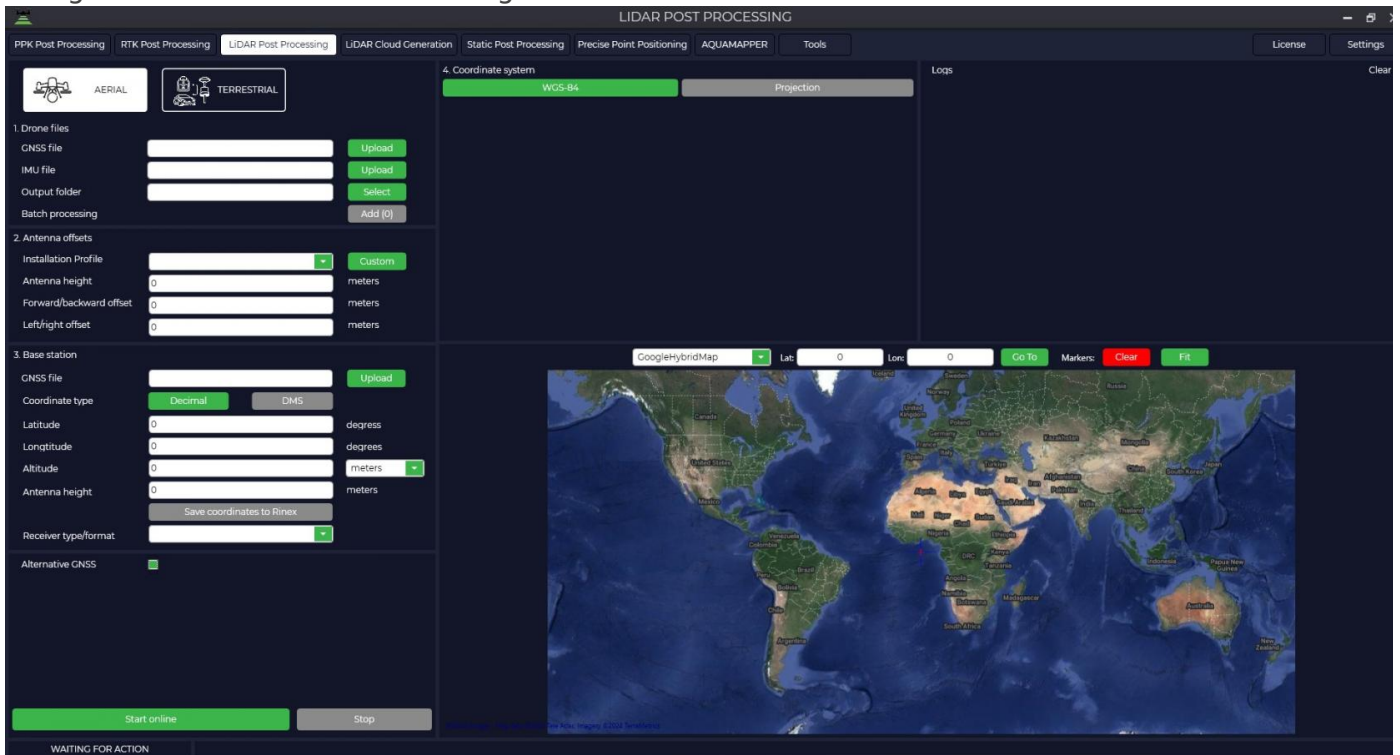


LiDAR Post Processing

This module allows to calculate the trajectory of the laser scanner together with the inertial system data on the server solution of TOPODRONE company, thus not burdening the user's computer.

1. In order to start processing it is necessary to start the TOPODRONE Post Processing program and go to the LiDAR Post Processing tab.



