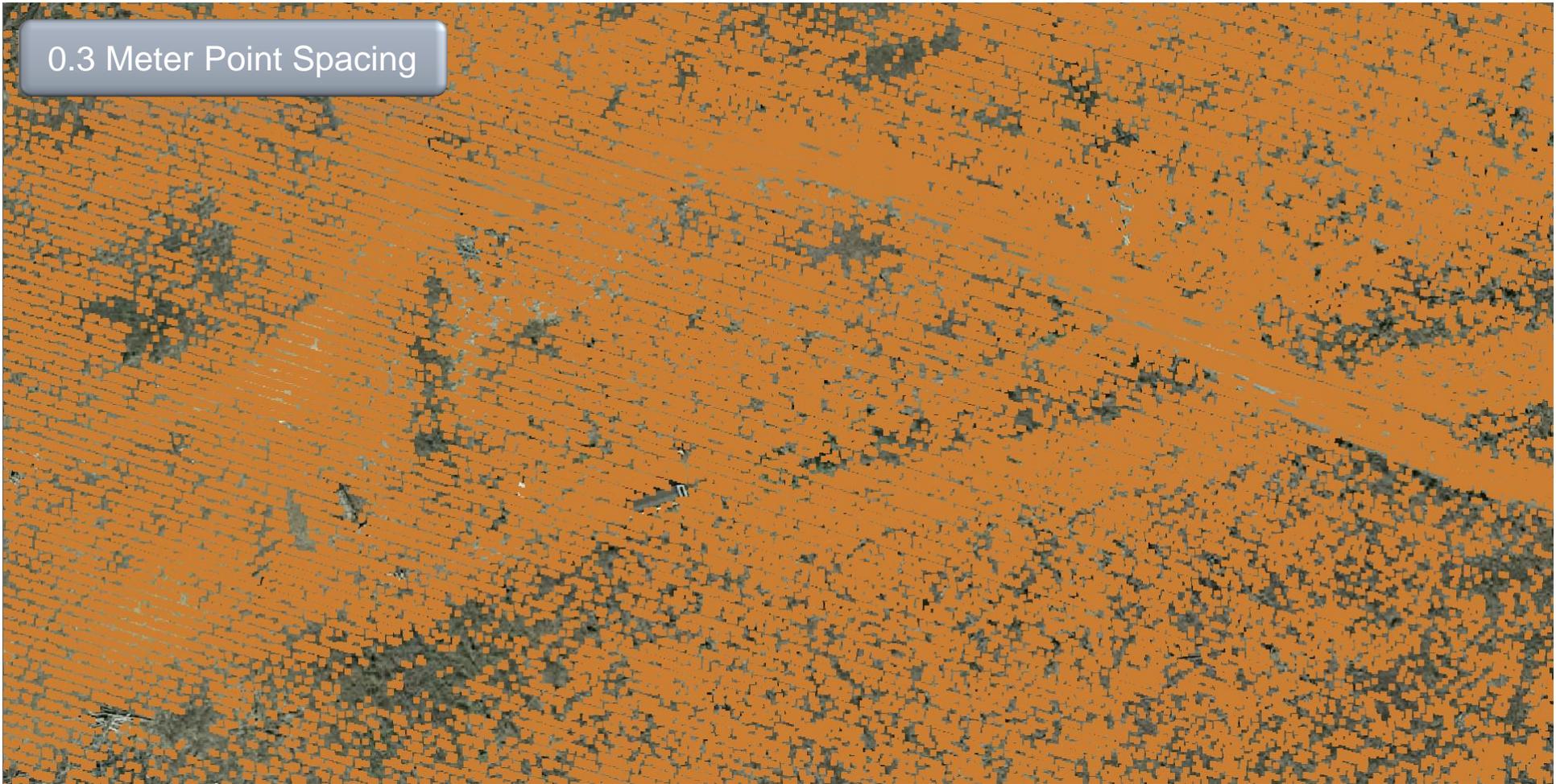


3 Meter Point Spacing



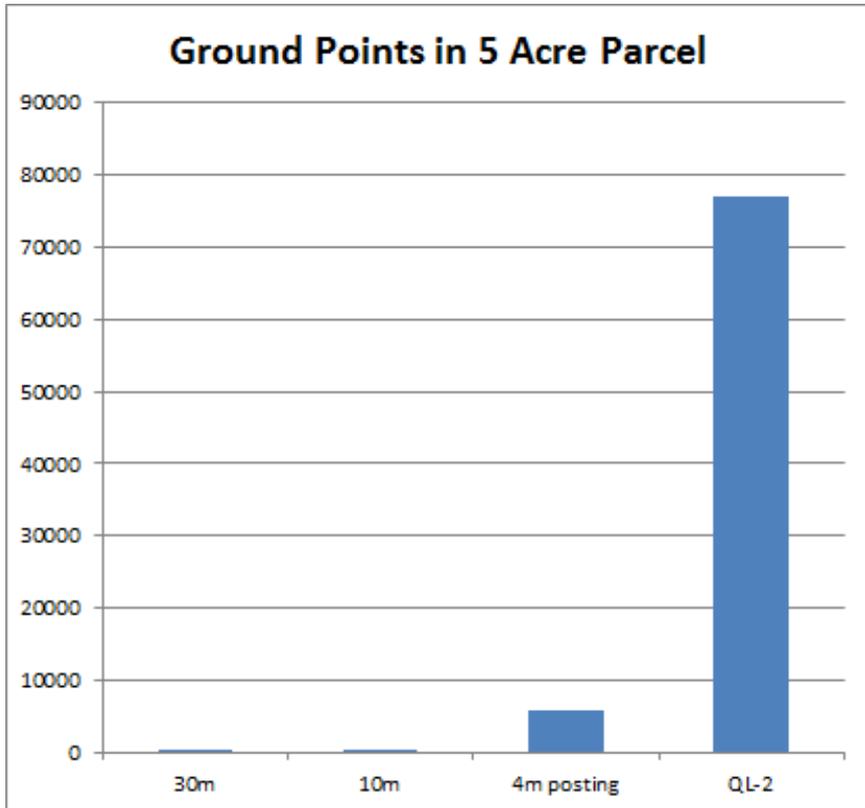
3 Meter Elevation Model (2003 NC LiDAR)

0.3 Meter Point Spacing

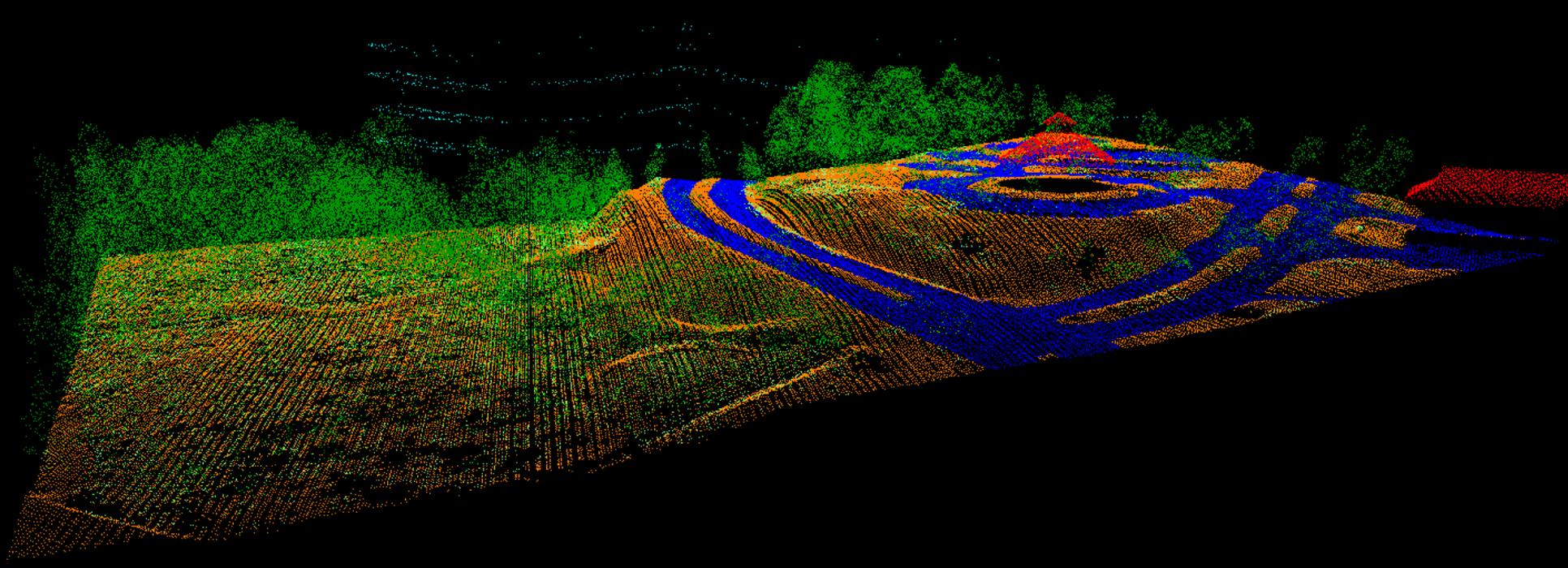
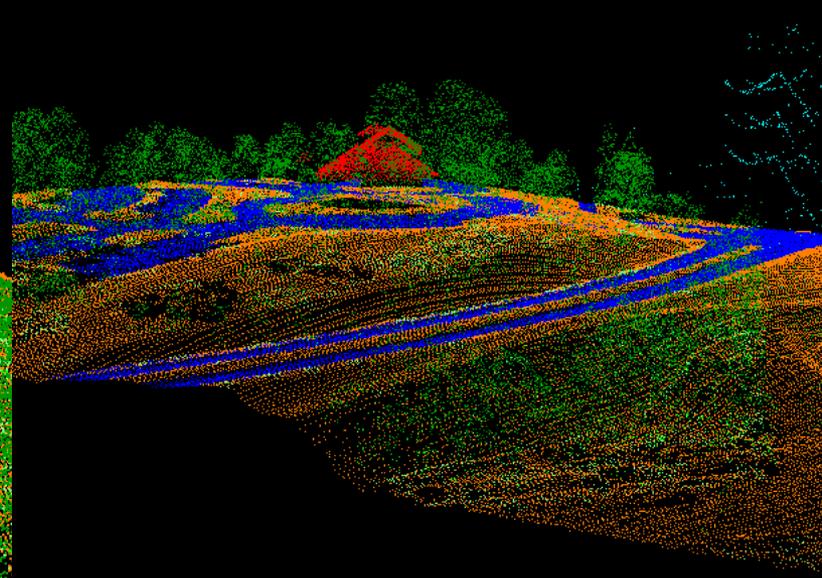
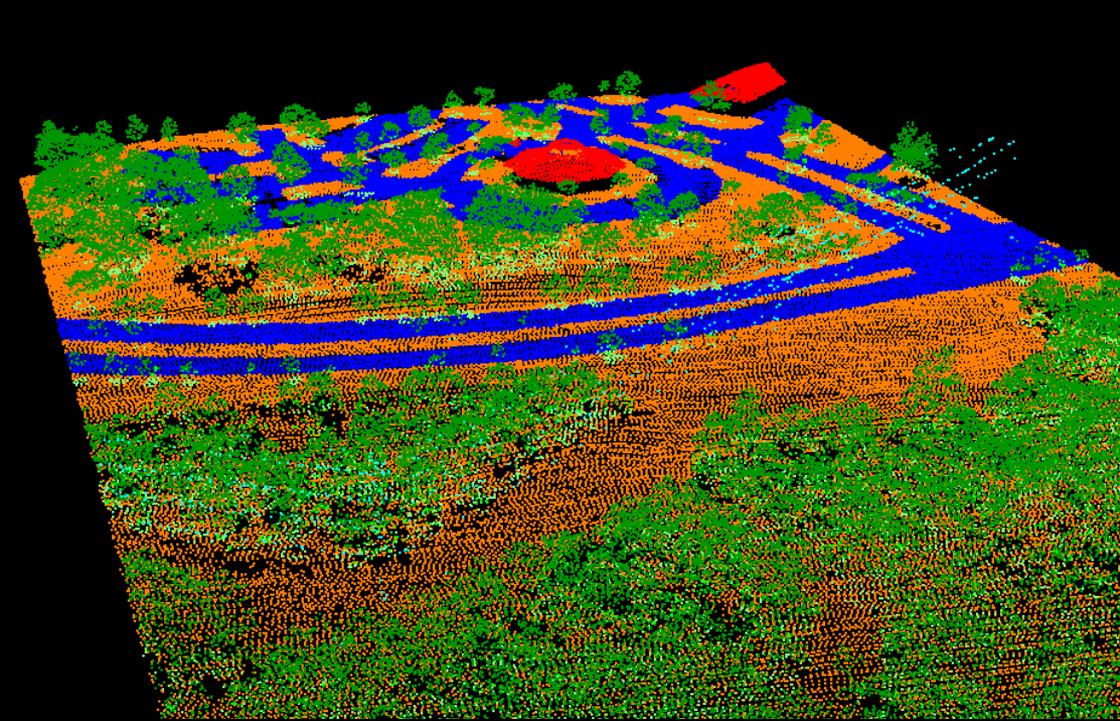


