

EVENT

UNMANNED SYSTEMS

Dual frequency Post Processing

Revision: May, 2023

Tips about Data Collection	3
Placement of the Rover and Base station	3
Baseline	3
Obtaining absolute accuracy	3
Suggested data organization	4
Requirements	4
Post Processing with RTKLIB	5
Converting the .ubx file to Rinex	5
Formatting the Observation File	6
Processing with RTKPOST	7
Tagging the images	11
Coordinate Conversions	12
Troubleshooting	15
FAQ	15

Tips about Data Collection

Placement of the Rover and Base station

When setting up the rover and base it's important to give the antenna a clear sky view. The antenna should be placed away from buildings, cars, and trees to avoid multipath. For good data collection it's imperative that the base station has a clear sky view.

For the rover, if it's impossible to have a clear view of the sky due to nearby obstacles the mission should be planned with a takeoff into a 5 lap loiter pattern to allow for calibration before beginning the survey mission.

Baseline

When using non local base stations the absolute accuracy may vary. When collecting data the closer the base station the better. In practice, every 10 km in distance from your base station adds another 1 cm to the RMS error. It's also important to keep in mind the elevation difference between your base station and rover. Accuracy tends to become worse with elevation differences above 500m.

Obtaining absolute accuracy

It's very easy to obtain accurate relative accuracy. In order to obtain absolute accuracy it is imperative that you have collected the correct data to obtain an accurate base coordinate or have set your local base station above a known coordinate. Refer to our section about methods on obtaining an accurate base coordinate.

Suggested data organization

Create a folder with the time and date of the flight.

Inside that folder create

- a folder labeled Rover and add the .ubx files obtained by the rover during flight
- a folder labeled Base and add the .ubx or observation files obtained by the base during flight.
- a folder labeled Images and add the images from flight

Requirements

Software

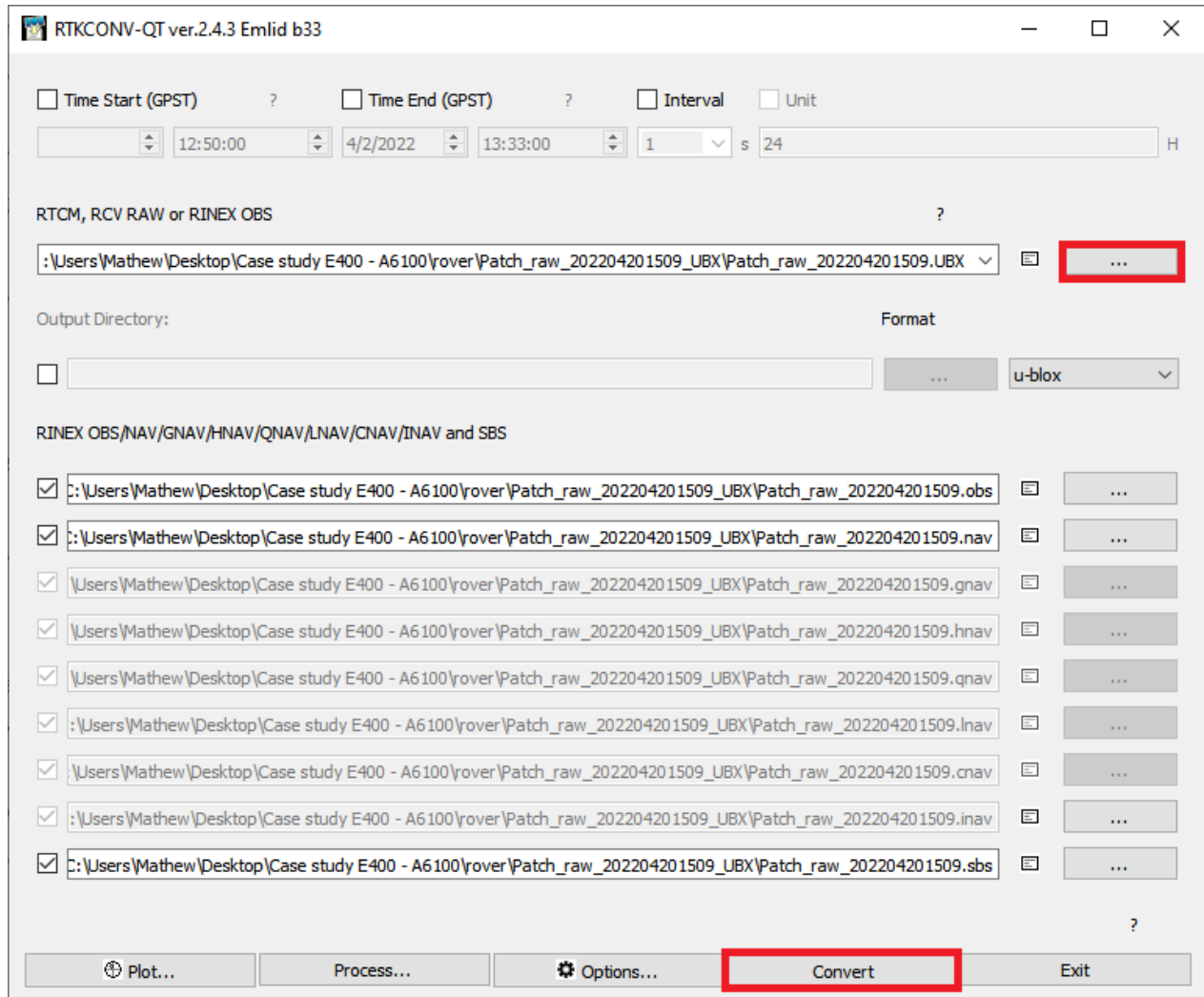
- 1) RTKLIB
- 2) Event38 Image Utility
- 3) Vdatum if converting to another CRS
- 4) Base Station data
- 5) Images and a .UBX file from a flight

