OPUS_Upload (OU)

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Version Information

Itemized version information is at the end of this document.

Subscribe to the Mail List for update information

If you use OPUS_Upload for any purpose, please subscribe to this mail list:

https://signup.ymlp.com/xguqjwsugmguu

so that I can send you notifications of changes and bug fixes. A list of previous messages can be found here [http://ymlp.com/archive_guqjwsugjgh.php].

Be Careful with OU!

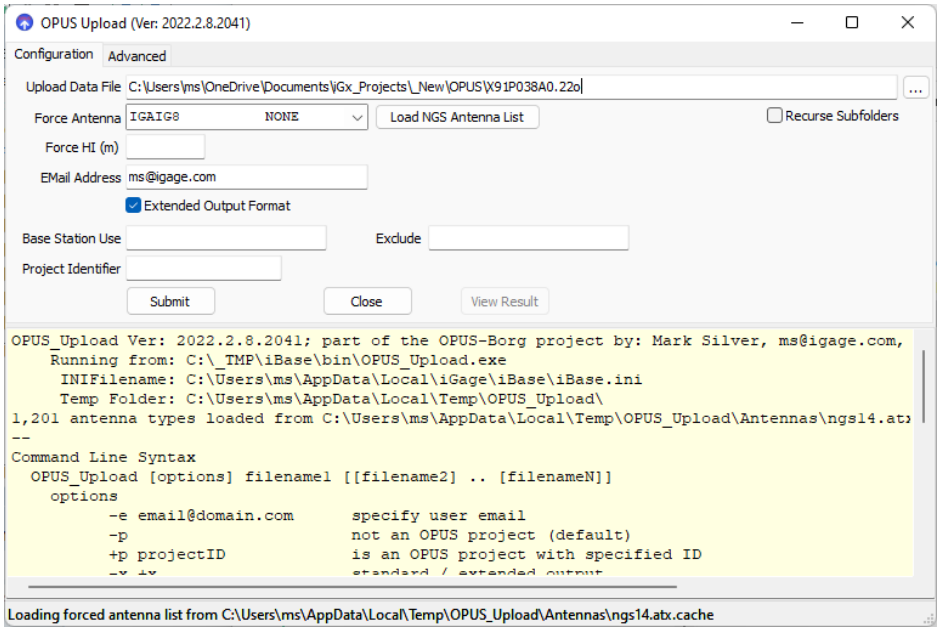
PLEASE: Carefully read this User Manual before using OPUS Upload. OU accepts wildcards and it is possible to submit every observation file on a computer with a single simple, errant command. For example:

```
OPUS_Upload +r C:\*.??o
```

Would submit every single observation file on the c: drive to OPUS for processing. I doubt that the NGS or the rest of the OPUS using community would appreciate your doing this.

I highly recommend that you not run the OU tool from the command line until you have tried it on single files from the Windows interface first.

OPUS Upload



OPUS_Upload (OU) is a small Win-32 application that automates the submission of GPS observation files to the online NGS processing system. OU navigates the HTTPS NGS website using SSL encryption.

OU can be run many ways:

- As a command line tool with arguments
- As a windows program that is open on your screen
- By dragging and dropping files onto the desktop icon

OU simplifies the submission of large sets of files to NGS. With OU it is possible to automatically submit thousands of observation files with a single command. OU has been tested with over 15,000 observation files on a single submission.

NGS Update 1 September 2018

NGS changed the minimum acceptable TLS level for accessing OPUS.

OPUS_Upload was subsequently modified to use the machine SSL layer (instead of utilizing OpenSSL). This effectively means that Windows XP machines can no longer submit jobs to NGS.

There is no work-around for this issue. Purchase a modern computer.

Distribution Limitations and Use Considerations

The OPUS programmatic interface is complicated and the slightest change on the NGS server side will require updating OU. (Thus you should register for the mail list, above).

Like the OPUS Accumulator, if you need OPUS Uploader, you really need it. OU has the potential to save some users lots of time.

Finally, OU is part of a much larger project. The OPUS Borg. The Borg uses OU, OA and a few other clients to orchestrate automated quality control on large CORS network using advanced statistical quality control. OU's development is driven by Borg functionality.

No changes to OU that interfere with the Borg can be entertained. The Borg (https://en.wikipedia.org/wiki/Borg) rules OU development. Just like in the *Next Generation*. The OPUS Borg was named the Borg because it has many 'simple' components that try to work together to process piles of GNSS observation data. It is a complete mess, but it is too late to fix at this point. Admittedly the simple components like OU and OA are now so complicated that it is just a big mess.

Changes

Please send any changes that will make OU more useful for your application to ms@igage.com.

Installing OPUS Upload

Currently the OPUS Uploader is distributed in a ZIP file with this User Manual. All of the program files are code signed by 'iGage Mapping Corporation'.

You can install the uploader anywhere you want, there is only one file. You can then manually create a shortcut for your desktop.

Things that OPUS Upload Requires

OPUS Upload automatically determines if a RINEX file should be submitted as a Rapid-Static or Static file by the length of the RINEX file.

Observation files 118-minutes in length or longer are submitted as Static.

The Antenna Name and the HI in the RINEX file should be correct. If your RINEX files have incorrect values, then they are not compatible with OU (this requirement has been relaxed).

