

# ***NCGS: Positioning NC today and for the future!***



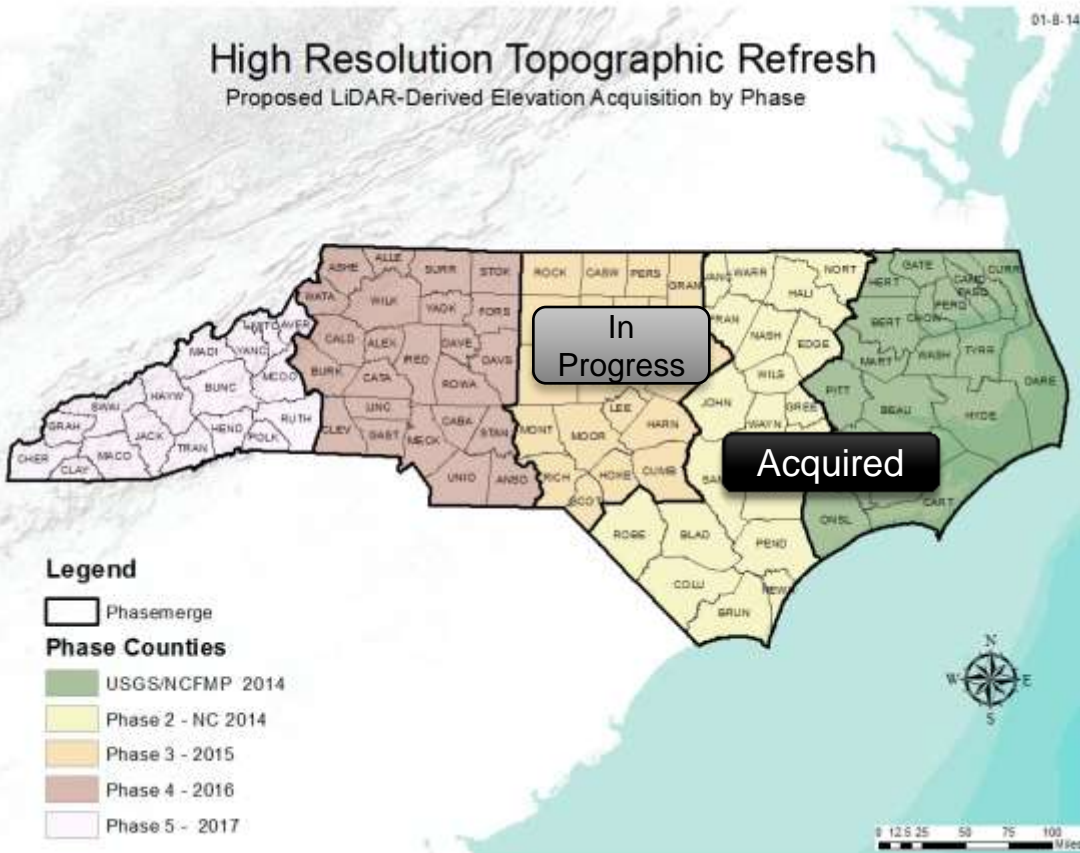
## **North Carolina Geodetic Survey**

Establishing and Maintaining  
the Official Survey Base  
in North Carolina

# STATEWIDE PHASES

## Original Plan

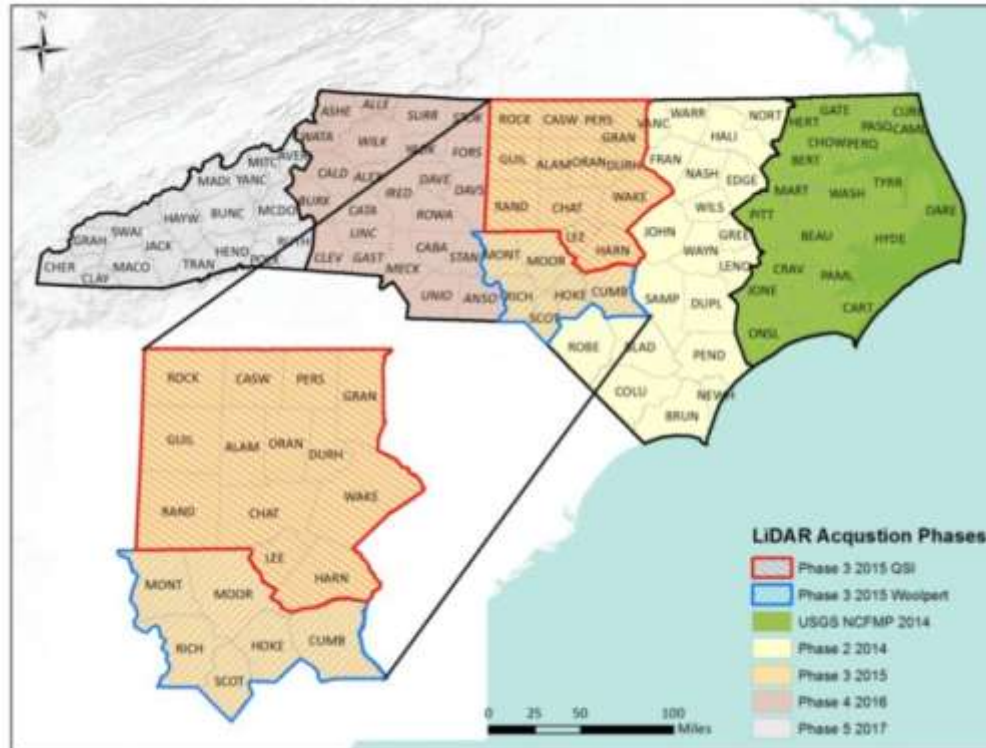
- The Plan put forward was a 5 phase 4 year plan
- Phase 1- USGS
- Phase 2- NC
  - Both occurred in 2014
- Phase 3 – NC (2015)



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

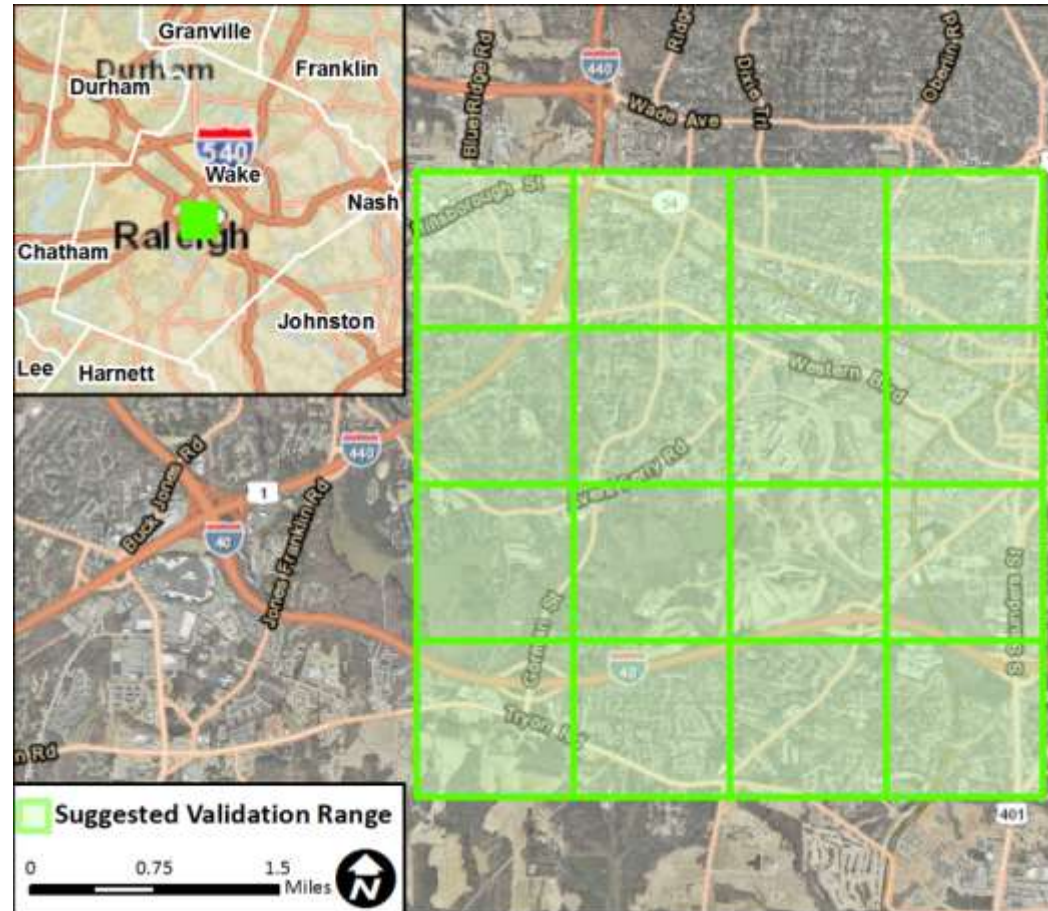
Class	Description
1	Processed Unclassified
2	Ground
3	Low Veg/Strata
4	Medium Veg/Strata
5	High Veg/Strata
6	Buildings (Automated)
7	Noise (High/Low)
9	Water (Hydro Cleaned Areas)
12	Flight Line Overlap
13	Roads
14	Bridges
17	Overlap Default
18	Overlap Ground
25	Overlap Water

