Geosys Reality Capture Solution

Presented By

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MRICS, MHKIES, MSc in Geomatics

Chief Technology Officer / Land Surveyor

Expert Review Panel / Co-Founder

Geosys Reality Capture Solution 2020

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About Geosys Hong Kong Ltd / 香港吉歐系統有限公司

Geosys Hong Kong Limited (Geosys) was founded in 2009 in Hong Kong, and it is well known as a leading innovative geospatial technology research and development company in the Greater Bay Area now. In the past 10 years, Geosys successfully delivered many enterprise GIS systems and advanced 3d surveying solutions to government departments, public and private companies in Hong Kong and China.

Geosys is specialized in enterprise BIM and GIS integrated 3D cloud-based solutions and it is adopted by Planning Department, Urban Renew Authority, Hong Kong International Airport, Civil Engineering and Development Department, Highways Department, Lands Department of HKSAR Government, as well as contractors, consultants such as Arup, AECOM, Buildking, CLP, CIC etc. in Hong Kong, and Huawei （華為）, Shenzhen Urban Planning and Land Information Center （深圳市規劃國土房產信息中心）, Guangdong Urban & Rural Planning and Design Institute（廣東省城鄉規劃設計院）, etc. in Guangdong Province.

Our services include data capturing and modeling like Remote Sensing, Aerial/UAV Photogrammetry, Point Cloud Scanning, Mobile Mapping and professional Services for enterprise BIM+GIS platform system design, development, delivery and support. Geosys has 14 full time professional staff in Hong Kong with at least a Master Degree in Geospatial / IT discipline and professional memberships in Surveying and IT institutions, and around 20 supporting staff in Shenzhen for system development and administration.

Geosys flagship product, the VR3D™ GIS+BIM Platform System has been a pre-approved Advanced Technology listed in CITF (construction innovation and technology fund) under CIC (Construction Industry Council) since Oct 2018 and it is now widely used in Construction Projects in Hong Kong as a BIM+GIS cloud platform to manage BIM, GIS and 3D Surveying, IoT monitoring data such as Reclamation Data Management System (Contract 3115) of HKIA 3rd Runway, Tung Chung New Town Extension Reclamation Data Management system for BuildKing and AECOM, BIM+GIS+Photogrammetry data management system for Cross Bay Link project for CRBC（中國路橋）, etc..

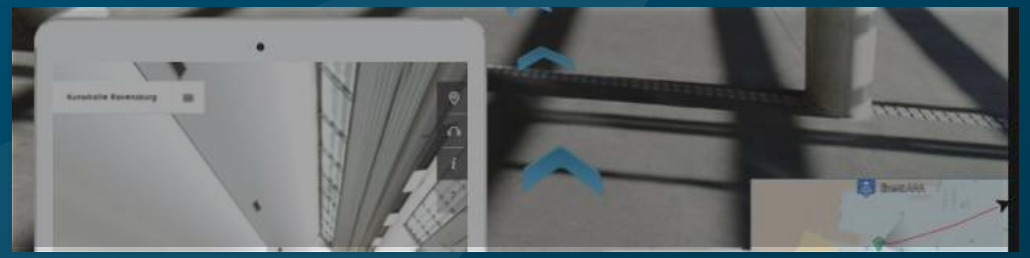
Mixed Reality Common Data Application Solution
By Geosys Hong Kong Ltd

Capture from the outside

By Aerial photo and LiDAR from UAV and Aircrafts, Videos, Streetview, LiDAR from Vehicles, Government 3D Data, Satellite Images, IoT sensors and Movement Markers, GNSS trackers etc

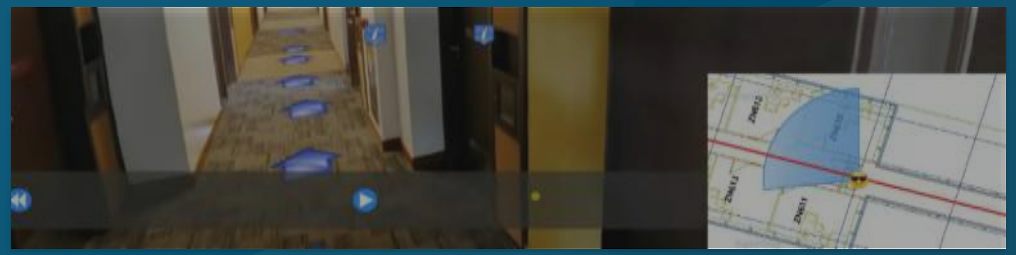
Data Capture from Indoor

Use existing floorplan, as-built BIM models, 720° Panoramic Images, indoor images, 3D Laser scanner, IoT devices, A.I. CCTV Cameras, etc



Common Spatial Data Environment

Use common spatial data standard to import, index and integrate existing world reality data into a common platform for data storage, management, tiling and catching, indexing and data dissemination to different platforms via HTTPs and Steaming APIs



Industrial Application and Solutions

Provide Spatial data visualization and analysis functions support to other application platforms by API and Widgets for further smart applications such as Construction Management, Environmental management, Architecture design, City Planning etc.

Professional Services for Government and public organizations in Hong Kong

UAV Reality Capture

The latest commercial drone platform by combining intelligence with high performance and unrivaled reliability

Camera Specification

QTY of Lens	5 pcs	Material	CNC aluminum alloy
Focal Length	35 mm	Size	140 x140 x 80 mm
Effective Pixels	24.3MP, total pixels≥120MP	Weight	≤ 650 g
Sensor Size	APS-C (23.5mm x 15.6mm)	Data Reading	USB3.0 Type-C
Lens Angle	45 degree	Data Preprocessing	SHARE Data Manager
Exposure Interval	≥0.8 s	Real-time Image Transmission	PSDK Supported
Storage	1280 GB	Real-time Kinematic	Supported
Power Supply	SkyPort / J30J	Intelligent Temperature Control	Supported
Power On / Off	Auto On / Off	OLED	Supported
Operating Temperature	-10℃~50℃	One Key Reset / Repaire	Supported
Humidity	95%	Firmware Upgraded	Upgrade online

BST – Certificate of Compliance

BST A RELIABLE TESTING FOR TRUST

Certificate of Compliance

Certificate No. : BSTXD2003147702O1EC

Applicant : SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
Room 502, Building 6B, Taihua Wutong Industrial Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen

Manufacturer : SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
Room 502, Building 6B, Taihua Wutong Industrial Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen

Product Name : AERIAL OBLIQUE CAMERA
Main Test Model : PSDK 102S
Additional Model : PSDK 101S, SHARE 101S, SHARE 102S, SHARE 102Spro, SHARE 202S

Test Standard : EN 55032:2015
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 55035:2017

As shown in the Test Report No. : BSTXD2003147702O1ER

The EUT described above has been tested by us with the listed standards and found in compliance with the council EMC directive 2014/30/EU. It is possible to use CE marking to demonstrate the compliance with this EMC Directive.
The certificate applies to the tested sample above mentioned only and shall not imply an assessment of the whole production.

CE

Christina Dong
Manager
Mar. 26, 2020

BST Testing (Shenzhen) Co.,Ltd.

BST A RELIABLE TESTING FOR TRUST

Supplier's Declaration of Conformity

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference

Certificate Summary

Applicant	SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
Address	Room 502, Building 6B, Taihua Wutong Industrial Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen
Manufacturer	SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
Address	Room 502, Building 6B, Taihua Wutong Industrial Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen
Test standard	FCC Part 15 Class B
Product Type	AERIAL OBLIQUE CAMERA
Main Test Model	PSDK 102S
Additional Model	PSDK 101S, SHARE 101S, SHARE 102S, SHARE 102Spro, SHARE 202S
Certificate Number	BSTXD2003147702O2EC
Report number	BSTXD2003147702O2ER
Issuance Date	2020-03-26
Tested by	BST Testing (Shenzhen) Co., Ltd.
Signature of Officer	Christina Dong -Certification Manager

We the responsible party:
SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
declare that the product
AERIAL OBLIQUE CAMERA

FC

was tested to conform to the applicable FCC Rules and regulations. The method of testing was in accordance to the most accurate measurement standards possible, and that all necessary steps have been enforced to assure that all production units of the same equipment will continue to comply with the Federal Communications Commission's requirements.

Signature _____ Date _____

Name _____ Title _____

BST Testing (Shenzhen) Co.,Ltd.

BST A RELIABLE TESTING FOR TRUST

Certificate of Compliance

Certificate Number: BST2003147702O1CC

Applicant : SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
Room 502, Building 6B, Taihua Wutong Industrial Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen

Manufacturer : SHENZHEN SHARE UAV TECHNOLOGY CO., LTD.
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Test Standard : IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-6:2015, IEC 62321-7-1:2015, IEC 62321-7-2:2017, IEC 62321-8:2017

As shown in the Test Report No. : BST2003147702O1CR

The EUT described above has been tested by us and found in compliance with the council RoHS 2 Directive 2011/65/EU Annex II (EU) 2015/863 as last amended by Directive (EU) 2017/2102. This certificate is only valid in conjunction with the test report.

RoHS

Tony Chen
Approved Signatory
Mar.26, 2020

Dongguan BST Testing Co., Ltd

General deliverables for the aerial reality model capture

- Take Raw Aerial Images with at least 24.3MP Resolution with fixed distance of each location in flight path in JPEG format
  - Raw image must be taken with APS-C Sensor and 35mm Focal Length lens
  - Take Aerial Images in different 5 angles, one in nadir and others in 4 oblique directions with 45 degree.
  - Each image must contain Fixed RTK position with +/- 5 cm accuracy
- Letter of “Permission to Operate Non-Scheduled Service for Hire or Reward UAS” by Civil Aviation Department
- Accuracy report with at least 5 ground check point and RMSE within 10 cm Accuracy in XY and Z direction
- Deliver 3D Point Cloud in LAS (and PLY/E57/XYZ (optional))
- 3D Photo Mesh Reality Model in Open Scene Graph (OSGB) (/3D Tiles/S3M)(optional)
- Digital Surface Model in Geo-Tiff format
- Digital Terrain Model in XYZ/Geo-Tiff format
- Digital True OrthoPhoto in Geo-Tiff / ECW format
- All geospatial data deliver in Hong Kong 1980 grid coordinate system and HKPD

RTK Positioning with Beidou + GPS Support

by Geosys Mount Point Or Lands Department Network RTK Onsite

- RTK GPS locations and Orientation could be written into Images POS for 5 angles
- With the support of Beidou, RTK can be fixed faster than only GPS.
- RTK link to M300 can be more stable than only GPS
- Positioning accuracy will be better using closer reference station.

吉歐系統 GeoSys.org

Permission to Operate Non-Scheduled Service for Hire or Reward UAS

Flight Approval issued from Civil Aviation Department

Application for Operating Unmanned Aircraft System (UAS)
Ref: UAS-202007-0012

I refer to the application submitted on 12 July 2020 for the operations of UAS "DJI Mavic 2" or "DJI M300 RTK" scheduled as follows:-

Date:	**22 July 2020 - 21 October 2020**
Time:	**07:00 – 18:00 (local time)**
Areas:	**1. Hang Kin Street, Ma On Shan**
	2. Wing Tai Road, Chai Wan

Please find enclosed the Permit for use of aircraft for the provision of air service – Unmanned Aircraft System (UAS). According to Article 48 of the Air Navigation (Hong Kong) Order 1995 (CAP. 448 sub. leg. C), a person shall not recklessly or negligently cause or permit an aircraft to endanger any person or property. You must ensure safety of UAS operations at all times and follow the safety parameters specified in Attachment 1. You are responsible for obtaining all the necessary authorisation or permission from other Government Departments, and complying with conditions required by them, before operating the UAS.

Yours sincerely,

(Harry AU)
for Director-General of Civil Aviation

Encl. (2)

Sample Mesh Model

Flight height 110m, GSD 1.72cm, 70%x80%, 12m/s, 9600 effective images

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Sample Mesh Model

Flight height 190m, GSD 2.97cm, 70%x80%, 12m/s, 8600 effective images， 2 flights, 1.5 sqkm

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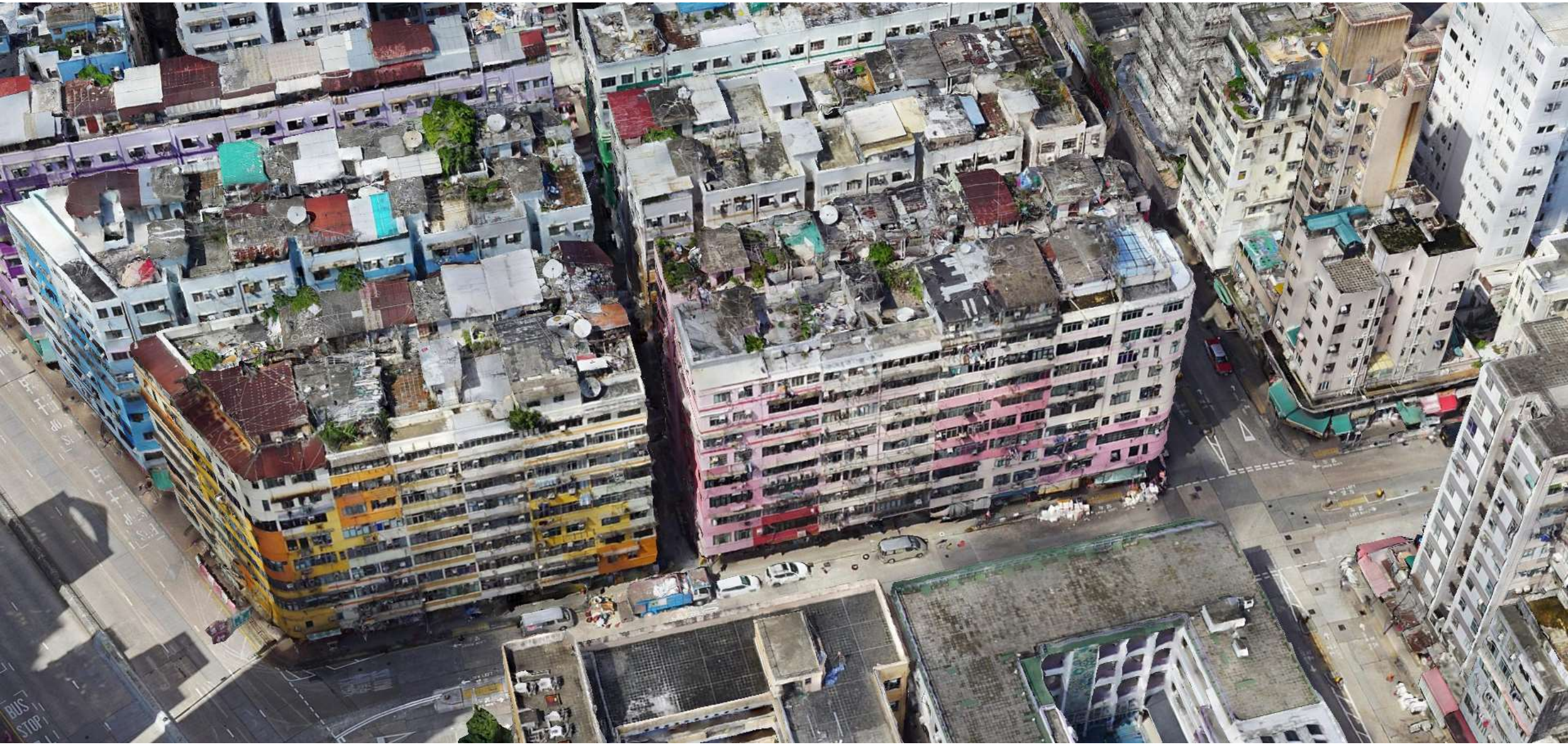

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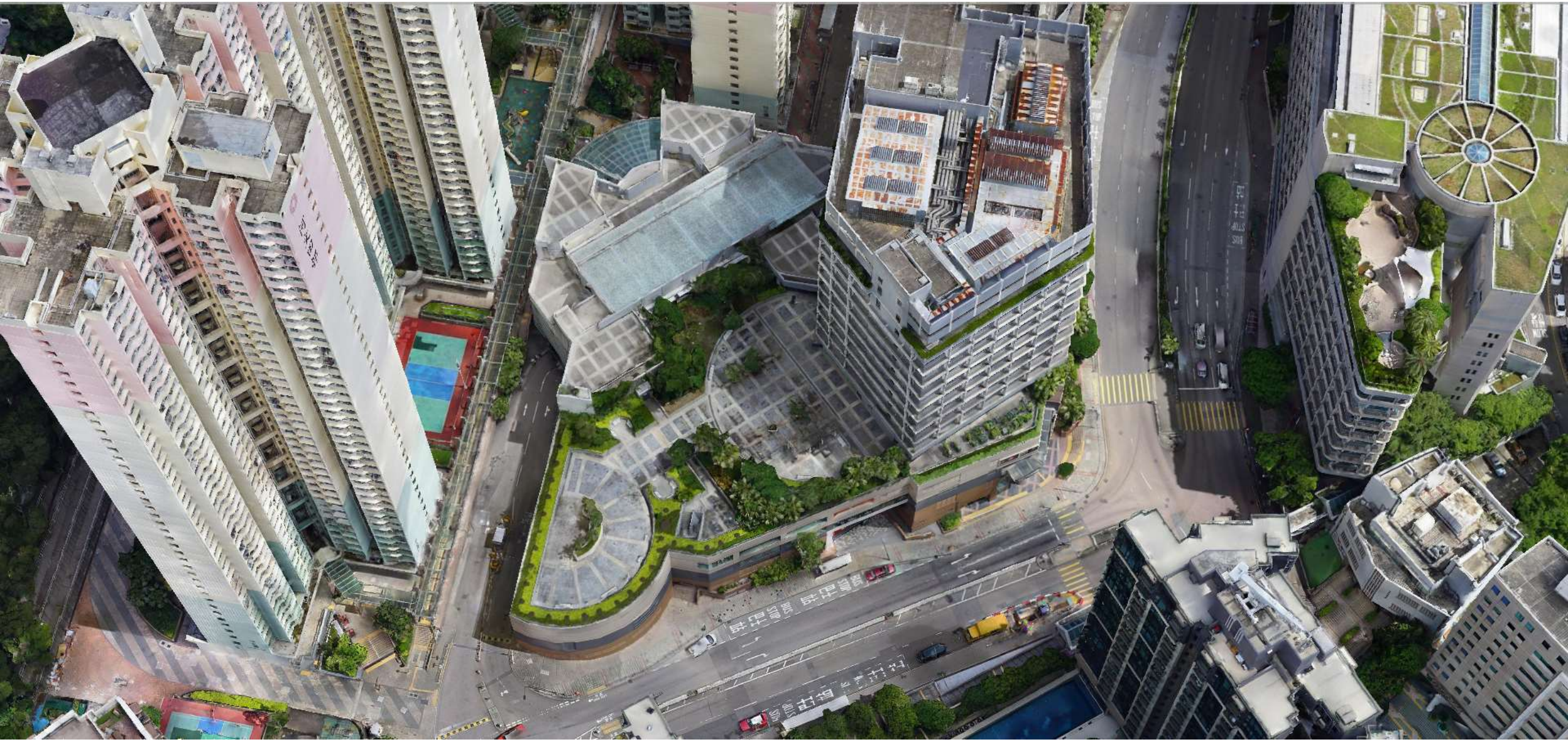


Sample Mesh Model

Flight height 190m, GSD 2.97cm, 70%x80%, 12m/s, 8600 effective images， 2 flights, 1.5 sqkm

UAV LiDAR System

Features

- **Light-weighted** for Drone LiDAR Collection Applications
- **High Quality LiDAR Sensor** with Livox Mid-40
- **High Resolution LiDAR Measurement Data** with 100,000 Points per Second
- **High Performance POS/NAV** for Centimeter-level Accuracy

