

OREGON GPS USERS GROUP MEETING MINUTES

Date: June 9, 2017

Location: Hollinshead Park, Bend, Oregon

Board Members Present: Eric Gakstatter, Chair-Elect
Chris Munson, Secretary

Called to Order: 9:00 am

Adjourned: 3:30 pm

Contact Hours: 5.5 hours

Business Meeting

- Welcome and outline of agenda by Eric Gakstatter, Chair.
- Treasurer's Report delivered on behalf of John Minor by Chris Munson, Secretary. Currently have \$12,162 in our bank account.
- Secretary's Report by Chris Munson:
 - Currently have 107 paid members, 308 people total on the email contact list.
 - Thanks to Randy Oberg, Eric Zimmerman, and Mark Armstrong for helping set up for the meeting.
 - Call for workshop ideas and nominees for board positions.

GNSS Technology Update by Eric Gakstatter, GNSS Consultant

- Active systems:
 - Constellations: GPS, GLONASS, QZSS (Japanese regional), BDS (Chinese regional)
 - Satellite-based augmentation systems (SBAS): WAAS, OmniSTAR, etc.
- Planned systems:
 - Constellations: Galileo (European), BDS (Chinese worldwide).
 - Galileo constellation has 10 of 18 satellites healthy, with another 4 satellites to be put into orbit later this year.
 - SBAS: SDCN (Russia)
 - IGS RT (Worldwide)
- Randy Oberg of the Oregon Department of Transportation (ODOT) said that the new Oregon Real-time GNSS Network (ORGN) receivers are Galileo and BDS capable, but ODOT has not made a decision as to whether they will update their Leica SpiderNET software in the future.
- Mark Armstrong, recently retired from the National Geodetic Service (NGS), said that NGS will be updating CORS coordinates soon, and that ODOT will follow with an adjustment of the ORGN stations.
- The GPS constellation has 31 satellites, and that GLONASS has 24 satellites. Both constellations are considered mature.
- Trimble Mission Planner is a free online service to determine satellite availability, but it only works on Microsoft Internet Explorer, not Microsoft Edge, Google Chrome, etc.

- BYOD trend (Bring Your Own Device): Using your smartphone or tablet for a data collector rather than a proprietary device (e.g. Trimble TSC3, etc.)
 - Advantages: Less cost, more current technology
 - Disadvantages: Not temperature tolerant or waterproof, short battery life.
- In answer to a question from a member regarding transformations between coordinate systems, Mark Armstrong stated that NADCON v5 is currently in beta testing, and will allow coordinate transformations from the United States Standard Datum (USSD) and the North American Datum of 1927 (NAD27) onward, but works best with NAD83(1991) and later datums. Will be released by Fall 2017.
- BYOD began in 2003 with SXBlue, and really took off in 2014 with the Trimble R1 (sub-meter) and R2 (RTK) receivers.
- The Trimble Catalyst, released in 2017, costs \$350 for the antenna, and works with Android BYOD only. It's a subscription model, with 1 meter accuracy costing \$40/month, and centimeter accuracy costing \$350/month, with other rates in between.

Current Status and Historical Perspective of Drone Regulations by Patrick Sherman, Cascade AUVSI

- Model aviation was unregulated by the Federal Aviation Administration (FAA) from 1958 to 2007. Only an advisory circular was issued in 1981—advisory circulars are neither laws or orders.
- Drones began in 2007. FAA prohibited drones for commercial activity.
- The Academy of Model Aeronautics (AMA) was also initially against drones, largely due to a few bad actors with drones.
- The FAA Modernization and Reform Act of 2012 (FMRA 2012) passed by the US Congress mandated integrating drones into aerospace operations, with full integration to occur by 2015. Full integration has not occurred as of today.
- In 2014, the FAA began issuing Section 333 exemptions for commercial operations. Exemptions required a pilot's license, took around 6 months to approve, and were so complicated that many people hired an attorney to complete the application for them.
- FMRA 2012 exempted recreation model aircraft from regulation.
- In November 2015, the FAA declared an emergency and required registration of drones, largely due to anticipating that over 1 million drones would be sold in the Christmas 2015 holiday season.
 - The FAA was sued in a case stating that FMRA 2012 expressly prohibited the regulation (and therefore the registration) of hobby drones. A recent ruling upheld the plaintiff's complaint that recreation drones are not required to register with the FAA.
- In August 2016, the FAA issued Part 107 of their regulations, establishing rules for commercial drones.
 - A Part 107 pilot's license requires:
 - Passing a written test
 - \$150 fee
 - Transportation Security Administration (TSA) background check
 - A retest is required every 2 years.
 - No hands-on practical demonstration or experience is required.
 - Around 50,000 licenses have been issued, with around a 92% pass rate.
- Part 107 aircraft & operation regulations:
 - Maximum weight of 55 lbs