# State Specifications

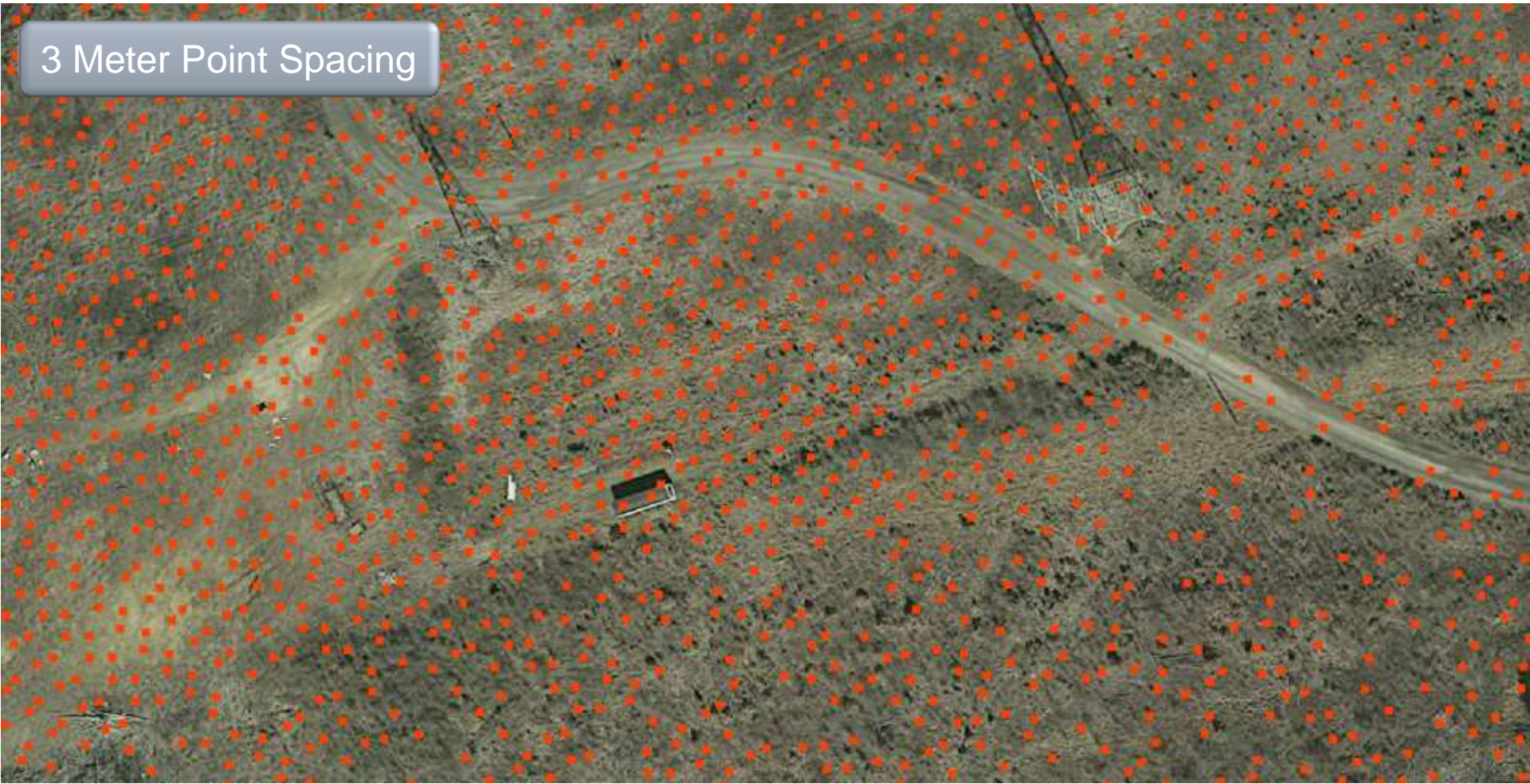
This project has set up an Validation Range

