



MAPPING & GIS

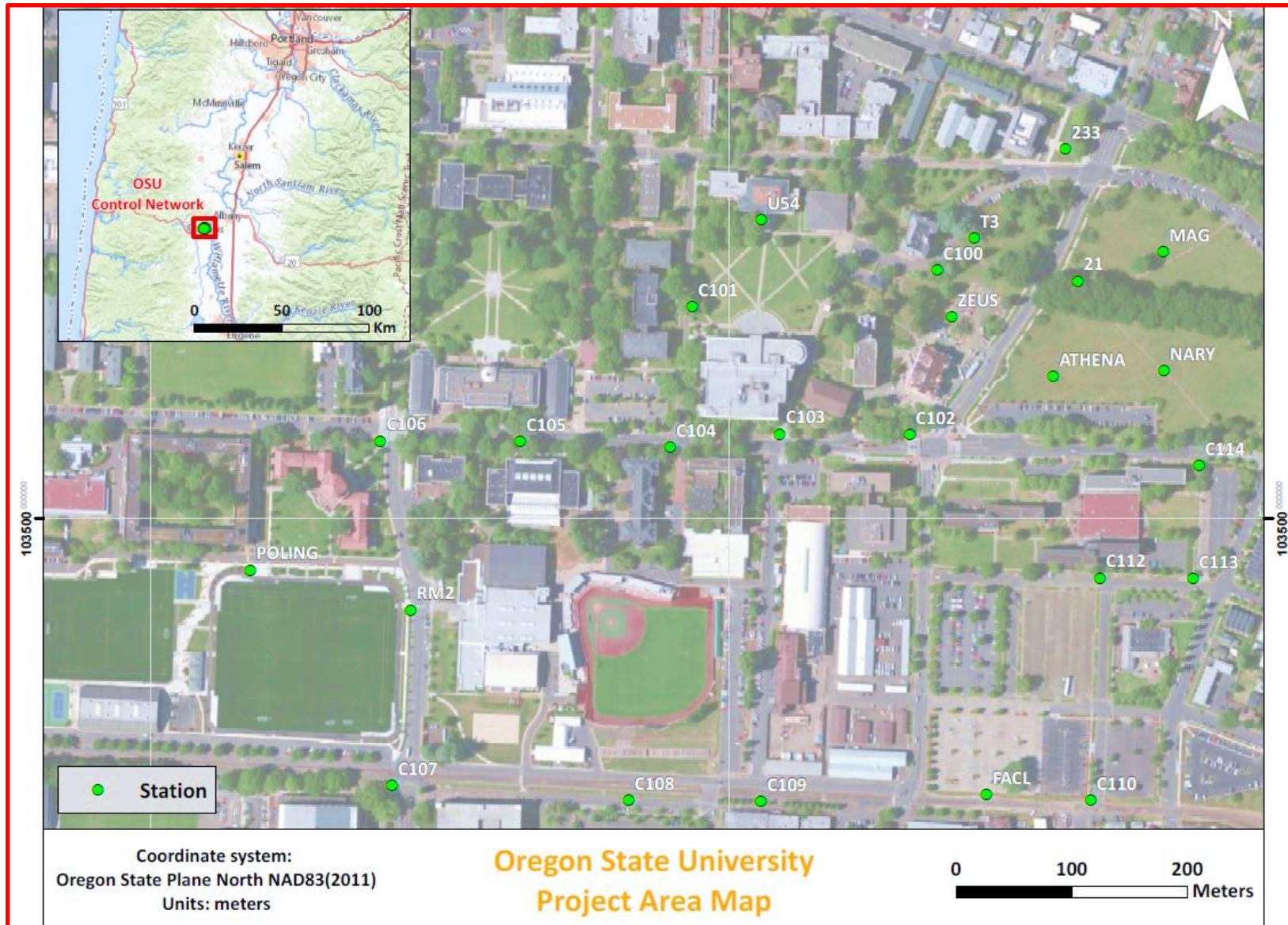
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Report on Preliminary OSU GNSS Control Observations

