

## FGCS Notes

### NGS Activities/Updates – Juliana Blackwell

#### Personnel updates

New SW Regional Advisor – Lynda Bell

Kim Valentine – hired as NOAA GIO

Tony LaVoi – NOAA Chief Data Officer

Ivan Deloach – retired as FGDC Executive Director

NGS staff still primarily working from home and not traveling except for mission critical activities

#### Budget

FY22 still in CR until later this month.

NGS should be receiving funds from Infrastructure Investment and Jobs Act (IIJA)

Coastal Surveying

GRAV-D

Vertical Motion modeling with CO-OPS (CORS)

CORS Comprehensive Plan – Currently being worked on

#### Beta Releases

[NGS Map](#)

[OPUS Projects 5.0](#)

[Leveling Projects Page](#)

[Passive Marks Page](#)

New NGS Homepage and feedback “badges”

## Federal Flood Risk Management Standard – Nic Kinsman

### Establishing a Federal Flood Risk Management Standard (FFRMS)

EO 13690 in 2015 and revoked in 2017 (put on hold)

Reinstated in 2021 EO 14030: Climate-Related Financial Risk

Review and update of the Oct 2015 FFRMS Implementation Guidelines, including the Climate-Informed Science Approach (CISA) Appendix

There are currently references to things where geodetic control is needed but it is not currently explicitly referenced.

### Climate-Informed Science Approach (CISA)

Includes the importance of incorporating Vertical Land Motion (VLM)

Is currently focused on long-term changes but there are recommendations for tectonically active areas that might change fast.

Blueprint 3 has a Use Case for Time-dependent Control in Flood Mapping

Alaska took a look at this and in December 2021 provided CISA Recommendations

Encourage and guide use of location specific VLM data where available

Provide recommended best practices for epoch use in conjunction with NSRS heights and tidal datums

Both recommendations were accepted

### Relative Interagency NSRS Coordination

NGS participates in FEMA Risk MAP Guidelines and Standards Annual Maintenance Cycle

The National Land Level Change (NLLC) Project will develop a vertical land motion model for all US regions (NASA, USGS)

NGS and USACE coordinate on applied use cases in preparation for NSRS modernization

## NSRS Modernization – Dru Smith

Modernizing the NSRS means

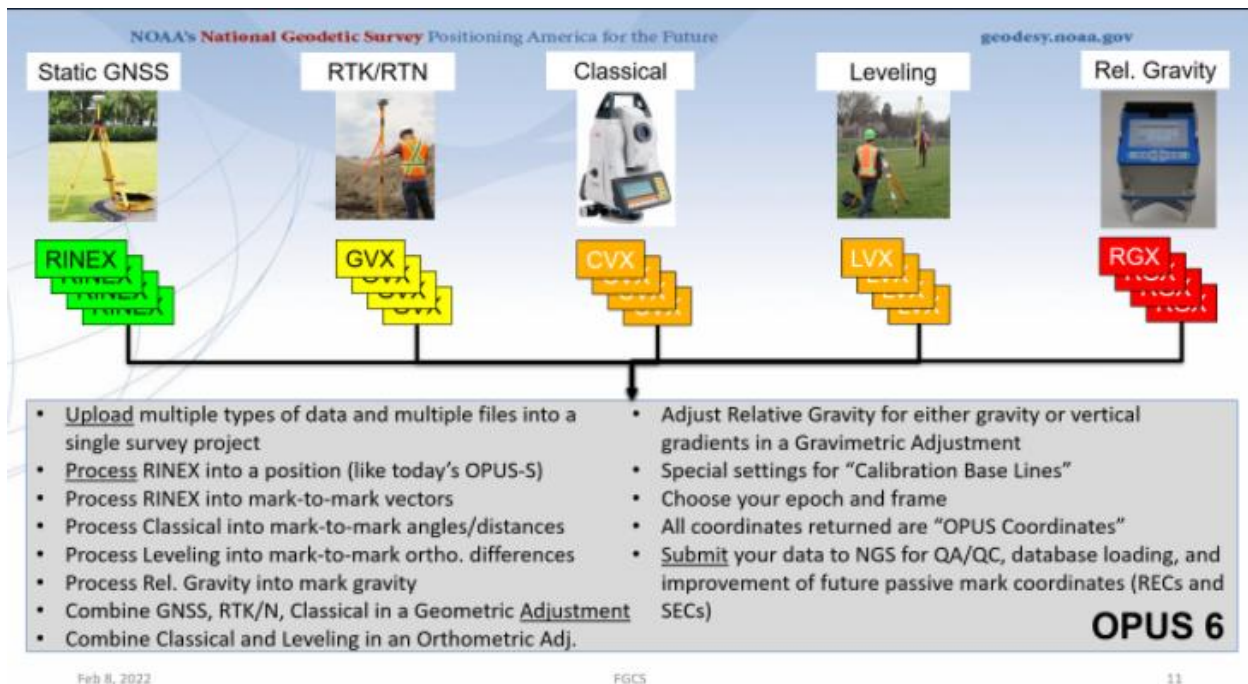
Replacing NAD 83 – with 4 Terrestrial Reference Frames (CATRF, MATRF, NATRF, PATRF)