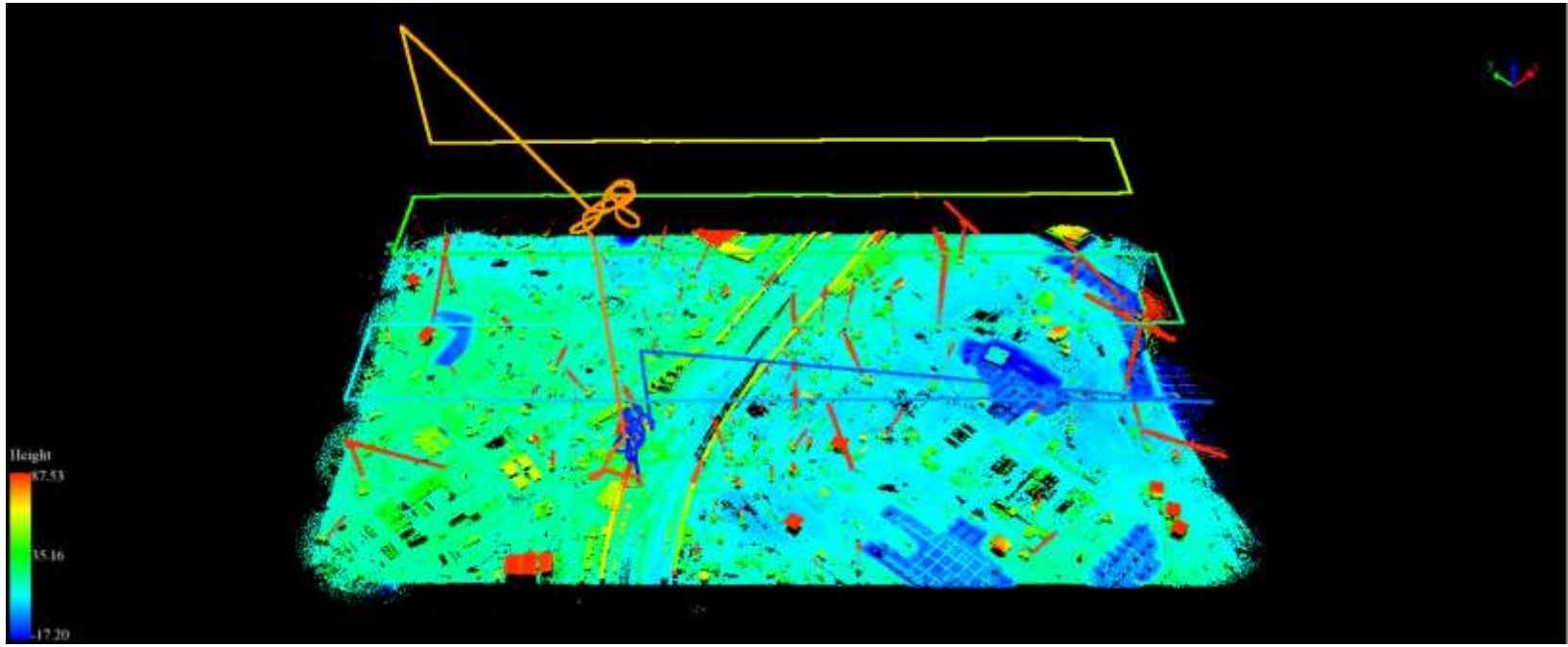
Specifications	
Laser Sensor	Livox Mid-40
Range Accuracy	± 2 cm
Scan Range	90 m @ 10% reflectance
	130 m @ 20% reflectance
	260 m @ 80% reflectance
System Accuracy	± 5 cm
POS System Performance	Attitude: 0.008° (1σ)
	Azimuth: 0.038° (1σ)
Onboard Storage	128 GB
Ports Available	Ethernet
Weight (excl. battery)	1.0 kg
Dimensions (Main Unit)	125*70*116 mm
Route Planning Software	LiPlan (proprietary)
Acquisition/PP POS Software	LiAcquire web & LiGeoreference
Field of View	38.4°
Scan Rate	100,000 pts/s

General deliverables for the aerial laser scanning

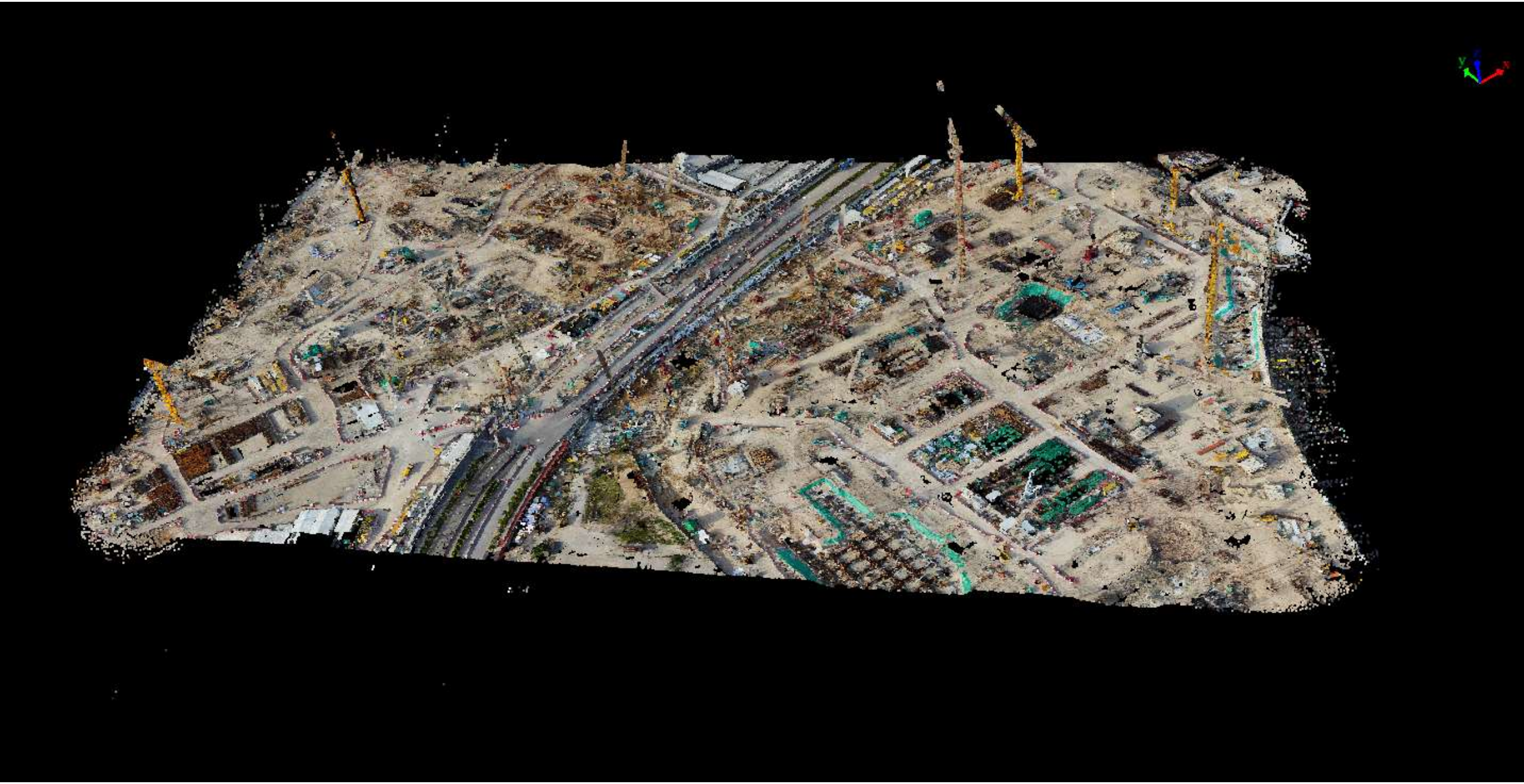
- Capture LiDAR Point Cloud data by UAV Laser Scanner
  - Laser Scanner System Range Measure Accuracy within +/- 5 cm
  - POS system integrates RTK GNSS and High Accuracy IMU system
  - Point Cloud has at least 3 returns
- Point Classification with at least 6 classes : Ground, High/Medium/Low Vegetation, Building, Model Key Point, etc
- Letter of “Permission to Operate Non-Scheduled Service for Hire or Reward UAS” by Civil Aviation Department
- Deliver 3D Point Cloud in LAS (and PLY/E57/XYZ (optional))
- Topographic map in Shp/CAD format
- Digital Surface Model in Geo-Tiff format
- Digital Terrain Model in XYZ/Geo-Tiff format
- All geospatial data deliver in Hong Kong 1980 grid coordinate system and HKPD

UAV LiDAR flight at Kai Tak Sport Park

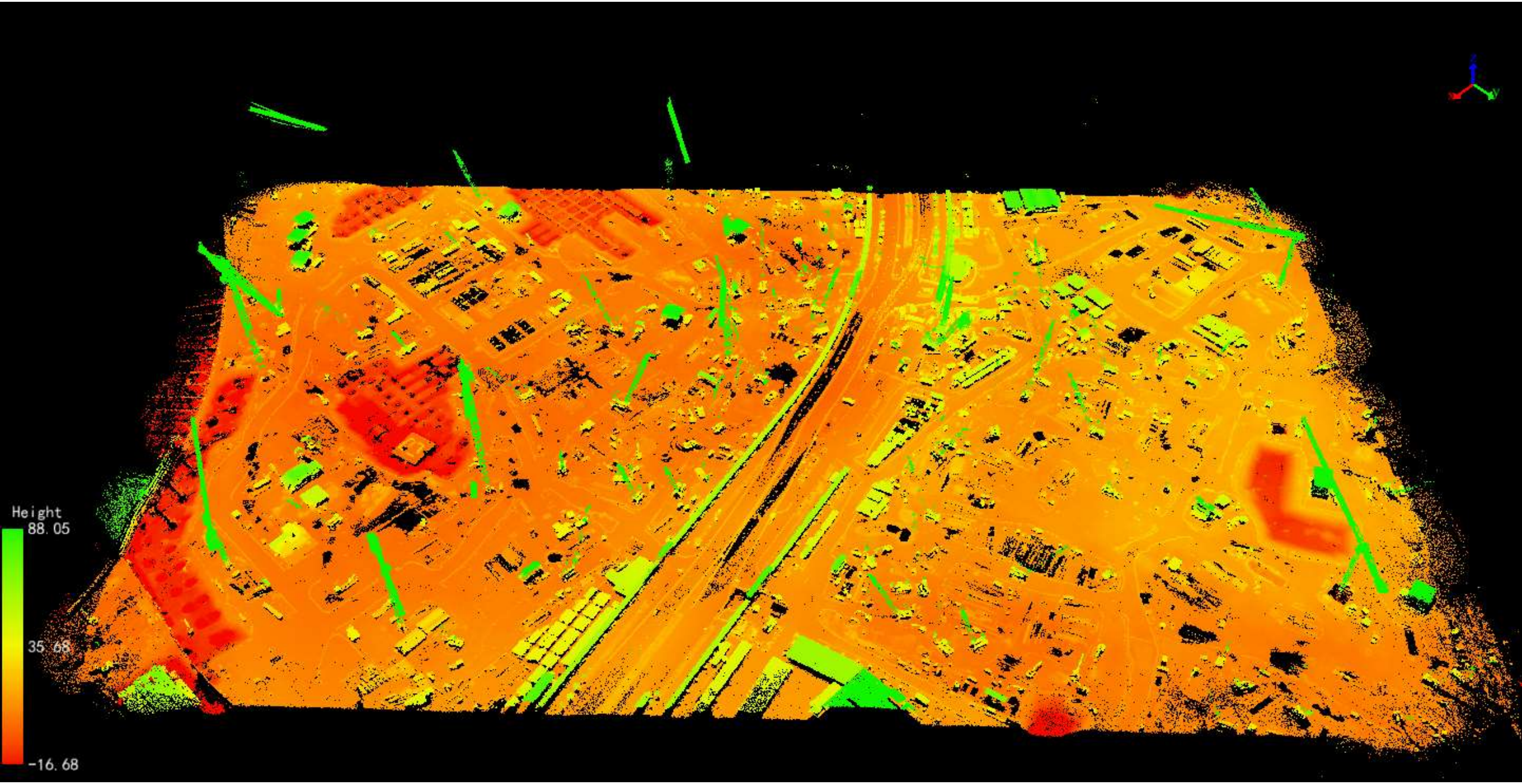
- Flight height : 90m
- Flight speed : 3m/s
- Flight time : 21:30~22:50 PM
- Point Cloud Density : 200~500 points/sqm
- Point Cloud Thickness : 5~10 cm
- Point Cloud Accuracy : 5~10 cm
- Number of Returns : 3
- Flight mode : Manual + Route



Colorized Point Cloud

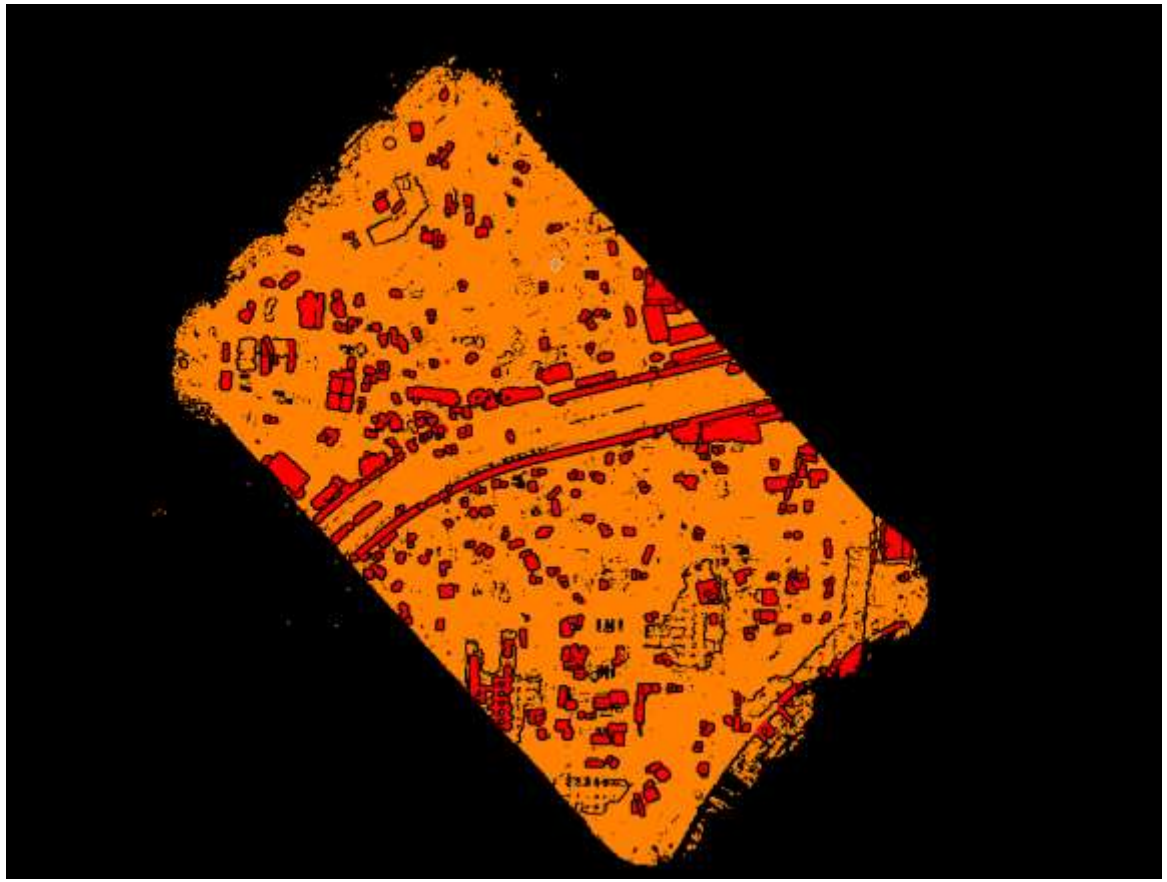


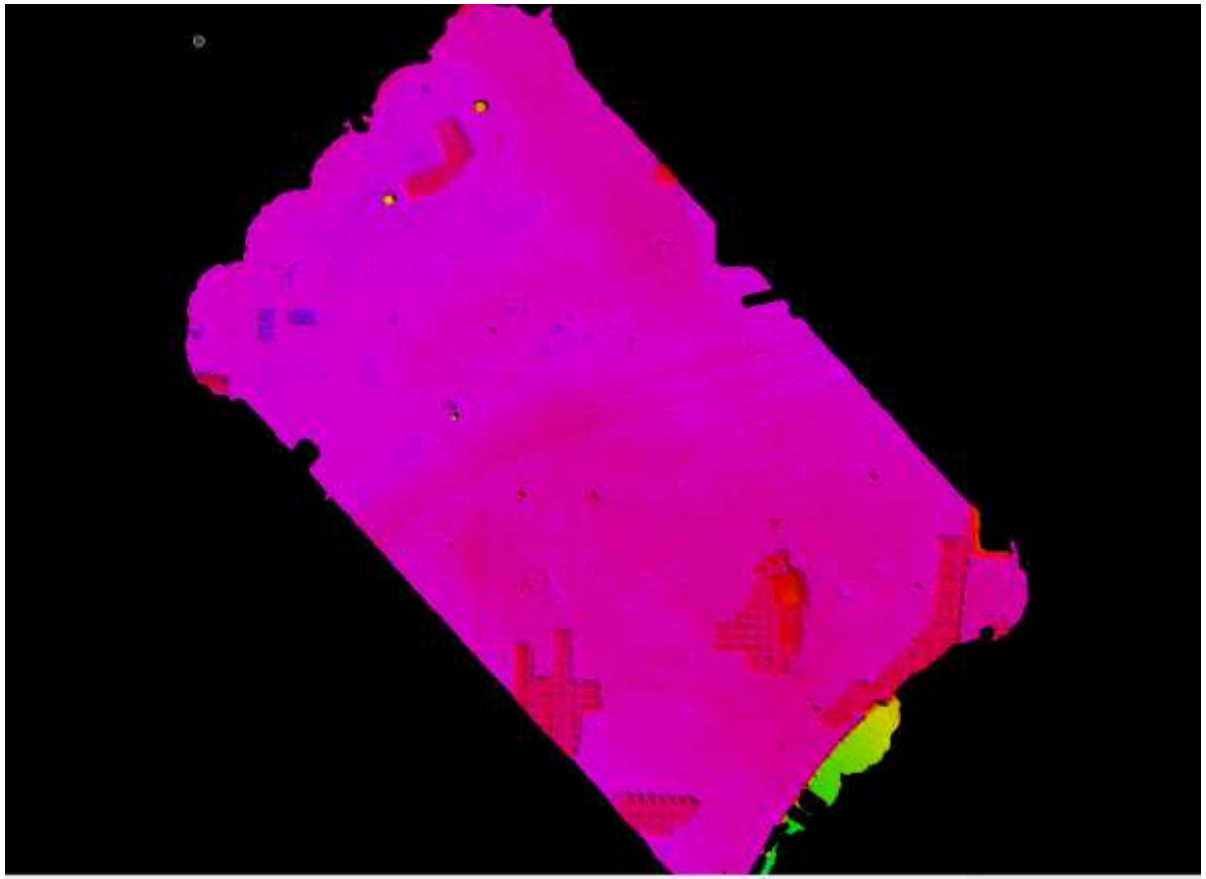
Point Cloud Colored by Elevation



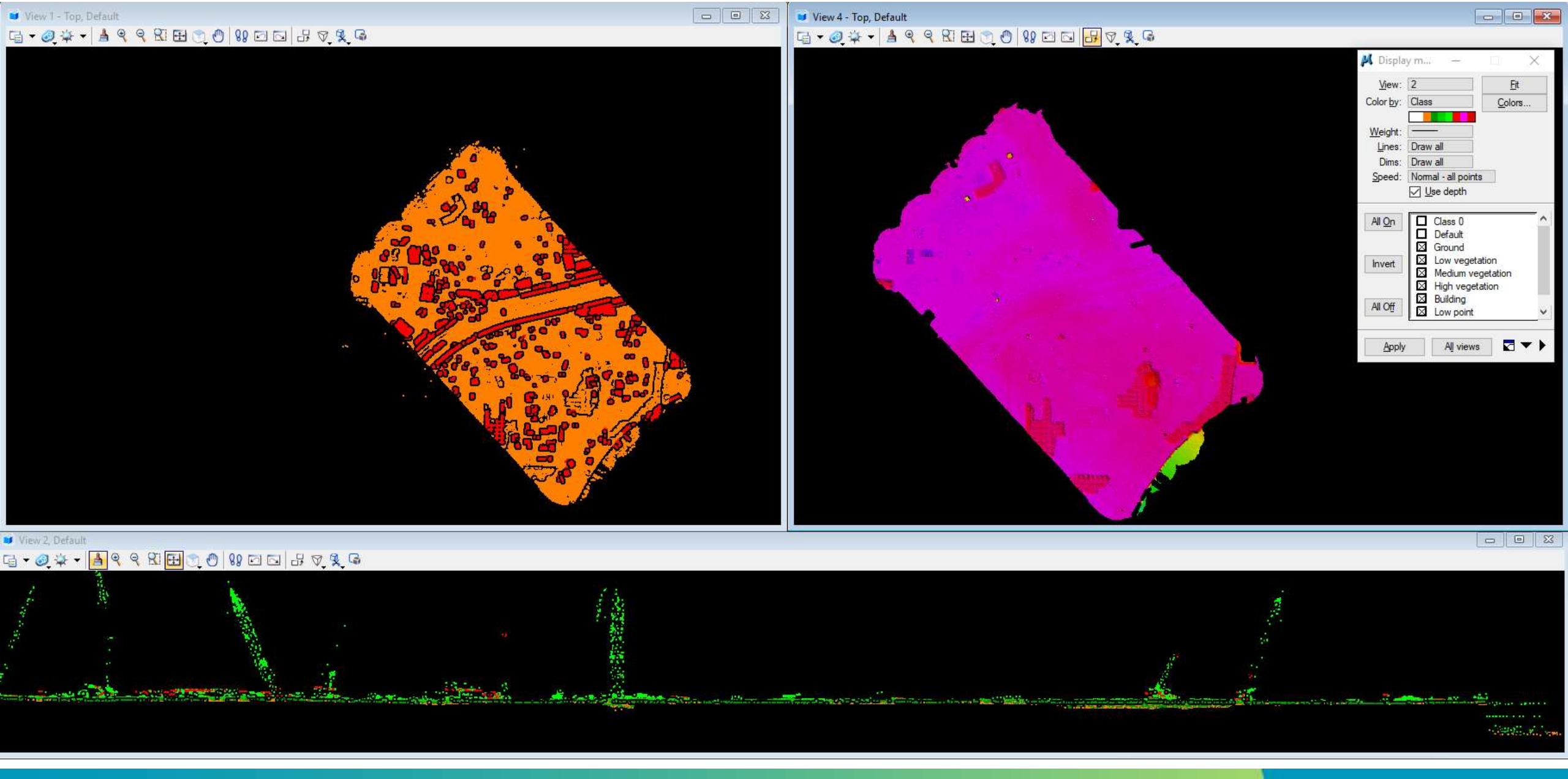
True terrain model by Point Cloud Classification

