

**OREGON GNSS USERS GROUP
MEETING MINUTES**

Date: June 21, 2024

Location: Chemeketa Eola Northwest Wine Studies Center--Chemeketa Community College
215 Doaks Ferry Road Northwest, Salem, Oregon 97304

Board Members Present: Alycia Lenzen-Hammerel, Chair
Chase Simpson, Chair-Elect
Eric Zimmerman, Treasurer
Chris Munson, Secretary

Called to Order: 9:00 am
Adjourned: 3:20 pm
Contact Hours: 5.0 hours

Business Meeting (9:00-9:05)

- Welcome and introduction by Alycia Lenzen-Hammerel, Chair.
- Treasurer's Report by Eric Zimmerman. Balance of around \$9,800 in bank account at the beginning of the year. Today's meeting is expected to cost around \$1,000 for the venue and another \$1,000 for the food, including amounts already paid. All amounts are approximate.

NSRS Modernization/Preparing for New Datums, presented by Dan Determan, National Geodetic Survey (9:05-10:05)

- NSRS (National Spatial Reference System) overview and evolution.
- NSRS today:
 - NAD83(2011) Epoch 2010.00
 - NAVD88 (GRS80, GEOID12B)
- NSRS will continue to utilize passive marks, but will transition to time-dependent positions.
- Active control uses a passive mark with GNSS equipment actively & continuously monitoring it (CORS).
- NSRS considerations:
 - Consistency.
 - Convenience.
 - "Semi-" constant coordinates.
 - Coherence with sea level.
- Why modernize?
 - Current datums developed prior to GNSS technology.
 - Not currently aligned with Earth's center (ITRF).
- Estimated horizontal shift of 1.5 meters in the northwest USA from NAD83 to NATRF2022. Vertical shift also occurring.
- NGVD29 was superseded by NAVD88 which will be superseded by NAPGD2022.
 - NGVD29 and NAVD88 relied on levelling.

- GRAV-D data collection is completed and is being processed and analyzed.
- NAPGD2022 is gravity-based—no levelling.
- A gravimetric geoid is created from scratch. A hybrid geoid uses gravimetric data but is best fit to known vertical control marks. NAPGD2022 is purely gravimetric.
- Orthometric heights are shifting around 1 meter in Oregon with the adoption of NAPGD2022.
- If using OPUS now, selecting the extended report will show estimated new orthometric height.
- NCAT now available to transform between datums.
- Use complete nomenclature when describing survey data, e.g., NAD83(2011) Epoch 2010.00, NAVD88 (GRS80, GEOID12A).
- Three categories of vertical datums: Geoid, orthometric and tidal.
- Resources and updates available on NGS website, including educational videos and online resources.
- NGS has email subscriptions available, including quarterly NSRS updates.
- Middle of 2025 estimated for NSRS update release: NATRF2022, NAPGD2022, plus many other subproducts.
- A browser-based multi-GNSS update of OPUS will be release as well.
- Although NSRS releases are estimated for mid-2025, they will not be “official” until FGDC votes to adopt, likely in 2026.
- Q&A.

Break (10:05-10:15)

GNSS Data Used in Remote Sensing, presented by David Moehl, PLS, CH, Oregon Department of Transportation (10:15-11:00)

- Remote sensing is the science of obtaining information at a distance. GNSS is used to tie down location.
- David has experience with the BLM, NOAA, DEA marine services and other private firms. Currently works for ODOT.
- Remote sensing setup can include:
 - GNSS antenna.
 - IMU (inertial measurement unit).
 - Laser scanner.
 - Cameras.
 - DMI (distance measurement indicator).
 - Echosounder.
 - GPR (ground penetrating radar).
- Best practices used at ODOT:
 - PPK (post-processed kinematic).
 - ORGN or user base.
 - High data rate (1 Hz).
 - Maximum 30 km baseline for single base.
- Description of different processing modes with base(s), analysis of results.
- Q&A.

