



An aerial, top-down view of a grey quadcopter drone hovering over a dense, dark green forest. The drone is positioned in the center of the frame, with its four propellers visible. The forest canopy is thick and textured, with some lighter green patches. The overall lighting is dim, suggesting a low-altitude or overcast sky.

HOW DRONES AND AI OFFER A SUSTAINABLE LEAP IN FORESTRY EFFICIENCY

DJI DRONE SOLUTION IN FORESTRY



FORESTRY RESOURCE

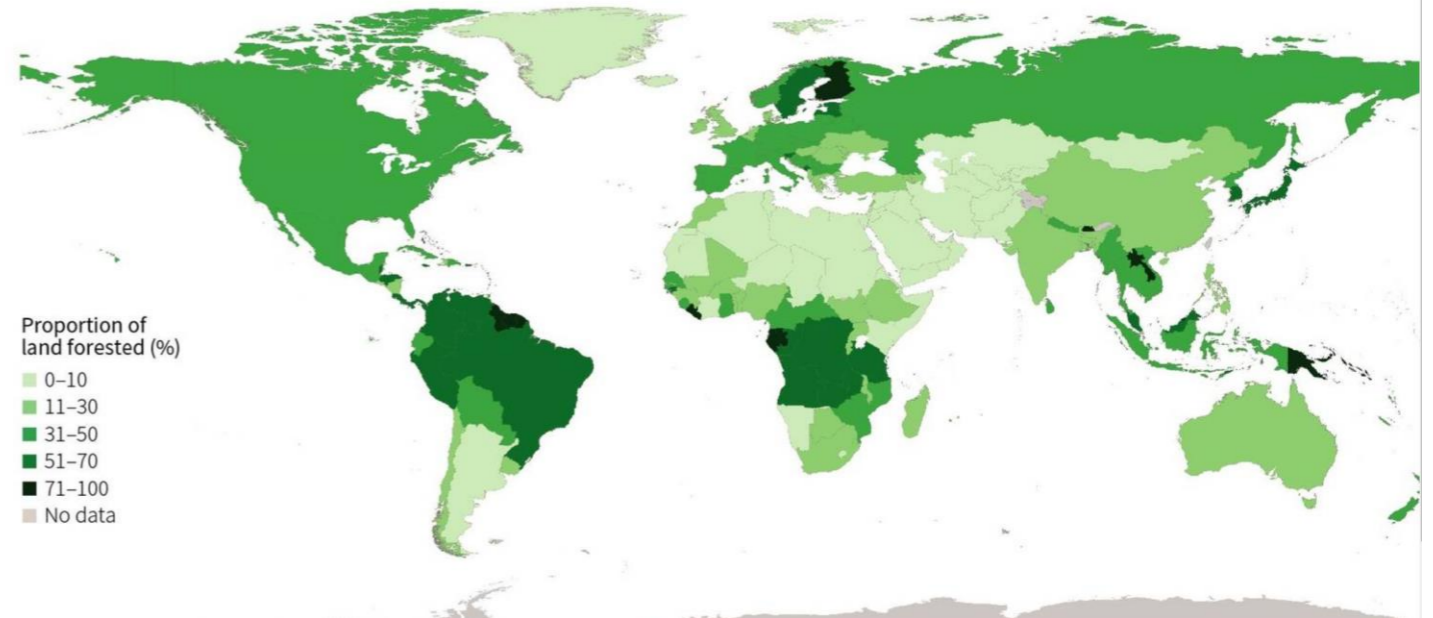
The world has a total forest area of 4.06 billion hectares (ha), which is 31 percent of the total land area.

More than half (54 percent) of the world's forests is in only five countries – the Russian Federation, Brazil, Canada, the United States of America and China.

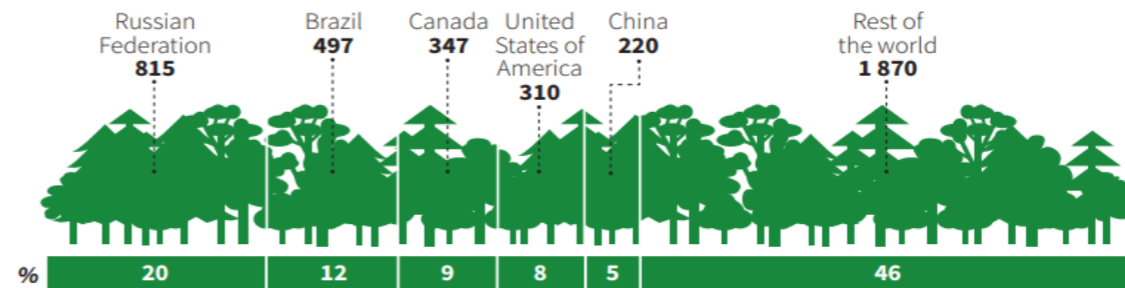
Major tasks in forestry area:

- Keep sustainable development forestry management
- Keep species diversity, reduce carbon emissions
- Prevent illegal logging and natural disasters such as fires

Forest area as a percentage of total land area, 2020



Top five countries for forest area, 2020 (million ha)



<https://www.fao.org/forest-resources-assessment/en/>

DRONE SOLUTION USED IN FORESTRY SCENARIO



Digital Model

Orth map, 3D models, point cloud models



Fire protection, disease protection, animal protection



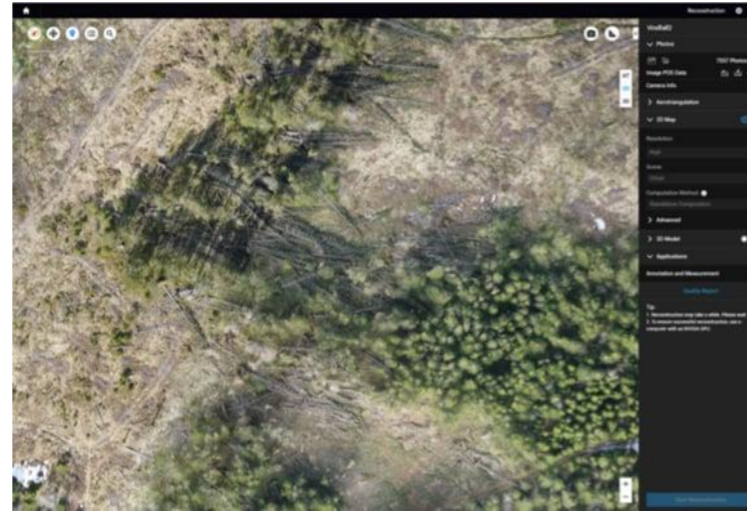
Remote, Repeat

Automatedly monitor key area , make annotation.

