North Carolina Geodetic Survey

North Carolina

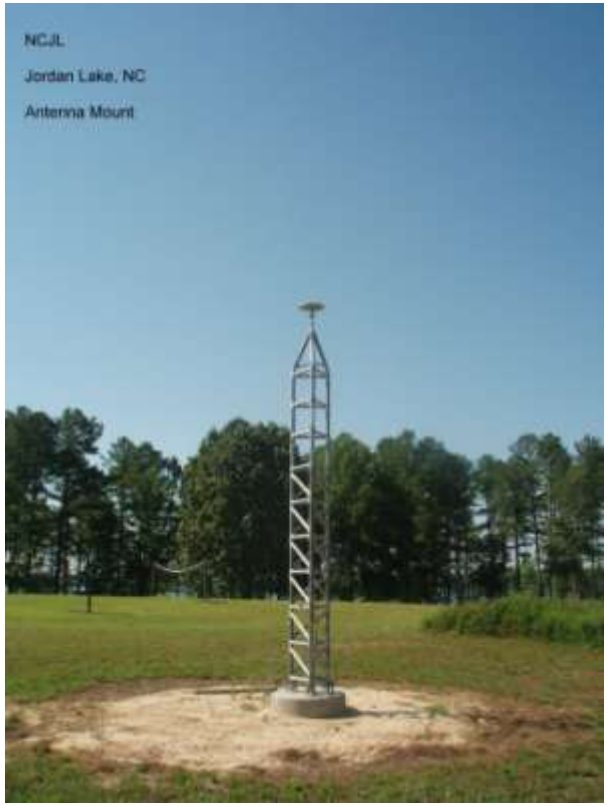
Continuous Operating Reference Stations (CORS)

What is a CORS?

- Continuously Operating Reference Station (CORS)
  - A permanent Global Navigation Satellite System (GNSS) receiver, antenna (with a surveyed reference position), and support equipment

What is a CORS?

- Continuously Operating Reference Station (CORS)
  - NC CORS Network
    - Composed of 83 CORS
      - 4 new CORS have been installed
        - Salisbury (NCSA)
        - Roanoke Rapids (NCRR)
        - New Bern (NCNB)
        - Bodie Island (NCBI)
      - 2 new CORS are being installed
    - Collects data 24/7 at 1 second intervals
    - Receiver type
      - 77 GPS+GLONASS
      - 6 GPS



Former Pea Island CORS

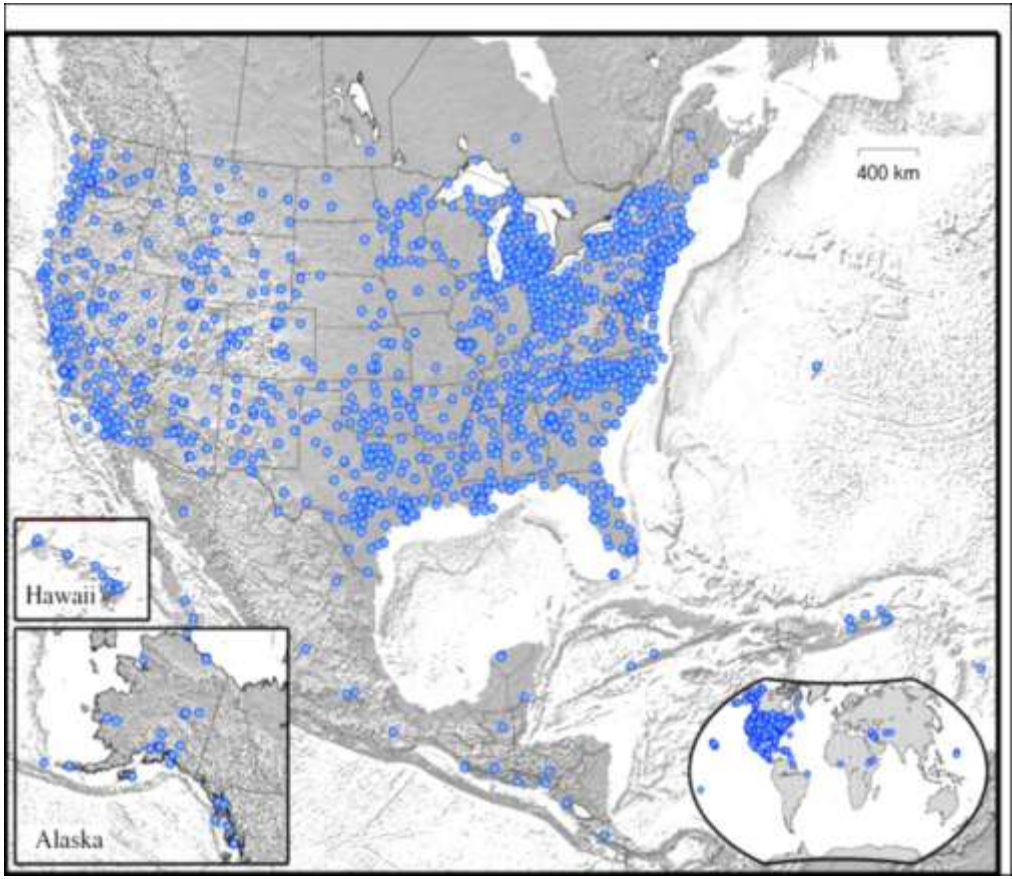
Carolina Country magazine source of imagery

What is a CORS?

- Continuously Operating Reference Station (CORS)
  - CORS in NC that are in the National CORS network but not included in the Real Time Network (RTN)
    - New Bern NDGPS (NBR5 and NBR6)
    - Greensboro NDGPS (NGR5 and NGR6)
    - Plate Boundary Observatory CORS at Rosman (P779)
    - Charlotte (CHME)
    - Conover (CONO)
    - Hillsborough (HILB)

National CORS

- National CORS Benefits
  - Included in OPUS solutions
  - Monitored by NGS (60 day plot)
  - Will be include in any future national adjustments



ncch map - Windows Internet Explorer

File Edit View Favorites Tools Help

ncch map

NCCH
CASTLE HAYNE
2007
Castle Hayne, NC
USA

Site operated by:
NCGS

Coordinates

SiteLog
Photographs
Data Availability
Standard Files
Custom Files (UFCORS)

Time Series (60-day)
Time Series (longterm)

Google Map ncch only
Google Map all CORS

Enter SiteID

CORS Home

National Geodetic Survey - CORS

Description of photos | Additional Photos | Send Photos to Us

Pictures of equipment may not reflect equipment currently installed. Please see sitelog

View looking north

View looking west

Overall View

View looking east

View looking south

No Photo Submitted

View of roof surface

No Photo Submitted

View mount attached to bldg

No Photo Submitted

Monument reference mark

Antenna attached to monument

Antenna serial number

Downloading picture http://www.ngs.noaa.gov/CORS/SitePhotos/Required/ncch/ncch_ant_180_thb.jpg...

Internet 100%

ncch map - Windows Internet Explorer

ncch map

NCCH
CASTLE HAYNE
2007
Castle Hayne, NC
USA

Site operated by:
NCGS

Coordinates

SiteLog
Photographs
Data Availability
Standard Files
Custom Files (UFCORS)

Time Series (60-day)
Time Series (longterm)

Google Map ncch only
Google Map all CORS

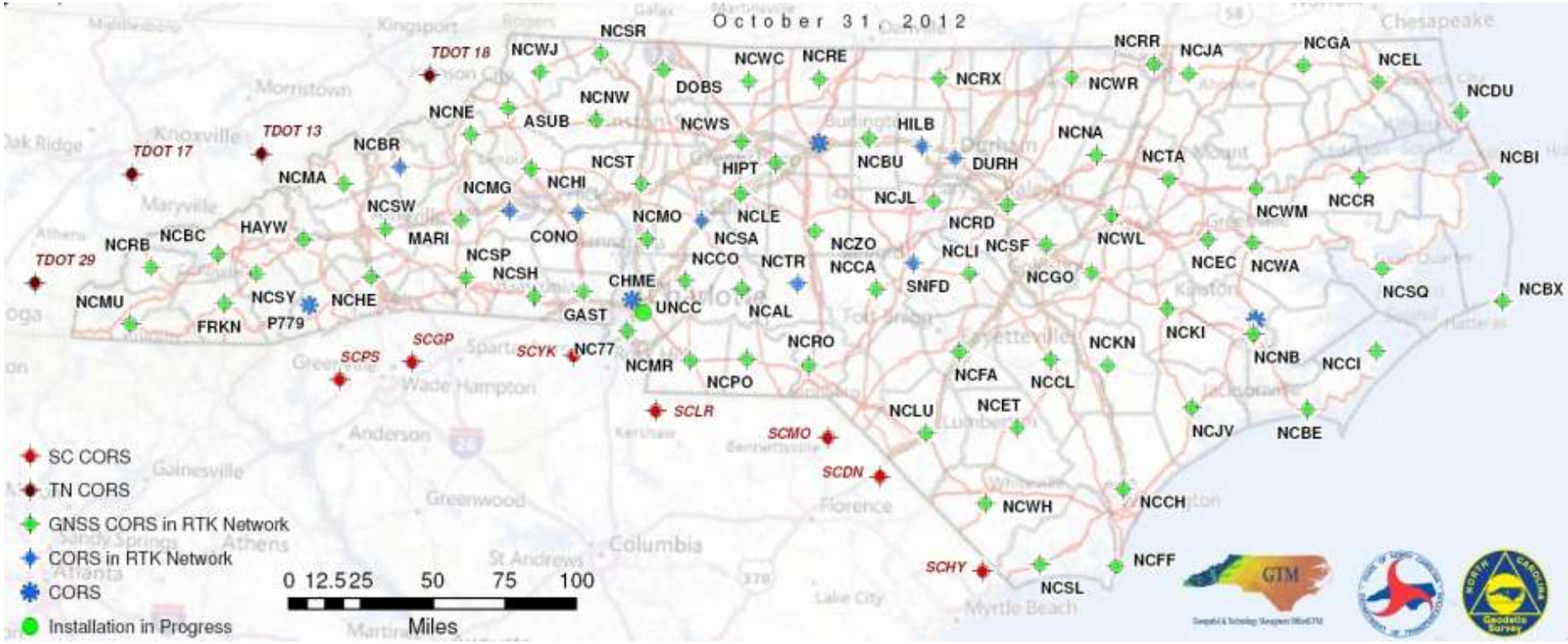
Enter SiteID

CORS Home

National Geodetic Survey - CORS

Done

Operational & Proposed (CORS)



North Carolina Real Time Network (RTN) Upgrade

CORS/RTN Upgrade

- New Servers
  - Three (3) dedicated servers
  - Housed in the western data center
- Software upgrade
  - VRS3-Net
- New features for users
  - Network status
  - Improvements in iono models
  - Access flexibility
- Schedule
  - Servers purchased and installed
  - Software purchased
  - Installation of software has been completed
  - Beta testing completed

CORS/RTN Upgrade

- NCGS operated both systems until to Geoid12 was available

- The new CORS/RTN system will utilize coordinates from the Multi-Year CORS Solution (MYCS)
  - NAD83/2011

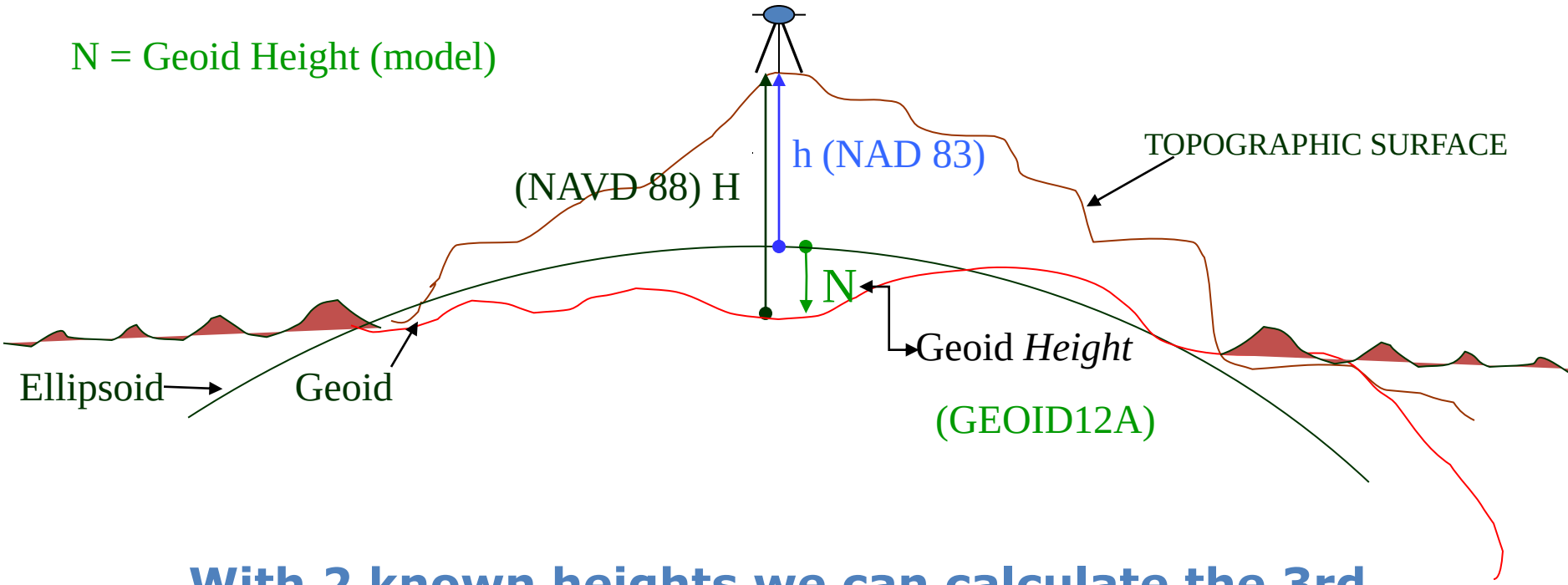
Ellipsoid, Geoid, and Orthometric Heights

H = Orthometric Height (leveling)

h = Ellipsoidal Height (GPS)

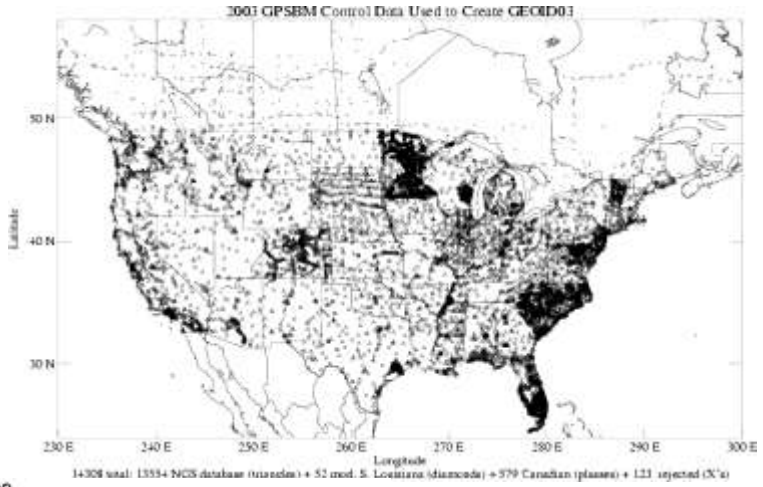
N = Geoid Height (model)

