

CORRELATOR3D™ RTK - PPK Assisted AT Quickstart Guide

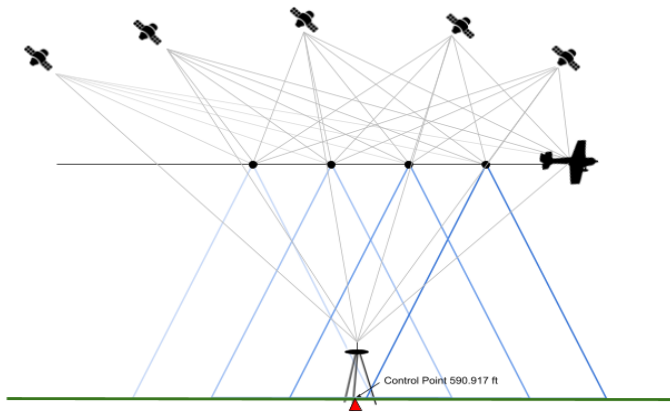
OVERVIEW

In Correlator3D's AT Module, an RTK/PPK Assisted bundle adjustment can be performed. Selecting this option indicates to the software that the image positions (X, Y and Z) are known to be accurate via a Real Time Kinematic (RTK) or Post Processed Kinematic (PPK) survey method. These corrected positions are imported directly into Correlator3D during the project setup through the image EXIF information or with an accompanying text file.

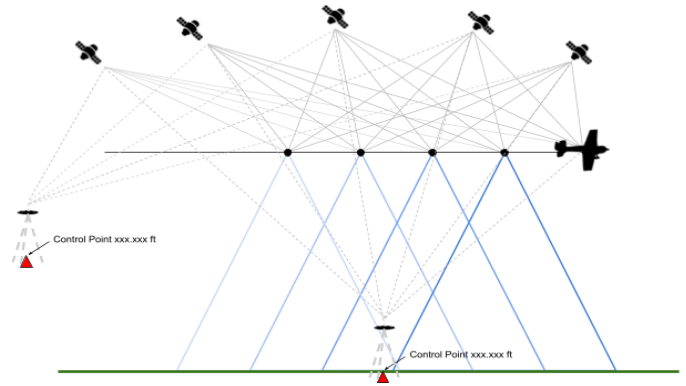
This guide will describe both processes in Correlator3D™ for first-time users covering the workflow from input imagery to final products. A more detailed description of the software can be found in the user manual.

THE DIFFERENCE BETWEEN RTK AND PPK

RTK requires a base station on-site. In order to achieve a solution, the base station must be on and collecting data over a known point prior to, during flight and after the drone lands. The benefit: results are processed in real time. The drawback: if the base station goes down or there is a loss of signal between the base station and drone, the mission will have to be restarted.



PPK uses a networked reference station either private or public in the vicinity. While an on-site base station is not necessary, it is recommended. If an onsite base station is present, results can be processed in real time upon completion of the mission, or post processed without at a later time. The benefit: successful GPS data collection is not reliant on an on-site receiver. The drawback: short delays are possible in post-processing if using PPK only. Delays depend directly on the desired level of accuracy.