Downloads for the aforementioned software are available at <https://event38.com/downloads/>.

Post Processing with RTKLIB

Converting the .ubx file to Rinex

Open RTK conv and select the raw ublox file from flight.

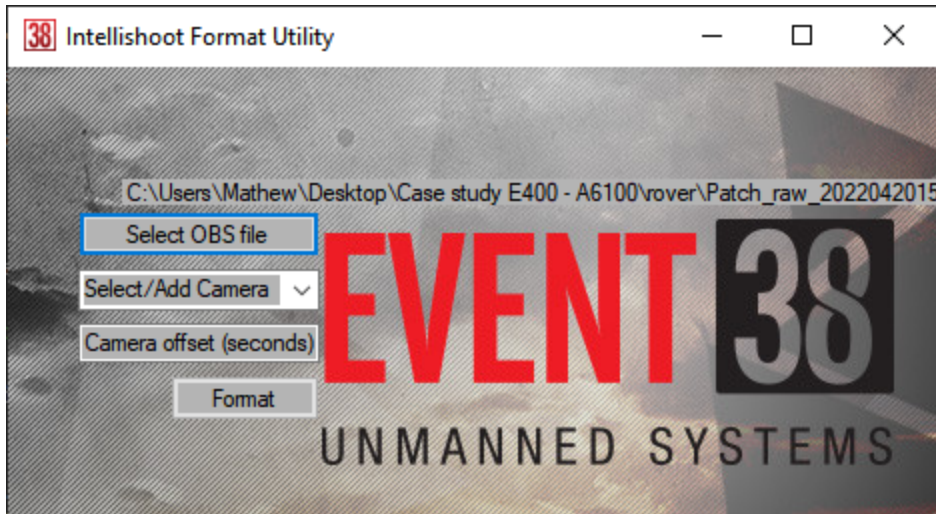


Click convert to convert the raw log to rinex.

If using a reach RS2 as a local base station perform the same process on the raw .ubx file.

Formatting the Observation File

Open the Event38 Rinex format utility.