$$H = h - N$$

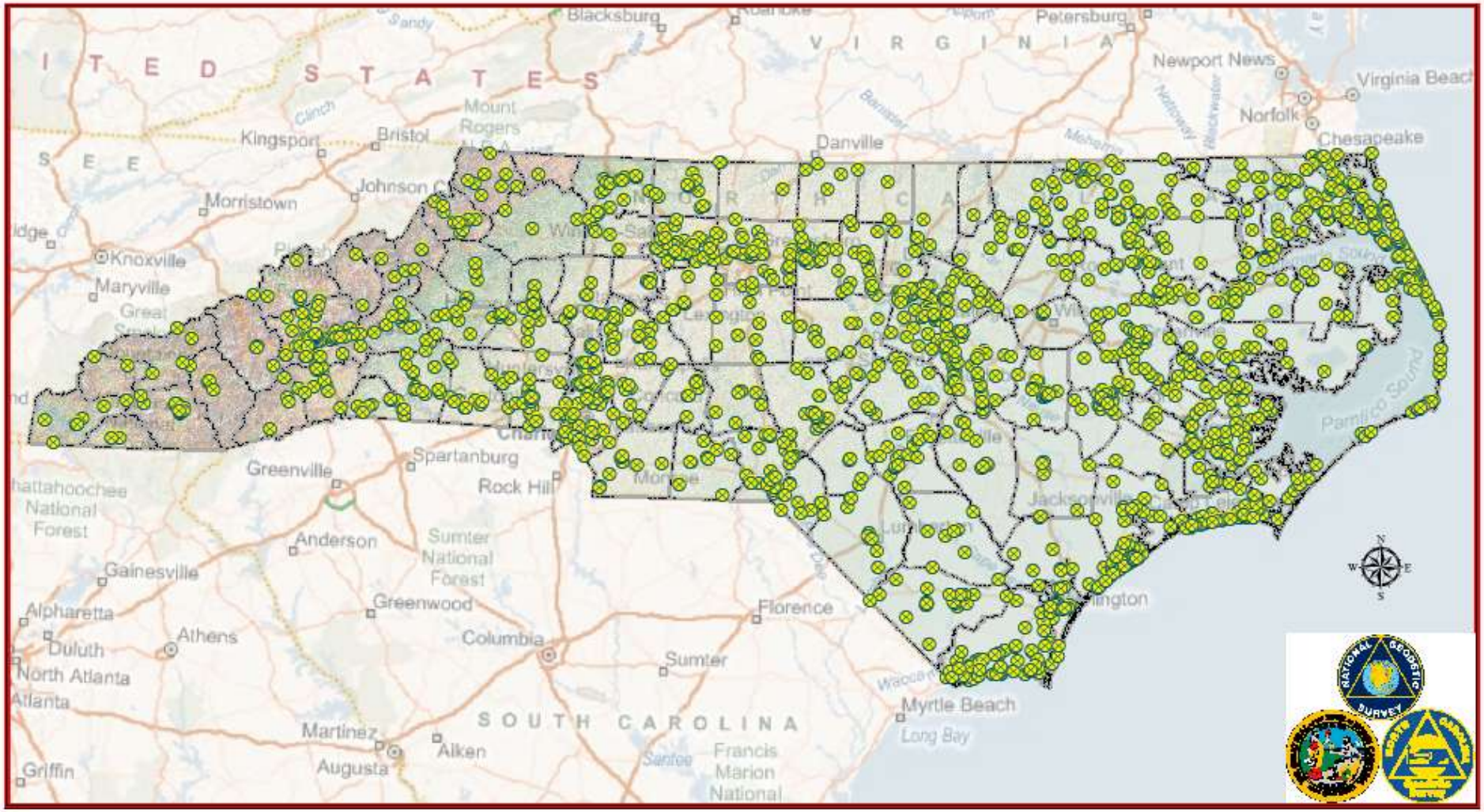


With 2 known heights we can calculate the 3rd

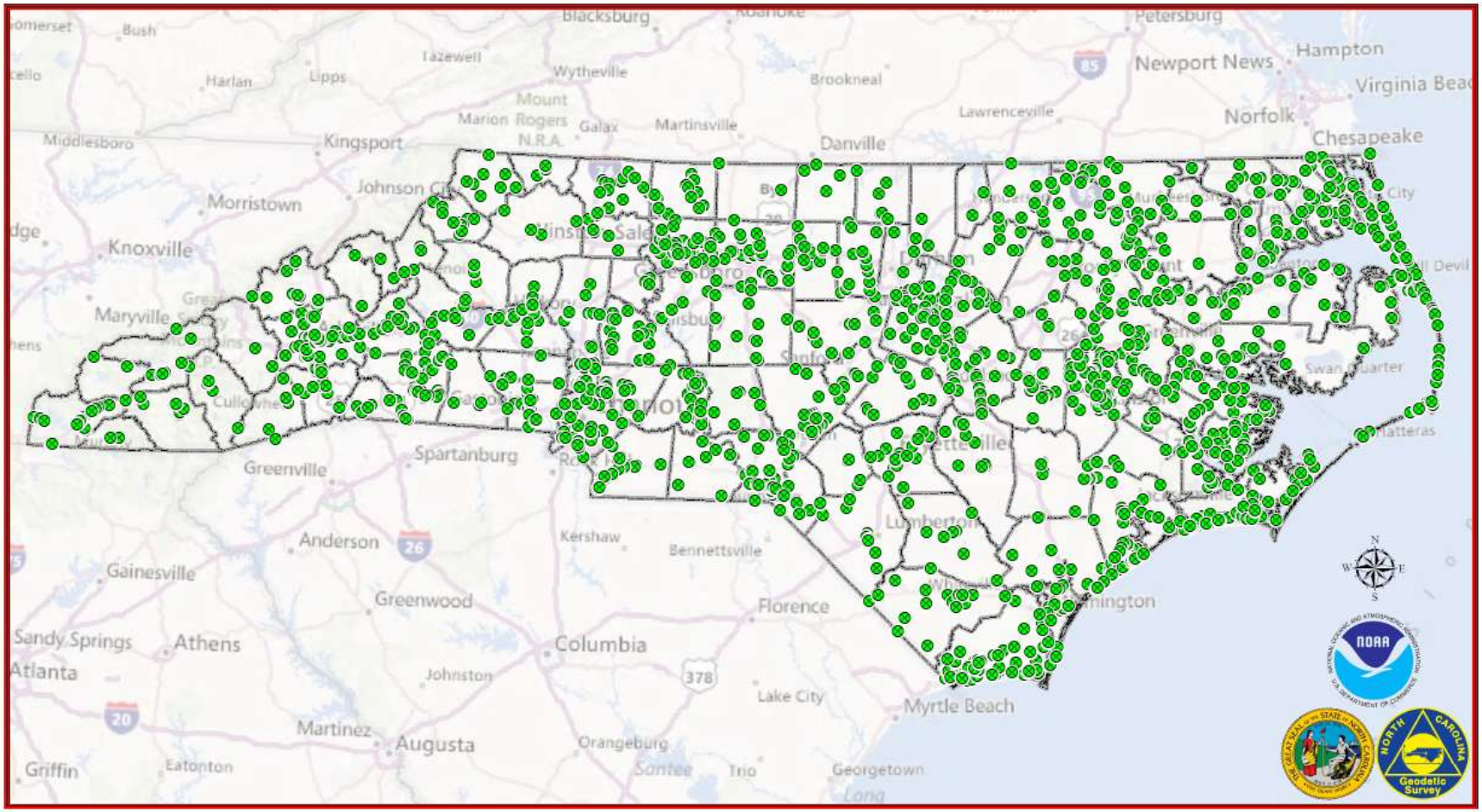
Geoid Model History



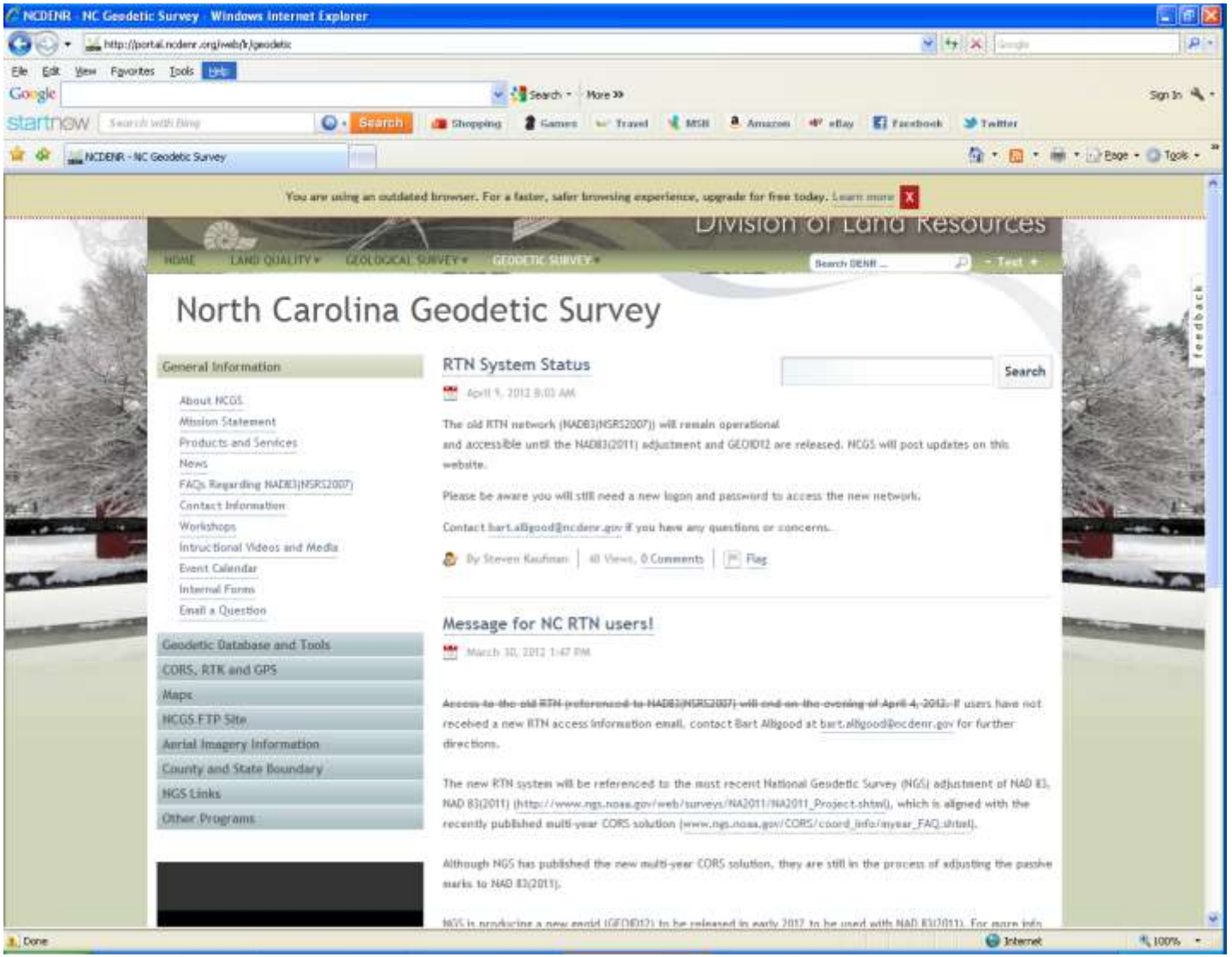
Distribution of Control used for the generation of GEOID 09 in North Carolina



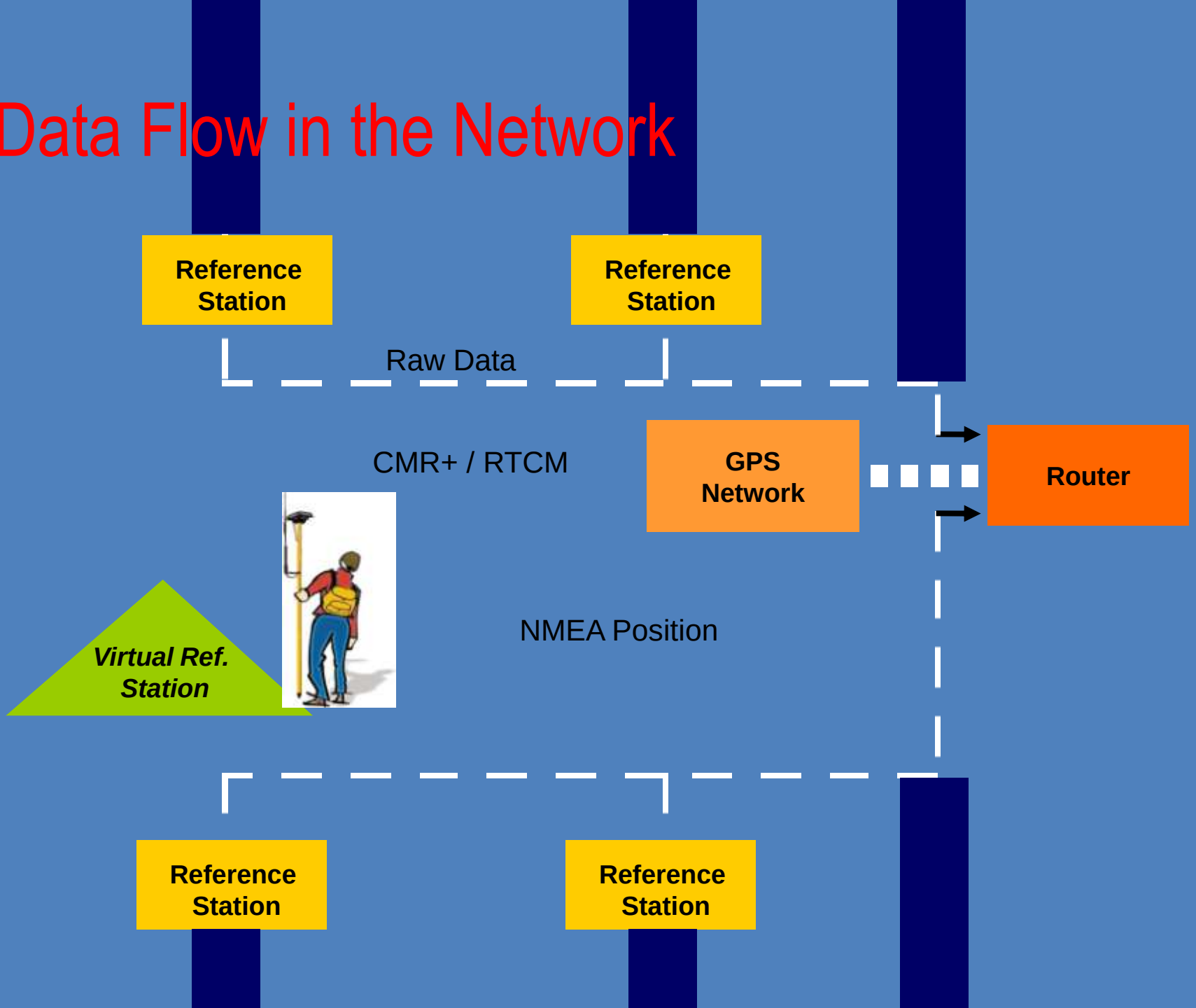
Distribution of Control used for the generation of GEOID 12 in North Carolina