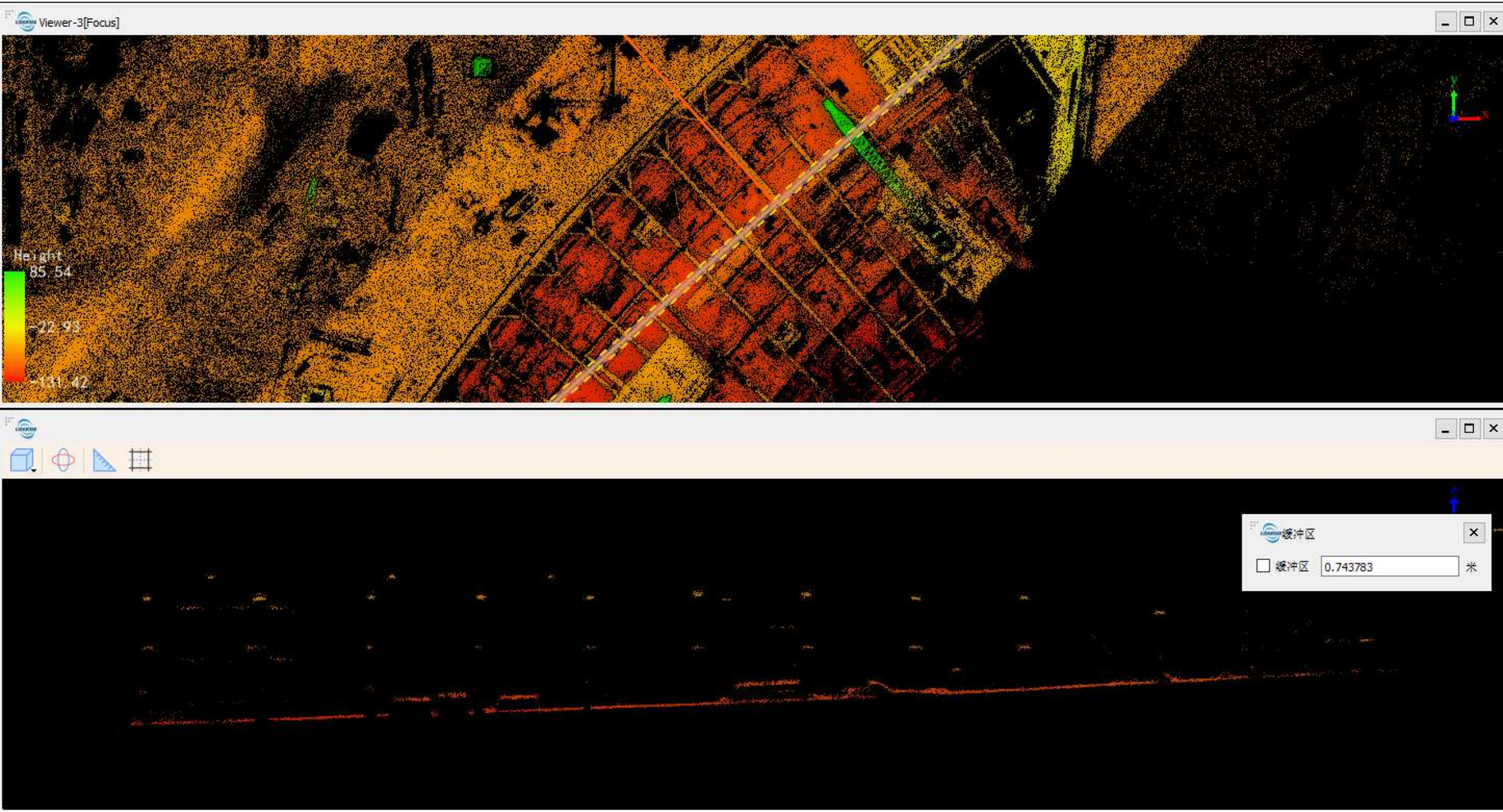
Use Terrasolid TerraSCAN + TerraModeler to build true DTM from editable TIN grid





Editable Point Cloud with Sectional Tools

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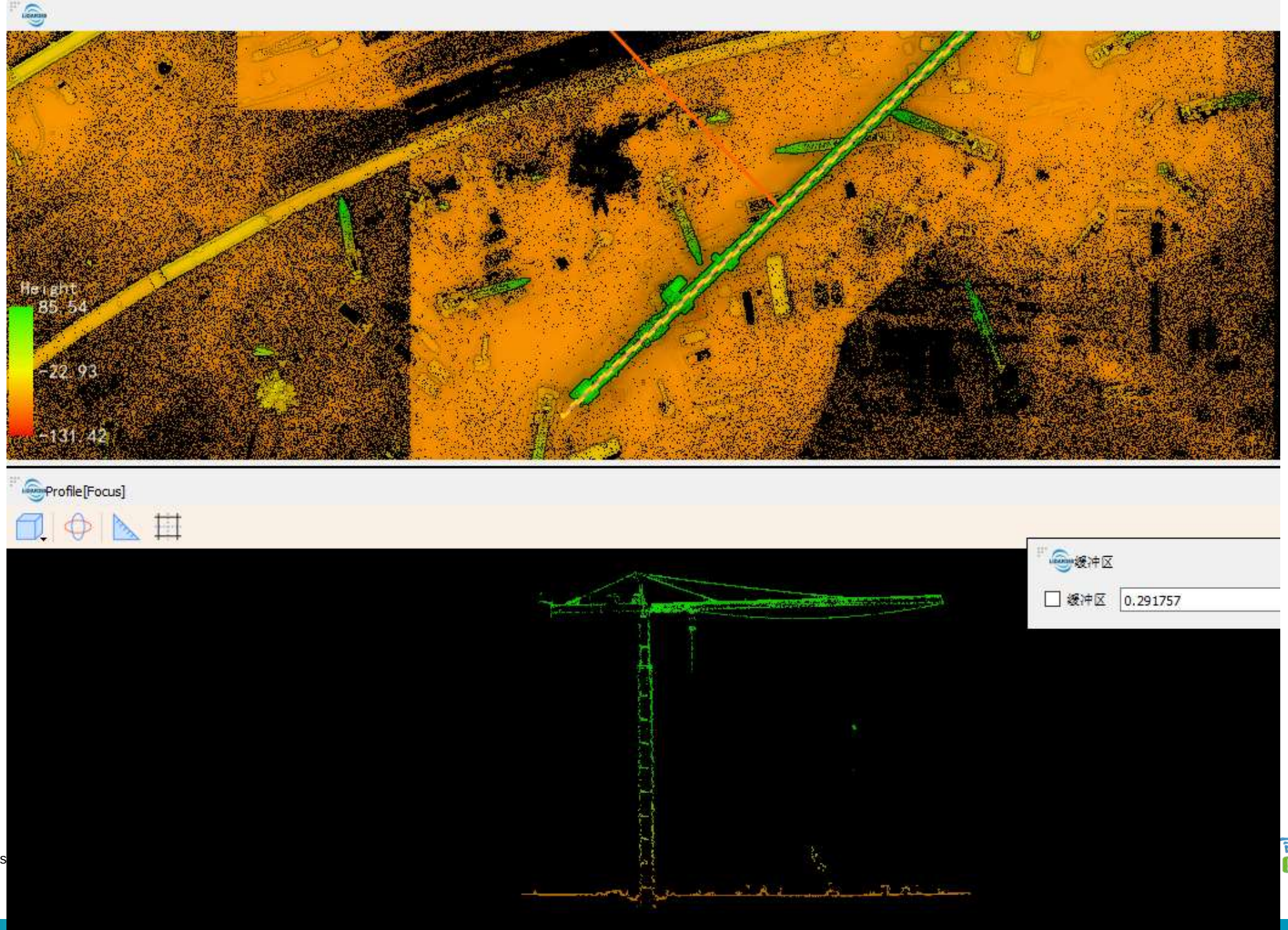

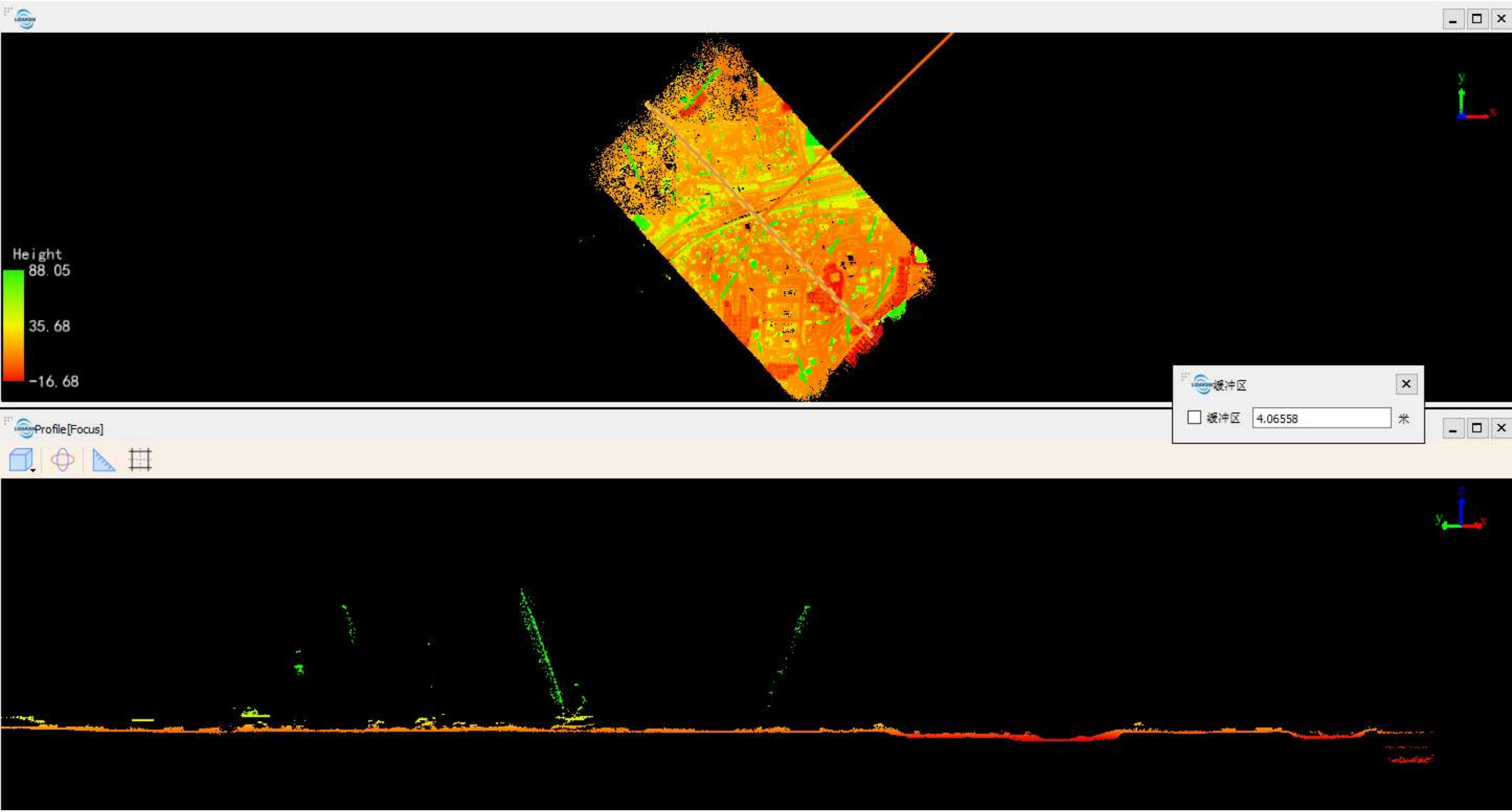
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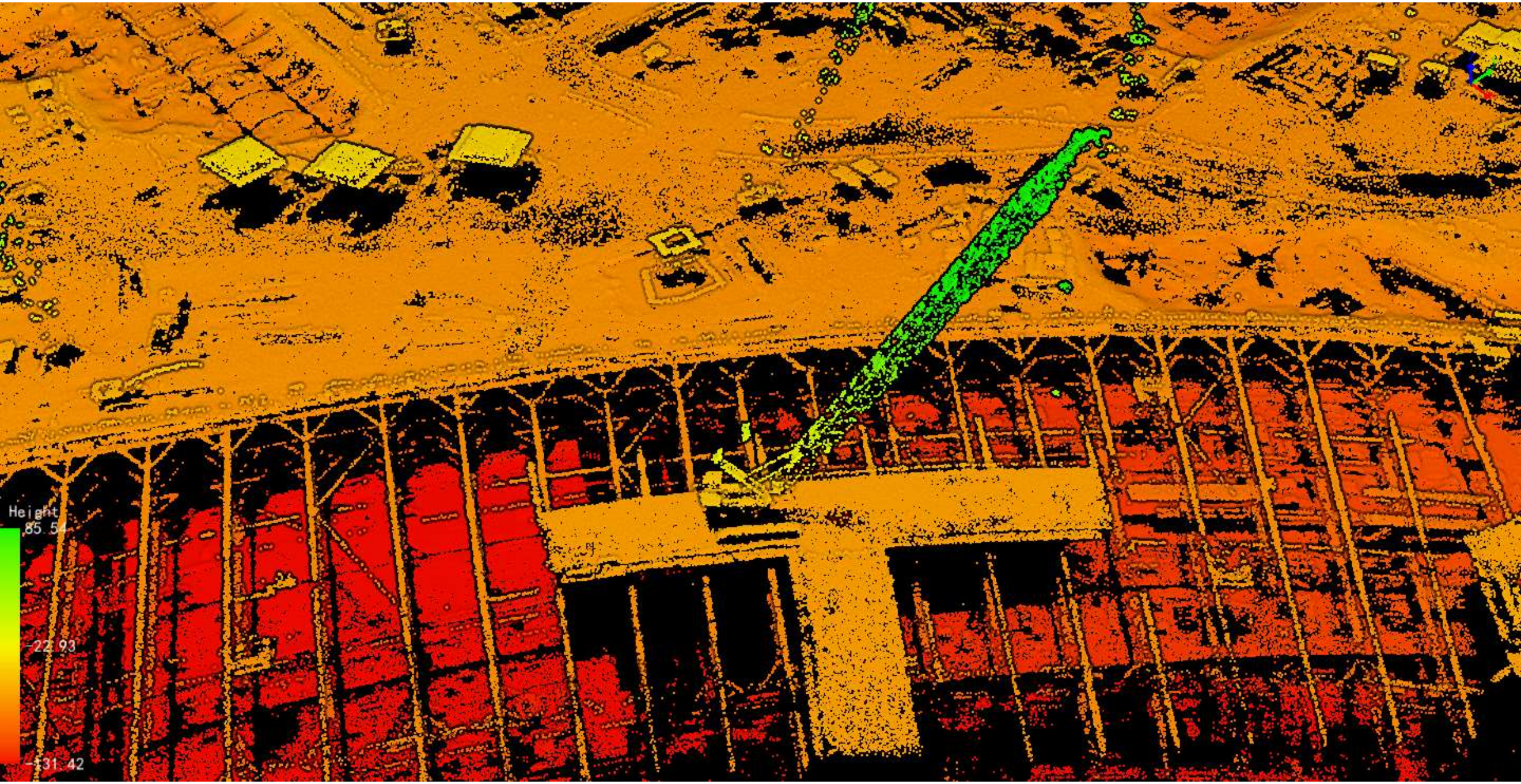
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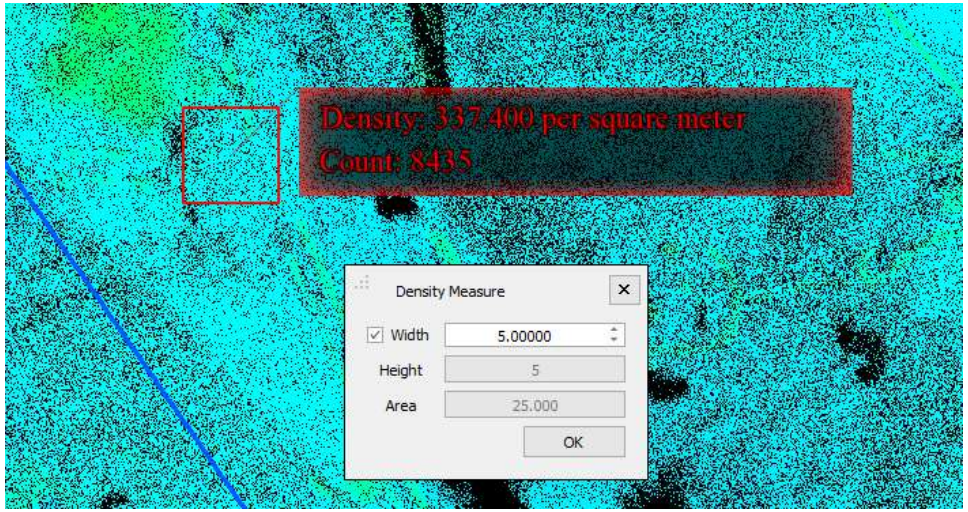
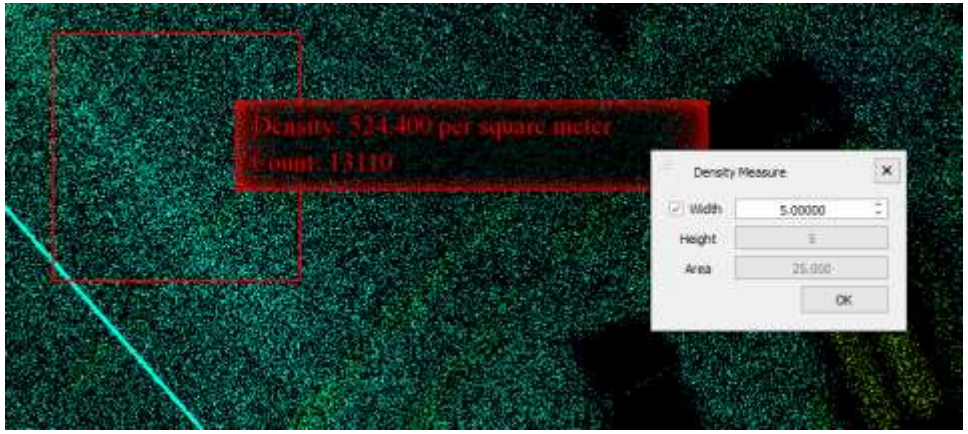
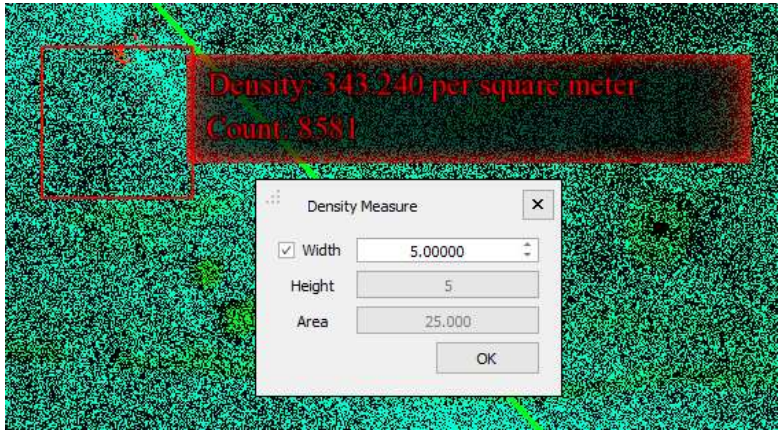
Point Cloud Density Measurement

