

PIX4Dmatic Quick Start Guide

Introduction

PIX4Dmatic is photogrammetry software designed to process unmanned aircraft system (UAS) imagery using Structure from Motion (SfM) to generate orthomosaics, 3D models, point clouds, and digital surface models. PIX4Dmatic is optimized for photogrammetric processing for large scale, corridor, and terrestrial projects. According to PIX4D, it is designed to handle and process more images and larger projects than its predecessor, PIX4DMapper.

As you work through any PIX4Dmatic exercise, please refer to the PIX4Dmatic Help Documentation for additional information. The help documentation can be found on the [PIX4D website](#), or by clicking the **Help** tab within the software interface.

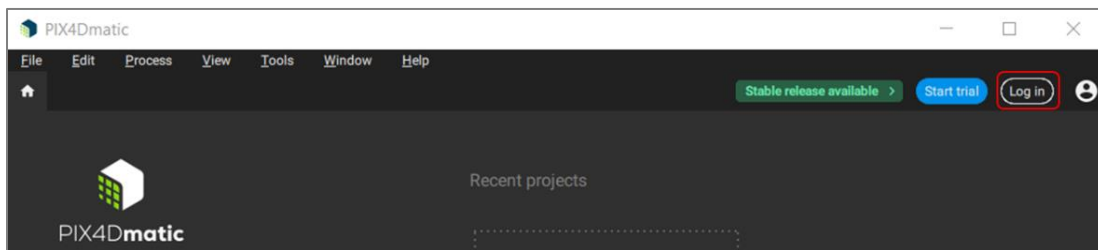
To install and activate PIX4Dmatic, please refer to the PIX4Dmatic Installation Guide available on the GTAC website at <https://apps.fs.usda.gov/gtac/software>. The software is available for download via the Forest Service Software Repository SharePoint site.

For a more detailed introduction to PIX4Dmatic, refer to PIX4Dmatic Exercise 1.

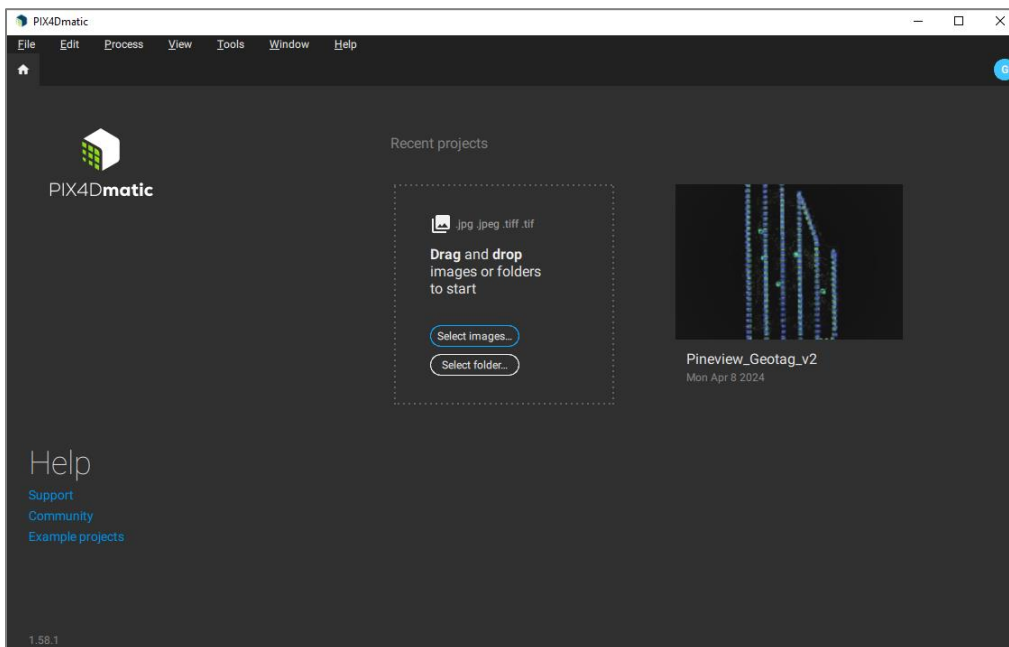
Part 1: Getting Started

a. Creating a new project

1. After successfully installing Pix4Dmatic, open it by navigating to your **Start Menu**, search for **PIX4Dmatic** and click on the application icon to launch.
2. Before creating your first project, log into the USFS PIX4D user account. Click the **Log in** button in the upper right corner of the window.