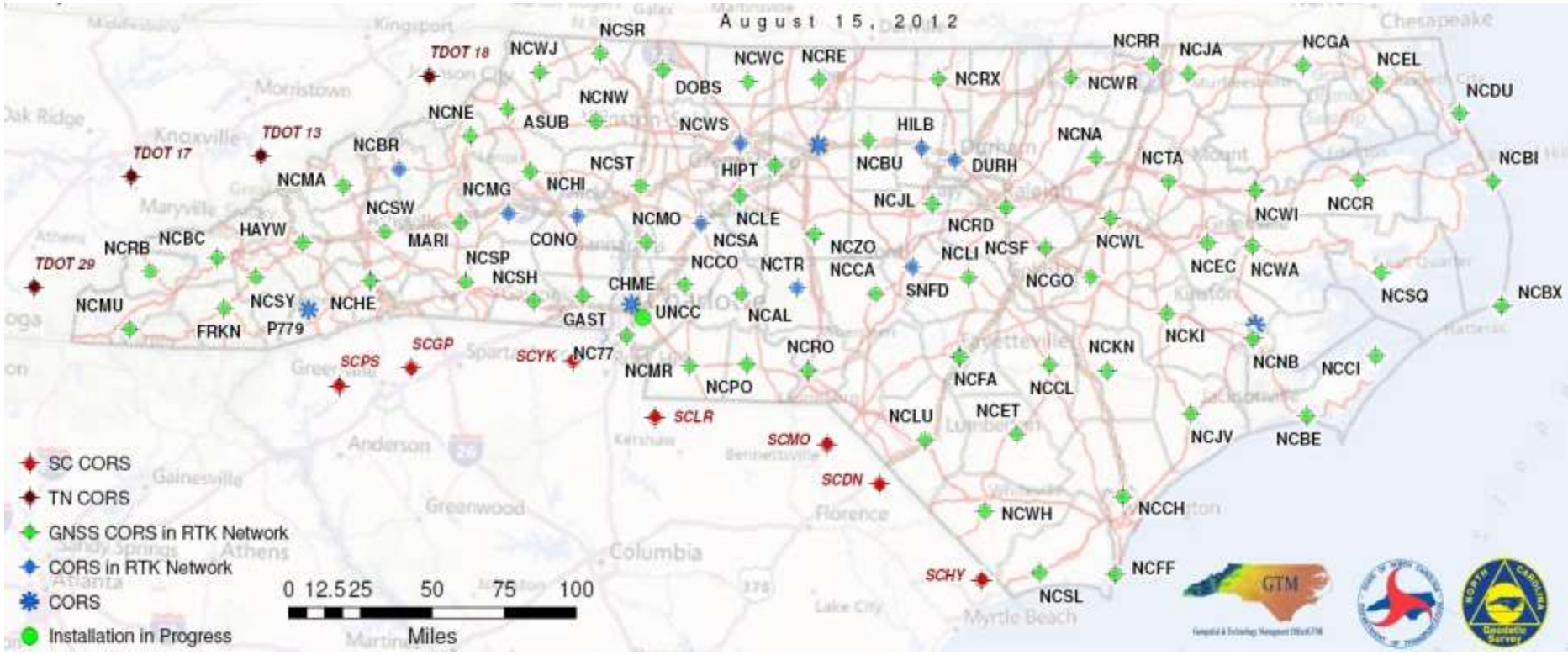
RTN Upgrade Notice



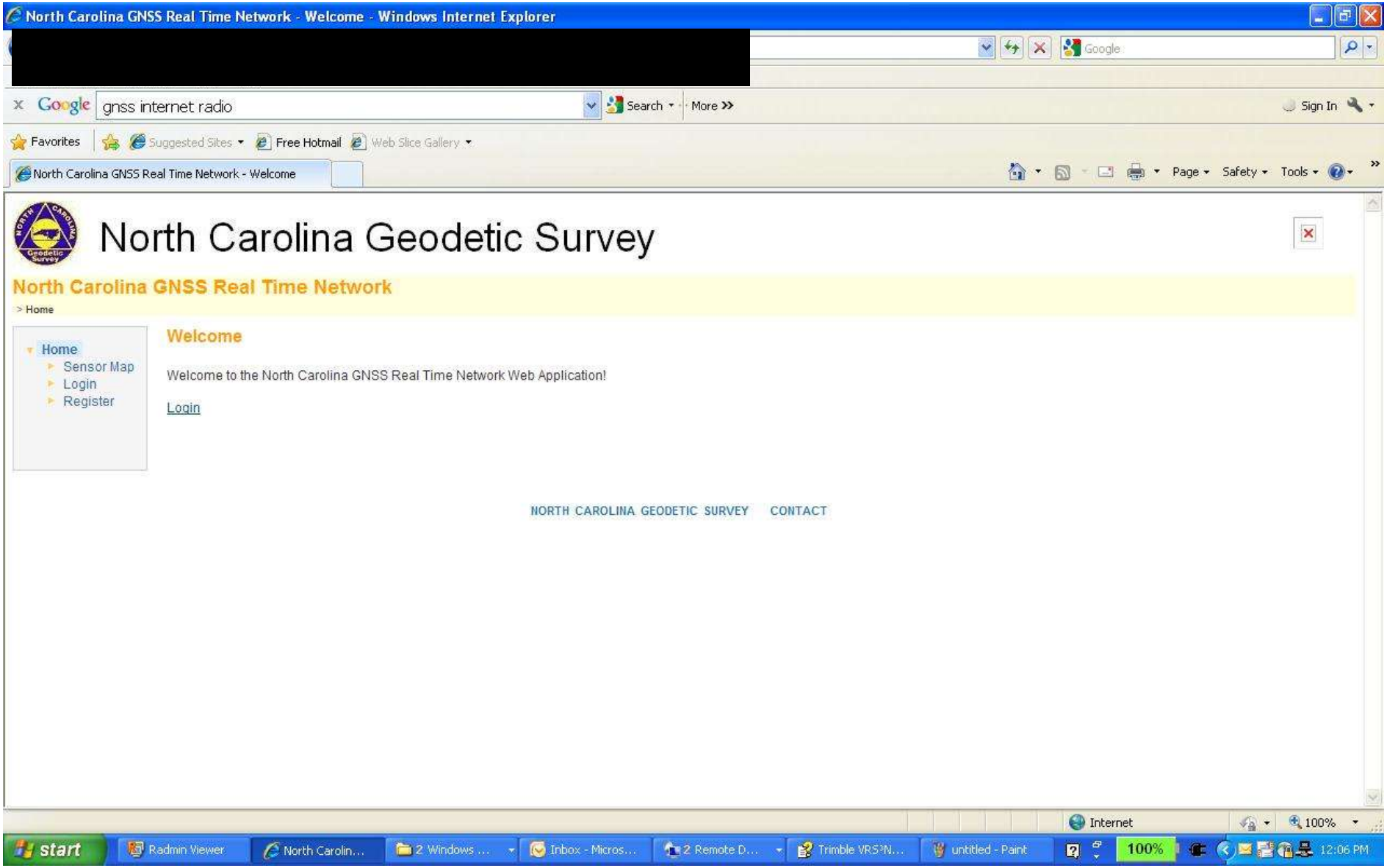
Data Flow in the Network



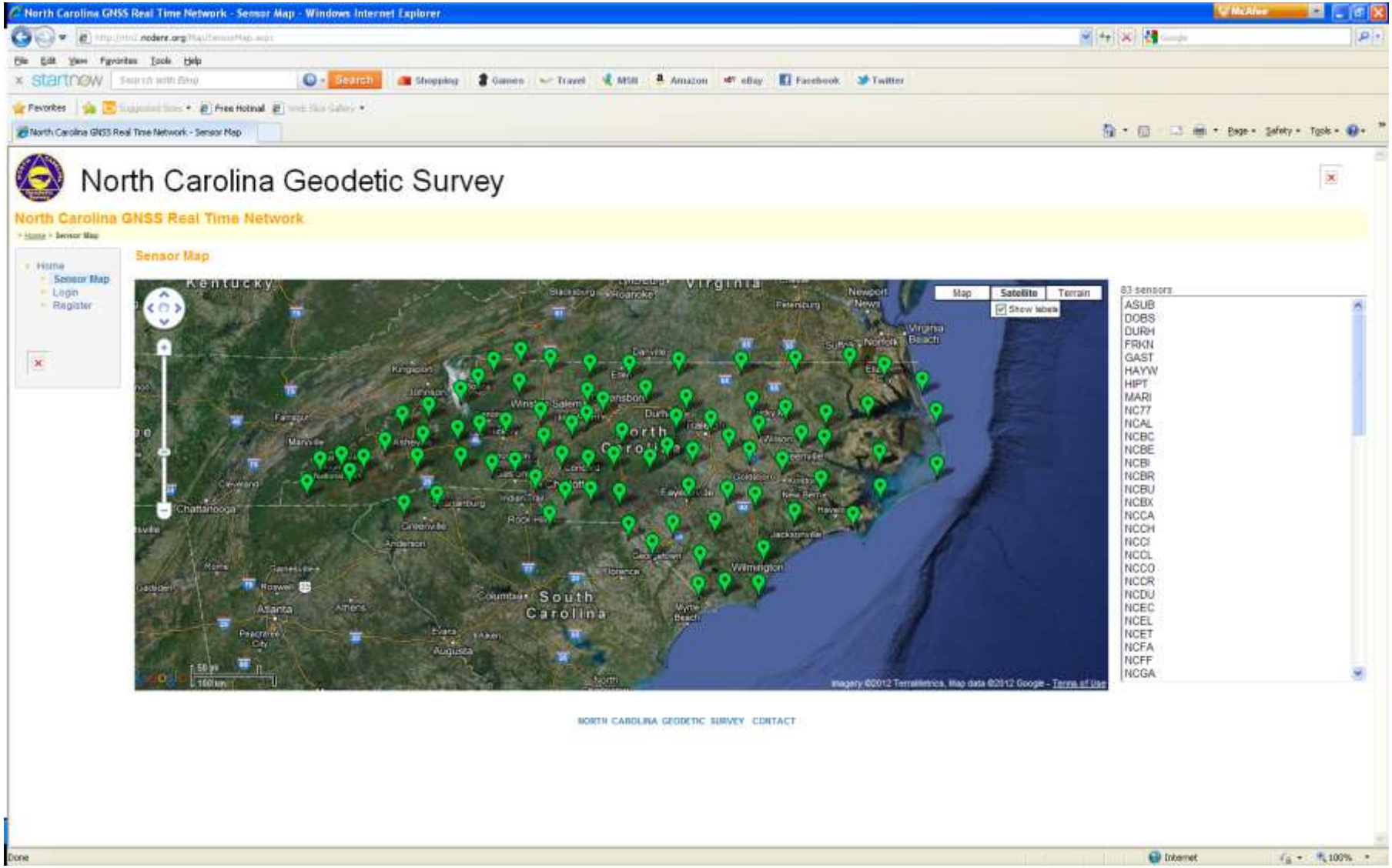
RTN Coverage Area

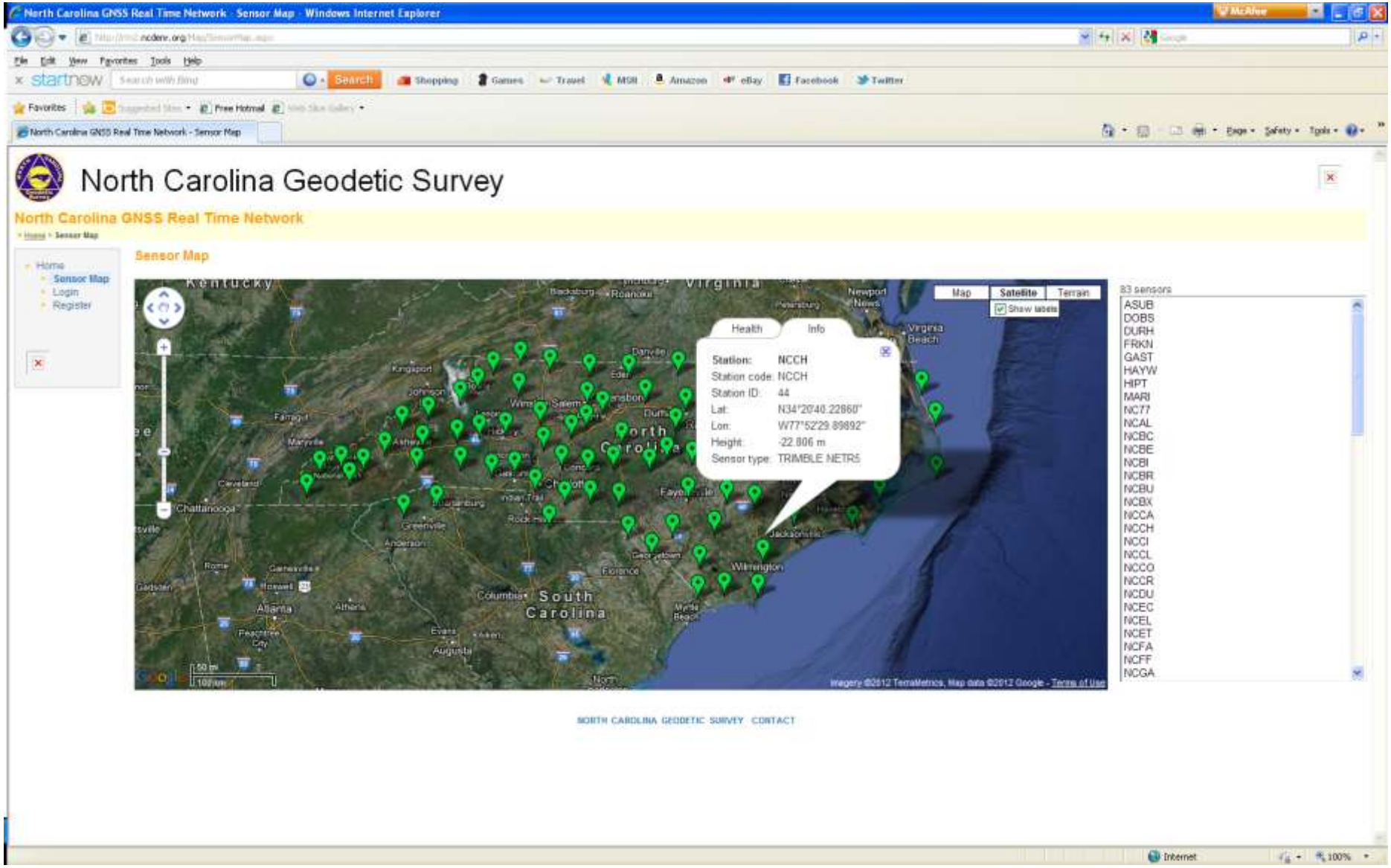


RTN Upgrade


North Carolina GNSS Real Time Network - Welcome - Windows Internet Explorer
gnss internet radio
Search
More
Sign In
Favorites
Suggested Sites
Free Hotmail
Web Slice Gallery
North Carolina GNSS Real Time Network - Welcome
Page
Safety
Tools
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
> Home
Home
Sensor Map
Login
Register
Welcome
Welcome to the North Carolina GNSS Real Time Network Web Application!
Login
NORTH CAROLINA GEODETIC SURVEY
CONTACT
Internet
100%
start
Radmin Viewer
North Carolin...
2 Windows ...
Inbox - Micros...
2 Remote D...
Trimble VRS³N...
untitled - Paint
100%
12:06 PM

RTN Upgrade


North Carolina GNSS Real Time Network - Sensor Map - Windows Internet Explorer
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
Sensor Map
Home
Sensor Map
Login
Register
Map
Satellite
Terrain
Show labels
83 sensors
ASUB
DOBS
DURH
FRKN
GAST
HAYW
HIPT
MARI
NC77
NCAL
NCBC
NCBE
NCBI
NCBR
NCBU
NCBX
NCCA
NCCH
NCCI
NCCL
NCCO
NCCR
NCDU
NCEC
NCEL
NCET
NCFA
NCFF
NCGA
South Carolina
Wilmington
Atlanta
Chattanooga
NORTH CAROLINA GEODETIC SURVEY CONTACT


North Carolina GNSS Real Time Network - Sensor Map - Windows Internet Explorer
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
Home
Sensor Map
Login
Register
Sensor Map
Map
Satellite
Terrain
Show labels
Health
Info
Station: NCCH
Station code: NCCH
Station ID: 44
Lat: N34°20'40.22860"
Lon: W77°52'29.89892"
Height: -22.806 m
Sensor type: TRIMBLE NETR5
83 sensors
ASUB
DOBS
DURH
FRKN
GAST
HAYW
HIPT
MARI
NC77
NCAL
NCBC
NCBE
NCBI
NCBR
NCBU
NCBX
NCCA
NCCH
NCCI
NCCL
NCCO
NCCR
NCDU
NCEC
NCEL
NCET
NCFA
NCFF
NCGA
Kentucky
Virginia
North Carolina
South Carolina
Chattanooga
Atlanta
Augusta
Columbia
Wilmington
Fayetteville
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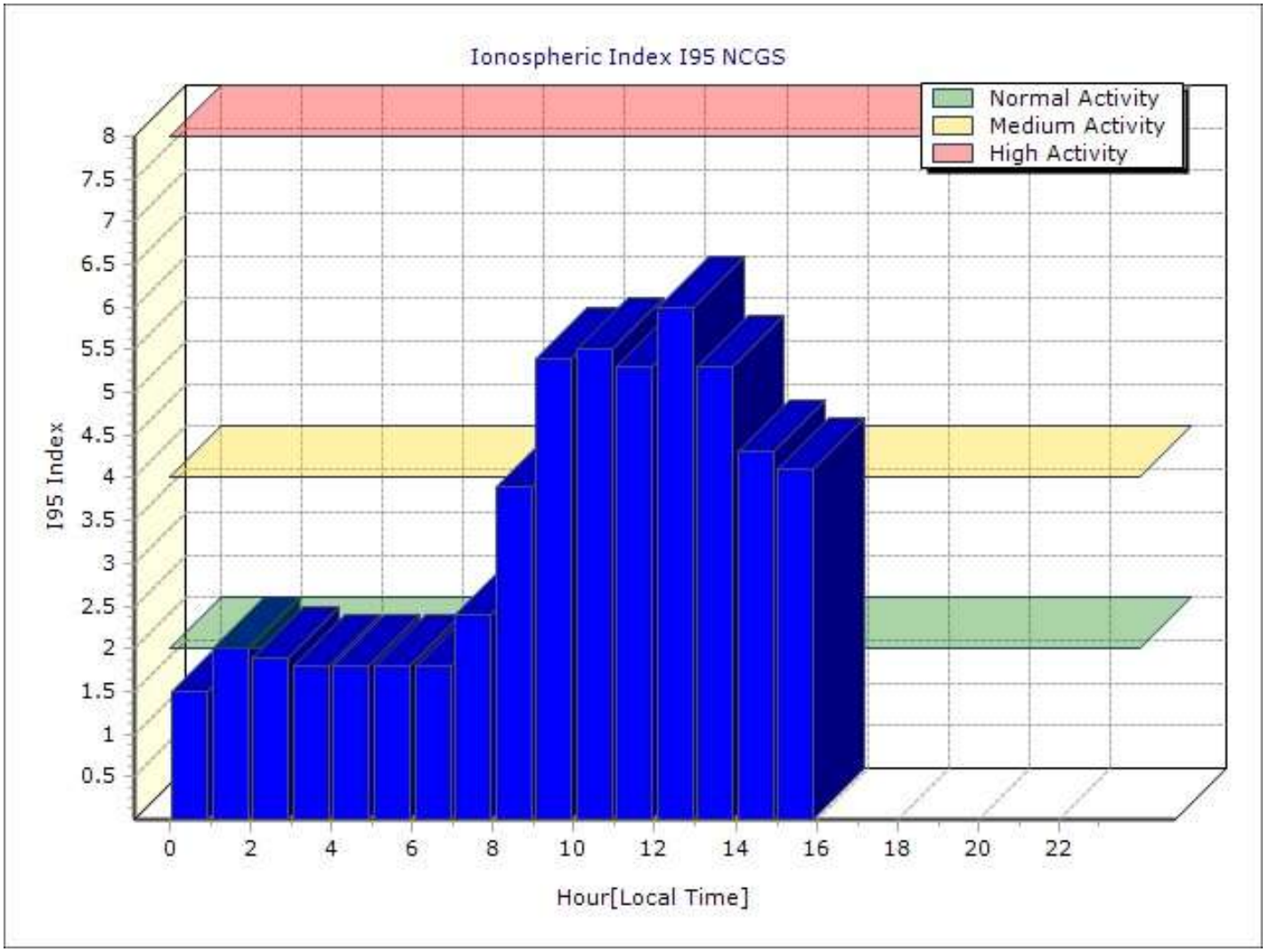
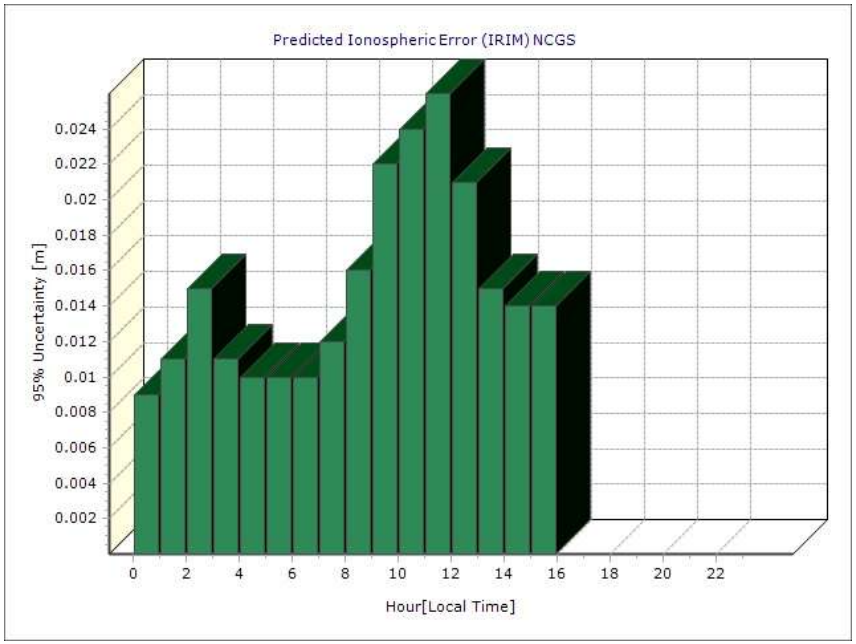
NORTH CAROLINA GEODETIC SURVEY CONTACT

RTN Upgrade


Ionospheric Index I95 NCGS
Normal Activity
Medium Activity
High Activity
I95 Index
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
2
4
6
8
10
12
14
16
18
20
22
Hour[Local Time]

RTN Upgrade


Predicted Ionospheric Error (IRIM) NCGS
95% Uncertainty [m]
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2
4
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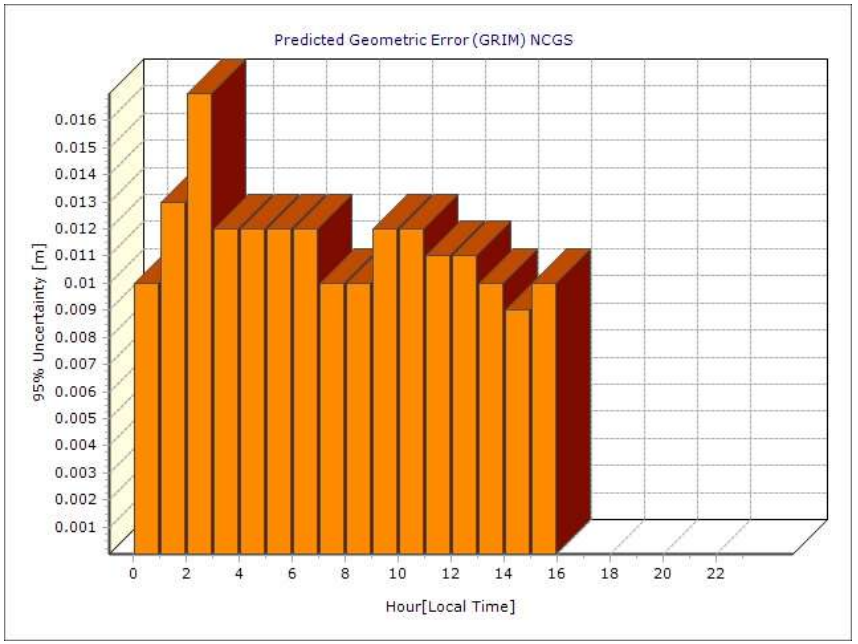
20
22
Hour[Local Time]


