OPUS Accumulator

Date: Sunday, April 26, 2020 Build: 112
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Program Description

The OPUS Accumulator (OA) program reads every:

.txt, .eml and .msg

file in a path and generates a tab-delimited summary file named 'SUMMARY.prn'. The SUMMARY.prn file is intended to be opened in Excel or the Open Office Spreadsheet and contains a summary of all of the data contained in NGS OPUS reports (RS or STATIC.)

Most items are summarized with the Minimum, Maximum, Range, Average and 1-sigma Standard Deviation. Lat and Lon are tabulated in decimal-degrees with the average listed as both decimal-degrees and Deg-Min-Sec for easier use populating reference station positions.

An ECEF option checkbox enables tabulation of the ECEF positions in addition to Lat/Lon.

It is possible to also generate a plot file 'SUMMARY.png' that graphically shows the UTM position trends. Additional information on the plot follows later in this document.

It can take as long as 10 seconds to fully parse some email formats, so a cache file system is available to speed up repeated readings of files by storing intermediate output in a .oacf file extension. Check the 'Use Cache' checkbox. The cache files will have the same timestamp as the input file, so if a change is made to an input file OA will automatically recompute the cache file.

OA has been enhanced to recurse through directories (check the 'Recurse' checkbox.) In this way a group of folders with OPUS results from multiple stations can automatically be computed with one invocation.

OA is part of the OPUS-BORG project that Mark Silver uses to monitor CORS stations. Other components include:

OU Opus Uploader

OU automatically submits files to OPUS without web form interaction. In the simplest operation a single file is submitted. Folder recursion is also possible so it is also possible to submit multiple files by wildcard or explicit list.

OU now has the ability to recurse through a folder structure looking for observation files that do not have current OPUS solutions, only submitting new files.

iBase_Mail Mail reader

Downloads mail from a POP server. Detects OPUS output files (from NGS) and automatically files the OPUS result files into properly named station folders. Other mail is placed into a junk folder.

iBase Automation of hourly RINEX file generation

Automatically converts RT27 capture files into observation and navigation RINEX files for multiple stations at the top of every hour. Output files are placed in standard NGS compatible folder structures.

iB_Daily Automatically converts hourly files to daily files

Automatically takes 24 1-hour 1-second interval RINEX files (that are in ZIP format), decimates to 30-second interval and combines to daily 24-hour files.

DIP_Cap RCAPTURE replacement

DIP_Cap is a replacement for the Trimble RCAPTURE tool.

RT27 streams from an IP address / Port are downloaded and collected into properly named, hourly, data files which are then read by the iBase program and converted to compressed observation and navigation files.

DIP_Cap is more reliable than RCAPTURE and will run for indefinite periods, automatically figuring out the best way to recover internet connections. Files are appended, not overwritten when errors occur and streams are cached in memory to reduce write cycles on disks.

Command Line Options

-d +d	disable / enable debug
-c +c	disable / enable cache
--c	clear cache prior to running
-e +e	disable / enable ECEF summary
-p +p	disable / enable plot file
"path to process"	path to process, enclosed in quotes if needed

if a valid path is specified, OA will automatically run.

Plotting Enhancement

In Build 97 an optional plotting tool has been added to the OPUS Accumulator. This option graphically summarizes the compiled OPUS reports into a set of three graphs drawn into a single PNG file placed in the folder with the compiled messages.

The plot is enabled by checking the 'Build Plot' checkbox:

After the input folder is processed and the plot file has been generated, you can click the 'Show Plot' button to display the generated plot in whatever tool your machine evaluates .PNG files with.

The format of the plot:

Includes a representation of UTM**X**, UTM**Y** and Ellipsoid **H**eight. All values are in meters.

The top right corner of the graph includes the full path and filename of the plot:

C:_TMP\OA_Test\SUMMARY.png 12/27/2019 9:08:54 PM

The remainder of the plot includes three similar sections. Each graph includes the plotted variable, the nominal and Average values (currently the same), the Range and the Standard Deviation:

The Y-axis of each graph includes text markers for the range. The amber background denotes a 4cm band (+/- 2cm) about the nominal value. The light-green band denotes a 2cm band (+/- 1cm) about the nominal value. The scale of the X, Y and Z graphs are independent and will adjust to include all

data points. The nominal ranges are +/-3cm for X and Y; +/- 6cm for the Height.

The graphed range is expanded such that all points and the top and bottom of the error bars are fully plotted.

Each OPUS report's results are plotted as blue dots. The RMS/Peak-to-Peak values are shown as extended error bars about the dot:

The horizontal axis includes tick mark for each 24-hour period. Days are annotated with the year and Julian date:

In this example, the primary bar above the '9' is the 306th Julian day of 2019. Remember that January 1st is Julian day 1. Every day has a tick, every 5th day (1, 6, 11, 16…) has a major graph line.

((V98 Addtion:)) Observation File Length Indication

Orange bars at the top of each graph indicate the length of the observation file. A red horizontal tick marks 24-hours. This example:

Shows several 24-hour files, a 48-hour file and a short 8-hour file.

Because all files are weighted equally in the average computations, you may want to get rid of observation files that are significantly shorter than others.

The right-hand side of each graph includes an indication of Range and Standard Deviation:

The blue bar includes the range of all results. The yellow 'I-bar' shows +/- 1 Sigma about the Average value. This provides a quick visual representation of range, probable value, skewness and kurtosis.