QL2 Elevation Model

Summary

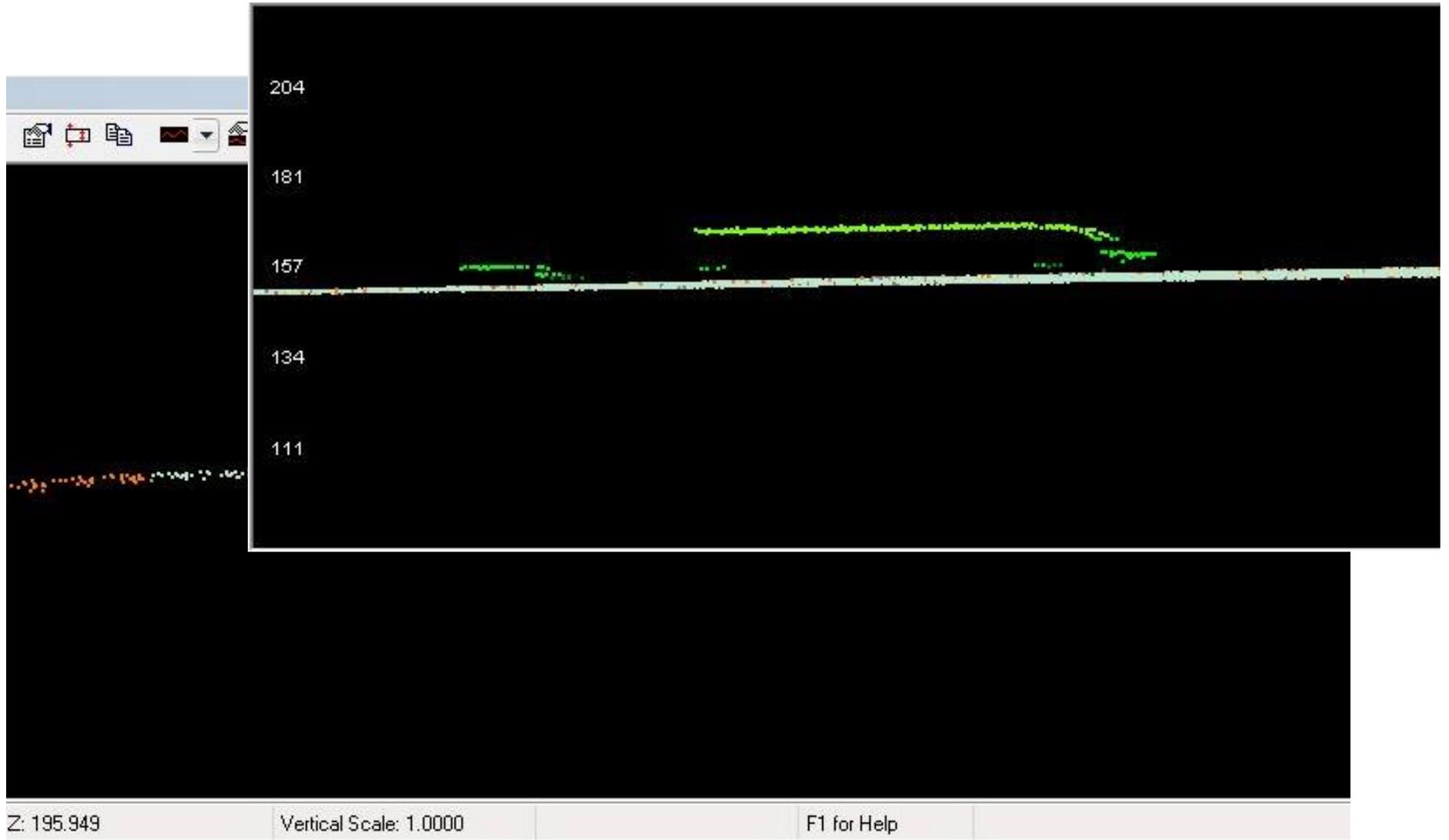


LIDAR Quality	Ground Points in 5 Acre Parcel
30m NED	32
10m NED	300
3m (circa 2003)	7,696
QL2	76,957

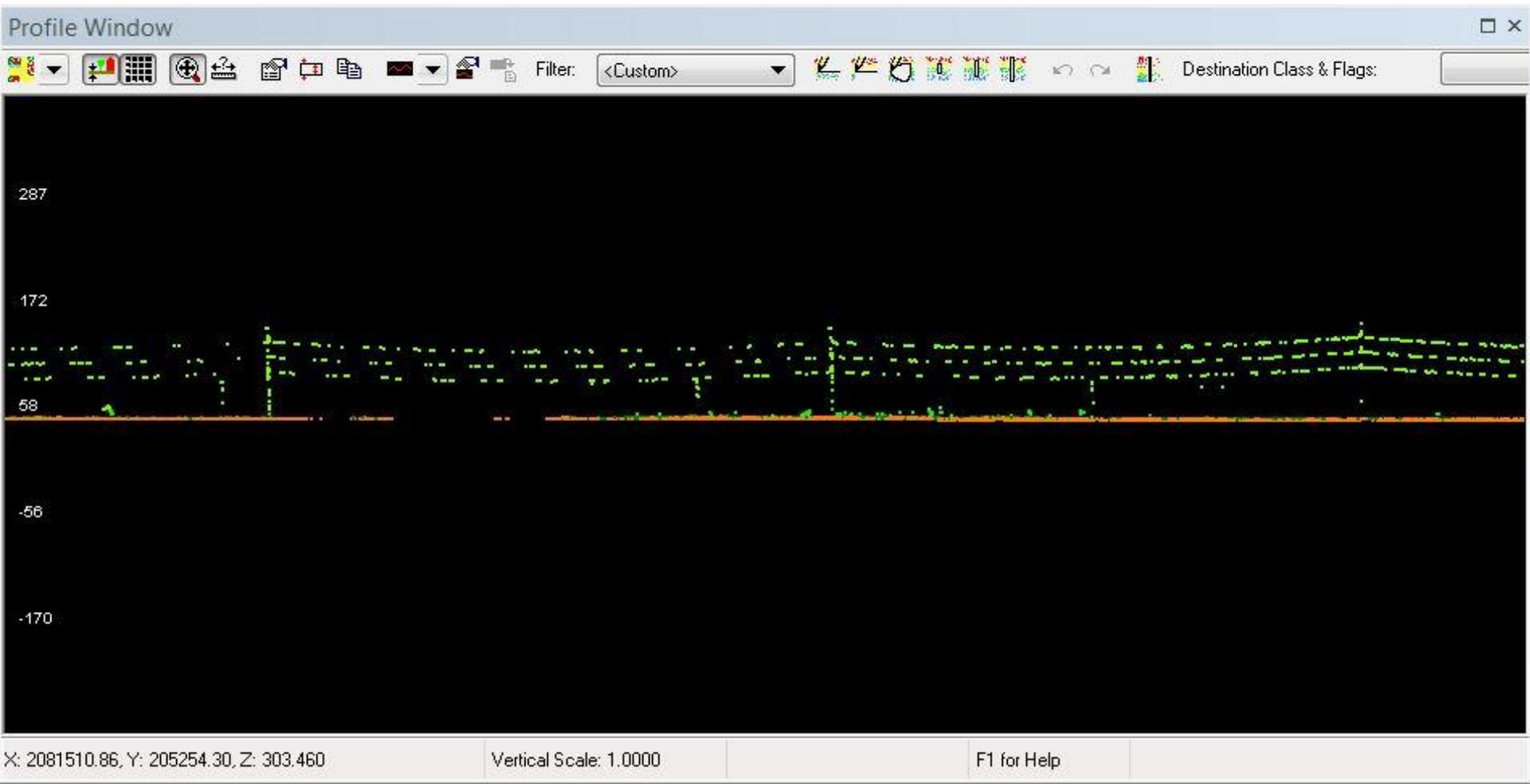


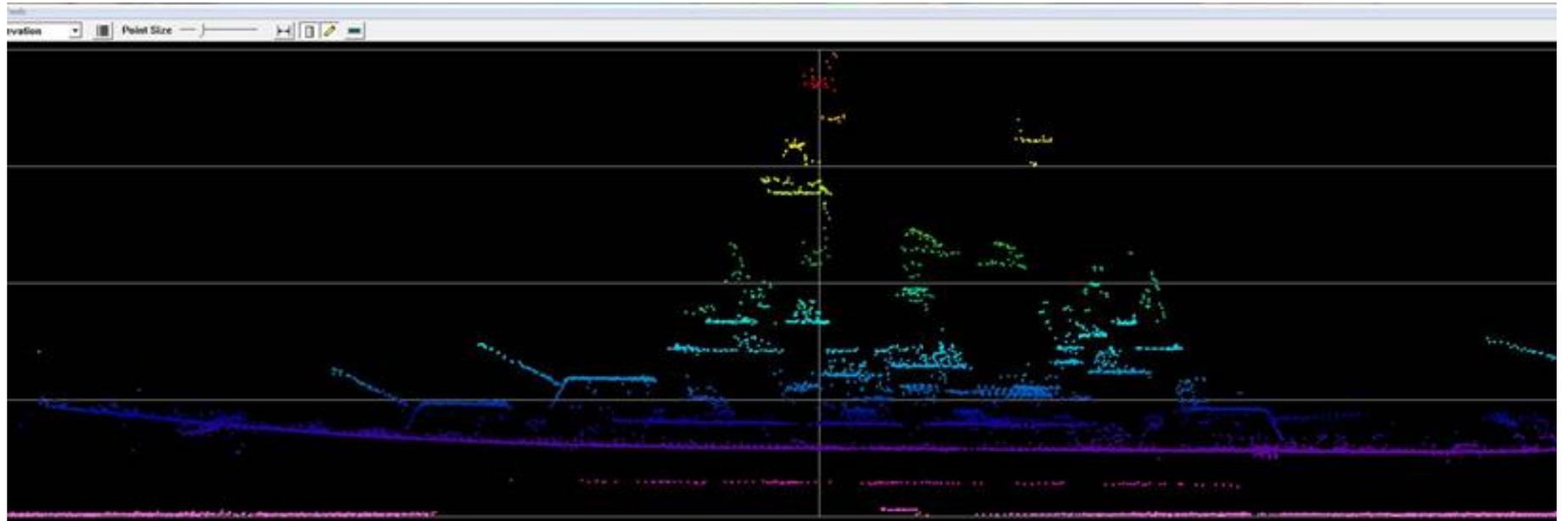


Vehicles



Utility Profile







SPATIAL Data Download

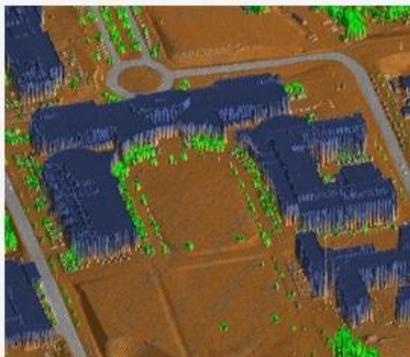
Login with NCID

A North Carolina ID (NCID) is required.
Don't have a NCID? Sign up [here](#).

NCID USER NAME:

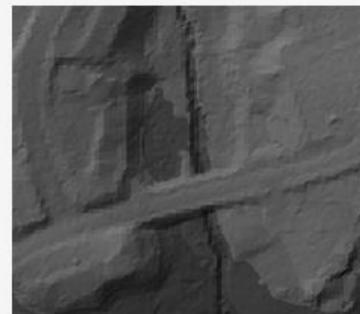
PASSWORD:

Login here for QL2 LiDAR



This data is Quality Level 2 (QL2) and was collected at a spacing of approximately 2 points per meter. All returns classified data is available.

Download legacy LiDAR at NC FRIS



All counties in North Carolina currently have legacy bare earth LiDAR from the initial statewide collection conducted from 2001-2005. This data was collected at a spacing of approximately 1 point per 3-4 meters.



This is a beta version of the Spatial Data Download site.

