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Training Manual for ESRI drone2map (v1.3) UAV image processing software

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NSF drone eelgrass mapping project along the west coast of North America

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1. Introduction

Drone2Map software package is developed by ESRI, which is designed for stitching and processing the UAV imagery. Drone2Map for ArcGIS streamlines the creation of professional imagery products from drone-captured still imagery for visualization and analysis in ArcGIS. Drone Support Use the drone and camera that meets your needs, and perform in-field image processing to verify the coverage and quality of your imagery collection.

1.1 Drone2Map products

- 1) Orthomosaic imagery
- 2) Digital Surface Models, DSM & DTM
- 3) Point clouds & 3D Meshes
- 4) Smart Inspection & 3D PDF

2. Drone2Map processing

Following processing instruction is based on the current drone2map version 1.3.2

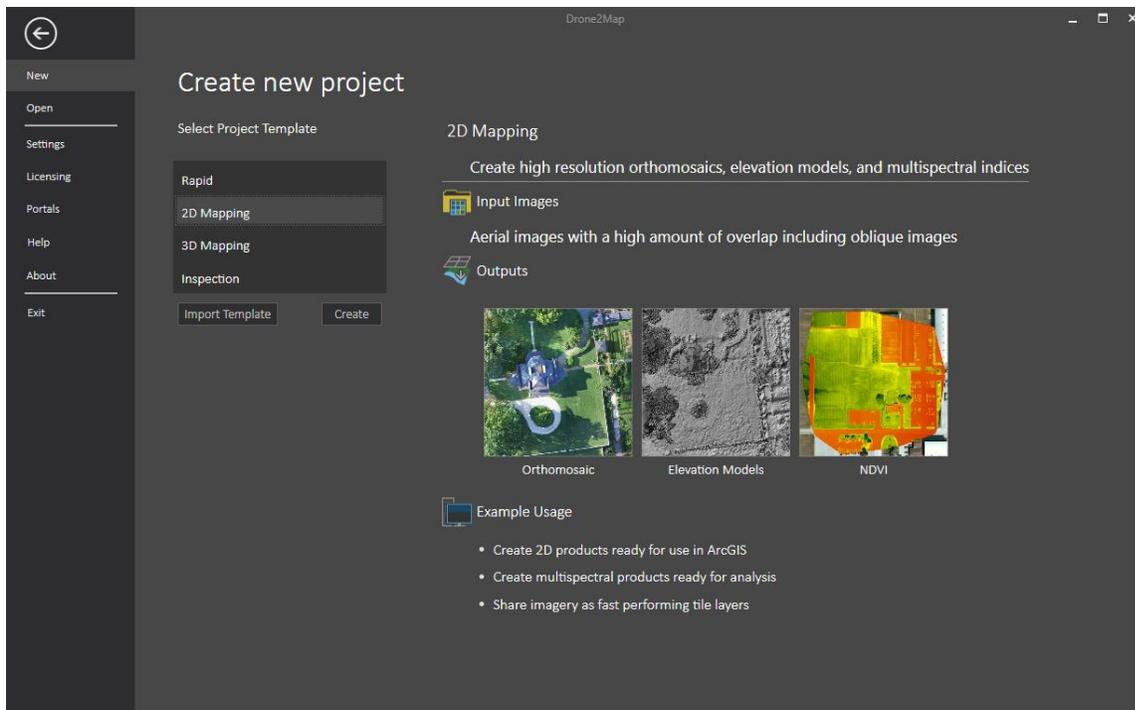
3.1 Create processing project

1. Open Drone2Map program, sign in your ArcGIS online account.

– It requires the Drone2map License activated under the ArcGIS account to use the software.