- Chad Simpson – Geomatics Professor at OSU
- Established 25 control points on campus
- Derived from differential leveling, total stations and GNSS
 - Static baselines from CORS to Master station
 - Real-time network baselines from master station to survey marks
 - Least Squares adjustments performed (253 adjustments)
 - Observed scores of times in class by students
- Chad tested the accuracy of the ORGN to adjusted network
- He invited Bob Green and myself to use Trimble RTX
- We used the Trimble R12i and the new Trimble Catalyst DA2
- We are reviewing the results
- White Paper to be published

Map of the Network



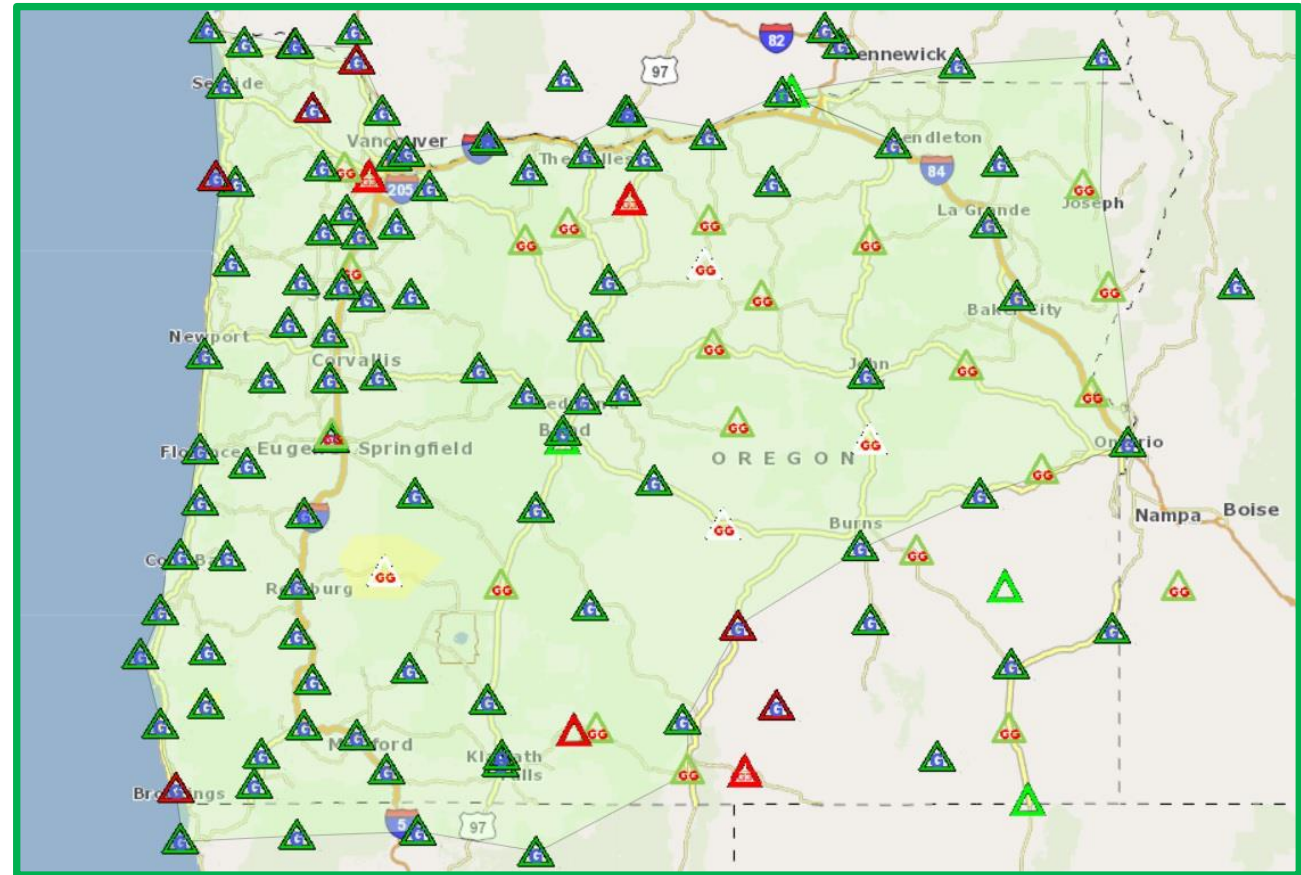
New Hardware & Correction Sources Introduced for this Round