- Maximum speed of 100 mph
- Maximum altitude of 400 feet above ground level (AGL)
- Daylight operation only
- Visibility of not less than 3 miles
- A pilot must maintain line of sight with the aircraft
- Operations are not allowed over people
- Aircraft must be registered
- Any Part 107 regulation can be waived upon written application to the FAA. 97% of waivers are for night operations.
- Operations in Class G airspace are unrestricted. Class B, C, D, and E airspace operations require prior approval by the FAA (2-3 weeks lead time).
- FAA is making UAS facilities maps for altitudes around restricted space of airports. These maps are forming the basis for a future real-time app-based approval of restricted airspace operations.
- Future of drones and regulations?
 - Beyond visual line of sight operation
 - Fully autonomous operations.
 - Single pilot operation of multiple drones (swarm)
 - Unmanned aircraft traffic management.

ESRI's New High Precision Workflow by Rich Ash, Geomobile Innovations

- Perfect storm for high accuracy GIS field data collection
 - Significant trend for BYOD with GNSS receivers
 - With ArcGIS Collector, iOS is used more than Android, with Windows users minimal.
- ArcGIS Collector works on a phone or tablet, and works offline as well. Some uses are:
 - Field data collection (GIS)
 - Mapping drone control points
 - Archeology
- The ArcGIS software now displays accuracy, has an accuracy filter, and has transformation settings.
- Rich then did a live demonstration of ArcGIS Collector.

Lunch Break

During lunch, Patrick Sherman did a live flight test of a DJI Inspire drone and answered members' questions.

NGS Calibration Baselines by Mark Armstrong

- Tier 1 baselines are federal calibration baselines
- Tier 2 baselines are community calibration baselines
- Mark described the process of remeasuring the Central Oregon and Eugene calibration baselines with ODOT and NGS staff earlier this year.
- Mark also presented some slides of highlights of a surveying trip to Ecuador he made with John Minor, Ken Bays, and others.

Presentation on RTK versus PPP by Gavin Schrock, Seattle Public Utilities

- Gavin described the history of Real-Time Kinematic (RTK) surveying. RTK technology has largely plateaued, with only incremental improvements at this time.
- Precise Point Positioning (PPP) uses satellite based signals for state-space representation.
- Traditional PPP technology was hampered by long convergence times.
- There are many online PPP post-processing engines, some of which are free.
- There are also L-band (satellite communications) PPP corrections.
- Many types of PPP: Single frequency, dual frequency, full/partial ambiguity fixes.
- PPP is currently giving accuracy of 2-3 cm horizontally and 4-8 cm vertically with 20 minute convergence times.

Debate on PPP versus RTK

Gavin Schrock and Eric Gakstatter engaged in a live debate on the merits and drawbacks of PPP versus RTK technology.

Photogrammetry with a \$1500 Drone by Eric Gakstatter, GNSS Consultant

- Overview of:
 - Mission planning software/apps
 - Image processing software
 - Types of drones
- Eric outlined a parts list for a DIY drone setup
- Sample projects flown by Eric and his firm
- Drone gotchas: Battery capacity, weather, computer processing power required.
- Big changes in the last year: FAA regulations, battery power, sensory capability, mission planning software.
- Consumer drones cost about the same from last year, but have more features for the price. Industrial drones have had a downward trend in price.

Respectfully submitted,

Chris Munson, Secretary