DRONE SOLUTION USED IN FORESTRY SCENARIO



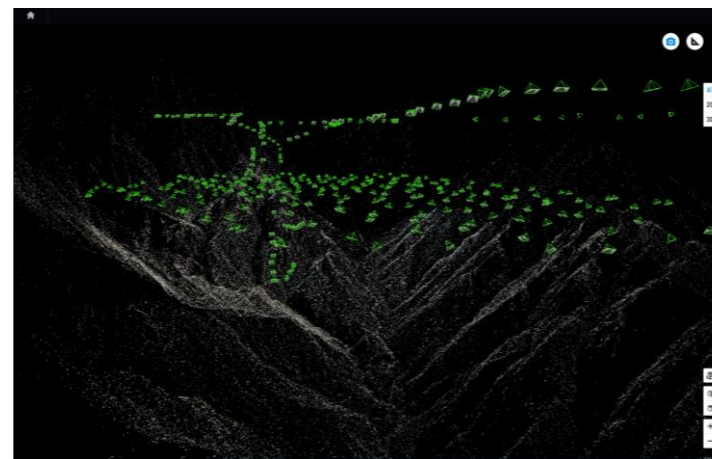
Photogrammetry



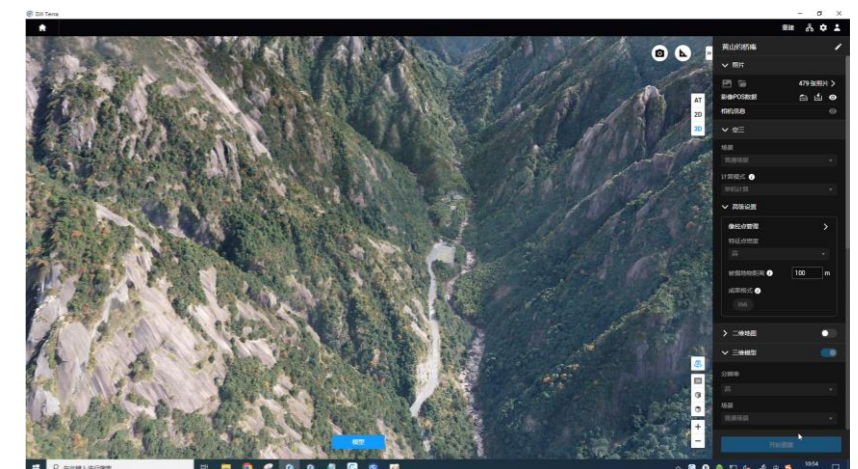
Terra 2D modeling



Forest resource management and assessment



Terra 3D modeling

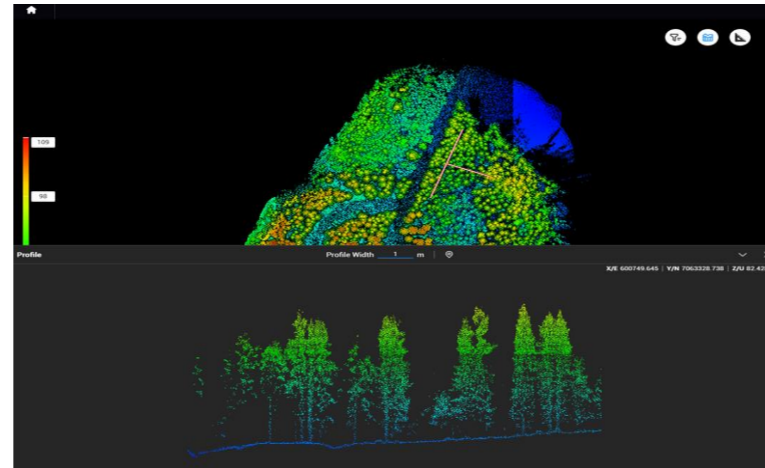


High risky area assessment

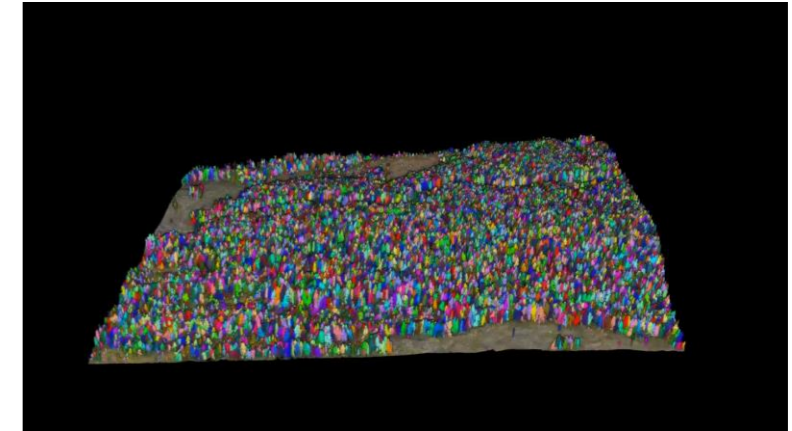
DRONE SOLUTION USED IN FORESTRY SCENARIO



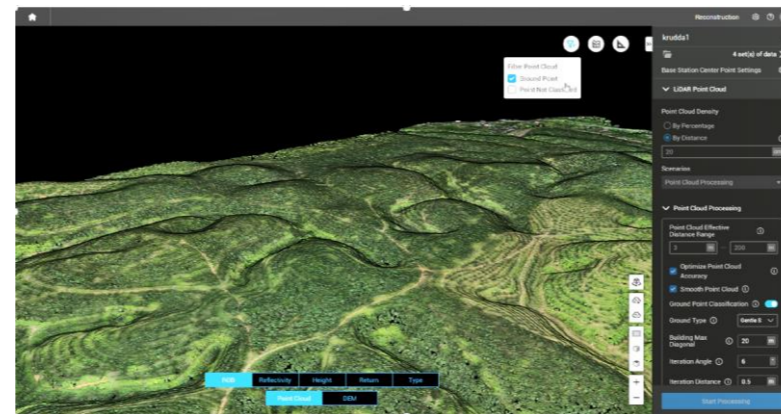
LiDAR



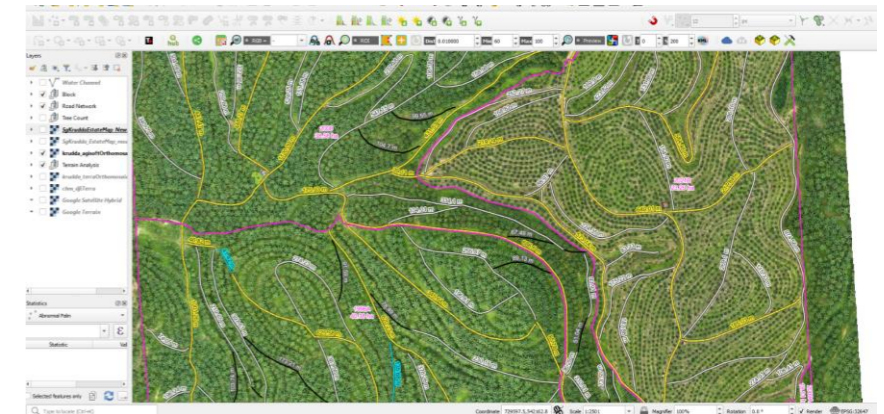
DJI Terra Cross Section measurement



Classification(3rd party)

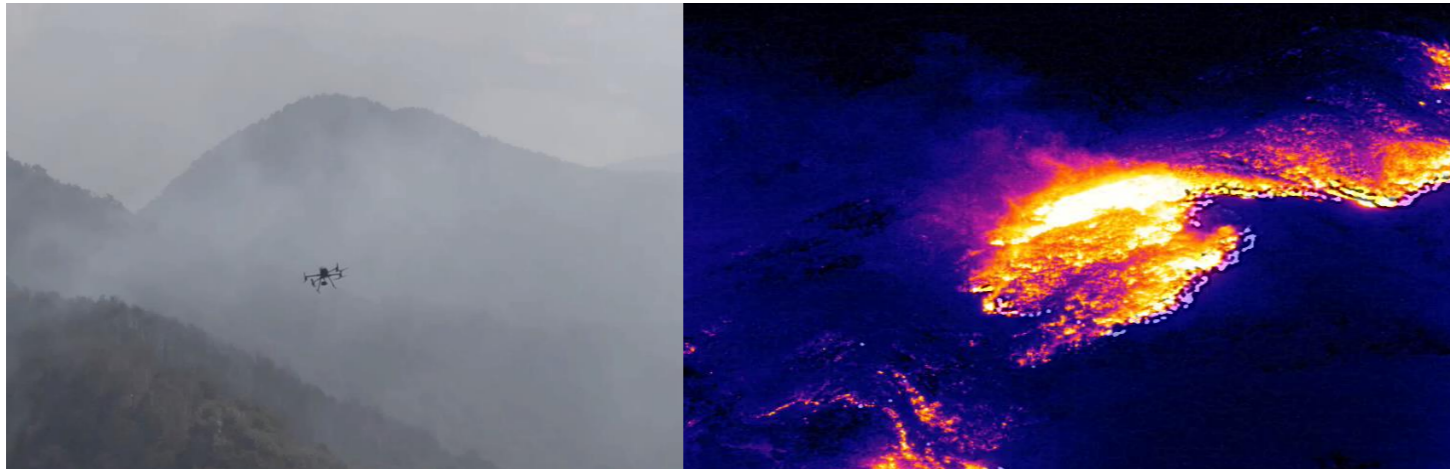


DJI Terra DEM and contour line

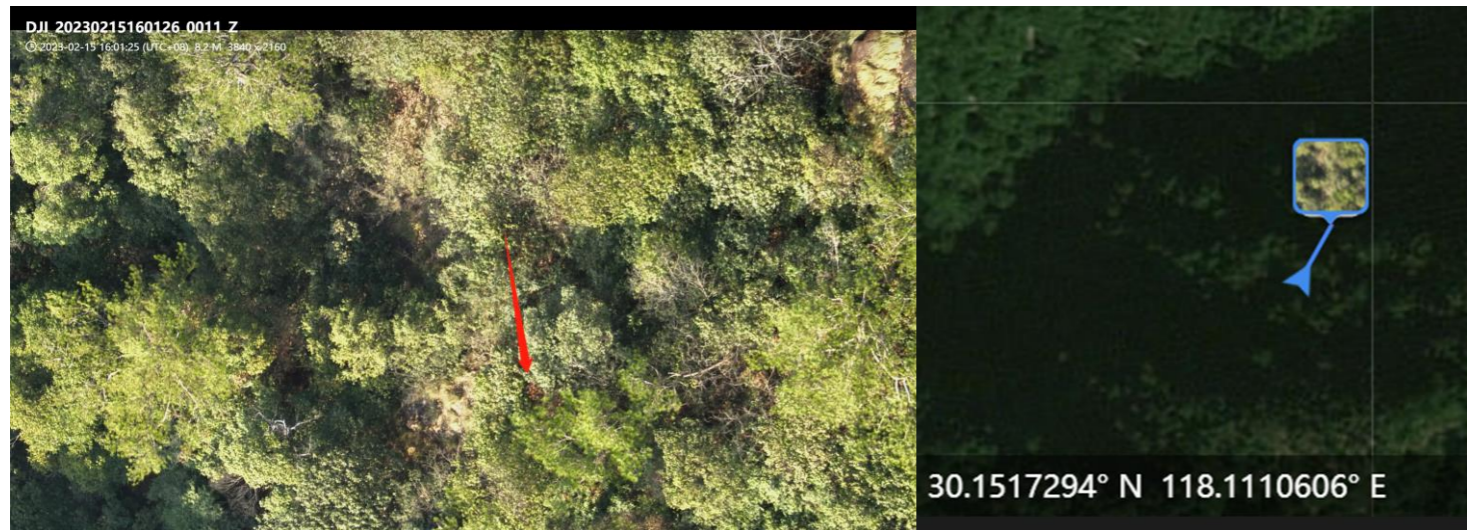
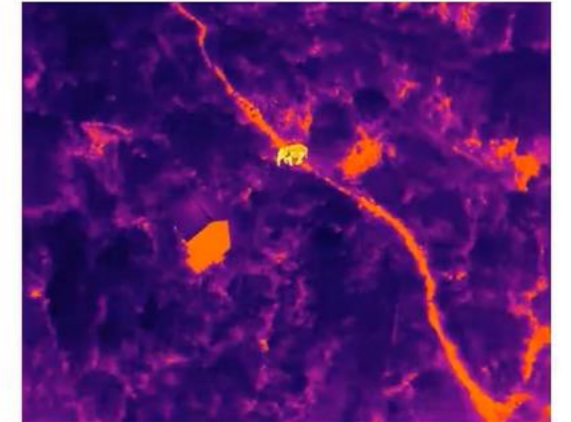
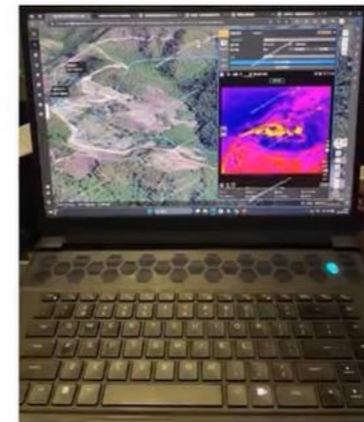


