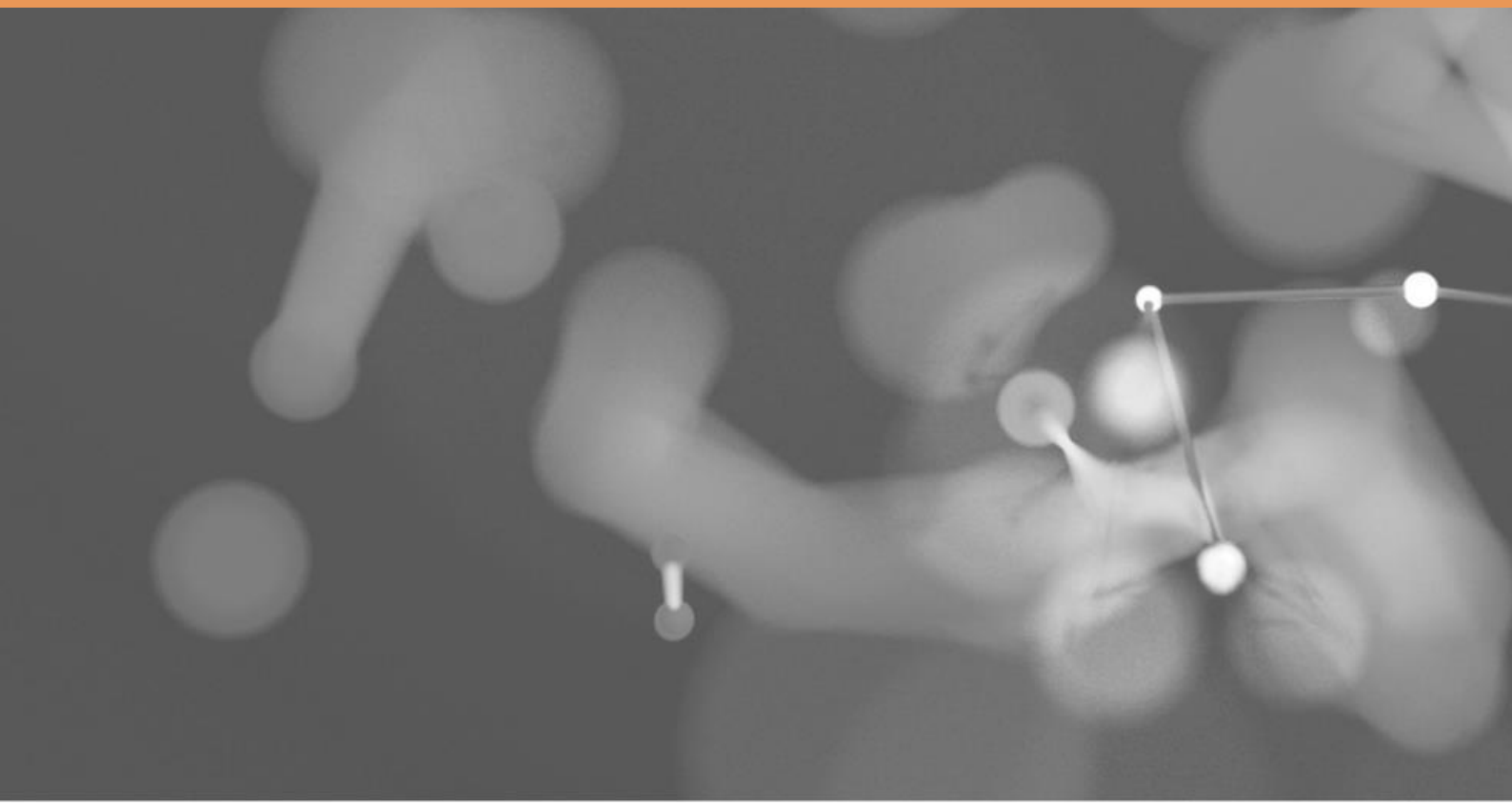
CHCNAV ALPHAAIR 450 APPLICATION CASE

AIRBORNE LiDAR APPLIED TO POWER LINES APPLICATIONS



BACKGROUND

With the rapid development of civil construction and the increasing demand for electricity in recent years, the market segment of power grid construction has grown significantly. Meanwhile, how to efficiently manage such large-scale power line networks and how to guarantee the reliability of power transmission is becoming increasingly important. A one-off power outage accident will not only result in losses to power line management companies, but also have serious repercussions for end users and society as a whole.

With the increasing mileage of high-voltage transmission lines, traditional observation and monitoring methods are increasingly unable to meet maintenance requirements. As a result, more automated and smarter inspection methods are needed, and the airborne LiDAR method started to be adopted in this domain.

CUSTOMER PAIN POINT

DESCRIPTION

As the scale of the power grid has expanded rapidly in recent years, long-distance transmission lines are developing rapidly. A growing proportion of them are in mountainous areas. To carry out daily power line maintenance, inventory of assets and resolution of power-related accidents, a continuous monitoring effort is required. Currently, most of the daily inspections are carried out by electrical engineers using traditional manual work or photogrammetry methods.

Figure 1 - Traditional Power Line Patrol work

The pain points for the customer can be listed as follows:

- **High workload -** The power line mileage increases rapidly, resulting in a high workload. Traditional manual inspection cannot keep up with operational requirements.
- **High labor cost** - Traditional manual inspections are associated with low speed, high cost, poor accuracy and high labor intensity.
- **High Standard** - The demand for higher daily observation quality has increased significantly over the past.
- **Helicopter Use** - Long preparation time, high cost, high risk, and not supporting daily routine inspections.

LiDAR SOLUTION ADVANTAGES

The constant development of the LiDAR technology now allows its use in power line monitoring applications. Using the captured aerial point cloud data and its software processing, the power line can be easily extracted and generated as a 3D model. In addition, due to the high scalability of the power line, the LiDAR solution also has fast optimization and asset inventory capabilities. LiDAR solution supports multiple echoes that can capture the coordinates of the power line, power installations, vegetation and ground objects based on a single scan to significantly improve inspection efficiency. Some of the key benefits include:

- Final acceptance inspection of new power network project and raw file creation. Includes power line channel (tree and building), intersection (power line, highway, railway), electrical installations (safety distance, gradient), ground wire sag and internal.
- Simplification in calculating the safety distance between the power line and vegetation or new constructions. Support for rough estimation of the vegetation growth pattern, the deformation of the line under high temperatures and the measurement of the interval between the points of intersection.
- Site layout of the electrical facilities prior to the construction phase and design of the components' size.

ALPHAAIR 450 KEY FEATURES

- The integrated LiDAR and camera allow fast extraction of information from the point cloud data and high-resolution images.
- Advanced power line analysis software supporting customized report and data content.
- Support for several types of drones: CHCNAV BB4, fixed-wing UAVs, DJI M300. Long duration and high stability to better meet the needs of patrols.