Predicted Geometric Error (GRIM) NCGS
95% Uncertainty [m]
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
2
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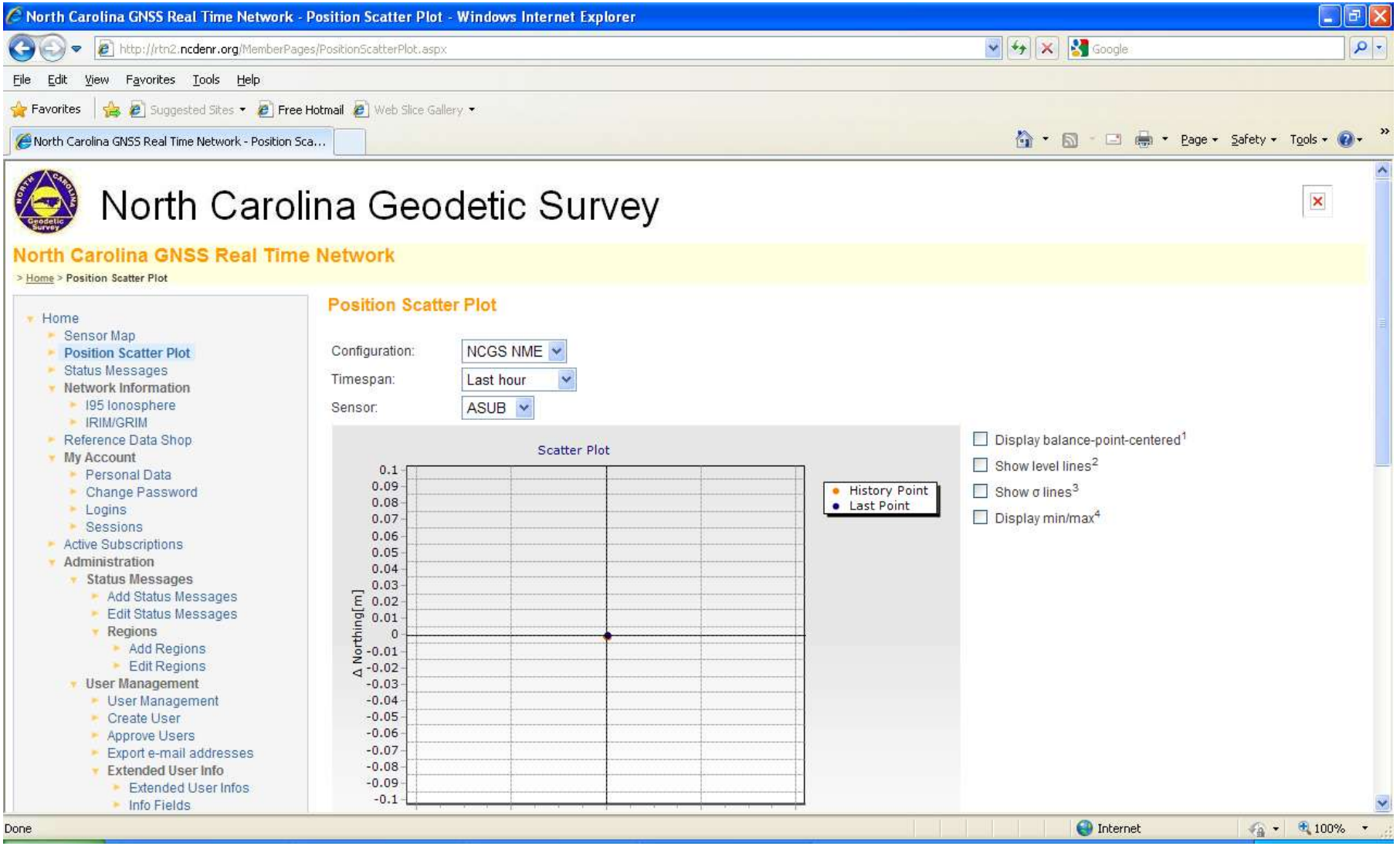
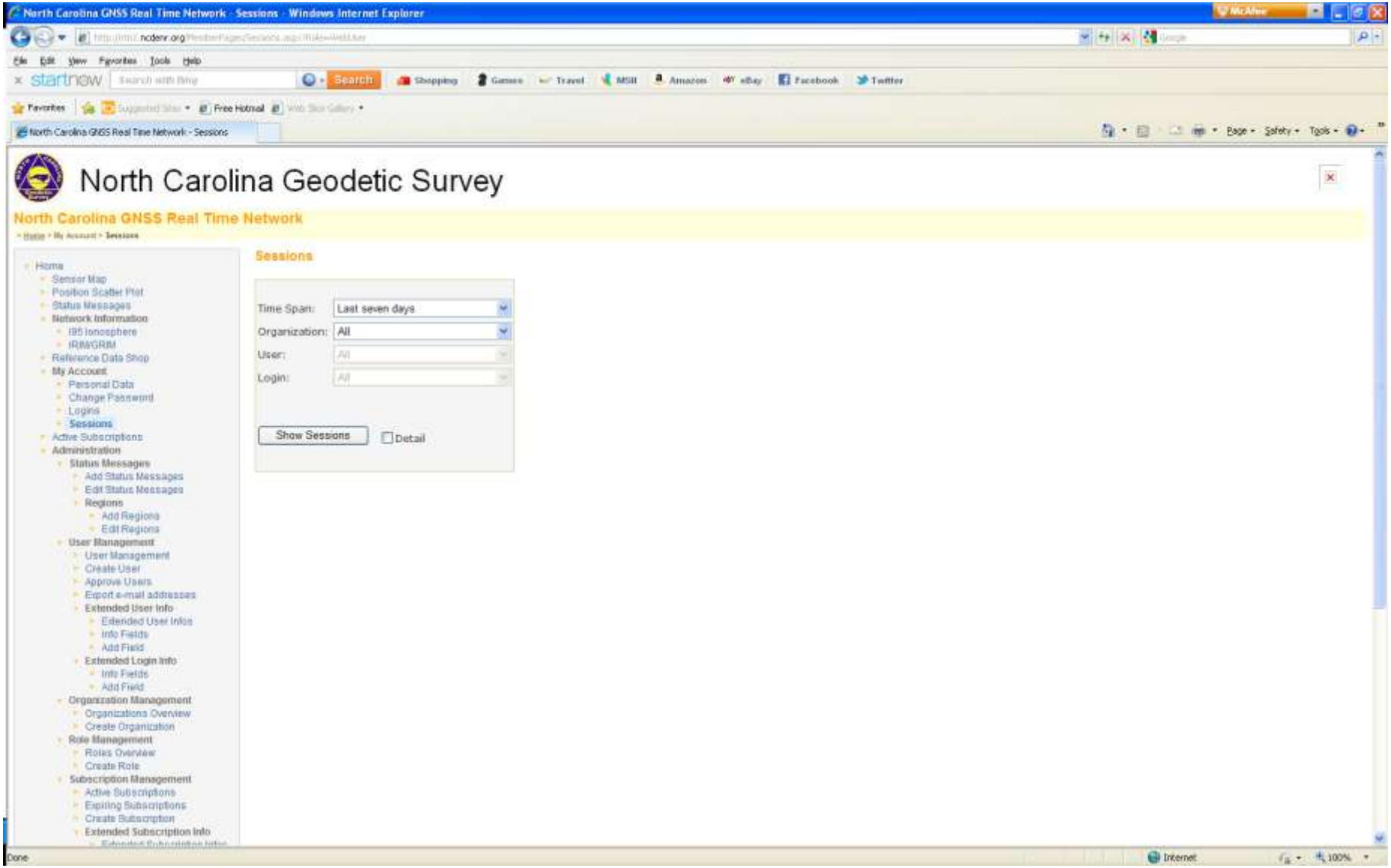
6
8
10
12
14
16
18
20
22
Hour[Local Time]

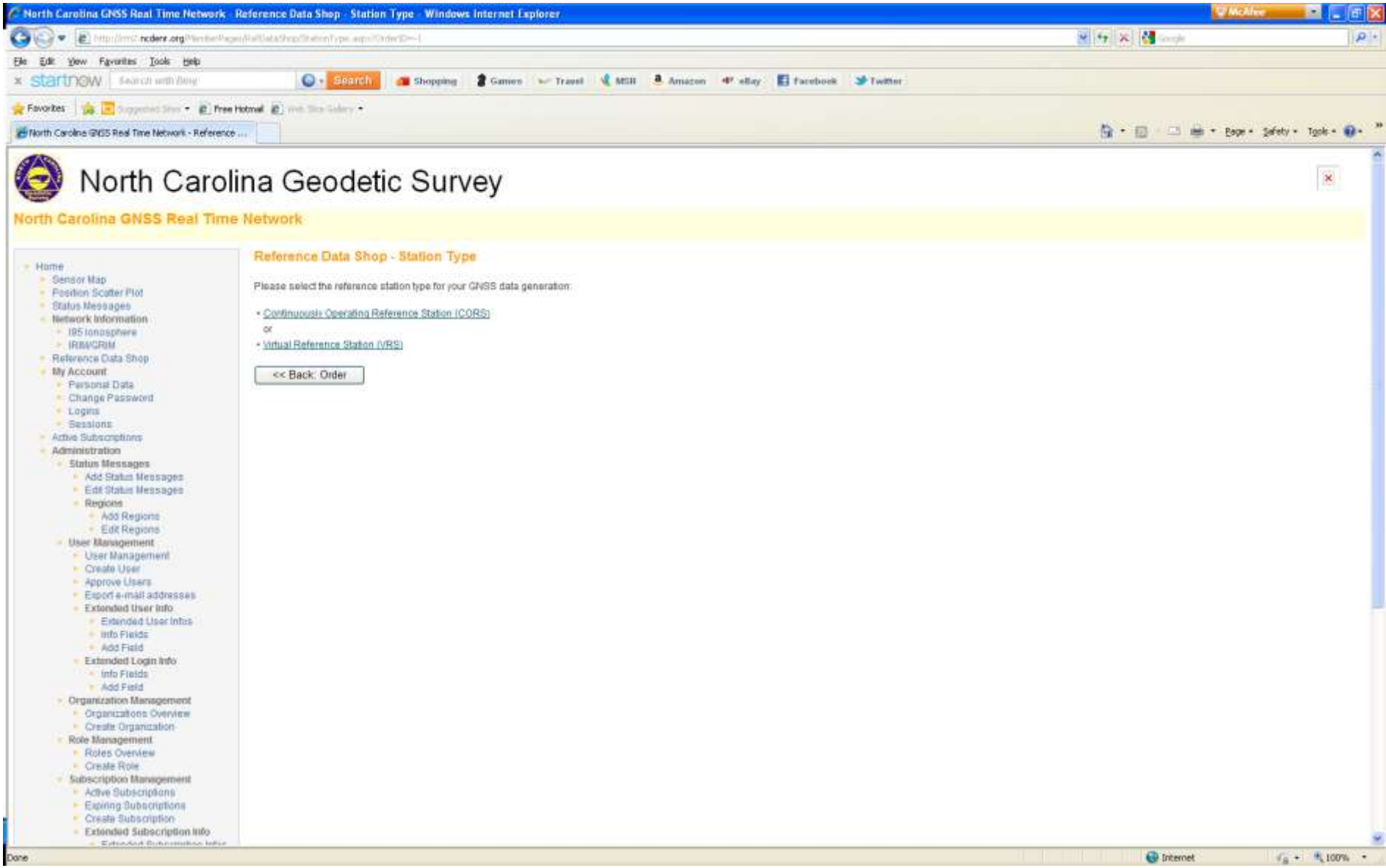
RTN Upgrade


North Carolina GNSS Real Time Network - Position Scatter Plot - Windows Internet Explorer
http://rtn2.ncdenr.org/MemberPages/PositionScatterPlot.aspx
File Edit View Favorites Tools Help
Favorites Suggested Sites Free Hotmail Web Slice Gallery
North Carolina GNSS Real Time Network - Position Sca...
Page Safety Tools
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
> Home > Position Scatter Plot
Home
Sensor Map
Position Scatter Plot
Status Messages
Network Information
I95 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 Infos
Info Fields
Position Scatter Plot
Configuration: NCGS NME
Timespan: Last hour
Sensor: ASUB
Scatter Plot
Δ Northing[m]
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
-0.08
-0.09
-0.1
History Point
Last Point
Display balance-point-centered[1]
Show level lines[2]
Show σ lines[3]
Display min/max[4]
Done
Internet
100%

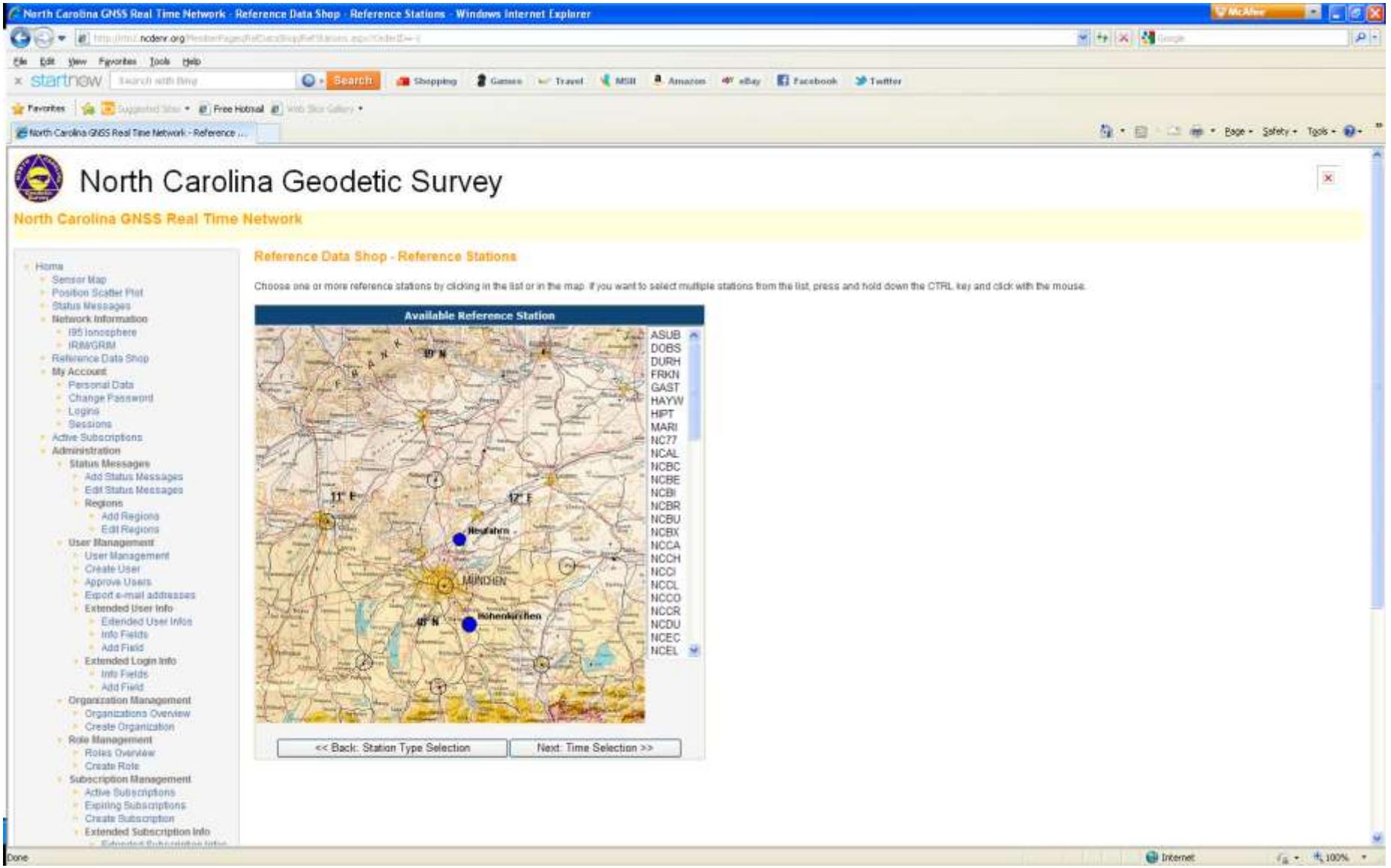
RTN Upgrade


North Carolina GNSS Real Time Network - Sessions - Windows Internet Explorer
North Carolina GNSS Real Time Network - Sessions
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
Sessions
Time Span: Last seven days
Organization: All
User: All
Login: All
Show Sessions
Detail
Home
Sensor Map
Position Scatter Plot
Status Messages
Network Information
IRM/GRM
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 Infos
Info Fields
Add Field
Extended Login Info
Info Fields
Add Field
Organization Management
Organizations Overview
Create Organization
Role Management
Roles Overview
Create Role
Subscription Management
Active Subscriptions
Expiring Subscriptions
Create Subscription
Extended Subscription Info
Done
Internet
100%

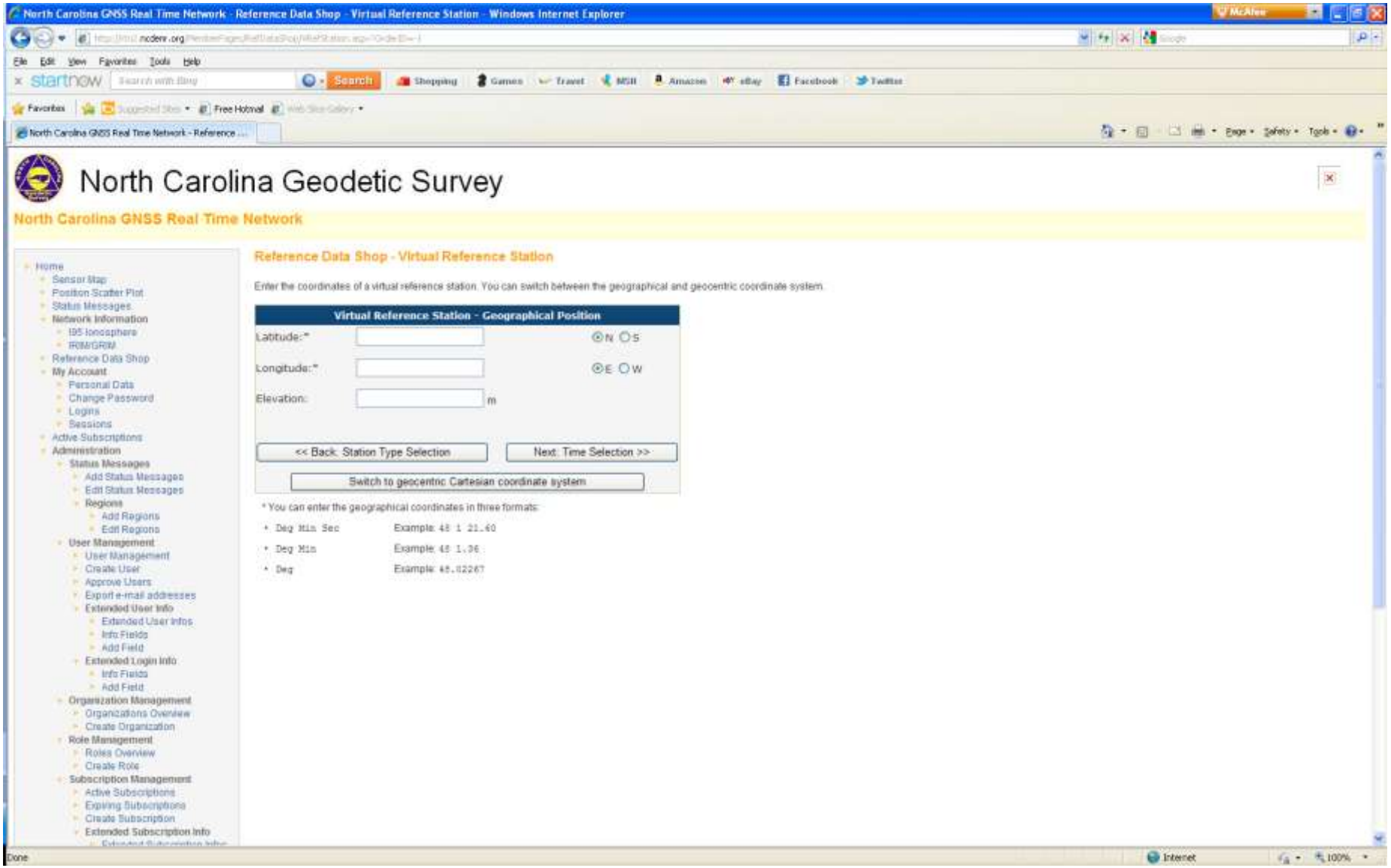
RTN Upgrade


North Carolina GNSS Real Time Network - Reference Data Shop - Station Type - Windows Internet Explorer
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
Reference Data Shop - Station Type
Please select the reference station type for your GNSS data generation:
Continuously Operating Reference Station (CORS)
or
Virtual Reference Station (VRS)
<< Back: Order
Home
Sensor Map
Position Scatter Plot
Status Messages
Network Information
IRI 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 Infos
Info Fields
Add Field
Extended Login Info
Info Fields
Add Field
Organization Management
Organizations Overview
Create Organization
Role Management
Roles Overview
Create Role
Subscription Management
Active Subscriptions
Expiring Subscriptions
Create Subscription
Extended Subscription Info

RTN Upgrade


North Carolina GNSS Real Time Network - Reference Data Shop - Reference Stations - Windows Internet Explorer
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
Reference Data Shop - Reference Stations
Choose one or more reference stations by clicking in the list or in the map. If you want to select multiple stations from the list, press and hold down the CTRL key and click with the mouse.
Available Reference Station
ASUB
DOBS
DURH
FRKN
GAST
HAYW
HIPT
MARI
NC77
NCAL
NCBC
NCBE
NCBI
NCBR
NCBU
NCBX
NCCA
NCCH
NCCI
NCCL
NCCO
NCCR
NCDU
NCEC
NCEL
MÜNCHEN
<< Back: Station Type Selection
Next: Time Selection >>