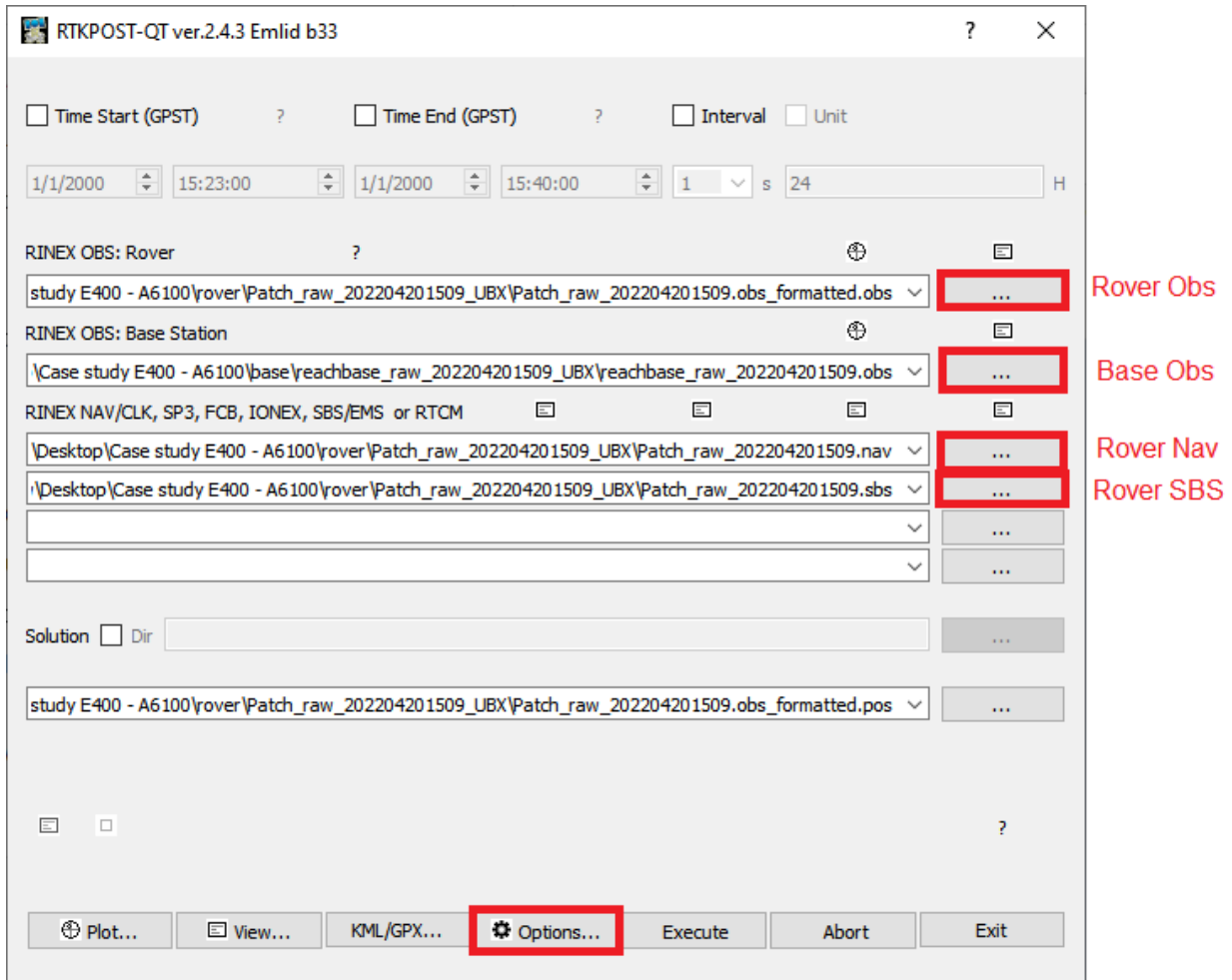


Select your observation file, select your camera in the cameras dropdown, then press format.

After processing finishes there will be a new observation file in the same location with “_formatted” appended to the filename.

Processing with RTKPOST

Open RTK POST.