> Note: in Build 2001 a command line switch '-a' was added to allow the submission of files without antenna designators.
>
> In January 2020 support was added to override the antenna name in the RINEX file.
>
> In February 2022 support was added to download the current NGS Antenna Type list to simplify Antenna Type override with a valid antenna type.
>
> Support for forcing HI (Instrument Heights) was also added in February 2022.

You might consider using TEQC to update the antenna name and HI. You might consider contacting the supplier of your RINEX generation tool and shaming them into making a better tool.

Here is a sample RINEX file header:

```
     2.11           OBSERVATION DATA    M (MIXED)           RINEX VERSION / TYPE
teqc  2015Nov6      X90-B9427           20161211 18:29:36UTCPGM / RUN BY / DATE
Linux2.4.20-8|i386|gcc|Win32-MinGW32|=                      COMMENT
     2.10           OBSERVATION DATA    M (MIXED)           COMMENT
CHC RINEX 2.1.5     CHC                 20161211 181717 UTC COMMENT
Format: NovAtel OEM4/V/6                                    COMMENT
039851                                                      MARKER NAME
1008                                                        MARKER NUMBER
MES                 IMC                                     OBSERVER / AGENCY
039851              CHC X900+S          54.0                REC # / TYPE / VERS
039851              CHCX900B        NONE                    ANT # / TYPE
 -1983123.9906 -4681454.9566  3840366.7309                  APPROX POSITION XYZ
        2.0000         0.0000        0.0000                 ANTENNA: DELTA H/E/N
HUACE ANT REFERENCEPOINT                                    COMMENT
     1     1                                                WAVELENGTH FACT L1/2
     9    C1    L1    D1    S1    P2    L2    D2    S2    C2# / TYPES OF OBSERV
    30.0000                                                 INTERVAL
```

I have highlighted the antenna name in yellow and the HI in green.

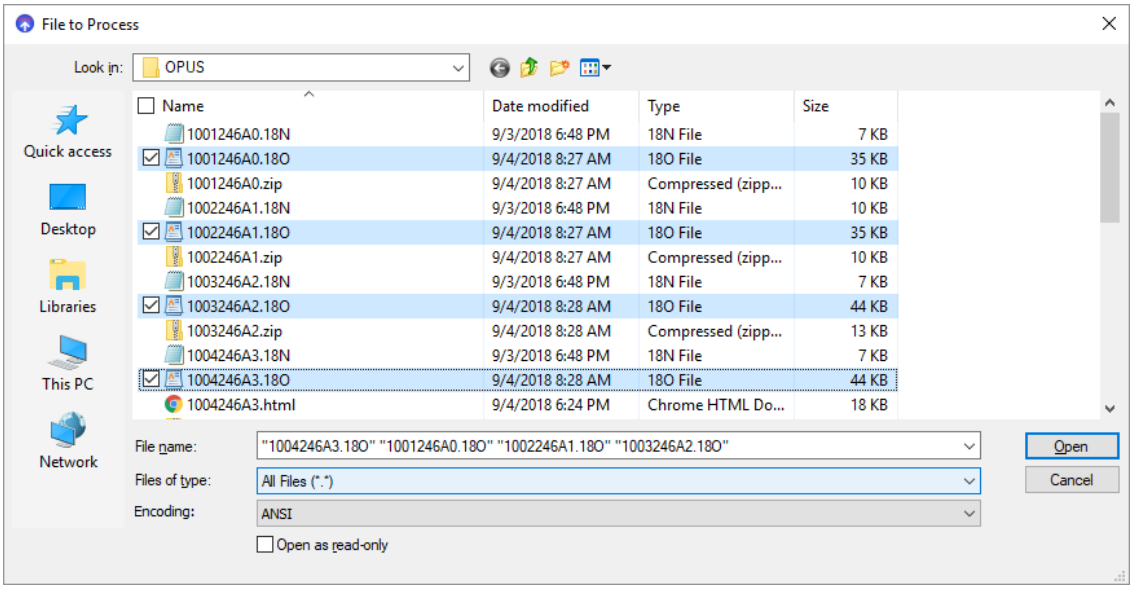
The antenna name must be an antenna supported by NGS.

Running OPUS Upload as a Windows Program

You can double-click on the program or a shortcut to start OU. OU will start in the upper left corner of your screen. If you move or resize the window and then close OU, the next time it starts the same position and size will be remembered. The screen position is checked at run-time to insure that it is on a currently available screen.

The first time you use OA OU you will need to enter your email address. You may want to change the options or add an OPUS-Projects ID. Your settings will be remembered.

The 'Upload Data File' is also remembered from the last time OU was run. You can click on the '…' button to choose one or more files to upload. The files should be GPS observation files, or ZIP files that contain GPS observation files. (In other words, the Open File browser will support multiple file selections.) Here is an example of manually choosing four observation files in a folder:



If you choose a ZIP file, the contents of the ZIP file will be assumed to be standard RINEX files and all RINEX files in the ZIP file will be processed individually.

If you include a NAV file in the ZIP file, OU will know that it is not a RINEX observation file and will automatically skip the NAV file.

Similarly, if you choose a NAV file (for example by selecting all of the files in the directory above) OU will skip the .NAV files.

Once you have set the filename(s) and options, click the Submit button and each RINEX file will automatically be submitted to OPUS.

