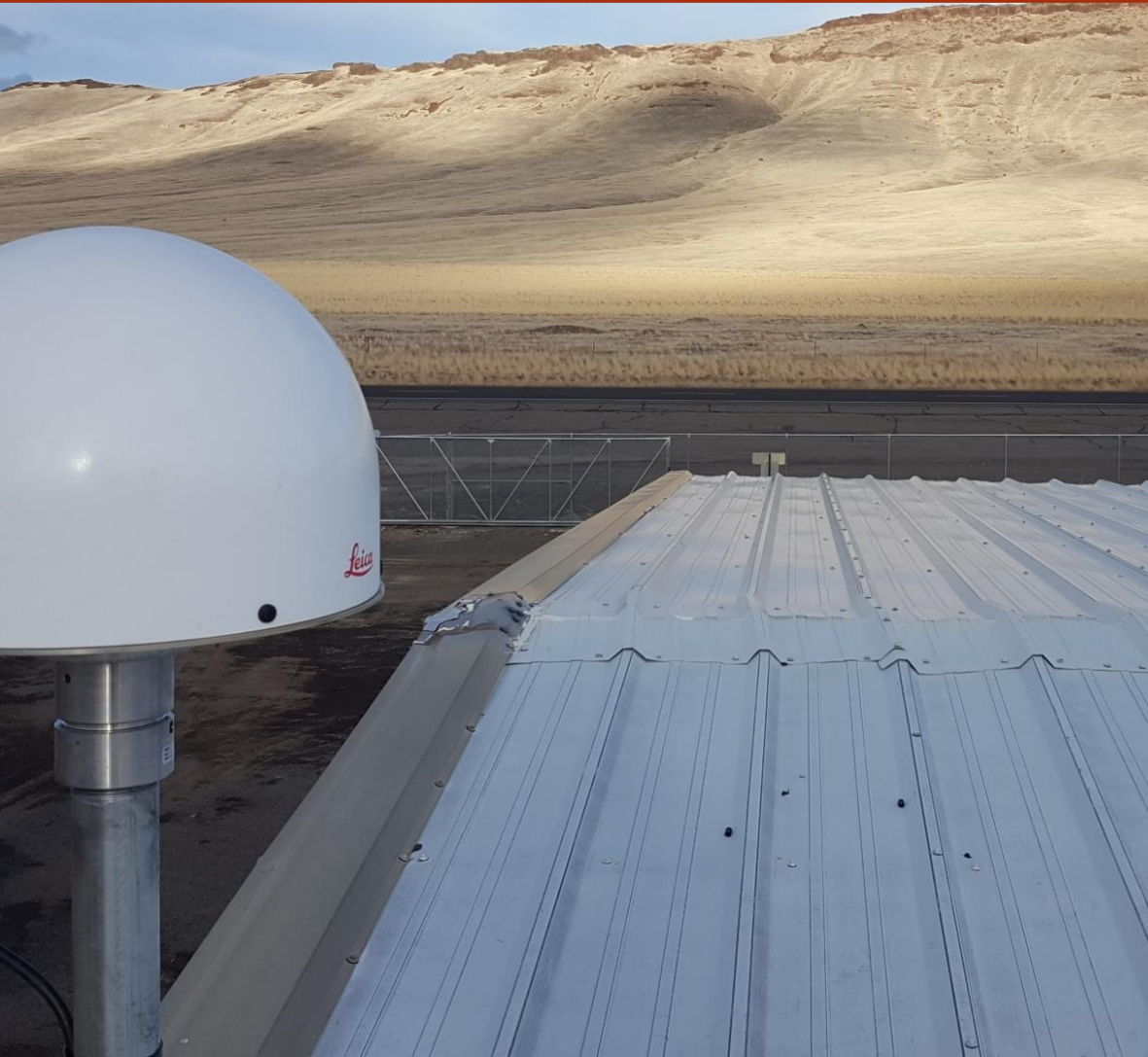


Oregon Real-time GNSS Network Changes in 2022



- **2023 – PLSO/ OGUG**
- **Randy Oberg, PLS**
- **Eric Zimmerman, PLS**
- **January 2023**