3. Enter the Forest Service PIX4D email: **sm.fs.gtac_uas@usda.gov**, and password: **gtac123**. Then click **Log in**.
4. Create a new project by dragging and dropping images or image folders, or by selecting the **Select Images** or **Select Folders** menu items, on the home screen (see following figure).

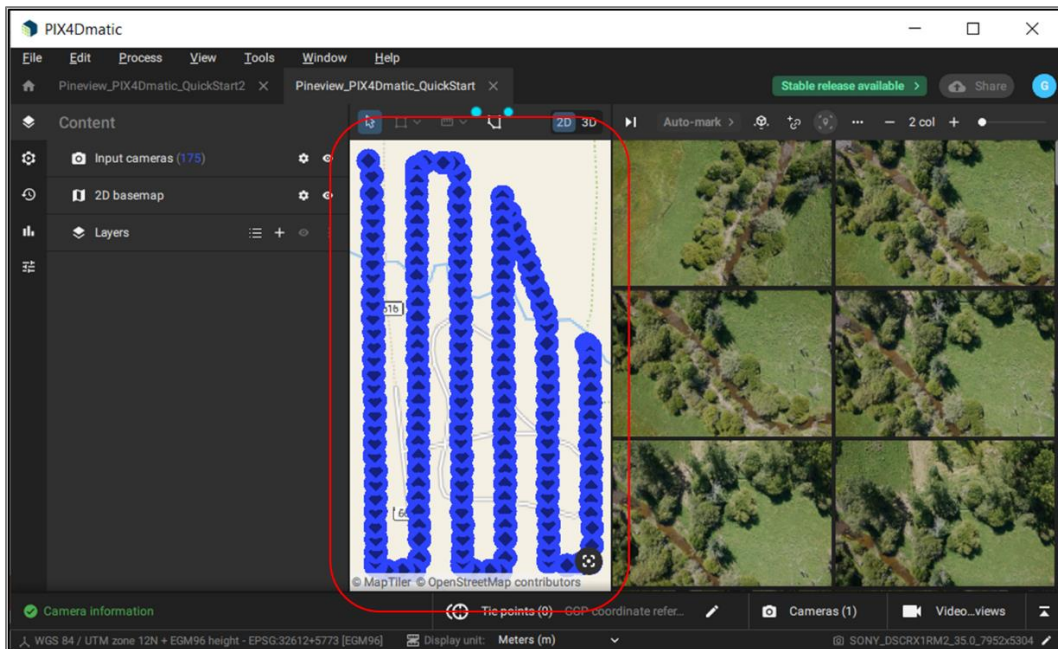


5. Name the project, select an appropriate path, and click **Start** to create the project and import images. Projects will be created in `C:/Users/user/Documents/PIX4Dmatic/` by default.
6. To add additional images, select **File/Import/Images**.