Running OPUS Upload from the Command Line

OU accepts these arguments:

```
Command Line Syntax
  OPUS_Upload [options] filename1 [[filename2] .. [filenameN]]
    options
          -e email@domain.com      specify user email
          -p                       not an OPUS project (default)
          +p projectID             is an OPUS project with specified ID
          -x +x                    standard / extended output
          -a                       ignore lack of antenna specification in RINEX
          +A "antenna type"        force antenna type, not checked for NGS compatibility
          -A                       clear antenna type override
          +H 2.345                 force antenna height (HI)
          -H                       clear forced antenna height
          +r  -r                   recurse / don't recurse subfolders
          -d  +d ss                clear / set interfile delay to ss seconds
          -t  +t                   clear / set test mode
```

```
-inc                    clear included station list
+inc "abcd,efgh"        include stations
-exc                    clear excluded station list
+exc "ijkl,mnop"        excluded stations
+log -log               enable / disable html log of server results to
                          folder with OBS file.
-q IG888888888          set the sequence number, disable auto
+q                      set automatic sequence number generation on
filename_               an explicit filename or a wildcard or ';'
                          separated list
-m   +m "filepath"      clear / set the exclude matching file path
-U   +U "url.prl"       clear / set the submission URL
-o   +o                 clear / set the Check Ephemeris (Orbit) checkbox.
```


This command:

```
OPUS_Upload -p +x -e ms@igage.com C:\tmp\2001213A0.obs
```

Will submit the single file without a project ID, requesting extended output, returning the result to the specified email address.

Once you set the email address on a computer, OU will remember it. Once you set a Project Name, it will be in use until it is cleared.

This means that after you run OU once (perhaps as a Windows application), you can just invoke OU with a filename:

```
OPUS_Upload C:\tmp\2001213A0.obs
```

and the previously selected options will be used.

You might specify two or more files

```
OPUS_Upload C:\tmp\2001213A0.obs C:\tmp\2001213A1.obs
```

You may also use wildcards to specify a group of files. This command:

```
OPUS_Upload C:\tmp\*.obs
```

will submit every file in the folder C:\tmp\ with an .OBS extension in the \tmp folder.

You may also use stack wildcards:

```
OPUS_Upload C:\tmp\002\*.obs C:\tmp\003\*.zip
```

Single letter wildcards are also supported:

```
OPUS_Upload C:\tmp\2001213A?.obs
```

It should be possible submit every single observation file on the C drive of your computer with this simple command:

```
OPUS_Upload +r C:\*.1?o
```

Is there really a need for this?

Submitting with Drag and Drop

If you have a shortcut on your desktop you can drag observation files (or .ZIP files containing one or more observation files) and drop them on the desktop icon.

The files will be processed just as if they were manually selected. The last email address and other options will be used.

There is no known limit to the number of files you can drop in one action.

The 'Test Mode'

You may want to test an action before launching OU. Check the 'Test Mode' box to see what the effects of your action might be without actually submitting files to NGS.

The Test Mode checkbox is saved when OU closes and reopens so if you inadvertently check it, OU will appear to not work.

Automatic Submission

If you start OU by the command line, with a filename; or if you start OU by dragging and dropping files onto the shortcut then OU will automatically run and then close 5 seconds after the last file is processed.

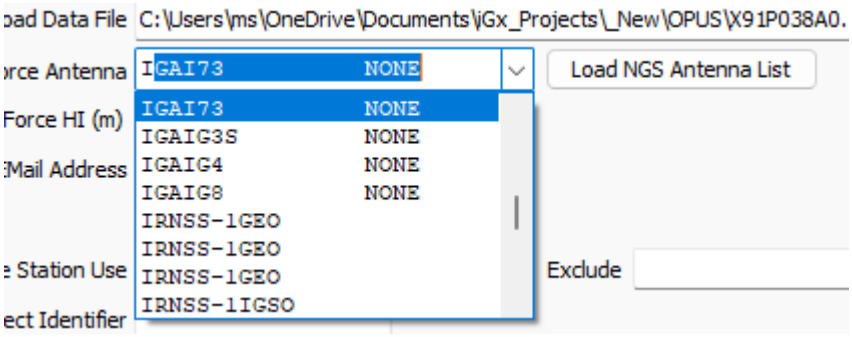
The Cancel button can be used to hold the form and the log open for viewing. During the 5 second end of run countdown, click on the Cancel button and OU will not automatically close. The form will also not close if Test Mode is enabled.

2022/2/9: OU will now close automatically after a 5-second delay if invocated from iGx_Download.

Advanced Topics

Forced Antenna Types

```
Command line:    +A "IGAI73          NONE"   to set
                 -A                           to clear
```



Click on the 'Load NGS Antenna List' button to download the current antenna list file from the NGS server (https://geodesy.noaa.gov/ANTCAL/LoadFile?file=ngs14.atx

). The list is parsed and every antenna, including the satellite definitions, are loaded into the drop-down box in sorted order.

You can then type in the first character of the antenna type ('I') is shown above. The list is stored in a temp folder:

```
C:\Users\username\AppData\Temp\OPUS_Upload\Antennas\ngs14.atx
C:\Users\username\AppData\Temp\OPUS_Upload\Antennas\ngs14.atx.cache
```

and reused when OU is started again.

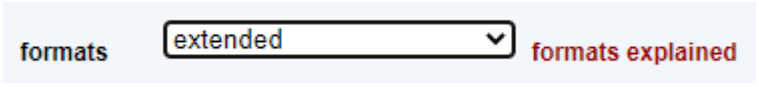
Important Antenna Type Note: You must include the proper number of spaces between the antenna name and the dome designation. So either pick the antenna from the drop-down list, or copy and past the antenna name from an authoritative source. A missing or extra space or any modified character will result in the antenna type failure.

