simactive

LOCAL COORDINATE SYSTEMS

QUICKSTART GUIDE

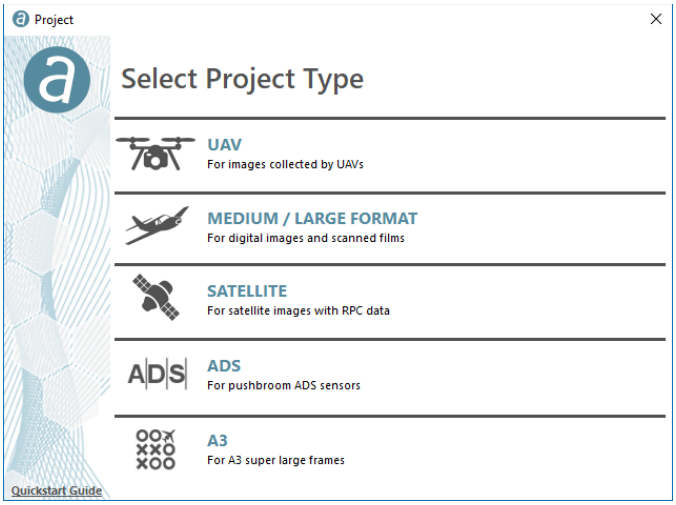
OVERVIEW

Local coordinate systems are sometimes used on site specific projects. They often start with an arbitrary reference point (0, 0) in the lower left corner and scale from there.

This guide describes the process for first-time users of local coordinate systems, covering the workflow from input imagery to final products. A more detailed description of the software can be found in the user manual.

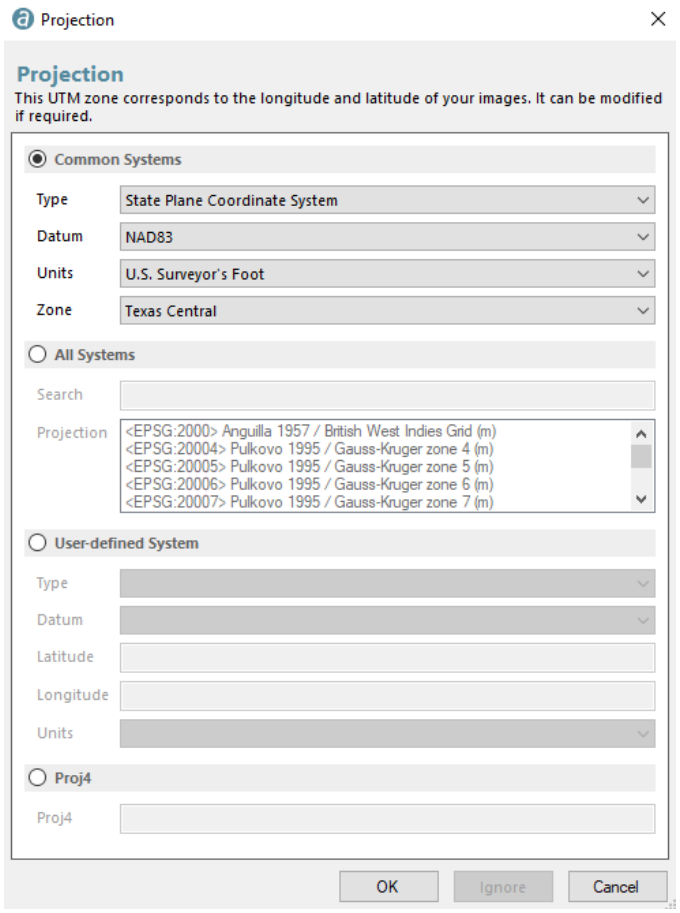
USING LOCAL COORDINATES IN CORRELATOR3D

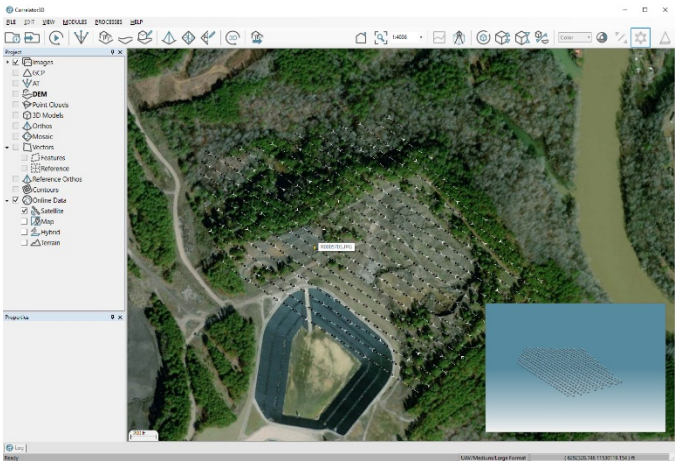
All workflows in Correlator3D™ begin by creating a project using the wizard and importing imagery, orientation parameters, projection, sensor parameters along with control if available.