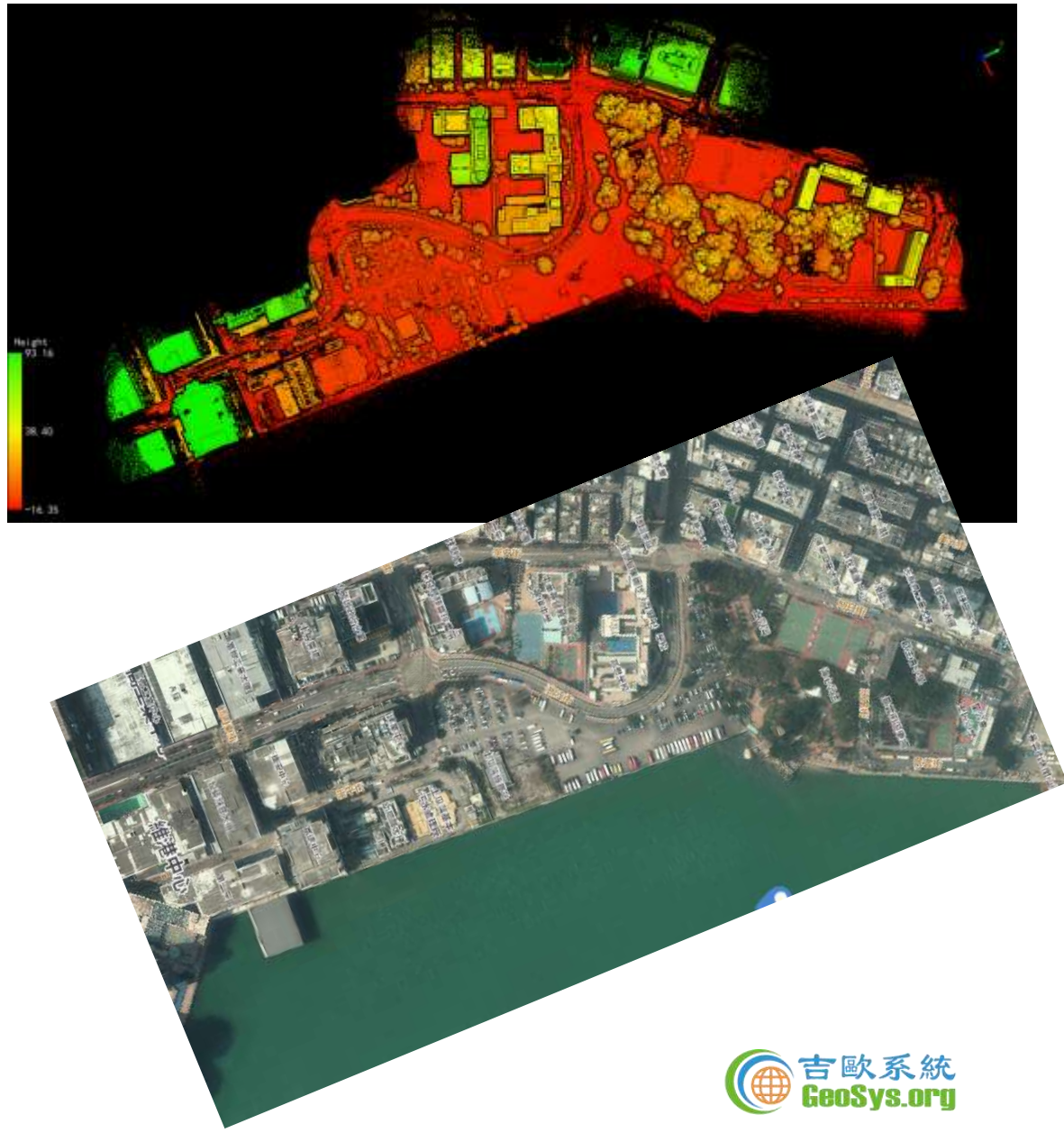




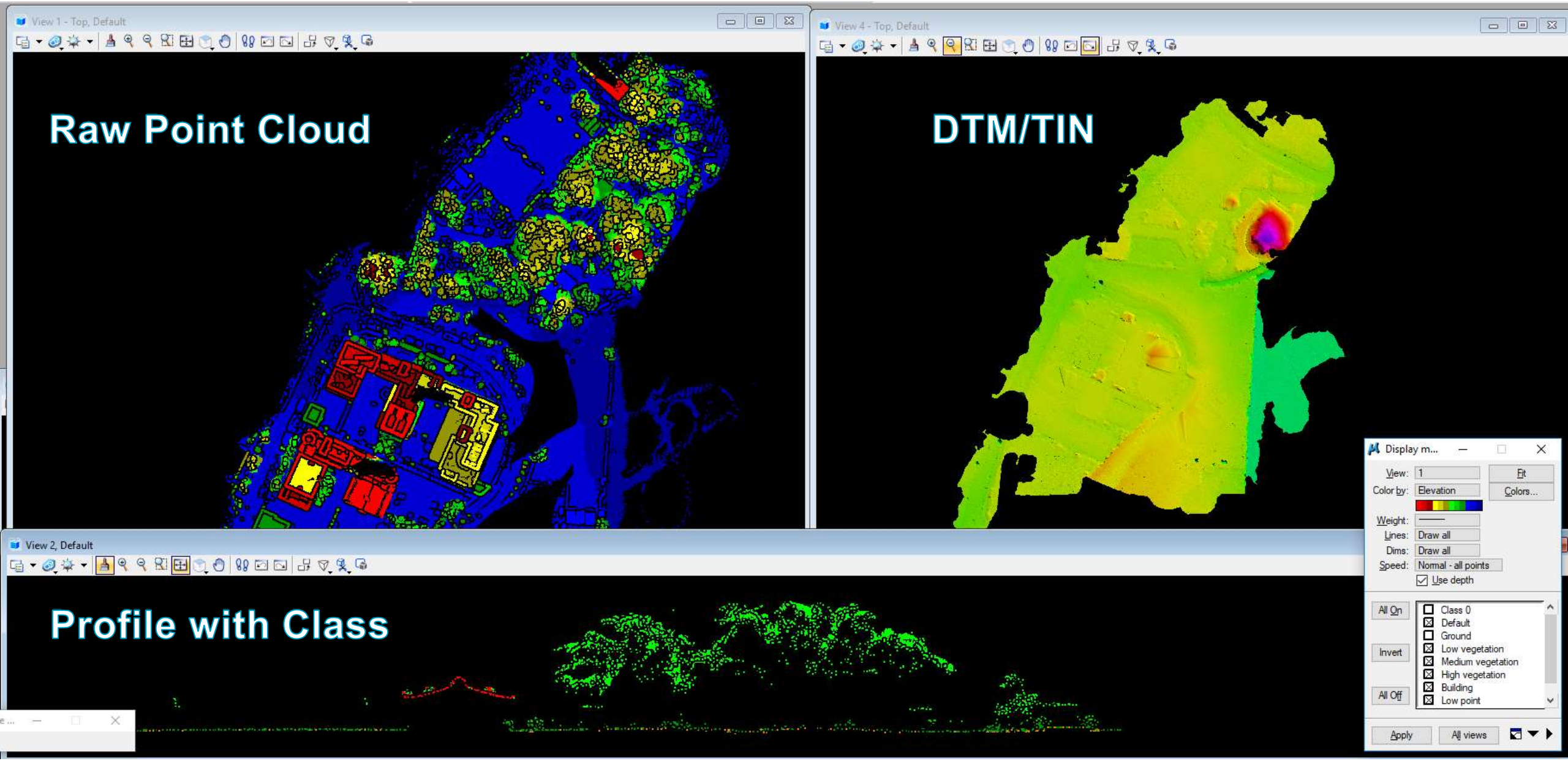


UAV LiDAR flight at 海心公園

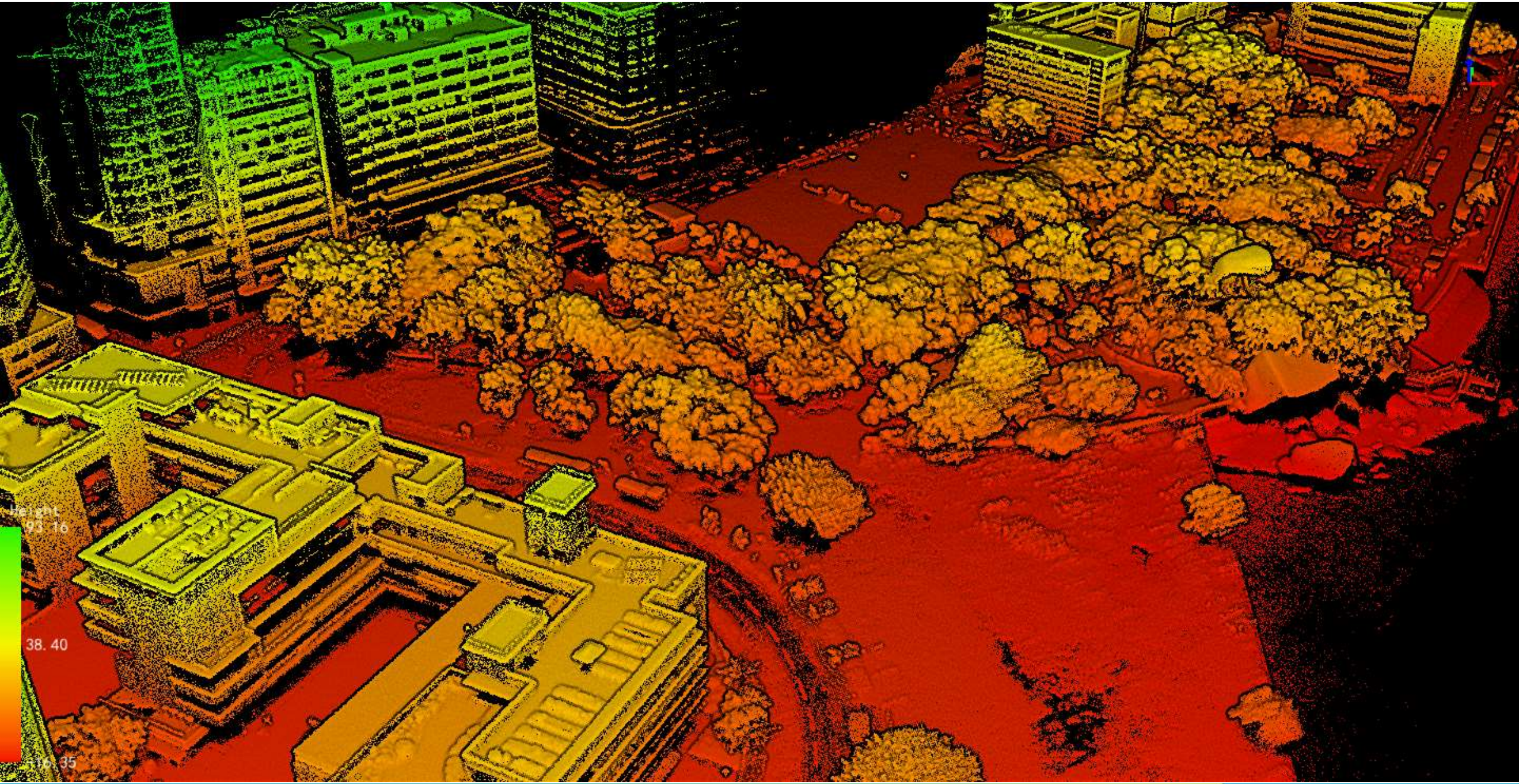
- Flight height : 90m
- Flight speed : 3m/s
- Flight time : 21:30~22:50 PM
- Point Cloud Density : 200~500 points/sqm
- Point Cloud Thickness : 5~10 cm
- Point Cloud Accuracy : 5~10 cm
- Number of Returns : 3
- Flight mode : Manual + Route



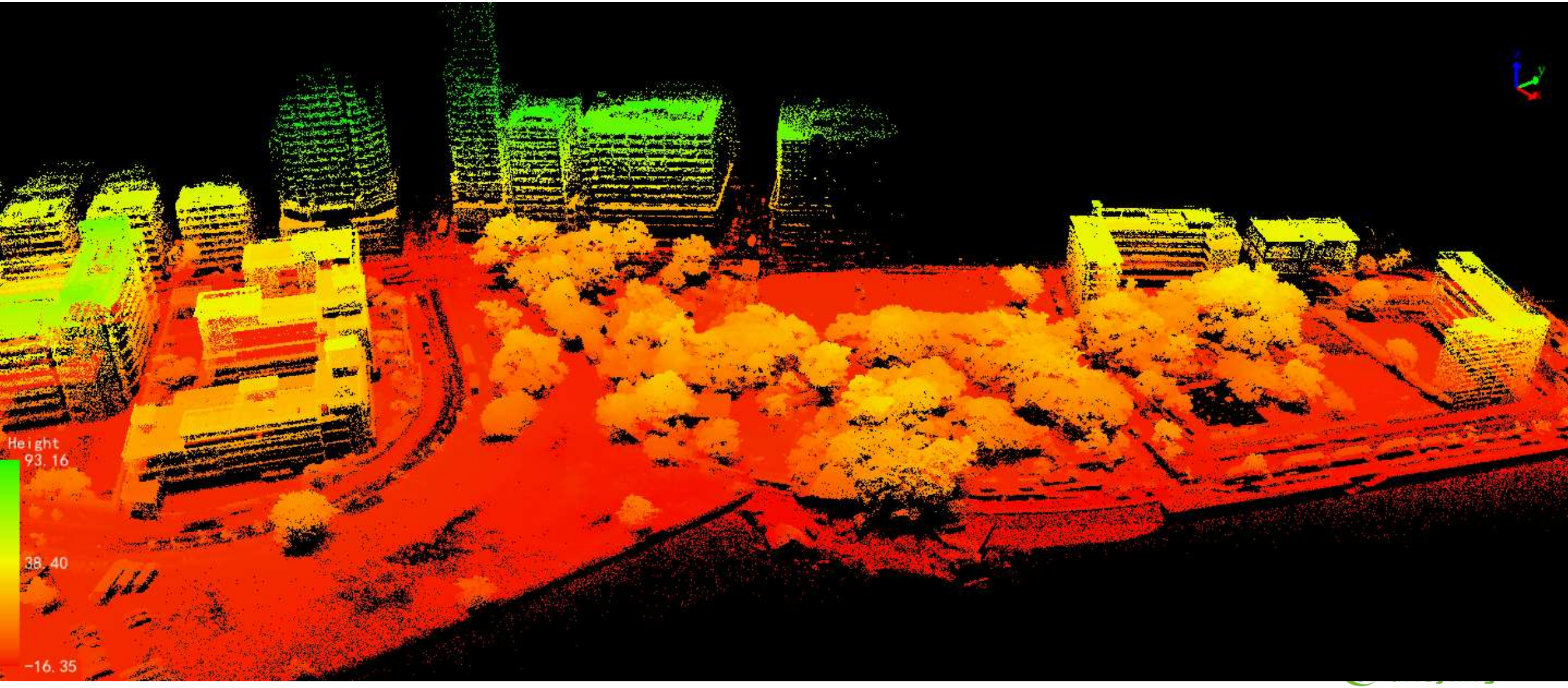
Point Classification Result – Ground / Vegation / Building