AIRBORNE LiDAR SURVEY TYPICAL WORKFLOW

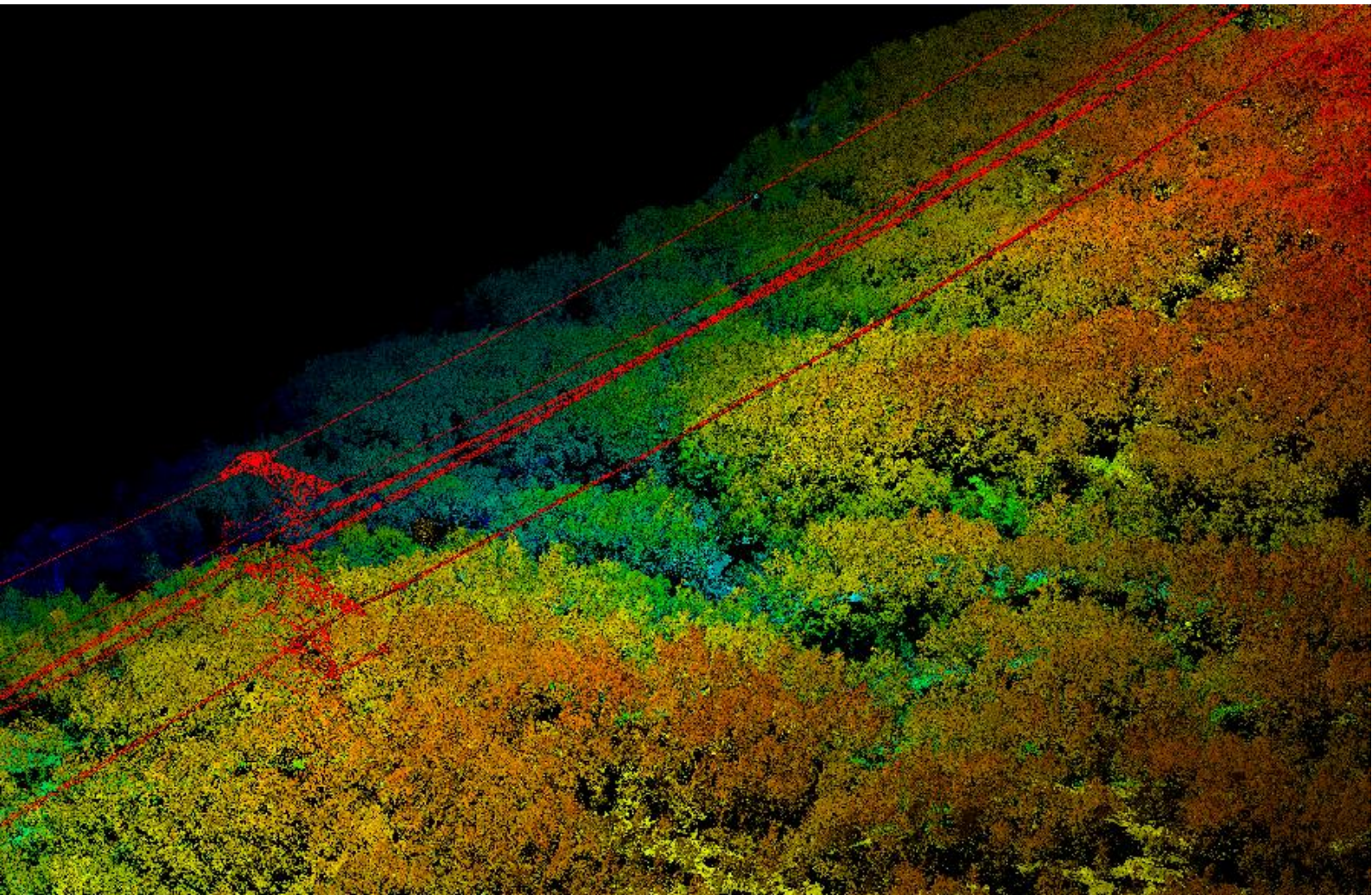
1. Mission planning

A well-designed mission planning is a key factor for a successful flight. It needs to take into account multiple factors such as local topography, flight duration, project area, etc. The take-off site must also be chosen in an open sky area for safety. For power line applications, CHCNAV AA450 and DJI M300 are very effective allies.

Figure 2 - Mission Planning

2. Data capture

AA450 supports both manual and automatic control method to start scanning. And it can capture point cloud data and high-resolution image data simultaneously.