Break (11:00-11:20)

An Affordable Approach to Mobile Lidar Data Acquisition, presented by Josh Kowalski, PLS, CMS-UAS, S&F Land Services (11:20-12:10)

- Overview of lidar and how it works.
 - Light detection and ranging. Like a reflectorless shot from a total station, but on a much higher level (number of shots, constantly moving).
- System:
 - Lidar.
 - GNSS.
 - IMU.
 - Onboard computer.
 - Camera (optional).
- Point clouds are stored as .LAS or .LAZ files. LAZ is compressed LAS.
- Showed self-made bracket, attaches to standard 2" trailer receiver, with 2 GNSS antennas and lidar sensor.
- Josh's total cost about \$45k, including around \$2500 in annual software costs. Commercially available units cost around \$700k.
- Described workflow from route planning to deliverables.
- Showed processed data from mobile collection earlier this morning at Chemeketa campus.

Lunch (12:10-1:05 pm)

GCAP: Geospatial Center for the Arctic and Pacific Tasks: 1, 4, 5, 6, presented by Hunter Mitchell, Oregon State University (1:05-1:40)

- OSU to receive \$6.5 million for federal effort to modernize the geospatial coordinate system.
 - Eight tasks, broadly themed on research, preparation for modernized NSRS, education & outreach.
- Hunter is working on 4 of 8 tasks:
 1. Real-time PPP (precise point positioning). Stochastic model comparison.
 4. Develop & evaluate OPUS utilities.
 5. Develop a national RTN (real-time network) alignment service.
 6. Multi-GNSS: Development/testing of multi-GNSS processing service.
- Chase Simpson of OSU came in at the tail end of Hunter's presentation and stated that OSU is pursuing a new Bachelor of Science degree in Geodesy, Geomatics & Geospatial Engineering. OSU is looking for letters of support from the industry.

Solar Cycle 25, the Ionosphere and Precise Point Positioning (PPP/RTX), presented by Bob Green, Frontier Precision (1:40-2:50)

- Solar effects and CME's (coronal mass ejection) affect the ionosphere.
- Ionospheric disturbances and how they affect GNSS.
- Currently in solar cycle #25 (not related to the year 2025).
- Space Weather Live app (free)
- New signal on Block III GPS satellites has L1-C.
 - L1-C has stronger signal, less noisy, more resistant to multi-path and canopy.

- Glonass is noisier. Bob turns off Glonass when doing fine control work.
- 56 total Beidou satellites. GPS has 31. Newest Beidou satellites have two-way messaging capability.
- Trimble Ionoguard comes with v6.23 firmware/Pro-point and above. Other manufacturers also offering similar products, such as Novatel.
- Bob showed testing results with and without Ionoguard in Alaska.
- PPP services:
 - WAAS.
 - Omnistar.
 - Hexagon Terrastar.
 - RTX (Trimble).
- Trimble says RTX fast service converges in about 1 minute; Bob says more like 3 minutes in his experience.
- Bob went over some spot field tests he performed in Oregon recently.
- Trimble Centerpoint RTX is their version of OPUS. Other manufacturers also have their own.
- ITRF is a constant frame with a rotating plate. NAD83 is a rotating frame with a constant plate.
- Bob says if nothing else learned from his presentation, keep firmware updated for HDTP corrections.

Break (2:50-3:00)

Oregon Real-time GNSS Network Brief Update, presented by Randy Oberg, PLS and Eric Zimmerman, PLS , Oregon Department of Transportation (3:00-3:20)

- Stations upgraded to full GNSS throughout the State this year.
- Chinese and Japanese satellite correctors available with ORGN single-base port for stations and equipment that are capable.
- GPS/Glonass/Galileo available with network correctors.
- ORGN transition plan is to run separate ports for NAD83 and NATRF2022 for a period of time.
- ORGN offering RINEX data at 1-second intervals soon (only 5-second is currently available).

Adjourned at 3:20 pm after closing remarks from Alycia Lenzen-Hammerel.

Minutes unanimously **APPROVED** by Board on June 28, 2024.

Respectfully submitted,



Chris Munson, Secretary
Oregon GNSS Users Group