Replacing NAVD 88 – with Geopotential Datum (NAPGD2022)

Re-Inventing Bluebooking (publishing data to NGS database)

Modernizing OPUS so that all surveying projects can be submitted to NGS through OPUS 6 including:

Static GNSS, RTK/RTN, Classical (Total Stations), Leveling, Relative Gravity



Improving the Geodetic Toolkit

Better Surveying Methodologies

Timeline – at current funding and staffing levels, NSRS Modernization will complete sometime during/after 2025

Recent Progress

Rotation model for the Mariana plate released (Relative to ITRF2014)

M-PAGES can now process data from all existing constellations

GRAV-D currently 91.74% done (Feb 1, 2022)

NGS and Canada released the first ever joint geoid model (xGEOID20)

GVX (GNSS Vector Exchange) 1.0 format released

Being adopted by industry

OPUS Projects 5.0 released (allows RTK/RTN preprocessed vectors)

LASER (replaces ADJUST) modules for GNSS and Leveling

Least squares Adjustments: Statistics, Estimates and Residuals

Replicated the 2011 national adjustment in 2 hours on modern computers

Nine science papers released in the last 2 years, at least 6 more coming this year

What to look for soon

OPUS-S to be updated to M-PAGES (GNSS processing)

Science papers focusing on least squares adjustments (using LASER)

How will NGS produce RECs and SECs

Question:

Brian Shaw: LASER mentions GNSS and Leveling but will it also adjust Total Stations etc?

Dru: With current funding the contractor is almost done but there is a plan to eventually include it either with another contract or NGS programmed

## GDA Update – Dan Roman

2021 Lead Covered Agency Report – GDA requires reports from agencies that are theme leads

NGS maintains 4 datasets – NOAA CORS Network, GRAV-D, Geoids, Passive Control

NGS is making progress on the datasets but not done

All NGDA Datasets are required to be shared on Geoplatform.gov

There is a need to make sure all federal datasets are interoperable and in a consistent coordinate system using the NSRS.

Many datasets are published or listed in WGS 84 but this leads to issues

What WGS 84, is it really WGS 84 etc

Example: Federal Real Property Profile (FRPP) Management System

Dan is working with them to get this moved from WGS 84

Senior Agency Officials for Geospatial Information (SAOGI)

Slides provide a listing of federal agency SAOGI as well as vacancies

Juliana: Mentions that the FGDC is currently reviewing Subcommittees etc and to continue working under the current Charter until new guidance is provided.

## Geospatial Measuring Equipment Funding Model – Ben Johnson

Ben has 17 years as a land surveyor (12 private and 5 federal)

Who – Ben is a federal land surveyor and not a FAR, attorney, accountant or contract officer

Who might be impacted is all federal employees that use geospatial measure equipment

What

Hoping to develop a Functional Model so purchasing equipment and keeping it updated

Currently the property managers have issues excessing old equipment so having a leasing model that returns the equipment back to vendors when receiving new equipment would save considerable workforce time.

Benefits of developing a functional model

- Consistent yearly values for budgeting

- Modernizing is built into the model

- Clearly defined acquisition, lifecycle and disposal

How could there be a centralizing BPS that all Federal users could purchase against?

- An example is the NASA SEWP

- GSA (somehow?)

- Could the FGDC support this initiative

Neil Winn: A couple things that are worth adding to the mix is that NPS had a bunch of antiquated devices and used Congressional funding (\$4M 1 year and \$2M another year). They spent considerable money upgrading their equipment to have the accuracy/precision needed. In the past equipment/software used to last for a decade but now things are improving so fast its hard to keep up.

Juliana: Did NPS purchase or are now leasing?

Neil: NPS did a one time purchase so if they want to upgrade that will have to be a new purchase.

Tim Smith: Kudos for working on this. What NPS has had to do the last few years has provided a lot of insight into what it takes to upgrade equipment with one-time funding and working to develop a leasing model can help to keep equipment up to date.

Juliana: mentions at NGS we usually purchase equipment but an example of leasing is vehicles. In the past we purchased a number of vehicles but as they get old we are working towards leasing them to minimize maintenance etc. As for BPAs we can try to elevate it up through NOAA and maybe FGDC.

Ben: He has done a lot of work promoting this up through BLM and sharing it across other offices but he is working to be proactive rather than reactive. When you start looking at all of the federal users it would be \$10Ms in savings.

Tim: Tim has working with a lot of the advisors over the years. Would it be possible for the advisors to have access to equipment for testing?

Juliana: Advisors have access to NGS equipment with shipping and there have been some instances of loaning equipment when we have an agreement in place. Maybe with Lynda being new she was not aware of that.

Kendall: NGS does have a pool of equipment available to advisors at the NGS Testing and Training Center.

Ross: NGS advisors are transitioning away from being the boots on the ground and more towards advising and guiding users. Advisors can still go out and get some sun occasionally in the field but certainly not as much as in the past.