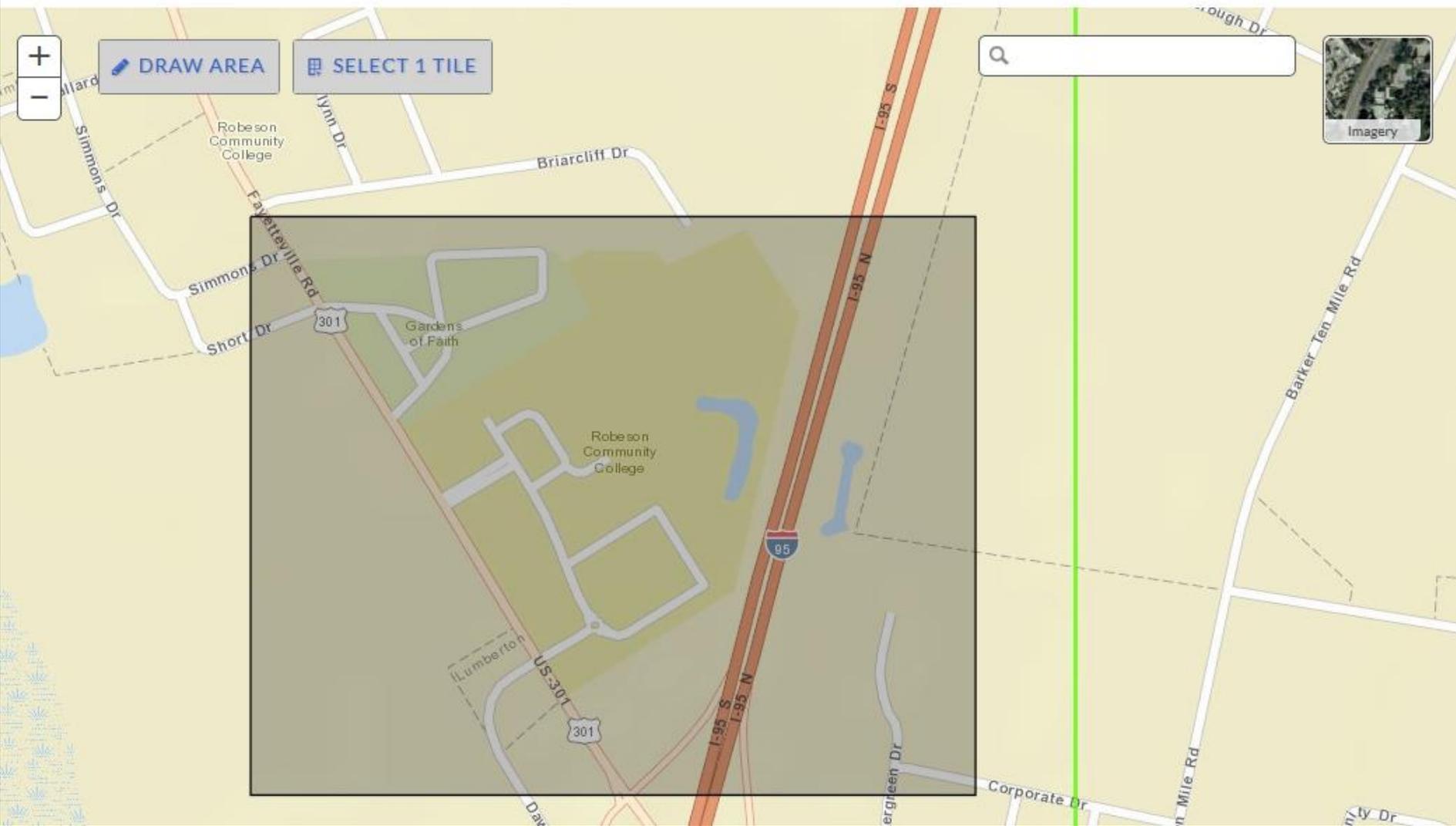
This is not the final version and you may encounter downtime, errors or bugs. If you do: [Email Your Feedback](#)

NCFMP will not be liable for any loss suffered by any party as a result of their use of the site. Any downloading of material is done at the users own risk and the user will be solely responsible for any loss that results from such activities.

❓ QL2 LiDAR is available on the **green areas** on the map. To select an area crossing multiple tiles, click "Draw Area" and then draw a small box on the map. Areas must be less than 4 tiles.

❓ Click Next to Continue

NEXT



QL2 LIDAR DATA DOWNLOAD

To request an entire city or county, go to the [Large Data Request](#) page. Download legacy LiDAR at [NC FRIS](#)



Select Area



Select File Output



Submit Request

Select the classes of LiDAR you wish to include in your output **.LAS** file.

ALL CLASSES

This dataset contains all classes including ground, roads, vegetation and water

BARE EARTH

This dataset represents the earth's surface with all vegetation and human-made structures removed. The output .LAS file will contain classes 2 (Ground) and 13 (Roads).

INDIVIDUAL CLASSES

- Ground
- Strata/Vegetation
- Buildings
- Roads
- Bridges

PREVIOUS

SUBMIT REQUEST





QL2 LIDAR DATA DOWNLOAD

To request an entire city or county, go to the [Large Data Request](#) page. Download legacy LiDAR at [NC FRIS](#)



Select Area



Select File Output



Submit Request

Your request has been submitted!

Jobs are processed in the order they are received and may require up to 24 hours for processing. You will receive an email from rmclipandship@ncdps.gov when your files are ready for download. Please make sure to add rmclipandship@ncdps.gov to your safe sender list.

[SUBMIT ANOTHER REQUEST](#)

[VIEW REQUEST HISTORY](#)



This is a beta version of the Spatial Data Download site.

This is not the final version and you may encounter downtime, errors or bugs. If you do: [Email Your Feedback](#)

NCFMP will not be liable for any loss suffered by any party as a result of their use of the site. Any downloading of material is done at the users own risk and the user will be solely responsible for any loss that results from such activities.

SPATIAL
Data Download

NC Floodplain Mapping Program
4105 Reedy Creek Drive
Raleigh, NC 27607

Mailing Address
4218 Mail Service Center
Raleigh, NC 27699-4218

Phone: (919) 715-5711

REQUEST SUMMARY

Request Summary

-  Click the column names to sort your requests.
-  Pending requests may take up to 24 hours to process. You will receive an email when your data is ready for download.
-  Click the Download button to access your completed data request files.

Status	ID	Date	Type	
 Pending	61	3/11/2015 9:30:40 AM	Rectangle	
 Complete	32	3/2/2015 1:54:51 PM	Rectangle	↓ DOWNLOAD

Your Spatial Data Download Job #61 is complete.

Selected Area (NC State Plane Feet)

Min X: 1,996,197.63

Min Y: 335,246.80

Max X: 1,999,539.66

Max Y: 337,937.92

The the data will be available for download for 3 days.

Download Files

Files are zipped using open source 7-Zip compression (.7z file type). 7-Zip is free and does not require registration.

Download 7-Zip

If you have any questions, please contact Hope Morgan at hope.morgan@ncdps.gov or John Lay at john.lay@ncdps.gov.

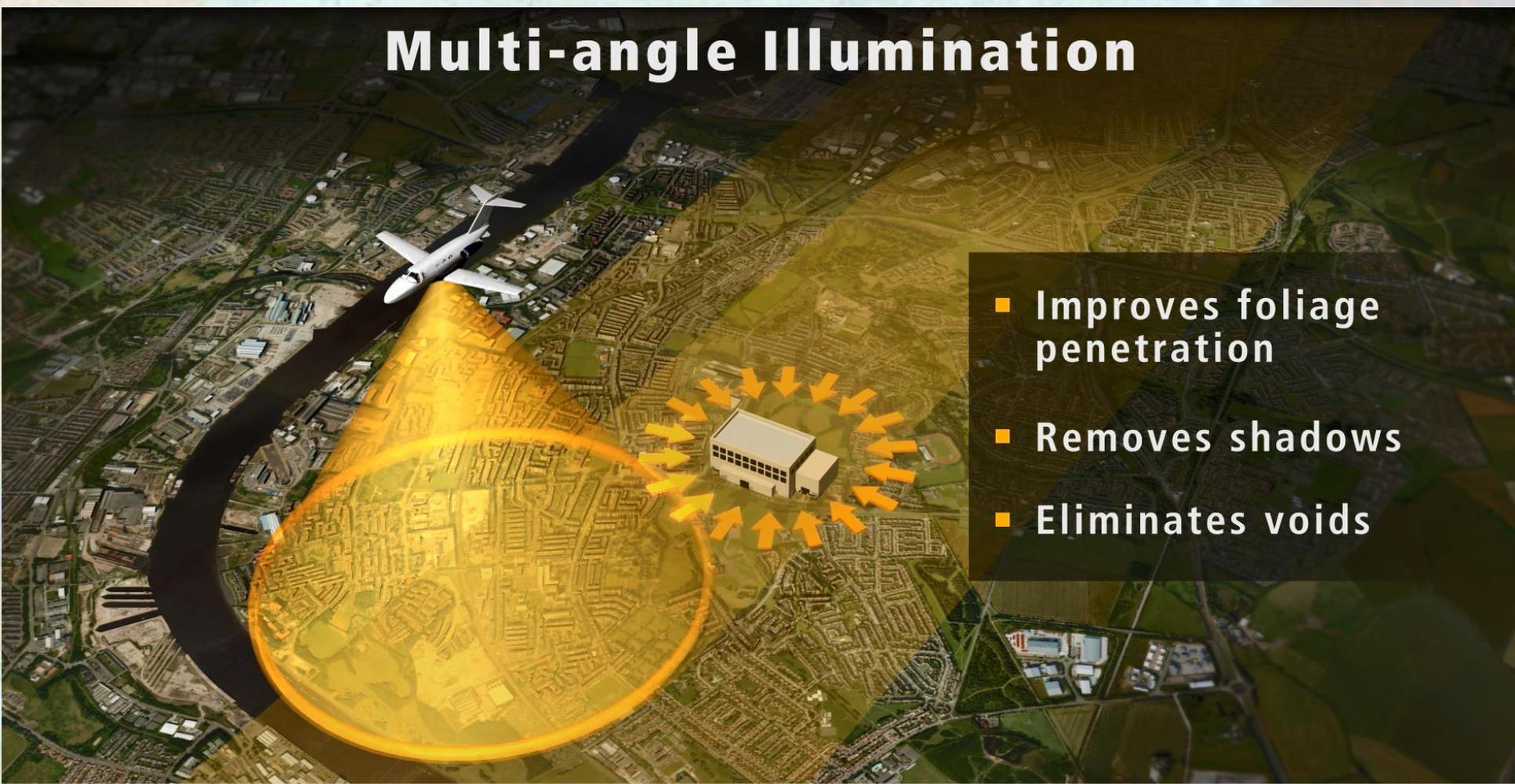
Thank you for using [Spatial Data Download!](#)

E-mail correspondence sent to and from this address may be subject to the provisions of G.S. 132-1, the North Carolina Public Records Law, and may be subject to monitoring and disclosed to third parties, including law enforcement personnel, by an authorized state official.

- Normal utility collection would be for corridors or circuit miles.
 - With the additional data you would be able to add new businesses or areas

Multi-angle Illumination

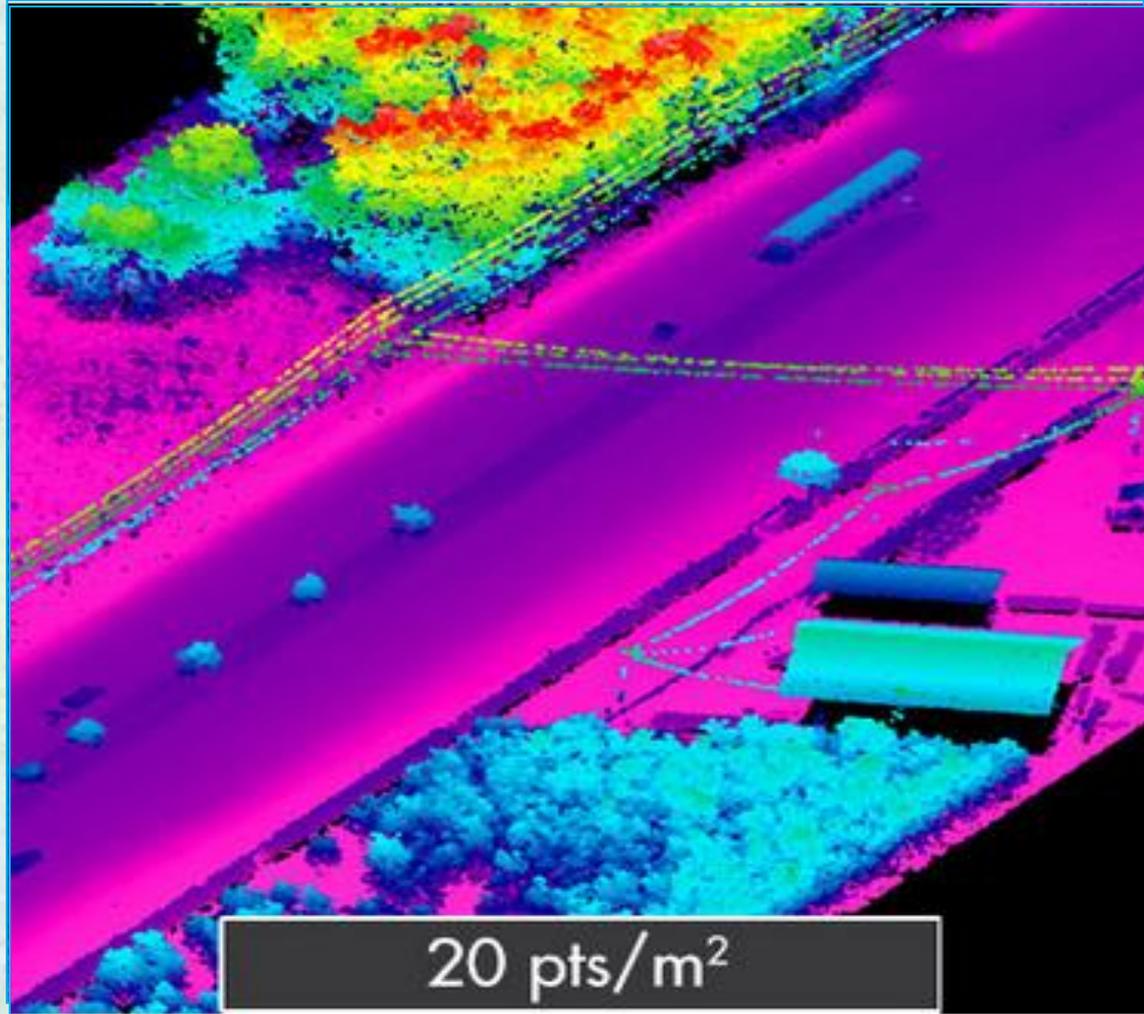
- Improves foliage penetration
- Removes shadows
- Eliminates voids

