

CORS/OPUS FUTURE PROSPECTS

- Delivery of some CORS data in near real-time via Ntrip
- OPUS-RS to process 15 minute data sets
- OPUS projects

Desired New Features

- Process multiple files as network
- Reduce occupation time to ~ 15 min
- Process single frequency (L1) data
- Publish OPUS results

Desired New Features

- Process multiple files as network ← OPUS Projects
 - Reduce occupation time to ~ 15 min
 - Process single frequency (L1) data
- } OSU Contract
- Publish OPUS results ← PAT 22

STREAMING CORS DATA WITH NTRIP

- What format?
- What stations?
- What software?
- What distance?
- What data rate?
- What latency?



OPUS - RS

Online Positioning User Service - Rapid Static



OPUS Rapid Static is a new version of OPUS designed to handle short (15 minute) data sets. It uses an entirely new processing engine. Its accuracy, reliability, and failure modes may be different from the original OPUS. This site should be treated as an Operational Prototype. [more](#)

[OPUS Upload](#) | [What is OPUS-RS](#) | [Using OPUS](#) | [Recent Solutions](#) | [FAQs](#) | [OPUS Policies](#) | [Contact OPUS](#)

What is OPUS - RS

Using OPUS - RS

Recent Solutions

FAQs

OPUS Policies

Contact OPUS

Recent Developments

[Nov 10, 2004] Format of the OPUS data sheet is changed to provide space for the combined factor for

1.

Enter your [email address](#)

2.

Enter your [DATA file](#) Now accepting RINEX and selected receiver formats.
Data files may also be compressed (.ZIP, .zip, .Z, .gz)

3. no antenna selected - see FAQ #6

Select the [antenna type](#)

4. meters

Enter the [antenna height](#)

5.

If desired, select from several options to modify the basic OPUS procedures.

Your data must be dual frequency data (L1 and L2) and a minimum of 10 minutes of observations is recommended.
Your collection rate must be 1,2,3,5,10,15 or 30 seconds.

OPUS-RS

- Uses RSGPS program instead of PAGES (based on OSU MPGPS program)
- Uses P1 and P2 as well as L1 and L2 obs
- Resolves all ambiguities with LAMBDA
- Geometry free linear combination used to determine DD ionospheric delays

RSGPS

Observation Equations

$$\lambda_1 \varphi_{1,ij}^{kl} - \rho_{ij}^{kl} - (\alpha_i^k T_i - \alpha_i^l T_i - \alpha_j^k T_j + \alpha_j^l T_j) + I_{ij}^{kl} - \lambda_1 N_{1,ij}^{kl} = 0$$

$$\lambda_2 \varphi_{2,ij}^{kl} - \rho_{ij}^{kl} - (\alpha_i^k T_i - \alpha_i^l T_i - \alpha_j^k T_j + \alpha_j^l T_j) + I_{ij}^{kl} (\nu_1^2 / \nu_2^2) - \lambda_2 N_{2,ij}^{kl} = 0$$

$$P_{1,ij}^{kl} - \rho_{ij}^{kl} - (\alpha_i^k T_i - \alpha_i^l T_i - \alpha_j^k T_j + \alpha_j^l T_j) - I_{ij}^{kl} = 0$$

$$P_{2,ij}^{kl} - \rho_{ij}^{kl} - (\alpha_i^k T_i - \alpha_i^l T_i - \alpha_j^k T_j + \alpha_j^l T_j) - I_{ij}^{kl} (\nu_1^2 / \nu_2^2) = 0$$