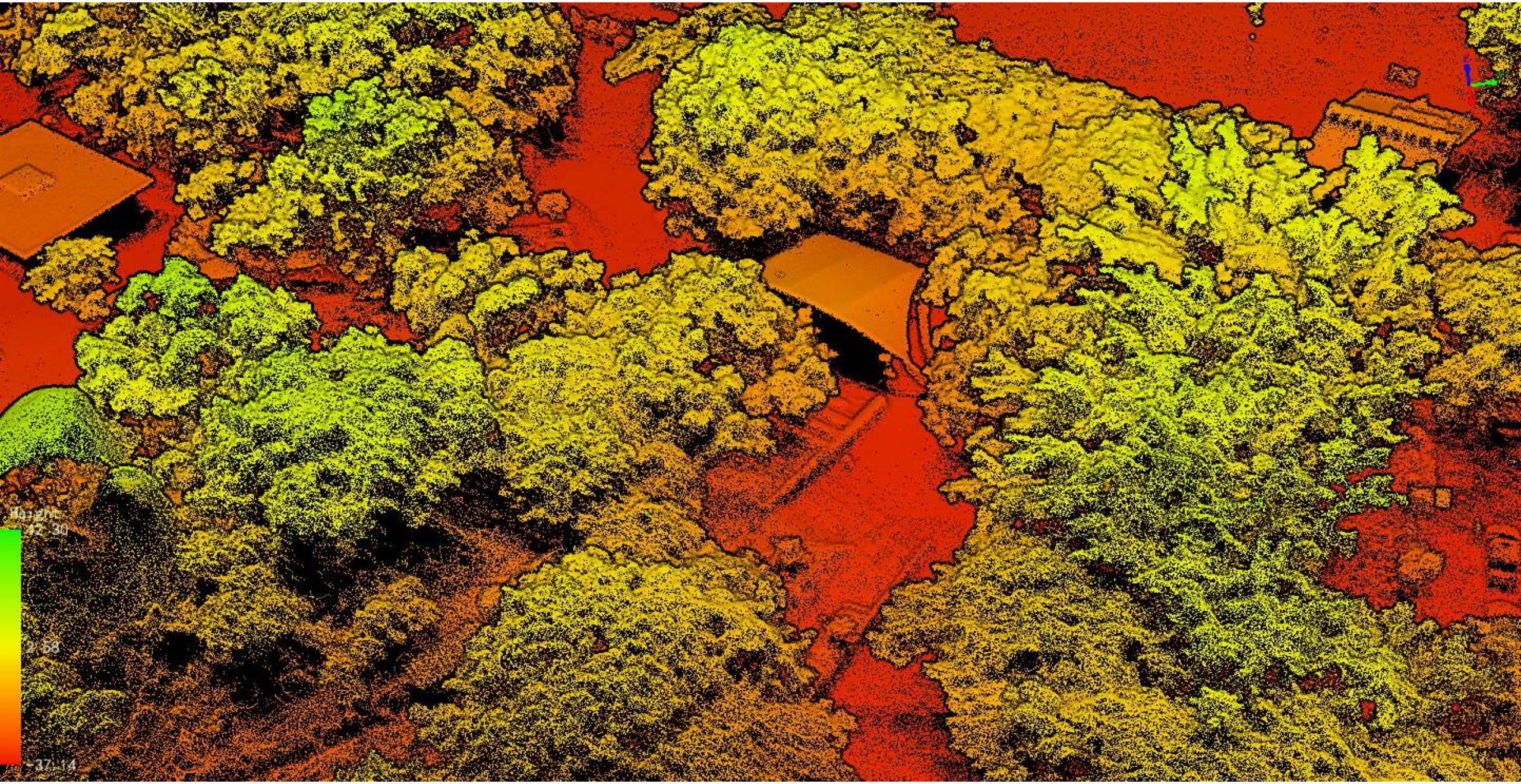


Raw Point Cloud



Raw Point Cloud

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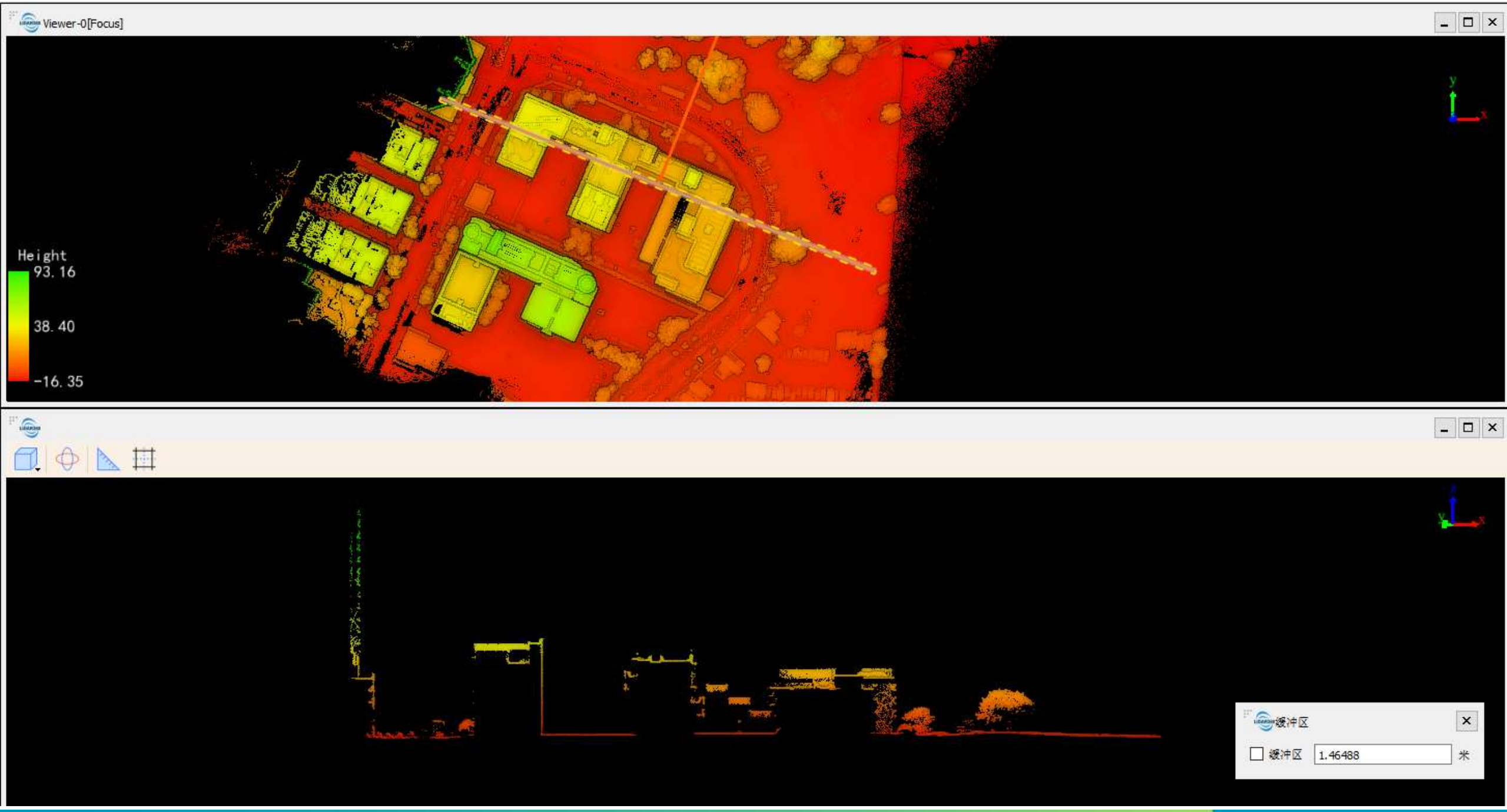
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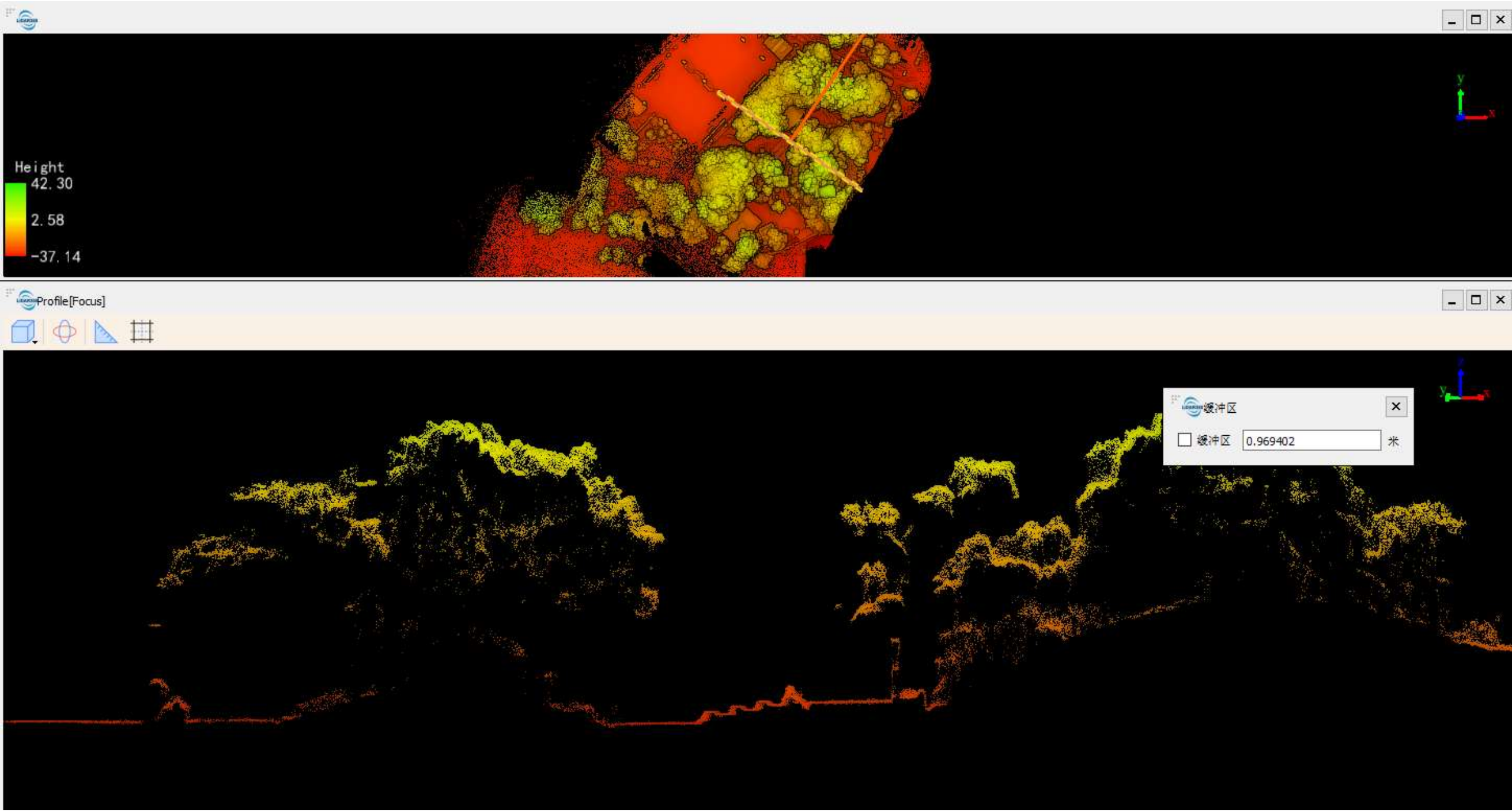
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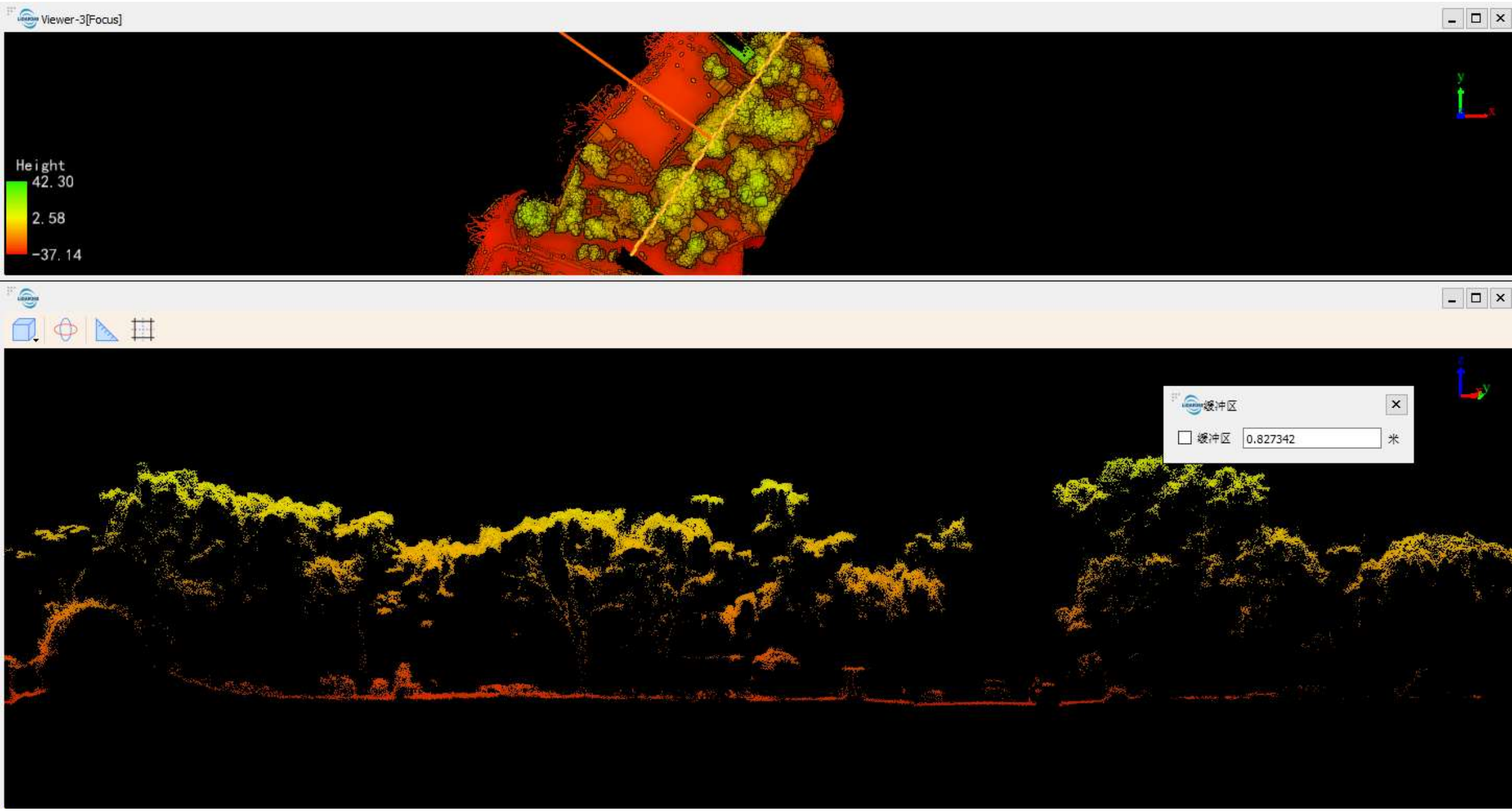
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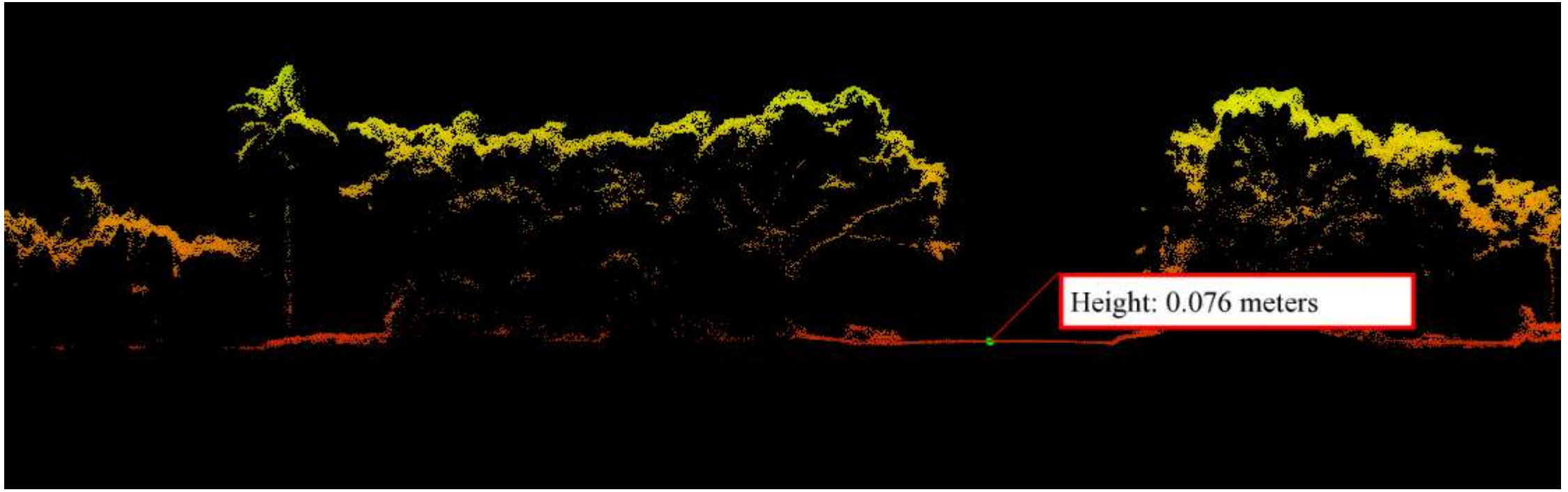
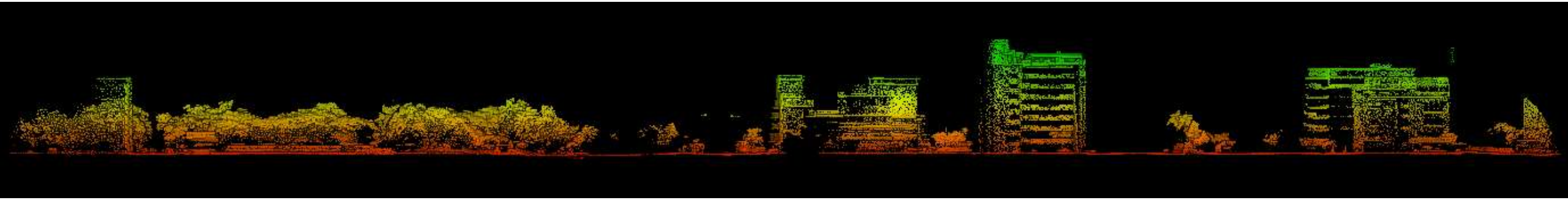
Point Cloud Thickness





Laser Scanner

Use the most advanced and accurate Laser Scanning device on the market with the professional team

We use the most accurate and suitable scanner system of 3D digital survey

Integrated Mobile Laser Scanning / Stop & Go Scanning / Mobile Scanning

Stationary Scanner-RIEGL VZ400i

- The RIEGL VZ-400i is a cutting-edge 3D Laser Scanning System which combines a future-oriented, innovative new processing architecture and internet connectivity with RIEGL′ s latest waveform processing LiDAR technology.

Backpack Scanner -PX8000

- PX8000 is the one of the most advanced Mobile Mapping System, and issused in 2019. Based on the SLAM-RTK technology, it integrates GNSS receiver to achieve the real-time positioning + SLAM for no-stop indoor and outdoor 3D digital surveying with Point Cloud and 720 Panorama, which made the data more accurate and efficient.

RIEGL VZ-400i specifications

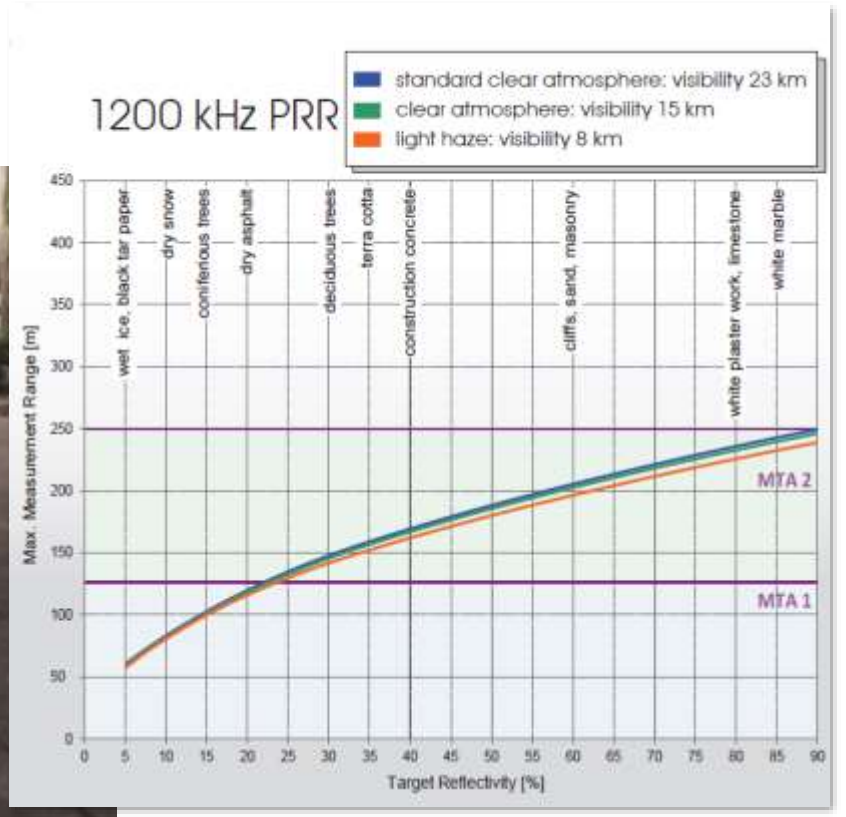
- Max. range **800m**
- Effect. meas. rate up to 500,000/sec.
- Cloud Connectivity via WiFi and 4G LTE
- MEMS IMU for pose estimation

Pose sensors

- Tilt sensors, compass
  gyros, barometric sensor

Post-processor

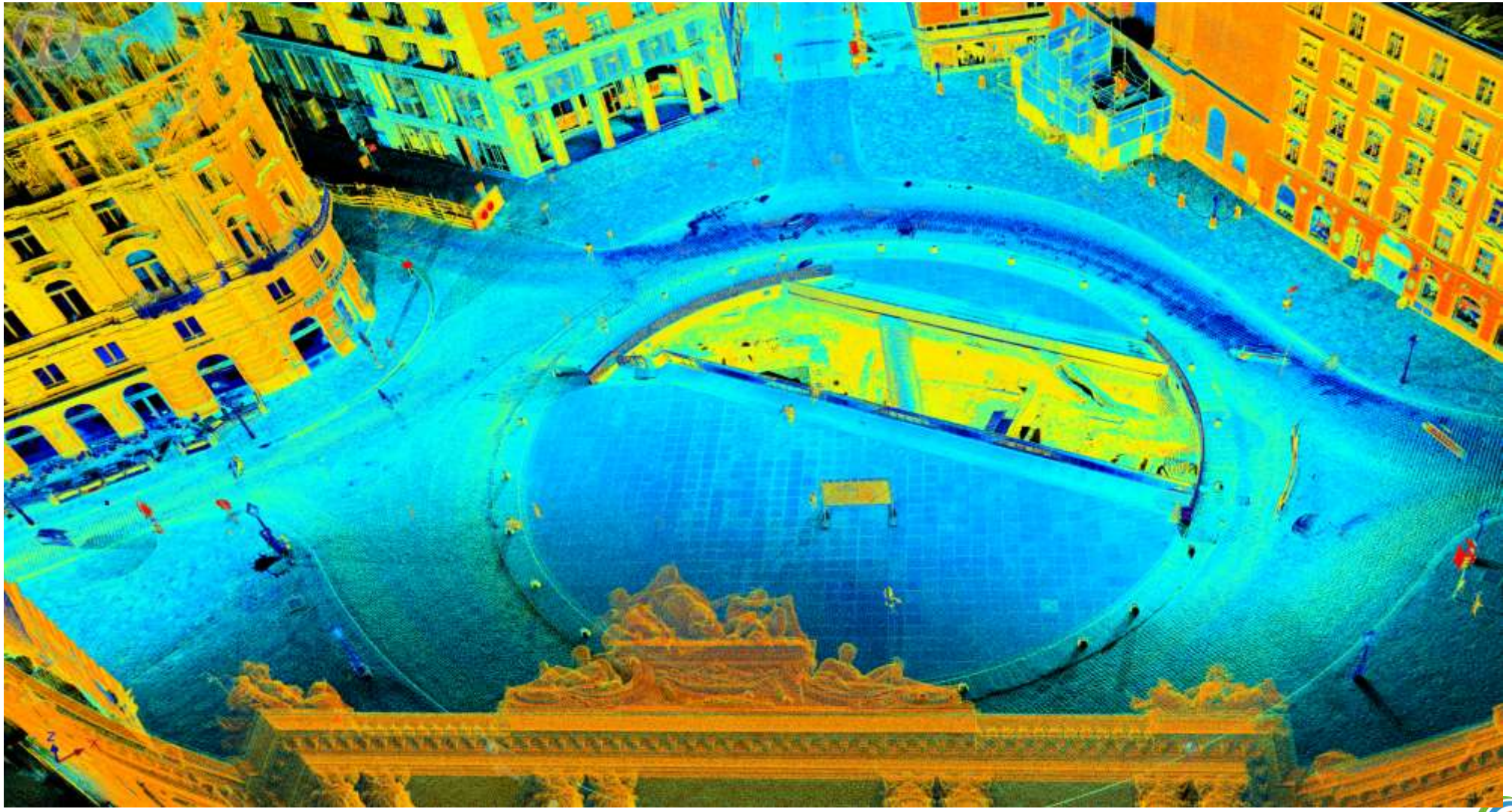
- Data post-processing
- e.g. data conversion, registration



General deliverables for the terrestrial laser scanning

- Capture LiDAR Point Cloud data by terrestrial Laser Scanner
  - Laser Scanner System Range Measure Accuracy within +/- 5 mm in 800 meters range
  - POS system integrates RTK GNSS and High Accuracy IMU system
  - Capture 720 degree panoramic images by 6 angle cameras with at least 20MP each
  - Stitch 6 images from different angle into one panoramic image in at least 8192x4096 pixels
  - POS data of each panoramic image in txt/csv format with X, Y, Z , Direction
- Deliver 3D Point Cloud in LAS (and PLY/E57/XYZ (optional))
- Stitched 720 degree panoramic images with XYZ coordinate and direction.
- All geospatial data deliver in Hong Kong 1980 grid coordinate system and HKPD

Sample data of RIEGL VZ400i



Sample data of RIEGL VZ400i

PX8000 Mobile Backpack 360 Laser Scanner specifications

Panoramic Photos / Indoor&Outdoor Large Scenes	
Range	0-100m
Total Weight	10kg
Acquisition Rate	2*300,000 pts/sec
Output	Colored point cloud/Panorama photos/POS
Connectivity	WIFI
Supported RTK Mode	Qianxun SI/CORS/Base Station VRS/SatRef/NTRIP
Coordinate System	WGS84 / CGCS2000/HK1980/ UTM/Local Coordinate
FOV	360°
Camera Type	FLIR® Ladybug 5+
Pixel	6*5MP
Image Resolution	8192*4096
Relative Accuracy	<3cm
Absolute Accuracy	3-5cm

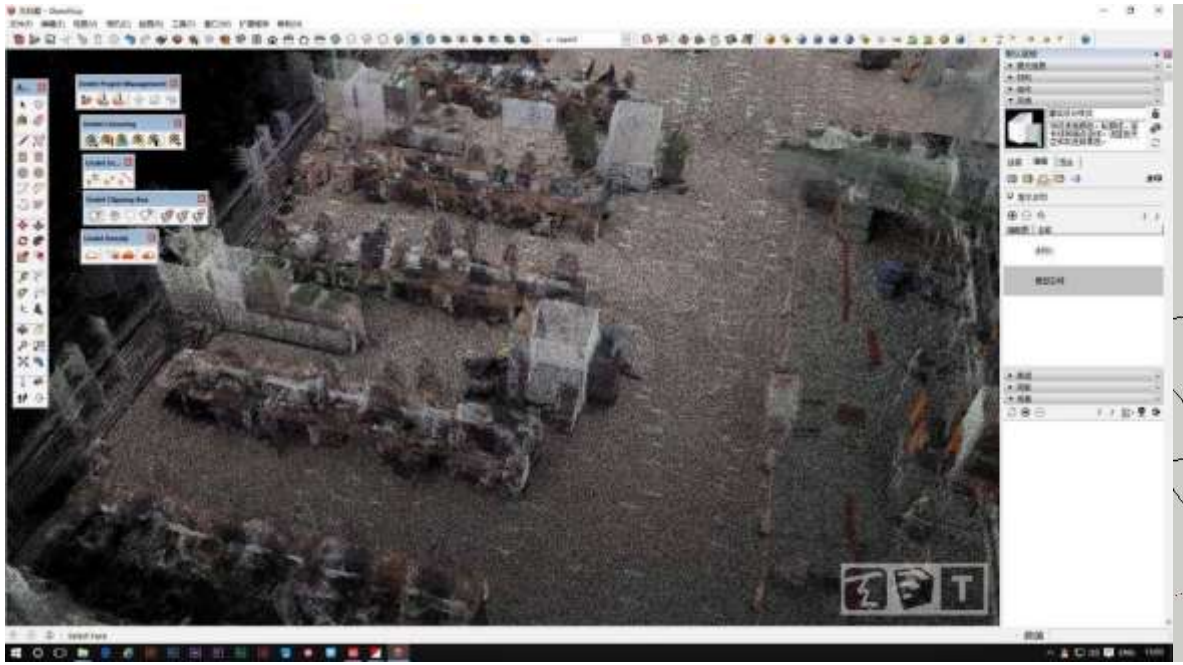
- ▶SONY pregius CMOS
- ▶60 FPS high images acquisition rate
- ▶100% of full sphere
- ▶Multiple Operation modes
- ▶30 km/h by vehicle operation
- ▶No need for initialization RTK-SLAM mode