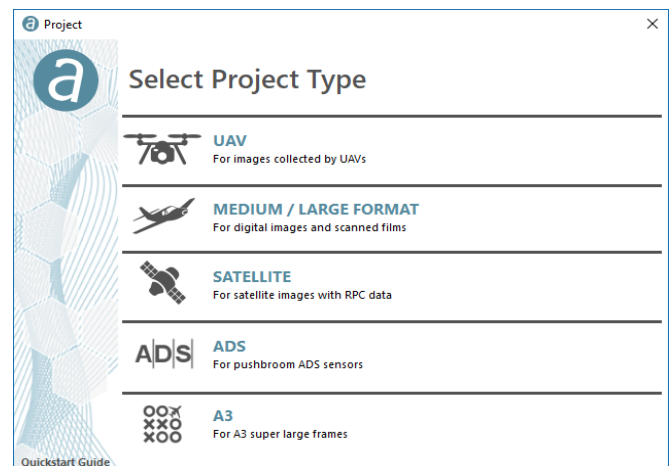


RTK / PPK ASSISTED BUNDLE ADJUSTMENT OPTIONS

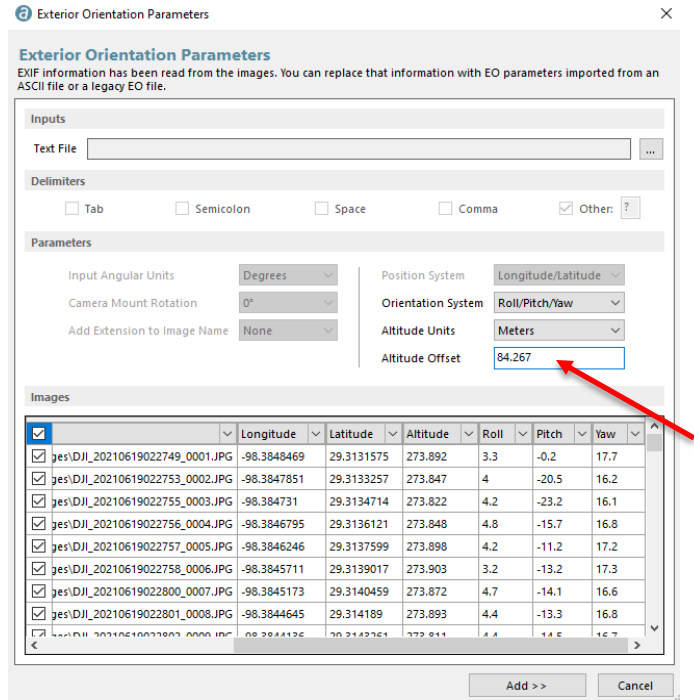
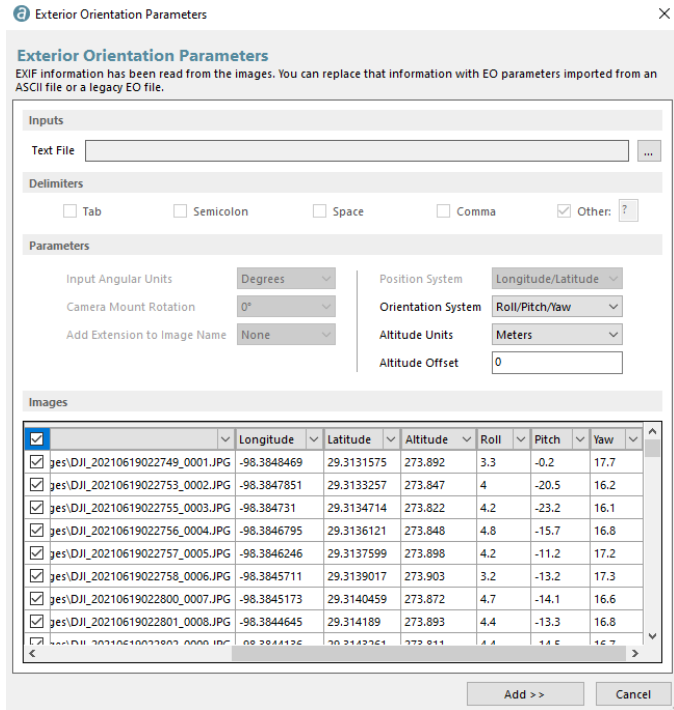
With the development of drones and the incorporation of RTK and/or PPK enabled positioning equipment, some users are under the false impression that these can reduce or completely do away with the need for survey/ground control. This is not the case. It is true that with an RTK / PPK assisted bundle adjustment, Correlator3D can produce an AT solution that is accurate relative to itself. However, check points (GCPs) are required to verify this.

PROJECT SETUP WIZARD

Use the project wizard to start a new project. Select the project type.



Once the images to be used have been selected, the Exterior Orientation Parameters dialog will be displayed.



Proceed through the project wizard following the remaining steps as usual.

Imported images will default to Longitude/Latitude WGS84, with ellipsoid height in meters. Label the columns appropriately.