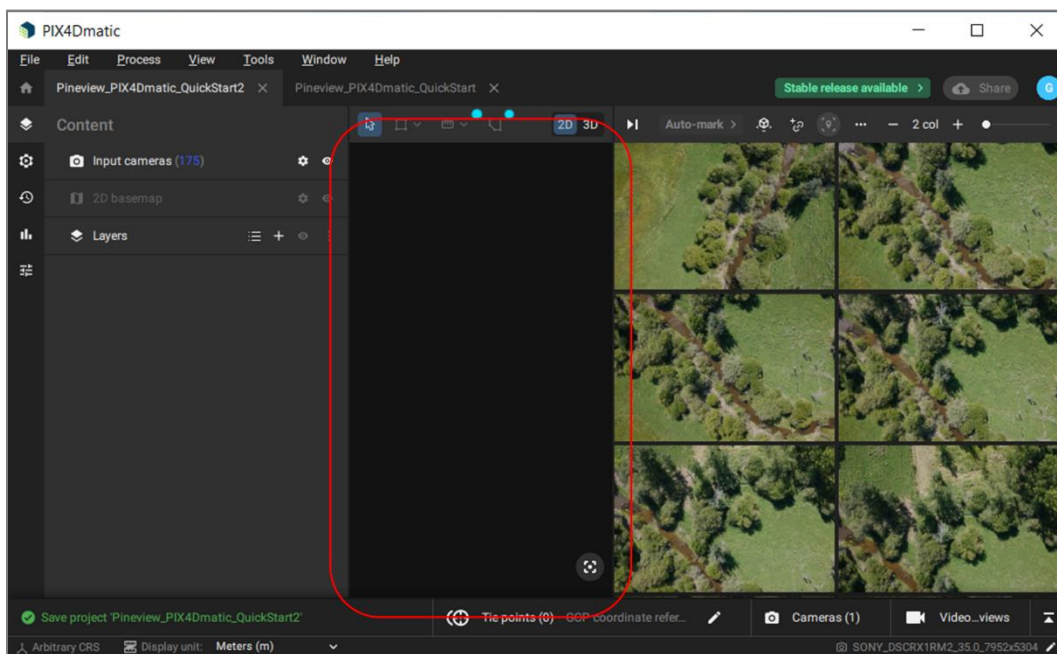
b. Image Geolocations and Coordinate Reference System

If the images have compatible position information in their EXIFs, the input image geolocations will be read by PIX4Dmatic during the import process. If the input image geolocations are not detected automatically, they must be imported manually from a .csv file.

1. If PIX4Dmatic detects compatible geolocations in the input image EXIFs, image positions will be displayed in the data viewer in the center of the window, and the default input image Coordinate Reference System (CRS) will be assigned (see following figure). If input images are geolocated, you can skip steps 2-4.



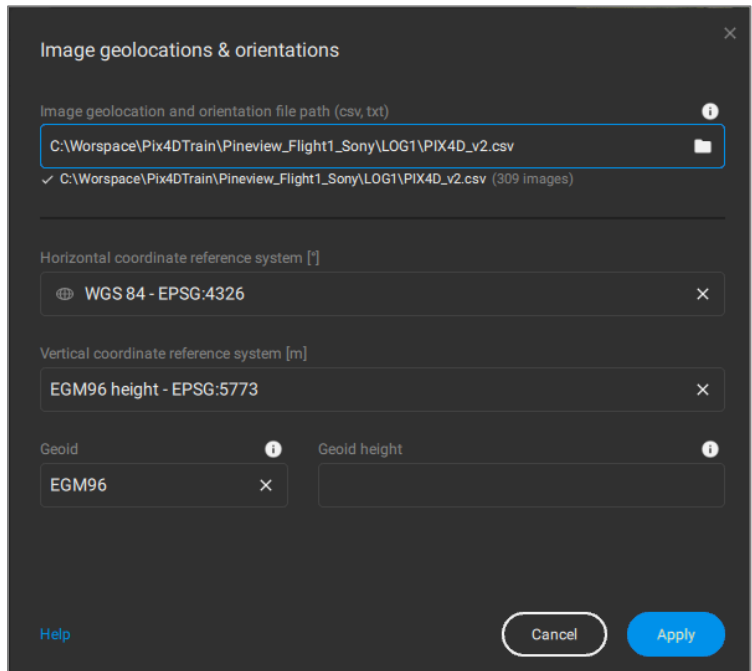
2. If PIX4Dmatic does not detect geolocation coordinates in the input image EXIFs during the import process, the data viewer in the center of the window will be empty (see following figure), and image geolocations must be imported.



3. To import image geolocations, select **File/Import/Image geolocations and orientations...** and select a .CSV file with image position information.

NOTE: Geolocation import file format specifications can be found on the [Pix4D Help Documentation website](#).

- Next, assign the CRS for the images. Set the **Horizontal coordinate reference system** as **WGS84 – EPSG:4326**, and the **Vertical coordinate reference system** as **EGM96 height – EPSG:5773** (see following figure).