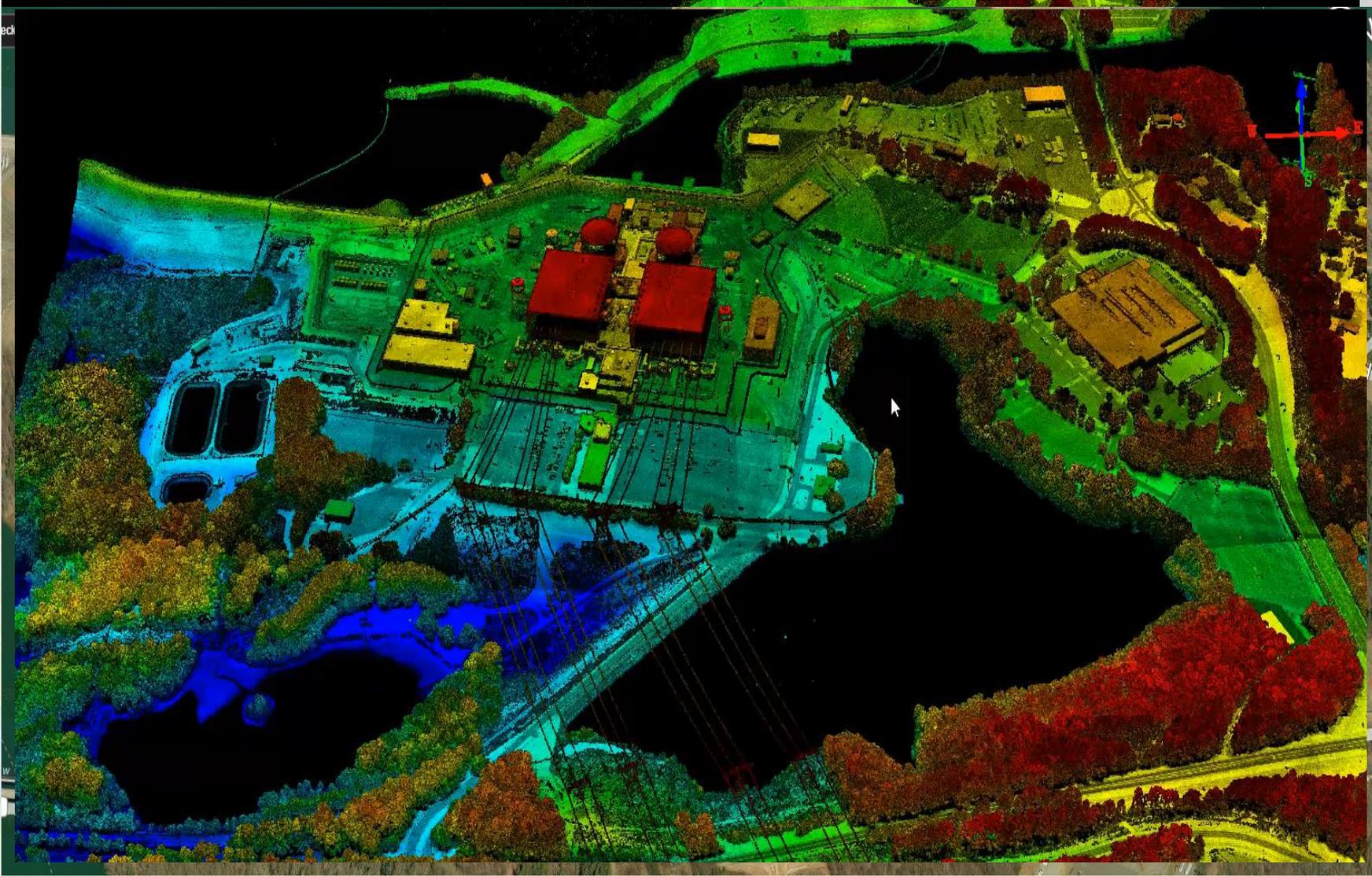


Second Generation Topography Geiger / Photon Counting Acquisition

Geiger / Photon Counting

- Advancement in technology to efficiently split single pulse into 100x and receive each as unique points.
- Pilot tested in Mecklenburg County.
- 20 points per square meter with nominal post spacing of 0.7 meters.
- 8 ppm deliverable at same or reduced cost.
- Data collected will support a 9.25 cm (3.36 inches) RMSEz.







Statewide Imagery Project



North Carolina Statewide Digital Orthoimagery, Business Plan for Four-Year Acquisition and Urban Counties

Statewide Digital Orthoimagery Acquisition Cycle



Orthoimagery Acquisition

- Coastal – 2012
- Eastern Piedmont – 2013
- Northern Piedmont and Mountains – 2014
- Southern Piedmont and Mountains – 2015

Sources: NC Center for Geographic Information and Analysis and the Working Group for Orthophotography Planning Statewide Mapping Advisory Committee

April 2013

0 50 Miles





NC OneMap GeoSpatial P | x

data.nconemap.com/ Press Tab to search NC OneMap Search

Mail BBT Slash Your Cell Pho... Online convert TIFF,... AWStats Document... Web 3.0 Working with Lidar ArcGIS | Don Meltz

Help About NC OneMap

NC OneMap GeoSpatial Portal

HOME SEARCH BROWSE DOWNLOAD IMAGERY MAP VIEWER

Home

We've changed! The NC OneMap GeoSpatial Portal has added functionality that makes finding and using data easier than ever. Want to see the most recently added or updated items, view items alphabetically, and download larger areas of imagery for multiple years? Check, check, and check. [Watch the video](#) to see a demo of all the changes or visit the new [services page](#) to see a listing of map services we host.

Find Resource...

Tutorial Videos

Most Recently Added/Updated Resources...

Expand results

-  [North Carolina Game Lands - September 2013](#)
-  [Submerged Aquatic Vegetation - SAV](#)
-  [Biodiversity/Wildlife Habitat Assessment \(BWHA\) - July 2013](#)

NC OneMap GeoSpatial P... x

data.nconemap.com/geoportal/catalog/raster/download.page

Mail BBT Slash Your Cell Pho... Online convert TIFF,... AWStats Document... Web 3.0 Working with Lidar ArcGIS | Don Meltz

[Help](#) [About](#) [NC OneMap](#)

NC OneMap GeoSpatial Portal

HOME SEARCH BROWSE **DOWNLOAD IMAGERY** MAP VIEWER

Select imagery for download

Zoom in and select an area for download

Pan/zoom with Draw desired area:

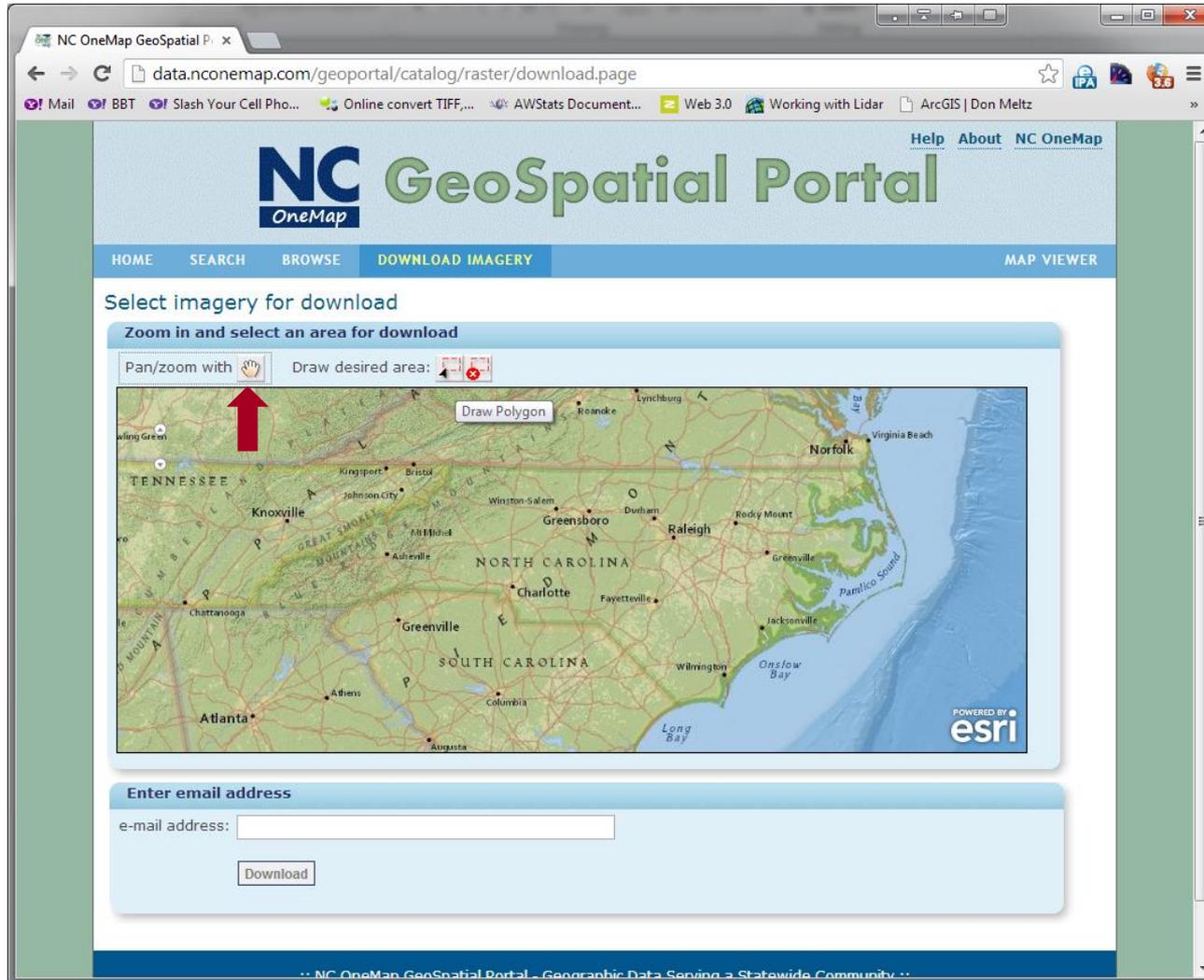
POWERED BY **esri**

Enter email address

e-mail address:

**** NC OneMap GeoSpatial Portal - Geographic Data Serving a Statewide Community ****

Step 1 - Zoom to area of interest (drag a box with mouse or use zoom tools)



Step 2 - Get a list of available imagery by drawing a box to define the project area

NC OneMap GeoSpatial Portal

data.nconemap.com/geoportal/catalog/raster/download.page

HOME SEARCH BROWSE **DOWNLOAD IMAGERY** MAP VIEWER

Select imagery for download

Zoom in and select an area for download

Pan/zoom with Draw desired area:

Select year(s) to download

2008 Preview

2010 Preview

Wilmington

Winnabow Airport

Wrightsville Beach

POWERED BY

Enter email address

e-mail address:

NC OneMap GeoSpatial Portal - Geographic Data Serving a Statewide Community

Step 3 - mouse over year to see coverage extent; click respective year to preview

The screenshot shows the NC OneMap GeoSpatial Portal interface. The browser address bar displays the URL `data.nconemap.com/geoportal/catalog/raster/download.page`. The page title is "NC OneMap GeoSpatial Portal". The navigation menu includes "HOME", "SEARCH", "BROWSE", "DOWNLOAD IMAGERY", and "MAP VIEWER".

The main content area is titled "Select imagery for download". Below this, there is a section "Zoom in and select an area for download" with a "Pan/zoom with" icon and a "Draw desired area:" tool. A map shows a satellite view of a coastal area with a yellow dashed rectangle indicating the selected area. The map is labeled "ville Beach" and "POWERED BY esri".