Recent Upgrades to full GNSS Thanks to CWU

2019

TILL

SEAS

ONAB

LFLO

REED

RDL2

YONC

RSBG

GTPS

2020

NWBG

2021

LPSB

KFRC

PSPT

PKDL

OAKR

PNVL



2022 Upgrades to Full GNSS *

- **CHEM** - Chemult
- **PLNA** - Paulina
- **LKVW** - Lakeview
- **WMSG** - Warm Springs
- **BLY1** - Bly
- **ENTR** - Enterprise
- ***BEND** - City of Bend
- ***COBO** - Beaverton
- ***MCSO** - Salem





Station Upgrades Needed

ODOT

- ▶ BASQ – Basque
- ▶ BEND – City of Bend
- ▶ BRNT – Burnt River School
- ▶ COBO – City of Beaverton
- ▶ COND – Condon
- ▶ CRAN – Crane
- ▶ FWBD – Farewell Bend
- ▶ GRAS – Grass Valley
- ▶ HALF – Halfway
- ▶ HRPR – Harper School
- ▶ JIME – Washington County
- ▶ MCSC – Salem
- ▶ MTCL – Mitchell
- ▶ SPRA – Spray
- ▶ UKIA – Ukiah
- ▶ WAMC – Wamic

PBO

- ▶ MDMT – Medicine Mountain



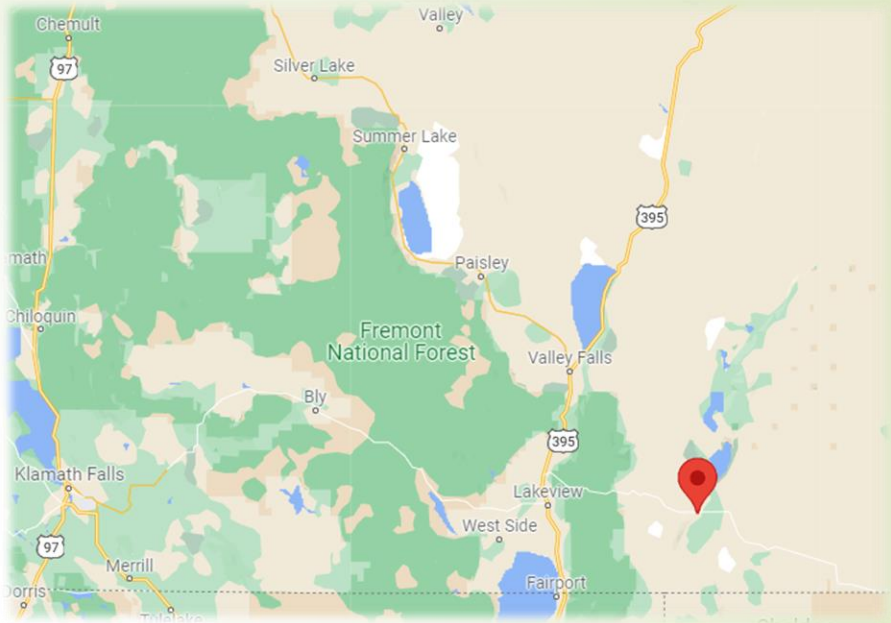
ADEL

ODOT Maintenance Station

- ~ Approx. 30 miles E of Lakeview
- ~ Completed October 2021

Previous Installs:

- ~ Basque (ODOT Maint. Station)
- ~ Crane (Crane School Dist.)