The screenshot displays the 'LIDAR POST PROCESSING' web interface. The top navigation bar includes tabs for 'PPK Post Processing', 'RTK Post Processing', 'LIDAR Post Processing' (which is active), 'LIDAR Cloud Generation', 'Static Post Processing', 'Precise Point Positioning', 'AQUAMAPPER', and 'Tools'. On the right side of the navigation bar are 'License' and 'Settings' buttons. The main interface is divided into several sections:

- 1. Drone files:** Contains input fields for 'GNSS File', 'IMU File', and 'Output folder', each with an 'Upload' button. There is also a 'Batch processing' section with an 'Add (0)' button.
- 2. Antenna offsets:** Includes a dropdown for 'Installation Profile' with a 'Custom' button, and input fields for 'Antenna height', 'Forward/backward offset', and 'Left/right offset', all with units in meters.
- 3. Base station:** Features an 'Upload' button for the 'GNSS file', a 'Coordinate type' selector (currently set to 'Decimal'), and input fields for 'Latitude', 'Longitude', and 'Antenna height' (in meters). There is also a 'Receiver type/format' dropdown and a 'Save coordinates to file' button.
- 4. Coordinate system:** Shows 'WGS-84' selected for the coordinate system and 'Projection' for the projection type.
- Map:** A Google Hybrid Map is displayed, showing a world view with a red location pin. Above the map are controls for 'Go To' (with 'Lat: 0' and 'Lon: 0' fields), 'Markers' (with 'Clear' and 'Fit' buttons), and a 'Go To' button.

At the bottom left, there is a 'Start online' button and a 'Stop' button. A status bar at the very bottom indicates 'WAITING FOR ACTION'.

2. Specify the installation type and path to the laser scanner files in the "GNSS file" field. Inertial data file will be loaded automatically in the "IMU file" field. Also by default the data will be saved to the source folder, but you can change the saving location in the "Output folder" field.



AERIAL



TERRESTRIAL


1. Drone files

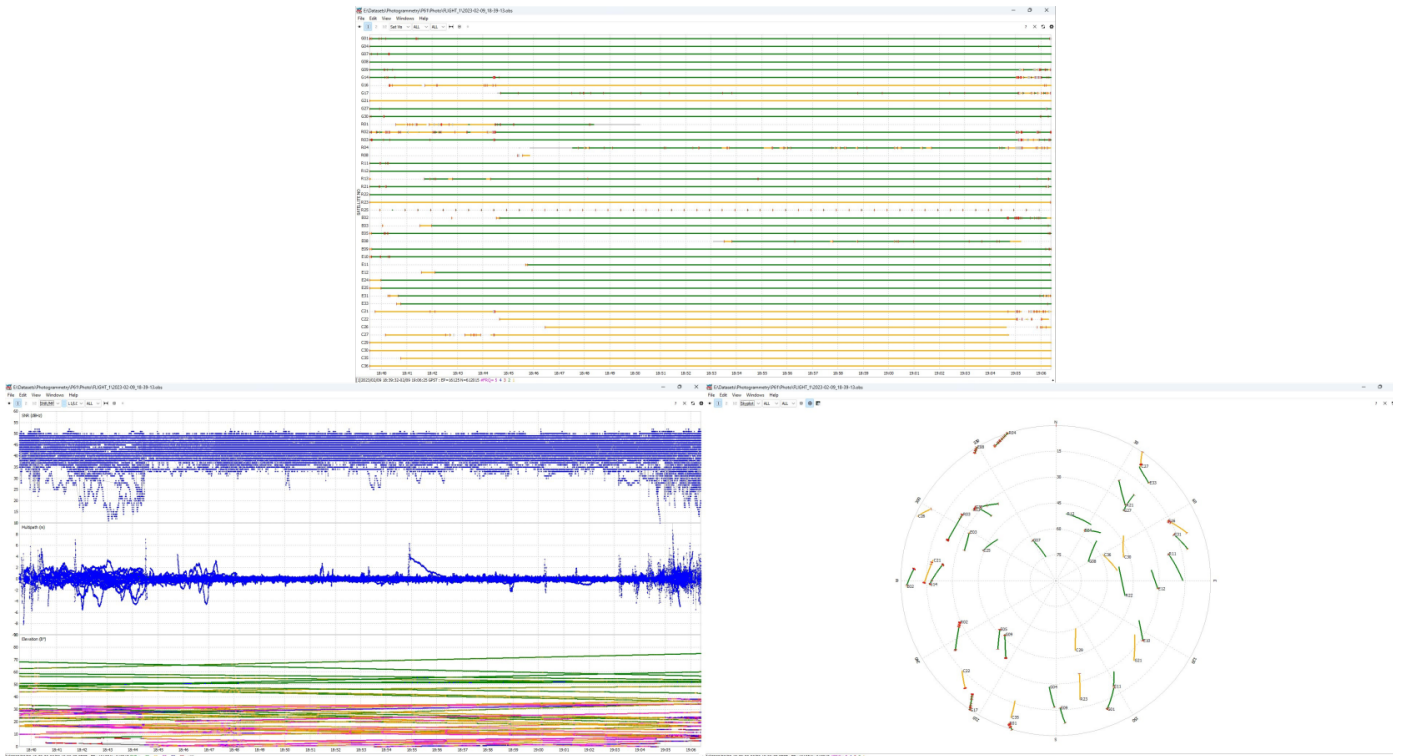
GNSS file	<input type="text"/>	<input type="button" value="Upload"/>
IMU file	<input type="text"/>	<input type="button" value="Upload"/>
Output folder	<input type="text"/>	<input type="button" value="Select"/>
Batch processing		<input type="button" value="Add (0)"/>