- 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

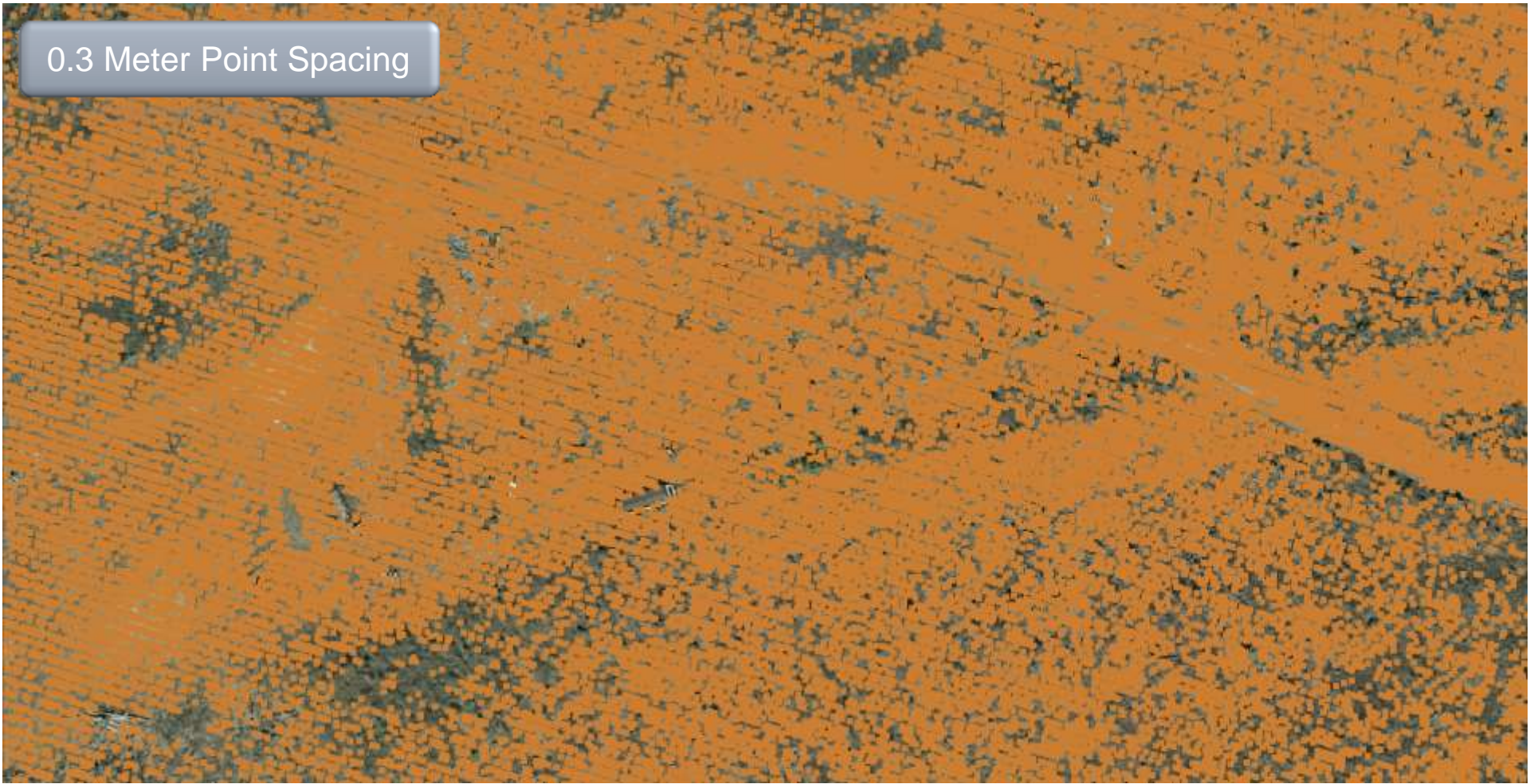


3 Meter Point Spacing



3 Meter Elevation Model (2003 NC LiDAR)

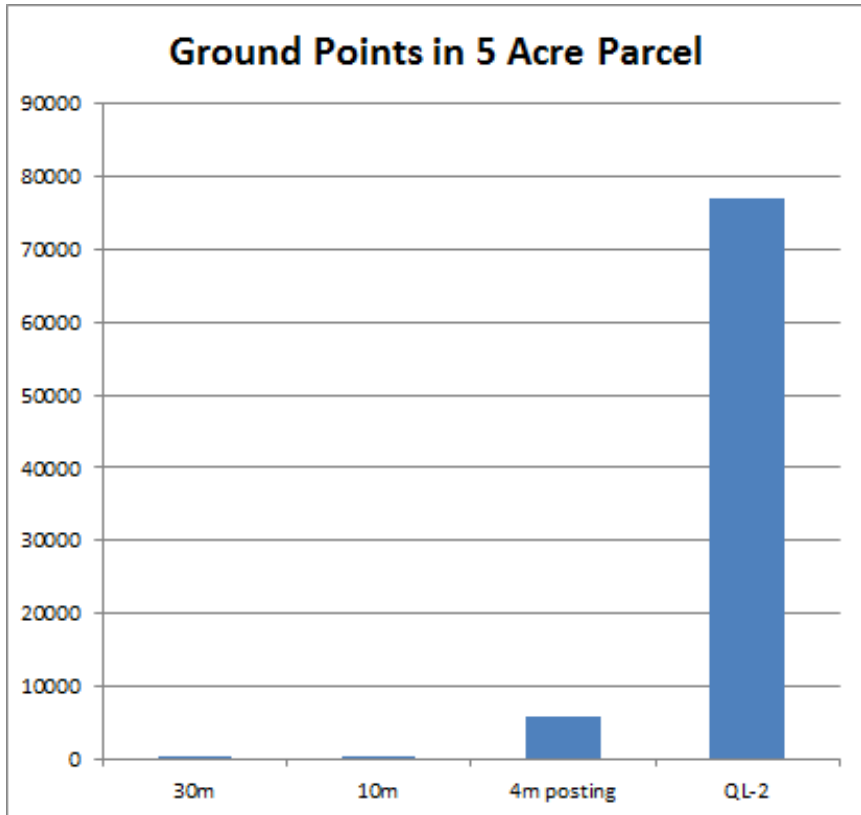
0.3 Meter Point Spacing



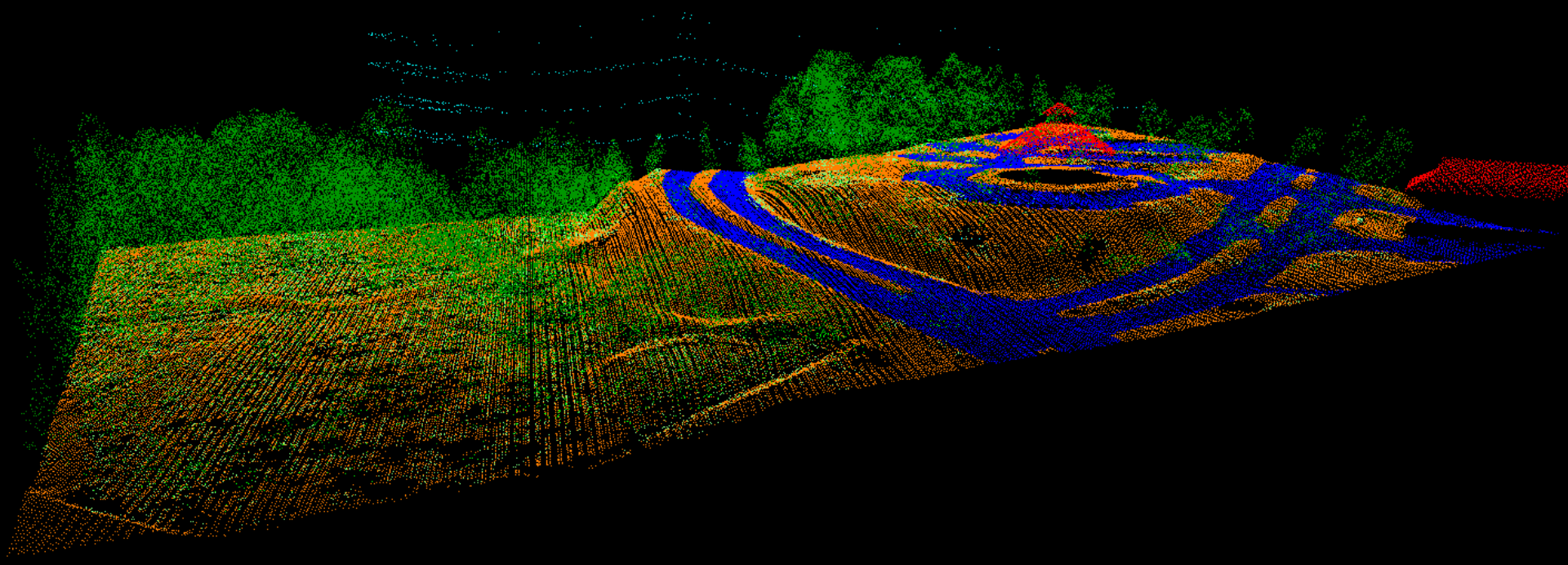
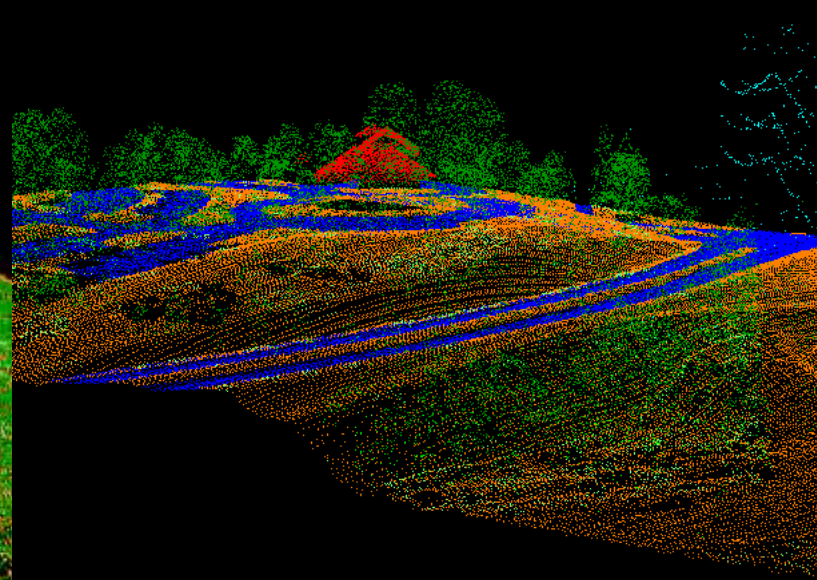
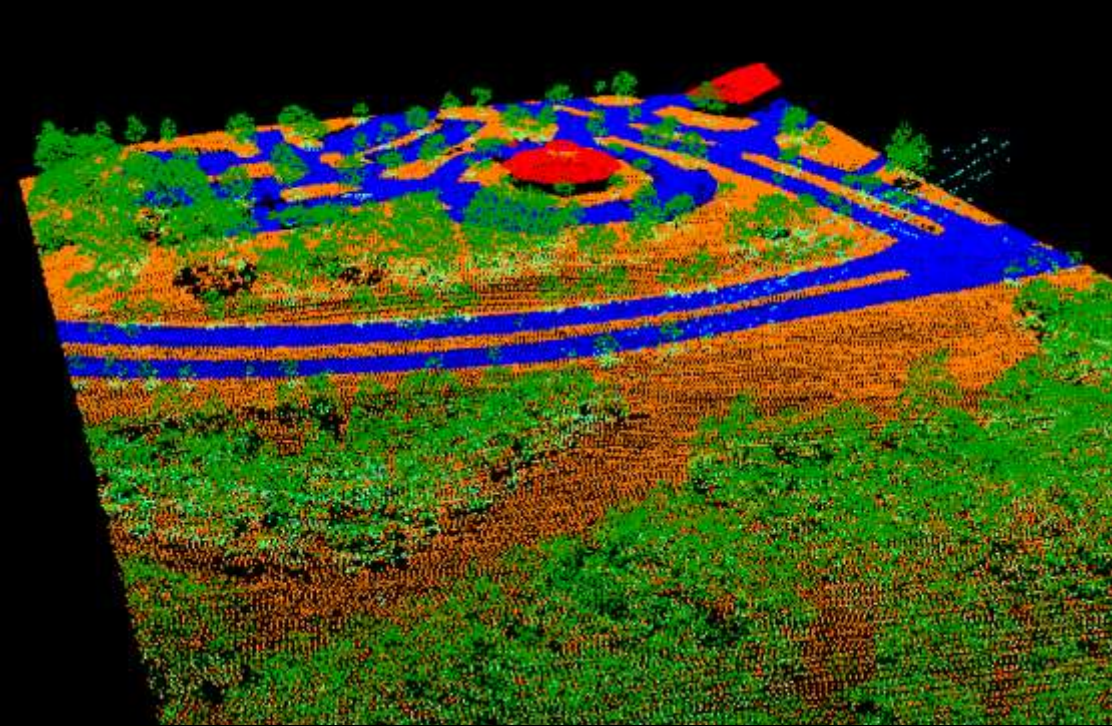
QL2 Elevation Model



# Summary

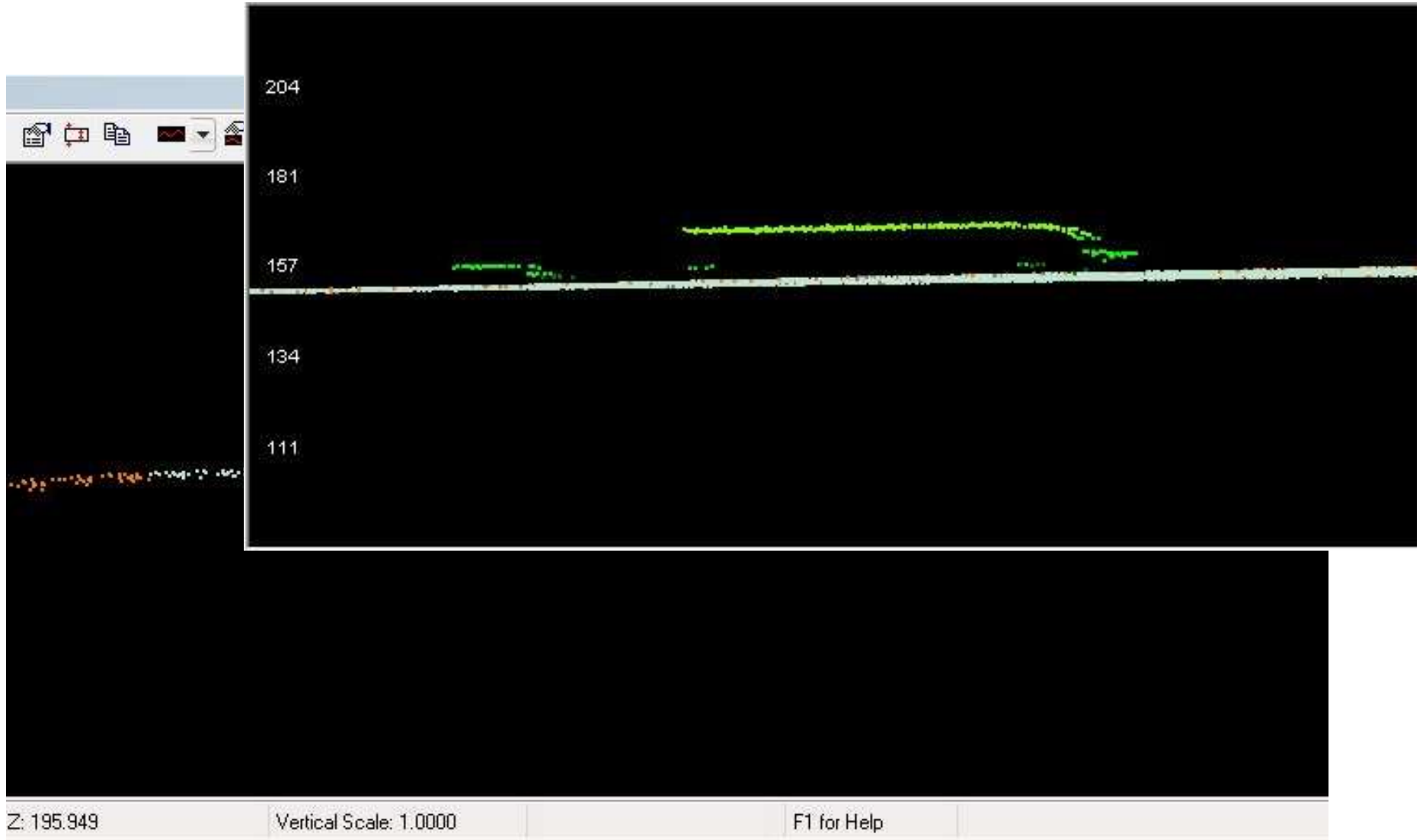


LIDAR Quality	Ground Points in 5 Acre Parcel
30m NED	32
10m NED	300
3m (circa 2003)	7,696
QL2	76,957

