

Summary of the August 4, 2016

Federal Geodetic Control Subcommittee Meeting

1315 East-West Hwy, Silver Spring, Maryland 20910

Meeting Chair: Dru Smith, NSRS Modernization Manager, National Geodetic Survey

Secretariat: Brian Shaw, National Geodetic Survey

FGCS Membership and Attendance

Department of Agriculture

US Forest Service – Everett Hinkley

Farm Service Agency – David Davis

Department of Commerce

US Census Bureau – Aaron Jensen

National Oceanic and Atmospheric Administration

National Geodetic Survey (NGS) – Dru Smith, Brian Shaw, Christine Gallagher, Pam Fromhertz, Michael Dennis, Mark Armstrong, Mark Schenewerk, Bill Stone, Dana Caccamise, Dave Conner, Joe Evjen, Kevin Choi, Rick Foote, Bill Stone, Vicki Childers, Kendall Fancher

Center for Operational Oceanographic Products and Services (CO-OPS) - [Absent]

Department of Homeland Security

US Coast Guard- [Absent]

Federal Emergency Management Agency – [Absent]

Department of Defense

National Geospatial-Intelligence Agency – [Absent]

US Army Corps of Engineers – Mark Huber

US Naval Observatory – [Absent]

Department of the Interior

Bureau of Indian Affairs – [Absent]

Bureau of Land Management – Mike Londe

Bureau of Ocean Energy, Management – [Absent]

Fish and Wildlife Service – [Absent]

National Park Service – Neil Winn, Tim Smith, Karl Brown, Joel Cusick

Office of Surface Mining, Reclamation, and Enforcement – [Absent]

US Bureau of Reclamation – [Absent]

US Geological Survey – Larry Hothem

Department of State

International Boundary Commission – [Absent]

International Boundary and Water Commission – [Absent]

Department of Transportation

Federal Aviation Administration – [Absent]

Independent Agencies

National Aeronautics and Space Administration – [Absent]

Tennessee Valley Authority – [Absent]

Federal Communications Commission – [Absent]

State

Caltrans – Scott Martin

Industry

Terrasurv – John Hamilton

NGS Activities – Dru Smith

Geodetic Advisor Program update, transition from state to Regional

GRAV-D is fundamental to our transition to the new datums coming in 2022. The program just past 50% data collection recently and continues to be above planned collection.

Geoid Slope Validation Survey (GSVS17) – Colorado, third project for checking of the GRAV-D enhanced geoid building towards the future

Validating the geoid accuracy expected for the new datums (1 cm accuracy)

GPS, Leveling, Gravity, DoV, LiDAR, Imagery, Other

TX was low and flat, IA was high and flat, CO will be high and rugged

IA showed that there was a great gain to using GRAV-D data in IA (high elevation)

CO will cross Wolf Creek Pass at of 11,000 feet and be the most challenging yet.

Experimental Geoid (xGeoid16B)

The 2016 annual experimental geoid released. Utilizes most of the GRAV-D data collected so far to build a gravimetric geoid similar to what the future datum will be.

The main geoid will cover HI, AK and North America; there will be additional models for AS, Guam and CNMI.

Geospatial Summit – Save the Date April 24-25, 2017

NGS uses these summits to interact with federal and private constituents to have a feedback loop expressing our plans and to discuss any concerns.

Questions or Comments

Are there continuous GPS tracking to check bias for the GSVS17?

There will be temporary CORS spread out along the route to help with processing and checking

NSRS Modernization – Dru Smith

Dru's new position deals primarily with the 5 Objectives of the [NGS 10 year plan](#)

Transcending the various NGS Objectives, many of them are interrelated.

Naming the replacements – new working agreement with the Canadian Geodetic Survey

Waiting on final word from INEGI (the Mexican counterpart to NGS) about proposed names

Template Legislation:

Working with the National Society of Professional Surveyors (NSPS) and the American Association of Geodetic Surveying (AAGS) to develop template legislation to provide guidance to state legislators for amending any laws that currently reference NAD83.