***PBO +**

CHZZ – W of Tillamook

AGNS – NE of GoldBeach #

NOSE – SE of Florence #
in the Coast Range

CRLA – Crater Lk, single base only
National Parks run

OB3C – renamed DOWL

Added 3 Idaho stations

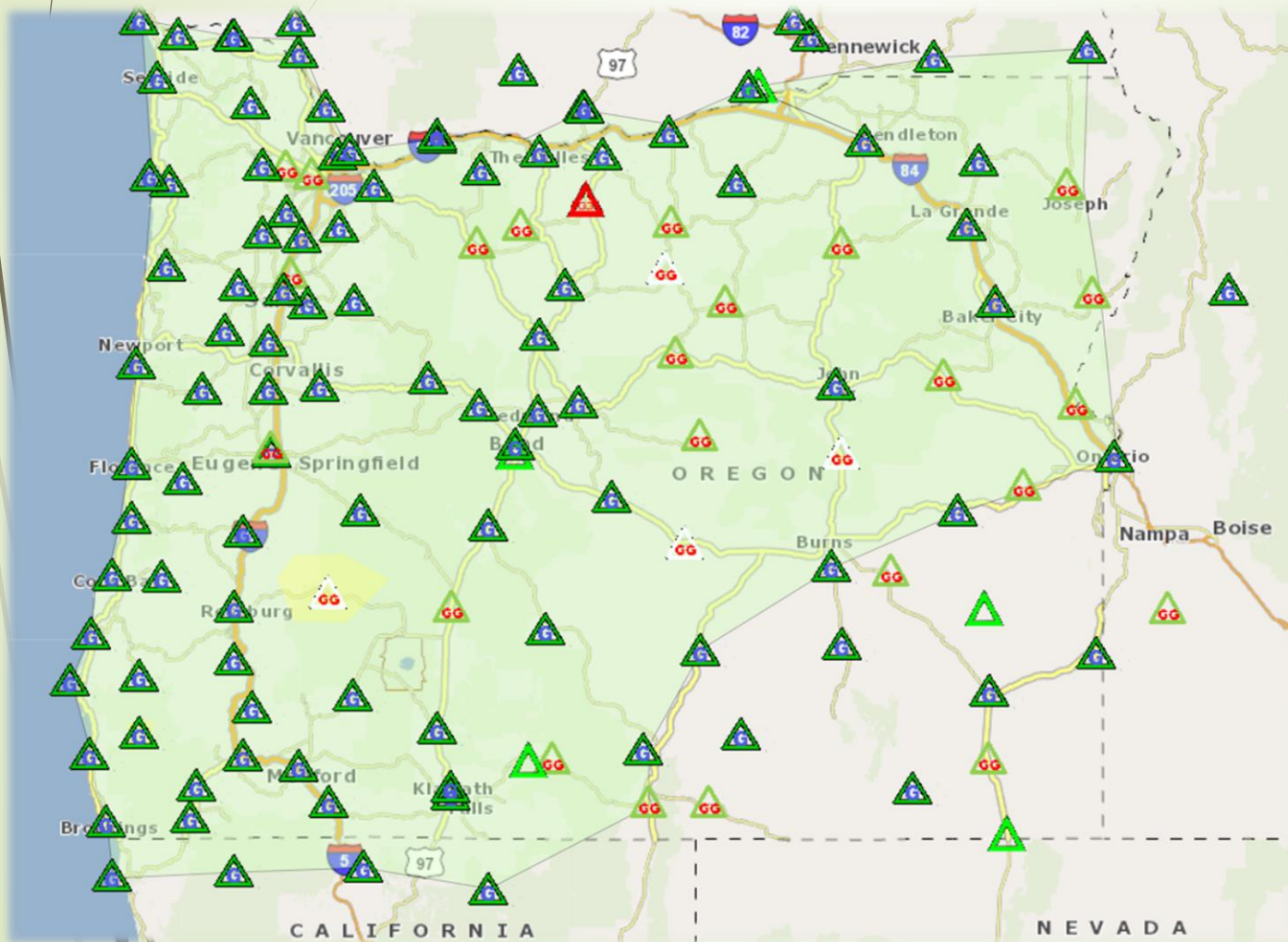


Leica System 1200 Cabinet ~ Septentrio PolaRx5 Cabinet





Oregon Real-time GNSS Network



ORGN Stations Legend

Ground Station Status

- GNSS Active
- GNSS Alert
- GNSS Inactive
- GLONASS Active
- GLONASS Alert
- GLONASS Inactive
- GLONASS Planned
- GPS Active
- GPS Alert
- GPS Inactive
- GPS Planned

Coverage Area

- No Coverage
- Coverage



All Stations List+

(Coordinates & Links to Station Pages, Partners, RINEX data and Site Logs)

