OREGON GNSS USERS GROUP
MEETING MINUTES

Date: June 17, 2022

Location: Danny Lang Center, Southern Oregon Wine Institute Building
                   Umpqua Community College, 1140 Umpqua College Road, Roseburg, Oregon

Board Members Present: Ken Hoffine, Chair
                                Samantha Tanner, Chair-Elect
                                Eric Zimmerman, Treasurer
                                Chris Munson, Secretary

Called to Order: 9:00 am
Adjourned: 3:15 pm
Contact Hours: 4.5 hours

Business Meeting (9:00-9:15)

- Introduction by Ken Hoffine, Chair. Ken asked if there was any interest in rearranging the time and/or date of the semi-annual meeting in January—Friday afternoon is tough for a lot of people who come in from out of town.
- Secretary's Report by Chris Munson. 304 people on OGUG contact list, 91 paid members.
- Treasurer's Report by Eric Zimmerman. Balance of $10,599 in bank account at the beginning of the year, with around $1,000 in dues coming in since then. The current balance is $11,575, prior to making disbursements for today's meeting.

Trimble R12i GNSS Receiver ProPoint and TIP Inertial Technology, presented by Jarrett Price—Applied Geospatial Engineer, Frontier Precision (9:15-10:00)

- Jarrett gave an introduction to himself and described his background.
- A brief overview of the evolution of RTK was given. The Trimble 4000SE was the first ever RTK system, debuting in 1992.
- An official white paper is coming from Trimble on ProPoint and TIP technologies, but has not yet been released.
- ProPoint was released in 2019. It is software technology used to provide improved results in high multipath and spoofed/jammed environments.
- TIP stands for Trimble Inertial Platform.
    - IMU-based tilt correction.
    - Can calibrate for gross out of straightness in the survey pole. Roll & pitch corrections are directly applied.
- Jarrett described his Trimble R12i test area at the Frontier Precision office in Tigard, Oregon.
    - Four test points were set in challenging places (deep tree canopy, near buildings).
    - Primary control was set with GPS, then the test points were shot in with a Trimble S7 total station.

- o The R12i was tested using Trimble VRS Now RTK correctors, using GPS, GLONASS and Galileo satellites.
- o The first test point was under a big leaf maple with the rod tilted up to 3 feet off center. 14+ satellites were observed, with a PDOP of less than 2. All R12i measurements were checking in within 0.1' horizontally and vertically. Jarrett proceed to describe the remainder of his test positions.

Break (10:00-10:15)

BLM Survey Use of Global Navigation Satellite Systems (GNSS) In Cadastral Surveys, presented by Ernest Lundeen—Cadastral Surveyor, US Bureau of Land Management—Medford District Office (10:15-10:50)

- Ern gave a background of himself and also introduced his supervisor who attended the meeting.
- The Medford District currently uses PDL 450x radios and Trimble R10's for their cadastral surveys. They used to use motorcycle and car batteries to power their equipment, but have upgraded to lithium batteries with great results.
- Normal practice is to set up their GPS bases on hilltops or in clearcuts.
- NGS OPUS is used to obtain a coordinate for the base station point, then all other points are RTK'd from there.
- Except for small projects, all points are observed with two separate base stations.
- In response to a question on the Power Point presentation, Ern confirmed that they use the Earth Point PLSS tool over Google Earth, which he says is a fantastic, indispensable planning tool.
- Ern then took questions from the audience.
- In response to a question on accuracy guidelines, Ern said their standard is that an inverse of less than 2.5 cm between two observations using one base station is used for surveys of six sections or less. For larger projects, an inverse of less than 8.5 cm is required from 2 different bases stations in separate quadrants.
- BLM guidelines for GNSS surveys were most recently published in 2019 and are publicly available.

Break (10:50-11:00)

Implementation of GNSS Technologies in Drone Surveying, presented by Josh Kowalski, LSIT, S&F Land Services (11:00-12:00)

- Self introduction by Josh.
- Drones are just another survey tool, like levels, total stations, GPS.
- DJI has 80% of the drone market.
  - o DJI M300 RTK is top of the line. Josh brought one to exhibit. It has its own DJI GPS base, and Josh also showed the DJI camera and lidar attachments he has for it.
  - o The DJI Phantom 4 has an amazing camera, and costs only about $1500. S&F Land Services also operates several of these.
- If you're flying a drone and trying to make money doing it, it is considered a commercial use and you need to register your drone and obtain a license to fly it.
- Photogrammetry uses raw images orthorectified with control points and elevation data to make orthomosaics.

- Use of DJI drones are restricted for US Department of Defense, other sensitive projects (US Army Corps of Engineers, Pacific Power, etc.) due to concerns about ties to Chinese military.
- Photogrammetry workflow:
    - Flight planning
    - Data acquisition
    - Preprocessing of raw imagery
    - Processing of edited imagery
    - Data extraction
    - Draft final deliverables
- Josh then gave an overview of the lidar workflow as well.
- Accuracy standards for remote sensing are published in the 2014 ASPRS positional accuracy standards.
- Josh ended by giving a live demonstration of the DJI M300 RTK outside the event center.