RTN Upgrade


North Carolina GNSS Real Time Network - Reference Data Shop - Virtual Reference Station - Windows Internet Explorer
North Carolina Geodetic Survey
North Carolina GNSS Real Time Network
Home
Sensor Map
Position Scatter Plot
Status Messages
Network Information
IGS Ionosphere
RIM/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 Infos
Info Fields
Add Field
Extended Login Info
Info Fields
Add Field
Organization Management
Organizations Overview
Create Organization
Role Management
Roles Overview
Create Role
Subscription Management
Active Subscriptions
Expiring Subscriptions
Create Subscription
Extended Subscription Info
Reference Data Shop - Virtual Reference Station
Enter the coordinates of a virtual reference station. You can switch between the geographical and geocentric coordinate system.
Virtual Reference Station - Geographical Position
Latitude:*
N S
Longitude:*
E W
Elevation:
m
<< Back: Station Type Selection
Next: Time Selection >>
Switch to geocentric Cartesian coordinate system
* 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
Done
Internet
100%

CORS Installation Components

- Planning
  - NGS Guidelines
  - Hardware
  - Monumentation
  - Software
  - Communication
- Installation
  - Documentation
  - Submittal to NGS

Guidelines for New and Existing Continuously Operating Reference Stations (CORS)

National Geodetic Survey

National Ocean Survey, NOAA

Silver Spring, MD 20910

February 2006

CORS Hardware

- GNSS Receiver
  - Uninterruptible Power Supply (UPS)
  - Receiver location
  - Surge protection
  - Internet connection

CORS Hardware

- GNSS Antenna
  - Antenna Type
  - Type of leveling device
  - Antenna location
  - Monumentation/mounting
  - Lighting protection
  - Grounding
  - Antenna cable
    - Length/Type
    - Routing

Guidelines –Equipment
Antennas

-L1 and L2

-Radomes NOT recommended

WHY: distort signal and not required in design of antenna

-Oriented to true North

WHY: apply antenna phase center values correctly

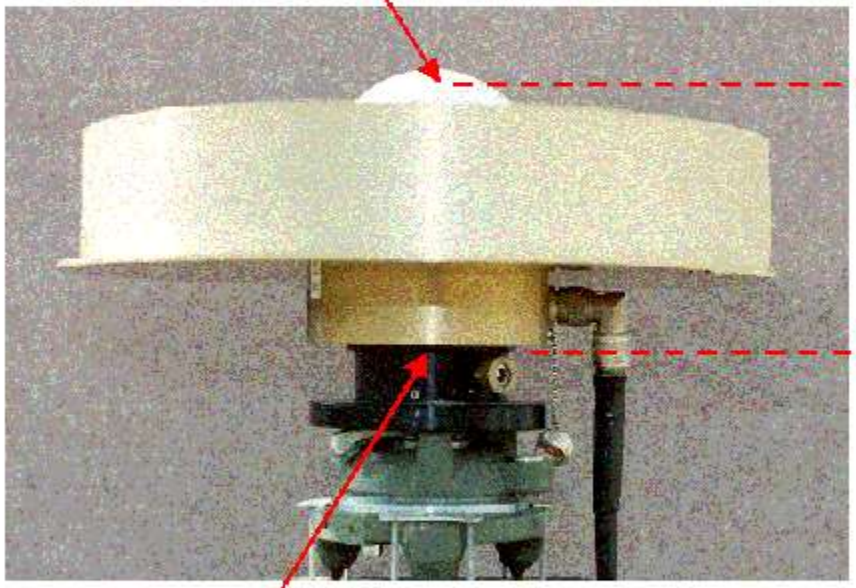
-Reference mark to antenna reference point (ARP) constant

WHY: change antenna same coordinate

CORS Hardware (Leveling Devices)

Edit View Favorites Tools Help
Search Favorites Media
http://www.ngs.noaa.gov/OPUS/Using_OPUS.html#Height_measure
Go

The antenna phase centers are located somewhere around here



The user does not need to know these offsets. They are passed to the processing software through the antenna type

The antenna offsets are the distance between the phase centers and the ARP

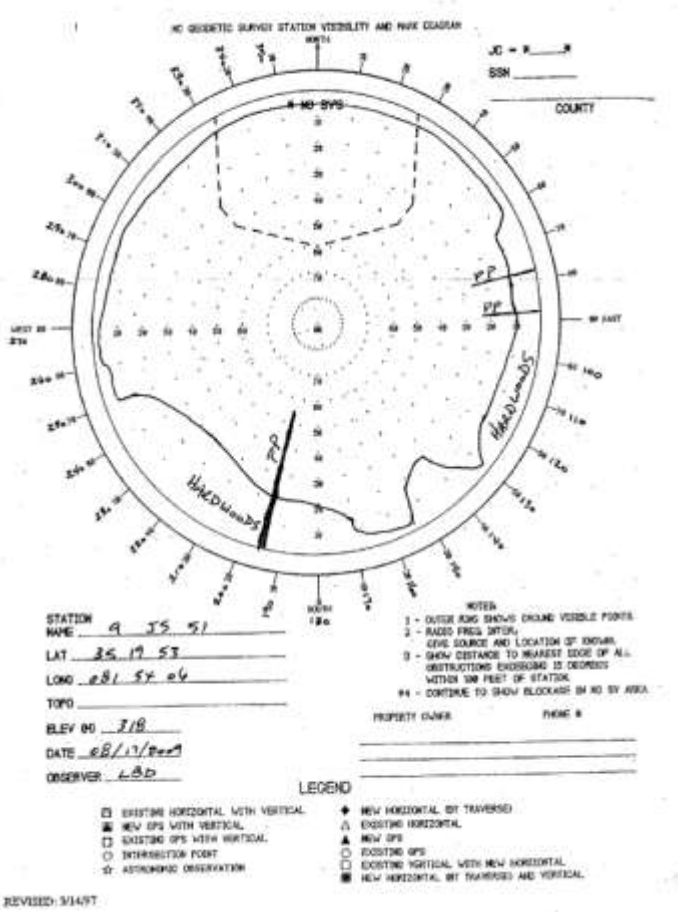
If the user selects NONE as the antenna type, the offsets are set to 0.000 and the antenna phase center becomes the reference point

The Antenna Reference Point (ARP) is almost always located in the center of the bottom surface of the antenna.

Site Selection

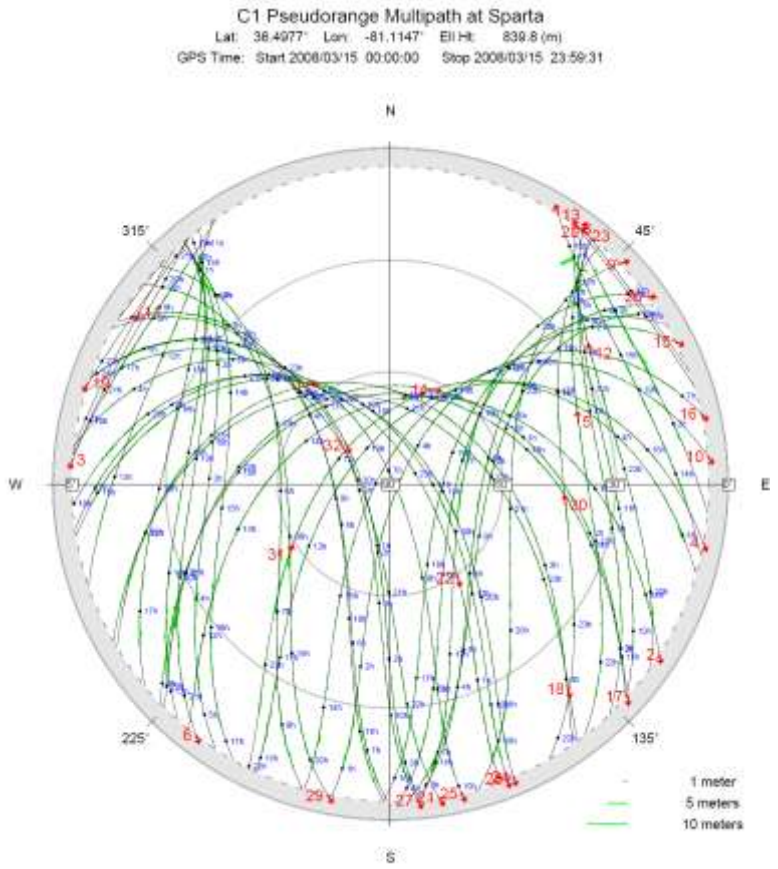
- Clear view of the sky
  - Unobstructed view of the horizon 360 degrees
- No nearby signal reflectors
  - 0.5 m to 1.5 m above horizontal surfaces
- No nearby signal transmitters
  - 300 meters
- Stability
  - Thermal expansion
  - Wind loading
  - Soil expansion/contraction

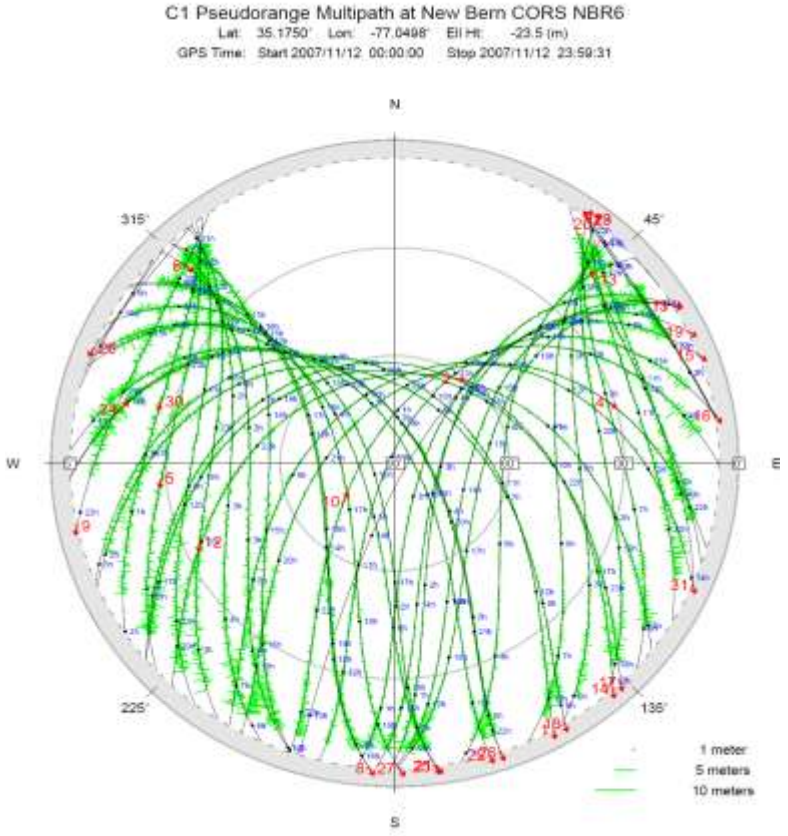
Site Selection



- Reconnaissance
  - Visibility diagram
  - Photographs of proposed location
  - Measurements for monumenatation
  - Cable routing and type
    - Are drilled holes required in walls
    - Length of cable
    - Type of cable (LMR400 or LMR600)
  - Internet connection
  - Collect 24 hours of data

Site Selection





Site Selection

- Building Mount
  - Brick/block or concrete building
  - Building must be 5 years or older
  - Chimney mount requires that chimney be filled with concrete
  - **No Metal Roofs!!!!!**

Monumentation

- Ground Monumentation
  - Concrete
  - Metal

Monumentation

- Drilled-Braced
  - Most stable
  - Specialized equipment required for installation

Monumentation

- Building Mount
  - Rooftop attachment
  - Wall attachment

CORS Administration

- Latency
  - Bandwidth
  - Transmission medium
  - Router and switch performance
  - Firewall
  - Wireless network voice/data traffic

CORS Administration

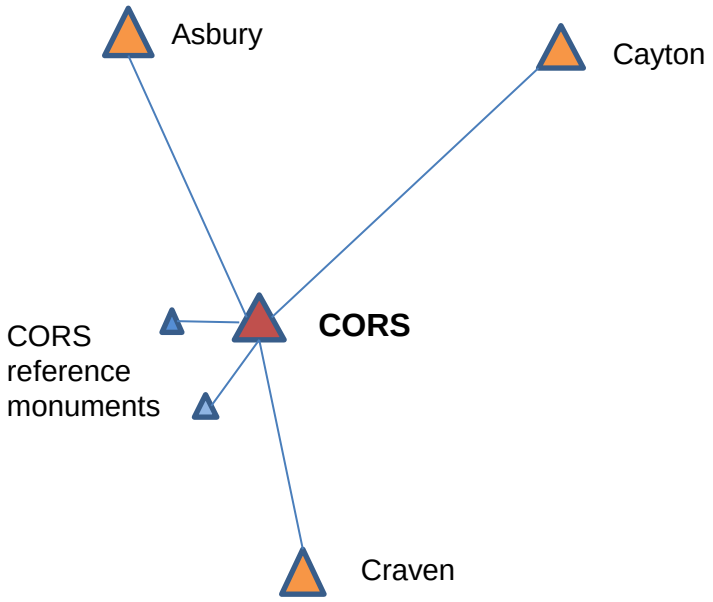
- Reference Station Datum
  - Benefits of using a reference datum that is consistent with the datum used by NGS
    - Easy to verify
    - Consistent with National CORS
    - Can use OPUS to position RTN CORS

CORS Administration

- Reference Station Datum
  - Ramifications of using a datum that differs from a datum utilized by NGS
    - OPUS and RTN solutions are based on different reference datums
    - OPUS can not be used to check RTN solutions
    - RTN can not be used to check OPUS solutions
    - Could create confusion with users

CORS Administration

- Connection to NSRS
  - Recommend local static surveys be performed to connect RTN CORS with local NSRS passive stations
    - NCGS uses NGS-58 to connect the CORS to the NSRS
      - Three (3) HARN monuments
      - Two (2) local CORS reference monuments



CORS Administration

- Connection to NAVD88
  - Connection completed before CORS antenna is installed or afterwards if offset leveling plate has been installed
  - Field techniques
    - Geodetic leveling
    - Trigonometric leveling
    - NGS -58 survey

Geodetic Leveling to CORS ARP

Geodetic Leveling to CORS ARP

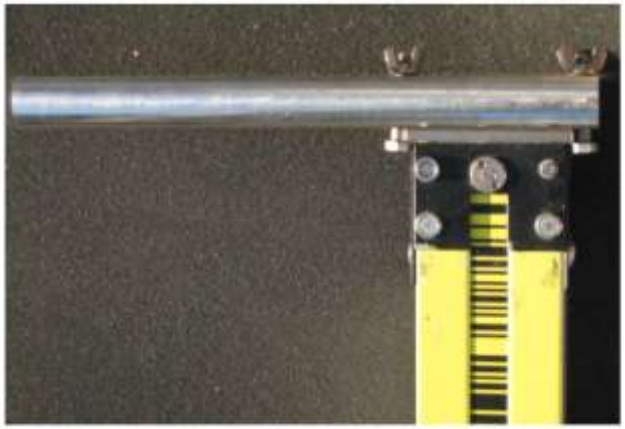


Figure 5. Leveling bar properly attached to rod. Bolt heads grip the rod's base plate.

DATASHEETS - Windows Internet Explorer
http://www.ngs.noaa.gov/cgi-bin/ds_desig.prl
File Edit View Favorites Tools Help
Google Search More Sign In
startnow Search with Bing Search Shopping Games Travel MSN Amazon eBay Facebook Twitter
Favorites Suggested Sites Free Hotmail Web Slice Gallery
DATASHEETS
Page Safety Tools

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

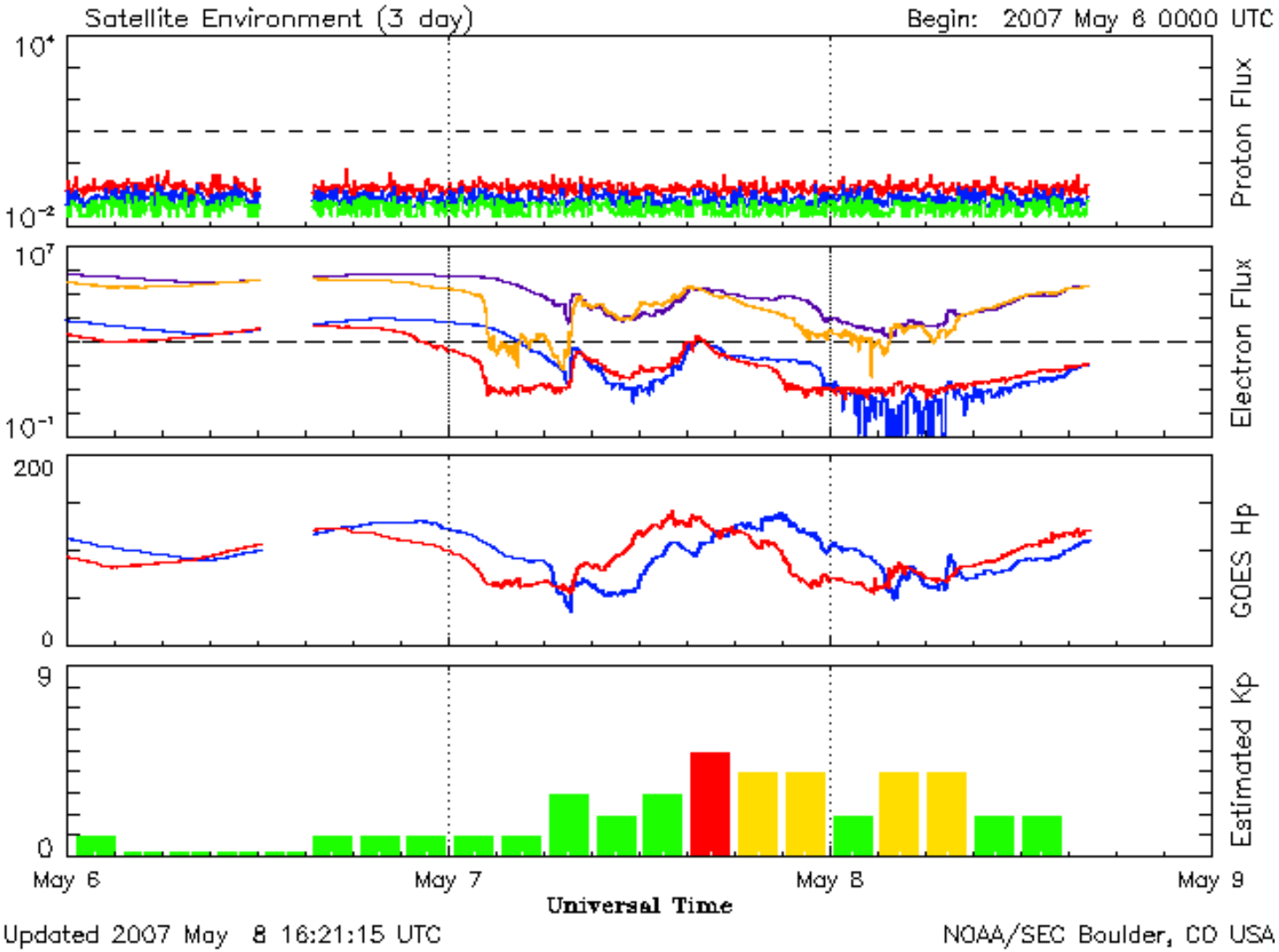
```
DATABASE = NGSIDB , PROGRAM = datasheet95, VERSION = 7.88.3
1        National Geodetic Survey,   Retrieval Date = JUNE 12, 2012
 DK7747 ***********************************************************************
 DK7747  CORS         -  This is a GPS Continuously Operating Reference Station.
 DK7747  DESIGNATION -  CRESWELL CORS ARP
 DK7747  CORS_ID      -  NCCR
 DK7747  PID          -  DK7747
 DK7747  STATE/COUNTY-  NC/WASHINGTON
 DK7747  COUNTRY      -  US
 DK7747  USGS QUAD    -  LEONARDS POINT (1974)
 DK7747
 DK7747                         *CURRENT SURVEY CONTROL
 DK7747
 DK7747* NAD 83(CORS) POSITION- 35 54 56.93119(N) 076 28 25.29233(W)   ADJUSTED
 DK7747* NAD 83(CORS) ELLIP HT-   -28.216 (meters)        (12/??/08)   ADJUSTED
 DK7747* NAD 83(CORS) EPOCH    -  2002.00
 DK7747* NAVD 88 ORTHO HEIGHT -     8.918  (meters)      29.26  (feet) ADJUSTED
 DK7747
 DK7747  NAD 83(CORS) X  -  1,209,562.351 (meters)                     COMP
 DK7747  NAD 83(CORS) Y  - -5,028,018.211 (meters)                     COMP
 DK7747  NAD 83(CORS) Z  -  3,720,613.981 (meters)                     COMP
 DK7747  GEOID HEIGHT    -        -37.10  (meters)                     GEOID09
 DK7747  HORZ ORDER      -  SPECIAL (CORS)
 DK7747  VERT ORDER      -  SECOND    CLASS II
 DK7747  ELLP ORDER      -  SPECIAL (CORS)
 DK7747
 DK7747.The coordinates were established by GPS observations
 DK7747.and adjusted by the National Geodetic Survey in December 2008.
 DK7747
 DK7747.The datum tag of NAD 83(CORS) is equivalent to NAD 83(CORS96).
 DK7747
 DK7747.The coordinates are valid at the epoch date displayed above
 DK7747.which is a decimal equivalence of Year/Month/Day.
 DK7747
 DK7747.The orthometric height was determined by differential leveling and
 DK7747.adjusted in April 2010.
 DK7747
 DK7747.No vertical observational check was made to the station.
 DK7747
```