April 8, 2022							
Station ID	Ref ID	Location	Latitude	Longitude	Ellipsoid Height (meters) @ ARP	Site Logs	GNSS
AGNS	282	Agness	42 33 09.94155	124 03 32.74455	51.783	AGNS	GNSS
ANAT	201	Anatone, WA	46 07 58.29503	-117 08 07.48104	1087.785	ANAT	GNSS
ABLN	202	Arlington	45 42 29.52532	-120 10 50.71154	120.812	ABLN	GNSS
ASHL	203	Ashland	42 10 50.47299	-122 40 12.55241	609.147	ASHL	GNSS
BASQ	270	Basque Maintenance Yard	42 24 41.76354	-117 51 46.84978	1349.14	BASQ	GG
BEND	205	Bend, City of	44 03 25.75727	-121 18 54.61222	1096.257	BEND	GPS
BLY1	204	Bly	42 24 24.62755	-121 02 56.57650	1313.889	BLY1	GG
BNDM	278	Bend (ODOT Maintenance)	44 05 21.80729	-121 18 27.07883	1070.737	BNDM	GNSS
BRNT	222	Burnt River School (Unity)	44 26 24.77044	-118 11 28.69155	1213.195	BRNT	GG
BURN	271	Burns Jct	42 46 46.18843	-117 50 36.65278	1181.437	BURN	GNSS
CABL	206	Cape Blanco	42 50 09.94322	-124 33 47.98644	38.291	CABL	GNSS
CATH	207	Cathlamet, WA	46 11 50.27547	-123 22 02.11302	56.670	CATH	GNSS
CHEM	208	Chemult	43 13 27.68494	-121 47 08.94043	1440.413	CHEM	GG
CHZZ	256	Tillamook	45 29 11.44035	-123 58 41.18384	51.145	CHZZ	GNSS
COBO	209	Beaverton, City of	45 29 08.88914	-122 47 50.56291	47.207	COBO	GG
COND	210	Condon	45 14 16.44868	-120 10 52.90279	865.844	COND	GG
CRAN	213	CRAN-Crane	43 24 56.80137	-118 34 29.70705	1248.78	CRAN	GG
CROK	211	Castle Rock, WA	46 16 28.54446	-122 54 45.09357	1.470	CROK	GNSS
CTPT	212	Central Point	42 22 38.08473	-122 53 38.19500	370.975	CTPT	GNSS
DANP	247	Richland WA	46 16 48.13634	-119 16 34.52974	104.176	DANP	GNSS
DOWL	237	Eugene	44 03 57.45920	-123 05 53.27962	112.197	DOWL	GNSS
		4/8/2022 OB3C Renamed to DOWL @ 10:01					
ELG2	341	Elgin	45 33 53.49145	-117 55 42.27526	816.489	ELG2	GNSS
ENTR	214	Enterprise	45 25 52.50855	-117 17 17.03741	1127.055	ENTR	GG
FWBD	215	Farewell Bend POE	44 17 30.78145	-117 13 17.85372	631.934	FWBD	GG
GLWD	217	Glenwood, WA	46 01 11.36775	-121 17 18.92579	561.420	GLWD	GNSS



Station Pages (ODOT only)

Go To

Station - BNDM



Looking North



Looking South



Looking West



Looking East

Equipment Specifications

Manufacturer: Leica Geosystems / Septentrio
Receiver Model: Septentrio PolaRx5
Antenna: Leica AR20 (LEIAR20 LEIM)
Elevation Mask: 0 Degrees

File Logging

File Type: RINEX
Logging Interval: 5 Seconds
Operation Time: 24x7 log files
Rollover: Hourly

Station Information

Site ID: BNDM
Location: Bend
PID: 205

Position

Antenna Ref Point: NAD83 (2011) epoch 2010.00
Latitude: 44° 05' 21.80729"N
Longitude: 121° 18' 27.07883"W
Ellip. Hgt.: 1070.737m

Tracking GPS and GLONASS

Location Address: 63055 N Highway 97
 Bend OR, 97703
Organization: Oregon Department of Transportation

Important Links

- [Site Log:](#)
- [RINEX Data:](#)
- [Alerts/Advisories:](#)
- [Superseded coordinates NAD83 \(CORS96\) epoch 2002:](#)



File Products (aka Correctors)

- ▶ Would a products list be helpful on our website?
- ▶ What should we do with our ORGN products?
 - ▶ Do we still need RTCM 2.3?
- ▶ File Products/ Correctors are split into 3 ports
 - ▶ **9879** – All single-base correctors by name: **GPS-only**, **GG** and **GNSS**.
 - ▶ **9881** - Network (multi-base) & nearest-single-base correctors:
all are **GPS-Only**.
 - ▶ **9882** – Network (multi-base) & nearest-single-base correctors:
all are **GG** (with several newly created **GNSS** ones)



FAQ's

- ▶ What is the difference between MAX & IMAX?
- ▶ Can I use 2 rovers on the same account? [**Concurrent Connection Messages (Too Many Users)**]
- ▶ How far outside of the network can you go and still get correctors?
- ▶ How far away from the master station can I be and still get correctors?
- ▶ Can I use the AG product, and is the accuracy less?
- ▶ Why does my rover change master station (bounces between master stations)?