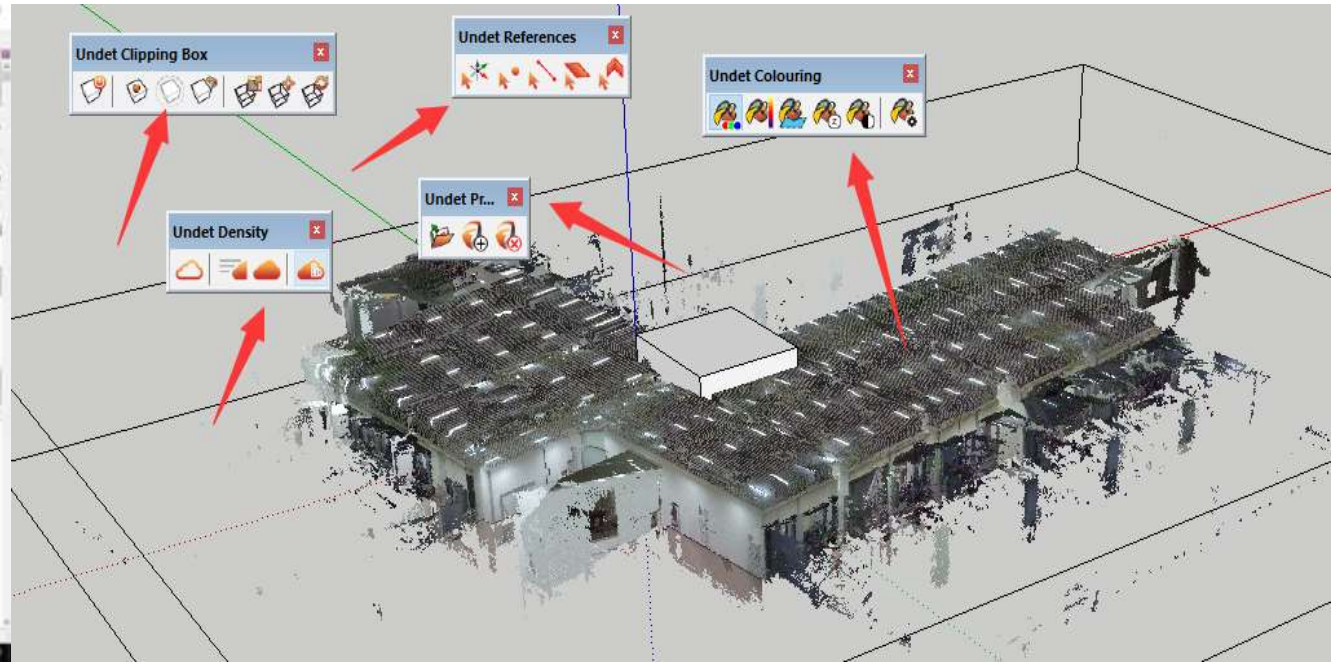
General deliverables for the terrestrial mobile laser scanning

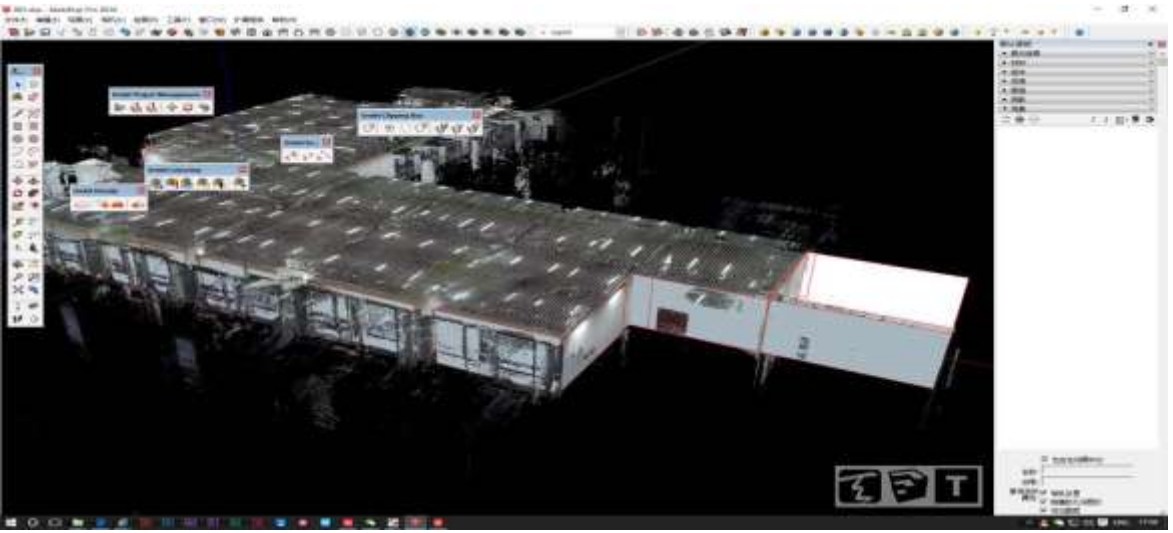
- Capture LiDAR Point Cloud data by terrestrial Laser Scanner
  - Laser Scanner System Range Measure Accuracy within +/- 10 cm
  - POS system integrates RTK GNSS and High Accuracy IMU system
  - Capture 720 degree panoramic images by 6 angle cameras with at least 5MP each
  - Stitch 6 images from different angle into one panoramic image in at least 8192x4096 pixels
  - POS data of each panoramic image in txt/csv format with X, Y, Z , Direction
- Deliver 3D Point Cloud in LAS (and PLY/E57/XYZ (optional))
- Stitched 720 degree panoramic images with XYZ coordinate and direction.
- All geospatial data deliver in Hong Kong 1980 grid coordinate system and HKPD

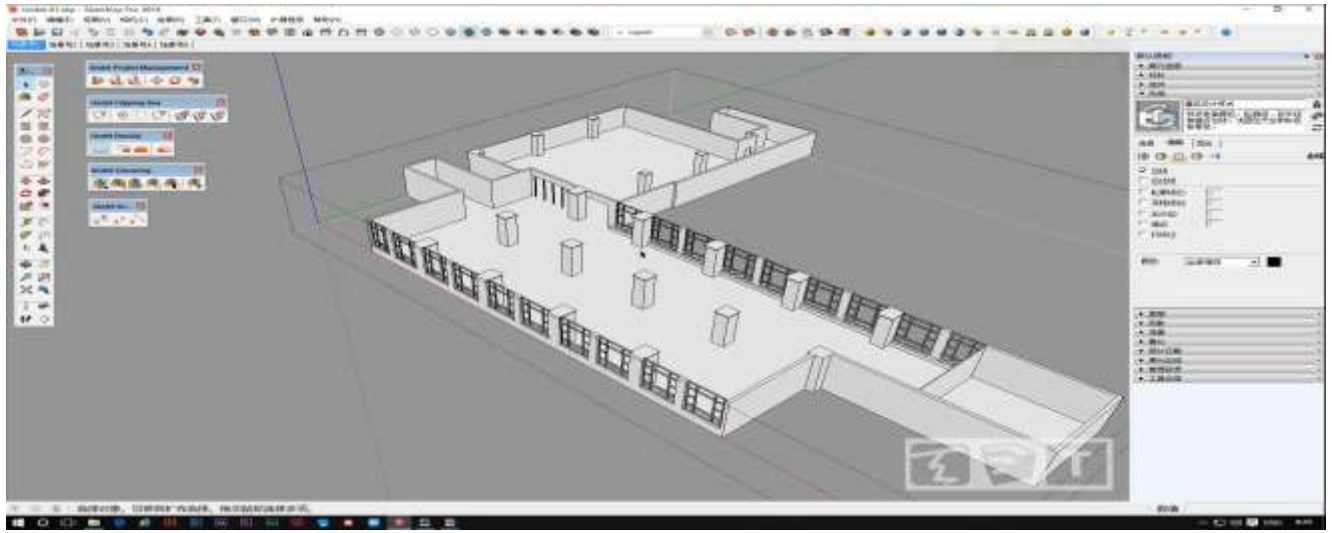
Mobile Laser Operation in different environment, Hiking / Bicycle / Urban

Scan to BIM using Mobile Laser Scan

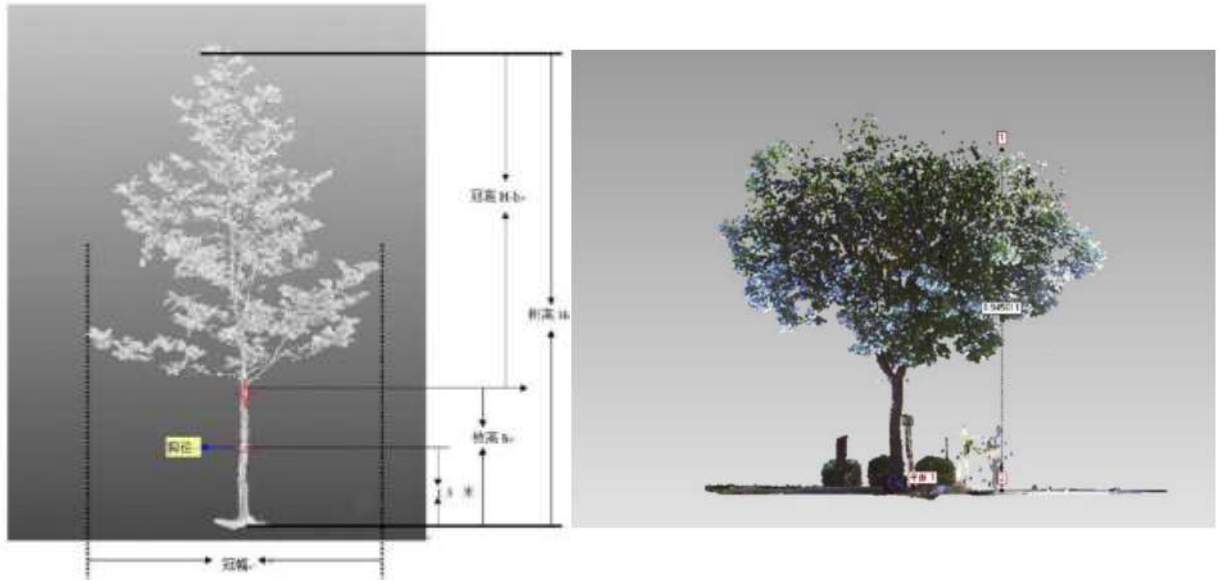


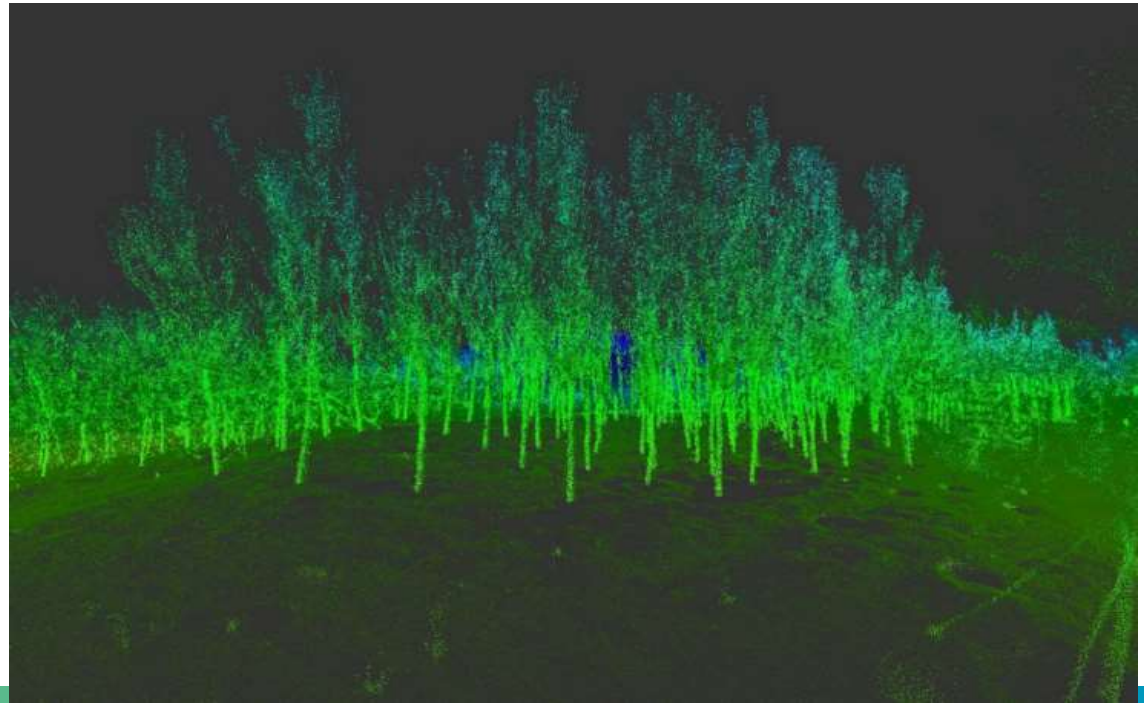




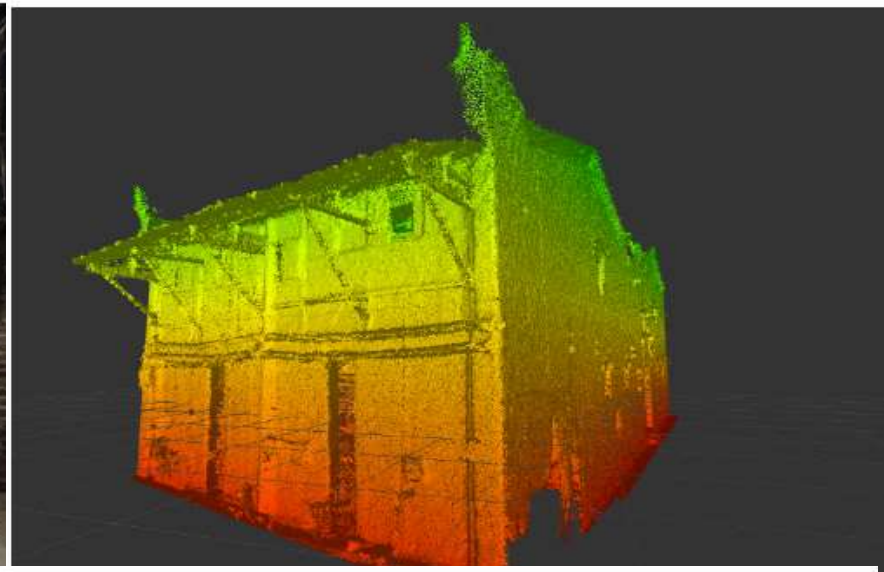


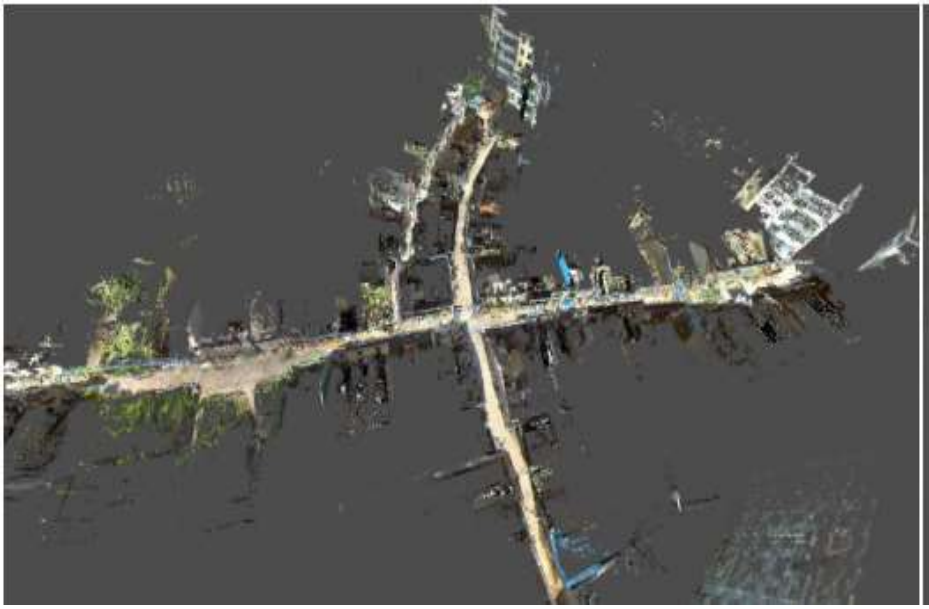
Forestry and Tree Management by VR3D MMS