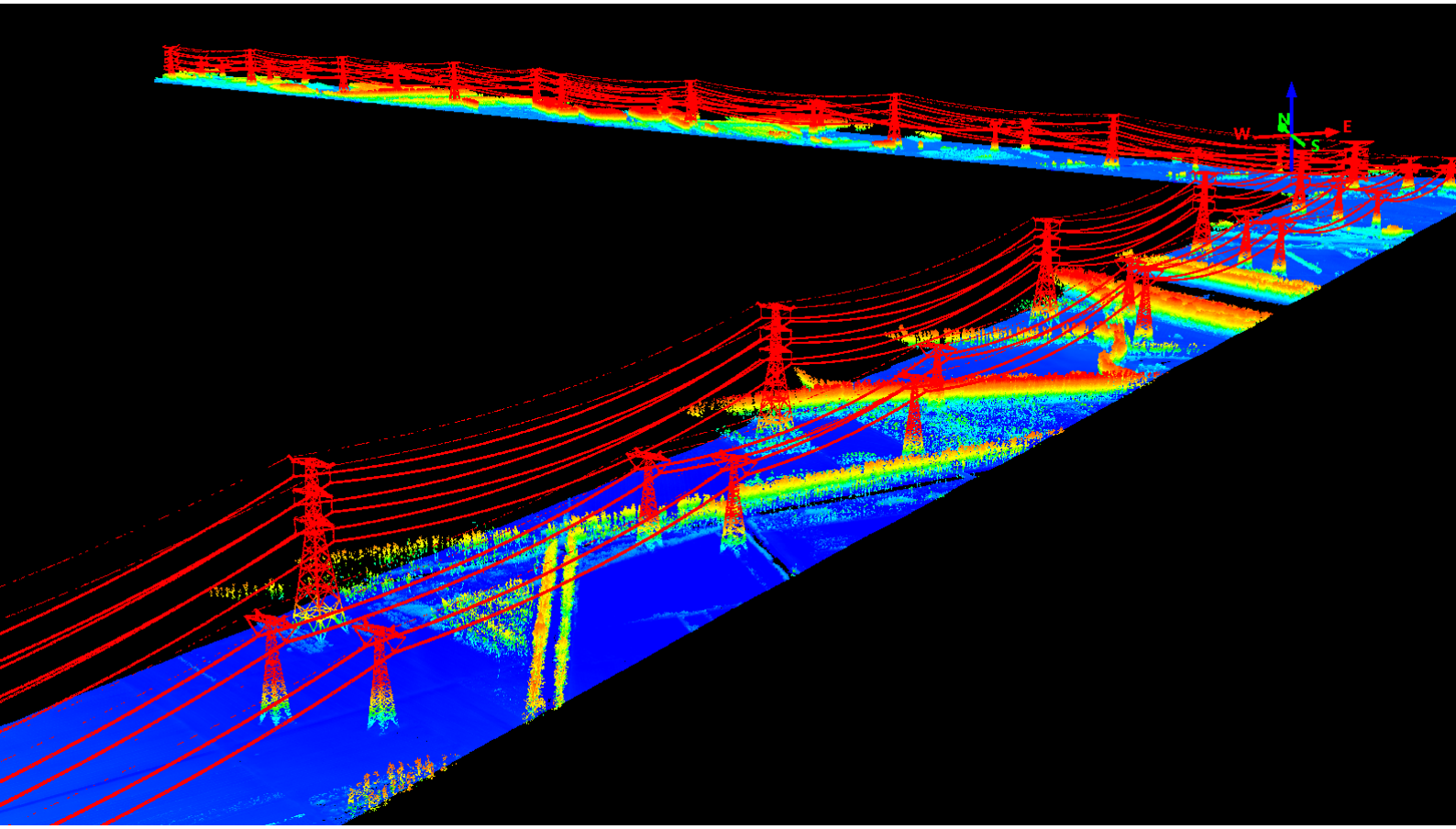


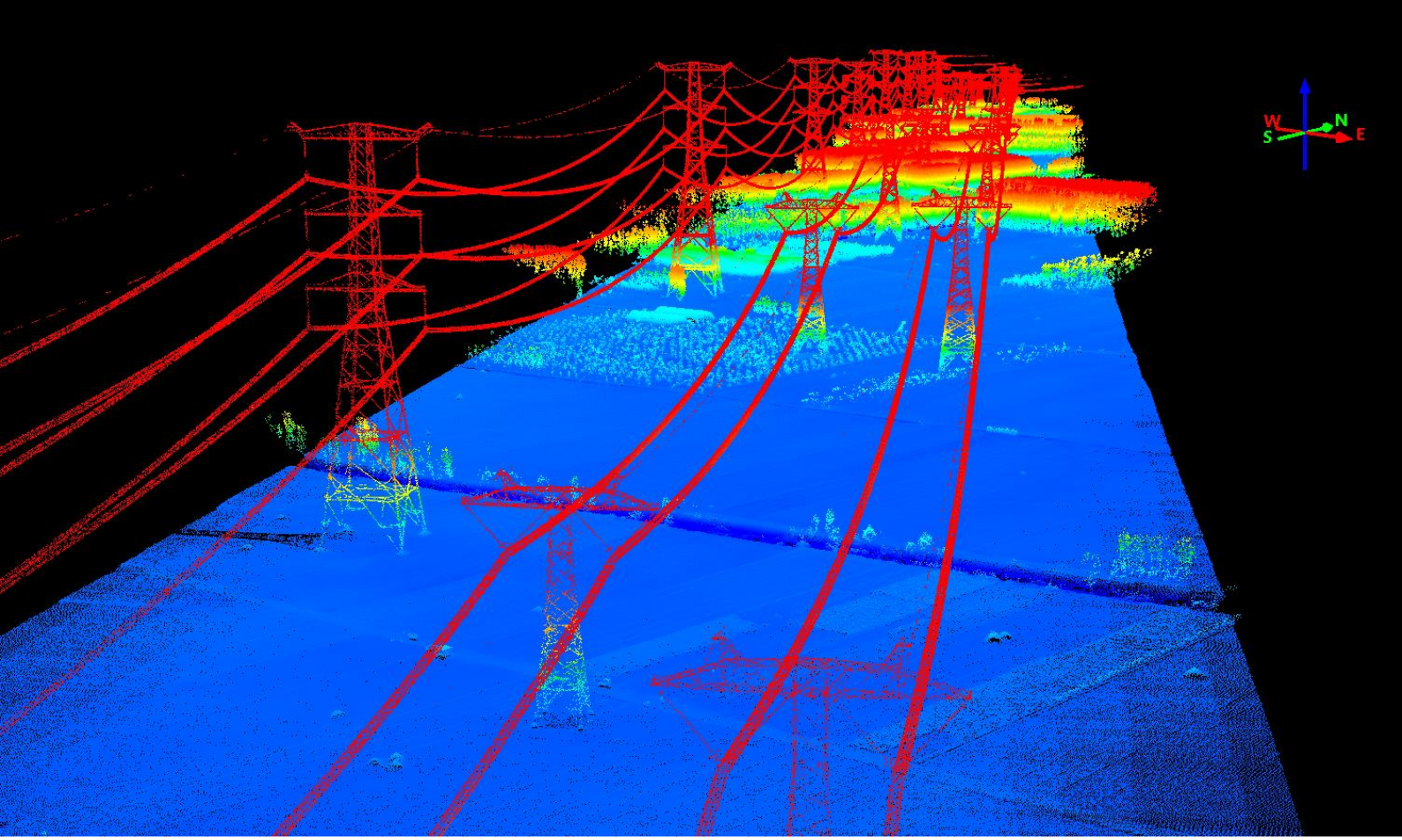
3. Data processing---CoProcess software

CoProcess is a software that contains a sophisticated Powerlines module for the post-processing of inspection data. It allows to quickly obtain high-precision 3D information from point cloud data, including terrain relief, electrical facilities, surrounding environment, etc. Ultimately, CoProcess can provide a more technical and efficient workflow for power grid planning, daily maintenance and accident investigation.

a) 3D View Management

A 3D view management module that supports multiple views to intuitively present 3D point cloud data.