Objective 1: Replace NAD 83

Math Model to connect IGSxx to 2022 and chosen epoch (Dan Roman PM)

Will contain plate rotation, probably four plates

The role of and responsibility for velocities is being discussed

NADCON 5

Cleaning up NADCON and GEOCON to make more useable and all horizontal transformations included. Planned to include all reference frames and most horizontal datums back to 1890's

New: adds estimated errors (meters) to all transformations

Objective 2: Replace NAVD 88

GRAV-D will cover all US States and territories

At 53.3% data collected as of the beginning of the month

Experiments with G4 plane (very large plane with long flight capability)

If successful collection in Pacific should begin next year

Common Gravity Files

NGA has offered new public dataset of 7 million gravity points. There is a need to develop a standard used for all gravity files (US, CAN, MEX)

Geoid Monitoring Service

NGS should monitor the following and discussing the possibilities

Secular shape changes - Hudson Bay GIA

Permanent episodic shape change – earthquakes

Secular size changes of GMSL

Ignore periodic changes

Seasonal, temporary episodic (drought)

GPS Campaign for Transformations

Morphing current GPS on Bench Marks campaign

Needed to create next NADCON and VERTCON

Will be determining ideal spacing of requested observations

Stable limited movement marks can be observed today where any bench marks in high motion area should be observed just before new datums created.

VERTCON 3

Should begin late 2016 after NADCON 5 is done

Objective 3: Improve Bluebooking

Build an NSRS Database

Spatial database, 4 dimensional, hold raw observations

Target 2020

OPUS Projects into the IDB – making data submission much easier

OPUS Projects for everything (Leveling, Gravity, DOV, Traverse)

Future surveyors doing leveling will get starting heights from taking GPS observations and using the geoid to obtain a starting orthometric height and then propagate height differences from there.

Organize Historic GPS Files

Organize all historical files and load them

Objective 4: Fix the Toolkit

[New Beta Geodetic Toolkit](#) for performing many of the old tools.

Will be adding the new transformations to this once NADCON 5 and VERTCON 3 are done.

Objective 5: Better Surveying

Oregon State University delivered a final report for NGS58 study. Not a manual, just a report.

Should we develop a FGCS working group to update the NGS58/59 guidance?

Leveling in a GPS/geoid world

Kendall is the project manager for this project

Simulations underway, Corbin field work underway, Apply to GSVS11/14/17 data to check

State Place Coordinates

NGS may use existing SPC projections with new false northings and eastings to distinguish them from NAD27 and NAD83.

Possibly user provided plugins for custom projections

NAIP – David Davis

Increasing the NAIP horizontal accuracy requirement

Photo identifiable ground control points to inspect the horizontal accuracy began in 2006, prior to that it was compared to USGS Topo Maps. NAIP has been around for 15 years.

Brief history of NAIP GCP Usage

2002 – 2008 full or partial relative control

2006 Utah was pilot project

2008 half and half and 2009 All states used GCPs

NAIP Inspection Requirements

Vendors and FSA both inspect the data

Inspections have improved year after year (last 4 years approximately 2 meter accuracy)

2008-2015 avg was 2.8 m, 2015 only 3 above 2m and only 1 state above 3m

NAIP Inspection and Requirements

After consulting with funding partners and vendors the FSA updated requirements to 4m instead of 6m

GCPs have increased from 7k in 2008 to over 41k since 2012 (insert map)

Densifying GCPs

Around 2012 they had a lot of GCPs but there were still areas that could use more.

FSA got a little funding to upgrade from Garmins to survey GPS units

They developed best practices for collecting GCPs developing standards, processes, forms, and menus to send out to the GIS groups etc.

Three states at a time have the devices for a month, up to 12 states per year able to collect GCPs.

Over 700 GCPs collected with a value of \$210,000 saved based on \$300 per GCP if purchased.

FSA State Office GCP Collections

Training and preplanning are the most important keys to success

Determining areas of need using Google Maps or other web based applications

Questions:

Joel Cusick: AK does not currently have NAIP but what Datum are the GCPs collected using and are you tagging an epoch?

David: Not currently tagging an epoch and due to accuracy requirements it has not been a priority but working on making improvements. FSA is providing advice and support to efforts by several agencies and organizations to create a GCP database in AK.

OPUS-Projects to NGS IDB – Mark Schenewerk

OPUS Projects is a web based tool allowing access to PAGES a GPS processing software

OP to IDB for short is to make OPUS Projects be the primary avenue for our users to submit GPS surveys to the NGSIDB.

Build one click submission to the IDB

Beta is planned for early calendar year 2017

Reinvent how folks bluebook

Make it easier and Keep It Simple Silly (K.I.S.S.)