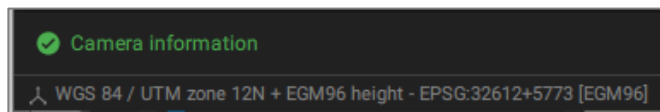


- Once the horizontal and vertical CRS has been set, click on **Apply**.

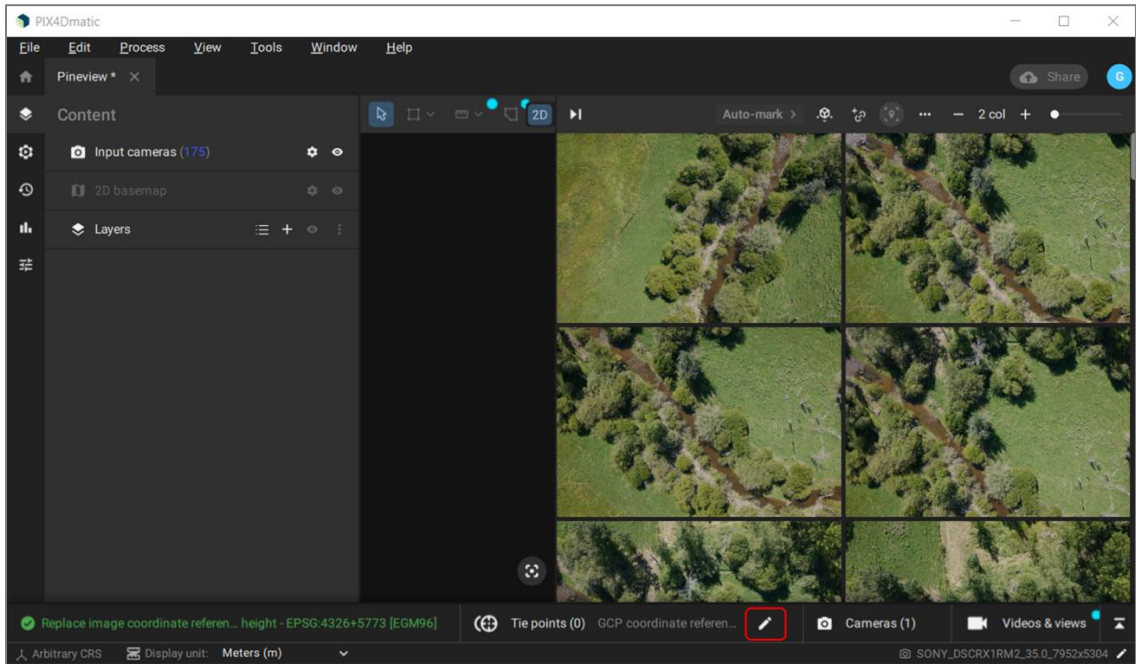
c. Project Coordinate Reference System

The project CRS is the coordinate system that will be used for the output image products. By default, the project CRS will be WGS 84 / UTM with appropriate zone assigned based on the input image geolocations. The project CRS can be set manually by assigning a CRS to the ground control points (GCPs). GCPs are optional, and for projects that do not use GCPs, the project/GCP CRS can still be manually assigned.

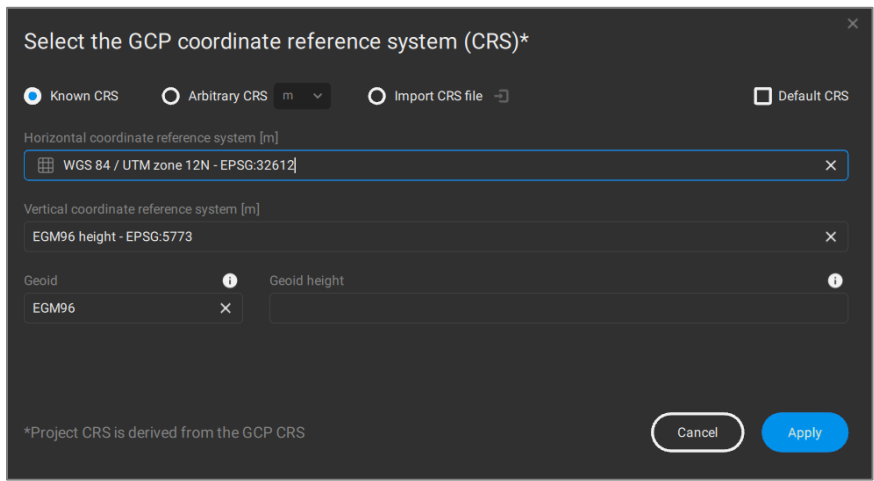
- If the project CRS has been automatically assigned, it will be shown in the lower left corner of the window. If the CSR is assigned, skip steps 2-4 (see following figure).