Ground Road Planning (3rd party)

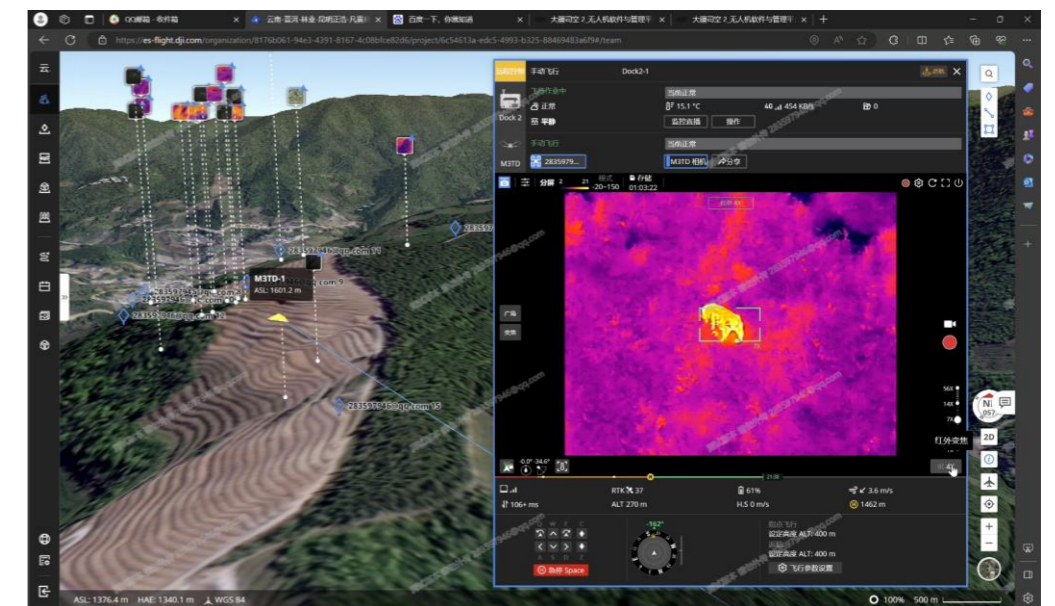
DRONE SOLUTION USED IN FORESTRY SCENARIO




Visual and thermal view of a forest fire



Mark detail location of disease area on Flight hub2 platform



Use dock to track elephant movement



HOW DRONES AND AI OFFER A SUSTAINABLE LEAP IN FORESTRY EFFICIENCY

Atilla Haugen  BIODRONE



WHO IS BIODRONE

A drone service provider based in Norway

8 years experience in UAS operations
Specializes in forestry and agriculture

Operates under EASA regulations

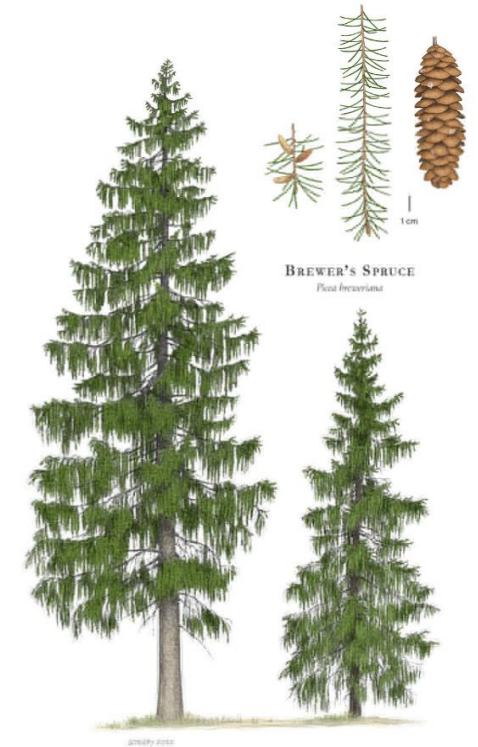
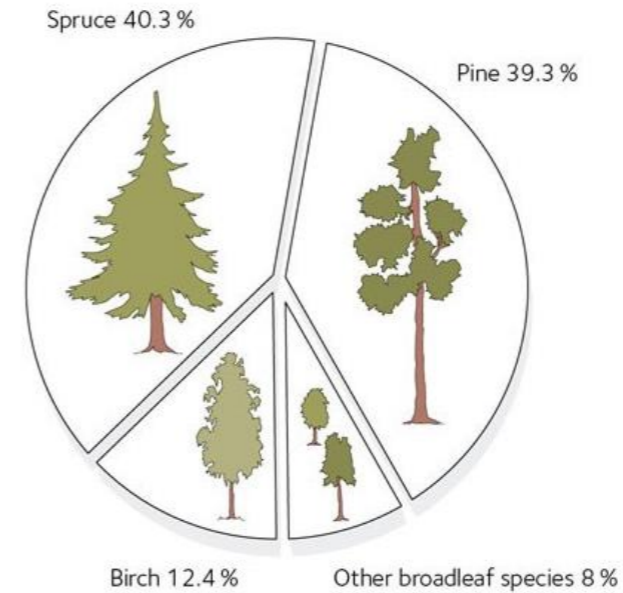
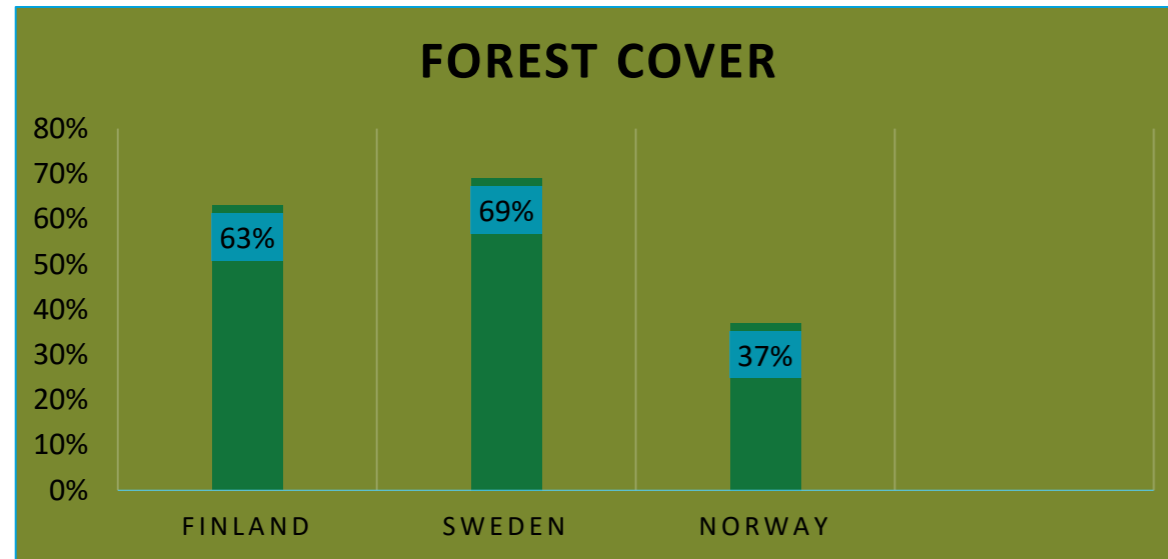
Has special permits like BVLOS
Operates the Agras series drones
High altitude operations up to 1500ft

A Solution Developer on a web-based AI platform for forestry analysis

Made in cooperation with the forestry industry in
Scandinavia and America



NORDIC FORESTRY TODAY



Key Tree Species are Spruce, Pine, Birch, and Fir



\$6 B

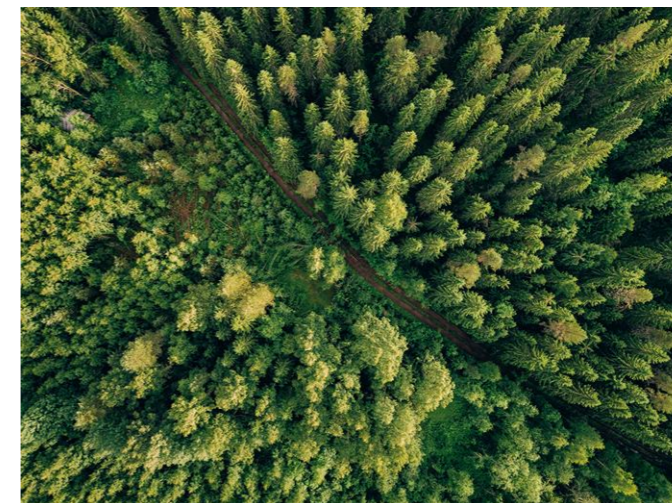


\$8.2 B



\$50 B

Industry turnover in \$Billion



BBENEFIT TO USE DRONES IN FORESTRY?