To the right of the map is a "Select year(s) to download" menu with the following options:

Year	Preview
<input type="checkbox"/> 2002	<input type="button" value="Preview"/>
<input type="checkbox"/> 2006	<input type="button" value="Preview"/>
<input type="checkbox"/> 2008	<input type="button" value="Preview"/>
<input type="checkbox"/> 2010	<input type="button" value="Preview"/>
<input checked="" type="checkbox"/> 2012	<input type="button" value="Preview"/>

Two red arrows point to the "Preview" buttons for the years 2006 and 2012.

Below the map is an "Enter email address" section with an "e-mail address:" input field and a "Download" button.

The footer of the page reads: "NC OneMap GeoSpatial Portal - Geographic Data Serving a Statewide Community"

Step 4 - Select years to download, enter email address, click download

The screenshot shows the NC OneMap GeoSpatial Portal interface. The browser address bar displays the URL `data.nconemap.com/geoportal/catalog/raster/download.page`. The page title is "NC OneMap GeoSpatial Portal". The navigation menu includes "HOME", "SEARCH", "BROWSE", "DOWNLOAD IMAGERY", and "MAP VIEWER".

The main content area is titled "Select imagery for download". It features a map viewer with a "Zoom in and select an area for download" section. The map shows a satellite view of a coastal area with a yellow dashed rectangle indicating the selected area. A red arrow labeled "1" points to the "Preview" button for the year 2012 in the "Select year(s) to download" panel.

The "Select year(s) to download" panel lists the following years and their corresponding "Preview" buttons:

- 2002
- 2006
- 2008
- 2010
- 2012

Below the map, there is an "Enter email address" section. The "e-mail address:" label is followed by a text input field containing "john.doe@email.com". A red arrow labeled "2" points to this input field. Below the input field is a "Download" button, with a red arrow labeled "3" pointing to it.

At the bottom of the page, there is a footer that reads: "NC OneMap GeoSpatial Portal - Geographic Data Serving a Statewide Community".

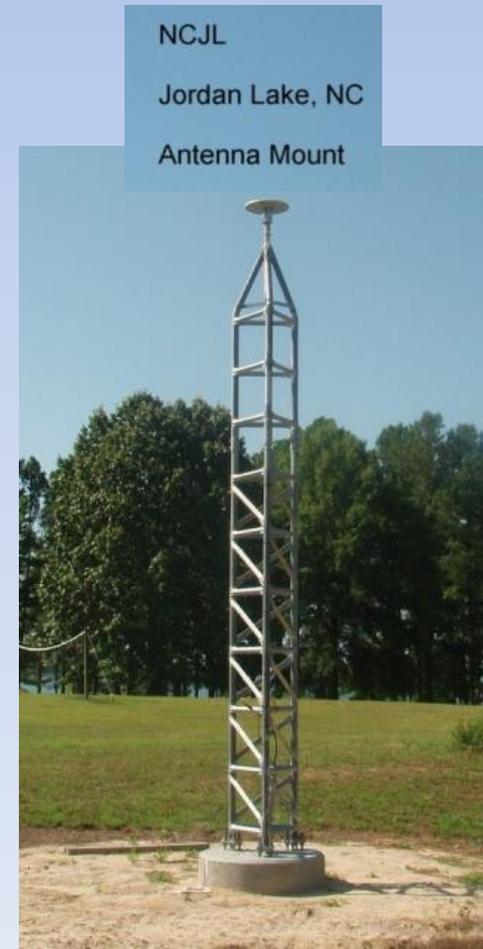


NC CORS Network

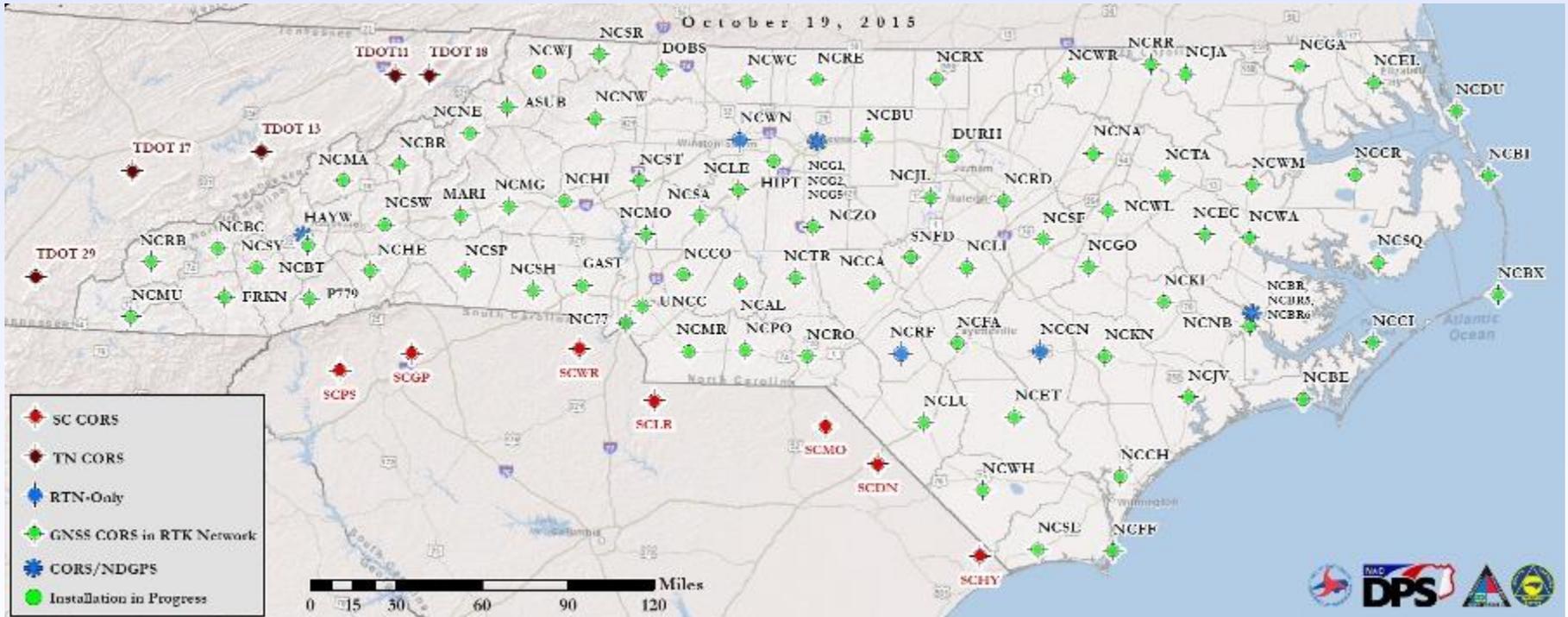


- Continuously Operating Reference Station (CORS)

- A permanent and continuously recording Global Navigation Satellite System (GNSS) receiver, antenna (with a surveyed reference position), & support equipment
 - Composed of 94 CORS
 - 1 new CORS has been installed
 - Raeford (NCRF)
 - Receiver upgrade in 2015 at:
 - NCBI
 - NCWA
 - NCJV



NC CORS Network



RTN port request

NCEM - Geospatial and Technology Management
NORTH CAROLINA GEODETIC SURVEY
Positioning North Carolina today and for the future.

Home About NCGS Geodetic Control **CORS and GNSS** County and State Boundaries Library Other Programs Tools Kids Page

North Carolina Geodetic Survey

North Carolina GNSS Real Time Network

Geodetic News
Cabarrus-Stanly County Boundary Recorded

Monday, June 30, 2014

The Cabarrus-Stanly County Boundary resurvey has been approved and recorded.

Cabarrus County Register of Deeds:

- Plat Book 66, pages 26-29

Stanly County Register of Deeds:

- Plat Book 23, pages 290-293

Unmanned Aircraft Systems Forum

Monday, June 02, 2014

AGENDA
Unmanned Aircraft Systems (UAS) Forum

June 12, 2014
9:00 a.m. to 12:15 p.m.

Magnolia Building (#15 on the campus map), rm #103
Asheville-Duncombe Tech
340 Victoria Rd (Google coords: 35.570079, -82.557235)
Asheville, NC 28801

Tweets

- NC Geodetic Survey @ncrtn**
The NCAL (Albemarle), NCLE (Lexington) and NCMR (Monroe) CORS are operating again.
- NC Geodetic Survey @ncrtn**
The NCAL (Albemarle), NCLE (Lexington) and NCMR (Monroe) CORS are currently not operating.
- NC Geodetic Survey @ncrtn**
The NCBE (Beaufort) CORS is operating again.
- NC Geodetic Survey @ncrtn**
The NCBE (Beaufort) CORS is currently not operating.
- NC Geodetic Survey @ncrtn**
The NCWJ (West Jefferson) CORS operating again.
Expand

Tweet to @ncrtn

Create Account
Register a new account

Personal Data

First Name:

Last Name:

Address:

Zip Code:

City:

District:

Country:

E-Mail:

Additional E-Mail:

Phone Number Home:

Phone Number Business:

Phone Number Mobile:

GSM Phone Number for TNC:

Language:

Next

<http://geodeticsurvey.nc.gov/Pages/CORS-and-GNSS.aspx>

Virtual Reference Station



North Carolina Geodetic Survey

North Carolina GNSS Real Time Network

- ▼ Home
 - ▶ Sensor Map
 - ▶ Position Scatter Plot
 - ▶ Status Messages
- ▼ Network Information
 - ▶ 195 Ionosphere
 - ▶ IRIM/GRIM
- ▶ Reference Data Shop
- ▼ My Account
 - ▶ Personal Data
 - ▶ Change Password
 - ▶ Logins
 - ▶ Sessions
- ▶ Active Subscriptions
- ▼ Administration
 - ▼ Status Messages
 - ▶ Add Status Messages
 - ▶ Edit Status Messages
 - ▼ Regions
 - ▶ Add Regions
 - ▶ Edit Regions
 - ▼ User Management
 - ▶ User Management
 - ▶ Create User
 - ▶ Approve Users
 - ▶ Export e-mail addresses
 - ▼ Extended User Info
 - ▶ Extended User Info
 - ▶ Info Fields
 - ▶ Add Field

Reference Data Shop - Virtual Reference Station

Enter the coordinates of a virtual reference station or drag the marker to the desired location on the map. You can switch between the geographical and geocentric coordinate system.

Virtual Reference Station - Geographical Position		
Latitude:*	<input type="text"/>	<input checked="" type="radio"/> N <input type="radio"/> S
Longitude:*	<input type="text"/>	<input checked="" type="radio"/> E <input type="radio"/> W
Elevation:	<input type="text" value="100.0000"/>	m
<input type="button" value="Switch to geocentric Cartesian coordinate system"/>		

<< Back: Station Type Selection Next: Time Selection >>

* You can enter the geographical coordinates in three formats:

- Deg Min Sec Example: 48 1 21.60
- Deg Min Example: 48 1.36
- Deg Example: 48.02267



How did North Carolina get its shape?



- NC Boundary Commission recommends that we start work on the NC-VA boundary
- NC-SC boundary
 - S575 and H834

