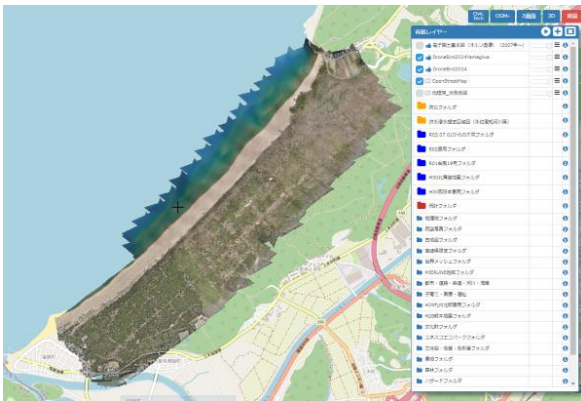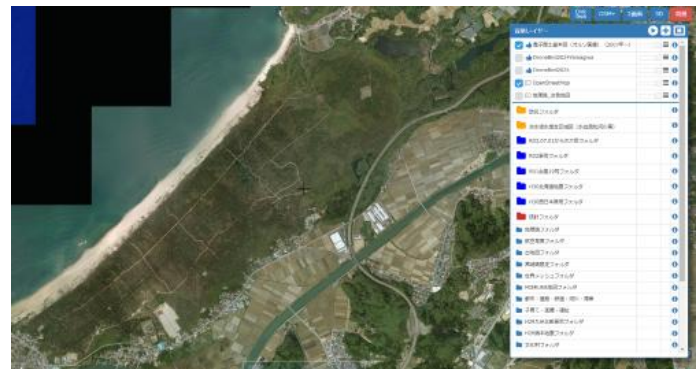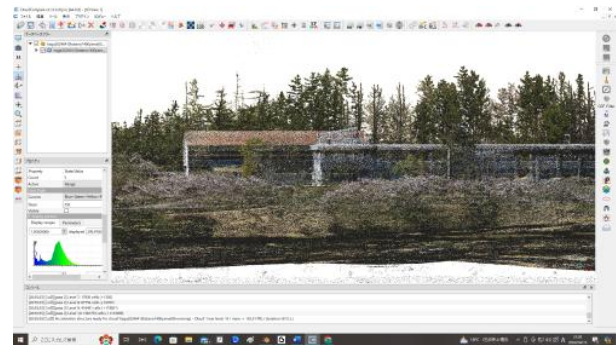# Survey on Pine Wilt Disease and Possible Taking Off/Landing Site

Orthomosaic of the windbreak forests in Kaga City now

Orthomosaic of the same windbreak forests by the National Land Agency in 2007

Point of Clouds of the former primary school

OVERVIEW	
Flying Labs	Japan Flying Labs
Geographic area	Kaga City in Ishikawa Prefecture, Japan
Date range	April 2024
Sector program	AidRobotics
Main SDGs	GOAL 11: Sustainable Cities and Communities GOAL 17: Partnerships to achieve the Goal

SCOPE	
People impacted	Citizens in Kaga City
Number of people impacted	About 1,100 residents of the towns along the beach (or Kaga city population of 58000).
Problem statement	There were two issues.

	1. Identifying the damaged area by insects (Pine wilt disease) in the windbreak forests (Pine forests) was difficult. 2. It was necessary to know whether the ground of the former primary school, which is close to the windbreak forests, can be used as the taking off/landing site of a fixed-wing drone in the future or not.
Project objectives	1. To find the damaged scale and area of the windbreak forests (pine wilt disease). 2. To find pine tree heights around the former primary school ground and heights of the ground to estimate the slope of the approach path for a drone to land/take off.
Scope	● Flying fixed-wing drones over a 5 km long beach line to get orthomosaic of the windbreak forests. ● Flying a drone with the HoverMap system to get 3D (Point of Clouds) to find pine tree heights around the former primary school.
Outcome	Two objectives were achieved: 1. The orthomosaic showed damage by insects (pine wilt disease) in the windbreak forests. Compared with orthomosaic by the National Land Agency in 2007, damages are noticeable now. See link - Push the red button (background layer) on the top right. Then click off the top (National Land Agency Ortho 2007) and click on DroneBird2024yamagiwa and DroneBird2024. You can compare before and after the insect damage. You can also zoom in/out to see pine tree damage. 2. The heights of pine trees were measured on point clouds and were used to calculate the approach gradient to safely avoid a pine forest relative to the ground surface - see link. The data served as a foundation for Kaga City to implement measures against pine wilt disease, leading to specific actions such as logging, reforestation, and treatment.
Impact	The pine forests, where we flew the drone, serve as the windbreak forests, protecting the area from sand blown in from the beach. If the pines die, it could directly lead to sand damage, which would significantly impact the lives of residents. Having assessed the current situation, Kaga City can now implement measures to prevent such damages.

Next steps	The cooperation between Kaga municipal office, the local community, and DroneBird/JFL (CrisisMappersJapan) has been strengthened. We hope to have a disaster agreement with Kaga City in the future and hope to increase cooperation with the local drone business community for effective work in case of natural disaster.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT	
Consent for data acquisition	DRONEBIRD/Japan Flying Labs (CMJ) decided to have a boot camp in Kaga City where Japan Flying Labs' R&D manager has had a strong contact. The Kaga municipal office helped DRONEBIRD/Japan Flying Labs to use the former primary school as a take-off/landing location and agreed to take aerial images around the area. In return, DRONEBIRD/Japan Flying Labs provided data to Kaga city.
Community feedback	CrisisMappersJapan, host of Japan Flying Labs joined the local consortium of drones and flying cars in Kaga City.

DATA ACQUISITION	
Size of area	430 ha or 4.3 km2
Drone	SenseFly eBeeX and DJI Matrice 300 RTK
Sensor(s)	● S.O.D.A 3D, DJI Zenmuse P1 (DJI Matrice 300 RTK) ● Hovermap ST-X
Flight plan software	● eMotion, Ugcs (DJI Matrice 300 RTK) ● Ugcs
Flight height	Meters above ground ● 150m ● Hovermap -60m
GSD (Accuracy)	5cm/pix and 2cm/pix
Number of images acquired	852 images(eBeeX) 600 images (DJI Matrice 300 RTK)
Number of flights	● 3 - (2 times by eBeeX and 1 time by DJI Matrice 300 RTK) ● 2 - (hovermap)
Time invested in data acquisition	SenseFly eBeeX - about 4 hours DJI Matrice 300 RTK - 30 mins Hovermap - 10 minutes
Georeferencing	● On board GPS, Network RTK(DJI Matrice 300 RTK) ● Network RTK

DATA PROCESSING & ANALYSIS	
Processing software	● PIX4Dreact ● Emesent AURA
Processing time	● About 20 mins for SenseFly eBeeX, 15 mins for DJI Matrice 300 RTK ● 10 mins for hovermap
Data products	● Orthomosaic by PIX4Dreact ● Point clouds
Analysis tools	OpenAerialMap, Hinata GIS, Trend point, Potree and Cloud Compare
Analysis outputs	● Geotiff ● Laz
Final outputs shared with stakeholders	GeoTiff and Point of Cloud
Data sharing	Email and the shared drive designated by the Kaga Municipal Office.