The "Logs" window displays all information on the downloaded files: type of scanner used, type of inertial system used, start/end time of file recording on the scanner and base station, as well as all information on data processing.

```

Logs Clear
> Convert drone file to RINEX...
> E:\Datasets\LiDAR\Aerial\100 M300 Sky Port\2023-10-04_11-12-10.obs
> IMU Model: Epson G370 250Hz
> The type of base station antenna is not specified in the header of the Rinex file.
> Parse E:\Datasets\LiDAR\Aerial\100 M300 Sky Port\2023-10-04_11-12-10.obs...
> APPROX POSITION X = 4377211.3658, Y= 529230.3835, Z= 4593882.7051
> ANTENNA: DELTA H/E/N = 0
> TIME OF FIRST OBS = 4/10/2023 11:12:30
> TIME OF LAST OBS = 4/10/2023 11:22:48
> Lidar Model: LiDAR 100
  
```

3. By pressing the  button you can analyze the quality of the data. For more information about data quality analysis, see [Appendix B](#).



4. Select your equipment model from the drop-down list.

2. Antenna offsets

Installation Profile Custom

Antenna height

Forward/backward offset

Left/right offset

3. Base station

DJI Matrice 200/210 (antenna in the center of the drone)
 DJI Matrice 200/210 (drone front antenna)
 DJI Matrice 300
 DJI Matrice 300/350 (Skyport mount)
 P24/P61 + DJI Matrice 300
 Fixar 007 + 200+

The offsets will be loaded from the library automatically. Note that if you have selected the AERIAL setting type, the presets for TERRESTRIAL are not displayed.

5. If your offsets differ from the standard ones, you should click the "Add" button and enter your values.

2. Antenna offsets

Installation Profile Custom

Antenna height meters

Forward/backward offset meters

Left/right offset meters

6. If the IMU center is located behind, below and to the right of the GNSS antenna in the direction of travel, then at the post-processing stage the offset values are specified in TOPODRONE Post Processing software as positive values (without sign -) in meters. If the IMU

center is located in front, above and to the left of the GNSS antenna in the course of movement, then at the post-processing stage the offset values are specified in TOPODRONE Post Processing software as negative values (with sign -) in meters. in meters.

The PARENT parameter is responsible for allowing the program to understand how the sensor was positioned during the scan. DJI Matrice 300 - sensor forward, P24/P61 + DJI Matrice 300 - sensor backward.

