Last updated October 2022

propeller

Data Services Description

This document describes our standard data services as well as terminology, criteria, standards, and limitations for data accepted and produced by Propeller. Services not explicitly defined herein are subject to a separate scoping process and terms of service.

Product Specifications

Quick Pack Comparison

Pack Type	Credit Pack	Unlimited Pack - 2,000 photo limit	Unlimited Pack - 4,000 photo limit	Unlimited Pack - 5,000 photo limit	BYOD Pack
Credits	Usually 15, 30, 55 or 110	Unlimited (fair usage applies)	Unlimited (fair usage applies)	Unlimited (fair usage applies)	Usually 15, 30, 55 or 110
Drones	Unlimited	1 (more can be purchased)	1 (more can be purchased)	1 (more can be purchased)	-
Photos per Credit	1,000 regardless of camera resolution	-	-	-	-
Max Photos per Upload	10,000 photos up to 210 GP	2,000 up to 210 GP	4,000 up to 210 GP	5,000 up to 217 GP	-
GCPs per Credit	40	-		-	-
Max GCPs per Upload	400	80	80	80	-
Check-points	Unlimited (fair usage up to 2,400 applies)	Unlimited (fair usage up to 2,400 applies)	Unlimited (fair usage up to 2,400 applies)	Unlimited (fair usage up to 2,400 applies)	-
Pre-processed Data per Credit	4GP	-	-	-	4GP
Max Pre-processed Data per Upload	40GP	-	-	-	40GP
Point Cloud	100M points	-	-	-	100M points
Max Point Cloud	1B points	300M points	300M points	300M points	1B points
Number of Sites	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Number of standard users	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Number of	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited

view-only users					

All Pack Type Details

- Each image:
  - Must be at least 8 megapixels.
  - Must be geotagged.
  - Must have a filename with fewer than 255 characters.
  - Should have less than 30mm of motion blur, otherwise, the effectiveness of stitching images is reduced leading to low accuracy in the final model.
  - Must have an acceptable aspect ratio and ISO for your camera's specifications.
- Each upload:
  - Must be one contiguous area. This is to avoid excessively long processing times and ensure accuracy in the resulting 3D model.
  - Must have at least 10 images with the same aspect ratio.

Credit Pack Details

- Additional Credits will be charged for:
  - Each additional 1,000 images over this limit OR
  - Each additional 40 GCPs over this limit

Unlimited Pack Details

- If you attempt to upload a dataset that is more than 2,000 images but your limit is set to 2,000 images, you can:
  - Use composite surveys.
  - Increase the limit for one survey by purchasing a one-time increase through the platform.
  - Upgrade to a higher image limit pack.
- Propeller's systems automatically restrict your uploads to the single drone device you have registered to the license. Certain packs restrict usage to DJI Phantom 4 RTK, WingtraOne or other supported drones with <30MP Camera, or WingtraOne or other supported drones with >30MP Camera. If you're unsure of your purchase, reach out to your account manager.
- Replacing your drone:
  - If you attempt to upload with a drone that is not registered to your license, you will be restricted to three uploads with that drone.
  - If you replace your drone or drone's camera device, you will need to contact Propeller support to update your license.
  - As your fleet grows, talk to your account manager about additional drone options.

"Bring Your Own Data" Pack Details

- A pre-processed credit is defined as an output from your photogrammetry processing solution or other

survey data sources in GeoTIFF format.
- The site must be in a projected system and the upload must match site CRS. Pre-processed data in WGS84 GeoTIFF cannot be updated into published or local sites. However, if you have existing WGS84 GeoTIFF assets and need to import this historical data into the platform, please reach out to our Sales Engineers so that we can assist you with the transition process.