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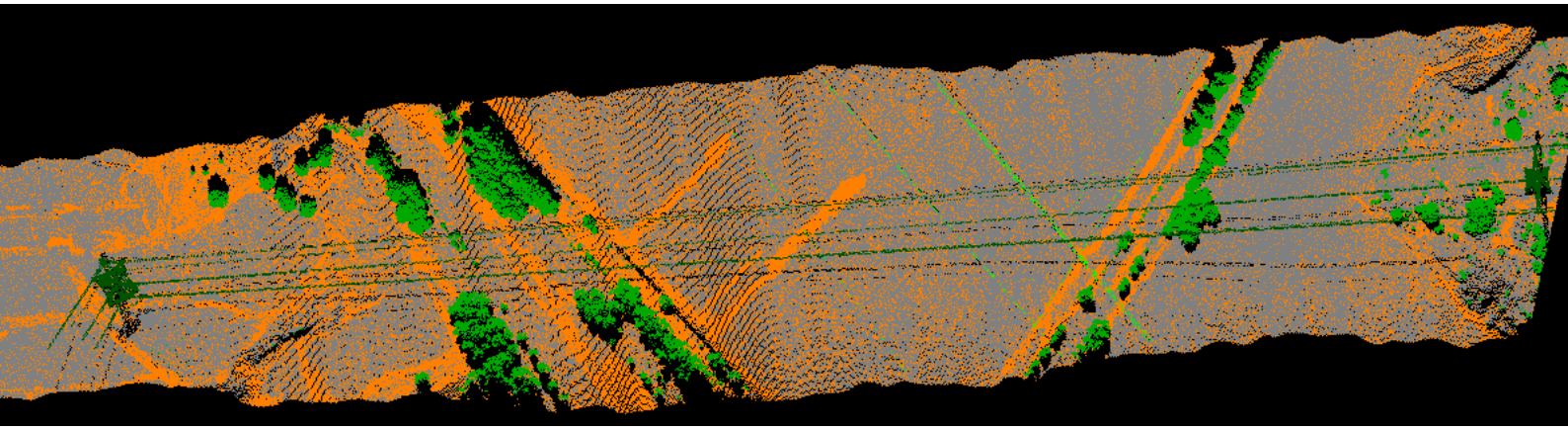
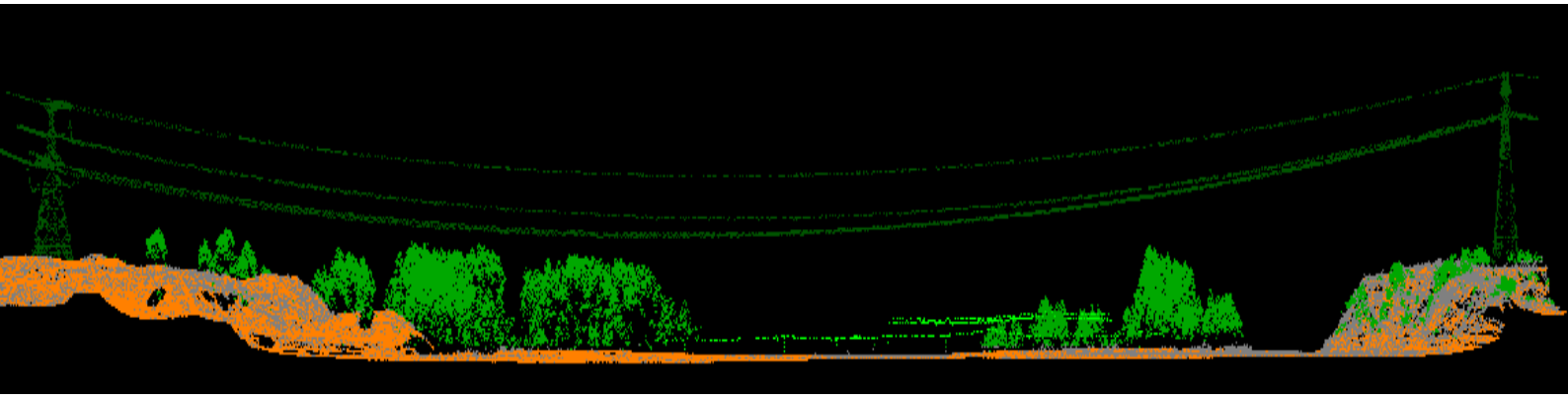
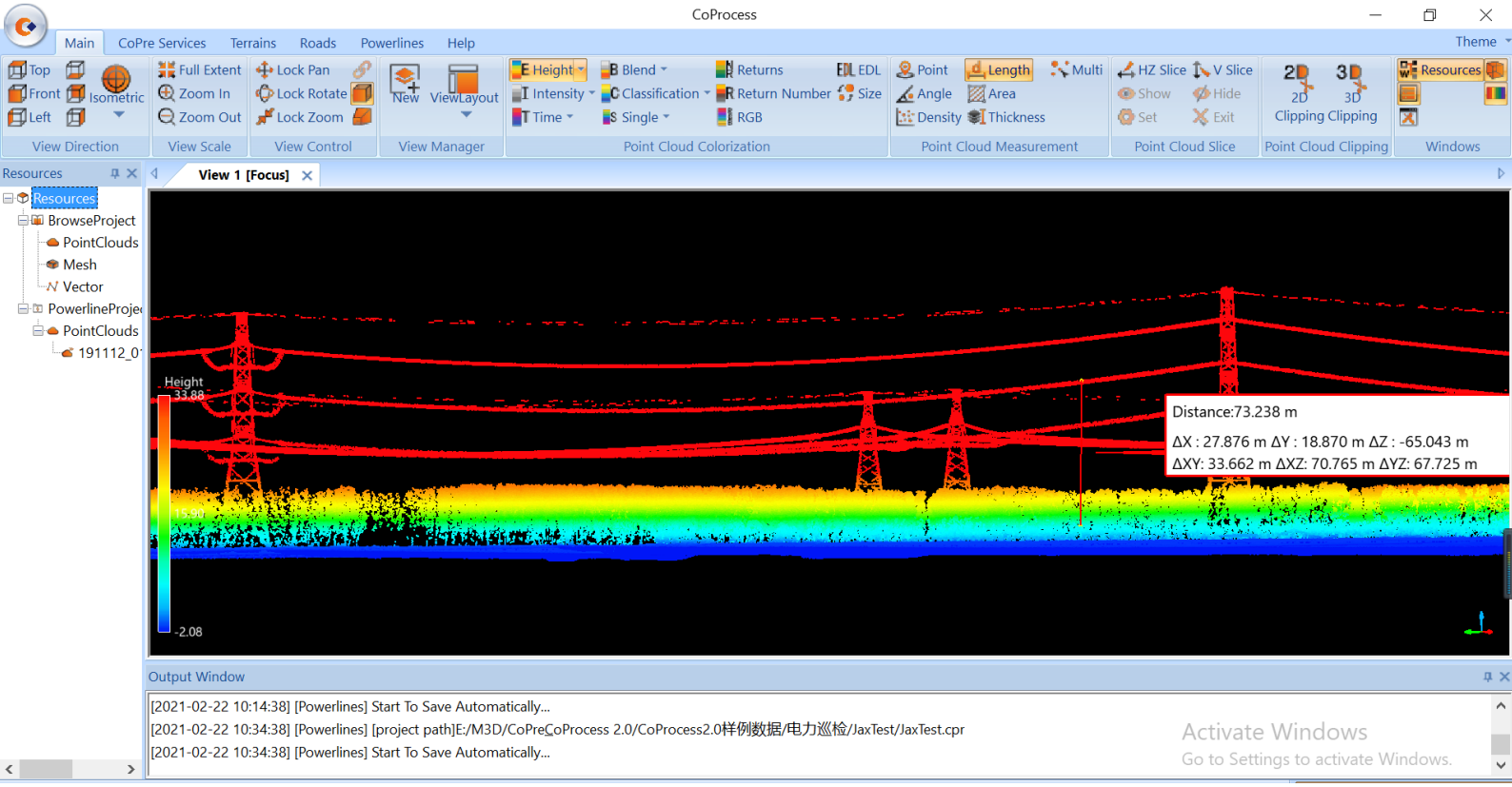