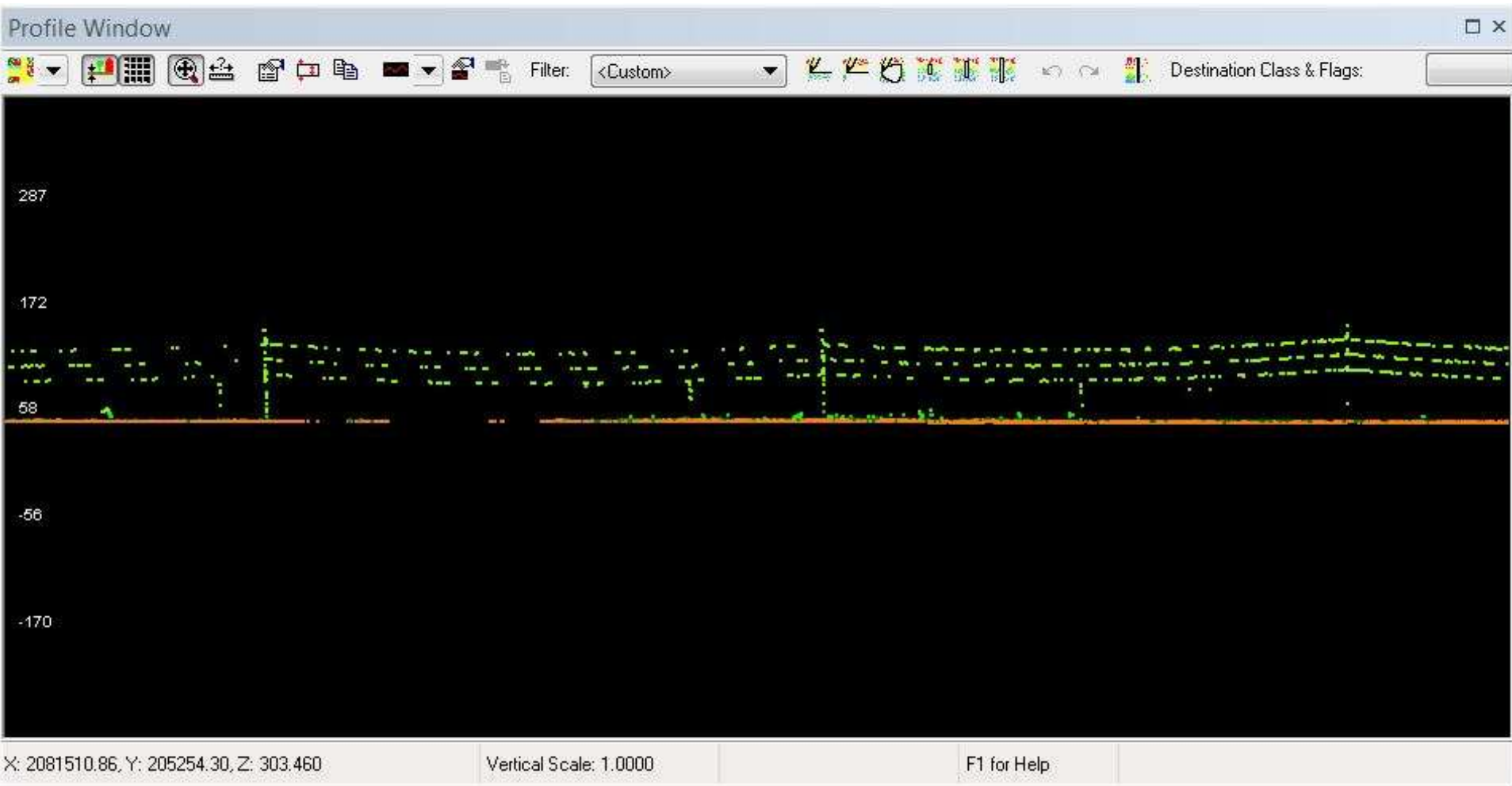


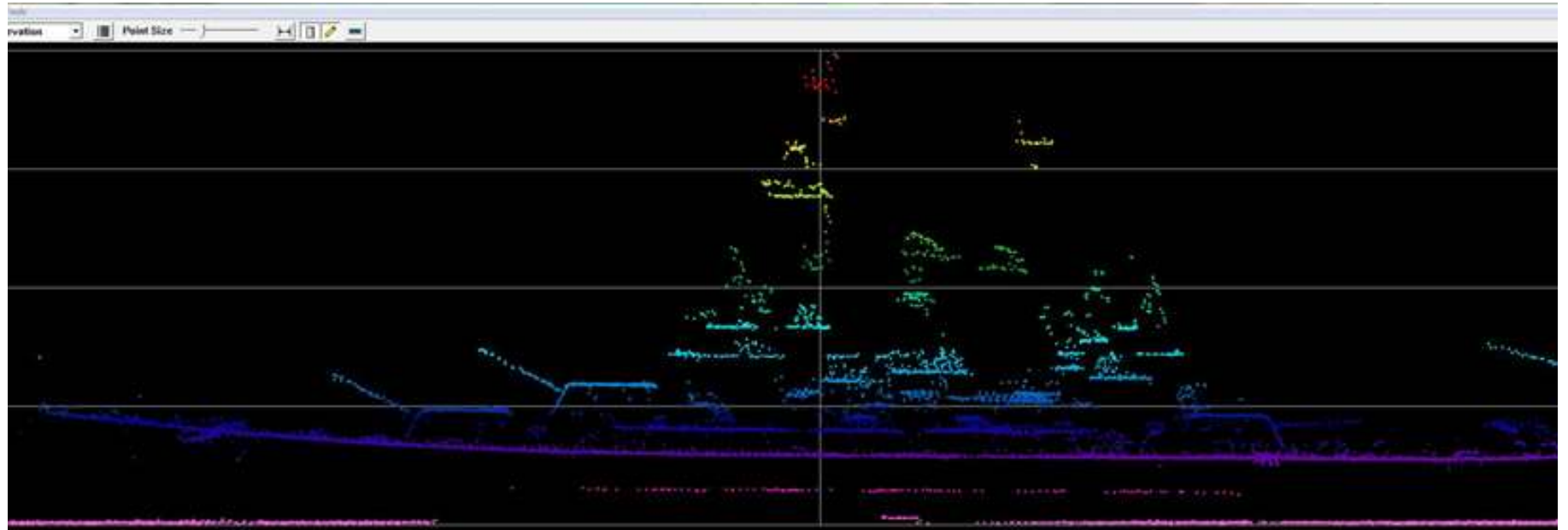


# Vehicles



# Utility Profile







### Login with NCID

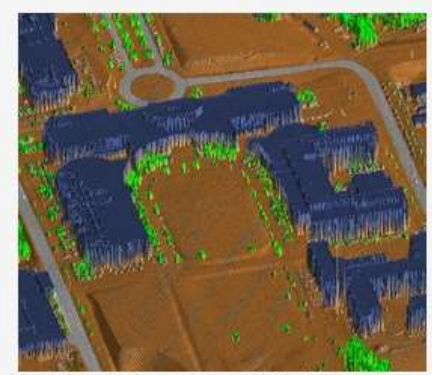
A North Carolina ID (NCID) is required.  
Don't have a NCID? Sign up [here](#).

NCID USER NAME:

PASSWORD:

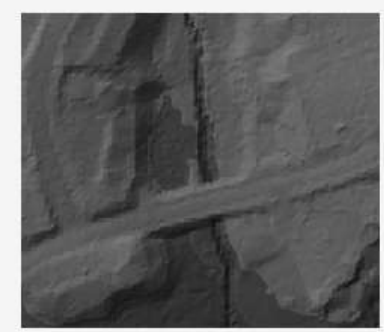
**LOGIN**

### 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.

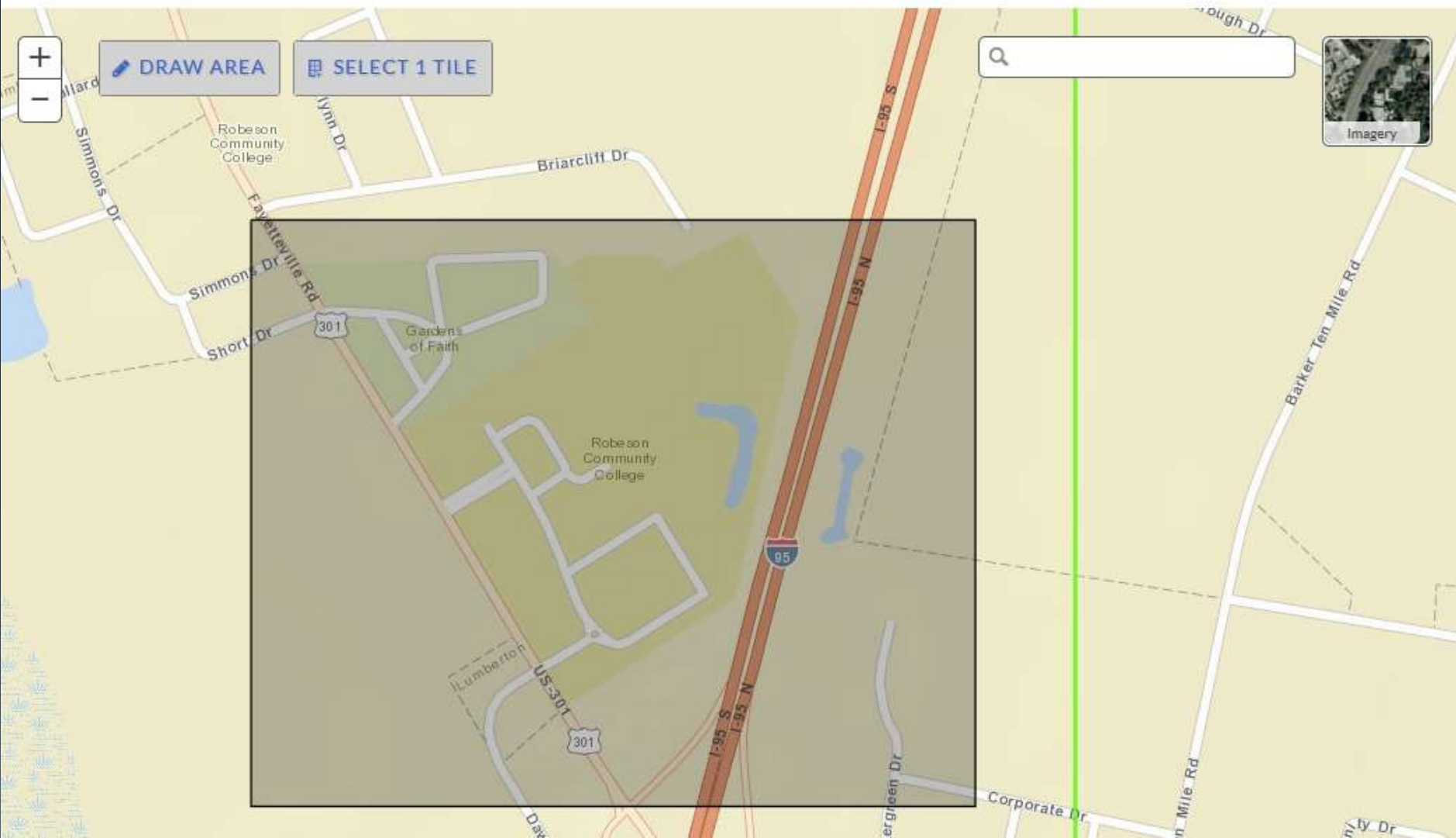




❓ QL2 LiDAR is available on the **green areas** on the map. To select an area crossing multiple tiles, click "Draw Area" and then draw a small box on the map. Areas must be less than 4 tiles.