Requirements
- One digital elevation model (DEM) and/or one orthophoto GeoTIFF file. Make sure your GeoTIFF files have unique names if you are uploading more than one to your portal and your orthomosaic should be 4 bands RGB+Alpha (instead of 5 bands).
- DEM should have a 32-bit floating-point sampling. An integer sampling creates a stepped elevation phenomenon across the model, making it unreliable.
- 8 bit color channels

Pre-Processed Credit Sizes
- Standard Pre-Processed Credit Size: 4,000 megapixels, referring to the resolution of the GeoTIFF files uploaded
    - For clarity, this would include GeoTIFFs with dimensions of just over 63,000 x 63,000 pixels height and width; or 40,000 by 100,000, or 10,000 by 400,000.
    - You can upload a matching orthophoto (colored RGBA) image and a DEM (greyscale) image together; the limit applies to the larger file of the pair.
    - Pixels are counted regardless of their transparency.
- Additional Pre-Processed Credits will be charged for:
    - Each additional 4,000 megapixels or part thereof
- Maximum Size Limit: 40,000 megapixels (10 Standard Pre-Processed Credits would be charged)

What Other Pre-Processed Data Can Be Uploaded?

Preprocessed Point Clouds
- LAS or LAZ (zipped LAS) format in the site coordinate system.
- Every 100,000,000 points counts as a single Dataset Credit.
- No individual Credit Pack upload can exceed 1,000,000,000 points.
- No individual Unlimited Pack upload can exceed 300,000,000 points.

Design Surfaces and Spatial Overlays
- Design surfaces (Georeferenced PDF, DXF, TTM, IFC, KML, KMZ or LandXML (CgPoints and Surfaces only))
    - Maximum file size is 500MB and 300 MB for IFC files.
    - 3DFACE or MESH surface layers containing more than 1,000,000 faces will not be displayed and cannot be used for measurement purposes.
- Linework (KML, KMZ, DXF)
    - For linework, files less than 2MB display better in Propeller.
    - Keep individual file sizes below 20MB.
- Georeferenced elevation models (DEM GeoTIFF)

File Storage
- Unreferenced image files (such as PNG or PDF)
- Unlimited total storage available per portal

Expiration and Data Retention

Dataset Credit Expiration:

- At the end of the term determined in their contract, customers will lose access to the platform unless they have renewed their subscription.
- Unused dataset credits, including oversized surveys purchased within the platform, will expire and no longer be usable at the end of the term.
- Dataset credits do not roll over into the next term.
- Dataset credits cannot be exchanged for refund or discount.

Platform Data Retention

- As a platform user, you can delete data that you no longer need or is no longer relevant to your project. Once deleted, the data is irrecoverable.
- If you let your platform license expire, your data will be deleted permanently after 14 days, unless you renew your license before then or purchase paid hosting. After 14 days, your data is irrecoverable, even if you do eventually renew.
- Click to read more about our Data Retention Policy.

AeroPoint Survey Data Retention

- If you let your AeroPoint subscription expire, you will still be able to access and download all AeroPoint surveys that were processed before the subscription expired.

Supported UAS and Coordinate Systems

Drones and Camera Systems

Recommended Drones: Recommended drones have specifically been selected for optimization with Propeller PPK, and will provide the best user experience.

- DJI Phantom 4 RTK
- DJI Mavic 3 Enterprise
- WingtraOne Gen I
- WingtraOne Gen II
- DJI M300 with Zenmuse P1
- Quantum Trinity F90+

Supported Drones: Supported drones are compatible with the Propeller Platform, but may have limited functionality and will not support the complete PPK solution.

- DJI Phantom 4 Pro
- DJI Phantom 4 Pro V2
- DJI Zenmuse X7 - Matrice 210RTK V2
- SenseFly S.O.D.A - Ebee
- SenseFly Aeria X - Ebee

See all supported drones here.

Drone Support

- Full support and training on data capture and upload (DJI P4RTK, DJI M300 with Zenmuse P1, DJI M3E, DJI P4P).
- Support for data upload only (Wingtra, Quantum).

Propeller PPK

- For non-software customers, Propeller PPK requires a subscription to annual corrections.
- When uploading imagery captured with drones that are compatible for use with Propeller PPK, each upload must include the following file types:
    - DJI: BIN and MRK.
    - Wingtra: SBF and JSON. Include only the original FlightName WingtraOne.SBF and FlightName.JSON files. Geotagging within WingtraHub will result in additional SBF and JSON files, do not upload these to Propeller.
    - Quantum: UBX and PROP.
- Each flight must be completely within the duration of the AeroPoint survey.