- Trimble R12i survey grade GNSS receiver with Access app
- Trimble Catalyst DA2 digital antenna with TerraFlex app and iPhone 13 Pro Max
- Both capable of 1cm H, 2cm V
- Both capable of receiving ORGN, Trimble VRS Now and Trimble RTX



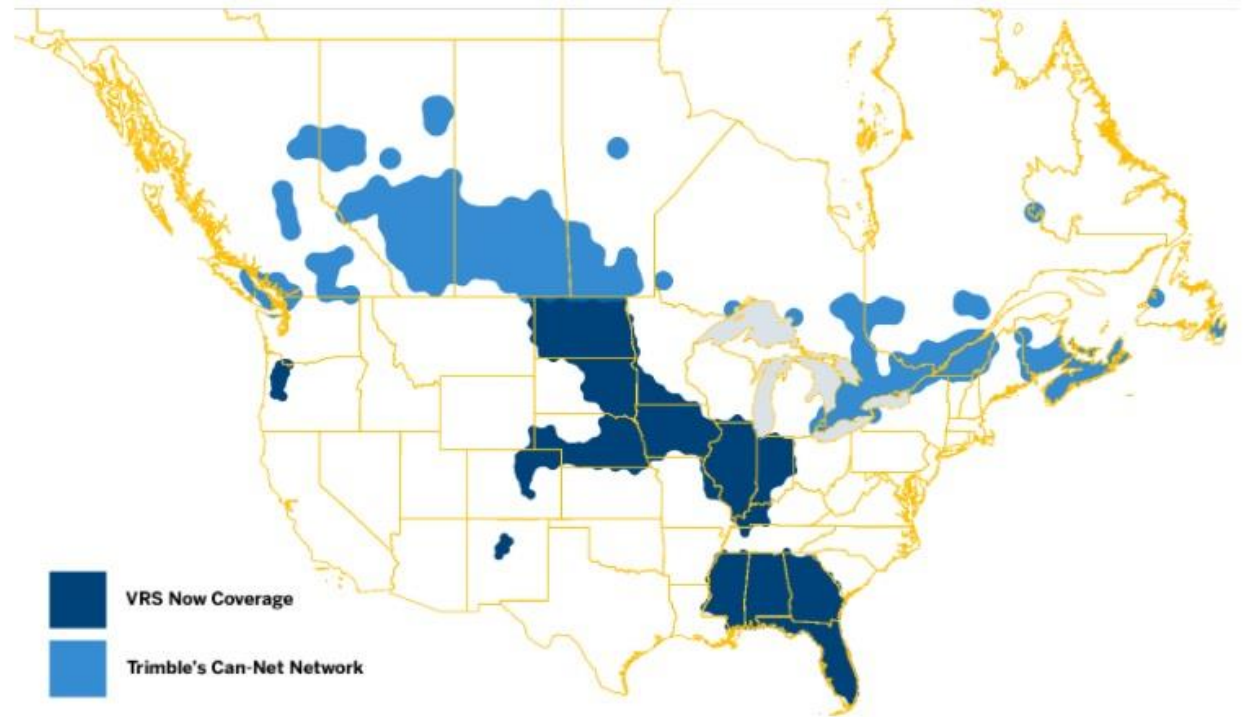
Correction Sources – ORGN

- Oregon Realtime GNSS Network
- Terrestrial GNSS control network
- Uses SpiderNet base station management software
- Covers entire State of Oregon
- Delivered via cellular network or Wi-Fi