When defining the projection system, the one nearest to the project location should be selected. Users must make sure it is in the same units (meters or feet) as the GCPs.

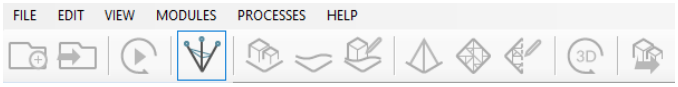
When specifying the project parameters at the last step of the project creation wizard, the entries "DEM", "GCP File" and "Reference Orthos" must be left blank before clicking on the "Finish" button. The flight lines and image positions should then appear in the main window. A reference image, based on current image positions, will be displayed in the background.





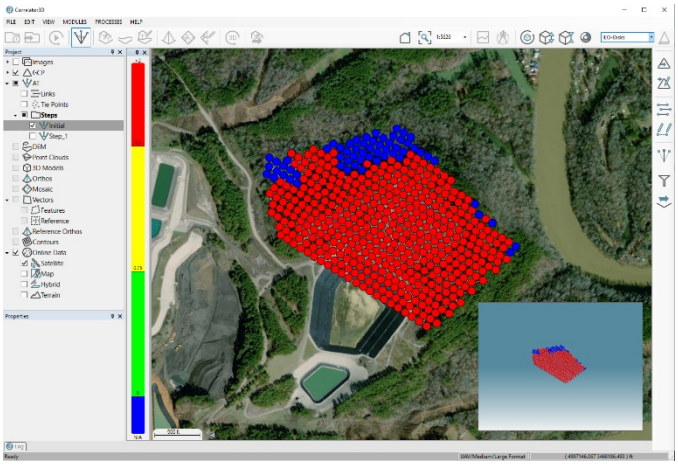
AERIAL TRIANGULATION

First, users need to enter the aerial triangulation mode by selecting the corresponding button in the main toolbar.

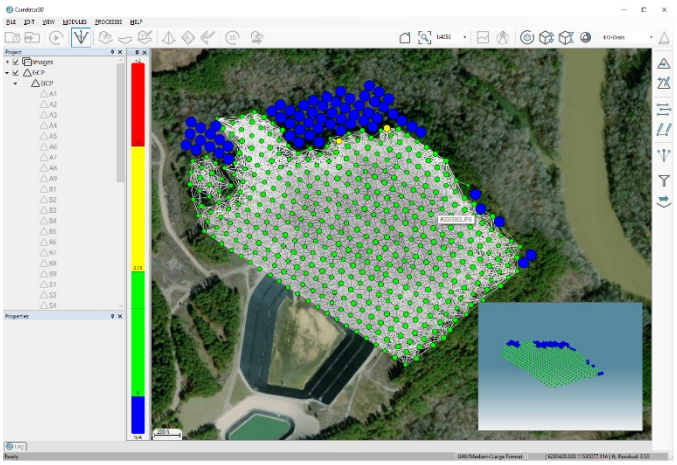


Tie points between images should then be extracted by clicking on the "Tie Point Extraction" button from the AT toolbar. Users can proceed with the standard extraction unless the dataset is challenging and has suboptimal inputs. For these specific cases, the "Exhaustive" option should be selected.

Before adding the GCPs to the project, a first bundle adjustment should be performed to facilitate the image tagging. This process can be launched by clicking on the "Bundle Adjustment" button from the AT toolbar. This will automatically improve exterior orientation values and camera calibration parameters from the image data. Once the bundle adjustment has been performed, users are presented with the overall tie point residual error expressed as colored circles centered on each image.



Before bundle adjustment.