- To manually set the GCP and Project CRS, select the **pencil icon** on the Tie points GCP tab (see following figure).



3. The project/GCP CRS can be manually set to meet project requirements. The default PIX4Dmatic CRS is shown below (see following figure).



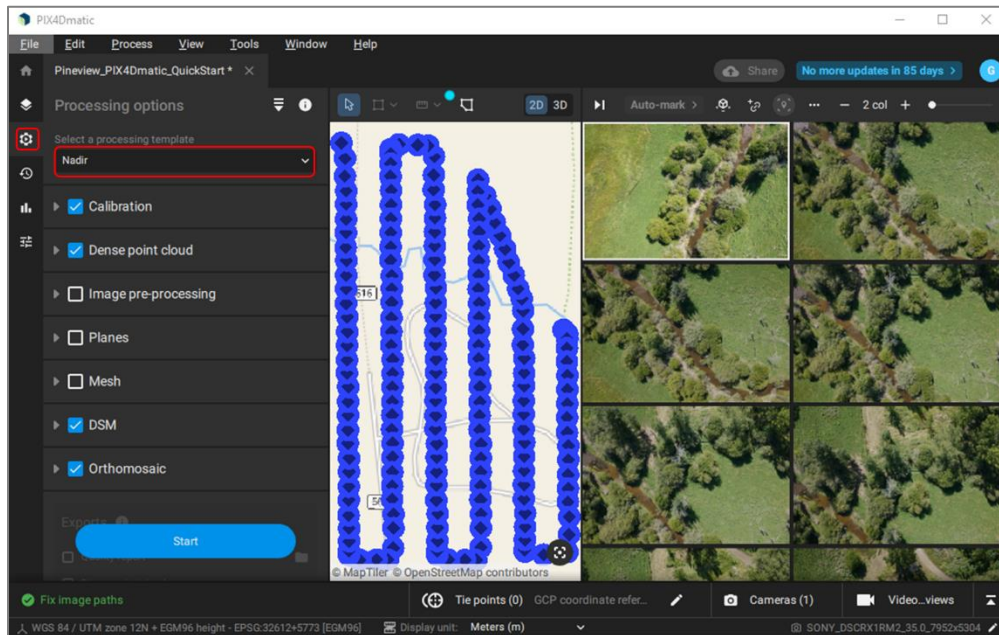
4. Once the project/GCP CRS has been set, click on **Apply**.

NOTE: If the GCP coordinate system is geographic, then the project CRS will default to UTM, and the project CRS cannot be manually set to another CRS.