NAME	HEIGHT	FORWARD/BACKWARD	LEFT/RIGHT	PARENT
Fixar 007 + 200+	0.6568	0.5961	-0.3586	DJI Matrice 300

Buttons: Add, Delete, Save

7. Load the base station file in the "Base station" window in the "GNSS file" field.

The screenshot shows the TOPODRONE Post Processing software interface. The 'Base station' configuration window is open, showing the 'GNSS file' field with the path 'E:\Datasets\LIDAR\Aerial\100 M300 Sky Po'. A dialog box titled 'TOPODRONE Post Processing' is displayed in the foreground, asking 'Do you want to add more navigation data files?' with 'Yes' and 'No' buttons. The background interface includes sections for '1. Drone files', '2. Antenna offsets', '3. Base station', and '4. Coordinate system'. The 'Base station' section includes fields for 'GNSS file', 'Coordinate type', 'Latitude', 'Longitude', 'Altitude', and 'Antenna height'. The 'Coordinate system' section shows 'WGS-84' and 'Projection'. The 'Logs' section on the right displays a list of log entries.

When you download the measurement file of the base station in RINEX format, ephemeris will be automatically downloaded, you can download ephemeris from the TOPODRONE receiver that is installed in your laser scanner or downloaded separately.

8. From the drop-down list of receivers it is necessary to select the one that supports TOPODRONE Post Processing


TOPODRONE Post Processing program supports downloading data from different types of receivers, and if your receiver is not in the list, you can always convert the file to the universal RINEX format.



9. Specify the high-precision coordinates of the base station.

Coordinates of the base station should be specified in the format latitude, longitude, height above the ellipsoid of the WGS 84 system.