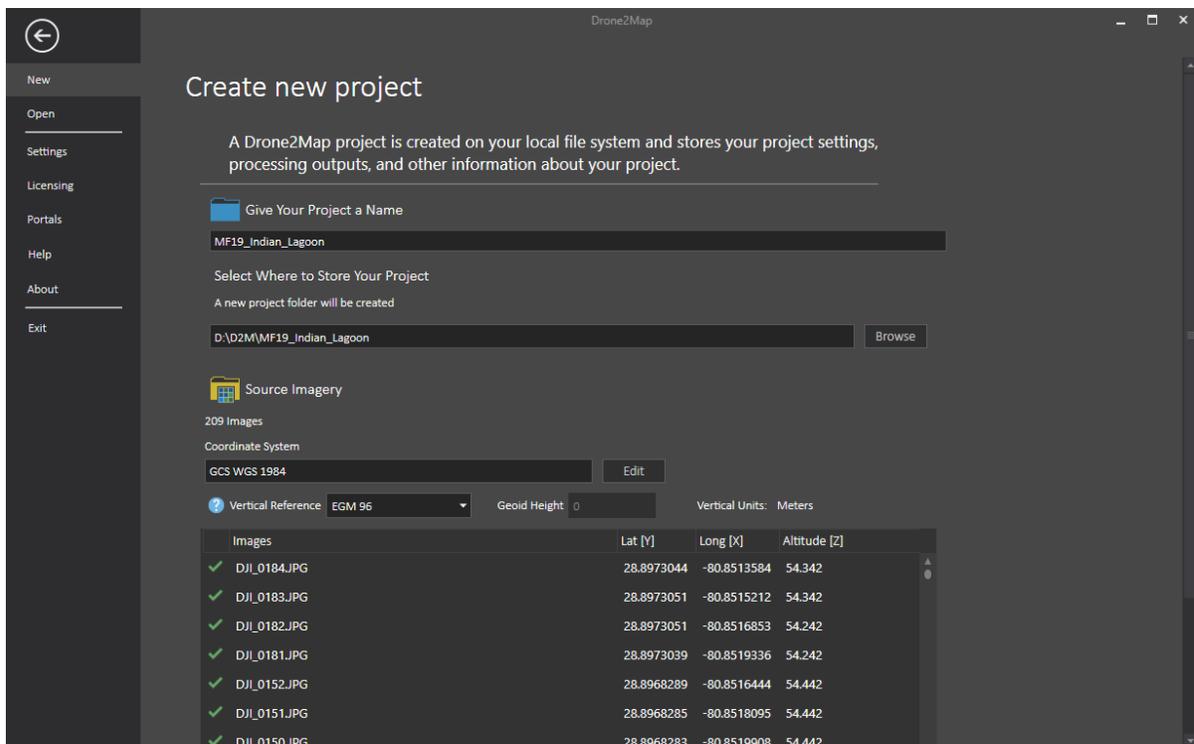
2. Create the new project, including:

- Rapid
 - Output Orthomosaic and Elevation models
- 2D Mapping
 - Output Orthomosaic, NDVI, and Elevation models
- 3D Mapping
 - Output 3D Textured Mesh, 3D PDF, 3D point cloud
- Inspection
 - Output Image Viewer and Annotate images



Normally, the 2D mapping is selected for the geographical analyses use.