Timesaving

A job that typically takes an entire day can be done in less than one hour using a drone



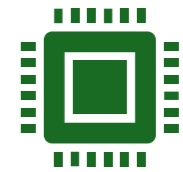
Safer Mapping

Mapping with drones is safer than manual survey in cases where the terrain is steep or with the presence of storm damage



Sustainability

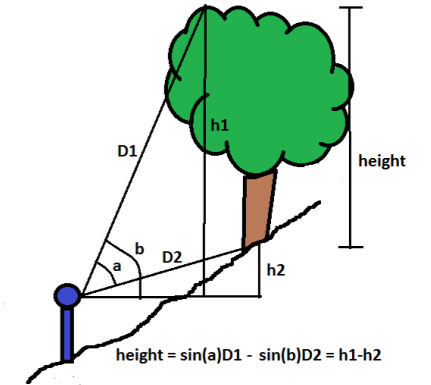
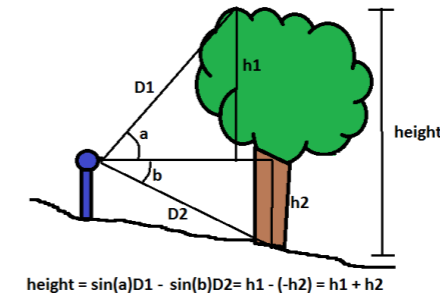
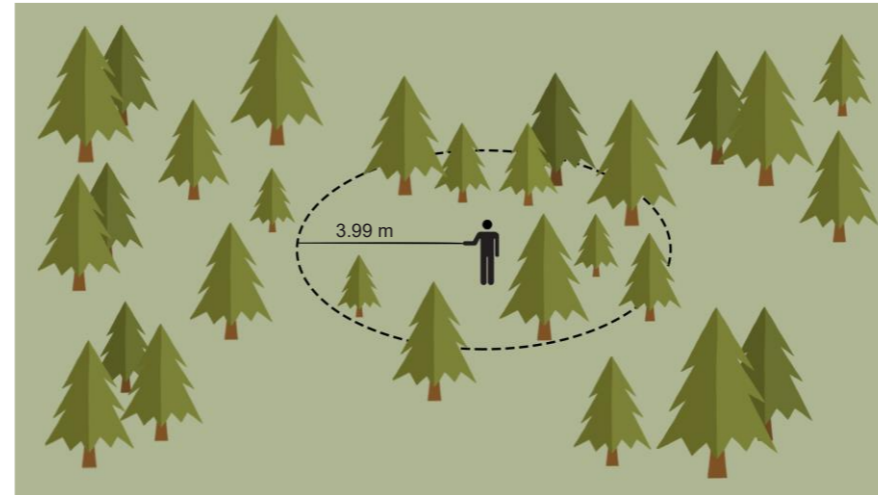
Mapping with drones is more sustainable than using helicopters due to lower emissions and less disturbance to animal life



Better Resolution

Drones provide better resolution and therefore more valuable data from the forest

TRADITIONAL MEASUREMENT METHODS



Mapping forest is often done by walking in the stands and taking statistical samples spread across.



Case studies: Mapping saplings / Restocking inventory

Foresters can map entire fields in a fraction of the time using drones.

Mapping GSD: **sub-centimeter**

Time: 16 minutes to map 10 hectares with M3E at 30m AGL

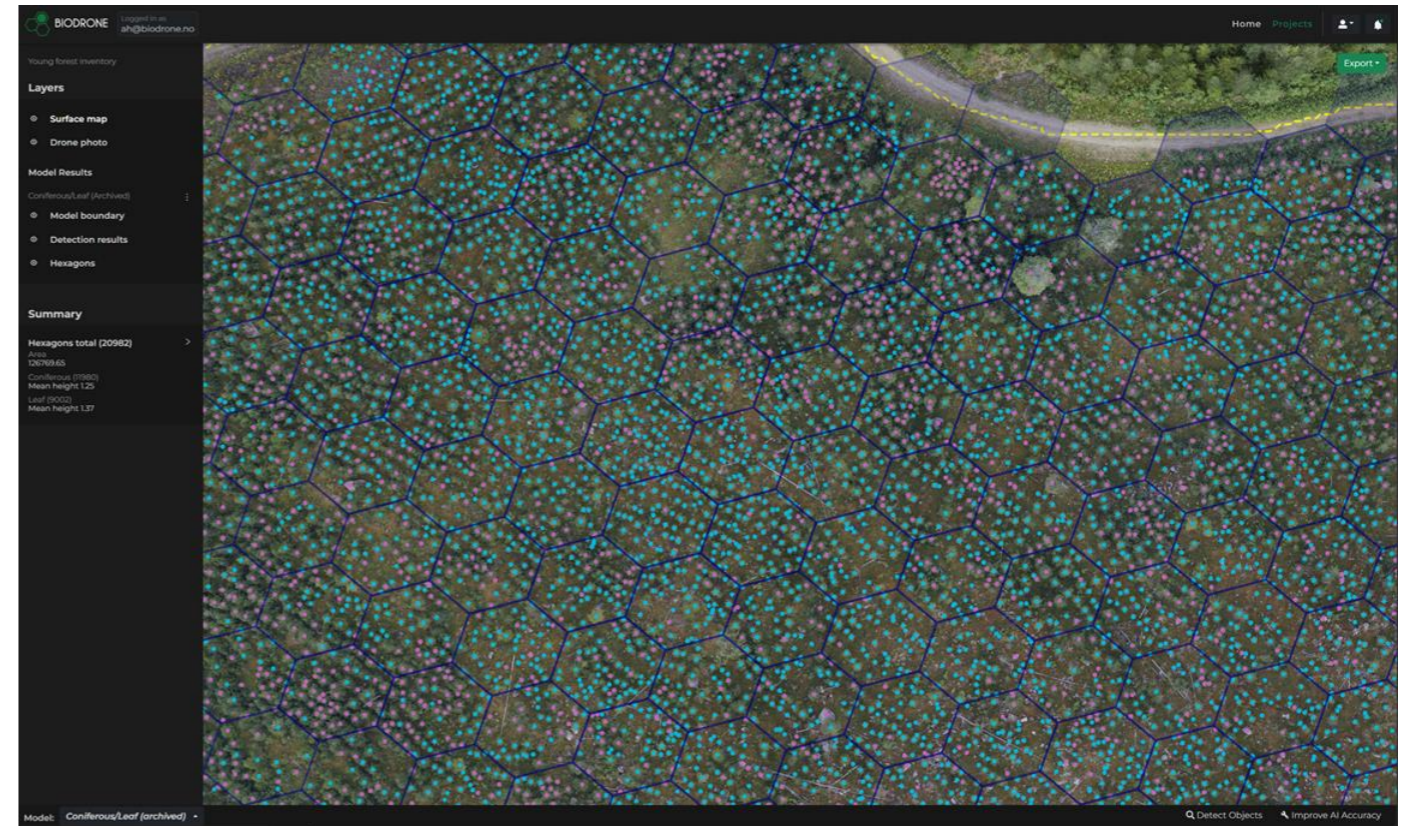
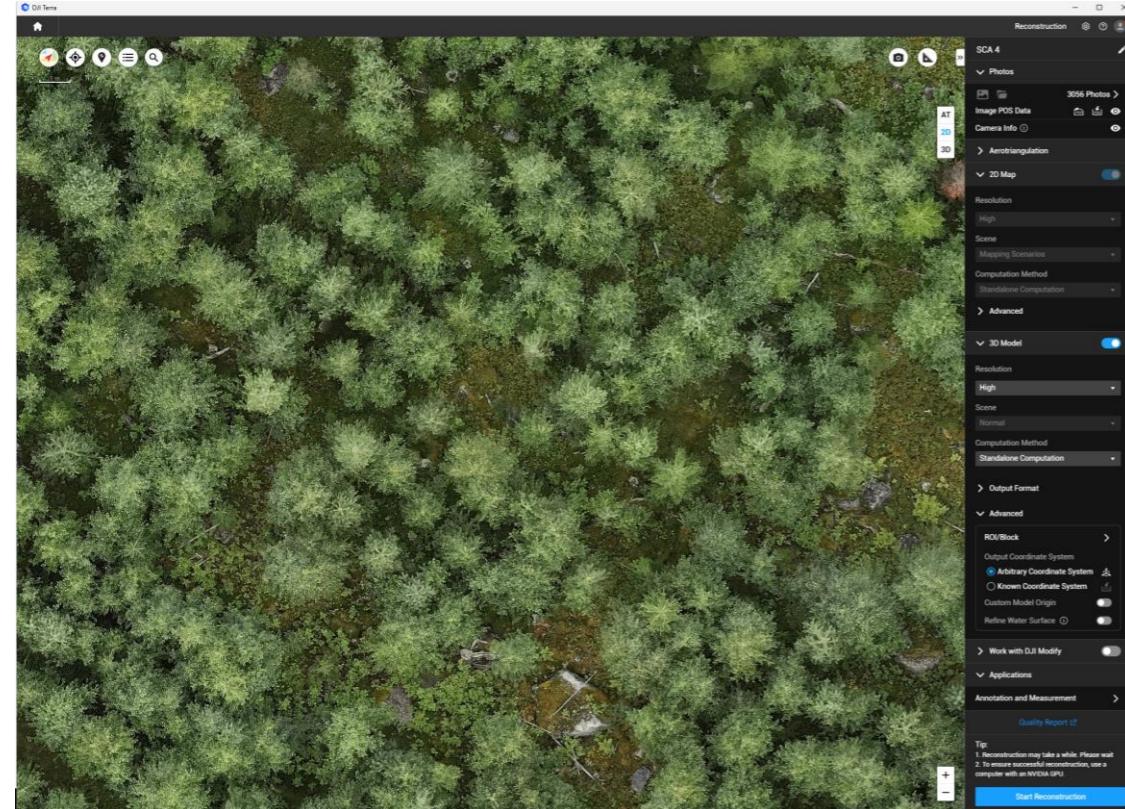
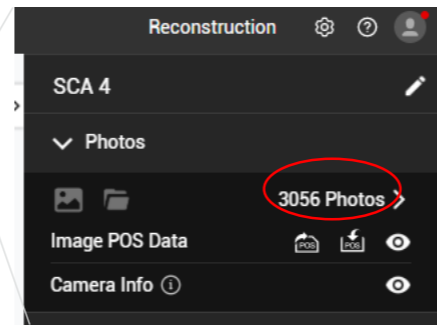
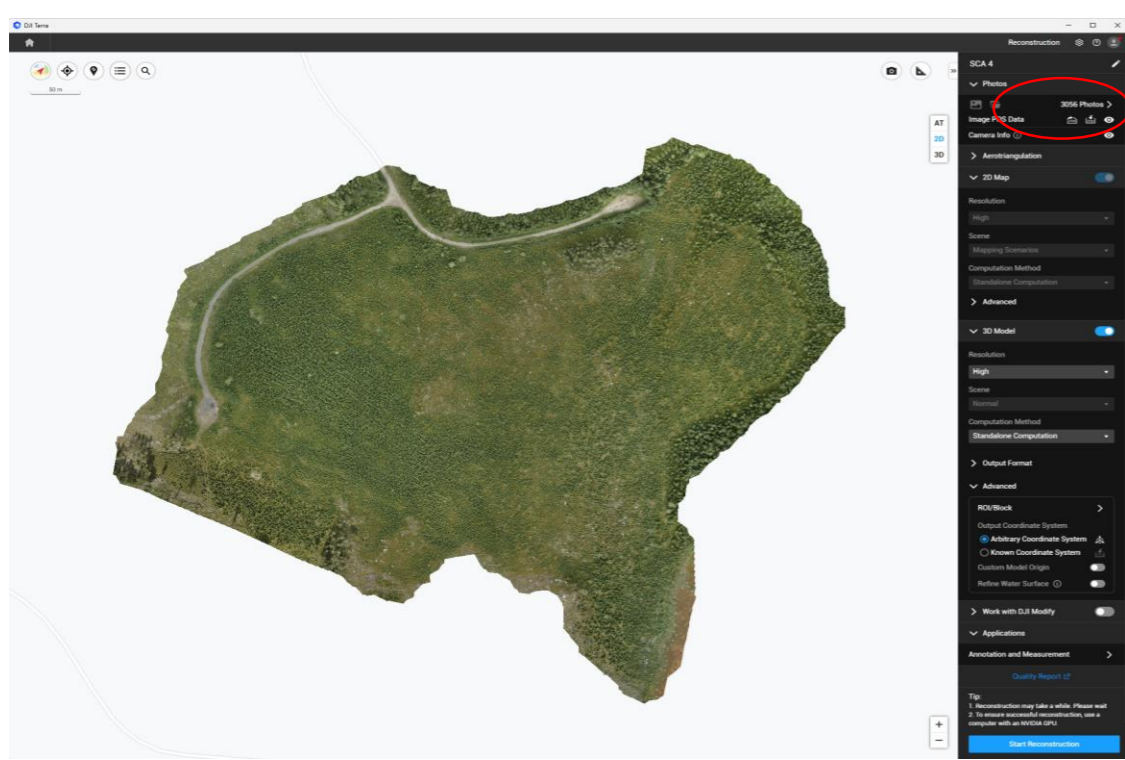
Setting : Real-time terrain follow