User Provided RINEX Data

RINEX data can be self-supplied for processing. This is the list of all compatible antenna types.

AeroPoint Surveys

- AeroPoint surveys can be processed using the RINEX Upload Method, which uses the user supplied data to process AeroPoint coordinates.

PPK Surveys

- While the Propeller Corrections Network is the simplest way to process a PPK survey, you can process PPK data with RINEX data.

In both of these cases, the accuracy of the final model will depend on the accuracy of the supplied RINEX file.

Coordinate Reference Systems (CRS)

Supported CRS

- Many ellipsoid and geoid datums, and many published projected systems.
- Most JXL and GC3 local calibrations.

Propeller Corrections Network (PCN) allows users to have their AeroPoints processed and corrected without the need for local ground control markings to be made.

To use PCN on your site,

- the site needs to be within range of a PCN base station (check in this map), and
- that station needs to be providing data in a compatible CRS.

To definitively find out whether your desired setup is supported, please contact us.

Data Processing

Propeller Processing Methods

Each survey dataset uploaded to Propeller is expertly transformed into a 3D site model by our powerful processing engine, using our proprietary algorithms and photogrammetric tools.

We support the processing of survey datasets:

- With or without GCPs (AeroPoints and/or custom GCPs).
- Submitted with standard accuracy or high accuracy (PPK or RTK) geotags.
- Using the Propeller PPK solution.

Propeller PPK
Photos are processed with high accuracy geotags, and the data can be processed with / without customer GCPs and AeroPoints

- PPK geotags can be processed using the following methods
    - Propeller Correction Network (PCN)
    - Known Point (Global Site Survey Benchmark)
    - Known Point (Local Site Survey Benchmark)
    - User supplied RINEX
- For more details on Propeller PPK, please refer to this article.

Please note:

1. For the Known Point methods, if the PCN is available, it may be used automatically to help increase the quality of the geotags.

Non-Propeller PPK
Photos can be standard accuracy or other high accuracy (PPK or RTK) geotags. The data can be processed with / without customer GCPs and / or AeroPoints

- AeroPoints can be processed using the following methods
    - Propeller Correction Network (PCN)
    - Known Point (Global Site Survey Benchmark)
    - Known Point (Local Site Survey Benchmark)
    - User supplied RINEX
    - Unreferenced
        - Note: Unreferenced uses coarse GNSS locations and only provides relative accuracy
- Customer GCPs
- Without GCPs

Downsampling

Downsampling is a method of processing that uses fewer of the source photos' pixels than there are. This method reduces processing times even for very large uploads.

When building the dense cloud, we almost always downsample by 1:4. Our testing has shown that this reliably provides accurate results when best practices are followed. For example, if the captured GSD was 2 cm/pixel, the dense cloud GSD will be 8 cm/pixel.

Here are our thresholds for downsampling when building the dense cloud.

- They are based on the total number of pixels in the source photos, measured in gigapixels (GP).
- They have been designed to rarely be used. Between 1 Jan 2021 and 17 May 2021, less than 2% of surveys exceed any of these thresholds.

	Thresholds for each pack type		Results	
Downsampling when an upload exceeds the relevant threshold	Credit packs	Unlimited - up to 5,000 images	DEM GSD compared to what was captured	Point cloud density compared to what's possible to reconstruct
1:8	60 GP	90 GP	8 x	1/64 x
1:16	120 GP	180 GP	16 x	1/256 x

Assuming that the survey needs to cover the area that has been captured, to remain underneath these thresholds to avoid heavy downsampling, you can

- fly higher with less overlap, and/or
- subdivide the survey into smaller areas for processing, then merge together afterwards.

Standard Processing & Delivery Timeframe

Standard surveys that follow best practices come back within 24 hours, but it's generally less than 12 hours.

AeroPoint surveys that follow best practices generally come back within 24 hours.

Upload Size	Up to 2,000 images	2,001 to 5,000 images	5001+ photos	Fixed-Wing Datasets (Wingtra, etc.)
Processing and Delivery Timeframe	24 hours	48 hours	Custom	48 hours

Factors that Extend Processing Time or Delay Delivery

1. If your dataset is larger than 2,000 images or has over 40 ground control points.
2. Your data requires manual fixes due to non-ideal or inefficient collection methods.
3. If your AeroPoints corrections data is delayed. Processing can only begin once the corrections data is available. For urgent jobs, use the "Known Point Method".
4. User input error.