Extended Output Format

```
Command Line:    -x          Standard Solution Output
                 +x          Extended Solution Output (recommended)
```

Checking this box:

Will effectively make this selection on the NGS submission page:

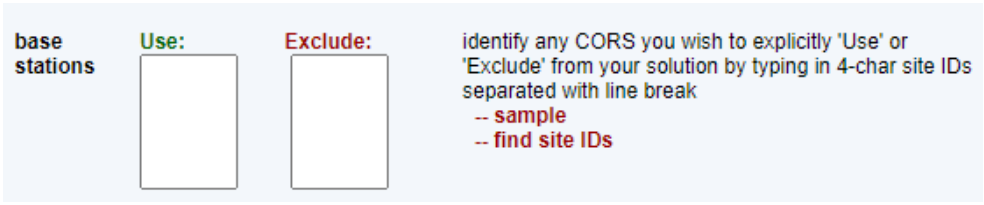


Base Station Use and Exclude

Enter base stations to Use and Exclude separated by commas:

Entered stations are NOT checked for accuracy.

This setting is equivalent to:



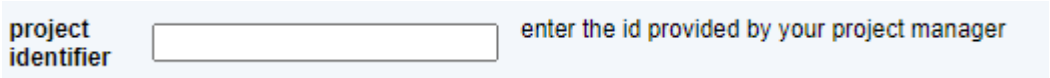
Project Identifier

```
Command Line:    -p                NOT part of an OPUS Project
                 +p projectname    Part of the specified project
```

The Project Identifier:

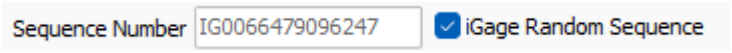
should be empty unless you are submitting the observation to a valid OPUS Project. The Project Identifier is NOT checked for validity.

This setting is equivalent to:

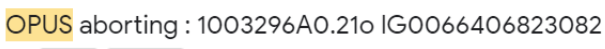


Do NOT enter your personal project name in this box, only enter valid OPUS-Project ID's. You must have OPUS Manager training to create and use OPUS-Projects.

Sequence Number



There is no official NGS description of this value, however it is VERY useful for tracking submissions. The OPUS Borg relies on every email return from the OPUS system having a unique sequence number in a successful or unsuccessful returned email subject:



When you load the NGS OPUS submission webpage, a unique number is assigned by NGS. If you check the 'iGage Random Sequence' checkbox, then a unique 13-character number with the 'IG' prefix is generated. If you don't check the box, then whatever value you enter is used.

The IG number is the fractional number of days since January 1 2020, in the local machine time zone, multiplied by 86,400,000 and rounded to the nearest integer. This seems to be adequate for uniqueness, is decipherable and increases with time. It is not random.

Minimum File Size and Maximum Length

```
Command Line:   no command line interface available
```

If you attempt to submit a file less than the minimum (in Bytes) the file will be skipped. A common occurrence is anti-virus tools forcing other tools to create zero length files. This traps these nuisance files from submission to NGS. The 2,500 byte minimum should be adequate and reasonable.

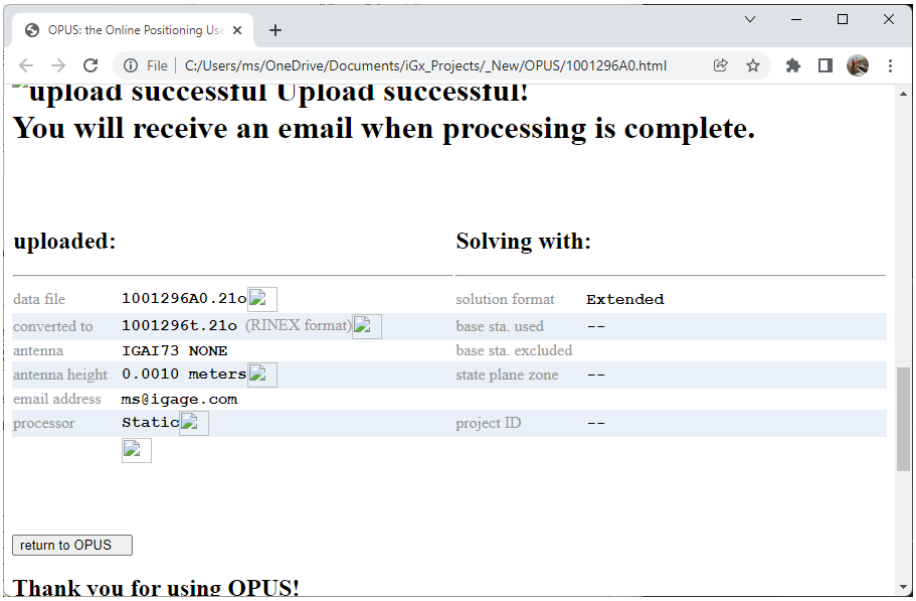
OU will check the first and last epoch of observation data and skip files that are longer than the maximum length in hours. There is a hard limit in OPUS that you can't cross midnight (GPS time) twice. If you have files that are longer than 25-hours, you should use the -tbin option of TEQC (https://www.unavco.org/software/data-processing/teqc/tutorial/tutorial.html) to break them into 24-hour files and submit them individually. Then you could use the OPUS Accumulator tool to statistically look at the individual solutions.