- Applicable for 3-4 year old saplings
- Older saplings can be mapped at higher altitudes for more efficiency
- AI portal analysis provides accurate counts of saplings and density map
- Identifies areas that need to be replanted

Case study: Brush Cutting / Young forest clearing



- Improves timber production by reducing competition for resources
 - More light, water, and nutrients for high-value trees
- Enhances biodiversity and habitat value
 - Creates diverse and open spaces for wildlife and plants
- Reduces risk of fire, pests, and diseases
 - Removes dead or dying vegetation
 - Improves air circulation and sunlight penetration
- Increases forest resilience and adaptability
 - Fosters balanced and natural composition of tree species and age classes
- Drones can survey faster and with less risk



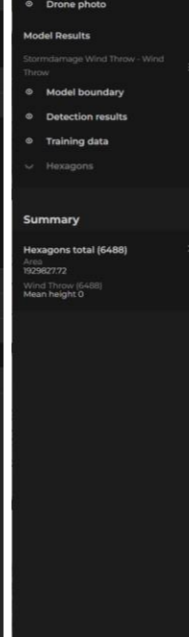
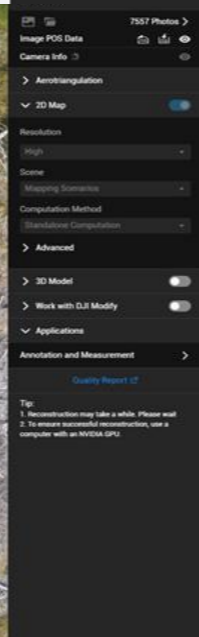
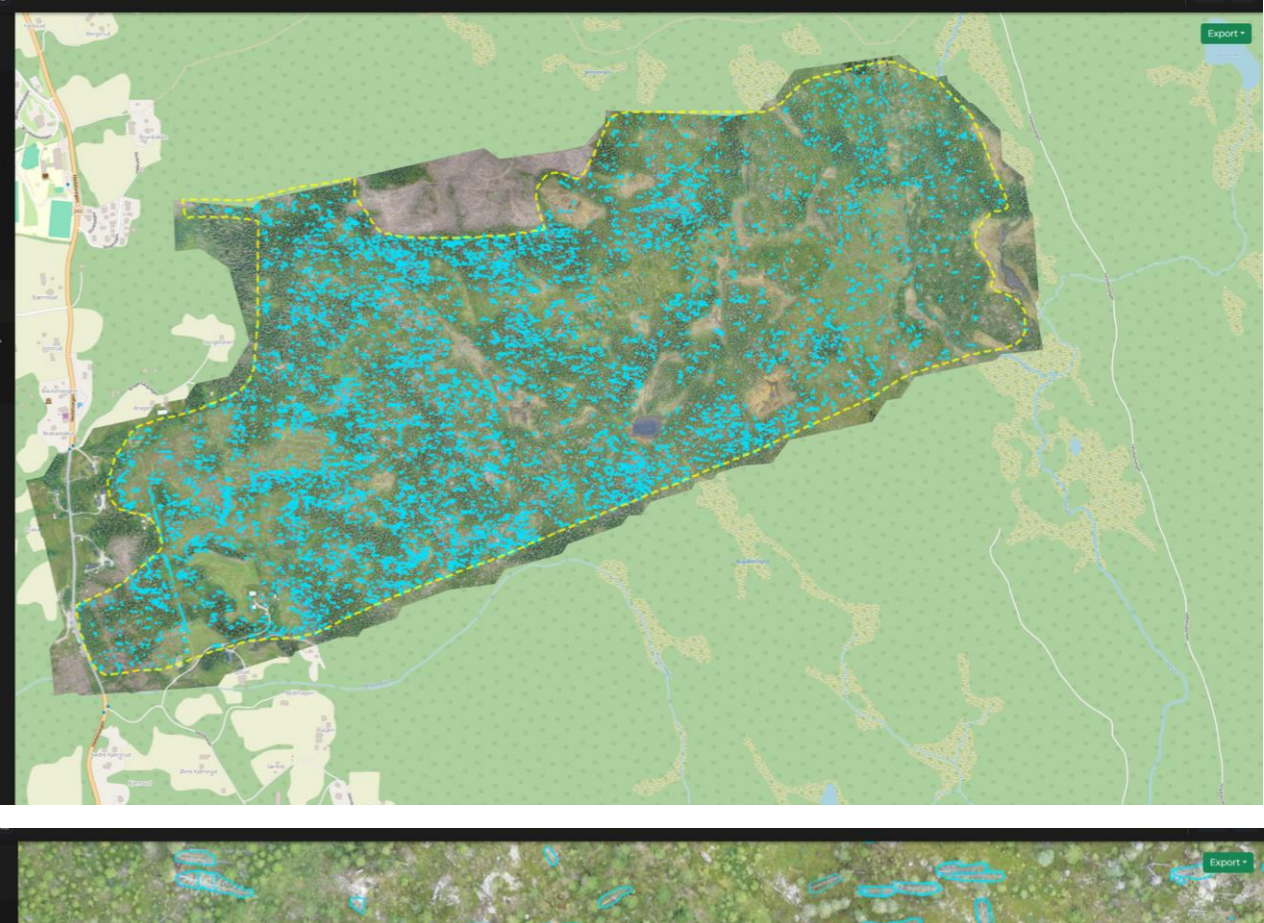
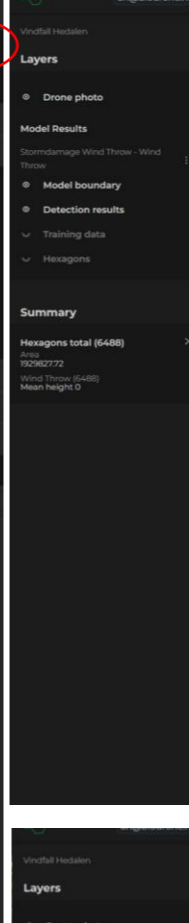
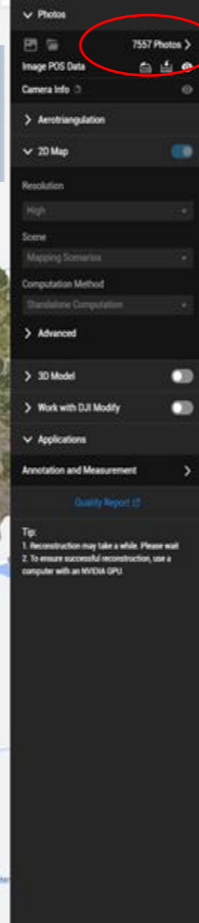
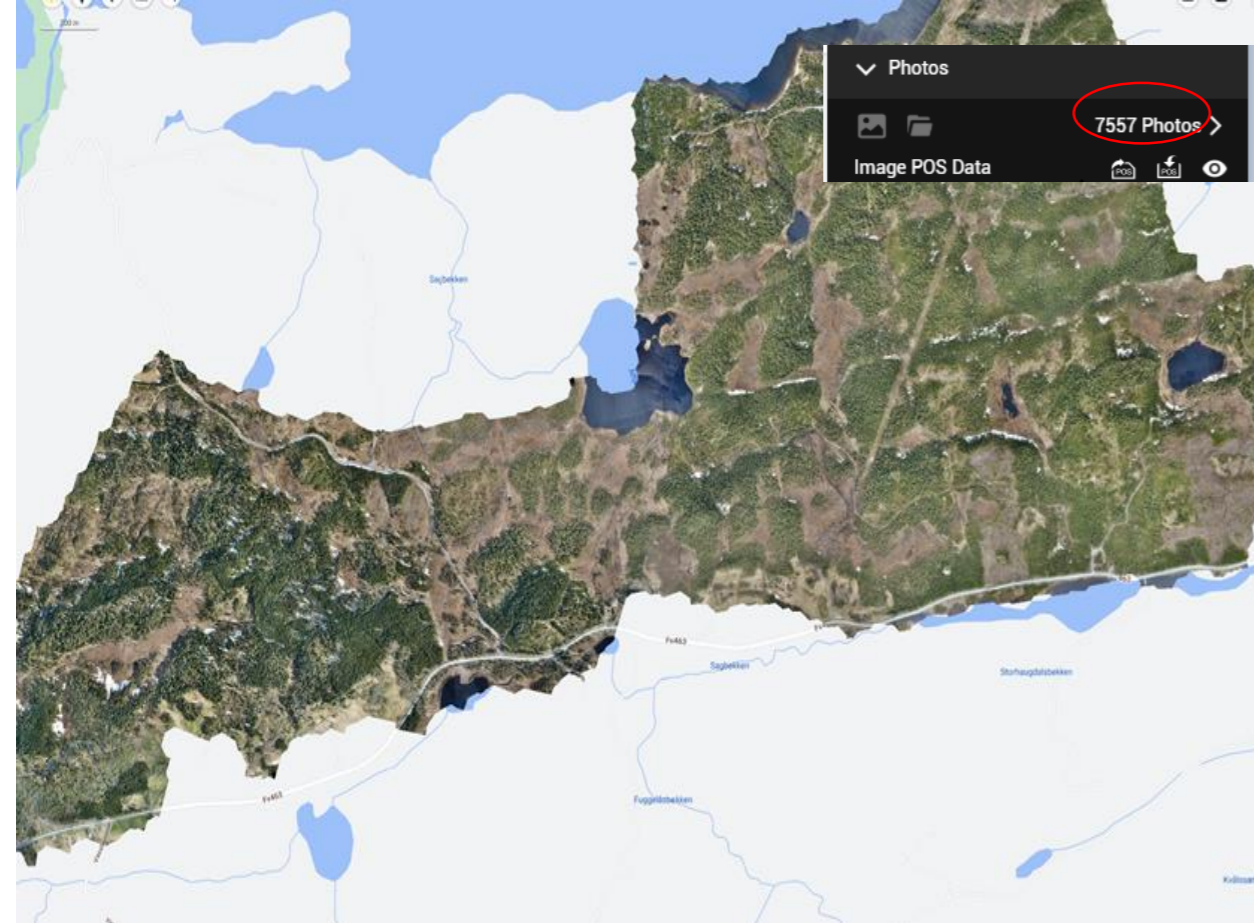
DJI Terra

