OREGON GNSS USERS GROUP
MEETING MINUTES

Date: January 20, 2017

Location: Sheraton Portland Airport Hotel, Portland, Oregon

Board Members Present: Dave Hills, Chair
Eric Gakstatter, Chair-Elect
John Minor, Treasurer
Chris Munson, Secretary

Called to Order: 1:00 pm
Adjourned: 4:30 pm
Contact Hours: 3.0 hours

Business Meeting

- Welcome and introduction by Dave Hills, Chair.
- Treasurer's Report by John Minor. Currently have $10,321 in our bank account.
- Secretary's Report by Chris Munson. Currently have 60 paid members, 290 people total on the email contact list. Have had a very positive response from the membership to the addition of PayPal credit card payments to the website, with 50% or more estimated membership renewals and workshop registrations using PayPal. Greg Crites mentioned his appreciation for the PayPal option, and Dave Hills thanked John Minor, Chris Munson, and Jim Lahm (webmaster) for their efforts in putting PayPal into place.
- Old business: None.
- New business: None.
- Elections. Dave Hills, current Chair, proposed Bill Ham for the position of Chair-Elect, and proposed the re-election of John Minor and Chris Munson for Treasurer and Secretary, respectively. By acclamation from members present, all three were elected accordingly. Eric Gakstatter, previously Chair-Elect, moved into the position of Chair per OGUG bylaws.
- Eric Gakstatter gave an introduction and overview of the afternoon meeting agenda.

Oregon Coordinate Reference System (OCRS) Review & Update by Mark Armstrong, Northwest Regional Advisor of the National Geodetic Survey

- 39 low-distortion projections (LDP) now cover the entire state of Oregon.
- The Oregon Coordinate System is composed of the Oregon Coordinate Reference System together with the Oregon State Plane Coordinate System (SPCS).
    - The OCRS grid coordinates are very close to being equal with actual ground coordinates, with low convergence angles.
    - Both the OCRS and SPCS are tied to the National Spatial Reference System (NSRS).
- Mark gave a short history of the creation of the OCRS.
- A distortion map of the SPCS was shown. Very little of the state has distortion of +/- 10 ppm or less.

- A distortion map of the OCRS zones within the state was shown, with almost the entirety of the state excluding some remote mountain ranges such as the Wallowas and the Steens having less than +/- 10 ppm distortion (0.05 ft/mile).
- The new version 3 of the OCRS Handbook is nearly complete.
    - Has recommended communities for each zone.
    - Has zone parameter checks to verify software transformation accuracy.
- SPCS did not account for vertical distortion, only horizontal distortion. 1/10,000 maximum horizontal distortion was the goal for SPCS, while 1/100,000 maximum horizontal distortion is the goal for OCRS.
- All grid coordinates, whether OCRS, SPCS, or any other LDP is tied to the datum frame, e.g., NAD83(2011) Epoch 2010.00, NAD83(CORS97), etc.
- Orthometric heights are dependent on the geoid model.
- Never mix datum frames, even within LDPs.

Oregon Coordinate Reference System (OCRS) by Ken Bays, Chief Geodesist of the Oregon Department of Transportation (ODOT)

- Ken presented an overview of the map distortions between OCRS and SPCS.
- Senate Bill 877 (SB877) in 2010 enacted the OCRS legally within the state of Oregon.
- The OCRS Advisory Committee was enacted with SB877, consists of 7 members. The committee can enact changes to the OCRS and SPCS by administrative rule (OAR).
    - On August 9, 2016, the seven members of the OCRS OAR Advisory Committee voted unanimously to approve the 19 new OCRS zones.
    - On December 15, 2016, the Oregon Transportation Commission approved the amended OAR containing the new 19 OCRS zones.
- The ODOT Geometronics On-line Toolkit will show distortion rasters of the OCRS zones.

Oregon GNSS Users Group Spring Workshop Announcement

- John Minor gave an overview of the upcoming Spring Workshop on the OCRS, to be held March 15, 2017 at Umpqua Community College in Roseburg, Oregon.
- Chris Munson estimated that around 80% of the current registrants are from the southern part of the state, from the Eugene area to the California state line.

GNSS Constellation Update by Eric Gakstatter, Editor of Geospatial Solutions

- GNSS+ conference to be held in Portland in September. Details at www.ion.org.
- China's regional GNSS system makes it the best place in the world to perform real-time kinematic (RTK) surveys.
- GPS constellation update:
    - 37 total satellites in orbit, 31 are set to healthy status.
    - All GPS IIF satellites (12 total) have been launched, with L1/L2/L5 capability.
    - GPS III satellites set to start launching in 2018.
    - GPS L5 capability requires 18 healthy L5 satellites.
- GLONASS constellation update:
    - 27 total satellites in orbit, 24 are healthy.
- Galileo constellation update:

    - 18 total satellites in orbit, 2 are unusable, 4 are not yet set to healthy status.
    - Galileo plans 30 satellites total.
- BDS (Beidou) constellation update:
    - 30 satellite constellation planned in orbit by 2020.
- Eric showed a chart of satellite availability for all four constellations over a 24-hour day.
- L5 frequency is four times as powerful than L1.
- Space weather
    - Reviewed the sunspot cycle over the last 20 years.
    - There are likely less than 10 events in an 11-year solar cycle that will severely affect GNSS.
    - Space weather can temporarily affect GNSS at any time.
    - During the Halloween storm of 2003, WAAS error rose to 25 meters.
    - 2006 solar radio burst affected GPS for 10-15 minutes.
- The Survey Association of the United Kingdom issued a paper studying GPS and GPS+GLONASS solutions. A GPS+GLONASS solution can actually degrade accuracy over GPS-only solutions. However, with greater satellite availability, productivity can increase with GPS+GLONASS methods. The decreased accuracy of GPS+GLONASS has been attributed the quality of the GLONASS signal. Reports indicate that signals from BDS and Galileo are expected to be similar to GPS, and likely would not degrade accuracy when used in conjunction with GPS.
- Galileo signals will be free for surveyors in their typical workflows.

Break (30 minutes)

Oregon Real-Time GNSS Network (ORGN) Update by Ken Bays of ODOT

- 85 of 98 ORGN stations are now GLONASS-enabled.
- A Memorandum of Understanding between ODOT and UNAVCO has been reached regarding Plate Boundary Observatory (PBO) stations.
- ODOT has begun deploying Septentrio PolaRx5 receivers at ORGN sites around the state. Currently 32 are operational, 19 by ODOT and 13 by UNAVCO. These new receivers are replacing old receivers, and are capable of receiving all GNSS constellations.
- Ken did a review of the ODOT Geometronics On-Line Toolkit.
- There are discussions for a possible collaboration with Dr. Jihye Park at Oregon State University (OSU) for integrating localized ionospheric maps with the ORGN for real-time correctors. Dr. Park has performed considerable research investigating ionic scintillation, and she has created local IONEX maps. The ORGN already uses global IONEX maps, but using localized ionospheric maps would create more accuracy.

Civil GPS Service Interface Committee (CGSIC) by Ken Bays of ODOT

- Ken attended a meeting of the CGSIC in Portland on September 12-13, 2016.
- The CGSIC is the only direct interaction between civilians and the US military operators of the GPS network.
- The National Differential GPS Network (NDGPS) has been greatly reduced, and is now mostly operating on the coasts and the Mississippi River.
- Discussed options to keep PBO stations alive after 2018 when funding for PBO expires.

- Ken gave an overview on Gavin Schrock's presentation at CGSIC on the Washington State Reference Network (WSRN).
- Ken also gave an overview of an OPUS Projects Best Practices presentation at the CGSIC meeting.

NGS Update by Mark Armstrong

- Mark is no longer affiliated with ODOT, he is now the Northwest Regional Advisor for NGS, covering the states of Oregon, Washington, and Idaho. His position is fully funded by NGS.
- Overview of the latest IGS orbit accuracies. At this point, there is no meaningful difference between the ultra-rapid and final orbits for land surveyors.
- Overview of the latest RINEX updates.
- ITRF 2014 has just been released.
- The name of the new reference frame that will replace NAD83 is the North American Terrestrial Reference Frame of 2022 (NATRF2022).
- ITRF/IGS will be fixed, not dynamic, and updated approximately every 4 years.
- There will be an estimated 1.5 m horizontal shift in Oregon from NAD83 to NATRF2022.
- There will be an estimated -0.4 m vertical shift in ellipsoid height, and a -1.0 m shift in orthometric height as compared to NAVD88 in Oregon with the new GRAV-D datum. The new GRAV-D orthometric elevations will be close to the old NGVD29 elevations in Oregon, but this is only a coincidence.
- GRAV-D flights have been completed on the Oregon and Washington coasts.
- Overview of an NGS grant to OSU for a hybrid height modernization project. The study found that when using the ORGN (GPS only solution), 5-6 180-epoch observations on the same point would yield a solution accurate to 2 cm or less vertically (95% confidence level). Three 180-epoch observations were sufficient for a horizontal solution accurate to 1.5 cm or less (95% confidence).
- New OPUS Projects updates offers one-button bluebooking. Beta testing to begin in Spring 2017.
- OPUS Projects sharing on hold for now, lower priority than other NGS efforts.
- Eight new CORS stations were added in Oregon in 2015 and 2016, mostly PBO stations. Four NDGPS CORS stations in Oregon were removed.

Conclusion

- Thank you by Eric Gakstatter
- In response to a question by immediate past Chair Dave Hills about Eric's focus for OGUG in 2017, Eric responded that he would like to increase outreach efforts and meeting/presentation topics to GIS professionals in Oregon.

Meeting adjourned at 4:30 pm.