Save Log Files

```
Command Line:    +log       save returned message from NGS submission
                 -log       do not save returned message
```

Clicking this box will save the return value from the NGS submission to a .HTML file with the same name as each submitted file, in the same folder as the submitted file.

If you open the file in a browser, it will look 'similar' to what you would have received by manually submitting the file:



However, the formatting will probably not be as expected.

This option is useful for debugging errant files that fail when submitted.

Extended Debug Logging

```
Command Line:    no command line interface available
```

Checking this box will result in extra logging information being displayed in the log dialog. This option is best left unchecked.

Each individual HTML submission field will be enumerated:

```
   Process C:\Users\ms\OneDrive\Documents\iGx_Projects\_New\OPUS\1001296A0.21o
     EMail 'ms@igage.com'
  Extended Y
   Project ''
   Antenna 'CHCX91+S        NONE'
    Height '0.0010'
    Static Y 310.00 minutes
!Antenna forced to 'IGAI73          NONE'
Sequence Number: IG0066572204008
```

```
 af ' af selectList1' '- '
 af 'extend_code' '2'
 af 'xml_code' '0'
 af 'set_profile' '0'
 af 'delete_profile' '0'
 af 'share' '2'
 af 'submit_database' '2'
 af 'opusOption' '1'
 af 'geoid_model' ''
 af 'seqnum' 'IG0066572204008'
 af 'theHost1' 'www.ngs.noaa.gov'
 af 'uploadfile'
'C:\Users\ms\OneDrive\Documents\iGx_Projects\_New\OPUS\1001296A0.21o'
 af 'ant_type' 'IGAI73          NONE'
 af 'height' '0.0010'
 af 'email_address' 'ms@igage.com'
 af 'SolutionFormat' '2'
 af 'selectList' ' '
 af 'excludeList' ' '
 af 'state_plane' '0'
 af 'project_name' ''
 af 'MyProfile' '0'
 af 'sharedOption' '2'
```


Inter-File Delay

```
Command Line:    -d          disable inter-file delay
                 +d time     enable time delay (seconds)
                               between submissions
```

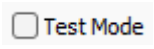
The NGS OPUS servers have a security feature that prevents denial-of-service attacks.

If you submit more than a few (perhaps 5) occupations in rapid succession, it appears that your IP address will be flagged as a pain-in-the-NGS's-butt and your submissions will be ignored.

Setting this delay to 15-seconds or higher is advisable. I use 31-seconds.

Test Mode

```
Command Line:    -t          disable Test Mode
                 +t          enable Test Mode
```



Checking the Test Mode button allows OU to run submissions and log actions, right up to the point of submissions. The log files will contain all normal and extended logging, but the file will not be sent to the NGS for processing.

This allows you to test a wildcard action without flooding the NGS servers.

A single logged line will be added to the log:

```
*** TEST MODE ***  Filename:  C:\Users\ms\OneDrive\Documents\
iGx_Projects\_New\OPUS\1001296A0.21o' would be submitted to URL:
'https://www.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opusup.prl'
```

Submission URL

```
Command Line:    -U          use the default URL for submission
                               (see below)
                 +U "custom URL"
                             use a custom URL for submission
```

Currently (in Version 2022.2.8.2041) OPUS-Static observations, files longer than 110 minutes, are submitted with this URL:

'https://www.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opusup.prl'

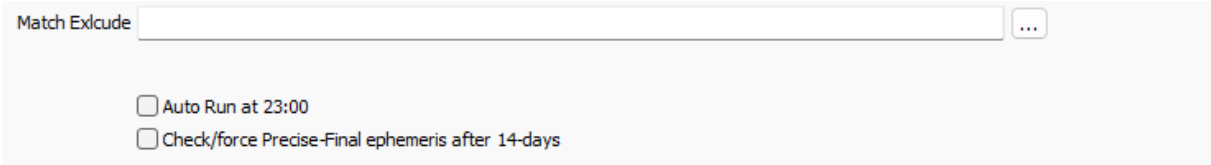
OPUS-RS files are submitted with this URL:

'https://www.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opus-rsup.prl'

You could use the 'Submission URL' to override the default to submit files to a NGS BETA server. However, you will need to ensure that the correct server address (Static or RS) is selected for the submitted file.

OPUS-BORG Settings

Command Line: -m clear excluded path
+m *path* set the excluded *path*



Auto-Run

Checking the 'Auto Run at 23:00' box results in the 'Submit' button being pressed at 23:00 UTC every evening. OU uses the machine's time-zone settings to compute the UTC time offset.

Match Exclude

This is not going to be a simple explanation.

Consider a scenario where there is a large set of folders, each containing many observation files. Each folder represents one GNSS CORS station. Each observation file is a 24-hour (GPS time-frame) 'Daily' observation file for a station. A station's Daily folder might contain 24-hour observation files for the previous 5 to 10 years, so thousands of RINEX files.

OU is used to submit these Daily files to OPUS. But we only want to submit each file twice:

once immediately after the file is collected to get a solution with rapid/broadcast ephemeris

again 14-days later to get a solution with precise/final orbits

NGS returns OPUS solution files by email and the solution files are kept in a matching set of station result folders: each CORS station has a unique OPUS solution folder.

If 'Match Exclude' contains a path, OU will search the relative path that matches the location of the source observation file for an existing-matching OPUS solution file.