Lunch (12:00-1:00 pm)

QGIS: Is Free Worth the Price, presented by Jon Aschenbach, Summerlake Enterprises (1:00-1:25)

- Overview of GIS and major software programs.
- QGIS: Quantum Graphic Information System
    - QGIS 3.16 Hannover is the latest stable (non-beta) version.
    - Free.
    - Works on Linux, Windows, Macintosh operating systems.
- Jon then gave a step by step demo of a QGIS project at Hagg Lake.
- Pros/cons of QGIS.
- Conclusion: Free is worth the price.
- Jon then handed out copies of the program as well as white papers he wrote on different processes. He then took questions from the audience.

Preliminary Results Comparing Coordinates Derived from Trimble R12i and the Trimble Catalyst DA2, presented by Jim Lahm—GIS Services Specialist, Frontier Precision (1:25-1:50)

- Jim gave a background of Bob Greene of Frontier Precision, Chase Simpson of Oregon State University, and himself getting together after the September 2021 Oregon GNSS Users Group meeting.
- A map was shown of the OSU control test network. Chase did many observations and least squares adjustments on this network.
- The Trimble R12i and Catalyst DA2 was tested on the control network with the ORGN, Trimble VRS Now, and Trimble RTX.
    - The ORGN and Trimble VRS Now are both Wi-Fi/cell phone based for corrections.
    - Trimble RTX uses satellite based correctors but can also work with cellular networks.
    - Several levels of accuracy for the Trimble products are available at correspondingly different costs.
- The Catalyst DA2 is an improved version of the DA1 introduced several years ago. The DA1 had drawbacks, including a USB connection requirement and lack of iOS support.
- Tests using the R12i with Trimble Access agreed well with the OSU control points, as would be expected for a top of the line unit.

- The DA2 was tested using Terraflex on iOS.
  - Corrections with the ORGN checked in very well with the OSU control network.
  - The VRS Now corrections also fit well with the OSU control network, but not quite as good as the ORGN.
  - Tests using the corrections from Trimble RTX did not check in as well as expected. This was tracked down to the fact that VRS Now uses NGS HTDP corrections in its broadcast, but RTX does not. Trimble Access (used with the R12i) recognizes when the HTDP corrections are not applied, and if not, will apply them itself. The Terraflex software does not apply any HTDP corrections, and just uses the correction stream as broadcast. Right now, Trimble Access does not support the DA2 equipment but someday probably will.

Break (1:50-2:10)

UNAVCO: Network of the Americas (NOTA), presented by Chad Pyatt, UNAVCO (2:10-2:40)

- Overview of UNAVCO: Supports geodesy research to understand Earth processes.
- Overview of UNAVCO staff in the Northwest.
- UNAVCO operates GAGE, formerly the Plate Boundary Observatory (PBO), part of Earth Scope.
- Major partners in Oregon:
  - ODOT/ORGN
  - University of Oregon Earth Hazards Lab and Pacific Northwest Seismic Network
- UNAVCO and IRIS will merge in 2022 or 2023.
- An overview of geodetic tools used was given, as well as an overview of projects.
- 70% of UNAVCO's data is used by the private sector, 30% for research.
- Real-time data is broadcast for free.
- PBO is now the Network of the Americas (NOTA); it ranges from Alaska to the Caribbean.
- An overview of the Shake Alert system was given by Chad.

Oregon Real-Time GNSS Network (ORGN) Update/Challenges, presented by Eric Zimmerman—Geodetic Survey Associate, Oregon Department of Transportation (2:40-3:15)

- Overview of the ORGN:
  - Started in 2006 with 4 base stations. Now over 130 stations are operated with multiple partners.
  - There are over 1800 ORGN accounts; over 50% of those are from the private sector.
- Eric showed a couple of different ORGN base station setups.
- An overview of NTRIP products was given.
- Central Washington University upgraded several ORGN stations as part of the Shake Alert program.
- The latest addition to the ORGN is at the Adel ODOT maintenance station (October 2021).
- Challenges to the ORGN:
  - State/ODOT network outages.
  - Temporary station outages.
  - Work outside network coverage areas.
  - 3G cell network phaseout. Mobile networks are already shutting down 3G service, and 3G will largely be defunct by the end of 2022. The ORGN does not have too many 3G

modems, but there are some, and the Ontario station was affected earlier this year due to the 3G phaseout.
- o FTP (File Transfer Protocol) is no longer supported by any major web browser due to security concerns. FTP was how ODOT supplied RINEX files. ODOT now has a workaround—contact Eric or Randy Oberg if you need RINEX files.

Adjourned at 3:15 pm

Minutes **APPROVED** by unanimous consent of the Board on June 22, 2022.

Respectfully submitted,

Chris Munson, Secretary
Oregon GNSS Users Group