Daily Monitoring. What We "See"

GNSS Spider 7.5.2.8679 - [Local Network Server]

File View Management Processing Status Tools Window Help

Management
Local Network Ser...

Local Network Server

Data Transfer Locations

Operators

Events

Transformations

User Management

Contents

- Network
 - Clusters
 - North Willamette
 - Rogue Umpqua
 - South Coast
 - North Coast
 - South Willamette
 - North Central
 - South Central
 - Northeast
 - Cells
 - WALA-0298
 - REDM Monitoring
 - P394 Monitoring
 - P179 Monitoring
 - P363 Monitoring
 - P374 Monitoring
 - P411 Monitoring
 - LCS1-0244
 - P022-0022
 - P063-0063
 - Automatic Cells
 - ASHL
 - BNDM
 - BNDM 1
 - CTPT
 - CTPT 1
 - GRAS
 - JIME
 - LAPN
 - LPSB
 - LPSB 1

Net Config RT Products **Map View** Rover Status Sat Status Sat History

Content	Cluster	Product	Date/Time	User	Category	Text
All			08.04.2021 11:38:55	ClusterSer...	Cluster	Cluster server WPDOTAPPL267_09883: Site <P154 Ishkeesh> has high latency (greater 5 s)
All Clusters			08.04.2021 11:38:55	ClusterSer...	Cluster	Cluster server WPDOTAPPL268_09882: Site <P154 Ishkeesh> has high latency (greater 5 s)
All Products		IMAX_GNSS	08.04.2021 11:38:48	Spider Ser...	Product	Rover user 'SRW02' rejected. No heartbeat received since 30 seconds.
Query (Offline)			08.04.2021 11:38:45	ClusterSer...	Cluster	Cluster server WPDOTAPPL266_09884: Site <WDBN Woodburn> has high latency (greater 2 s)
			08.04.2021 11:38:45	ClusterSer...	Cluster	Cluster server WPDOTAPPL266_09883: Site <WDBN Woodburn> has high latency (greater 2 s)

For Help, press F1

0/210 Real-Time Processing started Local User level: Administrator Local time : 11:38:56 OK



GNSS Spider 7.5.2.8679 - [Local Network Server]

File View Management Processing Status Tools Window Help

Management Local Network Ser... Local Network Server Data Transfer Locations Operators Events Transformations User Management

Contents Network Clusters North Willamette Rogue Umpqua South Coast North Coast South Willamette North Central South Central Northeast Cells WALA-0298 REDM Monitoring P394 Monitoring P179 Monitoring P363 Monitoring P374 Monitoring P411 Monitoring LCS1-0244 P022-0022 P063-0063 Automatic Cells ASHL BNDM BNDM 1 CTPT CTPT 1 GRAS JIME LAPN LCS3 LPSB

Map View: Shows a network map with stations like P406, WSTLKDC35, Hargrave Sam, P427, P412, FLS1, Ferguson Joe, HHPRA, Gaylord Pat, P427, P412, WDBN, and others. A central pop-up window displays:

Rover is receiving a network product RTK / PPS fix at this rover

User-ID: 20CS07

Rover user name: Ohmer Scott

Corrections started: 11:11:13

Connection duration: 00:32:49

Receiving product: IMAX_GNSS

Correction from: P406-0406

Location: 45° 12' 26.53803" N
123° 11' 01.75552" W
21.8270 m

Current dist to Reference Station: 3.12 km

Net Config RT Products **Map View** Rover Status Sat Status Sat History

Content	Cluster	Product	Date/Time	User	Category	Text
All	North Cent...		08.04.2021 11:44:04	ClusterSer...	Cluster	Cluster North Central: Broadcast Ephemeris missing for SV R04 in network processing
All Clusters			08.04.2021 11:44:02	ClusterSer...	Cluster	Cluster server WPDOTAPPL266_09882: Site <GLWD-Glenwood> has high latency (greater 2 s)
All Products			08.04.2021 11:44:01	ClusterSer...	Cluster	Cluster server WPDOTAPPL268_09882: Site <P154 Ishkeesh> has high latency (greater 5 s)
Query (Offline)			08.04.2021 11:44:01	ClusterSer...	Cluster	Cluster server WPDOTAPPL267_09883: Site <P154 Ishkeesh> has high latency (greater 5 s)
			08.04.2021 11:43:59	ClusterSer...	Cluster	Cluster server WPDOTAPPL266_09884: Site <WDBN Woodburn> has high latency (greater 5 s)