RSGPS

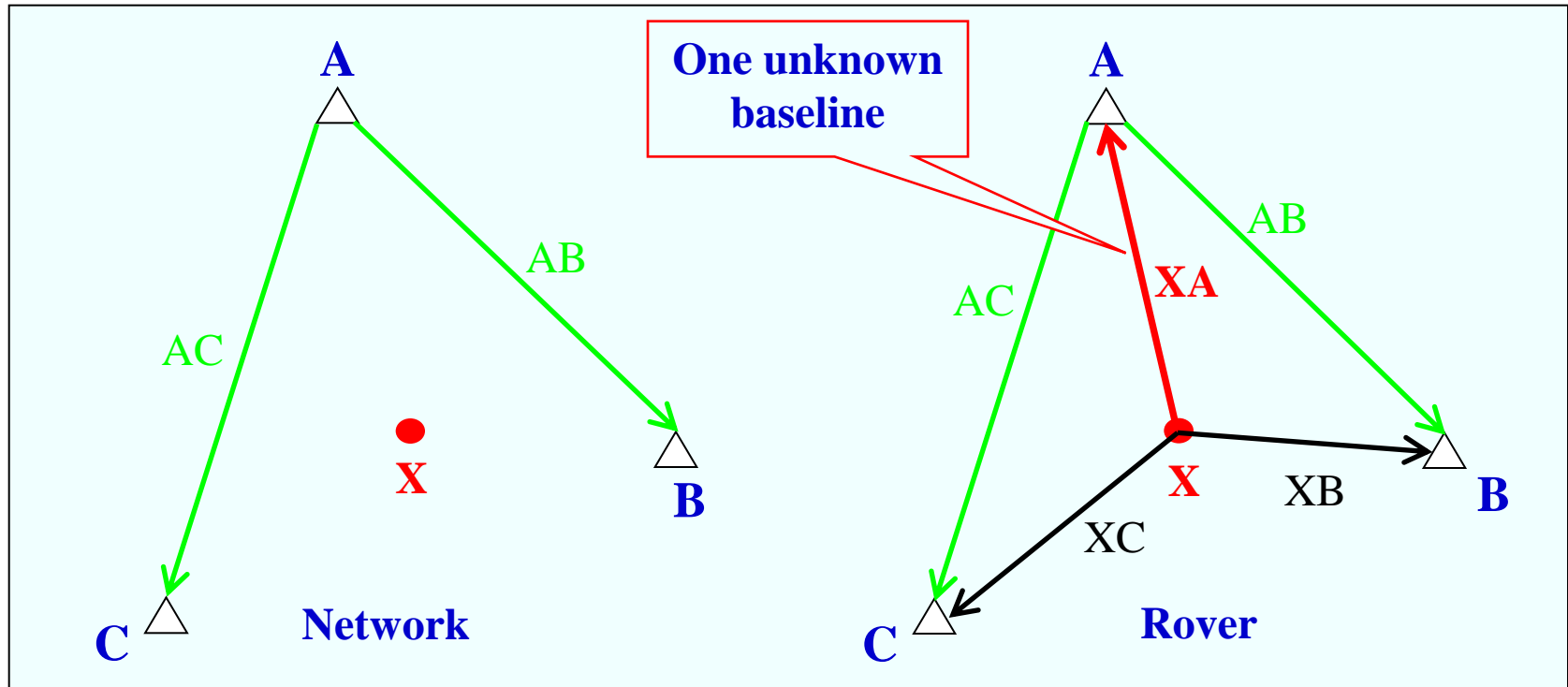
- May be used in two modes :
 Network and Rover
- In network mode, only reference stations are used and to solve for ambiguities and double difference ionospheric delays
- In rover mode, ionospheric delays and troposphere parameters are interpolated from reference stations to rover.

OPUS-RS

- Expected to produce solution with 15 minutes of data (vs. 2 hours for current OPUS)
- Network solution (rather than individual baselines)
- Expected accuracy approx. 2 cm horizontal and 4 cm vertical

Methodology – Rapid-Static Algorithm

Rover solution schemes



$$\Delta ABX : AB - XB + XA = 0 \quad \rightarrow \quad XB = XA + AB$$

$$\Delta ACX : AC - XC + XA = 0 \quad \rightarrow \quad XC = XA + AC$$

All three CORS stations contribute to the estimation of a single set of ambiguities

OPUS-RS

- Interface will be almost identical to regular OPUS
- Output report will be similar to regular OPUS, but with quality indicators based on the W -ratio from the LAMBDA validation tests

OPUS-RS DATASHEET

USER: charlies2@earthlink.net
 RINEX FILE: bkly118o.05o

DATE: August 29, 2005
 TIME: 12:09:34 UTC

SOFTWARE: rsgps 0.6 RS22.prl
 EPHEMERIS: igul3204.eph [ultra-rapid]
 NAV FILE: brdc1180.05n
 ANT NAME: NONE
 ARP HEIGHT: 0.0

START: 2005/04/28 14:00:00
 STOP: 2005/04/28 15:00:00
 OBS USED: 2120 / 2173 : 98%
 QUALITY INDICATORS: 8.33 / 6.54
 OVERALL RMS: 0.010 (m)

REF FRAME: NAD_83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2005.3222)

X:	776242.978 (m)	0.002 (m)	776242.306 (m)	0.002 (m)
Y:	-4986708.281 (m)	0.026 (m)	-4986706.835 (m)	0.026 (m)
Z:	3888159.007 (m)	0.015 (m)	3888158.876 (m)	0.015 (m)

LAT:	37 47 52.09045	0.011 (m)	37 47 52.11755	0.011 (m)
E LON:	278 50 52.04960	0.005 (m)	278 50 52.03155	0.005 (m)
W LON:	81 9 7.95040	0.005 (m)	81 9 7.96845	0.005 (m)
EL HGT:	692.689 (m)	0.026 (m)	691.398 (m)	0.026 (m)
ORTHO HGT:	723.765 (m)	0.036 (m)	[Geoid03 NAVD88]	

	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 17)	SPC (4702 WV S)
Northing (Y) [meters]	4183392.127	88557.655
Easting (X) [meters]	486599.893	586595.234
Convergence [degrees]	-0.09328516	-0.09409456
Point Scale	0.99960221	0.99994831
Combined Factor	0.99949357	0.99983964