**How did
North Carolina get its shape?**

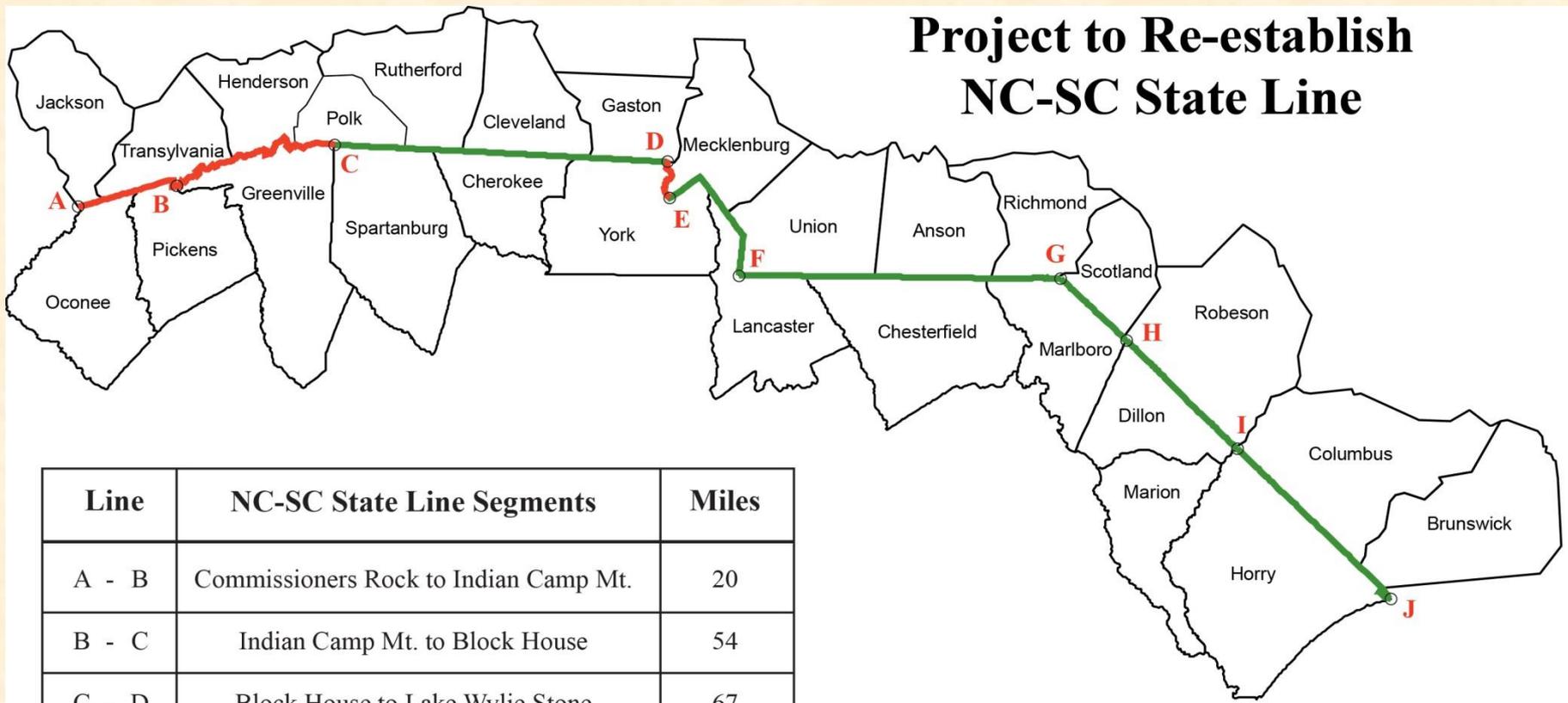
- **North Carolina/Virginia boundary**
 - In 1728 by his Majesty's Order, assented to by the Lords Proprietors [appointed rulers], "*The Dividing Line*" was to be surveyed, "*that neither the King's Grants may hereafter encroach upon the Lords Proprietors, nor theirs on the Right of his Majesty.*"
 - William Byrd's crew surveyed the line in 1728, but ran into a few issues:

The map shows the 36°30' North latitude line between Virginia and North Carolina. Key features include:

- Virginia** (top) and **North Carolina** (bottom).
- Wyanoke** is marked on the North Carolina side.
- Chowan River** and **Blackwater Creek** are shown.
- Nottoway Creek** is shown on the Virginia side.
- A red line indicates the "Line actually surveyed by William Byrd in 1728".
- A dashed line indicates "The 'westerly' line called for in the charter to connect the POB with Wyanoke".
- A red star marks the "POB North end of the Currituck River".
- A distance of "4.3 miles" is noted between the surveyed line and the westerly line.
- A distance of "5.5 miles" is noted between the surveyed line and the 36°30' latitude line.
- A distance of "6 miles" is noted between the surveyed line and the Currituck River.



Project to Re-establish NC-SC State Line



Line	NC-SC State Line Segments	Miles
A - B	Commissioners Rock to Indian Camp Mt.	20
B - C	Indian Camp Mt. to Block House	54
C - D	Block House to Lake Wylie Stone	67
D - E	Center Line of Old Catawba River Bed	8
E - F	Lake Wylie to North Corner	30
F - G	North Corner to 1905 Marlboro County Break Point Monument	64
G - H	Marlboro County SE - NW Line	18
H - I	Dillon County Line	31
I - J	Horry County Line	42

May 6, 2013 Status

- Re-established boundary approved by the NC-SC Joint Boundary Commission 82 miles
- Re-established boundary tentatively approved by the NC-SC Joint Boundary Commission 252 miles

Total 334 miles



County Boundary Surveys in Progress



- Mitchell-Yancey
- Cabarrus – Rowan
- Harnett – Wake
- Chatham – Harnett – Wake
- Alamance – Guilford
- McDowell – Mitchell
- Jackson – Macon
- Davie – Yadkin
- Bladen – Columbus – Brunswick
- Greene – Lenior
- Granville - Franklin



NC General Statutes on county boundaries



- **G.S. § 153A-17. Existing boundaries.**
The boundaries of each county shall remain as presently established, until changed in accordance with law. (1973, c. 822, s. 1.)
- **G.S. § 153A-18. Uncertain or disputed boundary.**
Provides directions and procedures for resurveying uncertain or disputed county boundary lines.

If adjacent counties along a boundary elect to change the county line from its original location (as defined by law), then ratification by the NC General Assembly is required.



G.S. 153A-18(a)

Resurvey of an uncertain county line



- Two or more counties may cause the boundary to be surveyed, marked, and mapped
- The participating counties may appoint special commissioners to supervise the surveying, marking, and mapping

Upon request of each county along the uncertain/ambiguous county line, the NC Geodetic Survey can provide assistance with resurveying the county line.



G.S. 153A-18(a)

Resurvey of an uncertain county line



- Each of the participating county's Board of Commissioners must ratify the resurvey with a resolution
- Each of the participating county's ratification resolution must be referenced on the map of resurvey with the following information: date & minutes page
- The map of resurvey must be recorded in:
 - Each of the participating county's Register of Deeds office
 - Secretary of State's office



Acceptance or Redefining



-
- **The participating counties may elect to either:**
 - Accept the resurvey line
 - ~ or ~
 - Redefine the line (change) through legislative process



Overview of New Datums

Scott Lokken

NC Advisor

Gary Thompson

Chief, NC Geodetic Survey

NOAA's National Geodetic Survey

New Datums are Coming in 2022!

- Both a new geometric and a new geopotential (vertical) datum will be released in 2022.
- The realization of the new datums will be through GNSS receivers.
- NGS will provide the tools to easily transform between the new and old datums.



Why change datums/Realizations

- NAD27 based on old observations and old datum
- NAD83(86) based on old observations and new datum
- NAD83(95) based on new and old observations and same datum (original HARN)
- NAD83(2001) based on better observations and same datum
- NAD83(NSRS2007) based on new observations and same datum. Removed regional distortions and made consistent with CORS
- NAD83(2011) based on new observations and same datum. Consistent with new Multi Year CORS solution

NEW STANDARDS FOR GEODETIC CONTROL

TWO ACCURACY STANDARDS

local accuracy ----- adjacent points
network accuracy ----- relative to CORS

Numeric quantities, units in cm (or mm)

Both are relative accuracy measures

Do not use distance dependent expression

Horizontal accuracies are radius of 2-D 95% error circle

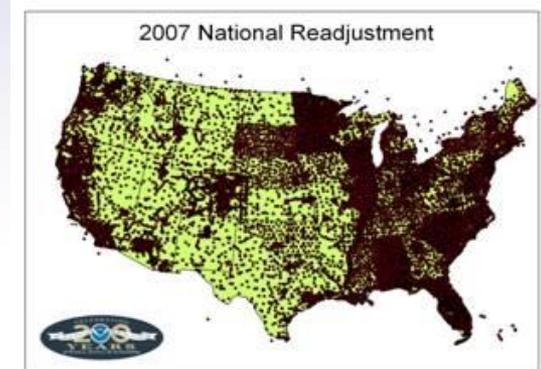
Ellipsoidal/Orthometric heights are 1-D (linear) 95% error

The NSRS has evolved



1 Million
Monuments
(Separate Horizontal
and Vertical Systems)

70,000
Passive Marks
(3-Dimensional)



Passive
Marks
(Limited
Knowledge of
Stability)



≈ 2,000 GPS
CORS
(Time Dependent
System Possible;
4-Dimensional)



GPS CORS → GNSS CORS



ITRF2008

For the geodesy, geophysics and surveying communities, the best International Terrestrial Reference Frame is the “gold standard.”

The global community recently adopted an updated expression for the reference frame, the ITRF2008.

International Earth Rotation and Reference System Service (IERS)

<http://www.iers.org>

The International Terrestrial Reference System (**ITRS**) constitutes a set of prescriptions and conventions together with the modeling required to define origin, scale, orientation and time evolution

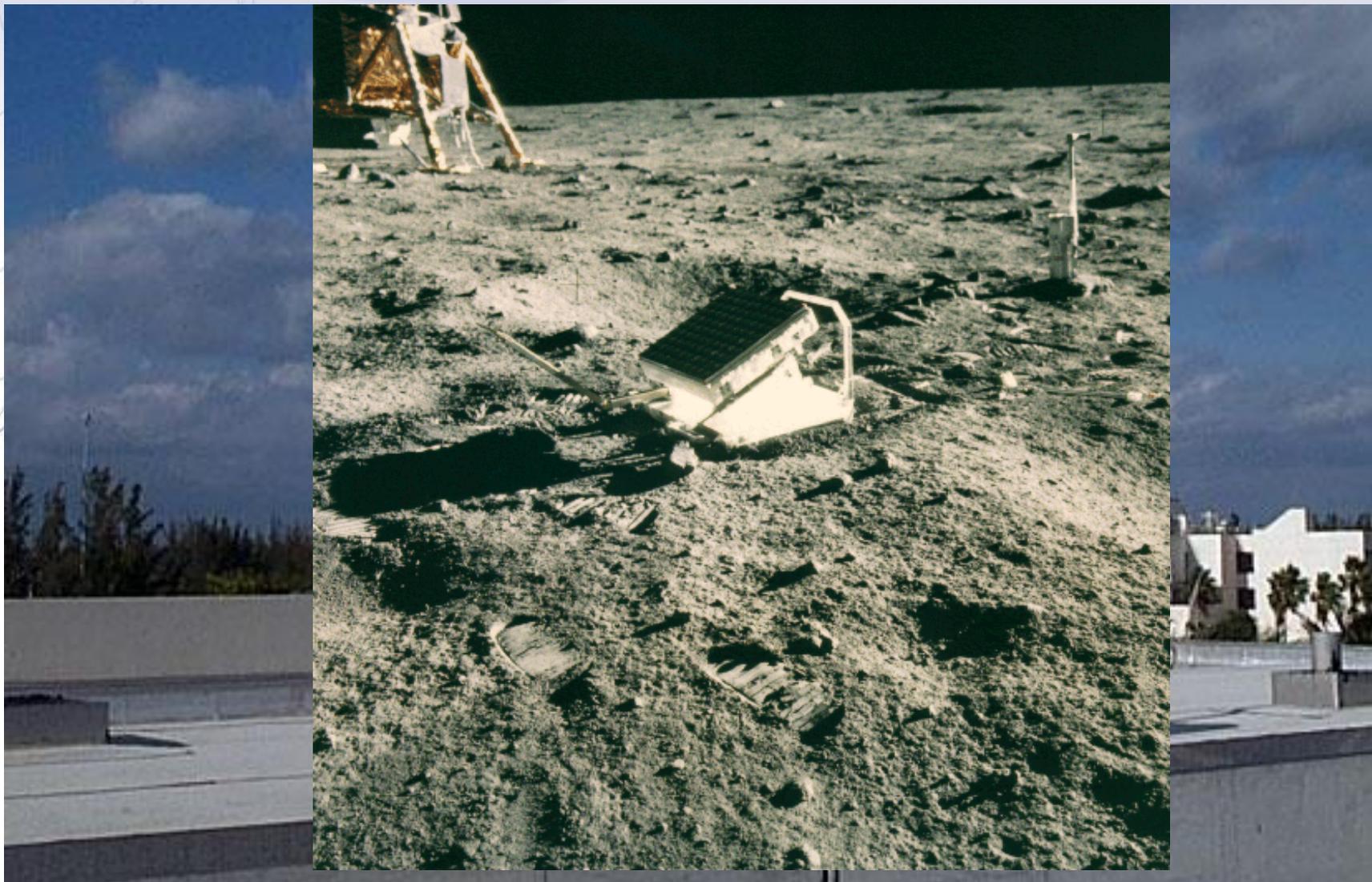
ITRS is realized by the International Terrestrial Reference Frame (**ITRF**) based upon estimated coordinates and velocities of a set of stations observed by:

- Very Long Baseline Interferometry (**VLBI**),
- Satellite Laser Ranging (**SLR**),
- Global Positioning System and GLONASS (**GNSS**), and
- Doppler Orbitography and Radio- positioning Integrated by Satellite (**DORIS**).