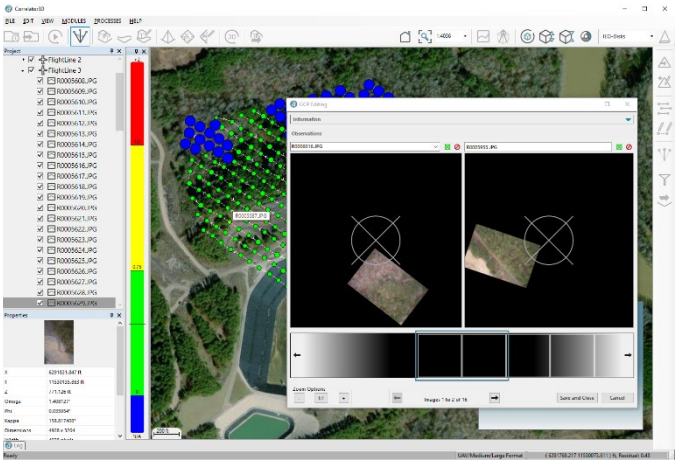
After bundle adjustment

COORDINATE TRANSFORMATION

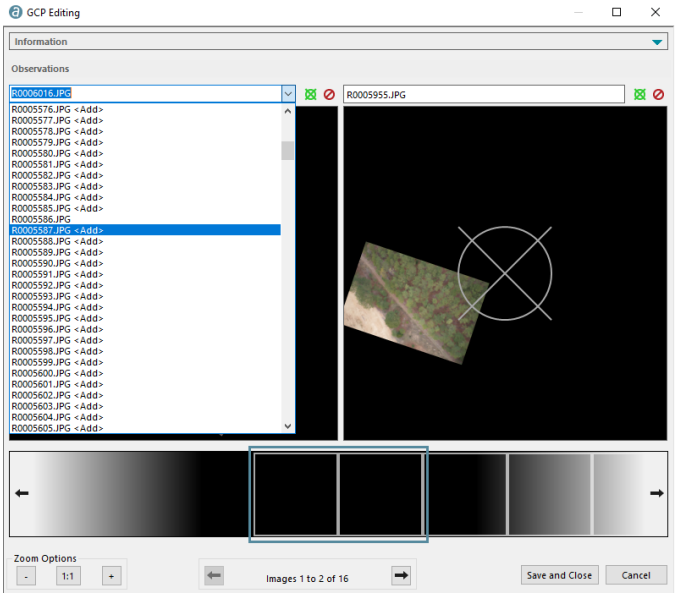
The next step is to import GCPs by clicking on the "Import GCP File" button from the AT toolbar. Note that the GCPs will not be initially displayed in the main window as they would with a known coordinate system. In fact, a large offset from the image block is expected as the position of the latter is still approximate. It is therefore suggested to have some knowledge of the GCP locations (or to have a reference sheet), and the ability to visually identify at least one of them in the images to initiate the GCP collection and correct for the coordinate transformation.

A first GCP can be edited from the project tree using the corresponding contextual button. This will bring the GCP Editing dialog displaying at least two image candidates. These are assumed to be near the control point. However, since the GCPs are represented in a different coordinate system, the control point will probably not be visible in those images. Correlato3D™ needs a better approximation of the image locations to accurately identify good candidates.

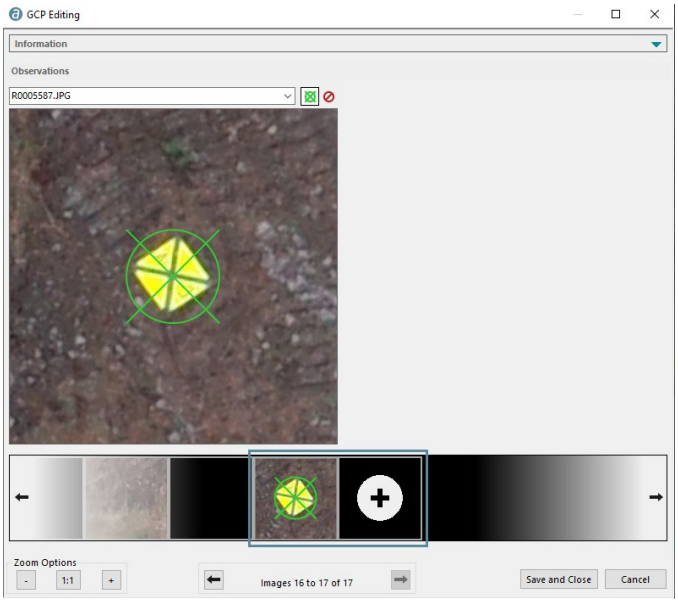
The strategy is therefore to hover the mouse cursor in the main window and locate an image in which the GCP should be visible. A popup label will display the image name.



Back in the GCP Editing dialog, the corresponding image must be selected from the drop-down menu located above the first image. This menu lists all images of the project.