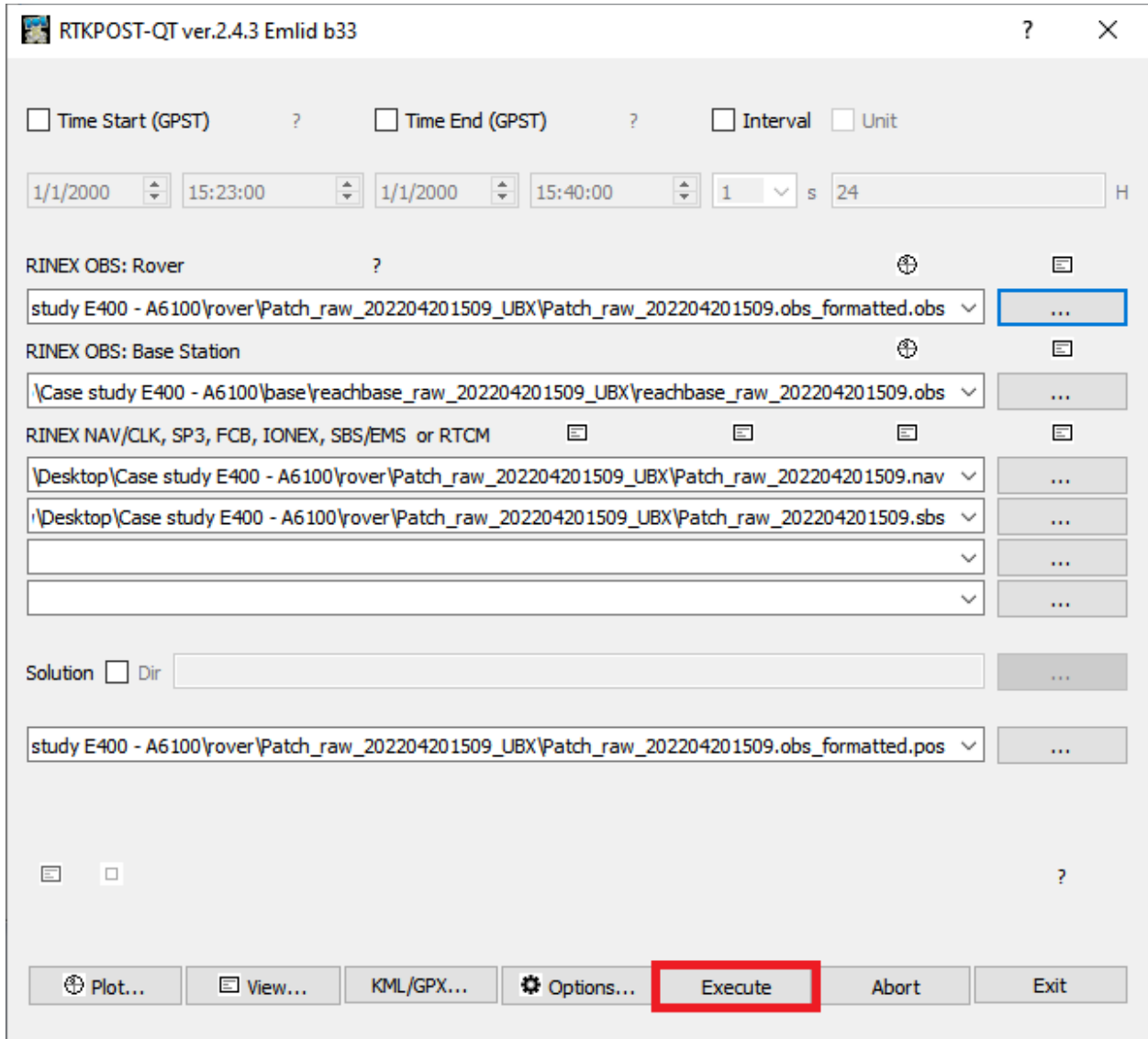


Select the formatted rover observation file, Base observation file, and rover NAV and SBS files.