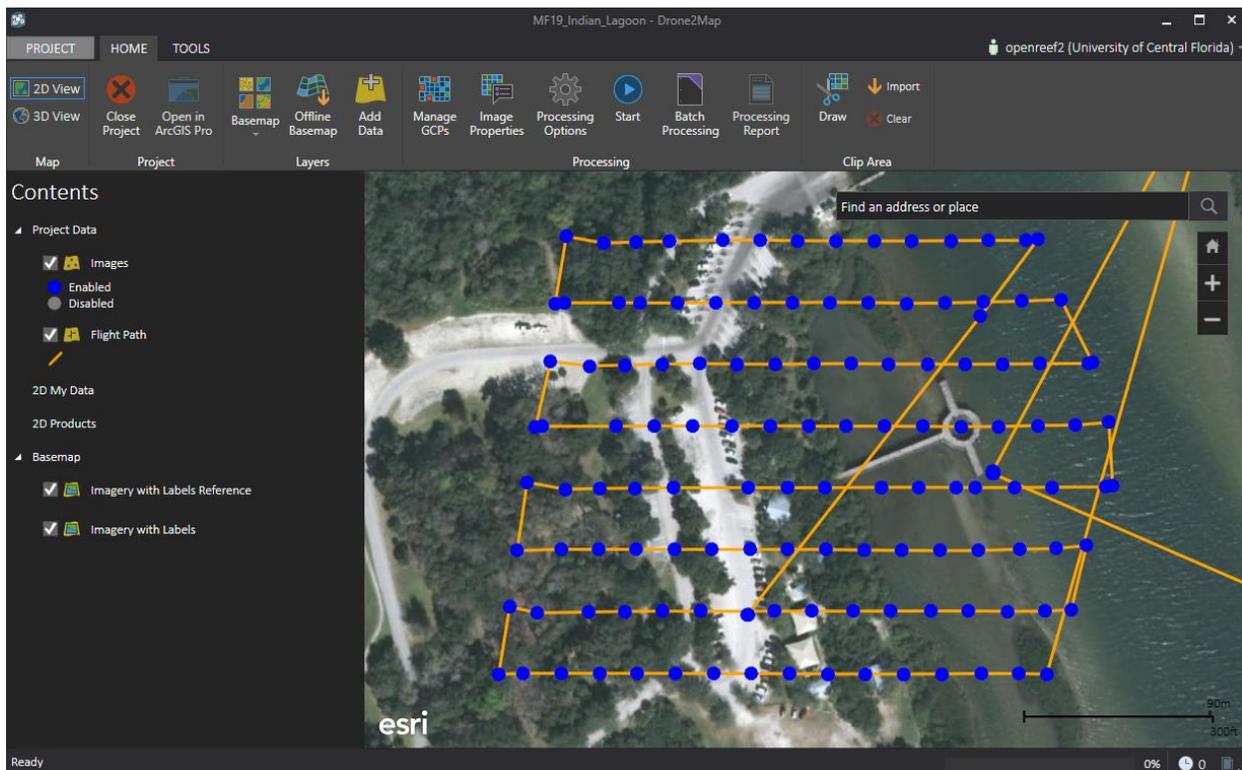
3. Create the new project,



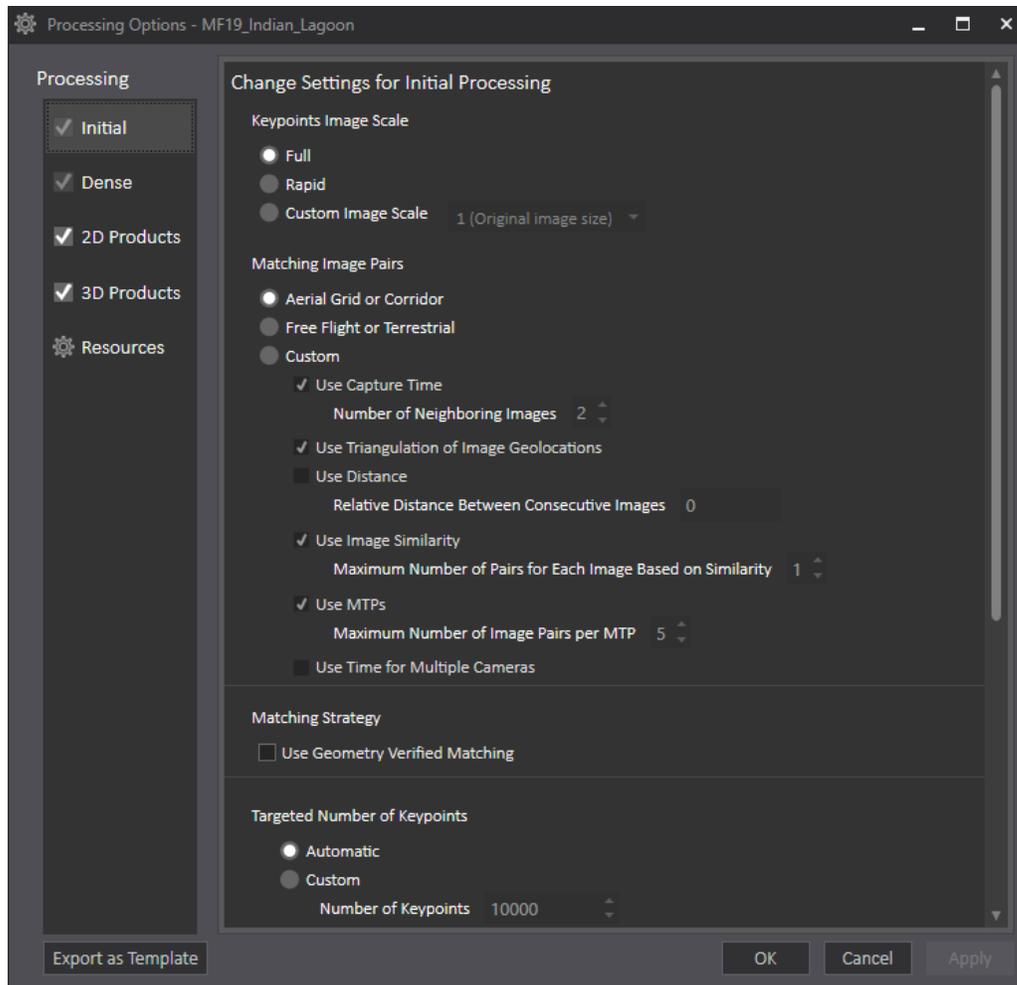
- Name the project after the mission flight and area that was flown (e.g. MF19_Indian_Lagoon).