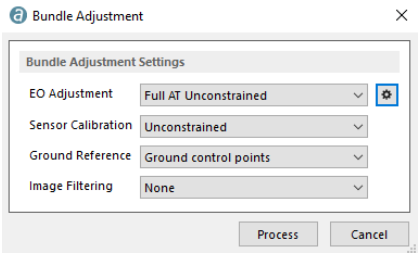


Now that the image is loaded, users can zoom into the GCP, drag it under the reference target and click on the "Save and Close" button.

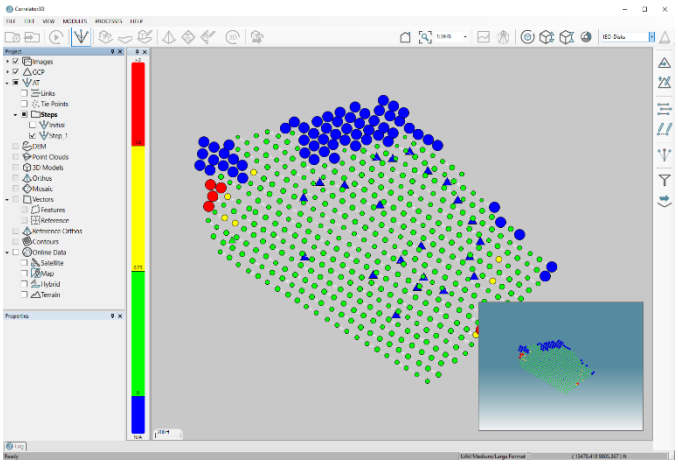


The same GCP must then be edited a second time, again using the corresponding contextual button from the project tree. This time, the GCP Editing dialog should display valid image candidates where the GCP can now be tagged.

While this is not required, a bundle adjustment can be performed to bring the image block where the GCPs are located before tagging the remaining ones. Users should specify the appropriate parameters and make sure the ground reference is set to ground control points. The EO adjustment parameters can be further specified by clicking on the settings button.



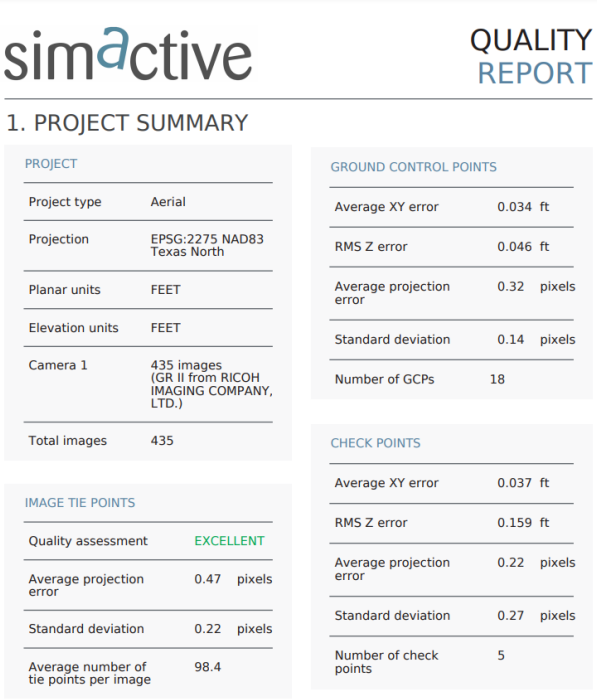
Once the adjustment is completed, users can zoom out and then zoom back into the image block.



The GCPs are now in the same location as the images, and the coordinate transformation to the local coordinate system is complete.

REMAINING CONTROL POINTS

Now that Correlator3D™ knows the transformation between the image block and the GCPs, all remaining GCP can be easily edited. A final bundle adjustment with all GCPs can be performed.



simactive QUALITY REPORT

1. PROJECT SUMMARY

PROJECT

Project type	Aerial
Projection	EPSG:2275 NAD83 Texas North
Planar units	FEET
Elevation units	FEET
Camera 1	435 images (GR II from RICOH IMAGING COMPANY, LTD.)
Total images	435

IMAGE TIE POINTS

Quality assessment	EXCELLENT
Average projection error	0.47 pixels
Standard deviation	0.22 pixels
Average number of tie points per image	98.4

GROUND CONTROL POINTS

Average XY error	0.034 ft
RMS Z error	0.046 ft
Average projection error	0.32 pixels
Standard deviation	0.14 pixels
Number of GCPs	18

CHECK POINTS

Average XY error	0.037 ft
RMS Z error	0.159 ft
Average projection error	0.22 pixels
Standard deviation	0.27 pixels
Number of check points	5

If the results are acceptable, the AT module can be exited and the workflow continued with the remaining steps (DSM generation, DTM extraction, orthorectification, mosaic creation, and 3D model generation).