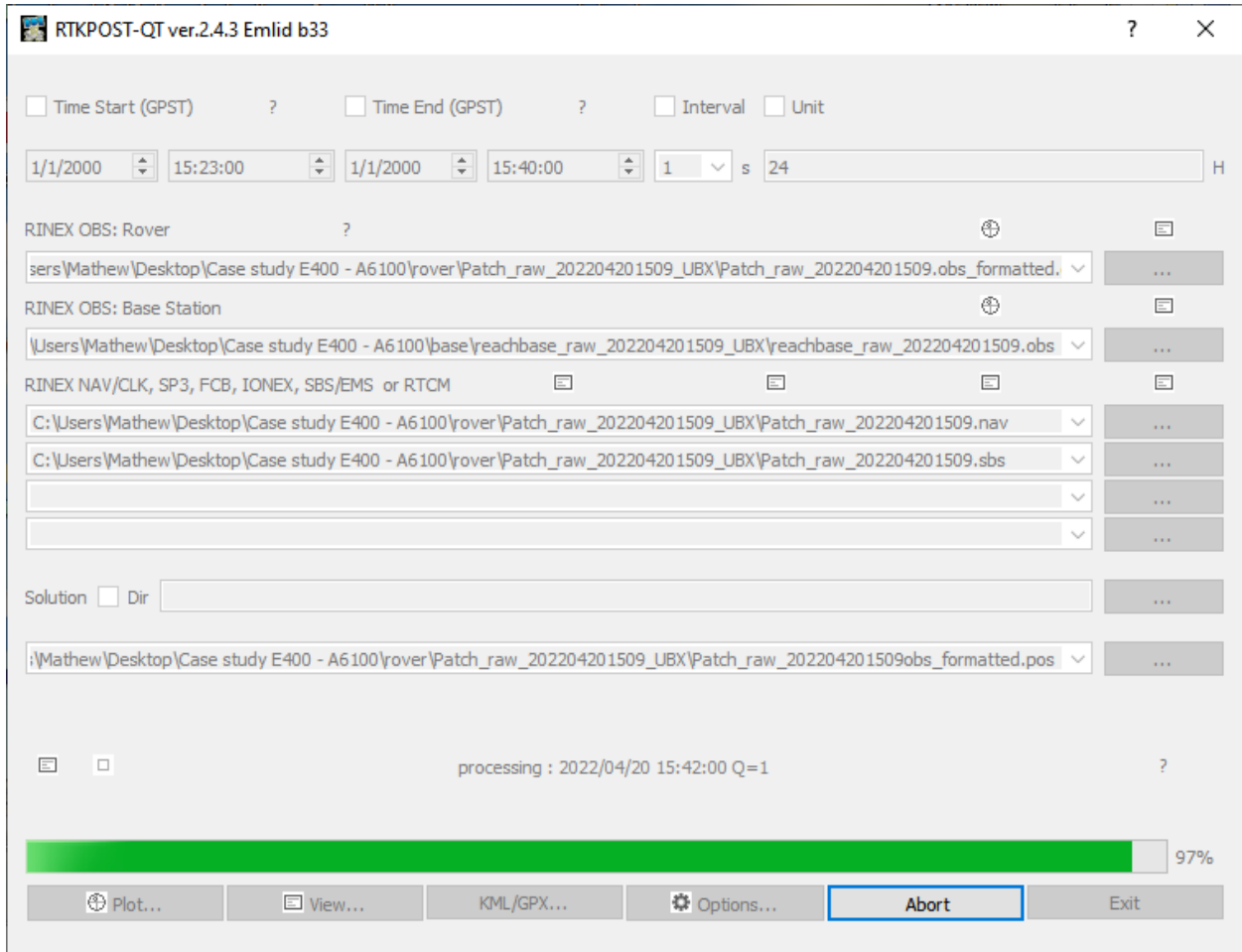
Open the options tab.

The screenshot shows the 'Options' dialog box with the 'Positions' tab selected. The 'Rover' section contains a dropdown menu for 'Lat/Lon/Height deg/m' and three input fields with values 0.000000000, 0.000000000, and 0.0000. Below it is a checkbox for 'Antenna Type (*: Auto)' and a dropdown menu, followed by three input fields for 'Delta-E/N/U (m)' with values 0.0000, 0.0000, and 0.0000. The 'Base Station' section is highlighted with a red box and contains a dropdown menu for 'Lat/Lon/Height deg/m' and three input fields with values 41.037174381, -81.529839272, and 262.7250. Below it is a checkbox for 'Antenna Type (*: Auto)' and a dropdown menu, followed by three input fields for 'Delta-E/N/U (m)' with values 0.0000, 0.0000, and 0.0000. At the bottom, there is a 'Station Position File' field and a button with an ellipsis. The 'OK' button is highlighted with a blue box.

Navigate to the positions tab and enter the coordinate of your base station then click OK.