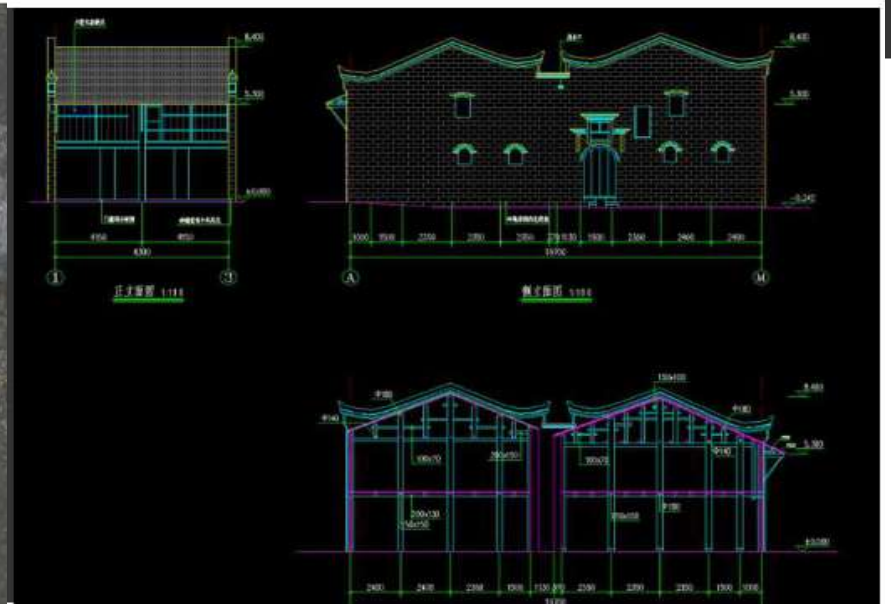




Heritage site management by VR3D MMS

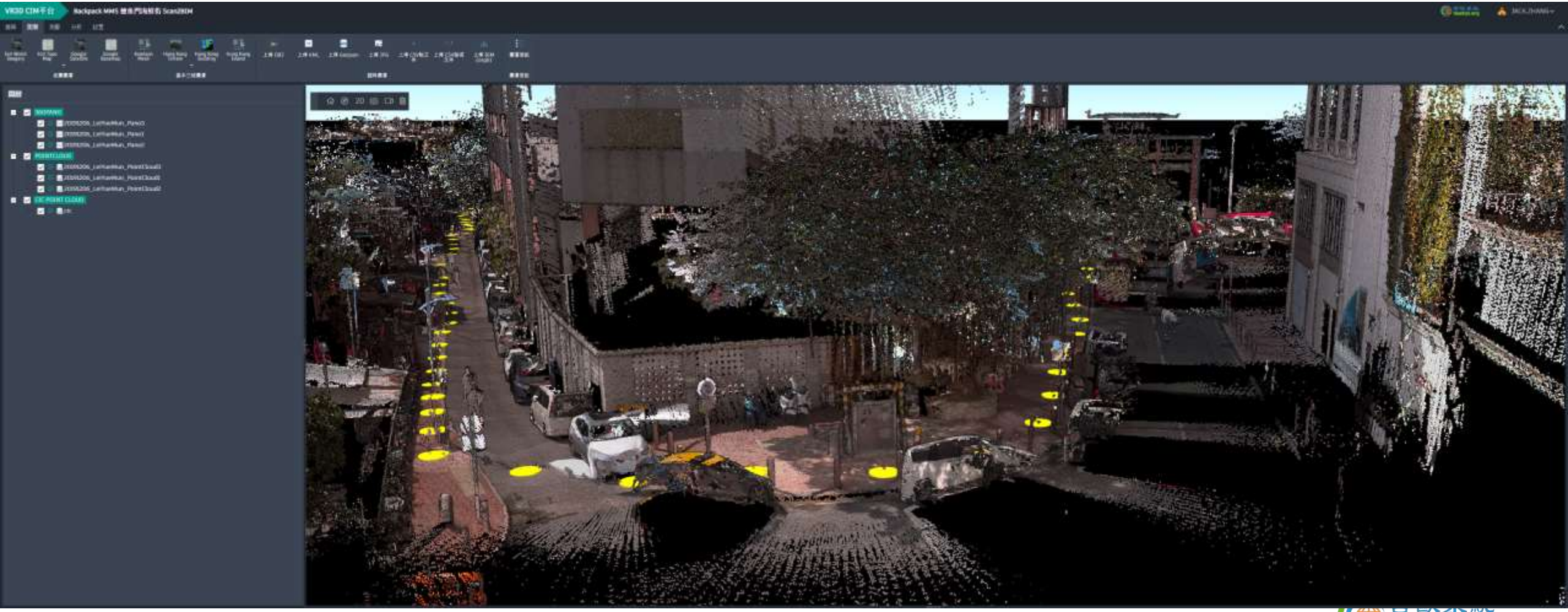






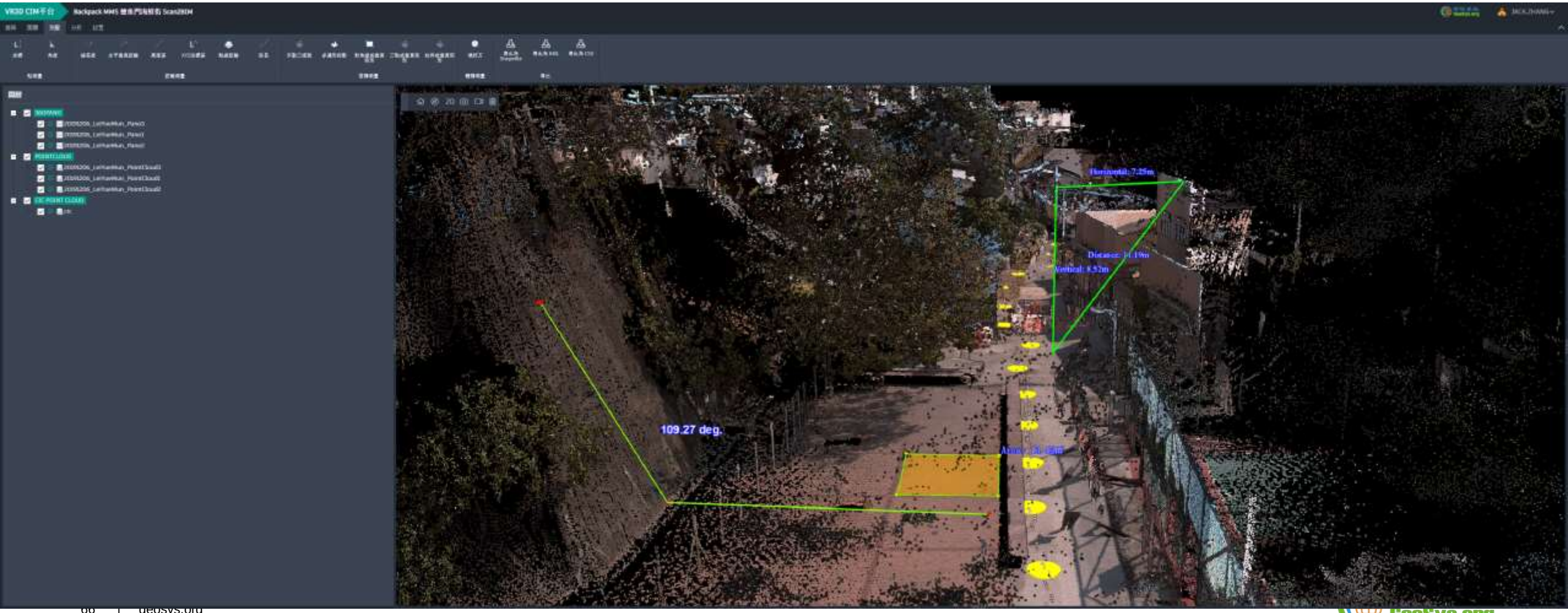
Sample Result of the Backpack Mobile Laser Scanning

Point Cloud in 3D with true color and overlay with GIS / Civil 3D BIM data



Sample Result of the Backpack Mobile Laser Scanning

Take Measurement such as slope angle, distance, area, volume and save as ESRI SHAPE FILE



Sample Result of the Backpack Mobile Laser Scanning

Overlay 360 streetview panorama with BIM/GIS data

Geosys VR3D

Mixed Reality Application System

The first single Cloud Platform with AI + GIS + BIM+ UAV management functions

Code: PA18-002

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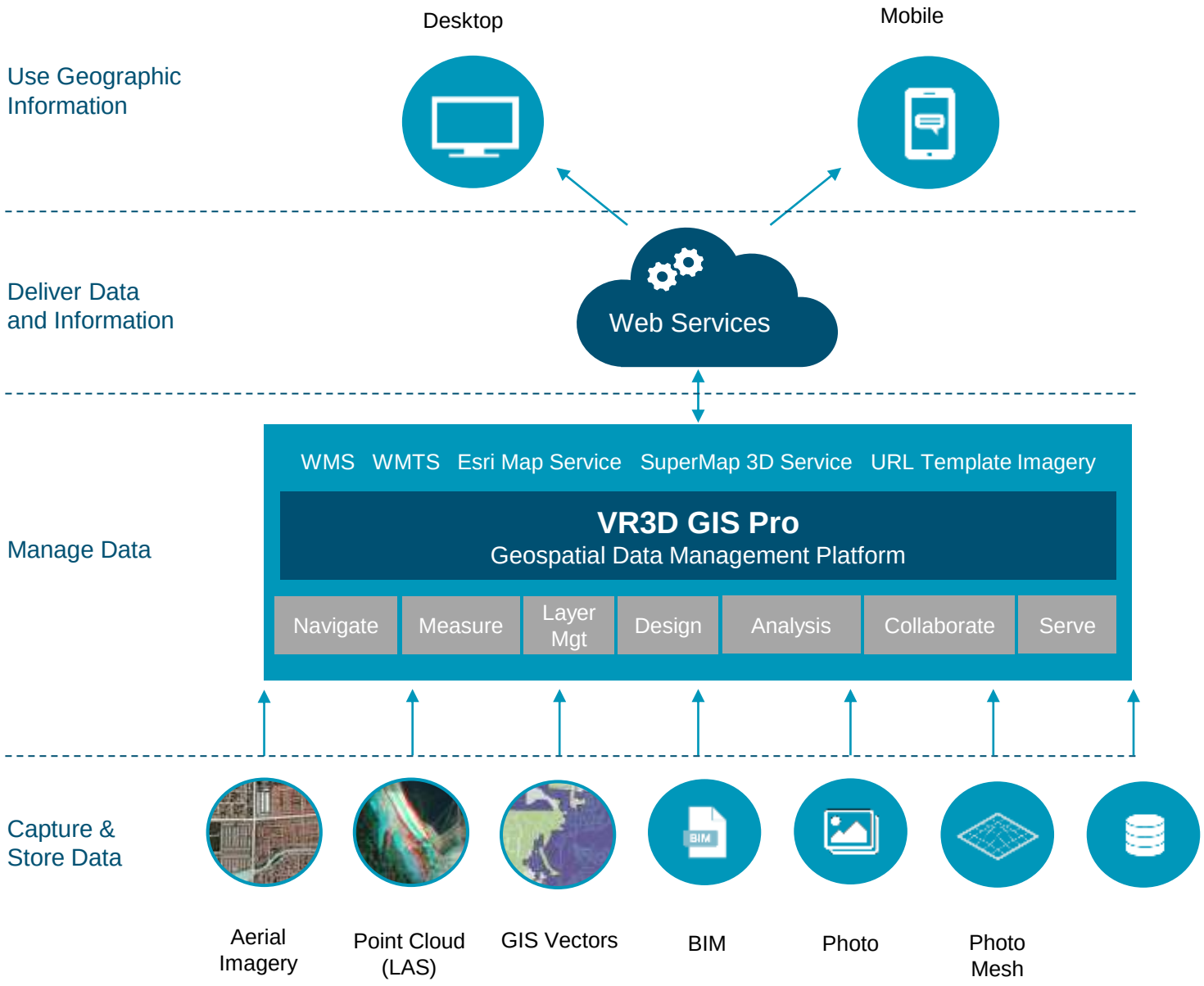
Geosys VR3D Apollo Data Management System

Provides comprehensive Data Management and Delivery.

Enables an organization to:

- Analyze
- Data Management
- Design & Analytics
- Securely disseminate massive volumes of geospatial and business data



Product Tiers
CIMS
PMS
DMS
DPMS

YouTube

Geosys VR3D GIS Platform

A CITF Pre-Approved Technology (PA18-002)

info@geosys.org

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Geosys Free Desktop Viewer for UAV Geospatial Data

Site Photos Viewer (DOM, Photo, DSM)

- Import folders of images with geotag locations in Exit file
- Automatic extract locations and display images in 3D map with trajectories.
- Click and show thumbnails of each image
- Download Trajectory and Image as Kml

Mesh Model Viewer (for Reality Mesh Models)

- Support import Reality Mesh Models in Cesium 3D Tiles format
- Display mesh models in 3D
- Support measurement by point, path, distance, volume, terrain profile, etc.
- Can export measurement in Kml format

Point Cloud Viewer (For LAS format)

- Support import Laser Scan / Photogrammetry point cloud into 3D Viewer
- Support view point cloud in Color RGB / Elevation / Intensity
- Support Cut sections of Point Cloud
- Support measurement in 3D

Geosys VR3D Mixed Reality Platform (On Cloud or On Premise)

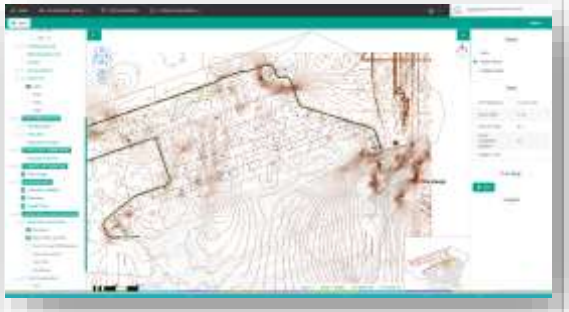
Product Modules

Photogrammetry Data Management

- Manage 3D and 2D surveying data
- Support Pix4d / ContextCapture / Smart3d
- Support Laser Scanner
- Support ESRI / Supermap
- Create Workspace to share online
- User / Role management
- Steaming 3D/Raster data via internet with SSL and Smart Caching and Tiling

GIS + IOT Management

- Query Database From Gdb, PostGreSQL, MSSQL, Oracle
- Support WMS,WFS, ESRI Rest Service
- Support ESRI Rest Service, OGC WMTS, WMS, WFS
- Support publish kml, Fgdb, Shape file, dxf, dgn as Web Map Service.
- Support publish TIFF, IMG, ECW as Web Map Service
- Display data feed from IOT devices
- Data dashboard to show charts and plots



BIM+GIS Management

- Support Publish OSGB, IFC, RVT, 3D Tiles, Obj, 3DS as 3d web map service.
- Support load 4D information from Navisworks and bind to BIM for progress animation
- Sectional tools and query control to view every details of BIM models
- Integrated view and measurement functions for BIM+GIS+Reality Models
- Collaboration and issue tracking with Forms, tasks and follow-ups

Planning & Design

- Powerful 3D GIS Analysis Functions for data on the server
- Viewshed, Shadow, Skyview, Volume difference, Slope, Radiation, flood analysis
- Support smart drawings and design on the 3D map
- Support upload dwg/obj/skp/shp to the server and overlay with any data ready on the system.
- Flythrough as bookmark or download in Mp4

Get upto 70% Service fee fund by CITF

Code: PA18-002

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https://www.citf.cic.hk/?route=search-key

- Search Technologies : VR3D

Type of Technology	Product Type	Code	Distribution Channel	Product Descriptions	Reference Photo
Internet of Things (IoT)	3D reality simulation / Data management (CDE-related)	PA18-002	Geosys Hong Kong Ltd Tel: 6198 5234 / +86 13088880388	**Geosys VR3D data management system** Geosys VR3D data management system support the visualisation of 3D GIS and BIM data in one integrated viewer for users with 2D and 3D measurement and analysis functions. Web based 3D Measurement tools such as distance, path, angle, height, Volume, Section are provided. Cloud and server-based system allows users to open the application without software installation and maintenance for different end-user's PCs *(Note: This product is CDE-related platform which the vendor shall be inquired for details.)*	

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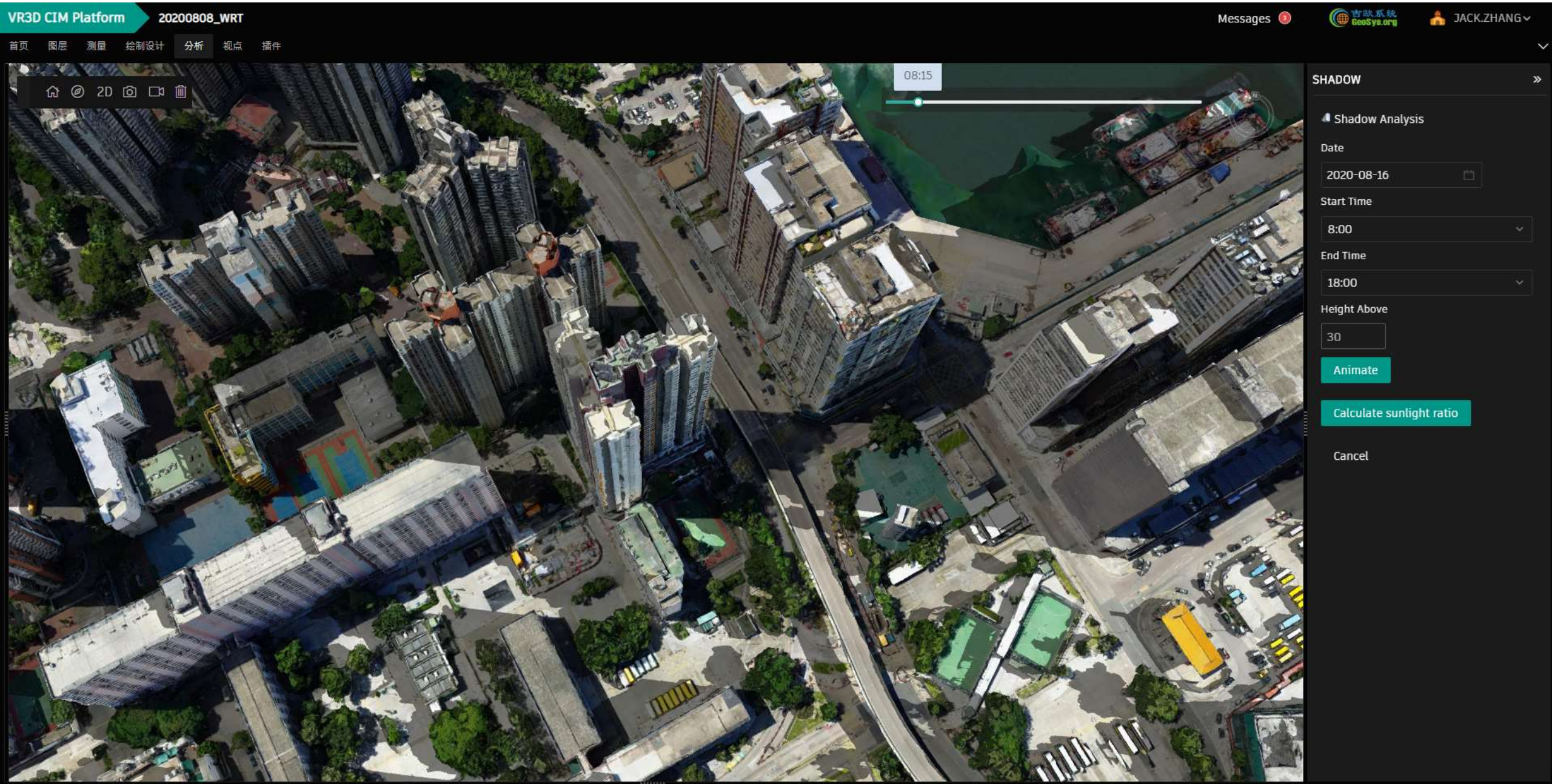
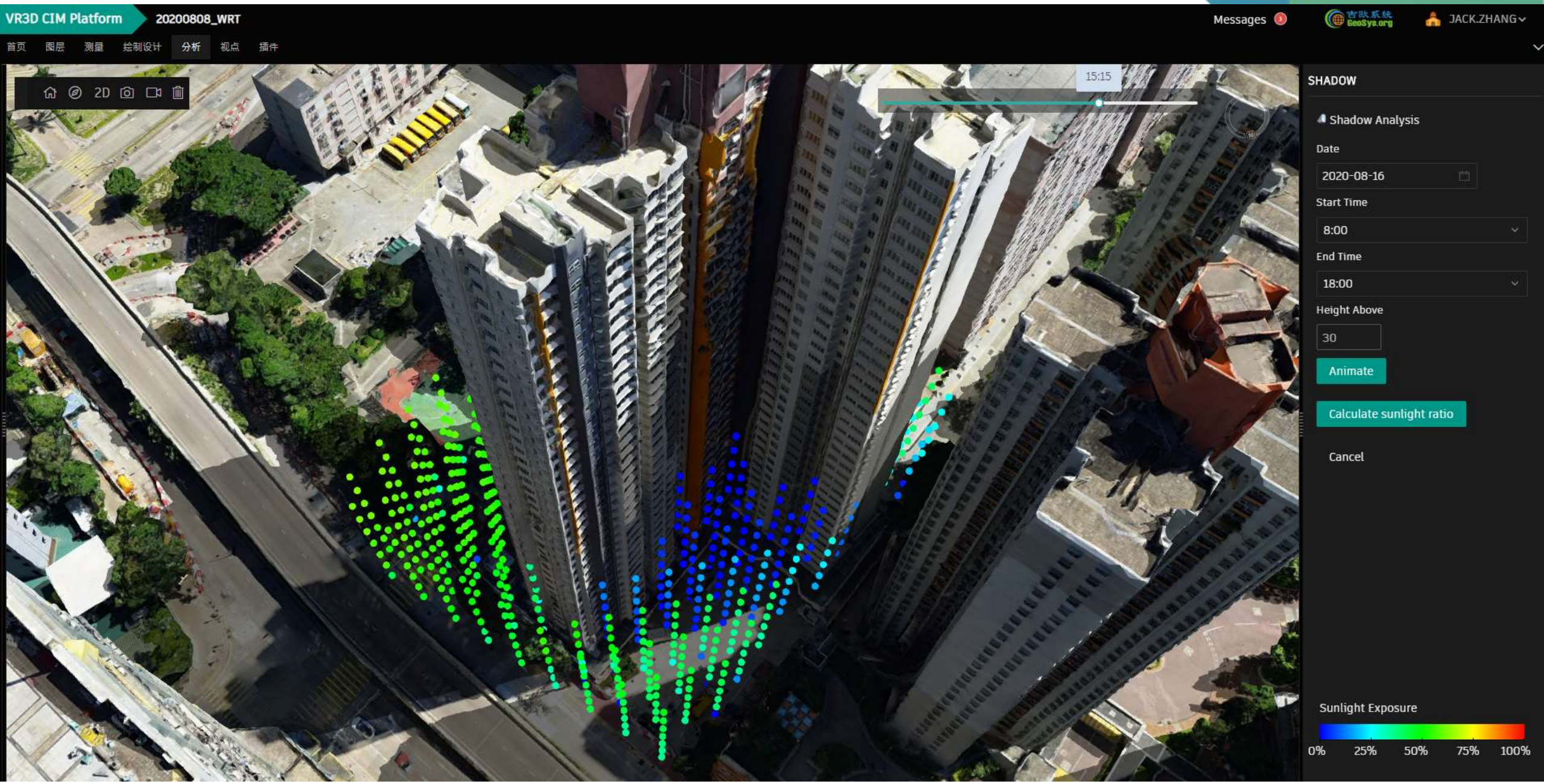
Shadow/Noise/Radiation analysis functions for EIA