This is complicated because the observation file will have a name like:

```
slci0010.22o
```

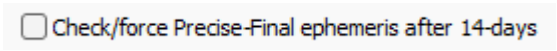
and the matching OPUS solution will have a name like:

```
slci001022o IG0064714690360.msg
```


(Notice the magic IG Sequence Number from above!)

If OU finds a matching solution file, it will skip submitting the observation file because a valid OPUS solution already exists.

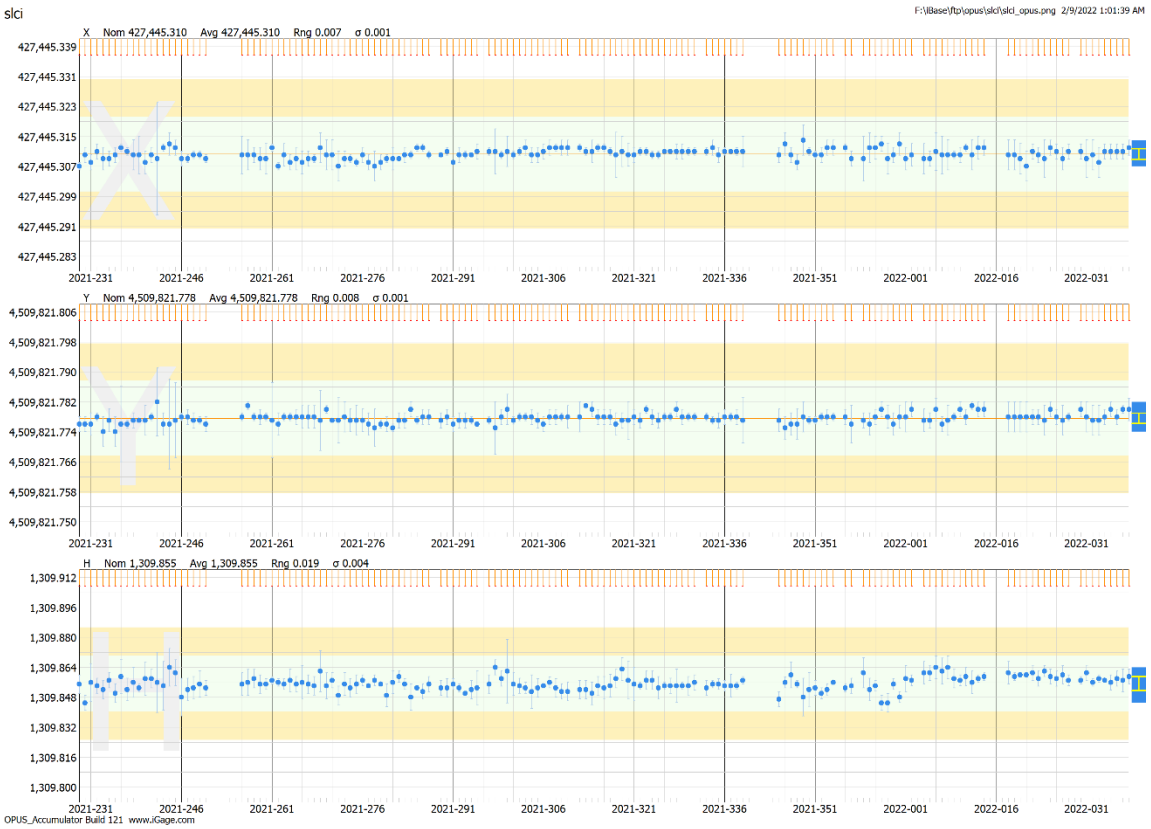
However, if you check this box:



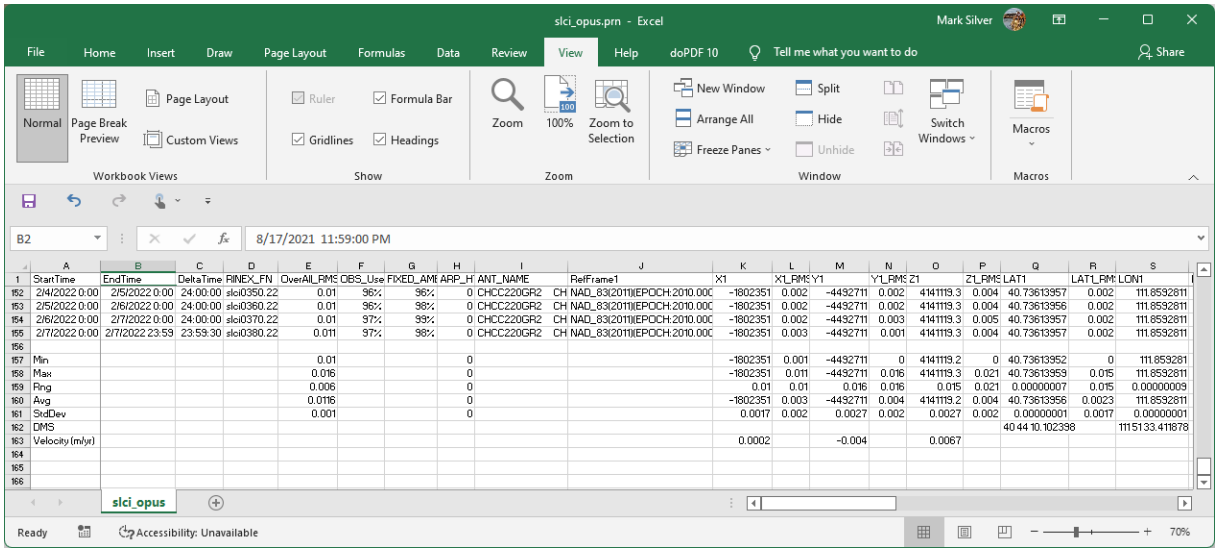
AND the OPUS solution is older than 14-days then OU will inspect the solution .msg file to determine which ephemeris type was used for the solution.