**ITRF89, ITRF90, ITRF91, ITRF92, ITRF93, ITRF94, ITRF95, ITRF96, ITRF97,
ITRF2000, ITRF2005, ITRF2008**

International Terrestrial Reference Frame

4 Global Independent Positioning Technologies



GEODETTIC DATUMS

HORIZONTAL

2 D (Latitude and Longitude) (e.g. NAD 27, NAD 83 (1986))

VERTICAL

1 D (Orthometric Height) (e.g. NGVD 29, NAVD 88, Local Tidal)

GEOMETRIC

3 D (Latitude, Longitude and Ellipsoid Height)

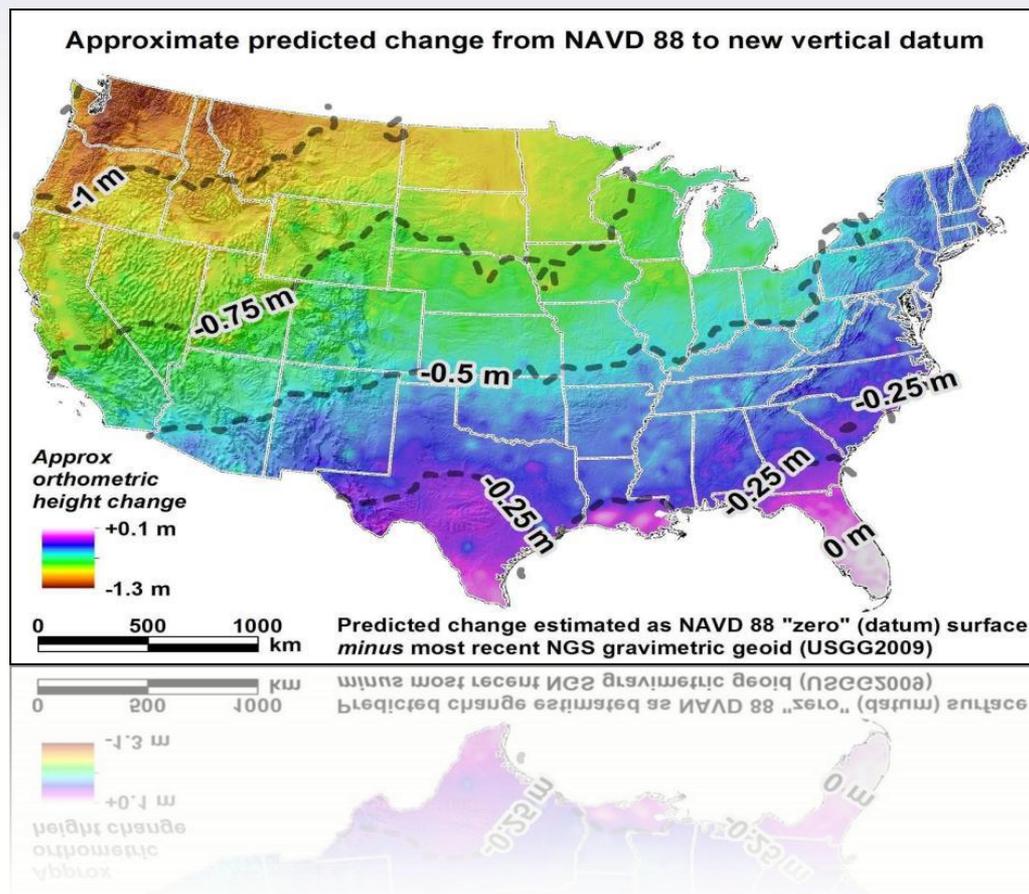
Fixed and Stable - Coordinates seldom change
(e.g. NAD83(1995), NAD83(NSRS2007), NAD83(CORS96), NAD83(2011))

also

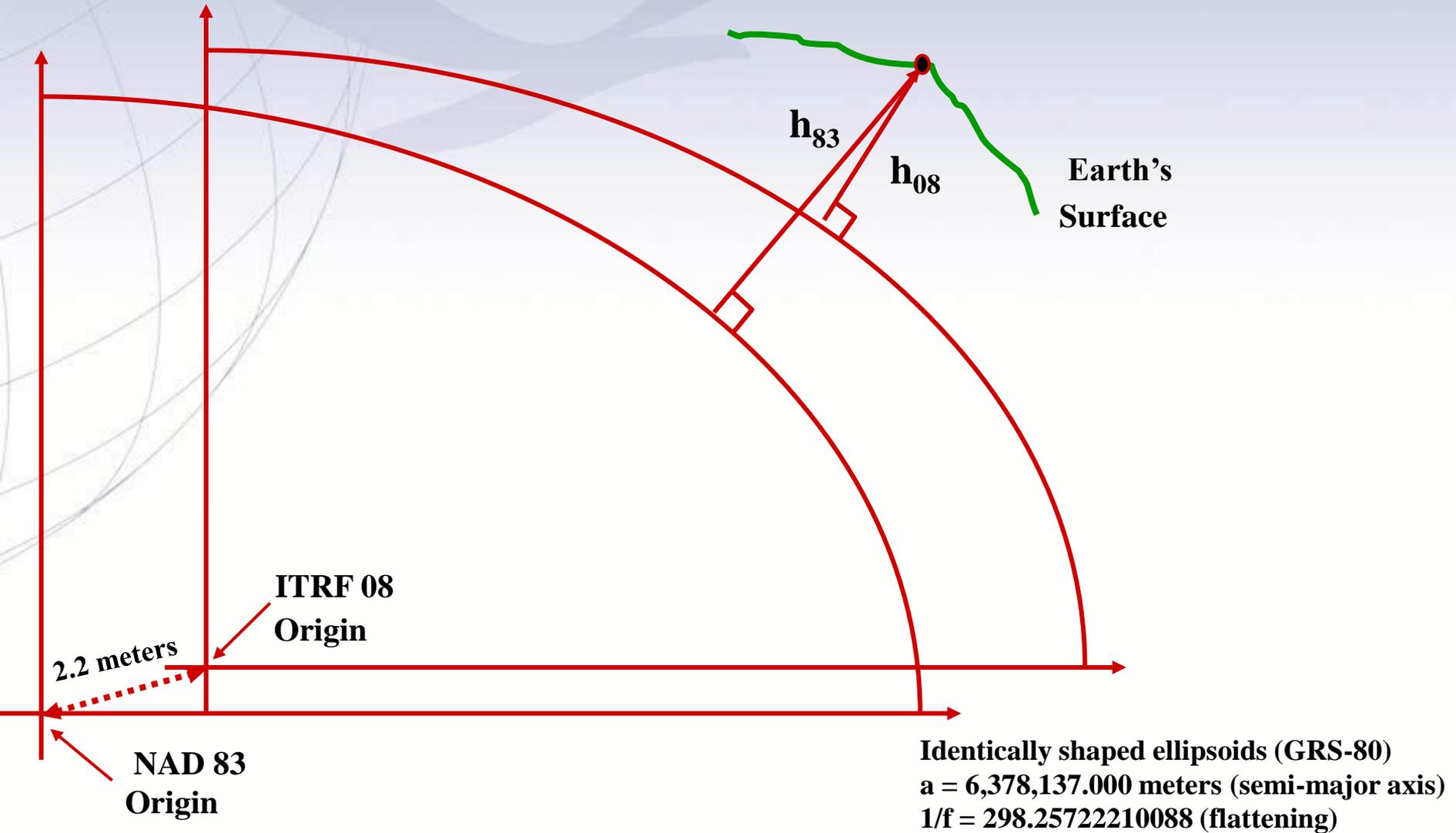
4 D (Latitude, Longitude, Ellipsoid Height, Velocities) Coordinates change with time
(e.g. ITRF00, ITRF08)

How will the new datums affect you?

- The new geometric datum will change latitude, longitude, and ellipsoid height by between 1 and 2 meters.
- The new vertical (geopotential) datum will change heights on average 50 cm (20"), with a 1 meter (39") tilt towards the Pacific Northwest.



Simplified Concept of NAD 83 vs. ITRF08



Questions: Themes

The questions provided to NGS fall into 3 major categories:

- Datum adoption
 - Speed, legal issues, impacts, transformations
- Datasheets
- State Plane Coordinates

Old vs New Datums

- What's being replaced:

Horizontal

- NAD 83(2011)
- NAD 83(PA11)
- NAD 83(MA11)

Latitude
Longitude
Ellipsoid Height
State Plane Coordinates

Vertical

- NAVD 88
- PRVD 02
- VIVD09
- ASVD02
- NMVD03
- GUV D04
- IGLD 85

← Heights

Old vs New Datums

- The old way

- The new way

Text based datasheets

```
NAD 83(2011) POSITION- 40 03 10.11448(N) 082 58 34.91800(W) ADJUSTED
NAD 83(2011) ELLIP HT- 239.400 (meters) (06/27/12) ADJUSTED
NAD 83(2011) EPOCH - 2010.00
NAVD 88 ORTHO HEIGHT - 273.3 (meters) 897. (feet) GPS OBS
```

Observed changes viewed as "corrections" not "movement"

SUPERSEDED SURVEY CONTROL

```
NAD 83(2007)- 40 03 10.11456(N) 082 58 34.91884(W) AD(2002.00) 0
ELLIP H (02/10/07) 239.418 (m) GP(2002.00)
ELLIP H (03/08/05) 239.413 (m) GP( ) 4 2
NAD 83(1995)- 40 03 10.11462(N) 082 58 34.91855(W) AD( ) B
ELLIP H (08/20/96) 239.417 (m) GP( ) 4 2
NAD 83(1986)- 40 03 10.12158(N) 082 58 34.92303(W) AD( ) 1
NAD 27 - 40 03 09.89400(N) 082 58 35.26500(W) AD( ) 1
NGVD 29 (09/26/89) 273.5 (m) RAPSU86 model used GPS OBS
```

Fragile, unchecked passive control



12/5/2015

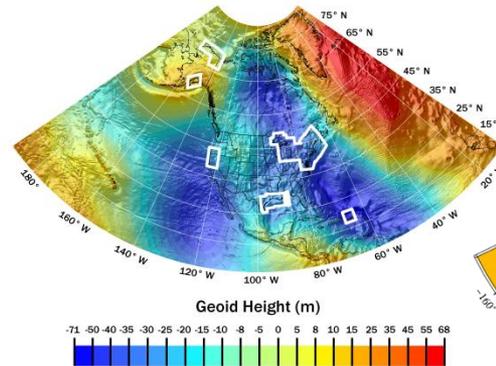
Modern datasheets



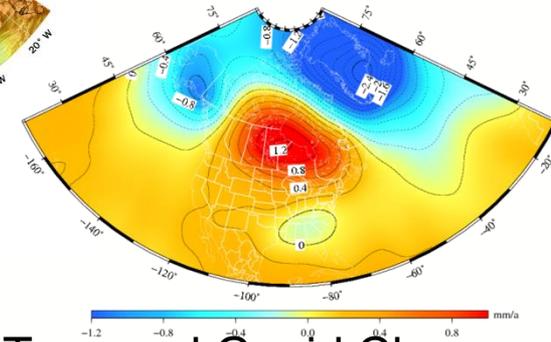
CORS



RTN



Geoid



Temporal Geoid Change

Terminology

- ~~Horizontal Datum~~
 - Geometric Reference Frame
 - Geocentric X, Y, Z
 - Latitude, Longitude, Ellipsoid Height
- ~~Vertical Datum~~
 - Geopotential Reference Frame
 - Geoid undulation
 - Orthometric height
 - Gravity
 - Deflection of the Vertical

Old vs New Datums

- Step 1: Do the best scientific positioning work we can in ITRF
 - Before any discussion of “plate fixed” or “map projections”
 - NGS’s core goal must be the *scientific integrity of positions*
 - **New database**
 - **Replacement of static vector-based GNSS processing**

Old vs New Datums

- Step 2: Consider the question of “plate fixed”:
 - Why do users want this?
 - Fixed latitude and longitude?
 - Nothing is “fixed” though
 - Plate is not just rotating; more than 1 plate
 - Who wins? Who defines “fixed”? Must all points maintain zero change?
 - Model and remove all real motion? (aka “HTDP”)
 - If not removing *all* motion, why remove *any* motion?
 - » ITRF minus plate rotation vs just ITRF

State Plane Coordinates

- Barring user-requested changes, NGS may use existing SPC projections, boundaries and equations, but with new false northings & eastings (to distinguish from NAD 27 and NAD 83)
- User-provided plug-ins (pre-written code) for SPC or other projections may be possible

Tools for Transitioning

Geocon/Geocon11



News Item

National Geodetic Survey

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Tuesday, August 12, 2014

NGS Announces Joint Release of GEOCON v1.0 and GEOCON11 v1.0

NGS is pleased to release two related products: **GEOCON v1.0** and **GEOCON11 v1.0**. Each product transforms coordinates between specific realizations of the North American Datum of 1983 (NAD 83).

GEOCON v1.0 allows users to transform latitudes, longitudes, and ellipsoid heights between NAD 83("HARN") and NAD 83(NSRS2007). (NAD 83["HARN"] is an abbreviation for "the most recent pre-NSRS2007 realization of NAD 83 at any given point.") **GEOCON** also issues information about the quality of the transformation at each point and notifies users in the event of poor quality results.

GEOCON11 v1.0 performs a similar task as **GEOCON**, but it transforms coordinates between NAD 83(NSRS2007) and NAD 83(2011). Similar to **GEOCON**, **GEOCON11** issues information regarding the quality of the transformations to users.

You may find more information about **GEOCON v1.0** and **GEOCON 11 v1.0**, including operator and user guides, technical reports, and download instructions on the NGS website at: <http://www.ngs.noaa.gov/GEOCON/>. Information on **GEOCON11 v1.0** can be found at the above link or at: <http://www.ngs.noaa.gov/GEOCON11/>.