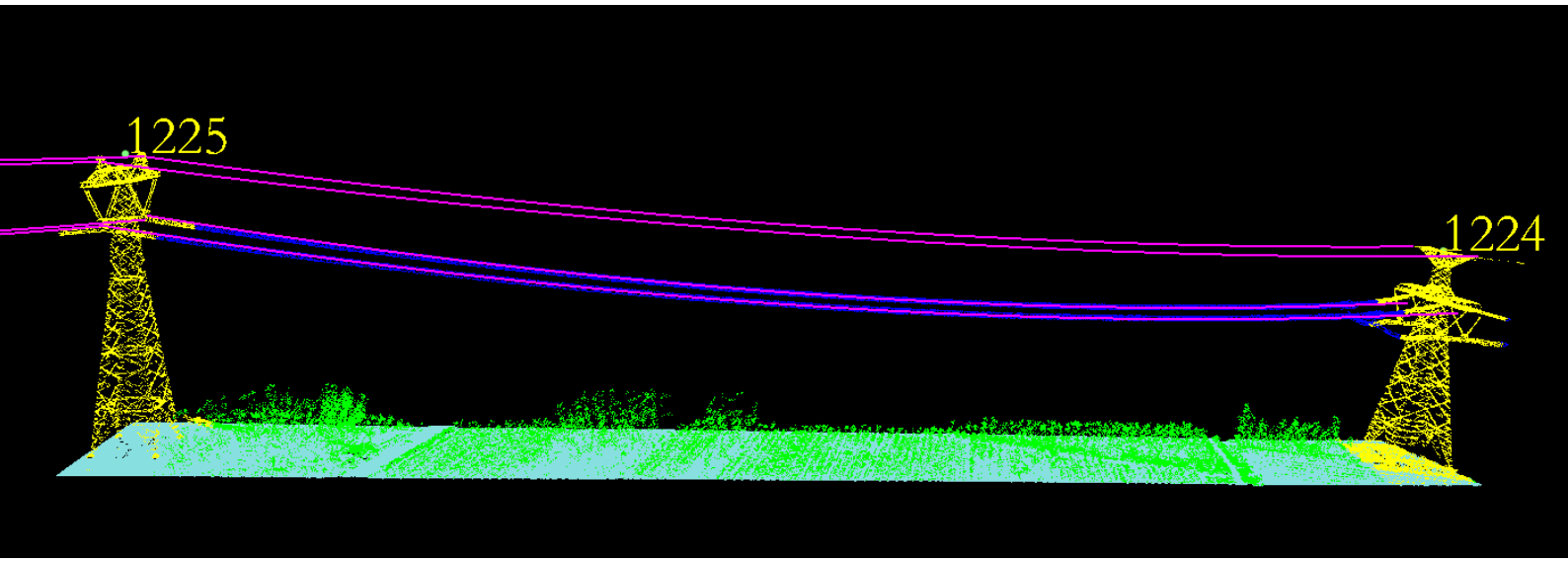
b) 3D Measurement

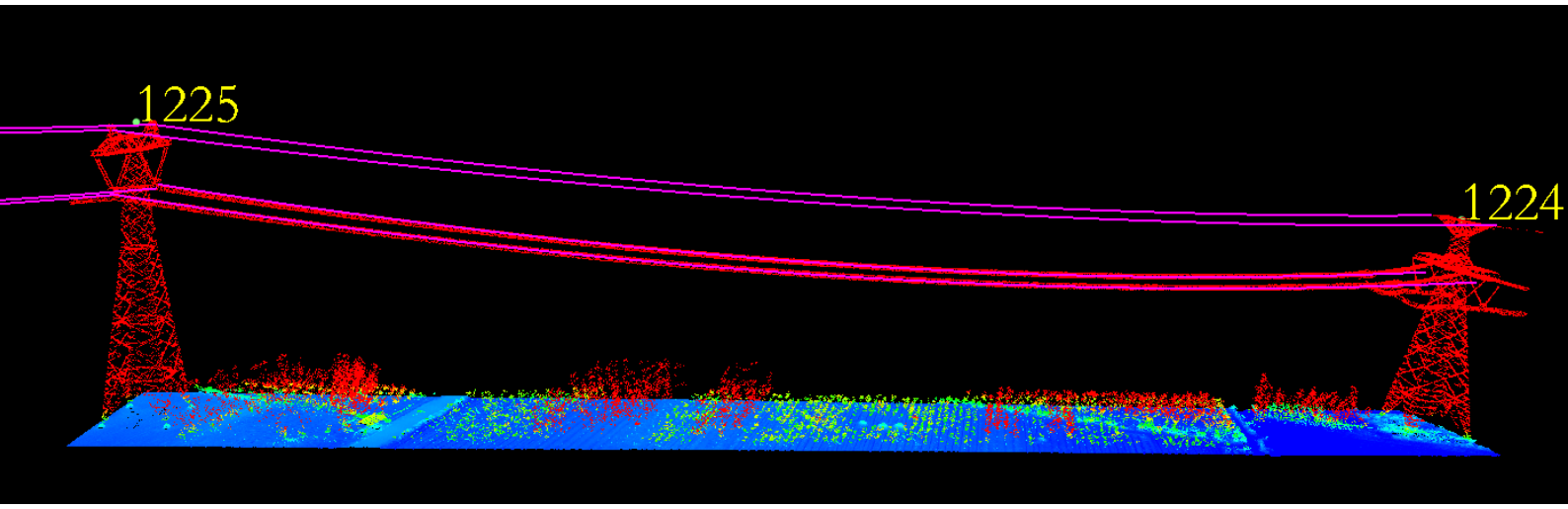
A point cloud measurement module that includes length, area, thickness, density, angle, etc. Complete the measurement easily and quickly.



c) Ground Filter and Classification

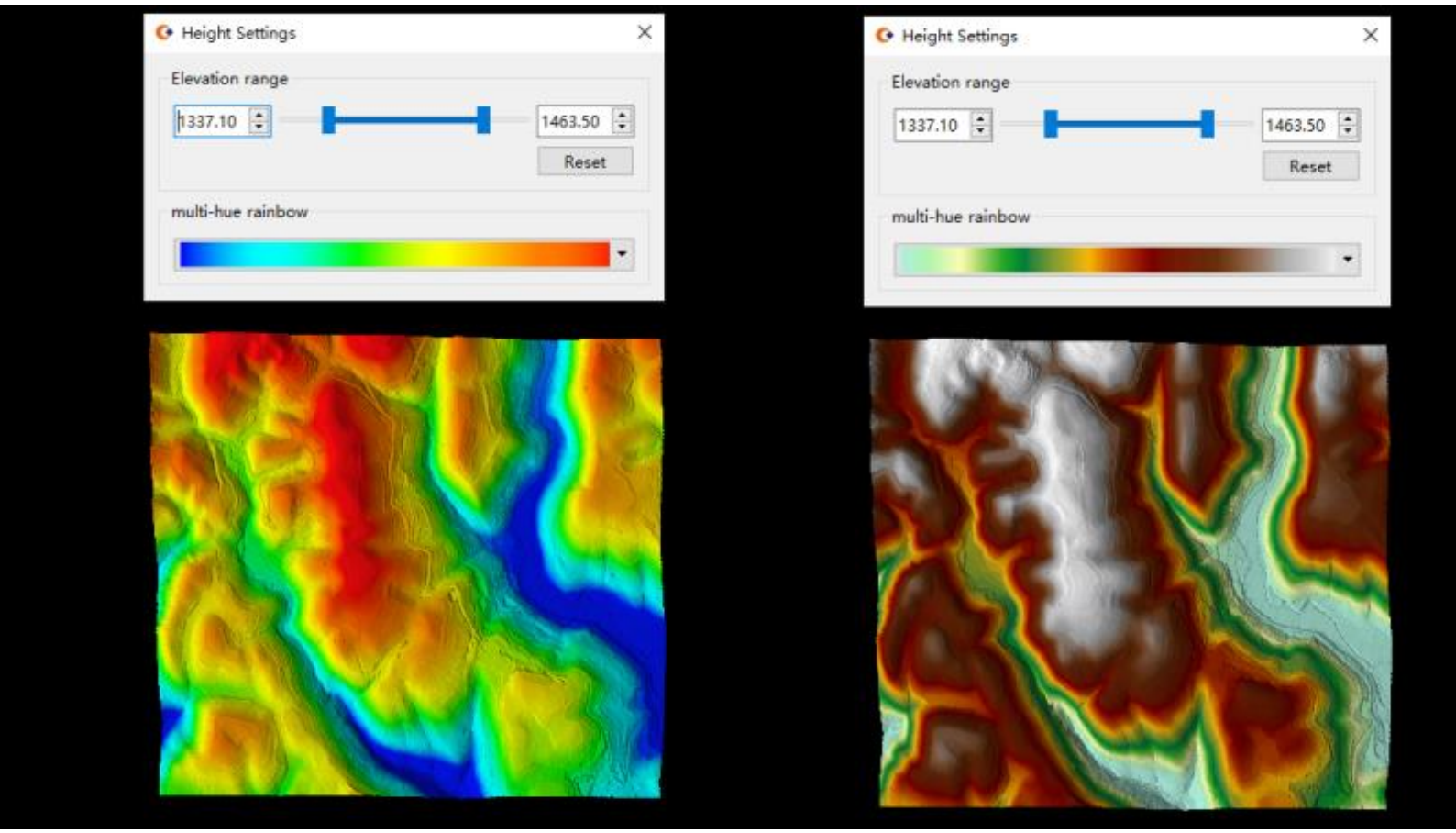
The powerful ground filter and classification function can classify point cloud data into ground point, power line point and surrounding object point. This feature enables automatic data processing and saves considerable time.