If the solution is NOT Precise or Final, then OU will delete the existing solution file and resubmit the observation file, hoping to get a solution file from the OPUS processing engine using Precise or Final ephemeris.

Later, early the next day OA (the OPUS Accumulator) processes the solution folders and generates trend plots for each of the monitored CORS stations:



OA also builds a summary XLS spreadsheet for each of the monitored stations:



This summary includes an average position for the CORS station along with the Min/Max/Range/StandardDeviation for each of the values found on an NGS OPUS solution.

The station velocity is also computed, both in the NAD83 fixed frame and in the ITRF daily epoch frame for the ECEF XYZ, Lat/Lon/Height, State Plane projected and UTM projected frames.

In addition, OA produces a summary file:

```
; 'F:\iBase\ftp\opus\' 2/9/2022 1:01:56 AM
; site, LatDMS, LonDMS, HAL, N, rngLatDMS, rngLonDMS, rngHAL ; Ver: 2021.9.12.121
bisc, 34 15 14.761756, 80 25 45.723874,   65.4525,    47, 00 00 00.000290, 00 00 00.000110,    0.0170
bp22, 40 53 10.622013, 109 11 04.256596, 1715.1326,     7, 00 00 00.000110, 00 00 00.000140,    0.0030
cotx, 31 49 18.653895, 99 24 30.554090,  491.1828,   220, 00 00 00.000360, 00 00 00.000290,    0.0250
dltx, 32 48 41.412478, 96 44 52.505367,  134.6416,    49, 00 00 00.000180, 00 00 00.000290,    0.0230
dptx, 32 59 01.241890, 96 48 32.431751,  172.5872,    45, 00 00 00.000220, 00 00 00.000250,    0.0190
ht16, 29 30 33.608735, 95 05 39.436355,  -16.4550,    22, 00 00 00.000220, 00 00 00.000640,    0.0410
ht18, 29 26 42.977242, 94 39 33.063084,  -15.7239,   293, 00 00 00.000430, 00 00 00.000540,    0.0450
ida1, 43 28 26.158759, 111 59 36.219228, 1433.9602,   153, 00 00 00.000250, 00 00 00.000430,    0.0210
ig20, 40 44 10.398631, 111 51 33.539712, 1310.3876,    70, 00 00 00.000180, 00 00 00.000250,    0.0170
ig21, 40 44 10.398509, 111 51 33.539612, 1310.3906,   126, 00 00 00.000650, 00 00 00.000720,    0.0320
. . .
mlsi, 45 43 31.183510, 111 08 52.273183, 1384.2115,   185, 00 00 00.000290, 00 00 00.000510,    0.0340
mtsu, 45 39 40.376644, 111 02 42.009000, 1495.4715,   163, 00 00 00.000400, 00 00 00.000500,    0.0350
okok, 35 38 11.677205, 97 29 41.477051,  329.9911,   362, 00 00 00.001150, 00 00 00.000580,    0.0520
oxpu, 33 36 49.670123, 85 50 10.069264,  180.6250,   411, 00 00 00.000430, 00 00 00.000440,    0.0530
peq1, 31 25 32.467194, 103 29 46.718169,  772.2438,    33, 00 00 00.000330, 00 00 00.000280,    0.0210
puc2, 39 35 38.100333, 110 45 41.525275, 1714.2533,   644, 00 00 00.000720, 00 00 00.000720,    0.0290
ryy1, 33 54 25.651189, 84 34 59.222346,  289.2867,    83, 00 00 00.000540, 00 00 00.000400,    0.0190
sgu2, 37 06 47.513419, 113 34 14.009386,  896.0366,   649, 00 00 00.000320, 00 00 00.000570,    0.0300
slci, 40 44 10.102398, 111 51 33.411878, 1309.8553,   154, 00 00 00.000250, 00 00 00.000320,    0.0190
uvu2, 40 16 43.687515, 111 42 40.339581, 1420.6511,   751, 00 00 00.000510, 00 00 00.000610,    0.0430
```

That contains the site name, the average antenna position with ellipsoid height, and some additional information which is useful for private CORS station administration.

Other Borg processes run SQC analysis on the OA output data set and determine if the station is 'statistically' running in-or-out of expectations and send text messages if there is an issue.

Believe it or not, this entire Rube-Goldberg (https://en.wikipedia.org/wiki/Rube_Goldberg) process works!

OU Version Notes

Build 2000:

Added several command-line switches

```
Command Line Syntax
  OPUS_Upload [options] filename1 [[filename2] .. [filenameN]]
    options
          -e email@domain.com      specify user email
          -p                       not an OPUS project (default)
          +p projectID             is an OPUS project with specified ID
          -x +x                    standard / extended output
          -a                       ignore lack of antenna specification in RINEX
          +r                       recurse subfolders
          -d  +d ss                clear / set interfile delay to ss seconds
          -t  +t                   clear / set test mode
          -inc                     clear included station list
          +inc "abcd,efgh"         include stations
          -exc                     clear excluded station list
          +exc "ijkl,mnop"         excluded stations
```

However included and excluded stations don't appear to work quite yet.