❓ 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 [rmpclipandship@ncdps.gov](mailto:rmpclipandship@ncdps.gov) when your files are ready for download. Please make sure to add [rmpclipandship@ncdps.gov](mailto:rmpclipandship@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

- 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	<a href="#">↓ DOWNLOAD</a>

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](mailto:hope.morgan@ncdps.gov) or John Lay at [john.lay@ncdps.gov](mailto: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

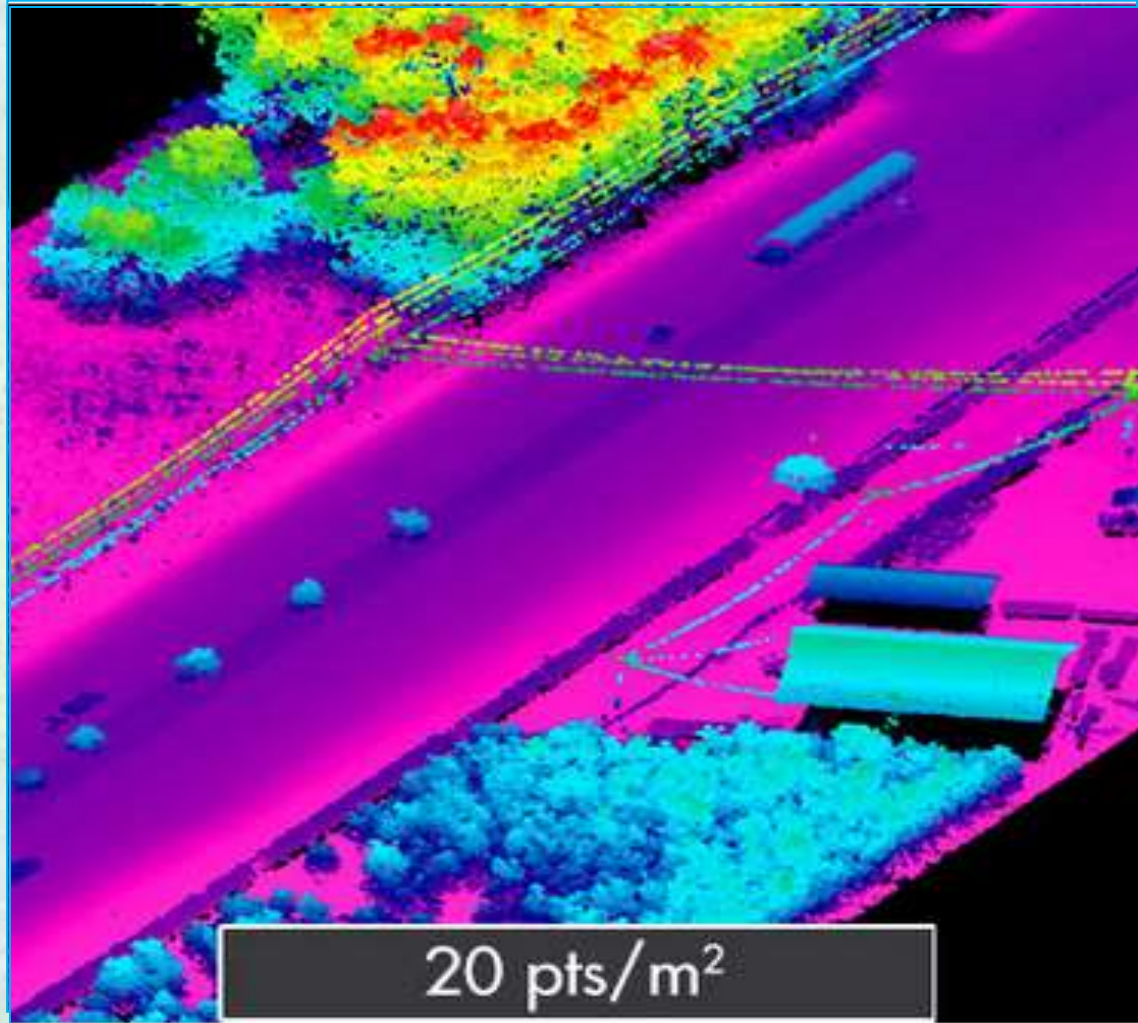
## Multi-angle Illumination

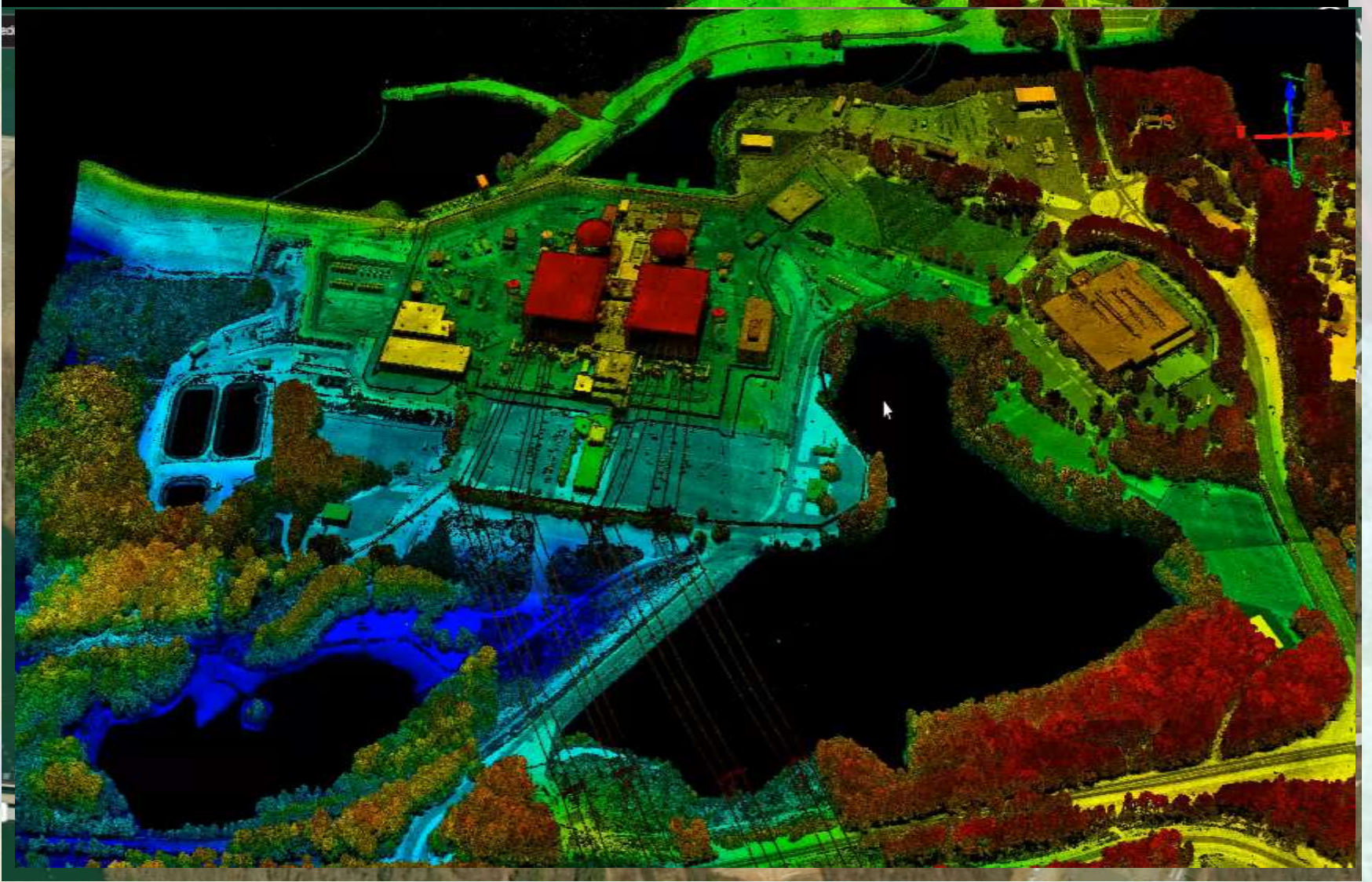
- 
- An aerial photograph of a city with a large yellow cone of light emanating from a building, illustrating the concept of multi-angle illumination. The cone of light is shown as a bright yellow area that penetrates through the foliage and shadows of the surrounding urban environment. The building is a large, rectangular structure with a flat roof. The surrounding area includes residential streets, green spaces, and a river. A large white airplane is visible in the sky above the city.
- 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...**

Search

**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 Portal

HOME SEARCH BROWSE **DOWNLOAD IMAGERY** MAP VIEWER

## Select imagery for download

Zoom in and select an area for download

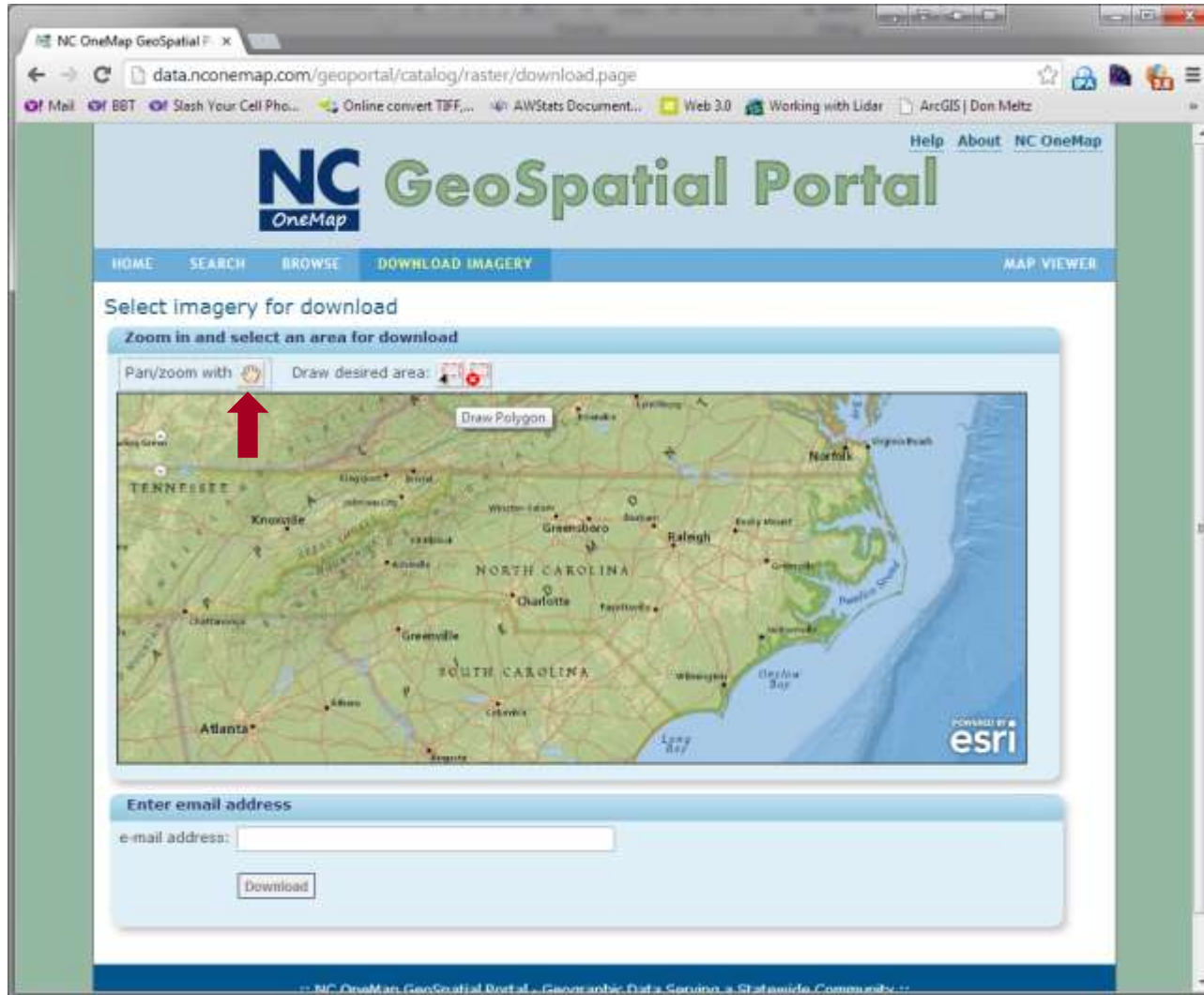
Pan/zoom with  Draw desired area:  