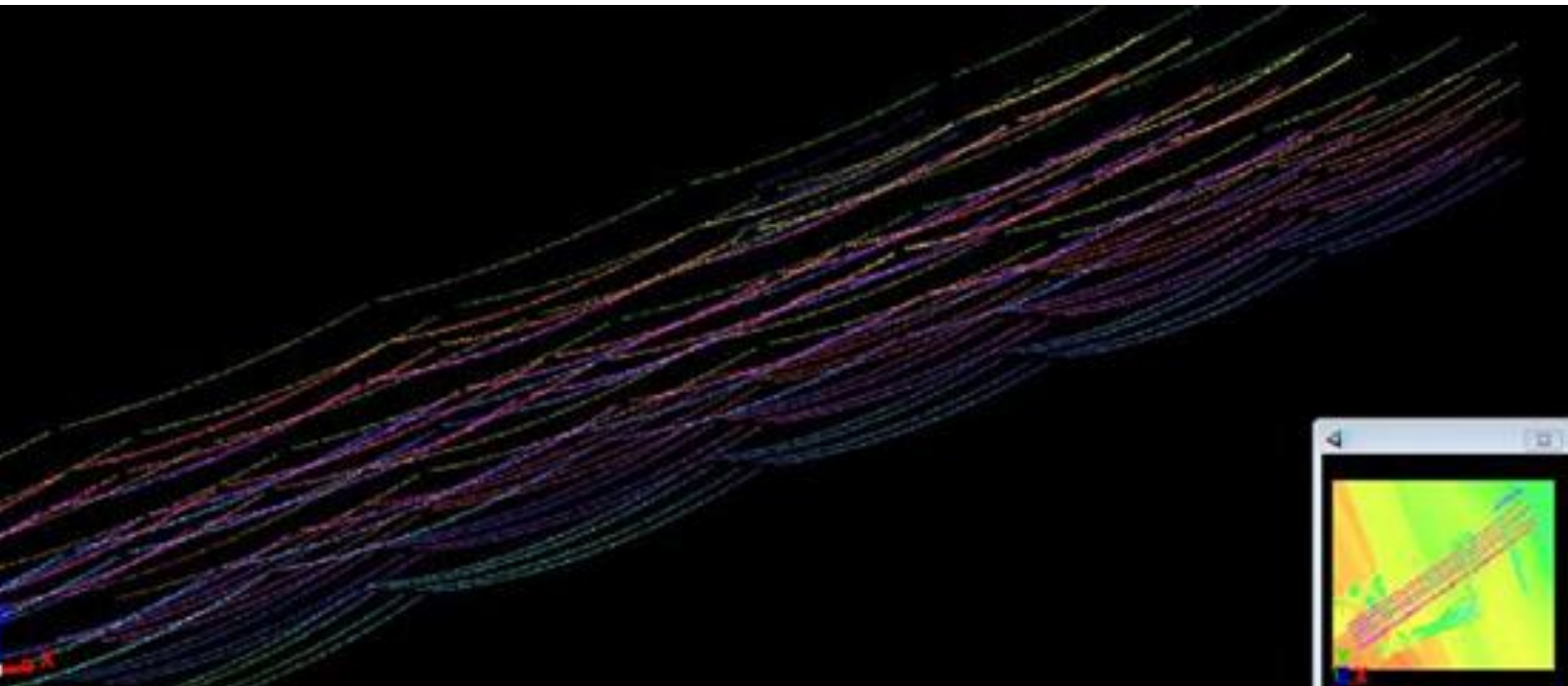
d) DEM and DSM

CoProcess also supports automatic DEM and DSM extraction based on classified point cloud data.