Part 2: Processing

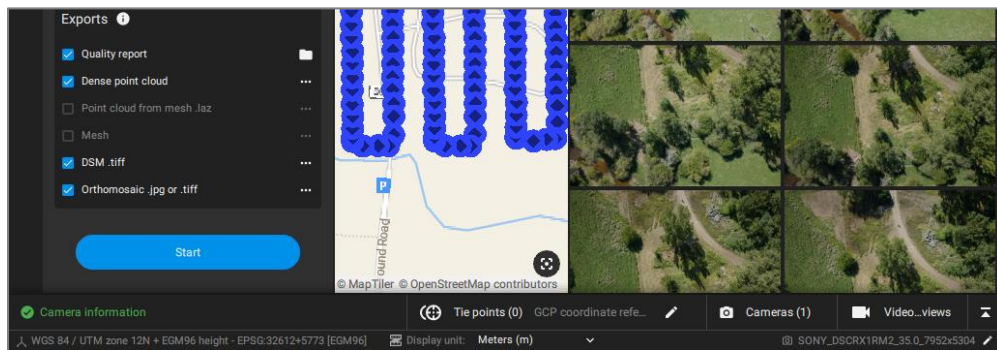
a. Select a Processing Template

1. Select the **Processing Options** tab on the ribbon on the left side of the window, and in the **Select a processing template** pulldown menu, select **Nadir**.
2. The main processing options are:
 - i. **Calibration** (required) – Aligns the images to one another using tie points and calibrates the camera to remove distortions.
 - ii. **Reoptimization** (optional) – This reruns the camera calibration but is only necessary if GCPs are added or modified.
 - iii. **Dense point cloud** (required) – Creates 3D points that represent reality from overlapping images. This forms the basis for all other products created in PIX4Dmatic.
 - iv. **Image pre-processing** (optional) – Computes information to enable the object selection tool.
 - v. **Planes** (optional) – Improves the mesh creation for developed environments where planar surfaces are common.
 - vi. **Mesh** (optional) – Triangulates between dense points to create a solid surface that represents the 3D environment. Meshes are more applicable for ground-based 3D models.
 - vii. **DSM** (required) – Creates a 2D raster representing the dense point cloud elevations. This is required for creating the orthomosaic.
 - viii. **Orthomosaic** (optional) – Projects the individual images onto the DSM to create an orthorectified mosaic. Any errors or gaps in the DSM will also be present on the orthomosaic.
3. Select the **Calibration, Dense point cloud, DSM, and Orthomosaic** processing steps (see following figure).



NOTE: Each processing step has many options for customizing the way imagery is processed. The Nadir processing template automatically selects PIX4D’s recommended settings for most aerial image projects. Depending on your input imagery and required outputs, you may opt for a different template. Changing any settings within a processing step will automatically change the processing template to Custom. Click the toggle next to each processing step to learn about the specific options available in each step.

- Once you are done selecting the processing settings, select the output products that you would like in the Exports box. For this example, we will select **Quality report**, **Dense point cloud**, **DSM.tiff**, and **Orthomosaic .jpg or .tiff**. The orthomosaic will be exported as a .JPG by default. Change the format to .TIFF by selecting ... on the Orthomosaic tab and changing the **Format** pulldown menu to **.tiff**. After selecting the exports, click **Start** to begin processing (see following figure).



NOTE: Image processing steps can be selected and run all at once, or one at a time, sequentially. Running processing steps individually can be helpful for testing settings and trouble-shooting issues within each step before moving on to the next. This can be particularly helpful with the steps that require significant processing resources and time, such as dense point cloud and DSM generation. The instructions outlined in this guide will initiate all the processing steps at once.

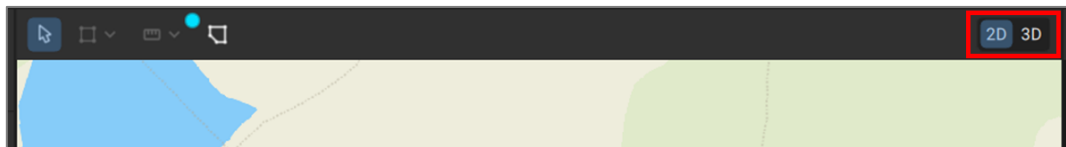
Part 3: Viewing and Finding Products

a. Saving your Project

- Click on **File** in the main menu.
- Select **Save**.

b. View products

- Toggle between the 2D and 3D views by clicking on the buttons above the main viewer.



- Click on the Contents button on the left side of the interface to open a list of viewable layers.



- i. The layers can be turned on and off by clicking the eye icon, and viewing settings can be changed by clicking the gear icon.



NOTE: While the 2D viewer is active, the following layers can be viewed: input cameras, calibrated cameras, DSM, and orthomosaic. To view the tie points, dense point cloud, and mesh, you'll need to toggle the main viewer to 3D.

c. Finding Exported Image Products

1. Exported products are created in the Exports directory within the project directory that you named when the project was created. To open the exports directory in Windows Explorer, click on **File**, and select **Open project export folder**.