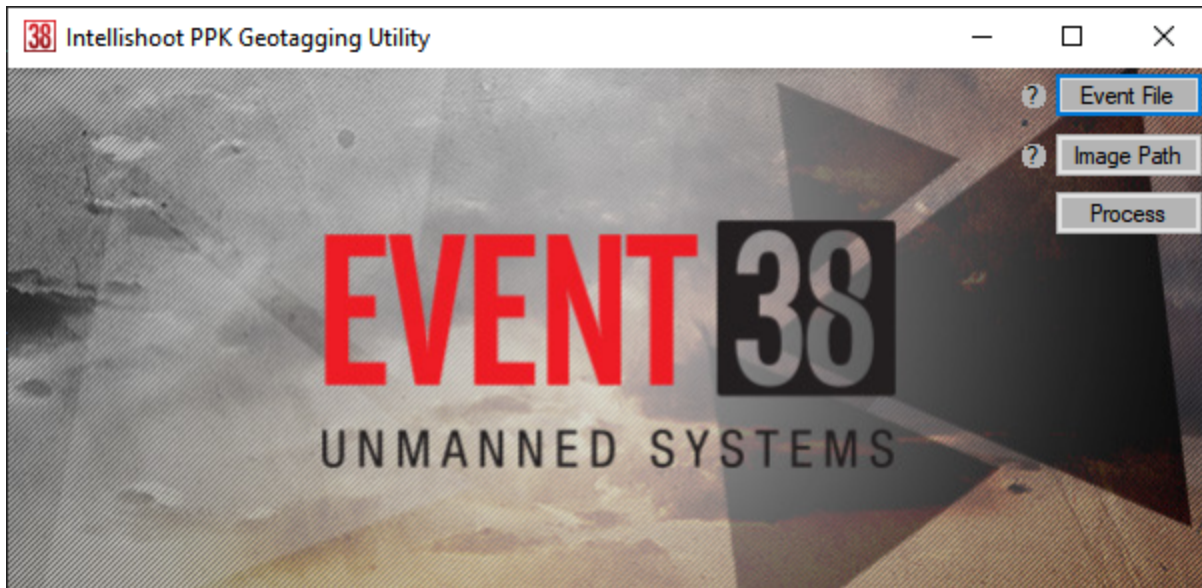
Click Execute and wait for processing to finish.



The processing bar at the bottom of the screen will go forward to 100% and backward to 0% to ensure the highest quality of data has been achieved. After processing has finished there will be a file with the ending events.pos containing the positions that the images were captured at.

Tagging the images

Open the Event38 Image utility.