Bio-drone AI portal



Case study: Storm damage

- Storms can cause severe damage to forests
 - Wind throw and top breakage of trees
- Storm damaged areas are dangerous to walk in
 - Potential energy in the tension of the trees
- Drones can safely map the forest and provide detailed damage assessment
 - Using orthomosaics and AI
- Surveyors can plan harvest accordingly
 - Prevent diseases and rot
 - Dead trees are potent fuel for forest fires



DJI Terra

Bio-drone AI portal

Case Study: Sick and dead trees

- Sick and dead trees are a threat to the health and sustainability of the forest.
 - They can be infected by pests, fungi, or diseases that can spread to other trees.
 - They can attract insects and rodents that can damage the wood.
 - They reduce the aesthetic and recreational value of the forest.
 - They can increase the risk of forest fires.
- It is important to identify and remove sick and dead trees as soon as possible.
 - Identification can be done with drones and AI.
 - Bark Beetle attacks are increasing rapidly due to climate change.



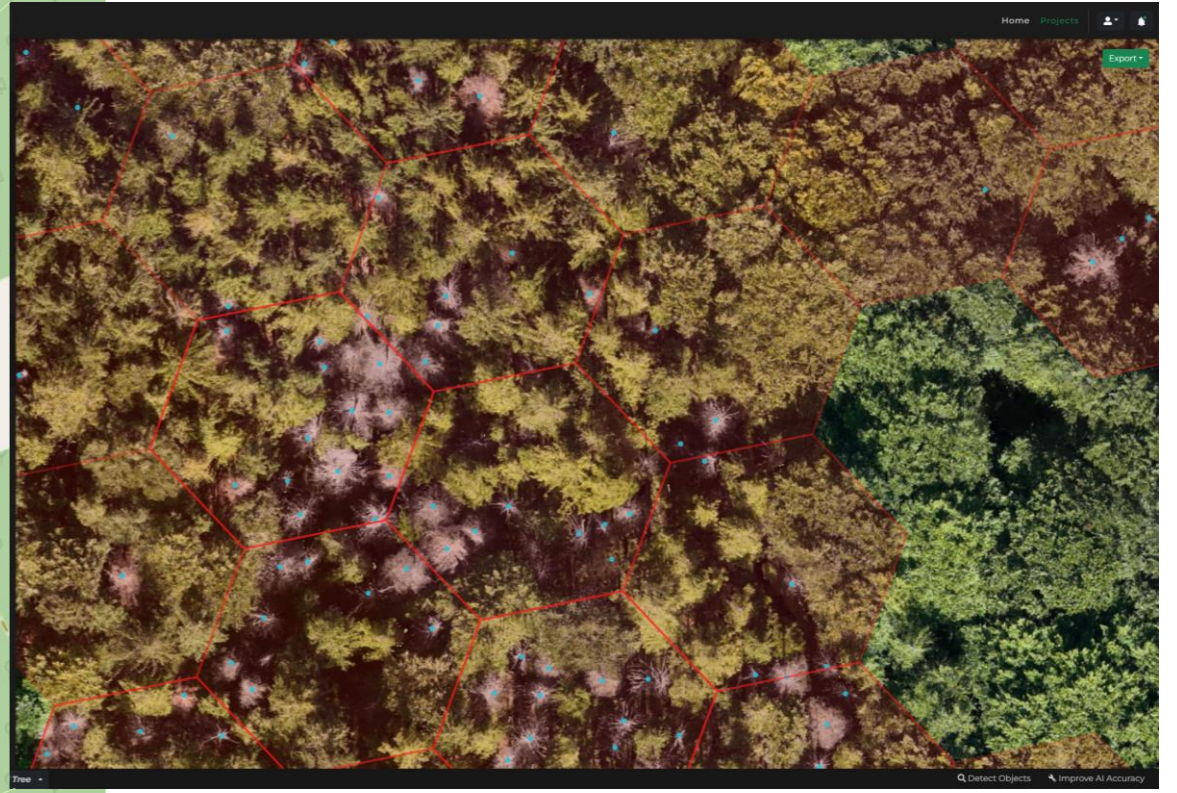
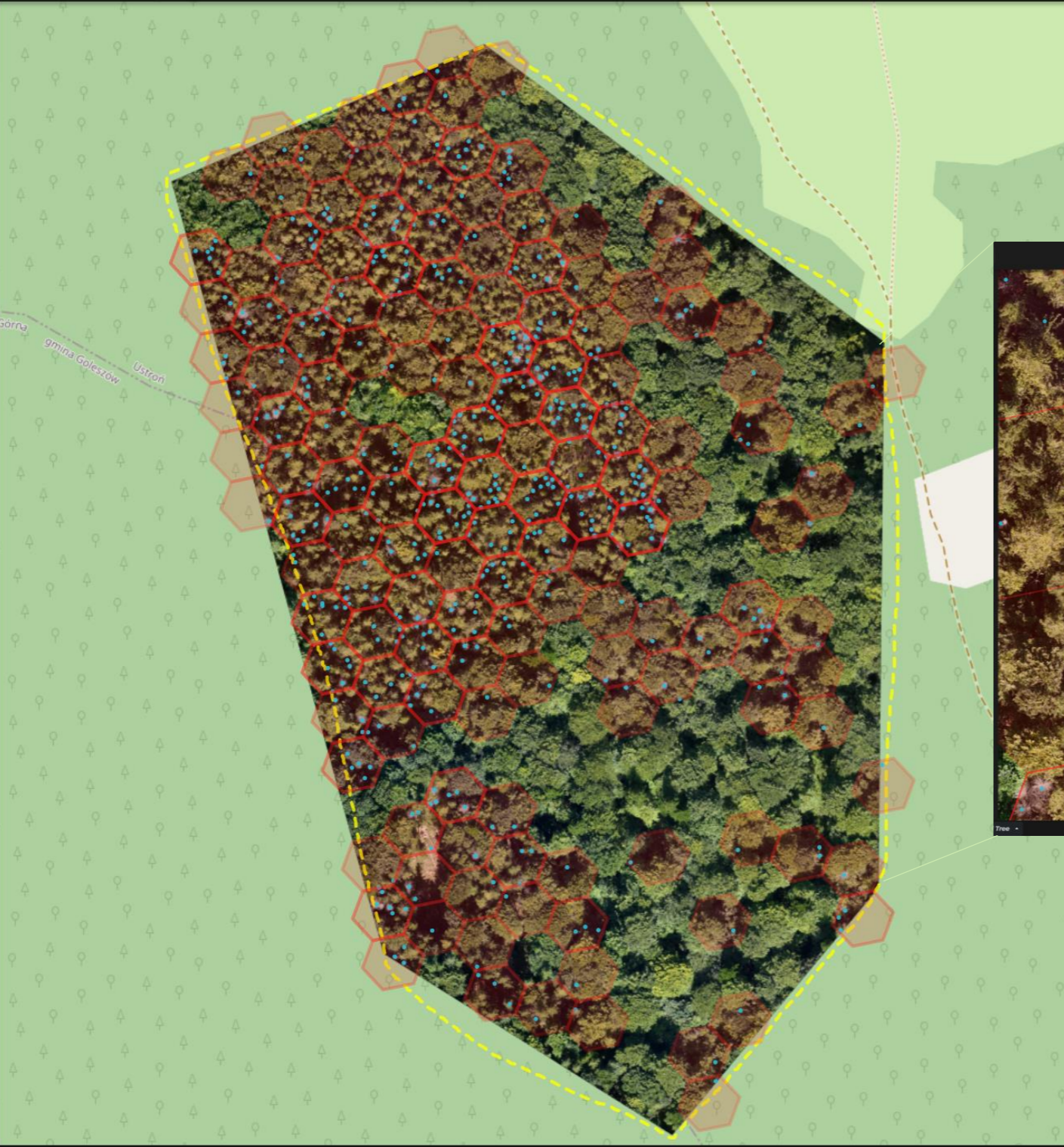
Chore-test