Tim: He has expressed to his leadership that it is important for him to get out in the field and use equipment to become familiar with the equipment. This helps him to provide advice on how equipment is used as technology changes and fondly recalls working with Bill Stone on doing vertical with GPS.

## GPS on Benchmarks – Galen Scott

What and Why?

Its about getting ready for the Modernized NSRS and promoting the benefits

### Primary Benefits

2020.0 Reference Epoch Coordinates (RECs)

Data for NAVD 88 NAPGD2022 Transformation Tools

Build time series of observations in areas of motion

### Added Benefits

Evaluation of the gravimetric geoid models

Dr Ahlgren currently uses this data to help evaluate models now

Check your RTN results

Update and maintain passive control marks (mark recoveries, condition)

Identify marks suspected of movement

Connecting current and future datums

NSRSs Modernization will fix the biases and tilts in NAVD 88 and GPS on Benchmarks will help this effort since that data will be used to measure that shift

2022 Transformation Tool Campaign

Set an ambitious goal of collecting data every 10 kilometers

GPS on BM has been driving a surge on OPUS Shared Solutions (see slides for graphs)

Things really picked up in 2018 for GEOID18 and then in 2020 and 2021 for the Transformation Tool

Extended the cutoff date to the end of 2022

In 2022 NGS has been working with NSPS, NPS, NFWS for 2022 efforts to do GPS on BM

Galen provided demos for the GPS on BM web page and applications

NGS has done a lot of outreach recently:

[2022 GPSONBM Webinar](#)

[xyHt article GNSS on Bench Marks?](#)

[NSPS “Surveyor Says!” Podcast with Tim Burch](#)



## OPUS Developments at NGS – Dan Gillins OPUS IPT Team Lead

### Brief Overview on OPUS

OPUS Static (2011) – more than 2 hours of data

OPUS Share – 4 hours of data, photos and description

OPUS Rapid Static (2007) – 15 minutes to 2 hours of data

OPUS Projects (2012) – multiple occupations to do network adjustments

### Recent Developments

July 2021 – released [OPUS Projects 4](#)

Streamlines publishing campaign style GPS surveys to NGS updating Datasheets

To publish requires:

Uploading descriptions, photos, logs and reports

[Detailed User Guide Available](#)

September 2021 – released [OPUS Projects 5 to beta](#)

Allows upload of GNSS vectors in GVX format (RTN/RTK).

**GNSS Vector EXchange Format (GVX) – [web page](#)**

Trimble and Topcon have already released converters and other vendors working on it.

### Ongoing Developments

M-PAGES: New GNSS baseline processing engine

Working to get this integrated into OPUS as the processing engine

Aiming for September 2022 into OPUS Static

Aiming for December 2022 into OPUS Projects

Processed all viable GNSS signals (GPS, GLONASS, Galileo, Beidou, QZS, IRN)

More accurate

Faster integer fixing

### Future Developments - OPUS 6

Provides solutions in the modernized NSRS

Develops files for submission into the new NSRS Database (spatial DB)

Supports GNSS, classical (angles/distances), leveling and relative gravity

Developments to OPUS will provide easier access to the NSRS

Geodetic data can be readily submitted to NGS for publication and development of models. Collection of RTK data will make data collection more efficient and effective.

Michael Michalski: Is there an anticipated release date for OPUS 6?

Dan Gillins: At this point is very much in its infancy so sometime in the next few years but at least by the time of NSRS Modernization.

Galen: asked Mike if he is most interested in processing GNSS and leveling together.

Mike: confirmed that is what he is looking forward to performing these surveys at tidal stations.

Larry: Is there any efforts to work to make GVX as an international standard?

Dan: NGS has been discussing how to possibly make this an international standard. There is currently something called Geodesy ML that Australia and New Zealand worked on. It might be possible to work and get GVX included in Geodesy ML. Dan also mentioned that we are developing other formats call CVX (classical angles, total stations), LVX (leveling), RGX (relative gravity).

Larry: Mentions that IGS is planning to have a workshop this spring (in Boulder) but he has not seen an agenda. One of these workshops is how RINEX was created with Gerry Mader being one of the leads. Getting involved with the IGS will help it to go up to the International Commission on GNSS (ICG). Right now the workshop is planned as in person but might become hybrid.

## Work Group Updates

### John Galetzka – Fixed Reference Station Workgroup

No work in the workgroup but Theresa and Phillip provided a CORS Stakeholder meeting in 2021 and planning a second meeting.

### Larry Hothem – Spectrum

In the news there has been FAA concerns with 5G with Verizon and AT&T (C band) so nothing with GPS

The news has highlighted the lack of collaboration with FCC and NTIA and the FAA

Ligado has caused for concern with the L band of GPS and Galileo (E band).

Larry notes that when Ligado does become active users should look to note any impacts to the GNSS base stations from the Ligado transmitters. The USGS CORS for plate motion are ready to provide impacts once they are operational.

Federal users will report through the NTIA if we see any impacts from the new transmitters.