Shadow/Noise/Radiation analysis functions for EIA



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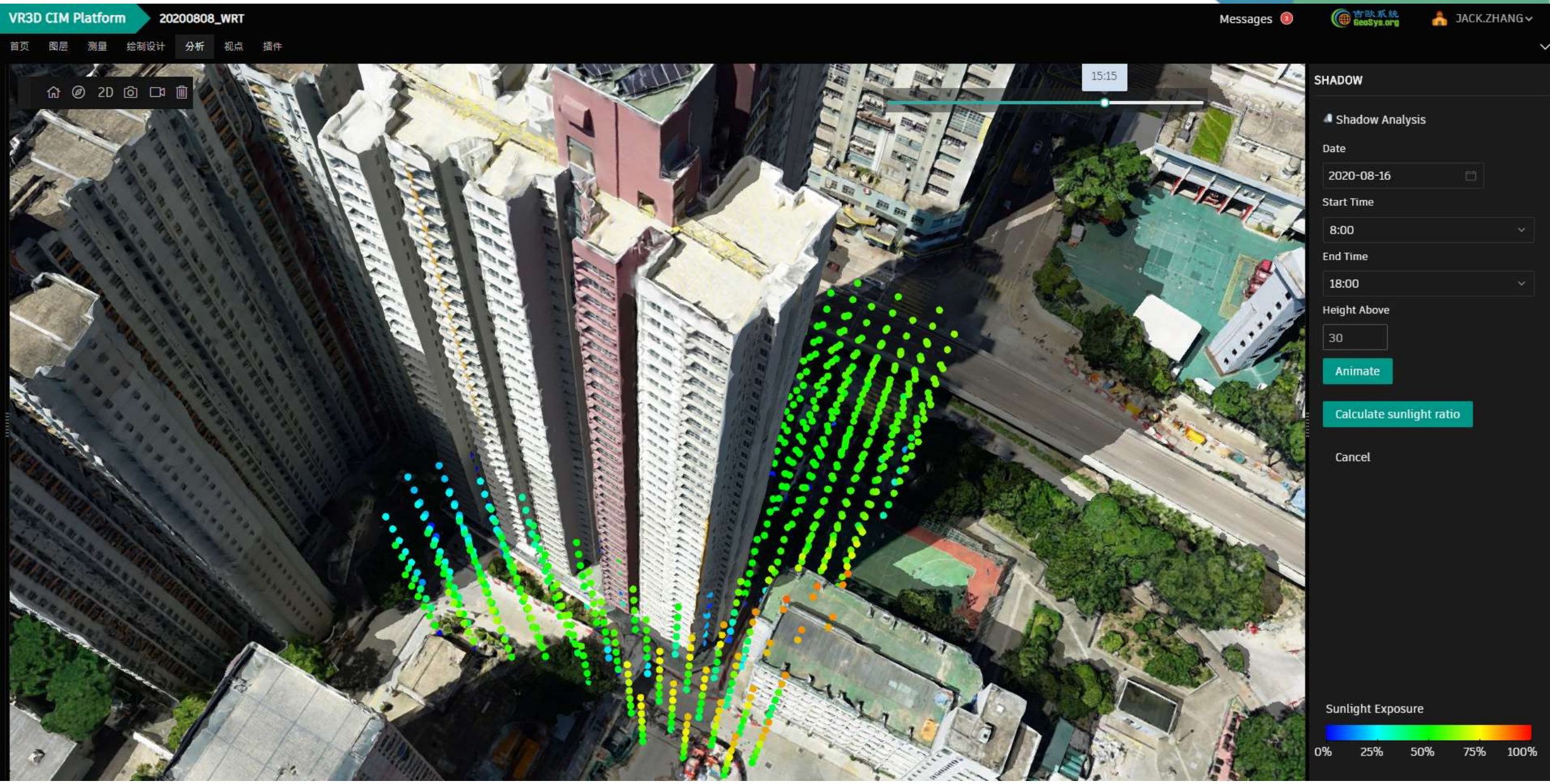
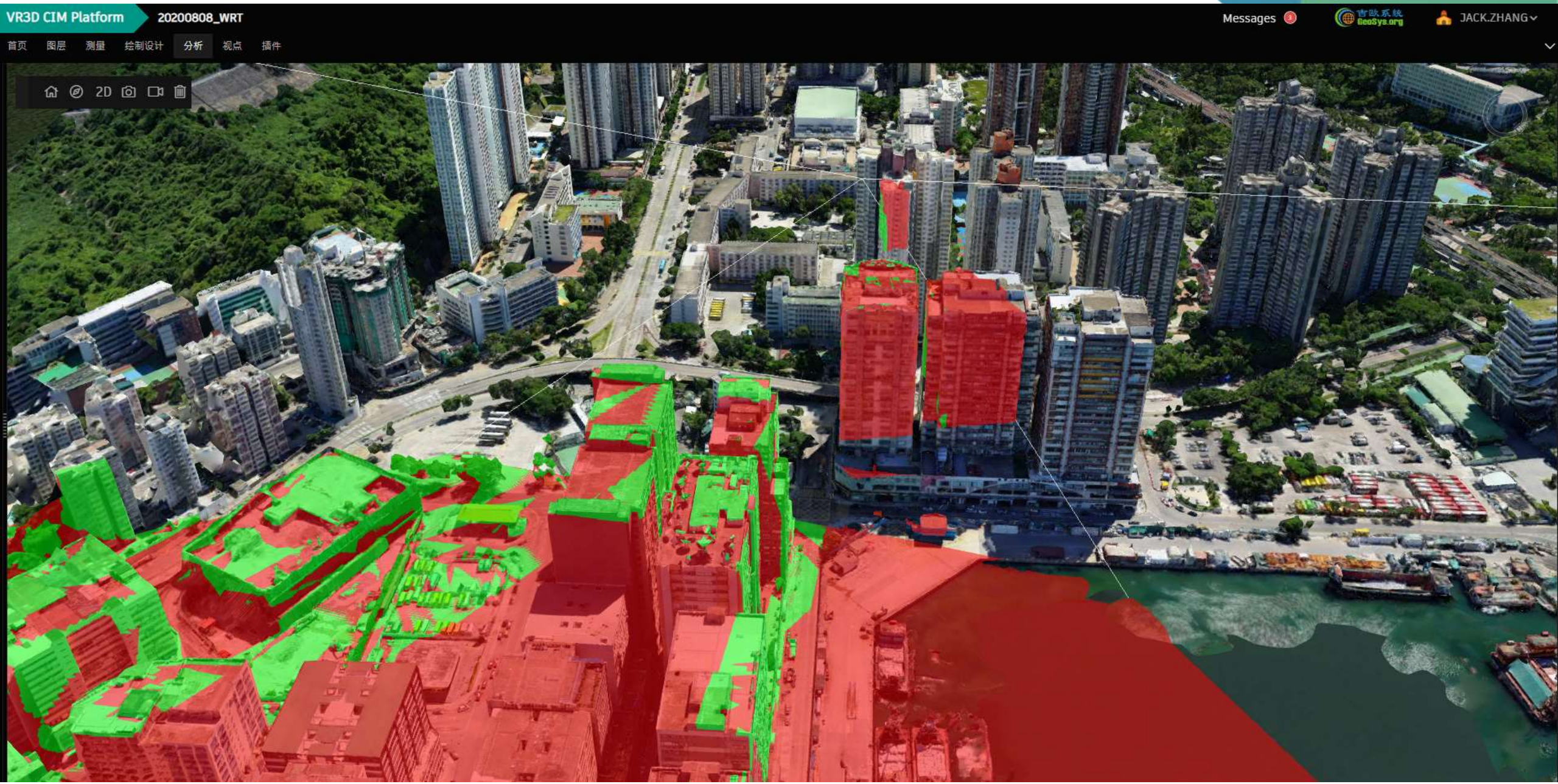
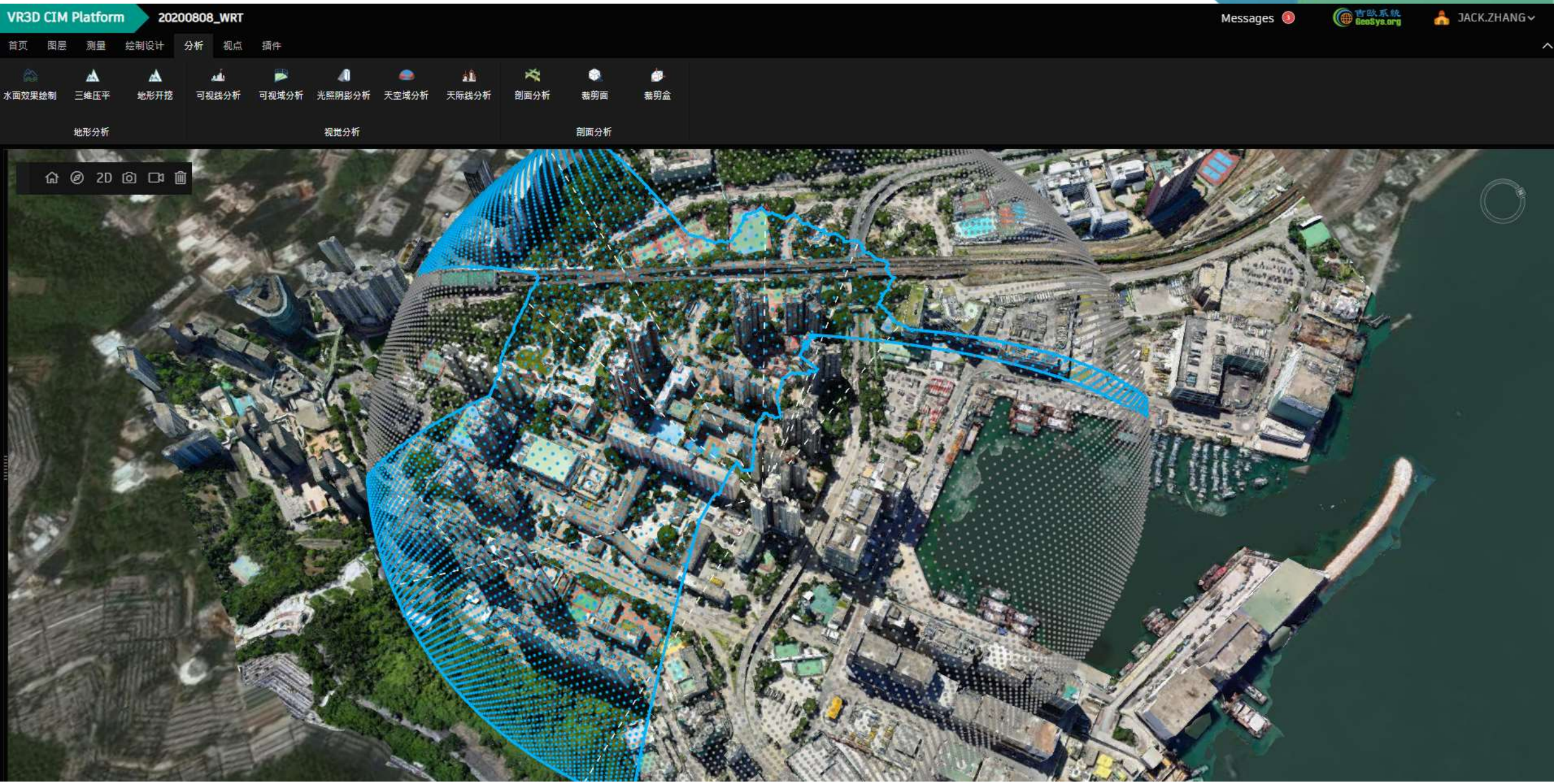


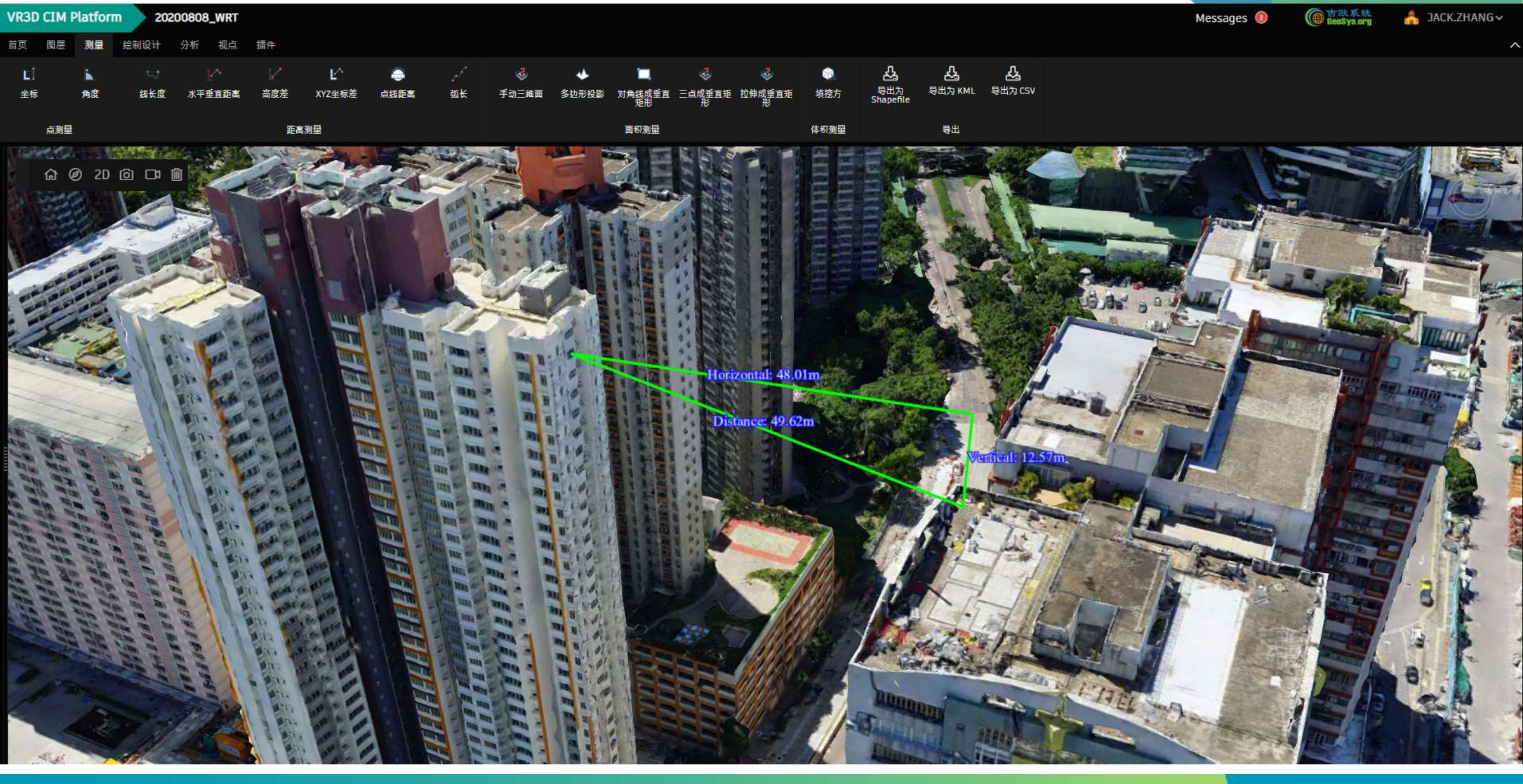
Visual analysis functions for Valuation



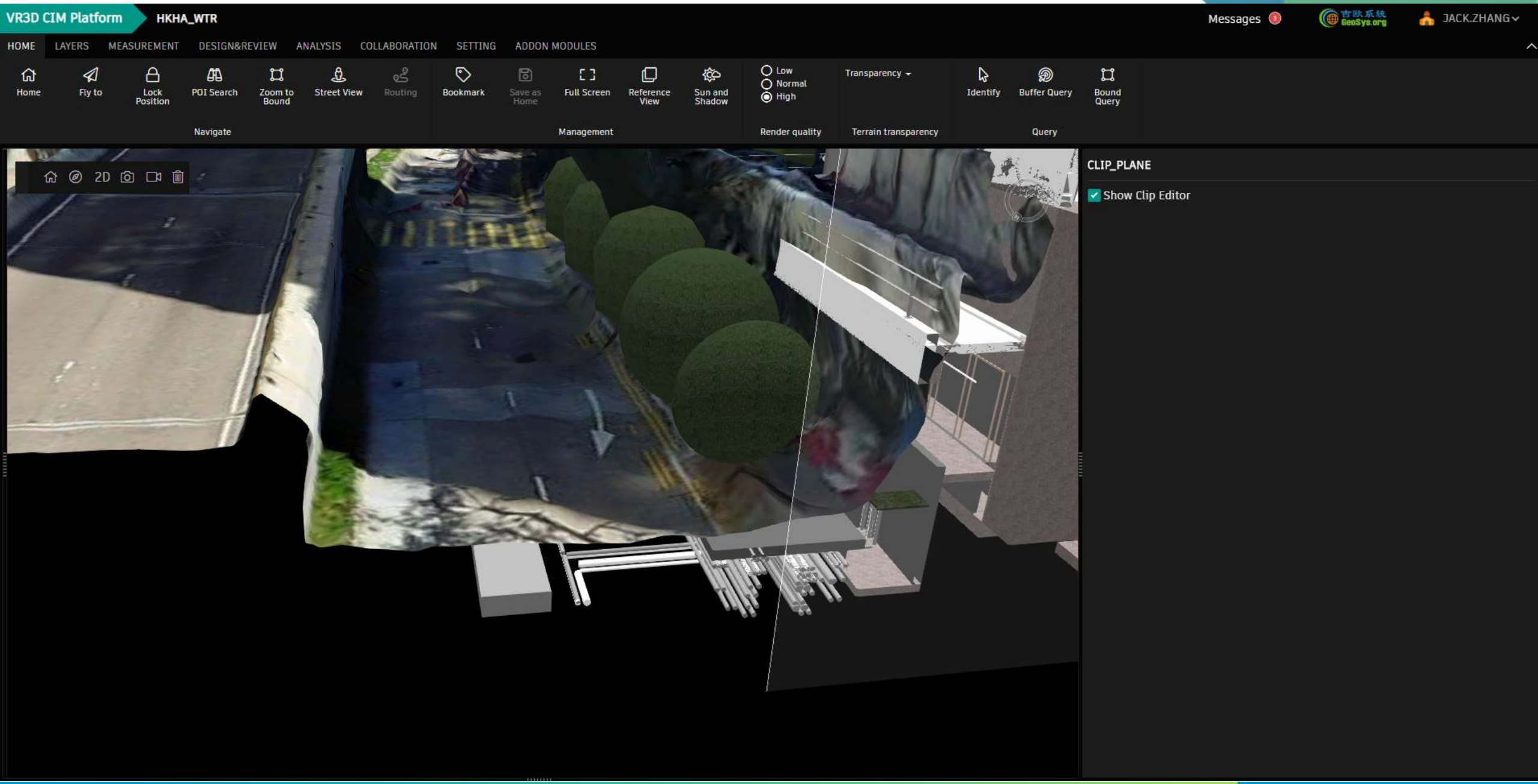
Visual analysis functions for EIA and Valuation



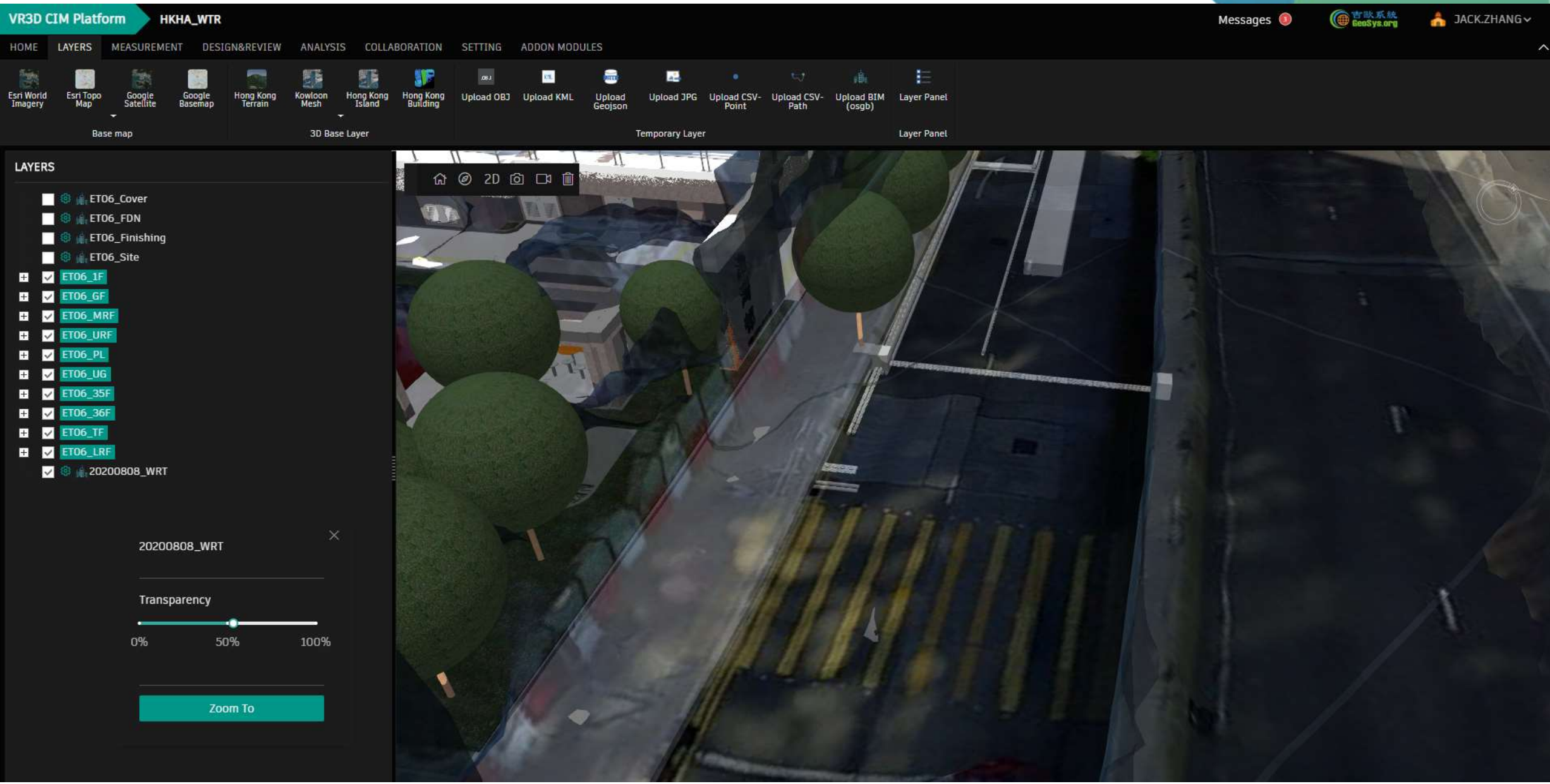
Measurement / Sectional tools for Planning and Design



Measurement / Sectional tools for Planning and Design



Measurement / Sectional tools for Planning and Design



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