Build 2004: 25 May 2017

Added an error log instead of a message box for unattended operation. Note that you won't be able save the log for command line jobs because the program will exit when complete.

Added a test for valid file when adding from the command line. Modified the handling of files from the command line to include a test for valid-existing files.

Warning: there may some limit to the number of files you can specify on the command line. There should not be a limit to the number of files that you can include with wildcards, string space for filenames should extend to available memory.

When specifying multiple files from the command line, the filename box is only loaded with the first file from the list.

Build 2005: 5 September 2018

Added the 'Save Log Files' checkbox. After submitting an observation file, all of the returned HTML code from the server can be stored in a like-named file in the same folder as the input observation file. The file extension is always .html and the location is always the same as the input file.

Support for TLS1 was suspended at the NGS. OPUS_Upload now uses the SSL layer from the client machine and OpenSSL is no longer required. This effectively means that Windows XP machines are no longer viable for use with OPUS.

Build 2016: 4 January 2020

Some major enhancements and changes were made to make OU work within the OPUS-Borg framework.

- The configuration values are now stored in the iBase.ini file with all other Bord member's configuration. You will lose any previous settings when running this version.
- An option to recurse directories is added to the form-based invocation. Previously this was only available to command line runs.
- There are now two tabs, one for common Configuration settings and a new tab for Advanced settings. This cleans up the tool's primary screen.
- It is now possible to set multiple paths with wildcards from the form-based tool. For example:
  C:\ftp\rinex\2017*.??o; C:\ftp\rinex\2020*.??o
  Will recurse both the 2017 and 2020 folders for files matching the .??o file extension.
- It is now possible to either set the NGS submission sequence number manually, or have OU build a unique sequence number in the form 'IG8888888888888': 'IG' followed by a 13-digit integer representing the number of milliseconds since January 1st 2020.
- A minimum file size to process has been added. This option only applies to files selected by wildcard. Set the value to blank, zero or negative to process all source files, regardless of size. A value of 2,500,000 is reasonable if you are expecting mostly 24-hour daily files.
- OU will now optionally check for existing OPUS solutions when recursing folders (using wildcards) for observation files. Solutions must start with the base filename of the OBS file; be in like named folders, under the 'Match Exclude' base folder; the solution file must have a file date greater than or equal to the observation file and have a .eml, .msg or .txt file extension. If a solution is found, the corresponding observation file is skipped. Set the 'Match Exclude' to the empty string to disable this function.
- It is now possible to force an antenna type effectively overriding the antenna type posted in the RINEX file. (I know this seems crazy; I needed this function for a video demonstration.)
- OU is now high DPI screen resolution compliant.

Build 2019: April 30, 2002

The -9dl (passing from iGx) command line switch now has these actions:

- Test mode = off
- InterFileDelay = 0.0
- Process Subfolders = off
- Match Exclude Existing Solutions = off
- Save Log File = off

The interfile delay value is now stored to the INI file and recalled when the program starts.

Build 2020.7.17.2020

Delay between file submission was taking 20% of machine resources because of an errant system semaphore. (ugghhh!)

Cancel button was not displayed correctly during waits.

Added the number of files left to submit in a batch to the status bar.

Build 2020.9.8.2021

If recursing folders, any folder with a name that starts with an underscore '_' will be skipped. Folders under said folder also skipped. This was added for use with iBase which puts incomplete (files with less than 90% of expected coverage) in a '_invalid' folder.

Build 2020.12.5.2024

Added URL editing to change submission URL. New command line '-U' returns to default submission address, '+U "full url"' sets override URL. The default URL currently is:

https://www.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opusup.prl

The beta site can be reached with this address:

https://beta.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opusup.prl

Build 2020.12.21.2027

Bug: When submitting files to NGS, the number of remaining files displayed was incorrect.

Bug: When looking for unsubmitted files, using the 'Match Exclude' function if a OPUS solution predates the observation file, it is now deleted. Previously it was left in place and the file was resubmitted. This resulted in multiple OPUS solutions for a single observation file (since the OPUS results have a unique iG sequence number identifier.)

Build 2021.11.7.2040

OU now uses new server side scripts for submission of RS vs. S OBS files:

```
Static  URL := 'https://www.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opusup.prl';
RS      URL := 'https://www.ngs.noaa.gov/OPUS-cgi/OPUS/Upload/Opus-rsup.prl'
```

The size of the log memo is extended to 4 million characters.

Added some hints to added a bunch of needless debugging (which I am not going to remove as it only shows up as you do extend-logging).

Added a hint that the submission url's are different for static vs. rapid in the override box.

Build 2022.2.9.2041

Based on feedback from people who are not using OU in a production environment, OU has been rearranged to look more like the NGS submission form.

It is now possible to select the forced antenna type from a drop-down box. Click the 'Load NGS Antenna List' button to download and parse the current NGS antenna list. The drop-down box is loaded with an alphabetical listing of types.

It is now possible to override the Instrument Height contained in the RINEX file and enter the height directly.

These command line switches have been added:

```
+A "antenna type"        force antenna type, not checked for NGS compatibility
-A                       clear antenna type override
+H 2.345                 force antenna height (HI)
-H                       clear forced antenna height
```

This *User Manual* has been extensively updated.