

Airphoto Ortho Suite

The Airphoto Ortho Suite includes rigorous models used to correct the geometry of analogue and digital/video cameras and to produce orthorectified air photos. These models compensate for the effects of varying terrain and for the distortions inherent to a camera; such as the curvature of the lens, focal length, perspective effects, and the camera's position and orientation. The computed math model calculates the camera's position and orientation when an image is taken.

MODULE PREREQUISITES

The Airphoto Ortho Suite is an add-on to Geomatica. It requires Geomatica Core or Geomatica Prime as a pre-requisite.

SUPPORTED AIRPHOTO FORMATS

The OrthoEngine Airphoto Models support the following image formats. For more details on specific sensors, see the [Sensor support webpage](#).

Digital/Video Frame Images

- All still digital or video images, including:
 - Handheld commercial cameras
 - High-end mapping cameras (UltraCam from Vexcel, DMC from Z/I)

Scanned Standard Aerial Images

- All standard aerial images scanned from film or paper prints

CAMERA CALIBRATION

Camera calibration information is essential in the orthorectification of air photos. The camera calibration information includes essential camera parameters, distortions and fiducial mark measurements.

Calibration Information Entry

- Focal Length
- Principal Point of Symmetry
- Radial Lens Distortion
- Decentering Distortion
- Photo Scale
- Earth Radius
- Fiducial marks from calibration report
- Chip size and y-scale factor

Fiducial Mark Collection

- Interactively selects fiducials from scanned images
- Links camera calibration fiducials with selected fiducials

GROUND CONTROL

The OrthoEngine Airphoto Models support imported GPS/INS data and existing triangulation solutions, as well as GCP and tie-point ground control.

Import GPS/IMU Data

Using the onboard Global Positioning System (GPS) and Inertial Measurement Unit (IMU), you can:

- Skip GCP and tie-point collection
- Import from any sensor system that uses omega, phi, and kappa
- Use alone or supplement with ground control points or tie points, or both
- Perform kappa rotations
- Manually edit GPS and IMU data

Import Existing Triangulation Solutions

Using existing triangulation solutions, you can:

- Skip GCP and tie-point collection
- Manually edit existing triangulation solutions

GCP Collection

GCPs can be collected manually or by using:

- A geocoded image
- Geocoded vectors
- A chip database
- A digitizing tablet
- An imported text file

Other features include:

- Stereo-GCP collection
- Conversion of GCPs to check points to exclude from model calculation
- Display of individual and overall RMS error for GCPs

Tie Point Collection

Tie points:

- Extend ground control over areas without GCPs
- Identify how images in a project relate to each other
- Ensure the best fit for all the images in the project
- Can be imported and exported
- Let you enter tie-point elevations manually or extract them from a DEM
- Show individual and overall RMS errors

Residual Report

Using residual reports, you can:

- Show GCP, check-point, tie-point, GPS/IMU and Stereo-GCP error information in one report
- Edit points and update bundle adjustments
- View in ground units, photo pixels, or photo microns

- Print the report to a file

Project Summary Information

Raw Image Summary Table

A summary of information about all of the images in your OrthoEngine project can be viewed in the Raw Image Summary Table window. This window provides information about the following:

- Total number of images in the project
- Total number of ground control points (GCPs), tie points (TPs), and check points (CPs)
- Image-specific information, including image ID, GCPs, TPs, CPs, root mean square (RMS) error, number of overlapping pairs connected by TPs, number of potential overlapping pairs that could be connected by TPs, and the percentage of all overlaps connected by TPs

The Raw Image Summary Table provides you with a dynamic view of your project, allowing you to better target your quality assurance efforts to achieve your desired project requirements.

Image-specific information is displayed in tabular format. The tabular contents can be sorted, making it easier for you to analyze the data in your project and identify areas on which to focus your quality assurance activities.

Project Overview

The Project Overview window displays the geocoded vector footprints or image centers for all images in your OrthoEngine project, and provides options for displaying ground control points (GCPs), check points (CPs), tie points (TPs), image IDs, and point IDs, for the selected image or images or for all images. This viewer helps you better assess your project using a graphical overview.

ORTHOECTIFICATION

Orthorectification:

- Lets you perform batch processes
- Utilizes a DEM for terrain correction
- Increases working cache for processing
- Increases sampling interval for faster processing
- Offers the following resampling methods:
 - Nearest Neighbor
 - Bilinear Interpolation
 - Cubic Convolution
 - 8-pt SinX/X
 - 16-pt Sin X/X
 - Average filter
 - Median filter
 - Gaussian filter
 - User-defined filter
- Clips the image size upon orthorectification
- Lets you set a processing start time

- Provides approximately one-third of a pixel accuracy for VIR satellite images, and approximately one pixel for radar images when quality ground-control coordinates are used.

MANUAL MOSAICKING

With manual mosaicking, you can:

- Define a mosaic area
- Collect cutlines manually by:
 - Importing and exporting cutlines
 - Blending seams using Blend Width
- Perform manual color balancing:
 - Based on samples identified in overlap between images
 - By using samples (match areas) to compute look-up tables (LUTs) to adjust new images to match an existing mosaic
 - By adjusting the dark end or light end
 - By importing and exporting LUTs for color balancing
- Mosaic unreferenced images

FUNCTIONS

With a license for the Airphoto Ortho Suite, the following functions are activated within the EASI and/or Modeler/Algorithm Librarian environments:

- APMODEL – calculates the mathematical model required for orthorectifying a set of images in an OrthoEngine project file
- CAMEXPORT - Export the camera calibration information from an OrthoEngine project file to an XML file.
- CAMIMPORT - Imports camera calibration parameters from an XML file into an OrthoEngine project file.
- EOEXPORT - export the exterior orientation data from an OrthoEngine project file into a text file.
- EOIMPORT - import the exterior orientation data into an OrthoEngine project file from a text file.

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