5. GCP Identification errors.
6. Corrupt images.
7. When clients don't respond to our questions..
8. Non-recommended drones need time to finalize QA.

Factors that Lead to Processing Rejection

Sometimes datasets uploaded into Propeller will be deemed “unusable” after our Data Success Team has completed a thorough investigation. In these scenarios, if we are unable to create a model from the data, we reserve the right to reject the uploaded survey after communicating with the customer.

Some examples of when we will need to reject a dataset include, but are not limited to:

- PPK surveys with majority low-fix geotags or low quality AeroPoints due to AeroPoint placement and/or short flights. Short Flights are flights less than 10 minutes for a PPK survey using an AeroPoint 1. If using an AeroPoint 2, a short flight is defined as a flight less than 2 minutes if using the Known Point Method for AeroPoint corrections, and a flight less than 10 minutes if using any other method for AeroPoint corrections.
- Severe motion blur.
- Extremely under / overexposed images.
- Images are all water or tall trees/dense vegetation.
- Insufficient photo overlap. We recommend a minimum of 70% at a standard flight height of 80-120 meters AGL but 75%-80% is optimal where there is a lot of change in topography.

You’ll be notified when your dataset has finished processing and is ready to view in the Platform.

We will also reach out if:

- We have questions about the data that must be answered before processing can continue
- There are any delays in processing
- Changes were made to any of the options selected during upload (ex. Excluding GCPs that were not captured in any of the photos)
- We find any issues during our Quality Assurance & Control Process that prevents us from releasing the survey.

If we do not receive a response from someone within the organization in a reasonable timeframe (typically 2 weeks from when the dataset was uploaded) and after multiple attempts to make contact, we may reject the survey and send a notification email as mentioned above.

Reprocessing or Refiltering Requests

Propeller is able to reprocess or refilter datasets on request. This may incur additional credit usage on credit-based packs.

Quality Assurance & Control

Quality and Control Improvement

Each ground-controlled dataset uploaded to Propeller is expertly transformed into a 3D site model by our powerful processing engine, using our proprietary algorithms and photogrammetric tools.

Along the way, each survey is also handled by our highly experienced Geospatial Specialists to ensure the highest quality outcome. Some of our most common quality-improvement tasks include:

- Offsetting moderately incorrect geotags from multiple flights for standard accuracy surveys.
- Assessing and selectively removing low-quality images that may degrade the site model.
- Validating the accuracy of geotags.
- Omitting ground control points that degrade the site model.
- Validating and adjusting image alignment in the site model.
- Attempting imagery alignment with adjusted camera calibration.

Processing Report

We generate a Processing Report for every survey dataset processed by Propeller, which indicates how well your provided data matches the surface we generate for you. It includes:

- Ground control summary
- Ground control RMS errors
- Camera locations
- DEM surface checkpoints
- Filter analysis
- Camera quality analysis

This report can be viewed, shared and printed from the Propeller portal.

Ensuring Consistency

When a site has been surveyed more than once, we compare overlapping survey results to ensure consistency between survey products. If both surveys have ground control, we evaluate whether they line up horizontally and vertically within standard error tolerances. We also check for any shifts or misalignment between images, and for unexpected surface differences (not caused by vegetation or earthworks).

Deliverables

Standard Data Outputs Generated by Propeller

Propeller's photogrammetry processing services turn your drone images into actionable 3D data, delivered directly to your portal in the Propeller Platform. There, you can visualize and interact with your 3D surveys to interrogate, measure, and track your worksite with our specialized tools.

We generate industry-standard spatial data products that will seamlessly integrate with your other systems including Trimble Business Center, Civil 3D, Autodesk, and more.

From your Propeller portal, the following standard output deliverables are available for download in the site's

coordinate system, unless stated otherwise. Source imagery can also be made available for download upon request.