Correction Sources – Trimble VRS Now

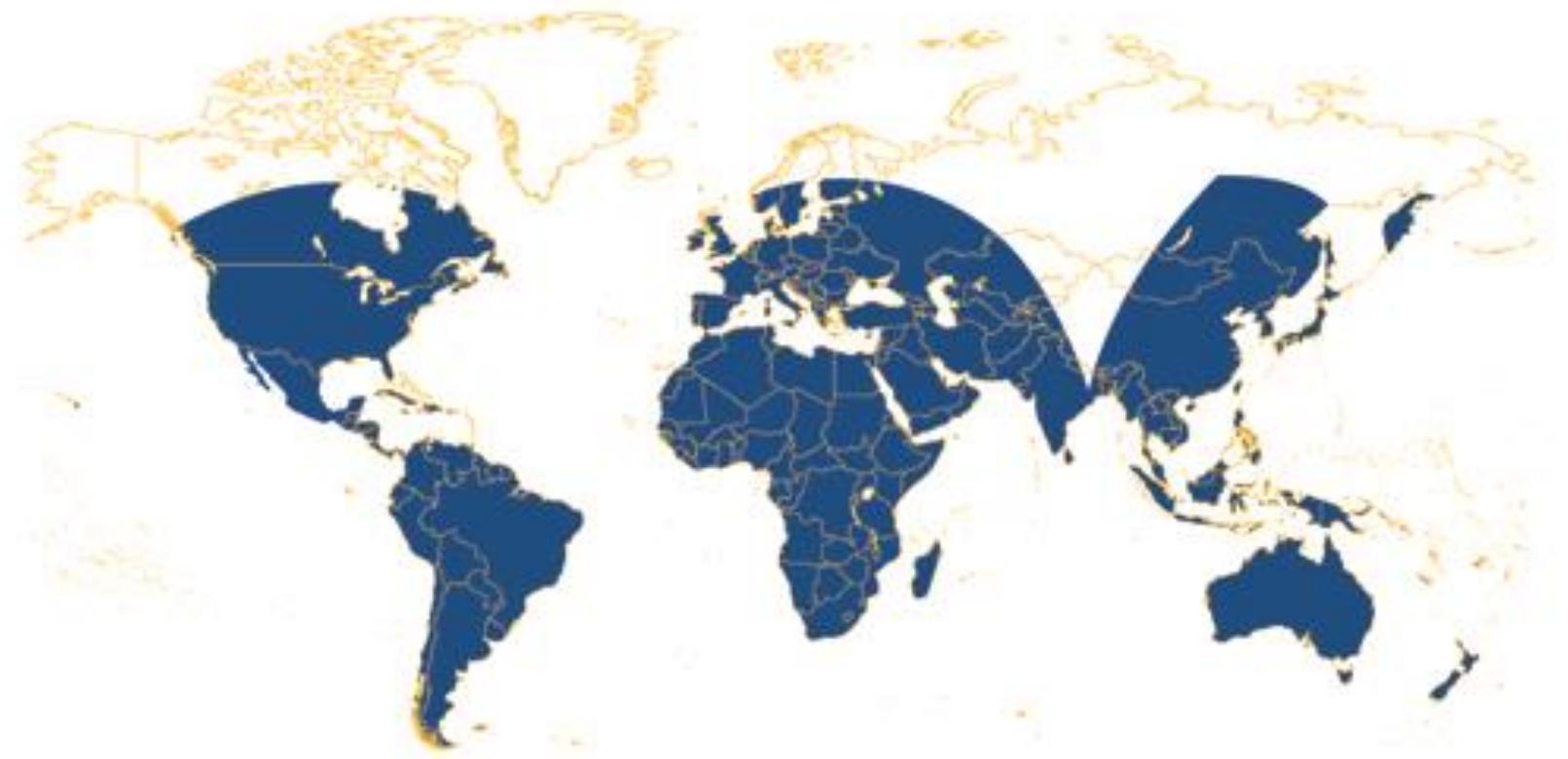
- Trimble VRS Now
 - Terrestrial GNSS control network
 - Uses Pivot base station management software
 - Range – from Vancouver, WA to Eugene, OR
 - Along I-5 corridor – several miles on either side
- Delivered via cellular network or Wi-Fi



Trimble VRS Now and Can-Net North America Coverage

Correction Sources – Trimble RTX

- Trimble RTX
 - Real Time Extended
 - Satellite-base correction service
 - Delivered via satellite L-band and Cellular