R O V E R L O G S



Spider v7.5.2 - ORGN

Real Time Connection Log

General Information

User-ID:	20CS09
Rover user name:	Weisz Jason
Subscription-Id:	LE-3IGJTLG7P3-2112102654
Organization:	ODOT, Region 3 (White City)
Heartbeat timeout:	30
Server time setting:	Local time (UTC -7h)
Client host:	174.204.210.44:12538
Connection-Id:	f827b100-2a46-42aa-966f-e97db09fb9f3
Connection started at:	2022-04-18 12:44:05
Start sending corrections at:	2022-04-18 12:44:06
Connection ended at:	2022-04-18 14:34:30
Duration of connection:	01:50:24 [H:M:S]
First reference station used / distance to station:	ASHL - 203 / 5.207 km
Last reference station used / distance to station:	ASHL - 203 / 5.510 km

Real Time Product Settings

Product name:	IMAX_GNSS
Type:	Automatic cells
Site/Cell/Rover Name/Company:	-
Send real time message to:	NTRIP-Client
Connection settings:	-
Authentication:	Ntrip
Maximum distance to provide corrections:	45.0 km
Check for nearest site/cell:	On
Fallback when network is not available:	-
Fallback when rover-master distance is shorter:	- m
Fallforward enabled:	-
Re-check if rover moves more than:	5000 m
Message type:	i-MAX RTCM 3.x (MSM4)
Satellite system:	GPS + GLO + GAL
Send NULLANTENNA:	Yes



Rover Logs

Connection History

Time	Event	Real time product state	Rover user state
2022-04-18 12:44:05	Connection started		
2022-04-18 12:44:06	NMEA received	ASHL - 0203	SPS (1); 12 SV; HDOP 0.7; 42° 13' 1.1871" N; 122° 42' 36.0925" W; 524.846 m; 0203; 0000
2022-04-18 12:44:06	User authenticated		
2022-04-18 12:44:06	Start sending corrections	i-MAX RTCM 3.x (MSM4); fixed: 0 SV (G/R/E/C/J: 0/0/0/0/0); ASHL - 0203 CTPT-Central Pt-212;P784- Montague-784;GTPS- Grants Pass-220;PSPT- Prospect-283;P179 Cave Jct-179	
2022-04-18 12:44:08	Reference state changed	i-MAX RTCM 3.x (MSM4); fixed: 20 SV (G/R/E/C/J: 7/5/8/0/0); ASHL - 0203	
2022-04-18 12:44:11	Rover state changed	ASHL - 0203	DGPS (2); 12 SV; HDOP 0.7; 42° 13' 1.1350" N; 122° 42' 36.0568" W; 527.536 m; 0203; 0203
2022-04-18 12:44:21	Rover state changed	ASHL - 0203	RTK fixed (4); 12 SV; HDOP 0.7; 42° 13' 1.1313" N; 122° 42' 36.0592" W; 528.146 m; 0203; 0203
2022-04-18 12:48:16	Switched to another station/cell	i-MAX RTCM 3.x (MSM4); fixed: 20 SV (G/R/E/C/J: 7/5/8/0/0); ASHL - 0203 P784-Montague-784;PSPT- Prospect-283;P179 Cave Jct-179;P154 Ishkeesh- 154;CTPT-Central Pt- 212;GTPS-Grants Pass- 220	
2022-04-18 12:48:18	New cell triggered for rover	ASHL CTPT-Central Pt;P784- Montague;GTPS-Grants Pass;PSPT-Prospect;P154 Ishkeesh	; 42° 13' 1.7094" N; 122° 42' 36.2241" W; 531.541 m;
2022-04-18 12:48:30	New cell triggered for rover	ASHL CTPT-Central Pt;P784- Montague;GTPS-Grants Pass;PSPT-Prospect;P179 Cave Jct	; 42° 13' 1.7098" N; 122° 42' 36.2238" W; 531.543 m;

Questions?

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Oregon Real-time GNSS Network

<https://www.oregon.gov/odot/orgn/pages/index.aspx>