Done Internet 100%

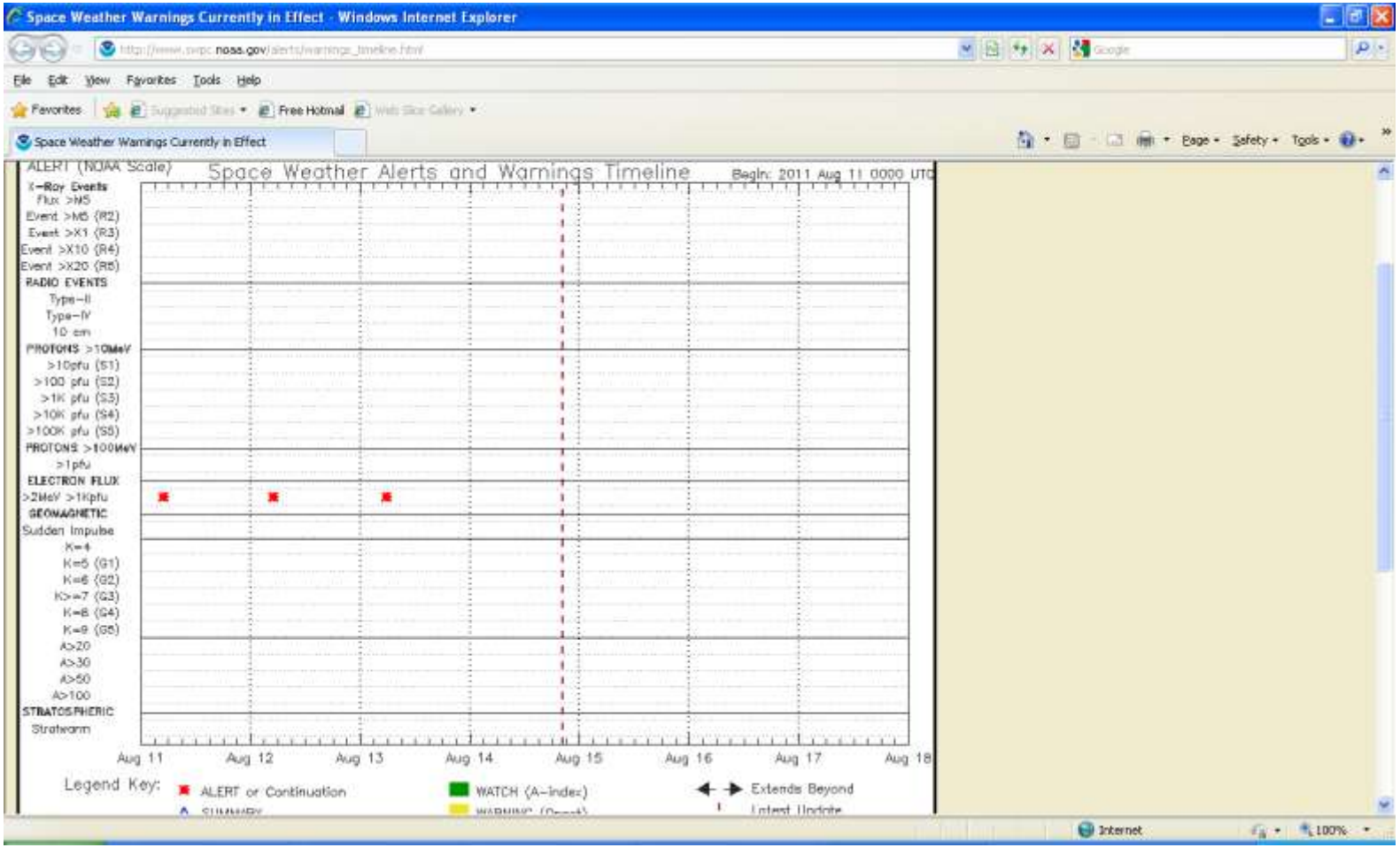
NC Geodetic Survey on Twitter

- NCGS has developed a Twitter web page (http://twitter.com/ncrtn), which is similar to the NCDOT Twitter page (http://twitter.com/ncdot)
- Provides information on the status of NC CORS, RTN, and other web features.

Space Weather



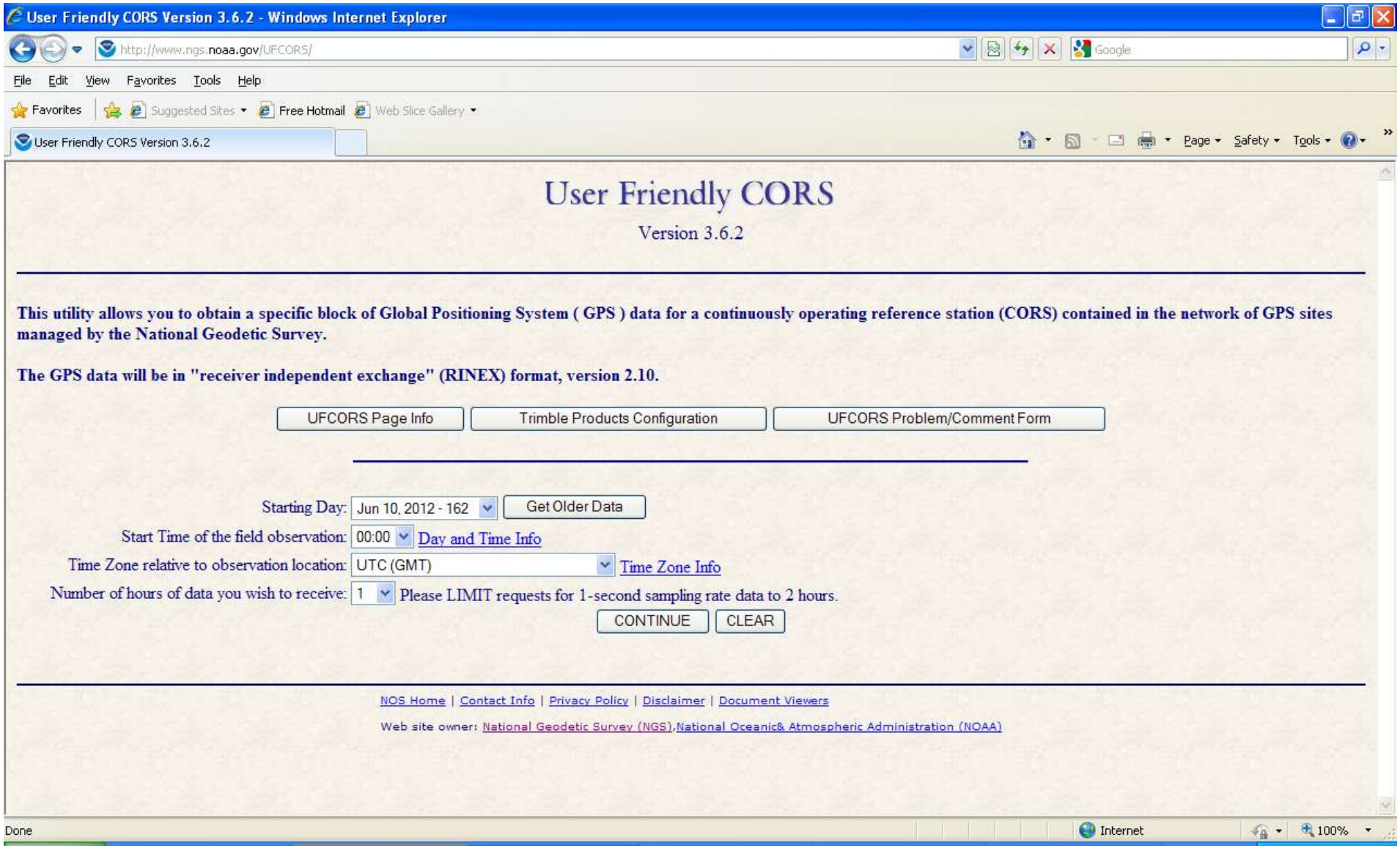
NOAA Space Weather Warnings



2012 CORS Upgrade

- GPS to GPS+GLONASS
  - Durham (DURH)
  - Sanford (SNFD)
  - Troy (NCTR)
  - **Winston Salem (NCWS)**

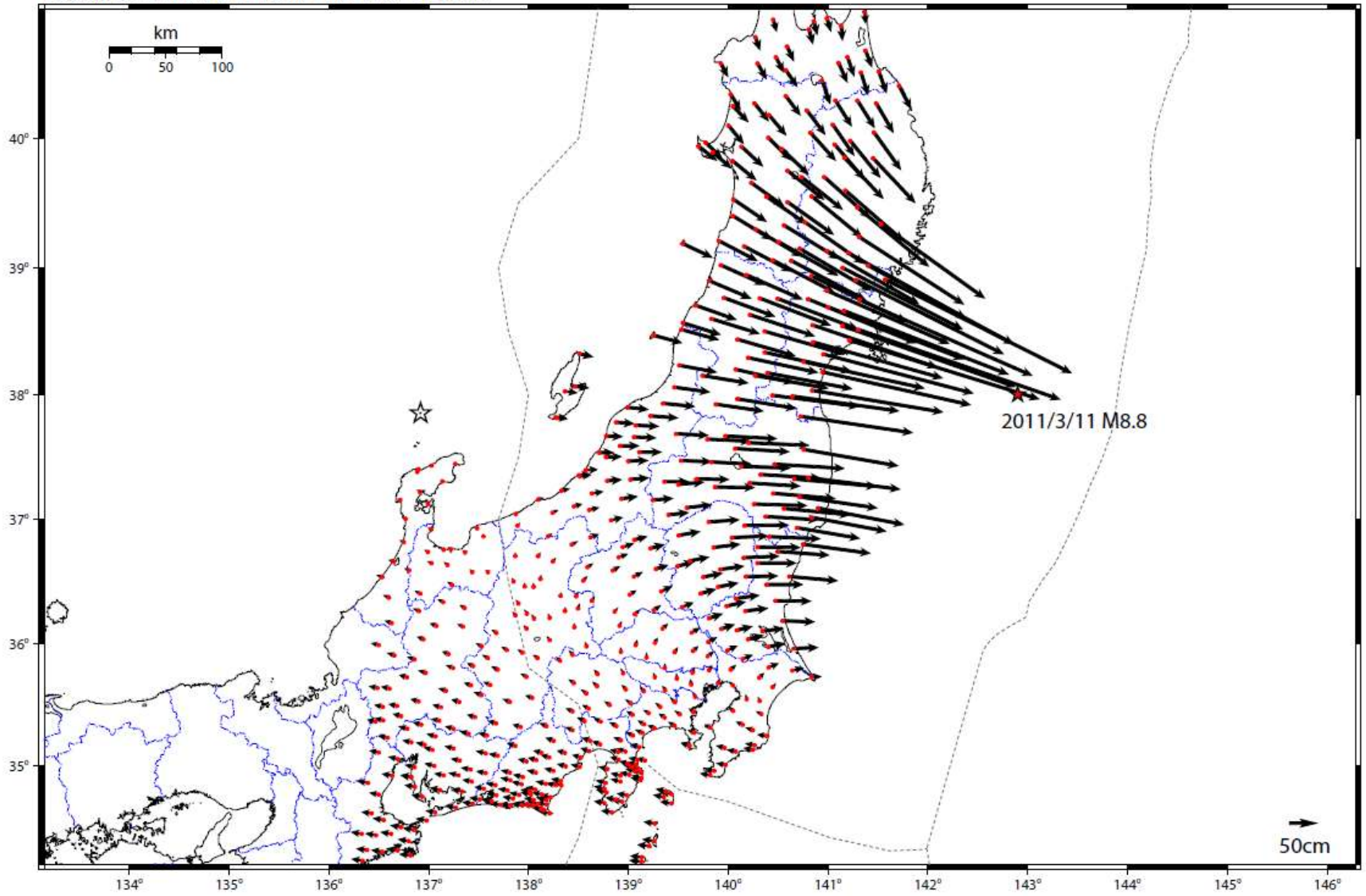
- New CORS
  - University of NC at Charlotte
- New location
  - Move HAYW at Haywood Community College to Bethel Elementary School


User Friendly CORS Version 3.6.2 - Windows Internet Explorer
http://www.ngs.noaa.gov/UFCORS/
Google
File Edit View Favorites Tools Help
Favorites
Suggested Sites
Free Hotmail
Web Slice Gallery
User Friendly CORS Version 3.6.2
Page
Safety
Tools
User Friendly CORS
Version 3.6.2
This utility allows you to obtain a specific block of Global Positioning System (GPS) data for a continuously operating reference station (CORS) contained in the network of GPS sites managed by the National Geodetic Survey.
The GPS data will be in "receiver independent exchange" (RINEX) format, version 2.10.
UFCORS Page Info
Trimble Products Configuration
UFCORS Problem/Comment Form
Starting Day:
Jun 10, 2012 - 162
Get Older Data
Start Time of the field observation:
00:00
Day and Time Info
Time Zone relative to observation location:
UTC (GMT)
Time Zone Info
Number of hours of data you wish to receive:
1
Please LIMIT requests for 1-second sampling rate data to 2 hours.
CONTINUE
CLEAR
NOS Home | Contact Info | Privacy Policy | Disclaimer | Document Viewers
Web site owner: National Geodetic Survey (NGS),National Oceanic& Atmospheric Administration (NOAA)
Done
Internet
100%

User Friendly CORS Version 3.6.2 - Windows Internet Explorer
http://www.ngs.noaa.gov/UFCORS/UFCORS2.jsp
Google
File Edit View Favorites Tools Help
Favorites
Suggested Sites
Free Hotmail
Web Slice Gallery
User Friendly CORS Version 3.6.2
Page
Safety
Tools
User Friendly CORS
Version 3.6.2
GPS data are available for the following sites for your specified time interval:
Site ID:
ncsw
Site Info, Site Map, Data Availability , Time Series
How many seconds do you want between individual data points?
Sampling Rate:
As Is
Data files are decimated to a 30-second sampling rate after they have become 30-days old. You may only request data with sampling rates equal to or lower than the sampling rate available in the CORS Archive.
Would you like the corresponding files?
Coordinate File:
no
Coordinate File Info
Met File:
no
Met File Info
NGS data sheet:
no
IGS Orbits in SP3 format:
no
Orbit File Info
Please choose the compression format.
Files can be compressed using:
pkzip
Compression Info
Processing will take place within a minute. A window will appear after processing that allows you to select where on your hard drive to save the transmitted files.
Also, a window displaying icons for several directories (folders) and files may appear. You may use this window to view the transmitted files. This feature is browser dependent and may not work on your browser.
SUBMIT
CLEAR
Report a problem or send a comment
Internet
100%

変動ベクトル図（水平）

基準期間：2011/03/01 21:00 - 2011/03/08 21:00
比較期間：2011/03/11 16:30 - 2011/03/11 16:30



［基準：Ｒ３速報解　比較：Ｓ３迅速解］

☆固定局：舳倉島（９５０２５２）

国土地理院

Better Positions *and*

Improved Access *to the*

National Spatial Reference System

The National Adjustment of 2011

and related National Geodetic Survey products & services

Scott Lokken
NGS State Advisor (NC)
scott.lokken@noaa.gov

Contents:

- The *National Spatial Reference System*
  - A (very) brief history of NAD 83
  - The latest realization: NAD 83(2011) epoch 2010.00
- Related and dependant NGS products & services
  - The Multi-Year CORS Solution (MYCS)
  - OPUS
  - A new hybrid geoid model (GEOID12)
  - New NAD 83 coordinate transformations
  - New NGS Datasheet format
  - Subsequent Development of GEOID12 (In progress, waiting on NAD83(2011) heights)

A (very) brief history of NAD 83

- Original realization completed in 1986
  - Consisted (almost) entirely of classical (optical) observations
- "High Precision Geodetic Network" (HPGN) and "High Accuracy Reference Network" (HARN) realizations
  - Most done in 1990s, essentially state-by-state
  - Based on GNSS but classical stations included in adjustments
- National Re-Adjustment of 2007
  - NAD 83(CORS96) and (NSRS2007)
  - Simultaneous nationwide adjustment (GNSS only)
- ***New realization: NAD 83(2011) epoch 2010.00***

Introducing…

NAD 83(2011) epoch 2010.00

- **Multi-Year CORS Solution (MYCS)**
  - Reprocessed all CORS GPS data Jan 1994-Apr 2011
  - 2264 CORS & global stations
  - NAD 83 computed by *transformation* from IGS08
- **National Adjustment of 2011-- NAD83(2011)**
  - New adjustment of GNSS passive control
  - GNSS vectors tied (and constrained) to CORS NAD 83(2011) epoch 2010.00
  - Approximately 80,000 stations and 400,000 GNSS vectors
- **Realization SAME for CORS *and* passive marks**
- **This is *NOT* a new datum! (still NAD 83)**