3D Site Model (non georeferenced)

- DXF in 3 resolutions (100k, 250k and maximum achievable faces)
- TTM (Trimble Stratus only)
- 3D textured model (OBJ format)

Terrain

- DSM GeoTiff
- DTM GeoTiff (for datasets that were processed using any of our filter options)
- Contours
    - DXF (non georeferenced)
        - 1 m intervals for sites set up with meters
        - 1 ft and 2 ft for sites set up with feet or US feet

Orthophoto

- GeoTIFF in WGS 84
- GeoTIFF
- JFIF/JPEG full resolution (zipped with world files)
- JFIF/JPEG lower resolution (zipped with world files)

Point Cloud

- LAZ in WGS 84
- LAZ
- LAZ (Reduced point count)

Custom Data Outputs Created by User in Platform

From your Propeller portal, you can also create and export some custom data products. These include:

- DXF Outline
- KML
- DXF Surface (triangles)
- DXF Contours (1 unit interval)
- Point Cloud (customizable point count in LAS, LAZ or CSV format)
- TTM Surface (Trimble Stratus).

We make sure that each file format is tested to verify that they are compatible and performing as they would in your portal. You can read more about the third party software that support our exports here.

Composite Datasets Created by User in Platform

From your Propeller portal, you can create composites of up to 25 partial survey or pre-processed datasets once they have completed processing.

The composite will become available as a new dataset, for which all measurement and analysis tools will be available, with the exclusion of terrain cleanups. However, terrain cleanups from its partial are carried over to the composite. Whole-site deliverables in the FILES modal are not available for composite surveys, including orthophotos or point cloud exports.

Crew

Crew provides an easy way to share interactive maps with design, earthworks quantities, and location information between the office and the field. Crew includes:

- 2D site overview
- Map details
- Design file overlays
- Real-time GPS location

Customer Support

Customer Support

Propeller offers multiple avenues for customer support

1. In-Platform Support
    a. 24/7 Live Chat Support
    b. Knowledge Base
    c. PropellerU video training library
2. Customer Success Support
    a. Software license customers have access to a Customer Success Engineer during local business hours.
3. Hardware Support
    a. Software license customers have access to Hardware Support for assistance with hardware needs via phone, email and chat during local business hours. This includes:
        i. Airspace Unlocks.
        ii. Hardware troubleshooting for the DJI Phantom 4 RTK, M300 with P1 and Mavic 3 Enterprise.
        iii. AeroPoints assistance.
    b. Customers who don't have a software license only have access to Hardware Support via email or chat for assistance with hardware needs. This includes:
        i. AeroPoints assistance.
        ii. PPK upgrade assistance.
    c. Customers using a WingtraOne drone will need to engage with both Wingtra's support team and Propeller's support team, depending on the issue. More information about who to go to for support when using a WingtraOne drone can be found here.
    d. Customers using a Quantum Trinity F90+ drone will need to engage with both Quantum's Support team and Propeller's Support team, depending on the issue. More information about who to go to for support when using a Quantum drone can be found here.
4. Non-English support limitations

a. The Propeller platform is available in French, German, Japanese and Spanish.
b. Propeller is only able to provide chat, email or phone support in English. Local dealers may be able to provide support in local languages. Contact your dealer for more information.

Data We Do Not Accept

Propeller does not currently accept or provide support for:

- Thermal and Multispectral Imagery
- Preprocessed Tiled 3D Models
- Unreferenced image files for spatial overlay
- Unprocessed LiDAR point clouds
- Shapefiles or geodatabase files

Data Services We Do Not Provide

To ensure that we can maintain quick high-quality service to all of our customers, Propeller does not engage in extensively manual data preparation, such as:

- Processing datasets requiring excessive manual tie points or where 50% of photos cannot be aligned. Examples include, but are not limited to sites covered extensively by: *water, tree canopies or thick vegetation, corrugated roofs, reflective or highly uniform surfaces, close-up inspection of repetitive surfaces & trusses.*
- Creating geotags for images without human-readable log files.
- Manually adjusting brightness and exposure of images.
- Manually aligning imagery with unacceptably poor overlap *(less than 60%).*
- Manual acquisition or manipulation of CORS correction data for surveys older than one month.
- Removing sky from source imagery.

Privacy and Security

You can learn more about Propeller's privacy and security policies here.