- Browse a folder to store the project files, the folder path should not be too long. It is suggested to store the drone2map project file to be same folder with the source images.
- Select Coordinate system to assign one of the target geographical coordinate system. Normally the WGS 1984 could be selected as reference
- Click Add Images at the bottom and navigate to the folder that contain the source images of the current project. It is suggested to store images for the same site to a single folder, then use add folder to include all the image to the project.
- After added the images, check the number of images to see if all the images are included, and check geo-tag of the images has been successfully loaded to the project.
- Verify all the information are correct then proceed to next step.

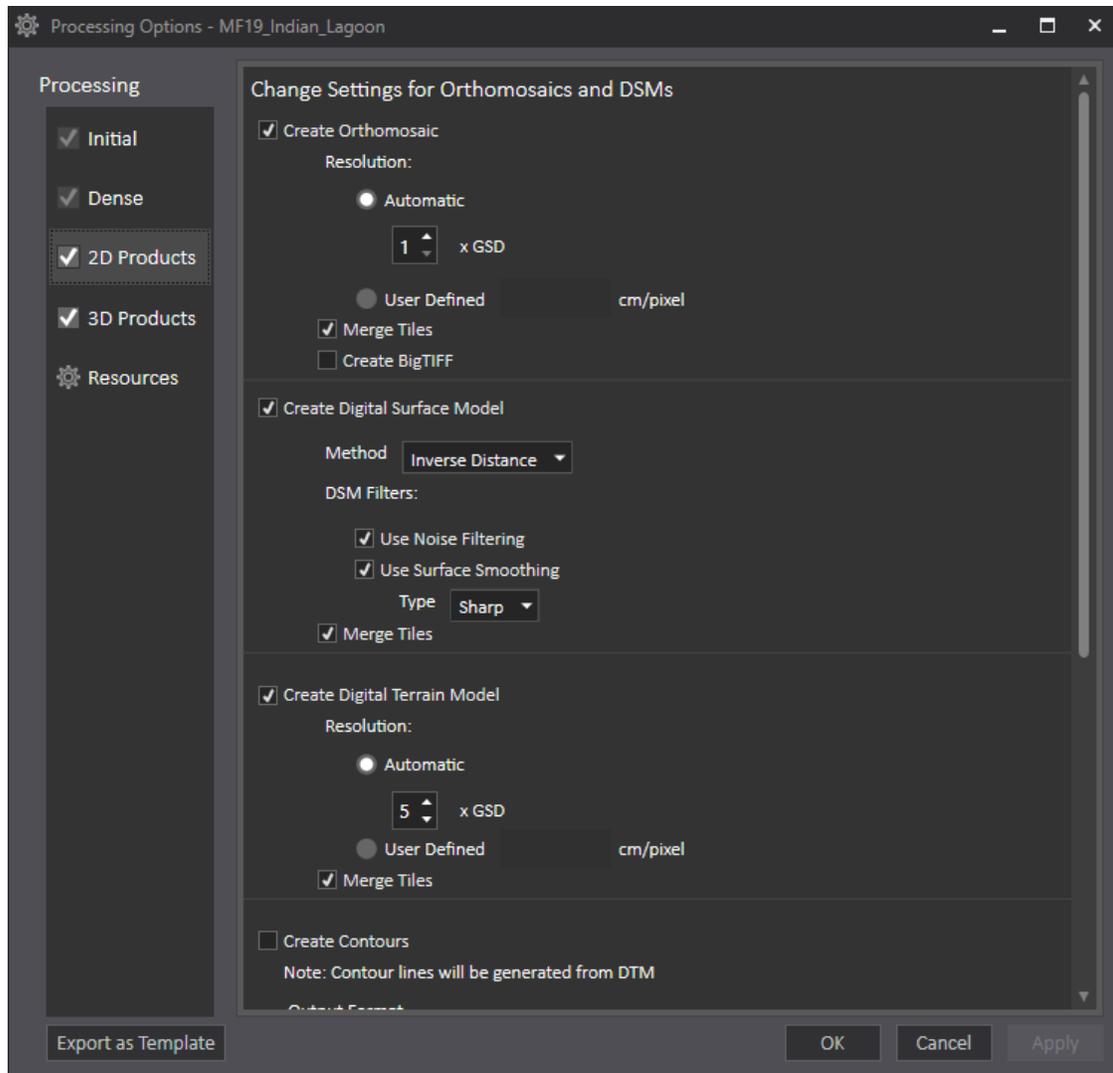
3.2 Processing images



1. Drone2map will display a world map and zoomed to your flight area. The orange lines represent the UAV flight lines and the blue dots represent the location an image was captured. You can click the blue dots to see each image.
 - Click Processing Options under the “Home” banner at the top.



- Uncheck the boxes next to 3D Products and Dense tabs on the left.
- Click the Initial tab.
- Select Full under “Keypoints Image Scale.”
- Select Aerial Grid or Corridor under “Matching Image Pairs.”
- Note: If the imagery was collected while manually flying the UAV and not using DJI GS Pro, select Free Flight or Terrestrial.
- Do not adjust any other settings under the Initial tab (see image below).
- Click the 2D Products tab.
- Check the box next to Create Orthomosaic.
- Enter “1” in the box next to xGSD.
- Check the box next to Create Digital Surface Model.
- Uncheck the box next to Create Digital Terrain Model.
- Do not adjust any other settings under the 2D Products tab (see image below).



- Click Apply then OK in the bottom-right.
- Next click Start under the “Home” banner at the top.
- The imagery will begin to process into an orthomosaic and digital surface model (DSM).
- Once processing is complete, both the orthomosaic and DSM will appear under “2D Products” on the left.

3.3 Uploading the products