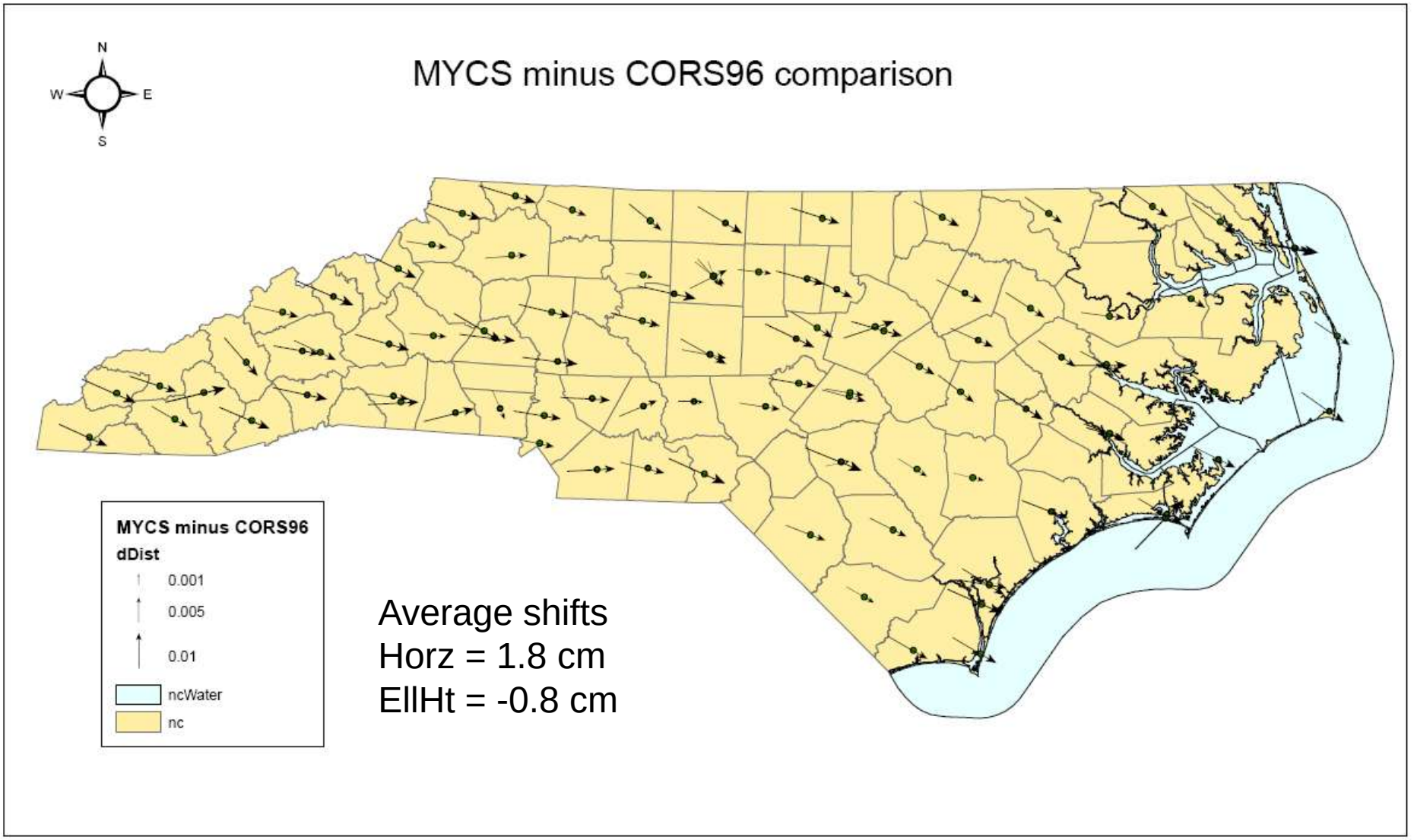
Why a new NAD 83 realization?

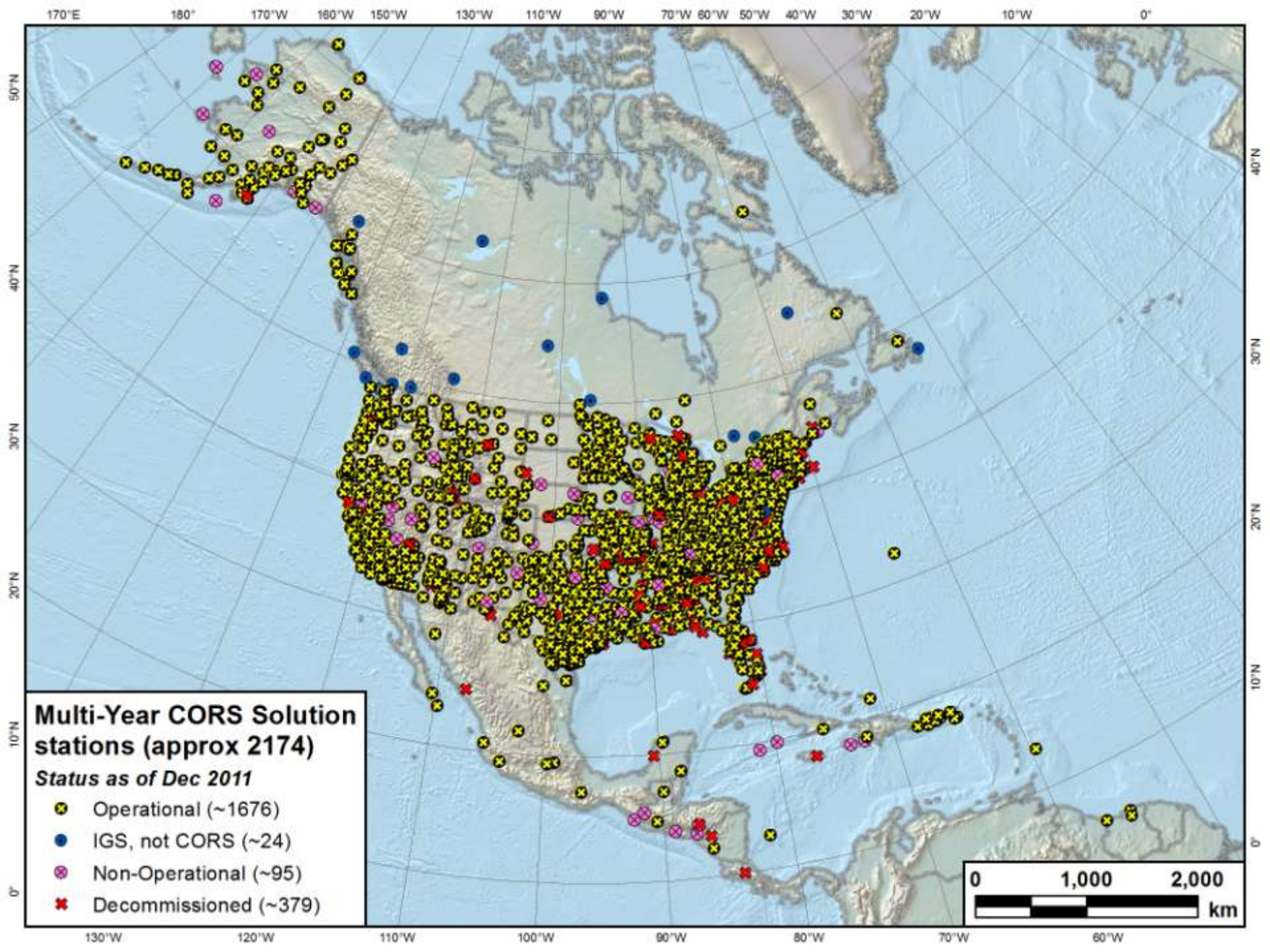
- Previous NAD 83(CORS96) needed many improvements
- NSRS improvements achieved with the MYCS include:
  - Consistent coordinates and velocities from combined solution
  - Aligned with most recent realization of global frame (IGS08)
    - **IGS08 epoch 2005.0** (previous aligned at epoch 1997.0)
    - **NAD 83 epoch 2010.0** (previous epochs of 2002.0 and 2003.0)
  - Major processing algorithm, modeling, metadata improvements
  - Absolute phase center antenna calibrations
- **Highly accurate *and* consistent CORS coordinates *and* velocities determined using *B*est *A*vailable *M*ethods**
  - ***Needed because CORS network is foundation of NSRS***

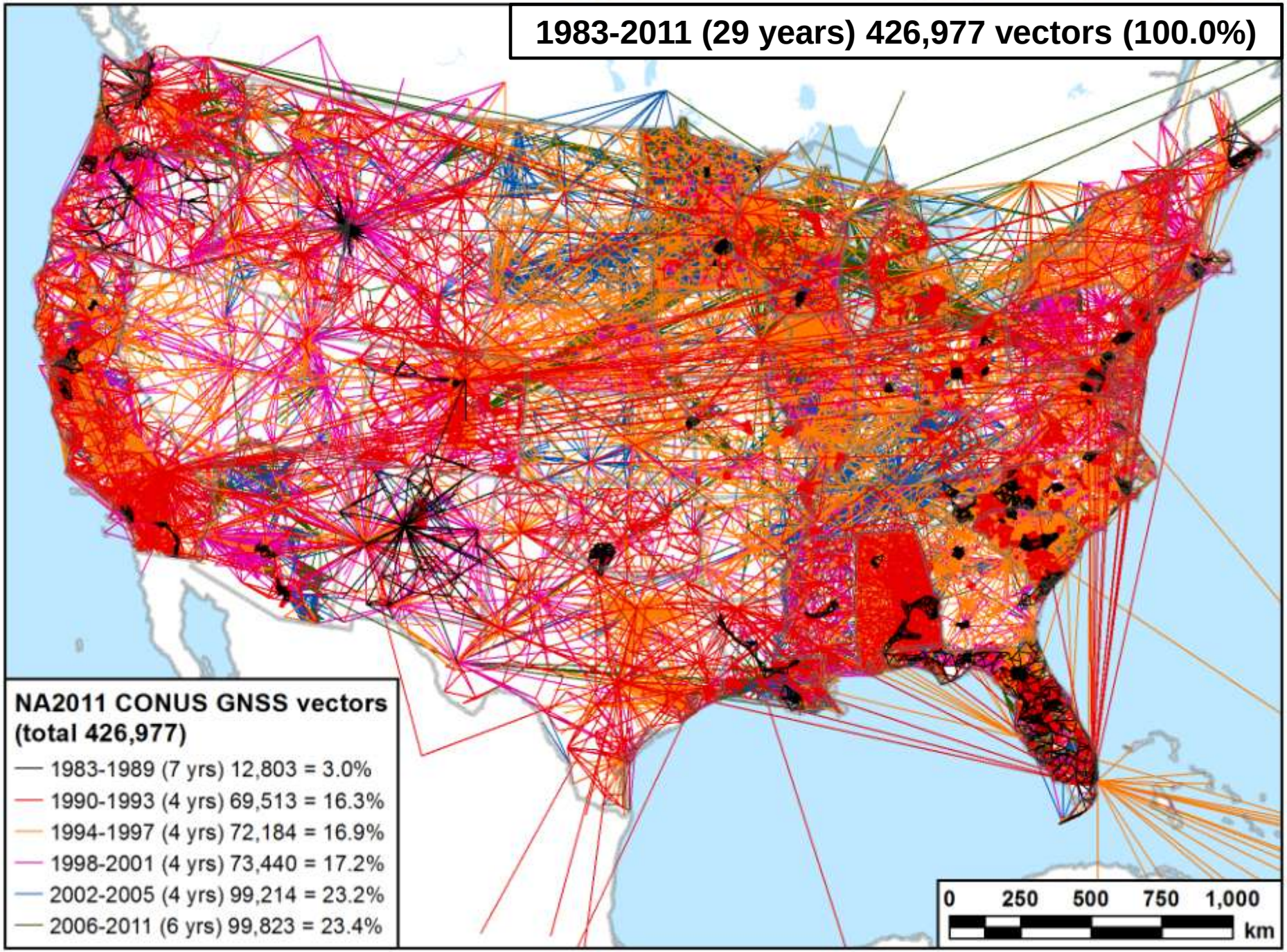
New Adjustment

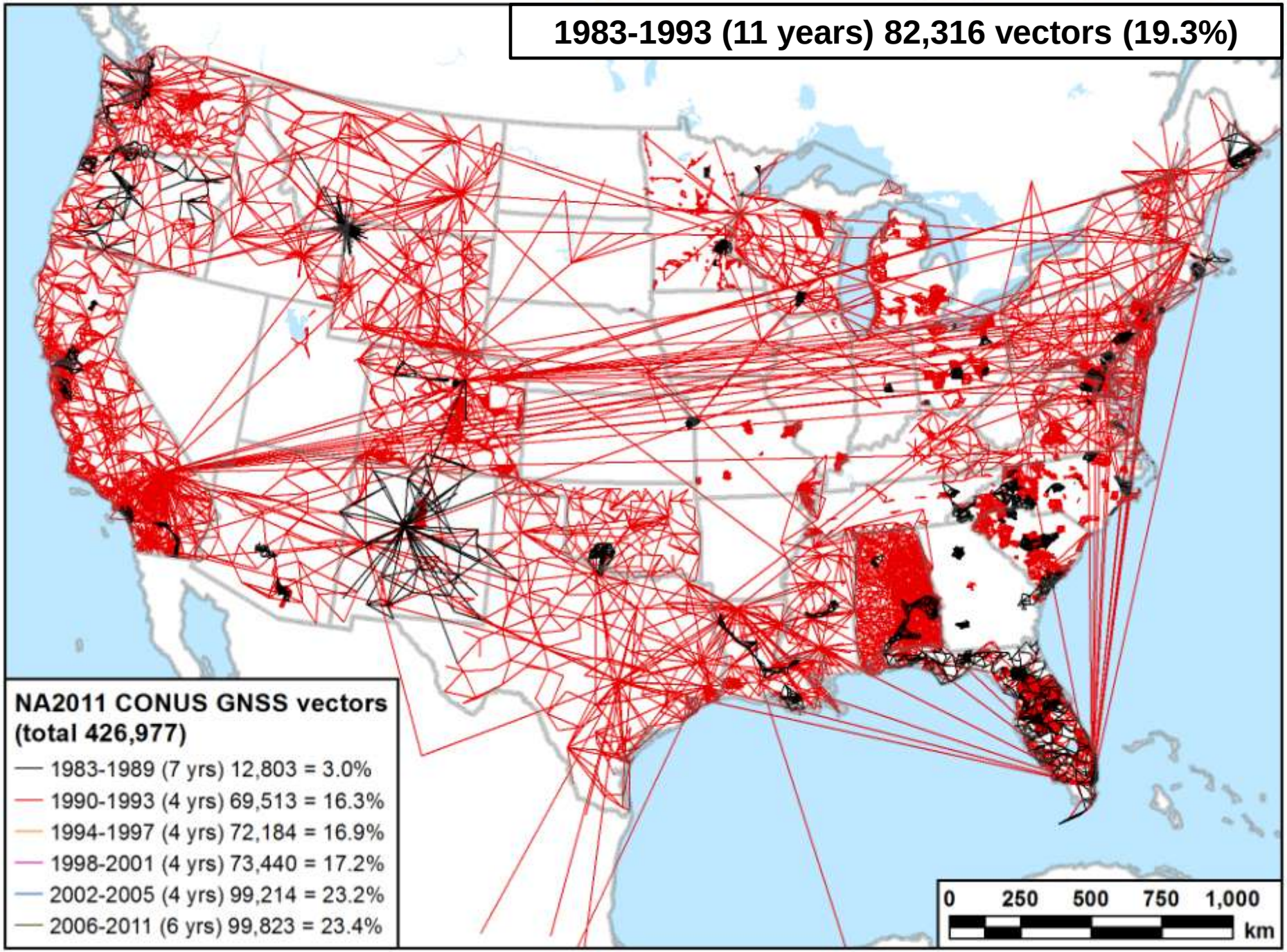
- Name: **NAD83(2011) epoch 2010**.
- Released end of June 2012
  - Delayed due to technical difficulties and new data inclusion
- Based on re-computation of all CORS 1994 to present to align with world wide effort.
- NC Shifts (based on CORS shifts)
  - @ 1.8cm generally ESE
  - @-0.8cm (mainly due to computational change)

Shift From CORS96 to NAD83(2011)



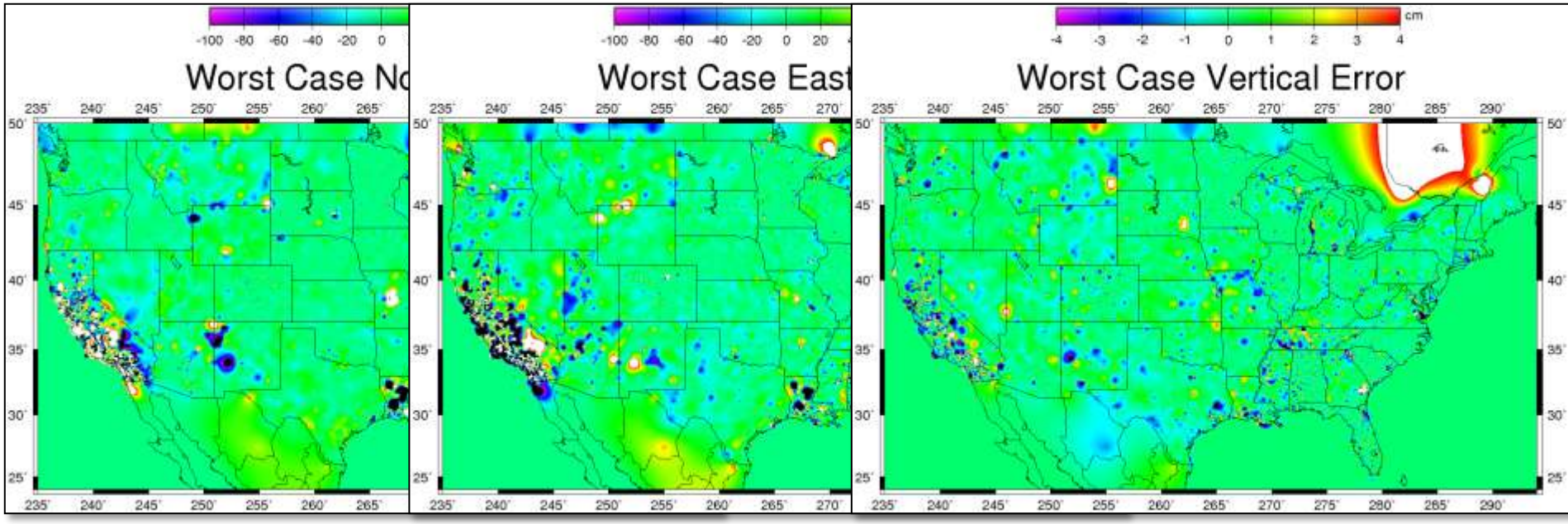

Multi-Year CORS Solution stations (approx 2174)
Status as of Dec 2011
Operational (~1676)
IGS, not CORS (~24)
Non-Operational (~95)
Decommissioned (~379)
0
1,000
2,000
km
170°E
180°
170°W
160°W
150°W
130°W
110°W
90°W
70°W
60°W
50°W
40°W
30°W
20°W
10°W
0°
50°N
40°N
30°N
20°N
10°N
0°
130°W
120°W
110°W
100°W
90°W
80°W
70°W
60°W


1983-2011 (29 years) 426,977 vectors (100.0%)
NA2011 CONUS GNSS vectors
(total 426,977)
1983-1989 (7 yrs) 12,803 = 3.0%
1990-1993 (4 yrs) 69,513 = 16.3%
1994-1997 (4 yrs) 72,184 = 16.9%
1998-2001 (4 yrs) 73,440 = 17.2%
2002-2005 (4 yrs) 99,214 = 23.2%
2006-2011 (6 yrs) 99,823 = 23.4%
0 250 500 750 1,000
km


1983-1993 (11 years) 82,316 vectors (19.3%)
NA2011 CONUS GNSS vectors
(total 426,977)
1983-1989 (7 yrs) 12,803 = 3.0%
1990-1993 (4 yrs) 69,513 = 16.3%
1994-1997 (4 yrs) 72,184 = 16.9%
1998-2001 (4 yrs) 73,440 = 17.2%
2002-2005 (4 yrs) 99,214 = 23.2%
2006-2011 (6 yrs) 99,823 = 23.4%
0 250 500 750 1,000
km