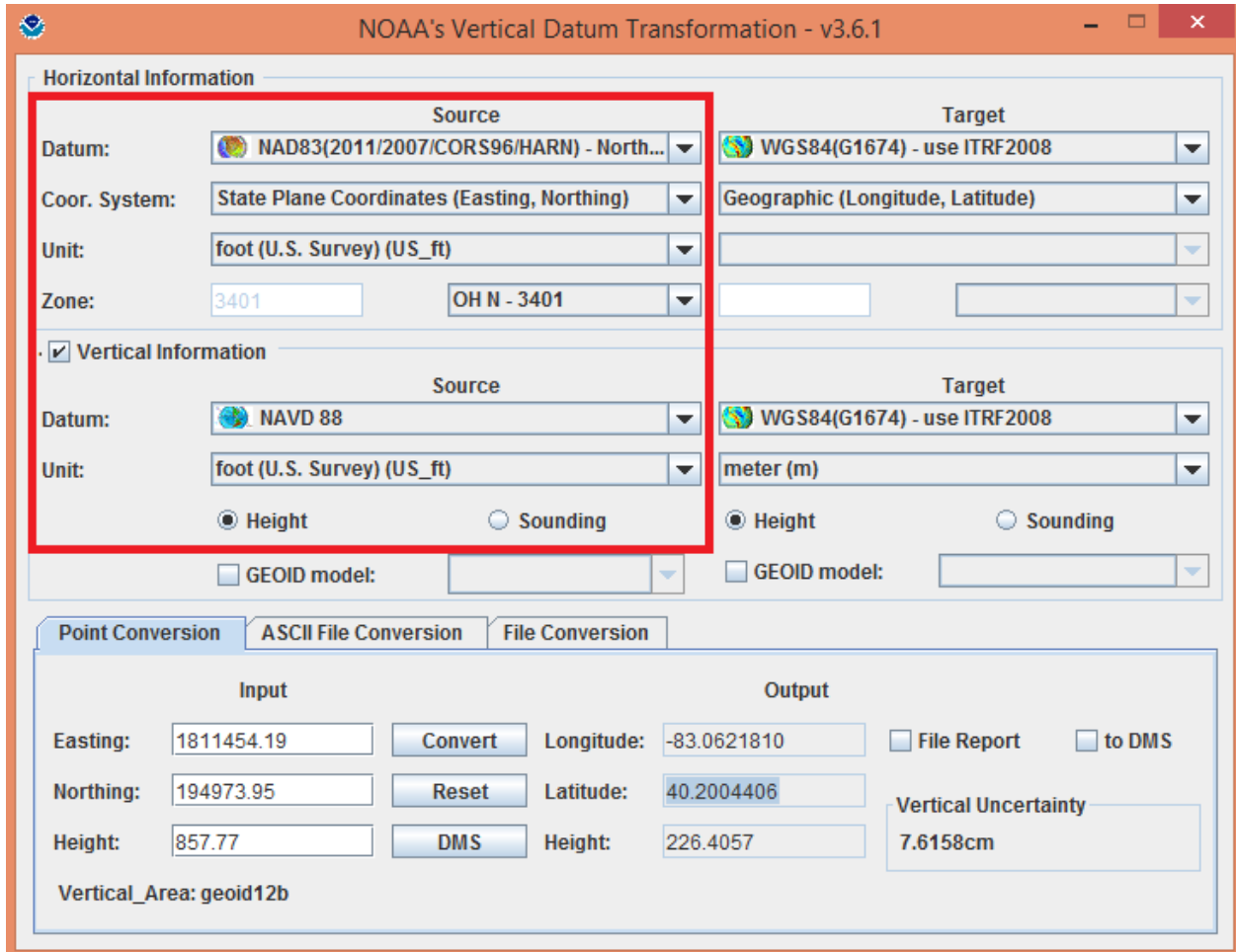


Multispectral imagery collected with micasense cameras must have all of the imagery moved into one folder prior to processing.

Select the event file and path to images then click process. A file with geotags called geotags.txt as well as a quality report on the geotags will be created in the same folder as images. The Event38 image utility performs a sequential geotagging process. Ensure only images taken during flight are included in the image path.

Coordinate Conversions

Open vdatum by double clicking on Vdatum.jar.



Select the coordinate system and unit system of the source coordinates system.

NOAA's Vertical Datum Transformation - v3.6.1

Horizontal Information

Source

Datum: NAD83(2011/2007/CORS96/HARN) - North...

Coord. System: State Plane Coordinates (Easting, Northing)

Unit: foot (U.S. Survey) (US_ft)

Zone: 3401 OH N - 3401

Target

Datum: WGS84(G1674) - use ITRF2008

Coord. System: Geographic (Longitude, Latitude)

Unit: meter (m)

Vertical Information

Source

Datum: NAVD 88

Unit: foot (U.S. Survey) (US_ft)

Height Sounding

GEOID model:

Target

Datum: WGS84(G1674) - use ITRF2008

Unit: meter (m)

Height Sounding

GEOID model:

Point Conversion | ASCII File Conversion | File Conversion

Input

Easting: 1811454.19

Northing: 194973.95

Height: 857.77

Output

Longitude: -83.0621810

Latitude: 40.2004406

Height: 226.4057

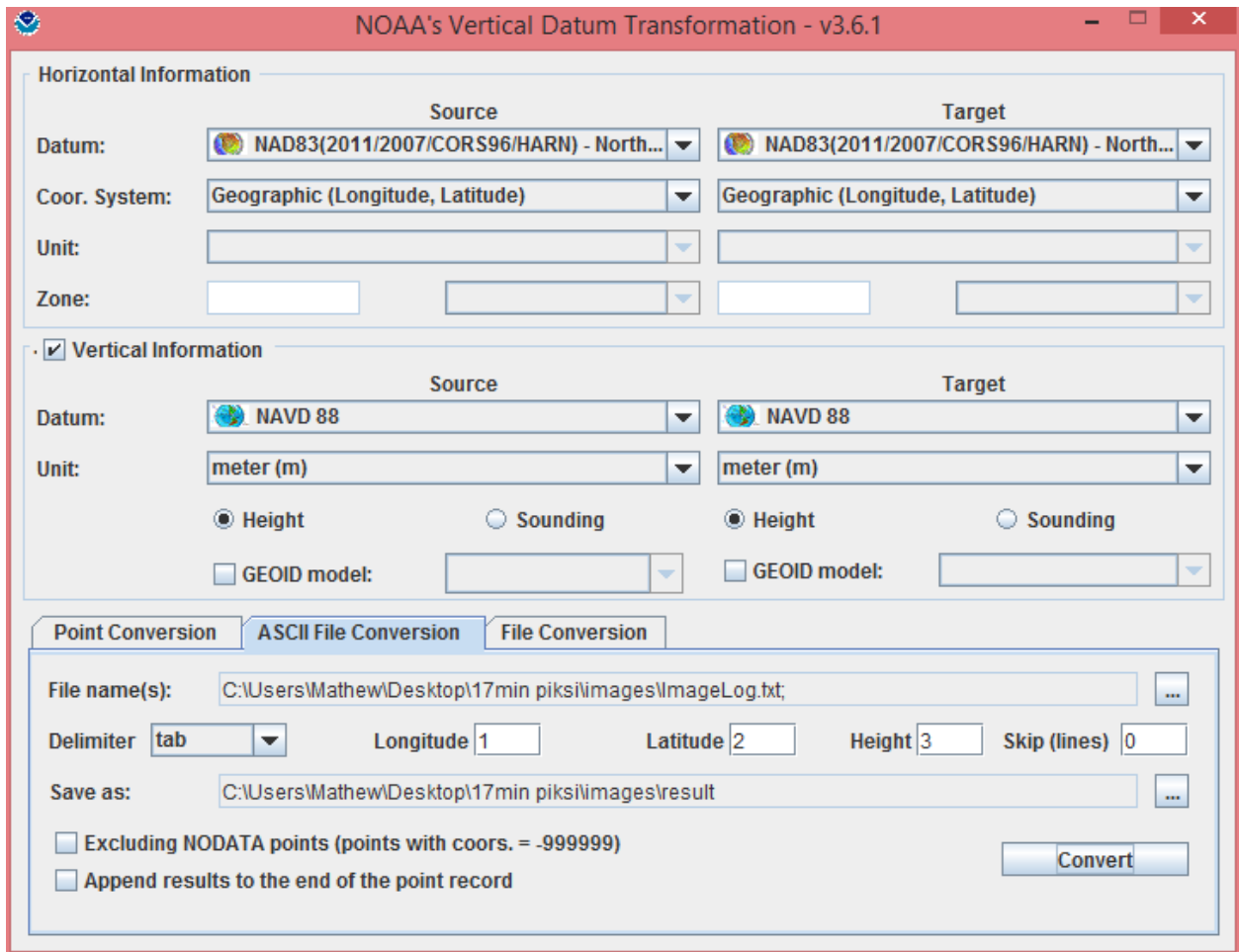
Vertical Uncertainty: 7.6158cm

Vertical_Area: geoid12b

Select the coordinate system and unit system of the target coordinate system.

Enter the coordinate to convert from into the point conversion tab and click convert.

Alternatively all coordinates in a file can be converted in the ASCII File Conversion tab.



The geotags.txt file obtained from post processing can be converted with the settings in the image above.

Troubleshooting

Image marks and time stamps do not match up.

- Verify that all images were taken during this flight
- Verify that all images taken during the RTKPOST specified processing time were added

FAQ

Q: Why don't all of my images have geotags?

A: We only use the quality 1 tags. If your image is missing a geotag the coordinate likely was not as accurate as the other surrounding coordinates.

Q: How can I obtain a base coordinate?

A: Read our documentation on methods to obtain an absolute base coordinate.