All orthomosaics created by Open Reef are uploaded to ArcGIS Online for public consumption and for easier digitization later on. The following steps show how to upload your orthomosaic and DSM online.

- Click “Tools” above the top banner.
- Click Tile Layer in the top banner.

- Check the boxes next to DSM Hillshade and Orthomosaic under “Products.”
- Verify the name is of the mission flight and area that was processed (ex. MF19_Indian_lagoon).
- Select “15” to “21” as the zoom levels.
- Choose the folder you wish to save the files online under “Folder.”
- Enter any tags you wish to attach to the files.
- Note: Open Reef enters the following: “Citizen Science GIS, open reef, Belize, [image name].”
- Select Everyone (public) under “Share With.”
- Verify everything is correct and click OK (see image below).
- Your files will be available on ArcGIS Online once the upload is complete.

3. Data management

2.1 Coordinate systems in Drone2Map

- 1) Coordinate system of input data
 - Coordinate data recorded in image metadata (EXIF) tags
 - Default horizontal (XY) usually WGS 84 Longitude, Latitude (In Degrees)
 - Default vertical (Z) usually EGM 96 MSL height WGS reference Ellipsoid (In Meters)
- 2) Ground Control Coordinate System
 - Coordinate Reference in ground control points are defined
 - Usually different from image coordinate system
- 3) Output Coordinate system
 - Coordinate system in which Drone2Map output products are defined
 - If using ground control, Output will default to Ground Control coordinate system
 - If no ground control, default is UTM or user specify

2.2 Data management tips for Drone2Map

1. When processing images, split the images into clusters which is geographically closed to each other. That is, don't process multiple UAV sites in a single drone2map project.
2. Keep the project path shorter, for single folder name ensure it is less than 13 characters.
3. Use underscore “_” instead of space in the path name to avoid error.
4. Do not use the project and path name start with number.
5. Every time when finished processing one drone2map project. Close the drone2map software, and re-open it after a few seconds to let the memory released.