For more information, contact: **Dru Smith**

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NGS Coordinate Conversion Tool



 **BETA** This is a BETA Release Site **Coordinate Conversion** National Geodetic Survey

NGS Home | About NGS | Data & Imagery | Tools | Surveys | Science & Education Search

Conversion from lat-long | Conversion to lat-long | Conversion of multiple coordinates | Web services | Downloads

Choose a location to generate projected coordinates

Enter decimal degrees *or drag map marker*

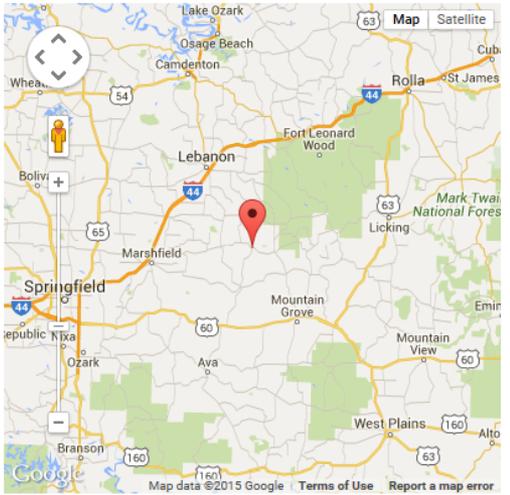
Lat

Lon

or degrees-minutes-seconds

Lat

Lon



Choose a datum NAD83 NAD27/Old HI/PR 40/AS 62/GU 63

Enter an Ellipsoid Height in meters (optional, affects XYZ and Combined Factors)

<http://beta.ngs.noaa.gov/gtkweb/>

OPUS Projects

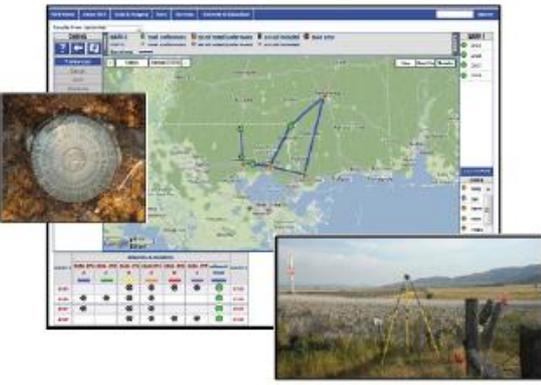
National Geodetic Survey Positioning America for the Future geodesy.noaa.gov



OPUS Projects

Online Positioning User Service
Baseline Processing and Adjustment Software
User Instructions and Technical Guide

Version 2.2 • September 20, 2013



Lead Author: Mark L. Armstrong, NOAA

National Oceanic and Atmospheric Administration • National Geodetic Survey



OPUS-Projects Manager's Training

National Geodetic Survey

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OPUS-Projects Manager's Training

March 26-27, 2014
OSU Campus, Corvallis, OR
Trainer: Mark Armstrong, Oregon Geodetic State Advisor

Class full, [email](#) for waiting list.

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Workshop Outline

- Introduction
- Step 1: Creating a Project
- Step 2: Uploading Data To Your Project
- Step 3: Session Processing
- Step 4: Network Adjustment
- Open Discussion
- One-on-one

What is OPUS-Projects?

- Web-based access to process multiple marks and multiple occupations
- Data uploading through OPUS
- Data processing using the PAGES software
- Visualization and management aids

Do We Really Need Another OPUS Flavor?

- Yes. The NGS and other groups have a history of projects whose specifications can't be entirely supported by OPUS.
- Yes, again. As good as OPUS does, sacrificing simplicity for flexibility can improve results in many cases.

What's In This Workshop?

- By attending this workshop, you should have enough information to successfully use OPUS-Projects for your own projects. Once the training is completed, you'll be given an opportunity to register your email address thereby authorizing you to create and process new OPUS-Projects.
- A project containing a training data set will be assigned to you. You'll have an opportunity to work along with the presentations. In addition, time is allotted for you to explore your project individually.

Website Owner: National Geodetic Survey / Last modified by erika.little Feb 07 2014

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Adoption and Outreach

Adoption: Legal / Feds

- The datums will be official once the FGCS approves them
- OMB A-16 then requires all federal, civil agencies to transition to the new datums
- Other groups may adopt at their own speed and need

Adoption: Legal / States

- NGS historically provided template acts for each state to help adopt changes
 - NAD 83
 - SPCS
- Has one major drawback: “NAD 83” is now *by-name* mandated in over 40 states.
- Would this be useful again?
 - **Only if “the latest coordinates of the NSRS as defined by the NGS” is the language used**
 - Avoids name-specific issues in the future



Publications/Videos



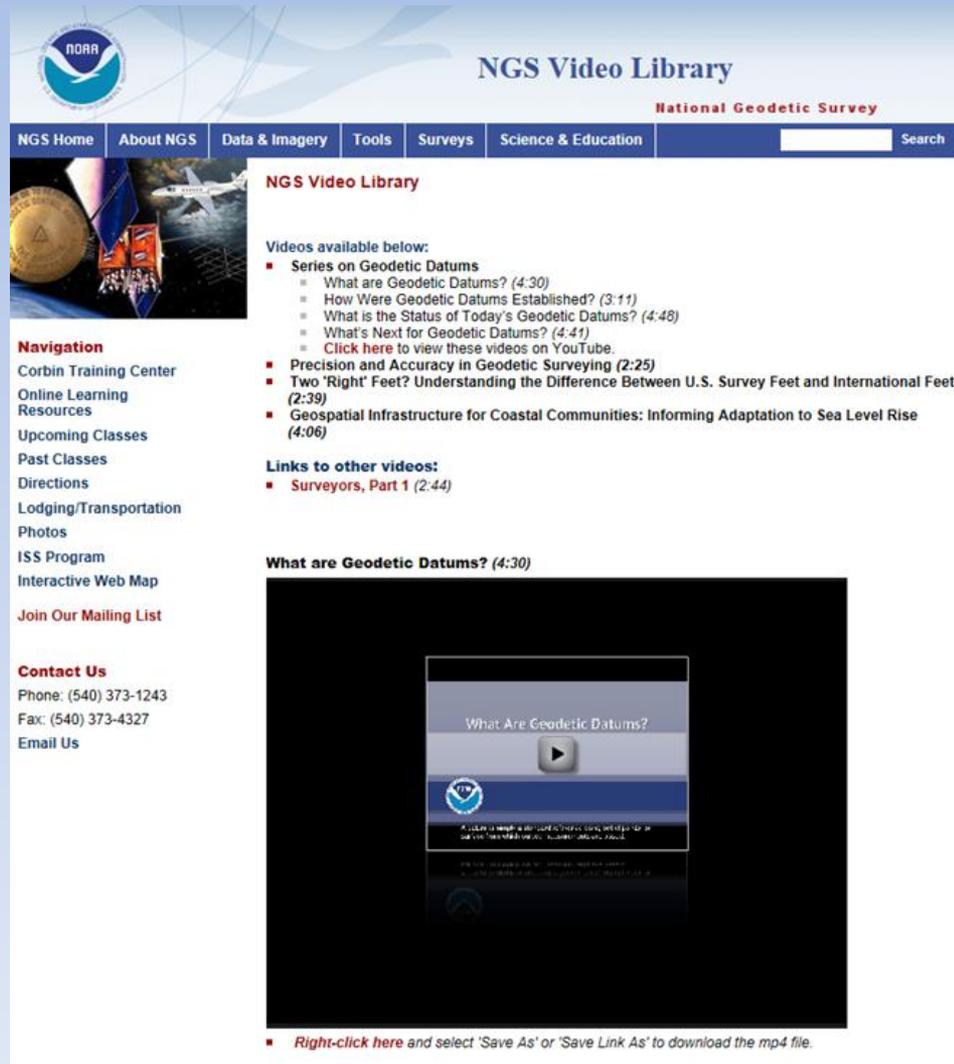
- Developed instructional videos
 - NCGS database
- Plan to develop additional instructional videos in 2016
 - Suggestions?
- NC-SC boundary video

A series of short video tutorials are now available to help navigate the most-recently developed NC Geodetic Database. The videos can be accessed by clicking the link below:

- [NCGS 1 Access Database](#)
- [NCGS 2 Navigating](#)
- [NCGS 3 View Details](#)
- [NCGS 4 Station Recovery](#)
- [NCGS 5 Export Data](#)



Instructional Videos



The screenshot shows the NOAA National Geodetic Survey (NGS) Video Library website. The page has a blue header with the NOAA logo and the text "NGS Video Library" and "National Geodetic Survey". Below the header is a navigation menu with links for "NGS Home", "About NGS", "Data & Imagery", "Tools", "Surveys", and "Science & Education". A search bar is located to the right of the menu. The main content area is titled "NGS Video Library" and lists several video series. A sidebar on the left contains navigation links such as "Navigation", "Corbin Training Center", "Online Learning Resources", "Upcoming Classes", "Past Classes", "Directions", "Lodging/Transportation", "Photos", "ISS Program", "Interactive Web Map", "Join Our Mailing List", "Contact Us", and "Email Us". The "Contact Us" section provides phone, fax, and email information. The main content area lists the following video series:

- Series on Geodetic Datums**
 - What are Geodetic Datums? (4:30)
 - How Were Geodetic Datums Established? (3:11)
 - What is the Status of Today's Geodetic Datums? (4:48)
 - What's Next for Geodetic Datums? (4:41)
 - [Click here](#) to view these videos on YouTube.
- Precision and Accuracy in Geodetic Surveying (2:25)**
- Two 'Right' Feet? Understanding the Difference Between U.S. Survey Feet and International Feet (2:39)**
- Geospatial Infrastructure for Coastal Communities: Informing Adaptation to Sea Level Rise (4:06)**

Below the list, there is a section titled "Links to other videos:" with a link to "Surveyors, Part 1 (2:44)".

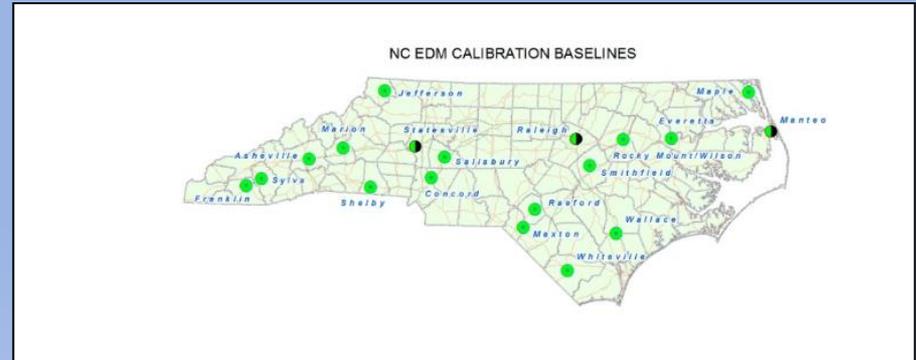
The main content area also features a video player for the video "What are Geodetic Datums? (4:30)". The video player shows a play button and the title "What Are Geodetic Datums?". Below the video player, there is a note: "Right-click here and select 'Save As' or 'Save Link As' to download the mp4 file."



Future projects



- Check EDM baseline
 - Asheville (replace)
 - Maxton (check)
 - Whiteville (check)
 - Maple (check)
 - Raleigh (replace)
 - Manteo (check)





NCEM - Geospatial and Technology Management
NORTH CAROLINA GEODETIC SURVEY
 Positioning North Carolina today and for the future.



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- CORS and GNSS
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- Feedback

Home » Library

A complete library of NCGS documents is provided below. To help find documents more quickly, documents are categorized by NCGS program area and document type. Filter the list by clicking the down arrow next to the column name. To view a document, click the file name. The document can then be saved to your hard-drive.

Alternatively, download a document by hovering over the file name until a drop-down arrow appears to the right of the name. Click the arrow and then click Download.

You may also view a group of documents based on their type by clicking one of the links below. For example, click Presentations to view a list of all presentations in the library. The displayed list can be further filtered by selecting from the NCGS Program Area values.

Document Type	File Type	Name	Document Type	NCGS Program Area
Presentation		CORS	Presentation	CORS
		CORS	Presentation	CORS
		CORS_11_03_2012	Presentation	CORS
		NC_SC_Boundary_Western_NC	Presentation	County and State Boundaries
		NC_State_Boundary_Archives	Presentation	County and State Boundaries
		Duke_2014	Presentation	County and State Boundaries
		GNSS_Elevation_Certificates_v3	Presentation	GNSS
		NGAT UAS Overview Surveys Meeting April 14	Presentation	Library
		Experience with Non-Metric Cameras	Presentation	Library
		UAS Business	Presentation	Library
		2012 Coastal Imagery Project (1)	Presentation	NCGS



NC SURVEYORS

**Following
In Their
Footsteps**

**1939
P
S**

NORTH CAROLINA

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