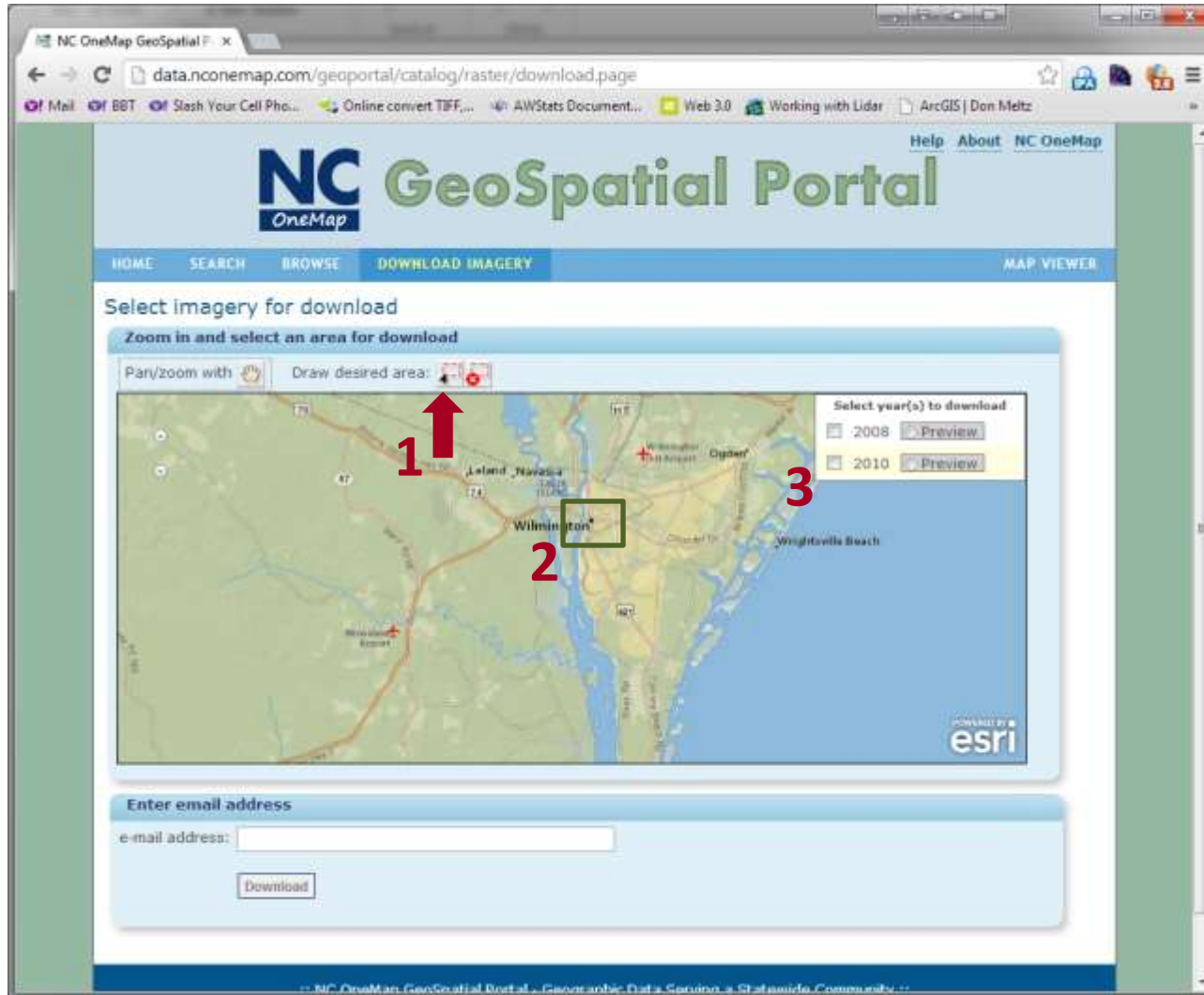
Enter email address

e-mail address:

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



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". It features a map viewer with a "Zoom in and select an area for download" instruction. The map shows a satellite view with a yellow rectangular selection box. Below the map, there is a "Select year(s) to download" section with a list of years and "Preview" buttons:

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

Two red arrows point to the "Preview" buttons for the years 2006 and 2012. Below the map, there is an "Enter email address" section with an input field and a "Download" button.

At the bottom of the page, there is a footer: "NC OneMap GeoSpatial Portal - Geographic Data Services - 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 `data.nconemap.com/geoportal/catalog/raster/download.page`. The page title is "NC GeoSpatial Portal" with a logo. Navigation tabs include HOME, SEARCH, BROWSE, DOWNLOAD IMAGERY, and MAP VIEWER. The main content area is titled "Select imagery for download" and contains a map viewer with a "Zoom in and select an area for download" section. A red box on the map is annotated with a red arrow and the number "1". To the right of the map is a "Select year(s) to download" panel with checkboxes for 2002, 2006, 2008, 2010, and 2012. The 2012 checkbox is checked and highlighted in green, with a red arrow pointing to it. Below the map is an "Enter email address" section with a text input field containing "john.doe@email.com" and a "Download" button. A red arrow and the number "2" point to the input field, and another red arrow and the number "3" point to the "Download" button. The footer of the page reads "NC OneMap GeoSpatial Portal - Geographic Data Services - Statewide Community".

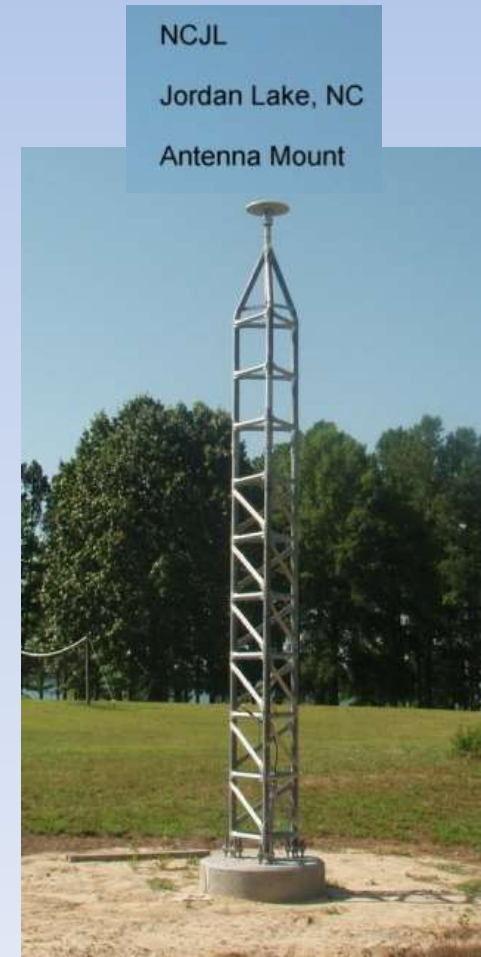




# NC CORS Network



- Continuously Operating Reference Station (CORS)
  - A permanent and continuously recording Global Navigation Satellite System (GNSS) receiver, antenna (with a surveyed reference position), & support equipment
  - NC CORS Network
    - Composed of 91 CORS
      - 1 new CORS has been installed
        - Raeford (NCRF)
      - 1 CORS has been upgraded to GNSS
        - P779



# NC CORS Network



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



North Carolina Emergency Management



# RTN port request

The screenshot shows the website header with the logo and navigation menu. The 'CORS and GNSS' menu item is highlighted with a red arrow. Below the header, there are sections for 'Geodetic News' (Cabarrus-Stanly County Boundary Recorded), 'Unmanned Aircraft Systems Forum', and an 'AGENDA' for the Unmanned Aircraft Systems (UAS) Forum on June 12, 2014.

The registration page features a 'Create Account' section with a 'Register a new account' link. Below this is a 'Personal Data' form with the following fields:

- 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:

A 'Next' button is located at the bottom right of the form.

<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
    - IGS Ionosphere
    - IRIMGRIM
  - 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:\*   N  S

Longitude:\*   E  W

Elevation:  m

\* You can enter the geographical coordinates in three formats:

- Deg Min Sec      Example: 45 1 21.60
- Deg Min          Example: 45 1.36
- Deg                Example: 45.02267



# Wake-Harnett County Boundary



- Research and field data collection in progress
- Developing report
  - Report will be provided to Wake and Harnett counties





# Wake-Harnett County Boundary





# NC General Statutes on county boundaries

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- **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

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- 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

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- 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



# Research methods

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- Original legislative descriptions
- Original surveys or first surveys
- Subsequent resurveys
- Historical maps and records of county line
- Witnesses to county line:
  - Property deed descriptions
  - Historical local witnesses



# Report of research findings

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- Research discovery information (evidence)
- Weighting of evidence to determine the best evidence
- Preliminary map presents the resurvey line using the best evidence of the original location



# 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

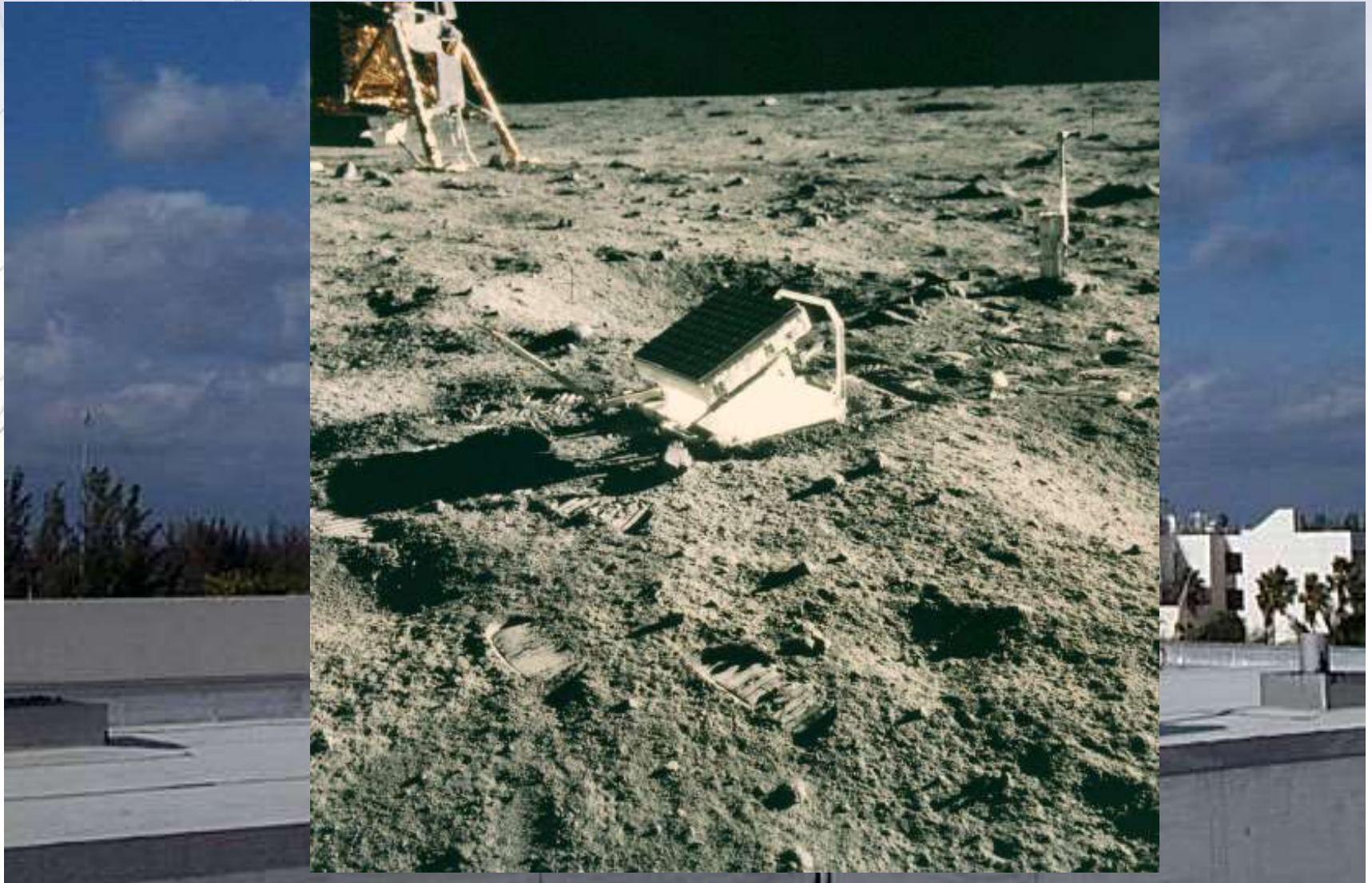
ITRS is realized by the International Terrestrial Reference Frame (**ITRF**) based upon estimated coordinates and velocities of a set of stations observed by:

- 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



# GEODETIC 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)

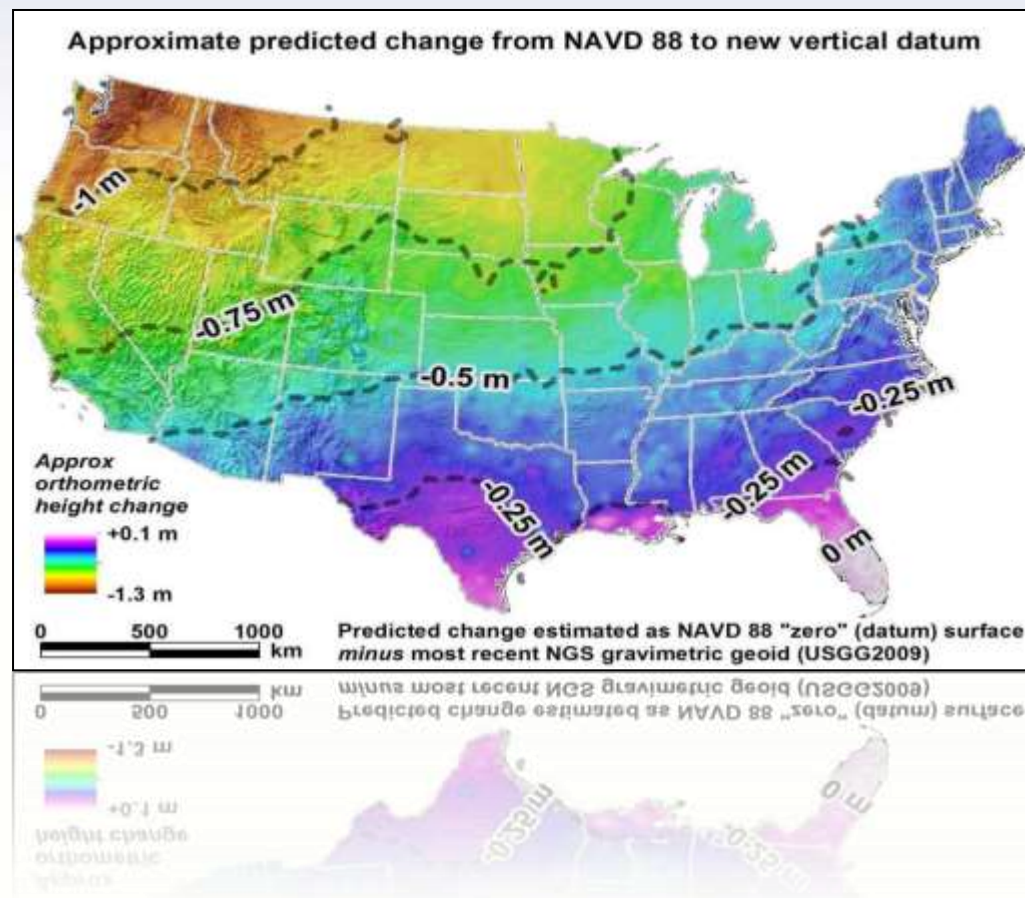
Fixed and Stable - Coordinates seldom change  
(e.g. NAD83(1995), NAD83(NSRS2007), NAD83(CORS96), NAD83(2011))

also

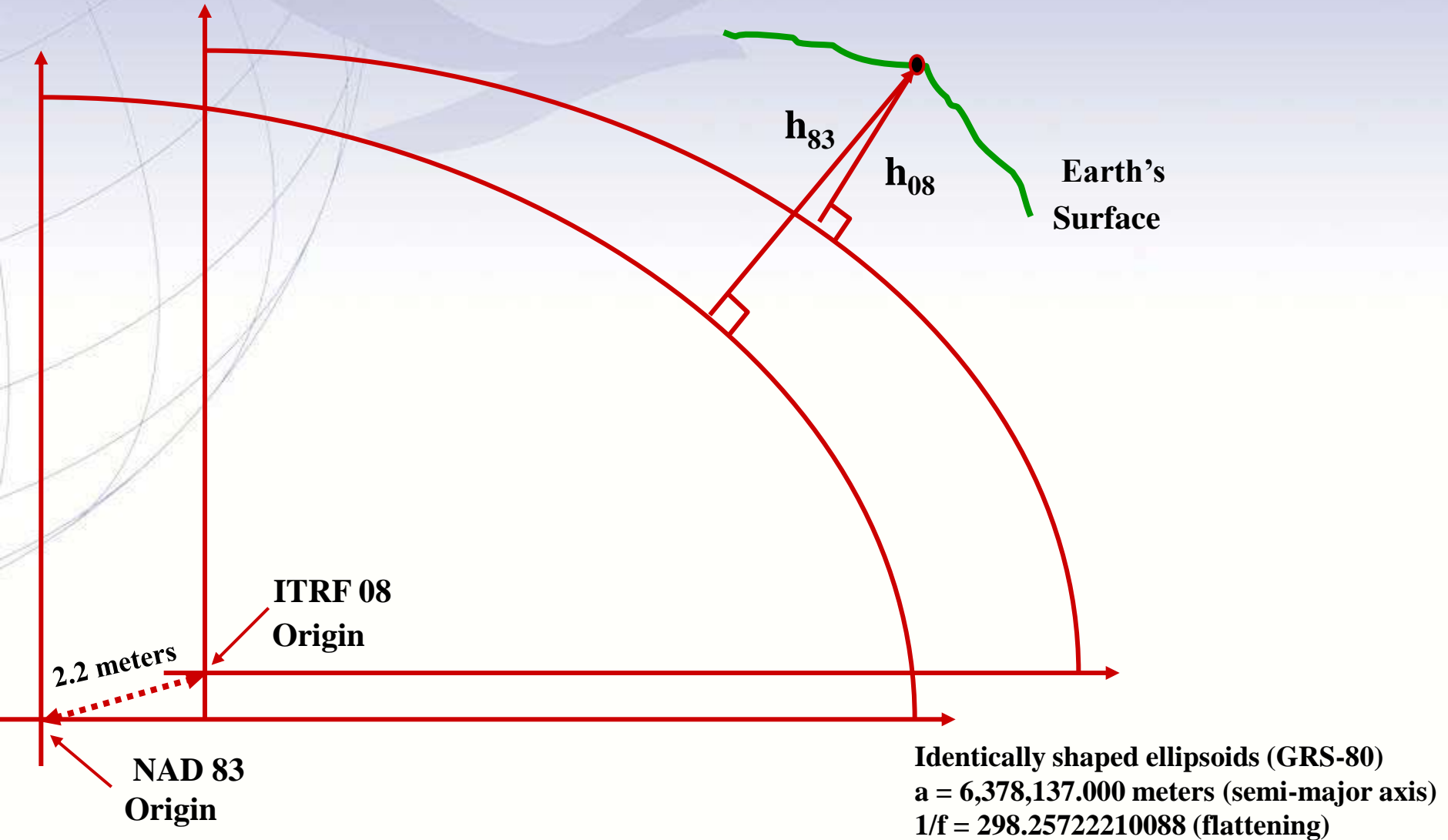
4 D (Latitude, Longitude, Ellipsoid Height, Velocities) Coordinates change with time  
(e.g. ITRF00, ITRF08)