Simplify processing; automate file creation, quality control start to finish

Let the tech work for us

Let OPUS Projects perform all the dull, error prone detail work

Let surveyors survey and collect the data

OP vs IDB

Looking at differences between OPUS Projects adjustments to historical surveys and compare the differences

Over 30 surveys selected across the nation and in the Pacific

Most surveys were completed 2011 to 2013, all seasons with various number of marks

Includes Airport surveys, HTMOD surveys and many more types

Each survey was processed by two different individuals and not made to replicate the loaded surveys.

OP to IDB conclusions for now

They meet the defacto ± 2 cm horizontal and ± 4 cm vertical accuracies laid out in NGS58/59.

They found 5 surveys with b-file errors

At least 2 surveys used out-of-date CORS information

Some surveys had questionable quality control measures

OPUS-Projects struggled with integer fixing with very long baselines in the remote locations (Ex Pacific)

6 surveys displayed biases to their published coordinates

When applying the constrains used in the original surveys the biases go away

Planned OPUS-Projects updates

Technical issues

ADJUST vs GPSCOM, update integer fixing, alternate session definitions, improve QA/QC

Bluebooking

Finish the b- and g-files

Edit/upload serfil

Upload/edit a description file

Create a submission “package”

Update documentation and training materials

Questions:

Tim Smith – Has Mark talked with Trimble or any manufacturers on how this can work with their software packages?

Mark – That is not in our current plans but can be added at a later time.

Michael – On the map there is an absence in the SW. Some of the bigger problems he had were in the Pacific and AK. Did he use HTDP for some of the data?

Mark – The gap in the SW was completely accidental. Plate tectonics should not cause many issues since all processing is in IGS08 and all final coordinates were converted to NAD83 later so HTDP was not needed.

Workgroup Updates

Fixed Reference Stations Work Group – Kevin Choi

Foundation CORS contract delays and determining future foundation CORS

MN CORS were having some metadata problems and have been resolved

USCG released federal registrar notice for NDGPS removing many inland stations and has open options for transferring control of the CORS to other entities.

Larry – comment: would be useful for NGS to develop impact maps for lost sites

Joe – noted and there is also potential impact of the PBO sites

Kevin – the NOAA-met CORS might also be dropped as that program has ended

Instruments Work Group - Kendall Fancher

Combining GPS with leveling project

The first river crossing project using the new procedures has been loaded in the database (Assateague Island, MD).

Methodologies Work Group – Joe Evjen

Updating the NGS58/59 guidelines now that the Oregon State University report has come out

Validating RTNs to the NSRS

Spectrum Work Group – Larry Hothem

GPS adjacent band compatibility assessment

Focusing on just the L1

Adjacent Band Interference (ABI) can be from the signals as well as the power

Two testing studies (April 2016 and July/August 2016)

Objectives were to evaluate allowable adjacent band power levels as a function of offset frequency

April testing was in New Mexico with many agencies and manufacturers

July testing was the “wired” testing – not over air, only over wire

(Specifics on the slides)

GNSS signals used in testing (see presentation slide 5)

National Advanced Spectrum and Communication Test Network (NASCTN)

[Article in InsideGNSS](#) with concerns over the Ligado Networks original testing plans

[There is information available at GPS.gov](#)

[Interdepartment Radio Advisory Committee website](#)

June 2016 letter on spectrum from PNT Action Board to the PNT ExCOM (gps.gov)

Question:

Karl Brown – Is DOT the principle member for GPS to the NTIA?

Larry – yes they are but IRAC is the advisory committee to the NTIA.

Karl Brown – FGCS can – and should -- write a letter to the NTIA as a federal government body making a letter of concern

Dru – recommends everyone on the phone send an email to him directly and we will engage the FGCS community more.

Open Discussion

Neil Winn – Is there any further thought for epochs in the proposed reference frame?

Dru Smith – It has been discussed and there has been a lot of discussion on the mathematics of that but no decisions have been made.

Michael – Is the current plan to have coordinates fixed to the tectonic plates of the proposed reference frames?

Dru – Currently it is planned to fix them to a coordinate but also have mathematical velocities tied since there are plate velocities.

Michael –So it is planned to have an approximate plate fixed?

Dru – We are uncertain how many plates will be fixed but probably 3-5. Dan will be leading this project and the end decision will be with him.

Larry – mentions ISO geodetic registry and making that developed to account for where we are going.

Dru – Much of our discussion with Canada included the ISO geodetic registry and so far we are compliant.