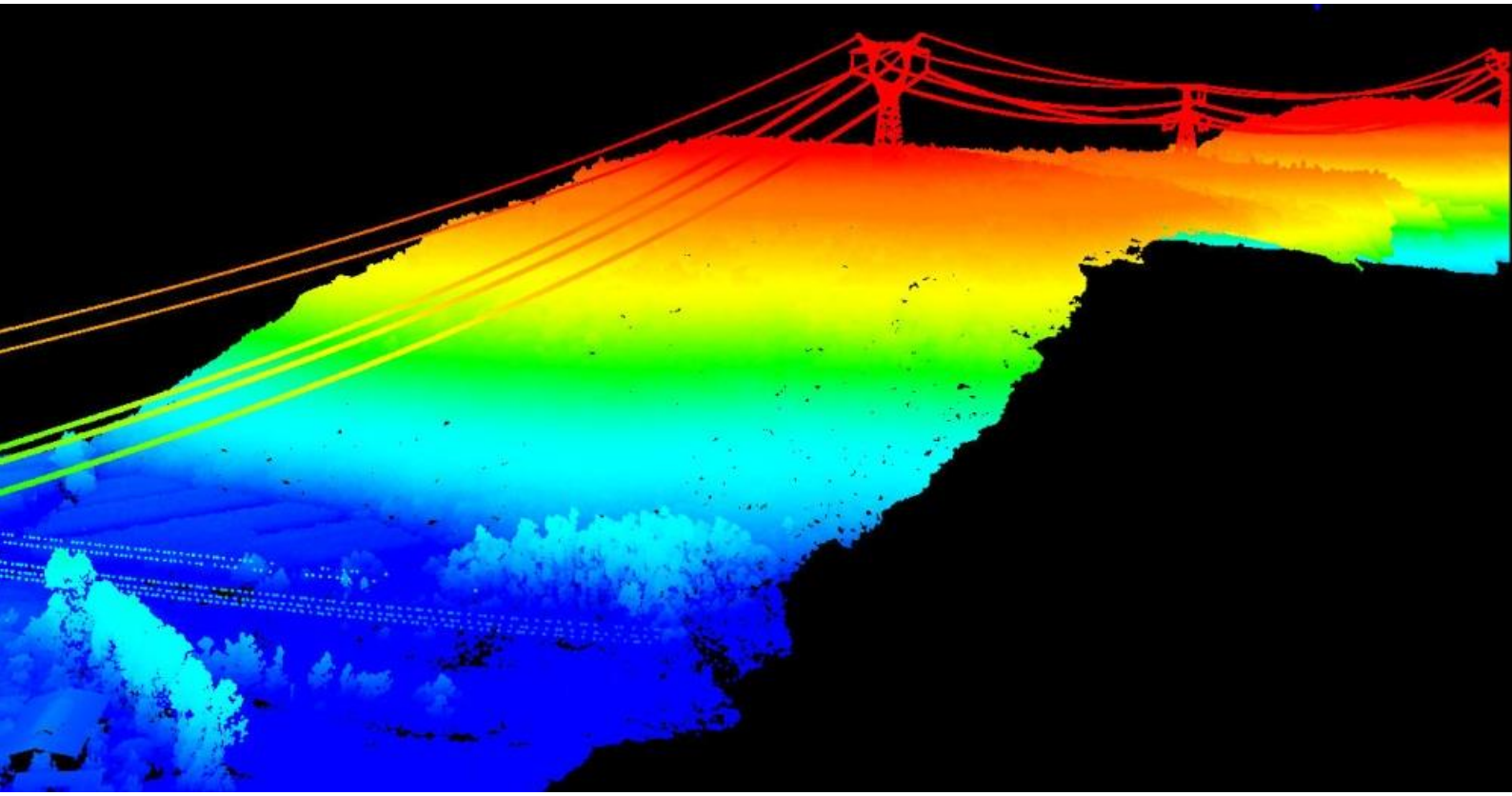
e) Power Line Extraction

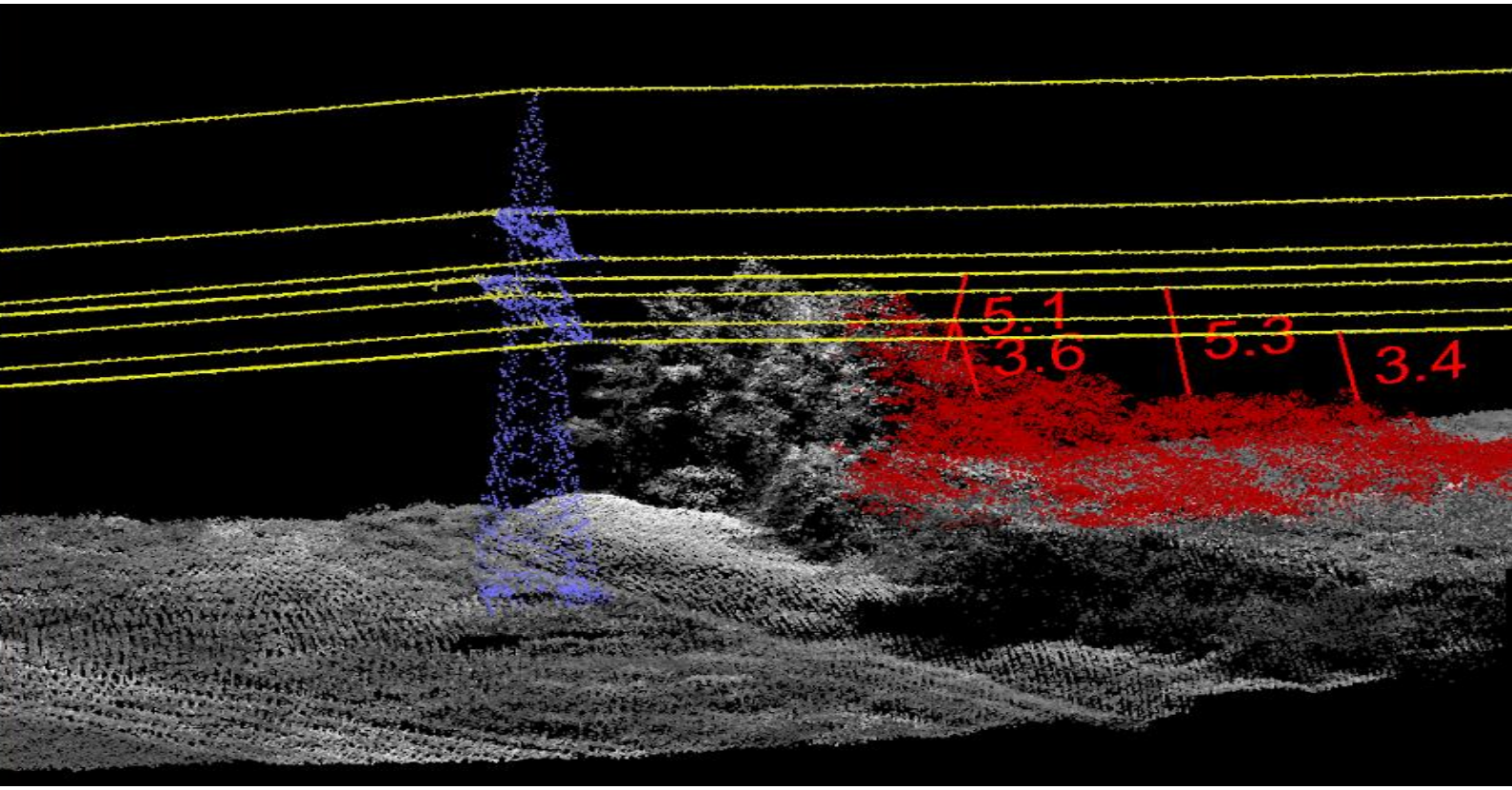
The software supports manual and semi-automatic power line extraction, which allows power line data to be extracted from a large number of points. After extraction, it can perform additional automated detection and export the vectorized result.