# 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
- GUVD04
- 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
```

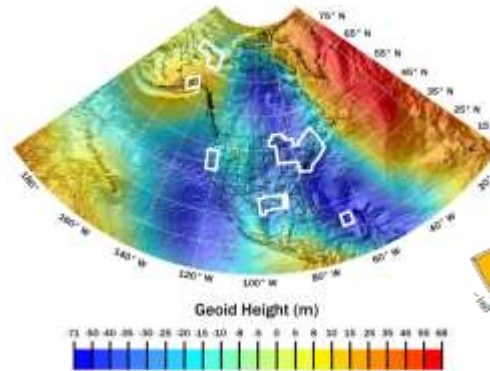
Modern datasheets



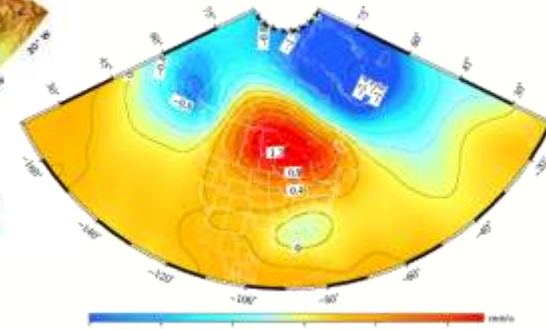
CORS



RTN



Geoid



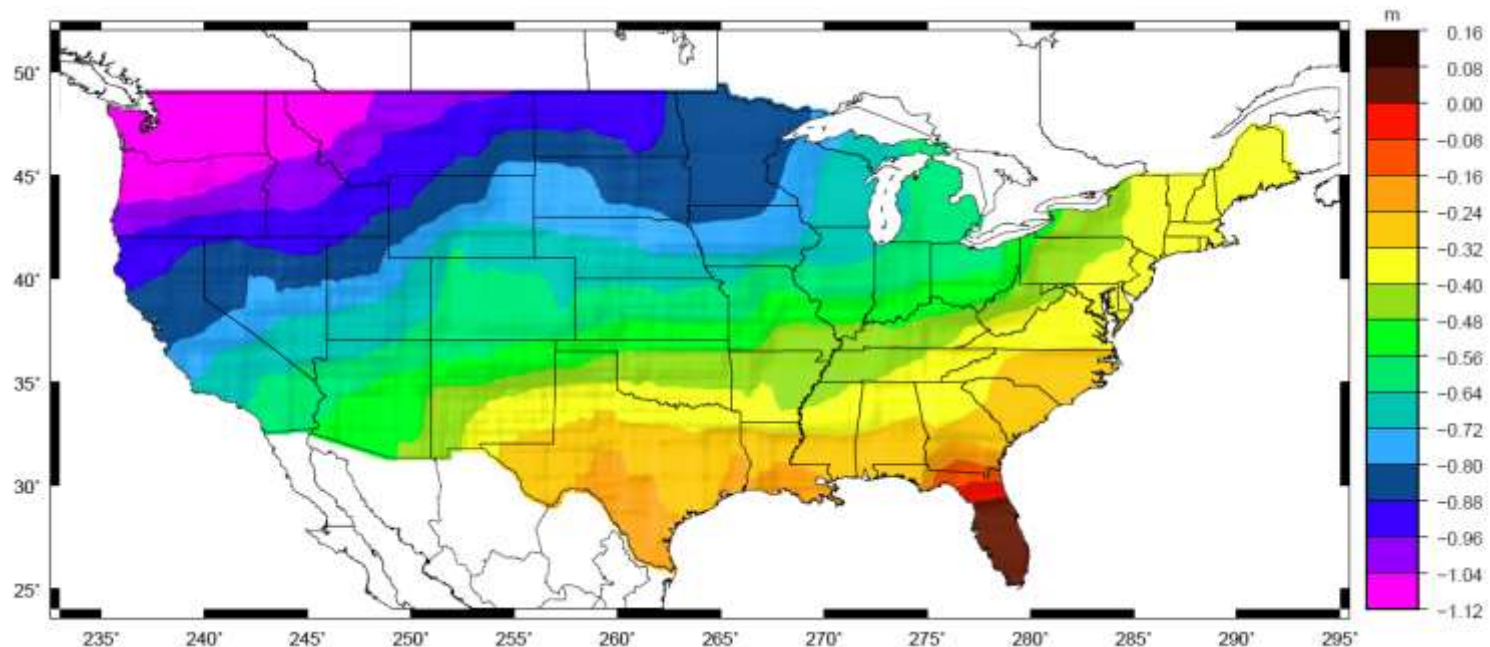
Temporal Geoid Change

Fragile, unchecked passive control



# Why isn't NAVD 88 good enough anymore?

- **Approximate level of geoid mismatch known to exist in the NAVD 88 zero surface:**



# 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**

Website Owner: National Geodetic Survey / Last modified by NGS.webmaster Aug 12 2014



# NGS Coordinate Conversion Tool



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

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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 H/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](http://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](#).

#### Navigation

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Fax: (540) 373-4327  
Email Us

#### 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

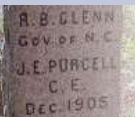
# Summary: Priorities

## NGS Priorities, in order:

1. Define datums on solid scientific footing
2. Provide tools for transitioning
3. Work within FGCS to ensure OMB A-16 compliance
4. Work with additional groups to aid in adoption



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



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- CORS and GNSS
- County and State Boundaries
- Library
- Other Programs
- Tools
- Kids Page
- Feedback

🏠 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.

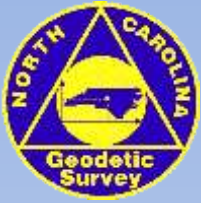
Alternatively, download a document by hovering over the file name until a drop-down arrow appears to the right of the name. Click the arrow and then click Download.

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.

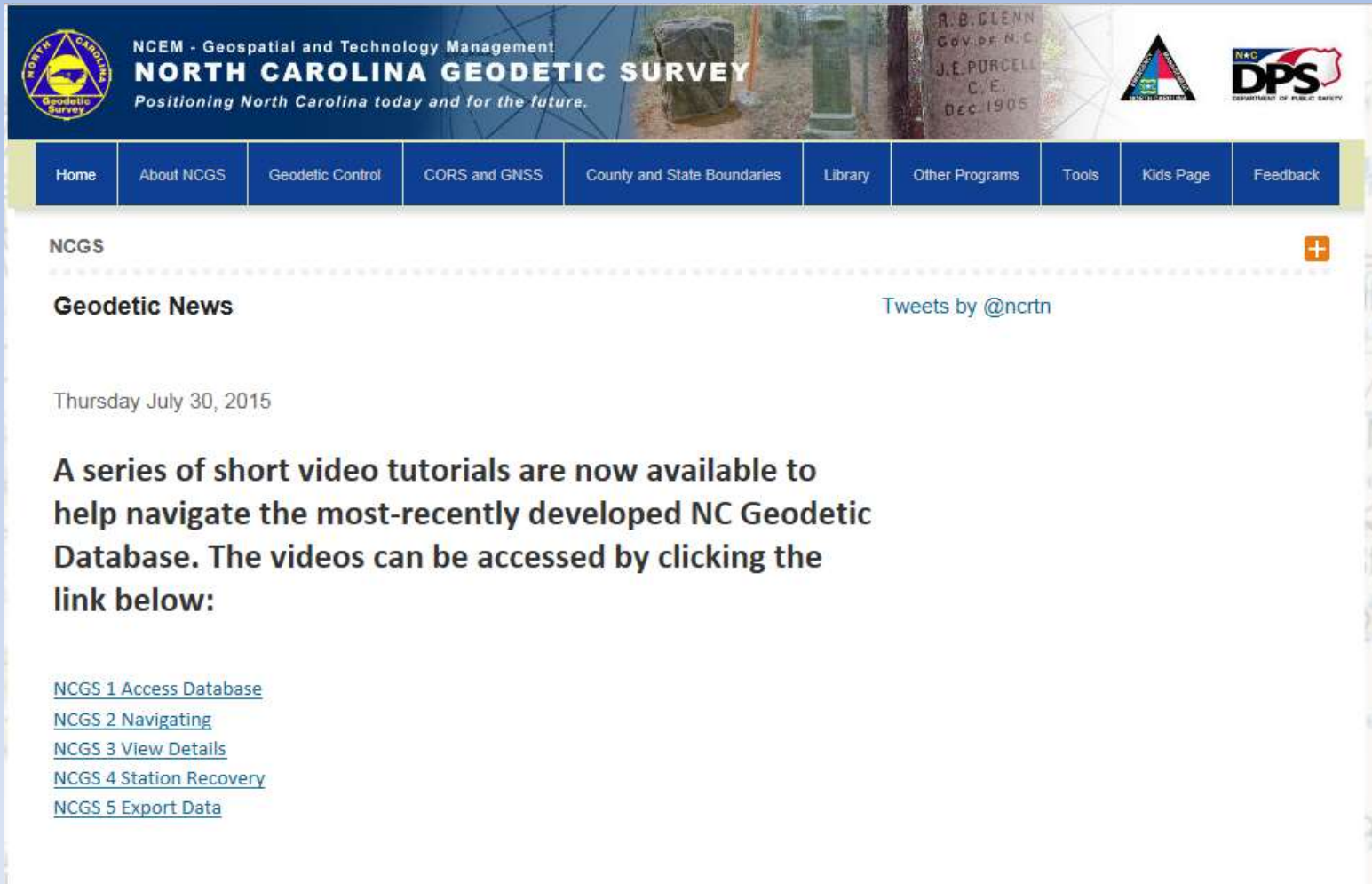
Document Type	File Type	Name	Document Type	NCGS Program Area
Presentation		CORS	Presentation	CORS
		CORS	Presentation	CORS
		CORS_11_03_2012	Presentation	CORS
		NC_SC_Boundary_Western_NC	Presentation	County and State Boundaries
		NC_State_Boundary_Archives	Presentation	County and State Boundaries
		Duke_2014	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







# Instructional Videos



The screenshot shows the website for the North Carolina Geodetic Survey. At the top left is the logo. The main header area contains the text "NCEM - Geospatial and Technology Management" and "NORTH CAROLINA GEODETIC SURVEY" in large, bold letters, followed by the tagline "Positioning North Carolina today and for the future." To the right of the header is a photograph of a survey station with a monument and a stone marker. Below the header is a navigation menu with the following items: Home, About NCGS, Geodetic Control, CORS and GNSS, County and State Boundaries, Library, Other Programs, Tools, Kids Page, and Feedback. Below the navigation menu is a section titled "NCGS" with a plus sign icon. Underneath is a "Geodetic News" section with the text "Tweets by @ncrtn". The main content area features a date "Thursday July 30, 2015" and a paragraph: "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:". Below this paragraph are five links: "NCGS 1 Access Database", "NCGS 2 Navigating", "NCGS 3 View Details", "NCGS 4 Station Recovery", and "NCGS 5 Export Data".

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

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NCGS

**Geodetic News** Tweets by @ncrtn

Thursday July 30, 2015


**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:**

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[NCGS 4 Station Recovery](#)  
[NCGS 5 Export Data](#)



# Instructional Videos






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### NGS Video Library


Videos available below:

- 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)

#### Links to other videos:

- [Surveyors, Part 1 \(2:44\)](#)

#### What are Geodetic Datums? (4:30)



[Right-click here](#) and select 'Save As' or 'Save Link As' to download the mp4 file.

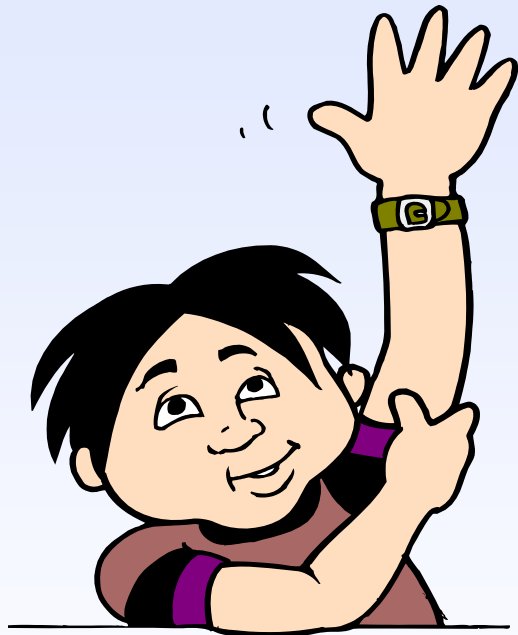
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**Following  
In Their  
Footsteps**

**1939** P  
S

**NORTH CAROLINA**

# Questions?



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**North Carolina Emergency Management**