Since imported imagery is in ellipsoid height, conversion to orthometric height may be required.

Fortunately, there are many online tools for determining the geoid offset of a project. The National Geodetic Survey (NGS) offers one which can be found via this [link](#). Simply choose an image in the center of the project, paste the latitude and longitude values into the NGS conversion tool and the geoid offset for that location will be provided. This offset should be entered into the Altitude Offset field.

Note: If the projection of the project is in feet, this value needs to be manually converted to feet before.

6/21/2021 GEOID COMPUTATIONS

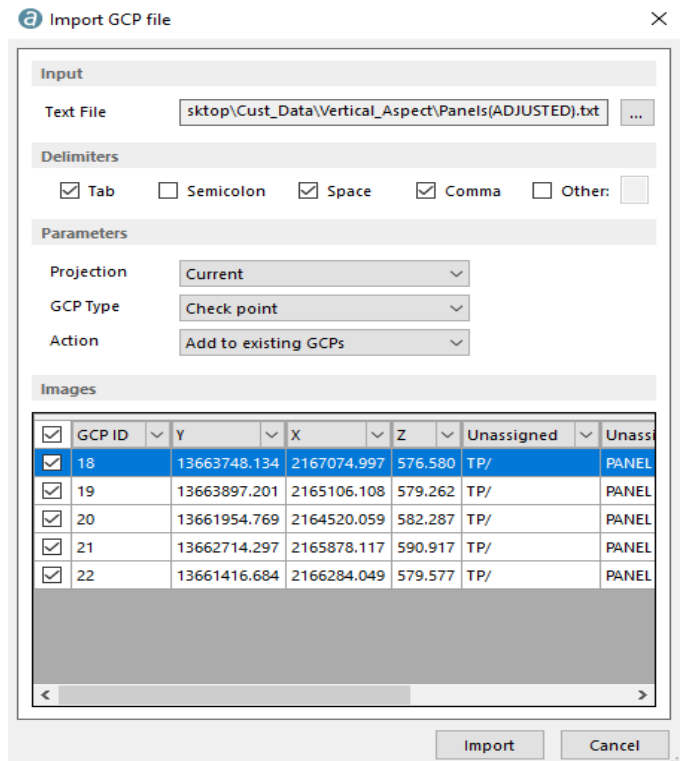
Output from GEOID18

Station Name USER LOCATION	Latitude ddd mm ss.sssss	Longitude ddd mm ss.sss	Geoid Offset meters	error (95% confidence interval) meters
	29 18 54.22190	261 37 9.534	-25.685	0.042

RTK / PPK ASSISTED BUNDLE ADJUSTMENTS WITH GCPS



If GCPs were not added in the Project Setup Wizard, they can be added in the AT module. Import GCPs as check points.



Once imported, tag each GCP in the images.



PROJECT SUMMARY

The project summary of the quality report indicates that the image tie points quality assessment was excellent. With an average projection error of less than half a pixel and an average number of tie points per image at 152, the resulting DSM, DTM and orthomosaic will have an excellent relative accuracy. When compared to the check points, once again the average projection error is less than half a pixel, meaning they were correctly located in each image to within less than half a pixel.

1. PROJECT SUMMARY

PROJECT	
Project type	Aerial
Projection	EPSG:6588 NAD83(2011) Texas South Central
Planar units	FEET
Elevation units	FEET
Camera 1	795 images (DJI Zenmuse P1)
Total images	795

GROUND CONTROL POINTS	
Average XY error	-
RMS Z error	-
Average projection error	-
Standard deviation	-
Number of GCPs	0

IMAGE TIE POINTS	
Quality assessment	EXCELLENT
Average projection error	0.45 pixels
Standard deviation	0.22 pixels
Average number of tie points per image	152.8

CHECK POINTS	
Average XY error	0.373 ft
RMS Z error	0.671 ft
Average projection error	0.37 pixels
Standard deviation	0.07 pixels
Number of check points	5

BUNDLE ADJUSTMENT



When running a bundle adjustment, select RTK / PPK Assisted for the EO Adjustment and Ground Control Points for the Ground Reference