US NATIONAL GRID DESIGNATOR: 17SMB8660083392 (NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
DF4048	GALP GALLIPOLIS CORS ARP	N385039.148	W0821640.092	152255.7
DF5767	DOBS DOBSON CORS ARP	N362531.514	W0804311.711	157086.8
AI1571	BLKV BLACKSBURG CORS ARP	N371221.637	W0802452.276	92575.9

DRAFT OPUS PROJECTS DRAFT

OPUS PROJECTS brings GPS users together to gather, process, and adjust multi-receiver survey campaign data. Unlike regular OPUS, data are processed using multiple base station technique which yields . . . well, better results than individual OPUS solutions. [\[see rationale\]](#)

1. CREATE A NEW PROJECT: [\[privacy\]](#) your E-MAIL:
[\[sample\]](#) project TITLE:

2. ADD DATA: project keyword:

3. PROCESS DATA: process keyword:
project keyword:
[\[privacy\]](#) your E-MAIL:

4. MODIFY PROJECT: manager keyword:
project keyword:

Your KEYWORDS
are available from
your Project Manager.

[sample e-mail](#) below.

[sample meta-file](#) below.

[Joe's commentary](#)
[new OPUS solution](#)

Print this page!!!
Your new OPUS project has been created.
The information below is needed for future work on your OPUS project!

A new OPUS project, "test1", has just been created for you.
The below information provides the instructions you need to gather, process, and adjust your data.
An email has been sent to you that also contains this information.
Here are three keywords you can selectively distribute to control access to your project:

- Your **PROJECT KEYWORD**: **514rcp65** is required for all project functions.
- Your **PROCESS KEYWORD**: **1x2qcfxd** enables access for data processing
- Your **MANAGER KEYWORD**: **xitzjvu4** enables access to modify & delete files.

To allow others to contribute GPS observations, send them the following instructions:

*Thanks for observing with the test1.
Please submit your GPS data thru <http://www.ngs.noaa.gov/OPUS>
by entering our project keyword **514rcp65** at OPUS option #5.*

To allow others to process data, send them the following instructions:

*To process test1 data,
visit <http://www.ngs.noaa.gov/PROJECTS/draft/OPUS/index.shtml#process>
and enter the following keywords:
process keyword: **1x2qcfxd**
project keyword: **514rcp65***

PRINT THIS PAGE; YOU WILL NEED THESE KEYWORDS!

To check the status of your project at any time, visit:
-- <http://www.ngs.noaa.gov/OPUS/projects/meta-files/514rcp65.txt>

To add or process data, or modify/delete project files:
-- <http://www.ngs.noaa.gov/PROJECTS/OPUS/projects/>

If you have problems, write us at NGS.OPUS-PROJECTS@NOAA.GOV Good luck on your project!



GPS Network Processing



Test Project for Neil

Project Days

- Choose a Project Day
- 03001
- 04258
- 04285

Stations

- Choose a Station
- roof258t
- ais12580
- jnul12580
- lev12580

Delete >>

<< unDelete

Deleted

[NONE DELETED]

Hub

roof

Add Hub >>

Remove Hub <<

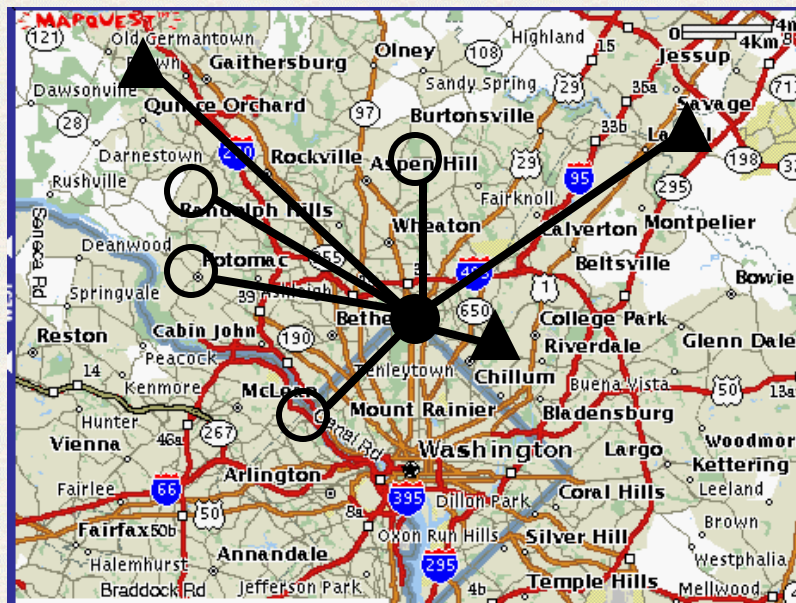
Fixed

jnul

Add Fixed >>

Remove Fixed <<

Submit



OPUS Projects

- Add project planning / monitoring
- Automated file management
- Review repeat measurements
- Network adjustment with GPSCOM
- Publish in NGS Integrated Data Base

Front of Room

Real-Time
Group

Iono/Tropo
Group

Guidelines
Group

OPUS
Group