Layers

- Drone photo
- Model boundary
- Detection results
- Training data
- Hexagons

Summary

Hexagons total (527)
Area
67756.12
Dead Tree (527)
Mean height 0



Case Study: Wheel ruts and harvest damage

- Wheel ruts are depressions left by heavy vehicles on forest soil
 - Negative impacts include soil compaction, erosion, waterlogging, nutrient loss, reduced biodiversity, and damage to tree roots and stems
- Wheel ruts are considered forest damage and are illegal in some Nordic countries
 - Forest owners are obliged to prevent and repair them
- Drones and AI can be used to monitor and manage wheel ruts
 - Provide high-resolution images and accurate measurements of affected areas
 - Maps and reports can help plan for repair operations
 - Can save time and money and improve data quality and reliability



Case study: Palm Oil tree plantation mapping

- Palm oil tree plantations are an important source of income and food for many countries, especially in Southeast Asia. However, they also pose environmental and social challenges, such as deforestation, biodiversity loss, greenhouse gas emissions, land conflicts, and human rights violations. To manage these issues, it is essential to have accurate and up-to-date information about the location, size, and condition of the palm oil trees.
- Drone mapping with AI provides detailed maps and reports that show the spatial distribution and attributes of the palm oil trees, as well as the potential risks and opportunities for improvement.



Tree Counting

GENERAL WORKFLOW



Matrice 350 + P1 for large scale mapping



M3E for capturing large numbers of small stands spread across a region.

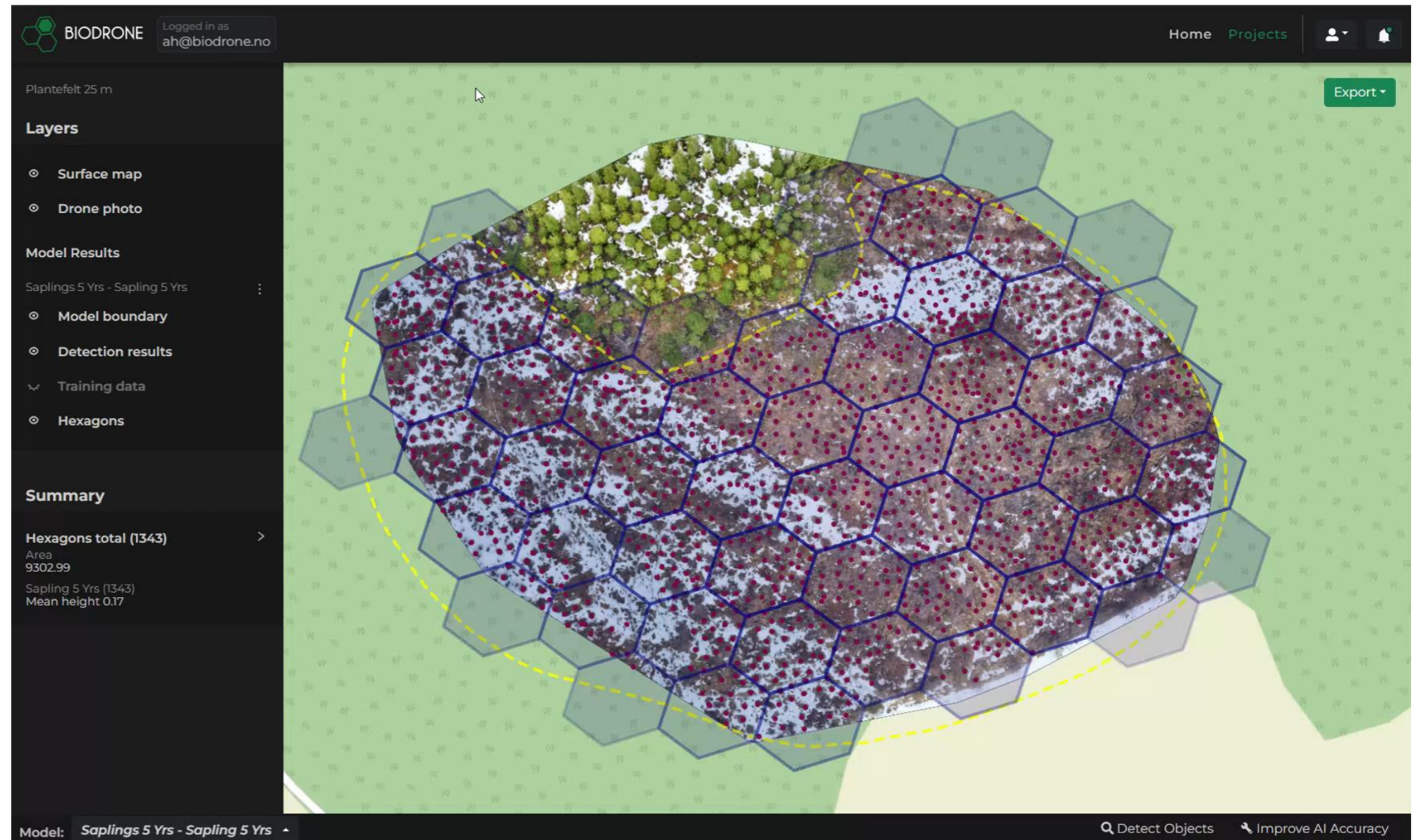
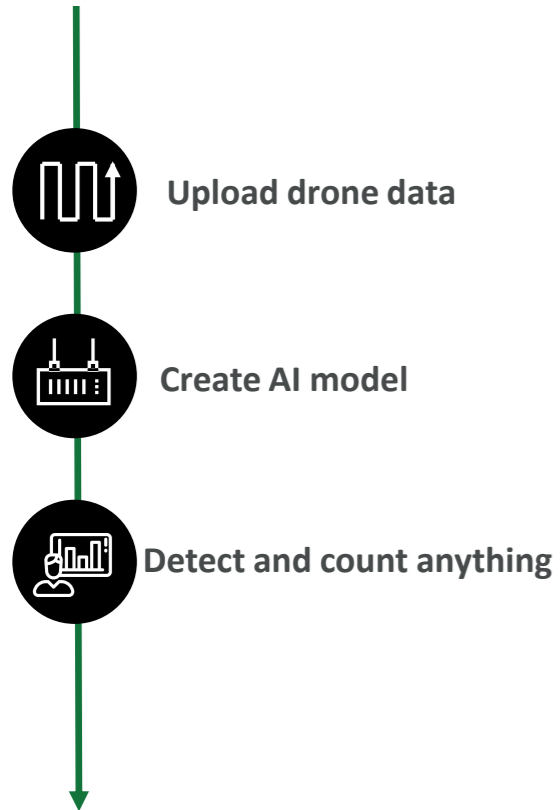


DJI Terra for ortho photo



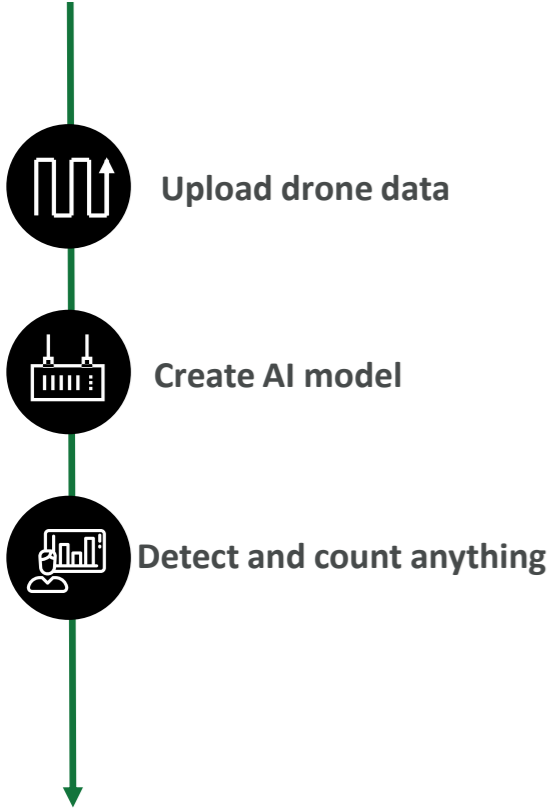
Bio-drone AI analysis

BIODRONE AI PORTAL- WEB-BASED PLATFORM TAILORED FOR USE IN FORESTRY



Footer can be set under "view" -> "header and footer"

BIODRONE AI PORTAL- WEB-BASED PLATFORM TAILORED FOR USE IN FORESTRY



Label: Ungskog pris 1

Color: [Red]

Classes: Bar, Lauv

Height: 0 to 1.8, slider at 1.2, input 1.8

Count: 0 to 17, slider at 10, input 17

250 Calculation multiplier

Results: Area: 2.200, Calculation: 2.750

Label: Ungskog pris 2

Color: [Yellow]

Classes: Bar, Lauv

Footer can be set under "view" -> "header and footer"





WHAT IS NEXT PLAN

4G Connectivity for Flying

Improved signal in mountainous regions and dense forests

Beneficial for Forestry

Overcomes difficulty of maintaining VLOS signal

Multiple Data Recourse

Combining Mavic 3 Multispectral data with machine learning.