Related Tasks, Products & Deliverables

- New NAD 83 coordinate transformations
  - NAD 83 "HARN" ←→ NAD 83(NSRS2007/CORS96)
    - Algorithm for this tool already created
  - NAD 83(NSRS2007/CORS96) ←→ NAD 83(2011)
    - Will build this tool as soon as NA2011 results available
  - Include output that indicates quality
    - Provided as (conservative) error grids and reports



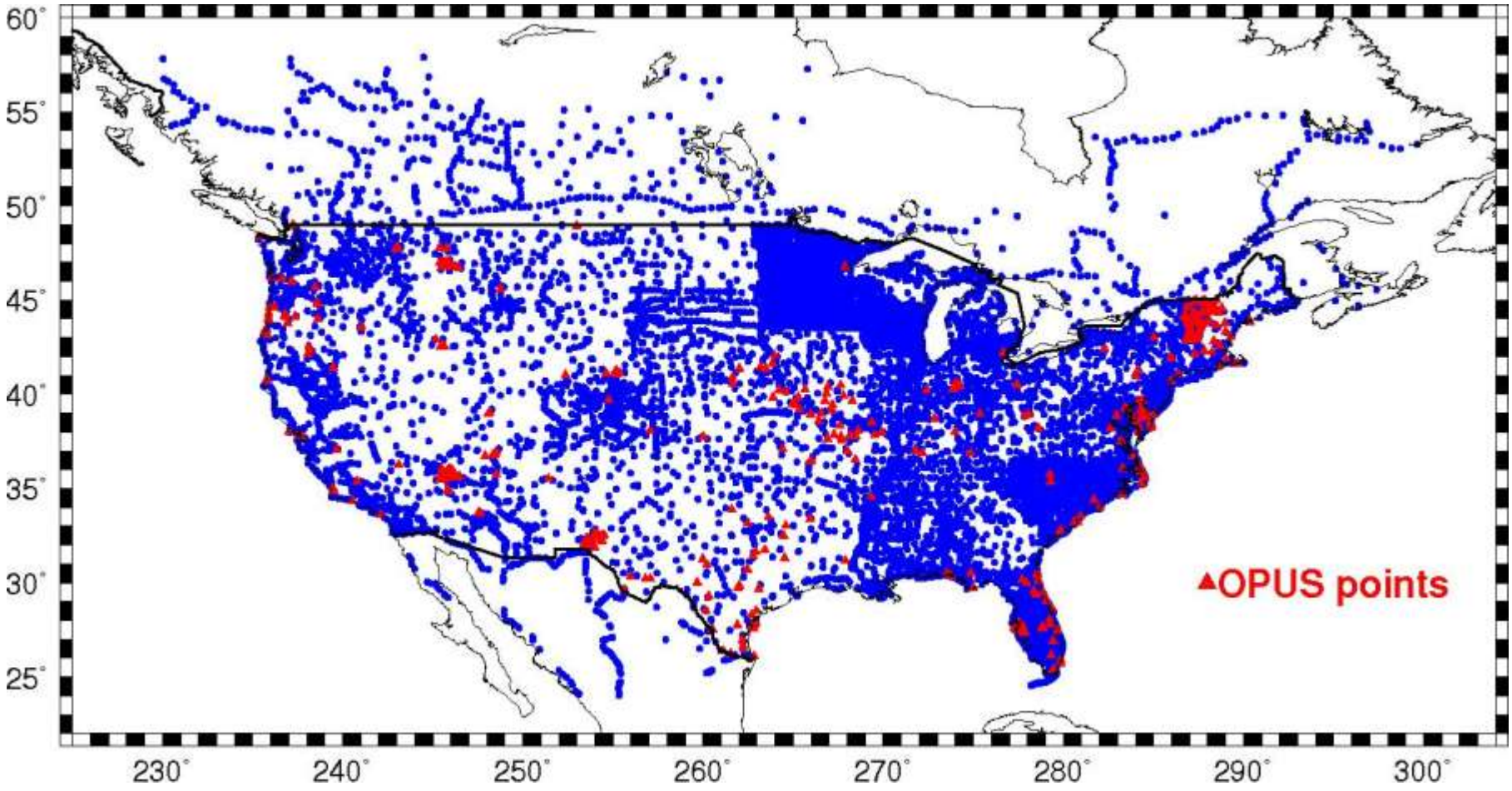
What about orthometric heights?

- NA2011 will yield:
  - NAD 83(2011/PA11/MA11) epoch 2010.00:
    - Latitude, longitude, and ellipsoid height
    - Network and “local” accuracies
- Orthometric heights (“elevations”) will ***NOT*** be determined in NA2011
  - Question: Will GPS-derived heights based on previous NAD 83 realizations and geoid models be consistent with those based on NAD 83(2011) and GEOID12?
    - i.e., is the ***relative*** change in ellipsoid heights and/or geoid heights significant (too large to ignore)?

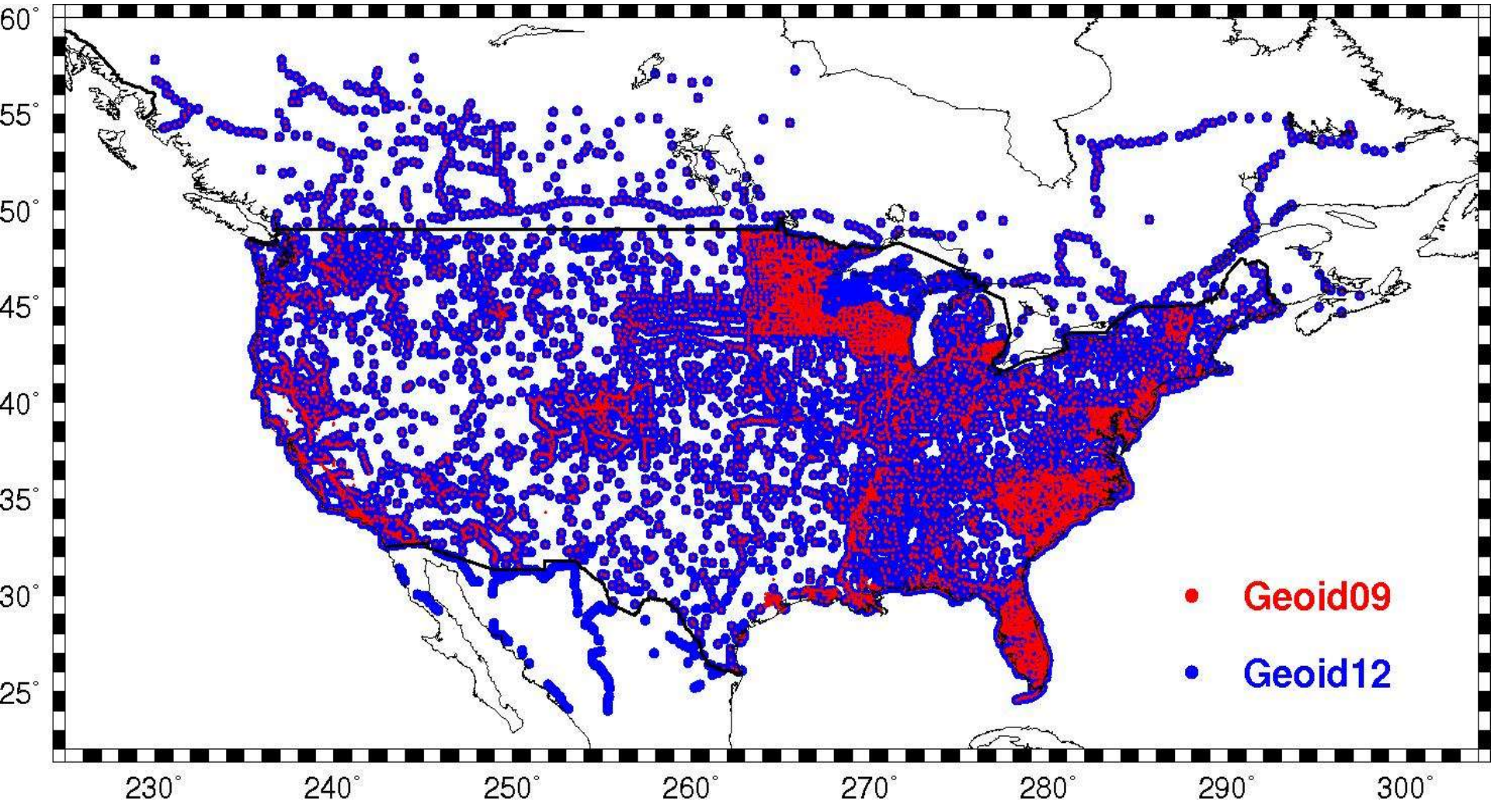
So…GEOID12

- New geoid model compatible with NAD83(2011) ellipsoid heights and NAVD88 bms.
- Released concurrently with NAD83(2011)
- No large slope changes in NC
- GEOID03 is NOT compatible **use Geoid12!!!**

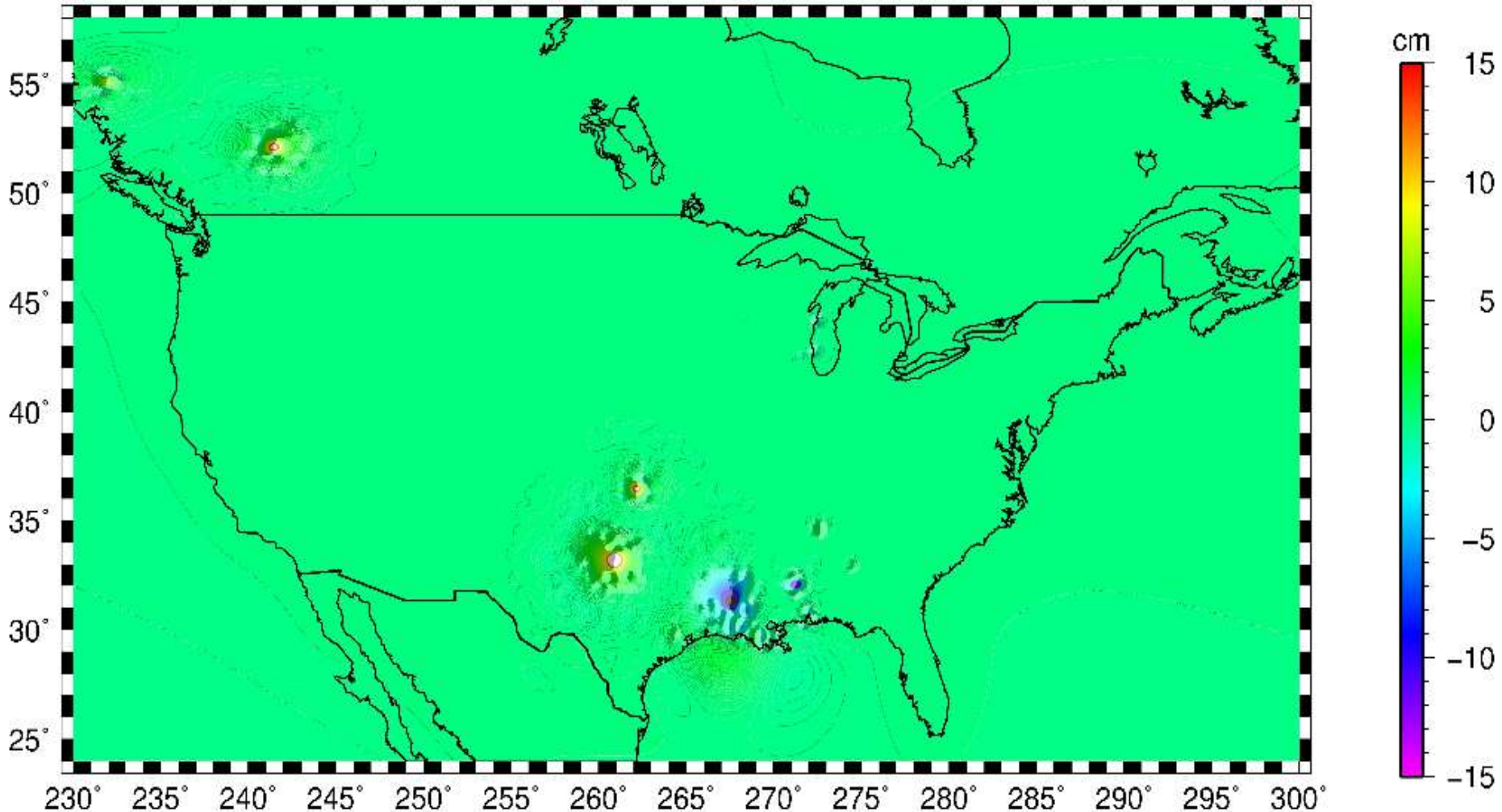
Distribution of OPUSDBBM12



An additional 6,000 points?



Problem areas Geoid12
Why Geoid12A developed



More information…

National Geodetic Survey

geodesy.noaa.gov

Positioning America for the Future

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

September 20, 2012

Announcements

The NGS Database will briefly be unavailable on Saturday, September 22, 2012 from 4:00pm until 4:30pm Eastern time, in order to install additional storage space. This will disable retrievals of data via the web during the upgrade. Thank you for your understanding and cooperation. Please contact the Database Administrator for additional information about this event.

NOTICE: September 18, 2012

NGS requests your patience while we update the "bluebooking" process for GPS projects.

While we update the **adjust guidelines**, **submissions for all GPS projects are being postponed** until the new "bluebooking" processes are posted. A notice will be posted here when this is accomplished. Thank you for your cooperation.

NOTICE: NGS Update, September 11, 2012

GEOID12A Model Released

The National Geodetic Survey has released the **GEOID12A model**. Analysis of the underlying control data has been completed and a number of corrections were made to the original data used in making GEOID12. Changes impacted regions in the states of Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Wisconsin. GEOID12A is now available

Most Popular

- Contact Us
- CORS
- Survey Mark Datasheets
- Geodetic Tool Kit
- NAD 83(2011) epoch 2010.00
- OPUS
- LOCUS
- Publications
- Geodetic Advisors
- Storm Imagery
- UFCORS

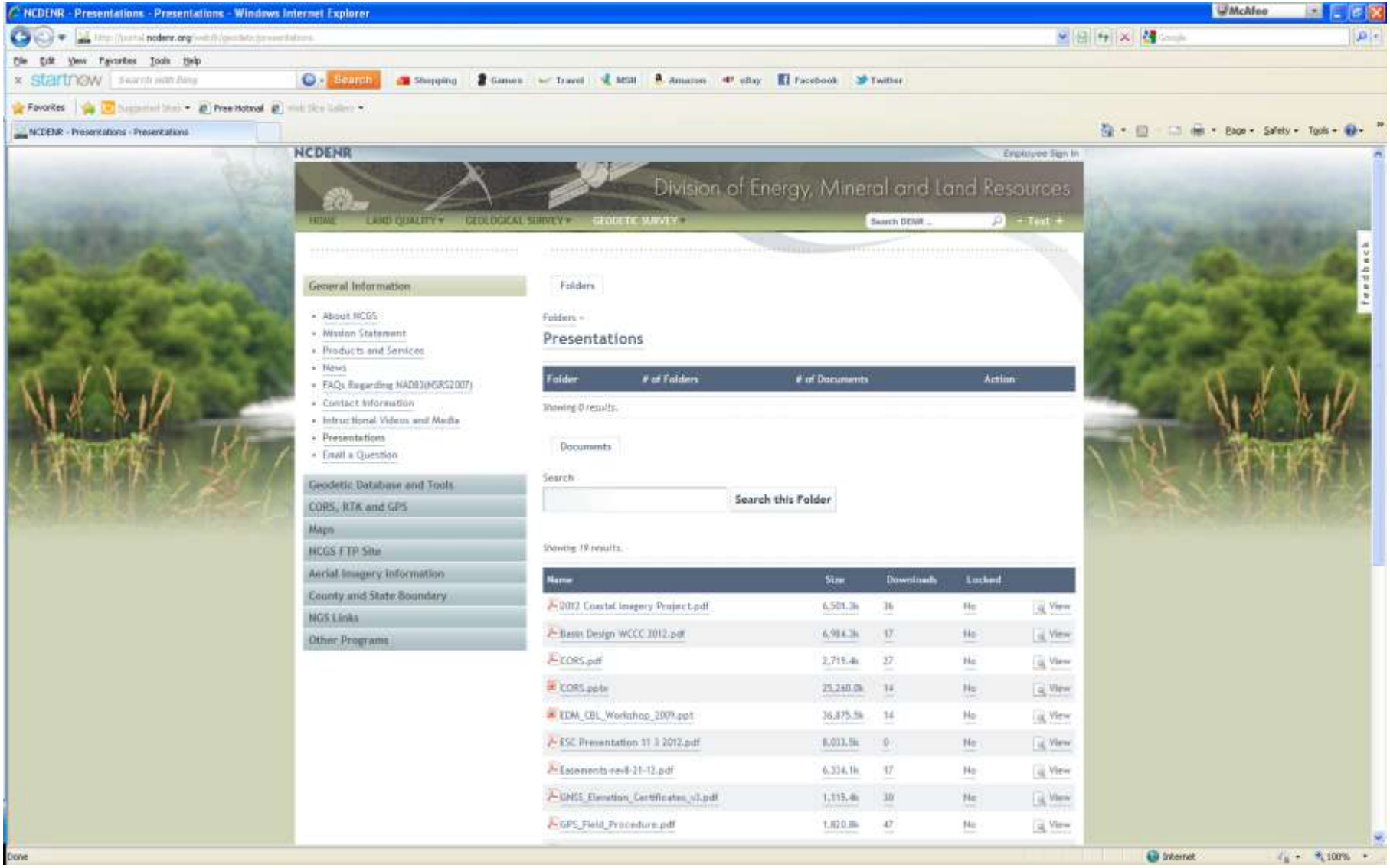
Upcoming Events

NRC Highlights Importance of NGS Products...

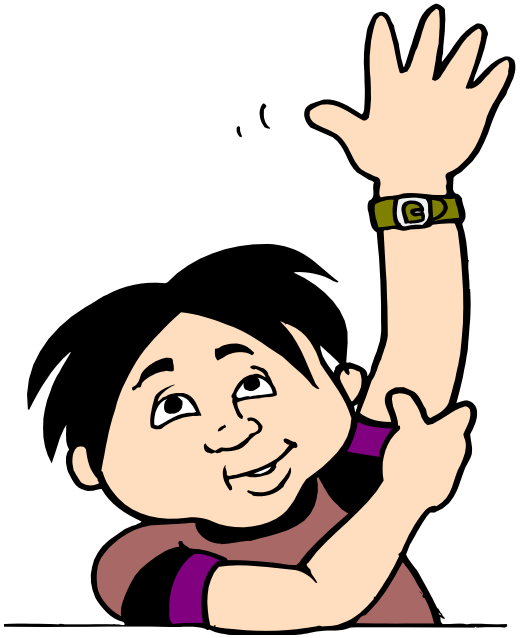
Federal Geodetic Control Subcommittee of the fgdc

NGS Public News

Presentations



Questions?



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NC Geodetic Survey
4105 Reedy Creek Road
Raleigh, NC 27607
919-733-3836 phone
Direct line 919-948-7844
Gary.thompson@ncdps.gov

CRIME CONTROL & PUBLIC SAFETY
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