The GNSS Hardware

- The Trimble R12i is the flagship system for surveyors
 - IMU-based tilt compensation
 - Built-in automatic integrity monitoring
 - ProPoint GNSS Technology
 - Trimble xFill[®] Technology
 - Flexible GNSS signal management
 - Much better accuracy in tough environments



The GNSS Hardware

- The Trimble Catalyst DA2 (Digital Antenna)
 - A code-based GNSS receiver
 - Uses the computing power of a smart device as the GNSS receiver
 - ProPoint Technology
 - Works with iOS or Android
 - Subscription-based accuracy model
 - 60cm
 - 30cm
 - 10cm
 - 1cm
 - Includes access to RTX and VRS Now
 - Compatible with many apps



Summary of Results with Catalyst DA2



Name	Northing (m)	Easting (m)	Elevation (m)
233 Control	103819.697	2279791.468	72.346
233 ORGN	103819.677	2279791.468	72.380
233 VRS Now	103819.693	2279791.415	72.349
233 DA2 RTX	103819.816	2279791.701	72.495

Summary of Results with Catalyst DA2



NARY Control	103627.603	2279876.649	69.962
NARY ORGN	103627.5892	2279876.63	69.95
NARY VRS Now	103627.608	2279876.597	69.94
NARY DA2 RTX	103627.728	2279876.629	69.987
ATHENA Control	103622.93	2279780.831	70.234
ATHENA ORGN	103622.9264	2279780.818	70.208
ATHENA VRS Now	103622.928	2279780.772	70.198
ATHENA DA2 RTX	103623.048	2279780.823	70.223
IL2 Control	103733.779	2279805.534	70.894
IL2 ORGN	103733.7831	2279805.521	70.901
IL2 VRS Now	103733.786	2279805.486	70.909
IL2 DA2 RTX	103732.888	2279805.857	71.972
MAG Control	103730.638	2279875.957	70.093
MAG ORGN	103730.6294	2279875.956	70.094
MAG VRS Now	103730.637	2279875.906	70.092
MAG DA2 RTX	103730.766	2279875.957	70.142

Errors in the RTX Observations

- HTDP – Horizontal Time Dependent Positioning
 - HTDP is a utility for transforming positional coordinates across time, and between spatial reference frames
- This model is used in Trimble VRS Now, but not in the ORGN or Trimble RTX
- We discovered that Trimble RTX produced accurate results when using the R12i, but why?
- The Trimble Access app, applies that model when RTX corrections are selected, but does not when using Trimble VRS Now



How to Resolve these Discrepancies

- Apps compatible with Trimble Catalyst DA2
 - Trimble TerraFlex
 - Esri Field Maps
 - Trimble UAV Ground Control
 - Trimble PenMap
 - This is not a complete list
- PenMap is a survey application that includes a site calibration feature
- Performing a site calibration would provide the transformation necessary to resolve those errors



Summary

- When using Trimble Access with the R12i and RTX HTDP is applied within the app
- When using Trimble Access with the R12i and the ORGN or Trimble VRS Now, HTDP is applied at the correction source
- Access manages that automatically
- Trimble Catalyst and TerraFlex do not apply HTDP inside the app or in RTX, so errors appear
- Trimble PenMap would provide the site calibration process necessary to resolve errors



- If you have questions, please contact me:

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Pricing for Catalyst DA2

Catalyst	Accuracy	Annual	Monthly
Catalyst 60	60 cm / sub-meter	\$420 (\$35/month)	\$42
Catalyst 30	30 cm / sub-foot	\$1,260 (\$105/month)	\$126
Catalyst 10	10 cm / ~4 in.	\$2,100 (\$175/month)	\$210
Catalyst 1	1 cm	\$3,675 (\$306/month)	\$368

Catalyst 1 On-Demand Packs	Cost	Cost Per Hour
10 Hour Pack	\$105	\$10.50/Hour
100 Hour Pack	\$875	\$8.75/Hour
1,000 Hour Pack	\$7,095	\$7.10/Hour
10,000 Hour Pack	\$50,000	\$5/Hour

*On Demand Hours have a 12-month expiry from date of purchase

**Usage <1hour will utilize 1 hour