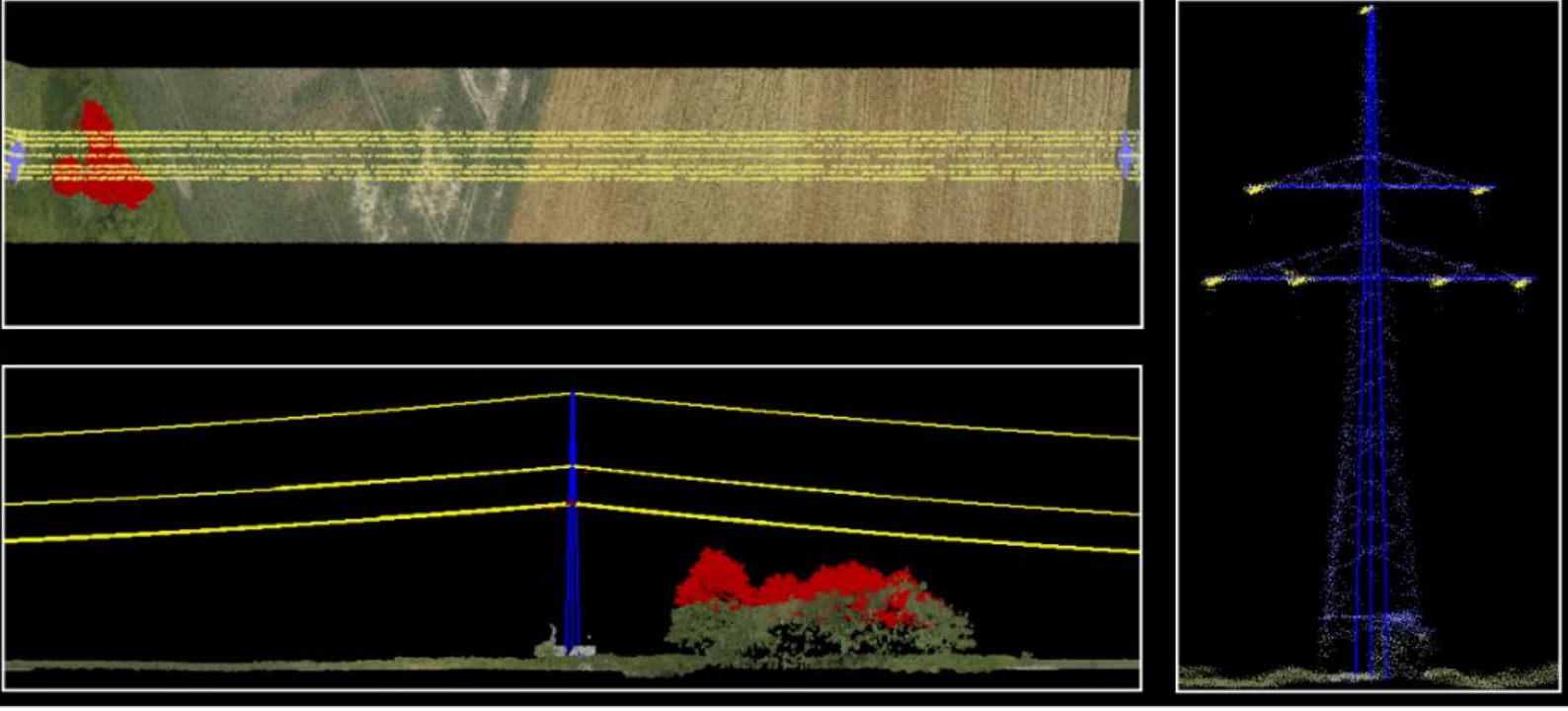


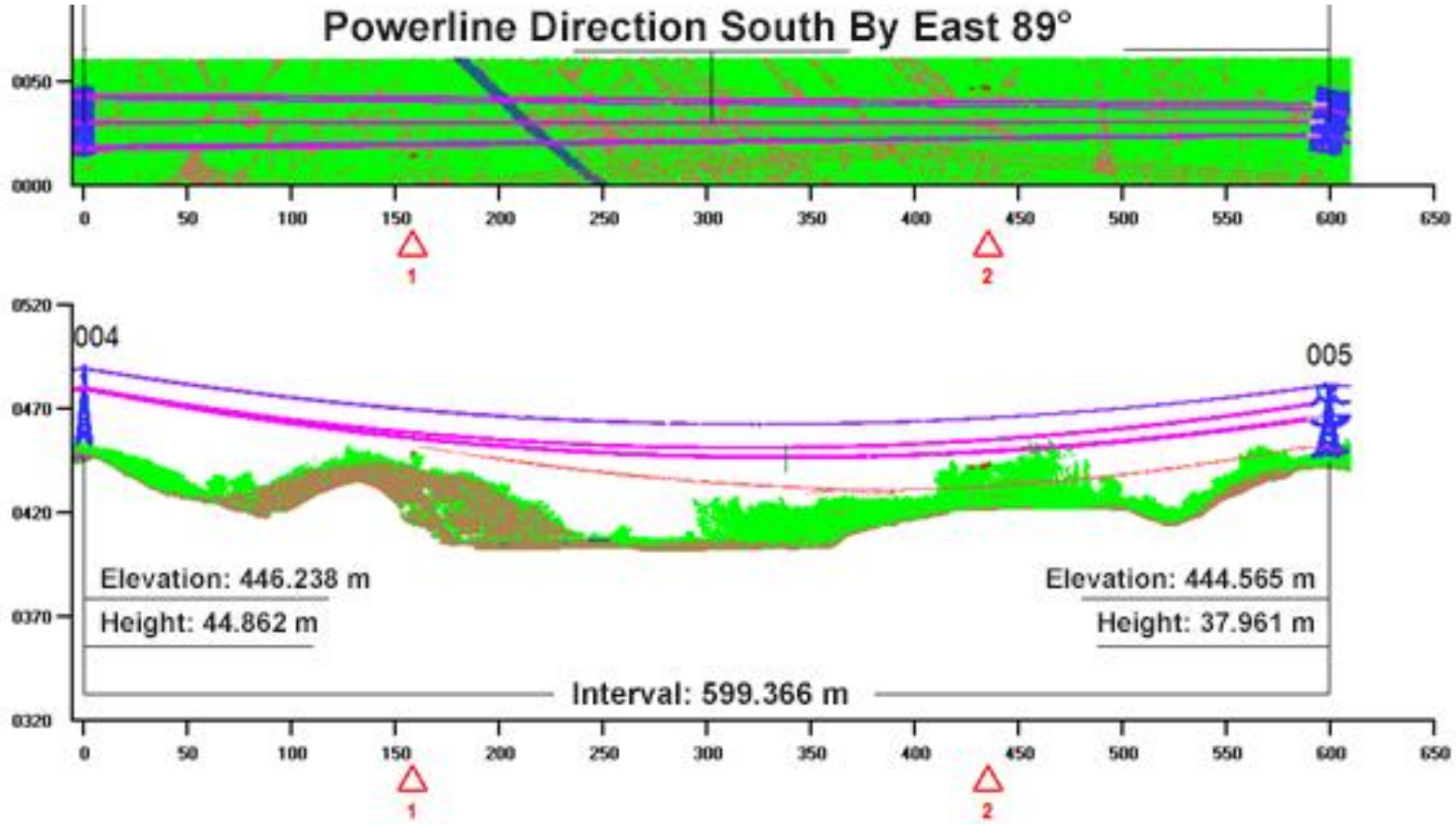
f) Analyze Result Export

CoProcess can export the obstacle detection analysis report, vegetation growth forecast and completion acceptance report in HTML and MS WORD format. It can automatically detect the data according to the parameters and if they do not meet the requirements, it will warn you and export a statistical graph for analysis.








Powerline Direction South By East 89°
0050
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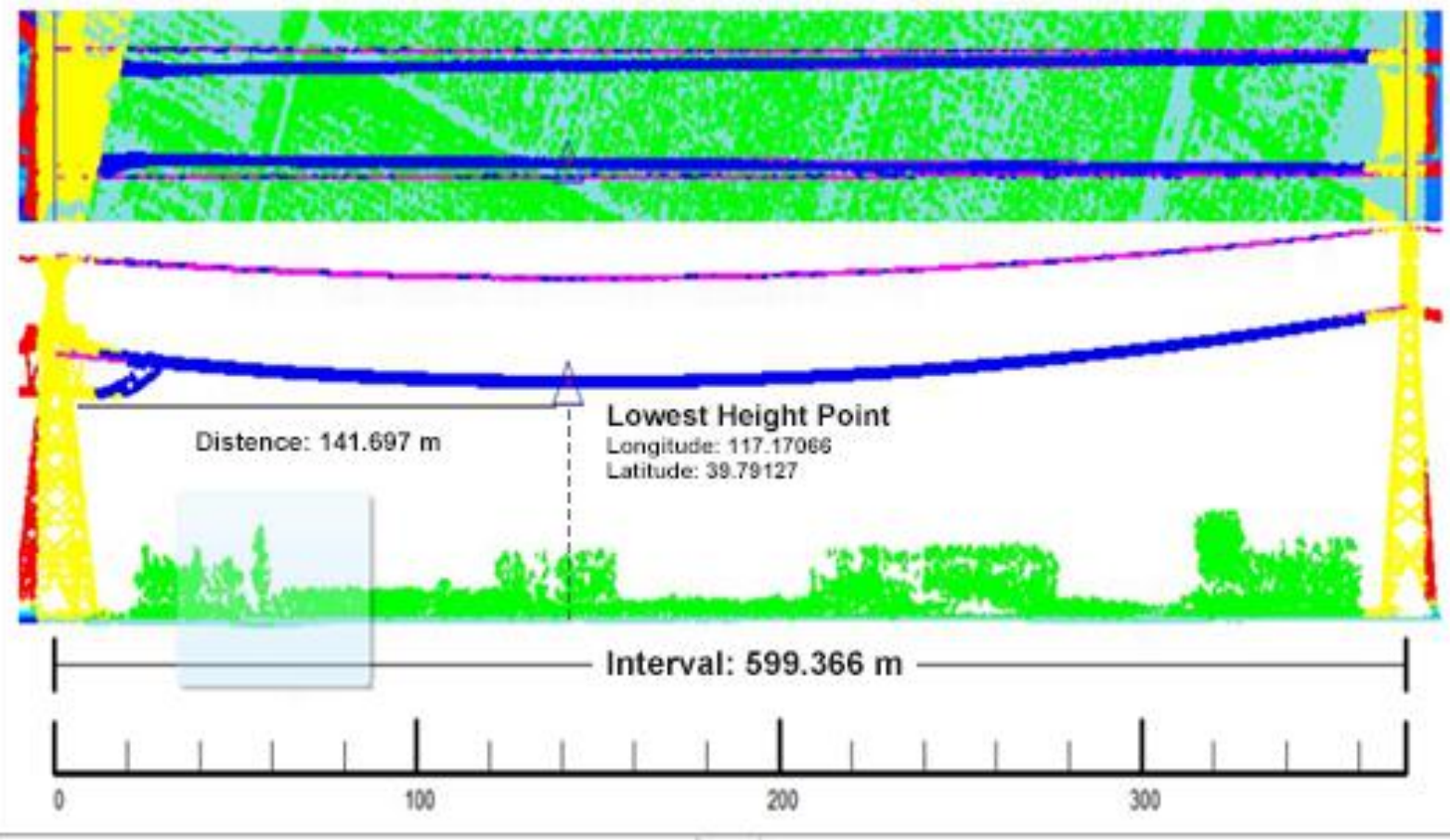
0 50 100 150 200 250 300 350 400 450 500 550 600 650
1
2
0520
0470
0420
0370
0320
004
005
Elevation: 446.238 m
Height: 44.862 m
Elevation: 444.565 m
Height: 37.961 m
Interval: 599.366 m
0 50 100 150 200 250 300 350 400 450 500 550 600 650
1
2

1224_1225 Cross-section Diagram



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