More accurate algorithm results

Covering broader use cases

Enhanced Map processing capability

Point cloud processing on the cloud integrations with DJI Terra API

DJI TerraAPI

Photogrammetry & LiDAR Processing scaled to
fit your needs

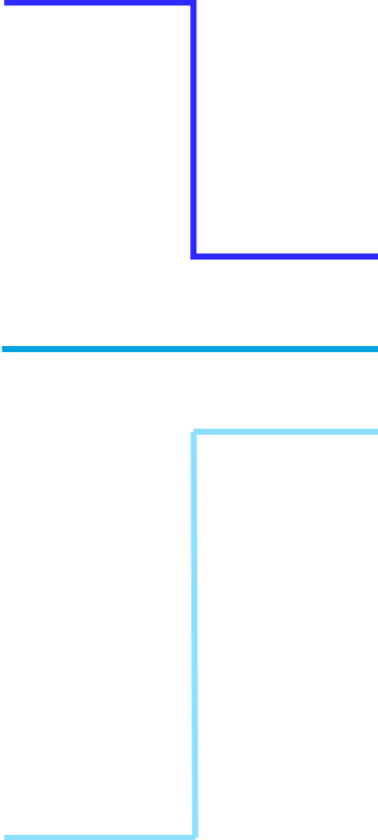


DJI TERRA OVERVIEW

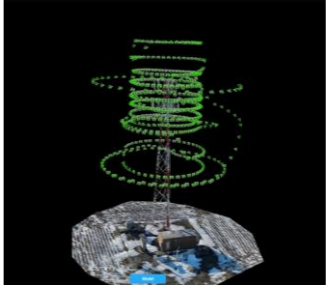
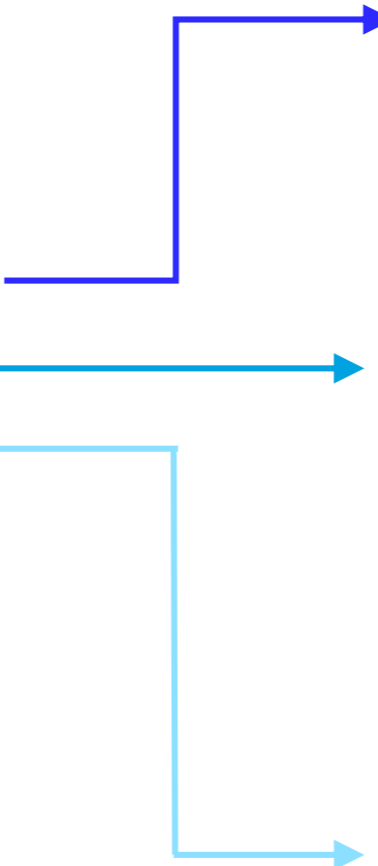
DJI Drone Images (M3E, P1,...)

DJI LiDAR Payloads Data (L1/L2)

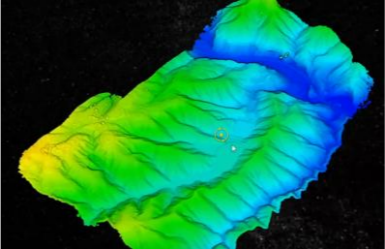
DJI Multispectral Drone Images (M3M)



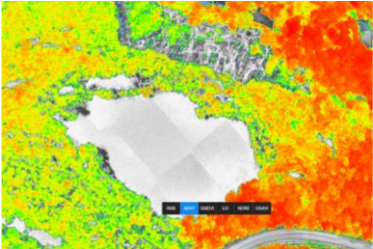
DJI Terra Software (V4.0)



2D map / 3D mesh model / point cloud



LiDAR Point Cloud

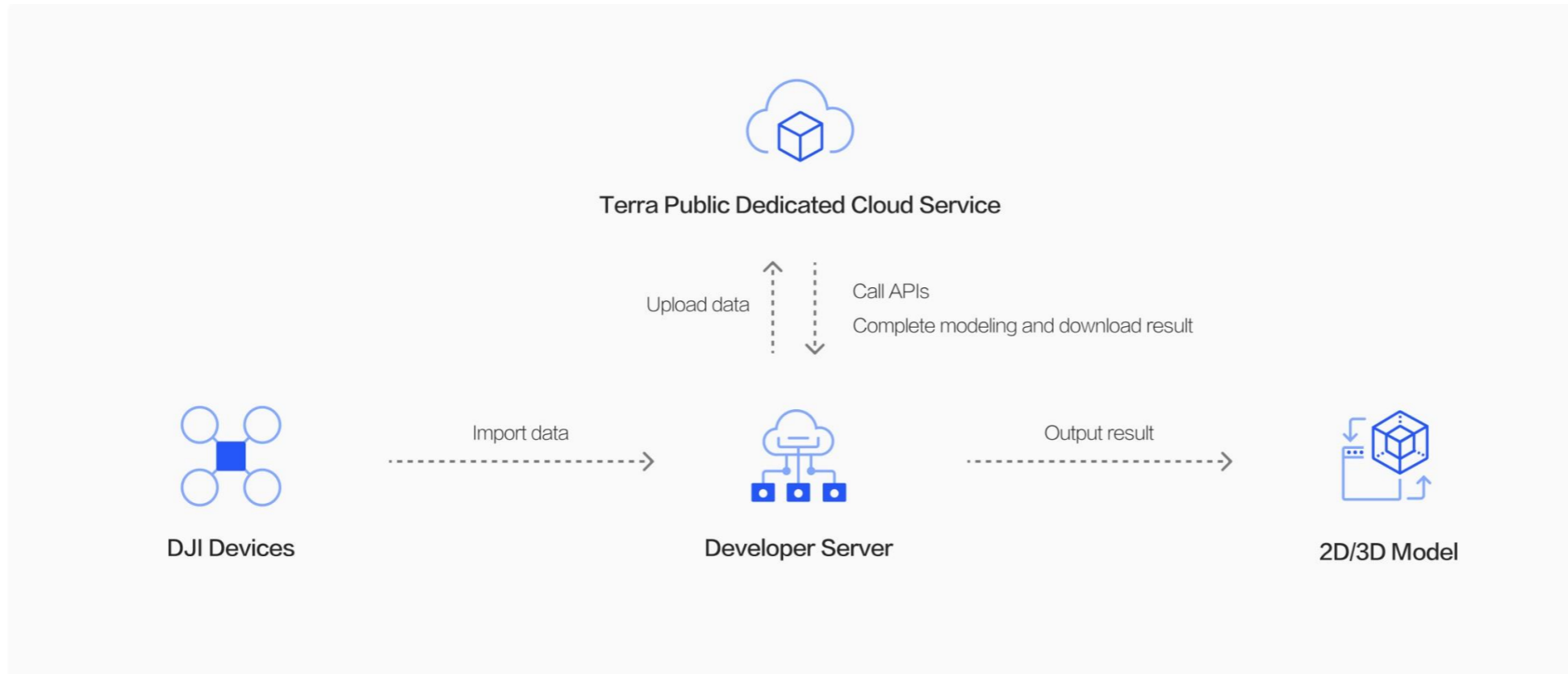


Vegetation index maps



DJI Modify software (3D model retouching)

TERRAAPI INTRODUCTION



TerraAPI is a set of API solutions that deploys the Terra engine on a cloud-based server. This API allows solution ecosystem partner to incorporate cloud computing power to process visible light reconstruction and lidar reconstruction.

1. Public beta date : **January 25, 2024.**
2. Trial duration: 1 year; only in beta currently

Trial Process for TerraAPI

dji DEVELOPER

App Dev.

Device Dev.

Cloud Dev.

Developer Tools

Solution

Support

中文 | EN



DJI TerraAPI

DJI TerraAPI

Cloud API

Overview

Documentation

API Reference

Feedback

Console

Trial Application:

Go to the homepage of the DJI developer platform and find the TerraAPI option . After registering for a DJI account and becoming a DJI developer, click Free Trial and wait for approval to start the Terra trial.

Notice:

1. Public beta date : **January 25, 2024.**
2. Trial duration: 1 year; only in beta currently
3. Trial quota (valid for 1 year): **2D / 3D reconstruction** : 50,000 total images ; **point cloud reconstruction** : point cloud size 500GB ; **storage space** : 500GB; concurrent processing permissions: 2 reconstruction tasks run at the same time, more than 2 tasks will report an error.
4. Complete information must be filled in when applying. Applications will be manually reviewed and DJI will issue the application based on the filled-in information. Batch applications will not be accepted for trial.
5. Please be reasonable on use of storage space. If the storage space is not enough, you can choose to delete previously uploaded data.

THE BETTER FORESTRY MANAGEMENT, THE GREENER WORLD