3. Base station

GNSS file 

Coordinate type

Latitude degrees

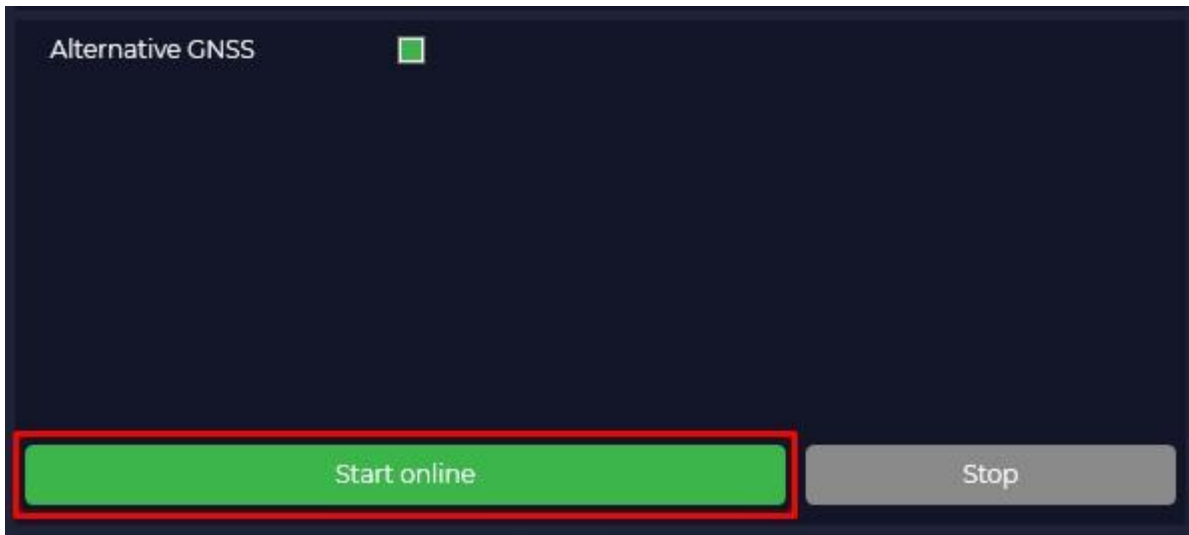
Longitude degrees

Altitude

Antenna height meters

Receiver type/format

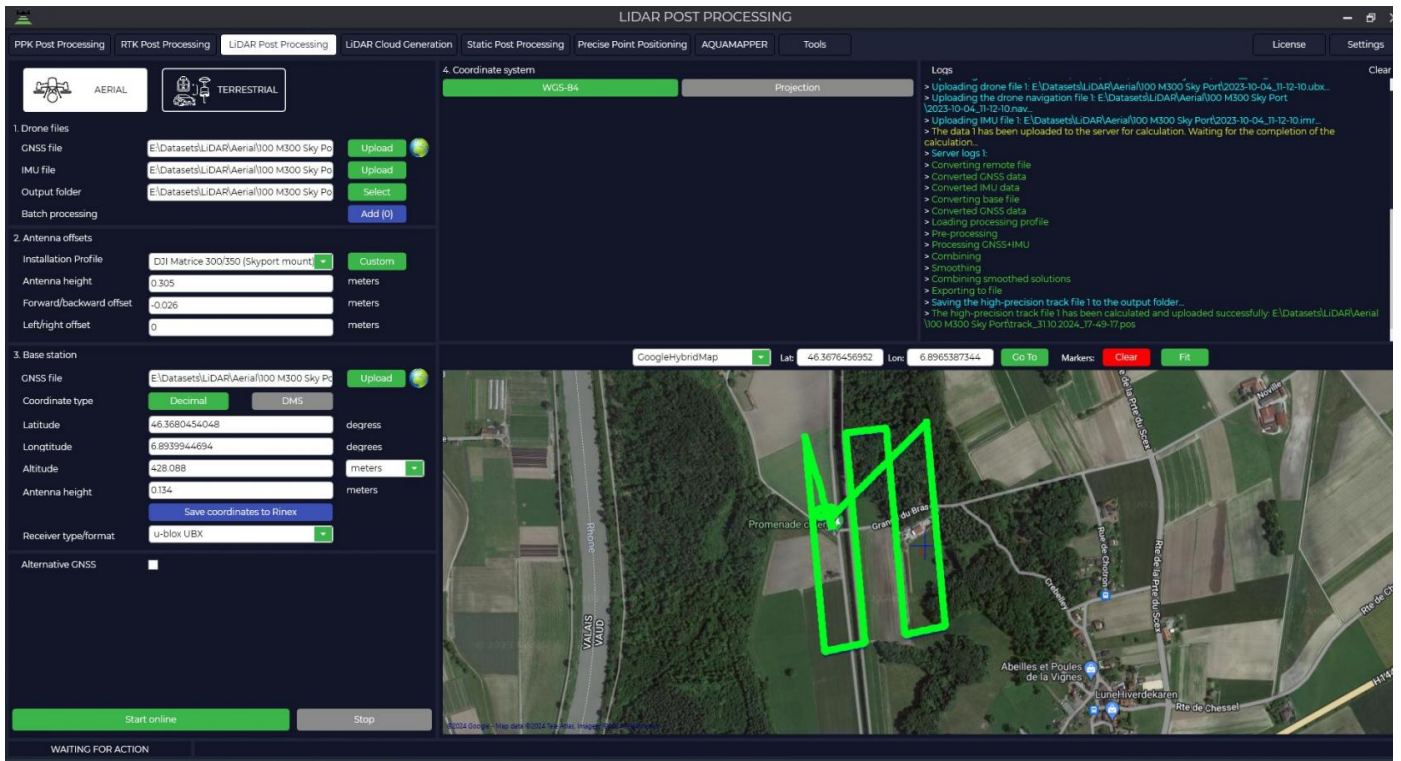
10. Start processing by clicking the "Start Online" button.



Once processing starts, the data is uploaded to our server, where the trajectory is jointly processed using GNSS and IMU data. For correct processing you must have stable internet without interruptions, if there is a failure at the data upload stage, the processing stage will need to be restarted.

The "Alternative GNSS" checkbox allows you to get additionally the trajectory processed on your computer, possibly with a better solution quality.

11. At the end of processing the file with the high precision trajectory will be downloaded to your computer and in the map window you will be able to see the trajectory and the accuracy with which it was obtained. Green color means that the trajectory was processed with a fixed solution, yellow with a floating solution, and red color will tell us that with an offline solution. The trajectory file itself will be located in the default folder or in the folder you specified.



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