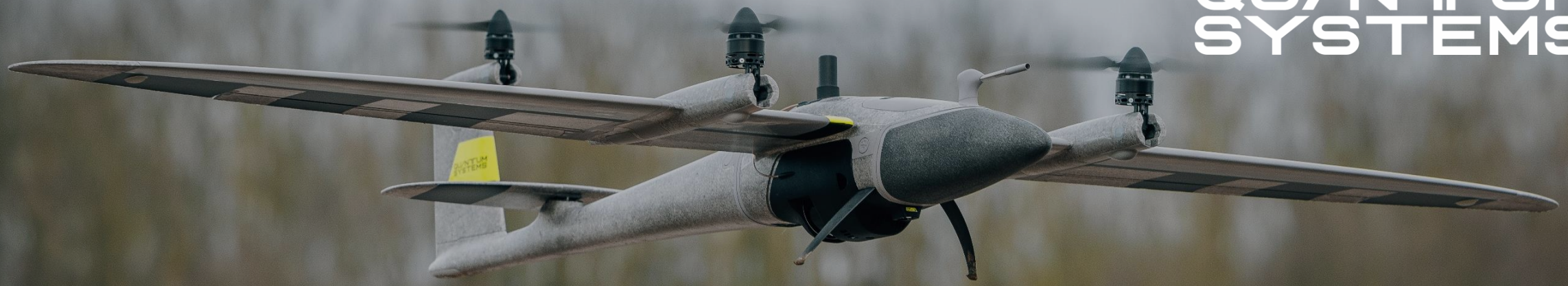


Trinity Pro and YellowScan Technology

A next step into the world of aerial LiDAR surveying

Montpellier | 18.04.2024

History of Partnership

YellowScan & Quantum Systems

2018 — Start of collaboration

2019 — YellowScan Surveyor Ultra for TRON

2021 — Qube 240 LiDAR for Trinity F90+

Qube 240 LiDAR Scanner

A turning point for LiDAR on drones

Door opener for both - Quantum Systems and YellowScan.

Market perception was excellent because of survey grade results.

Became a talking point in almost every sale – even if it was not applicable for the project.

Offering attractive new applications for several operations and projects never possible before.

Flooding Simulation

Equatorial Jungle Environment, Ghana

Plan protection measures in case of dam collapse.

Aera of 65km² was surveyed with 20 LiDAR flights (each 1h/325ha) within 4 days.

Reliable operation in hot and humid environment.

Easily penetrating tropical rain forest to create DTMs.

ROCKETMINE

Project Specifications

Wind
7-10 m/s
14-20 kn

Area
65 km²
6500 ha

Resolution
11.1 bn points
2.6 bn ground points

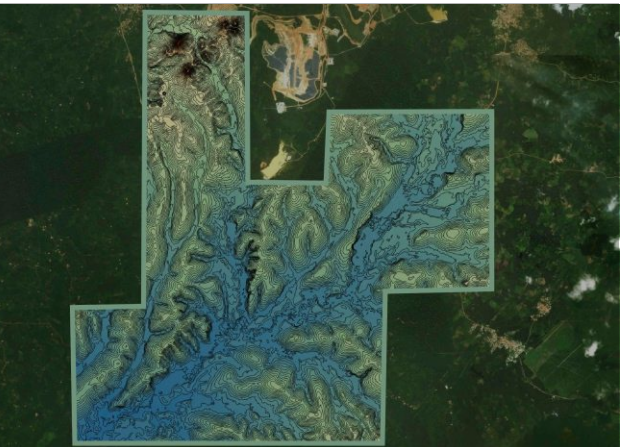
Payload
Qube
240

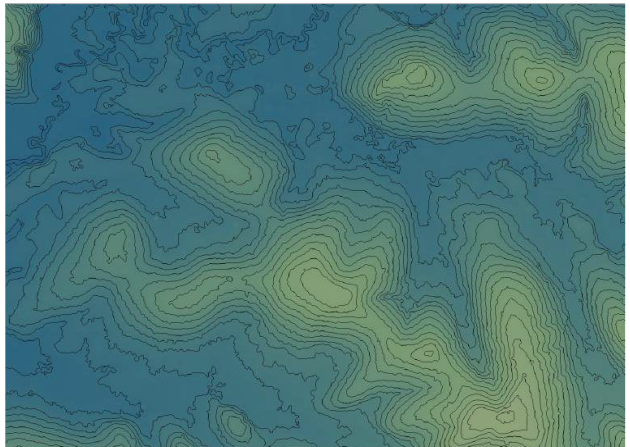
Altitude
120 mm
400 ft

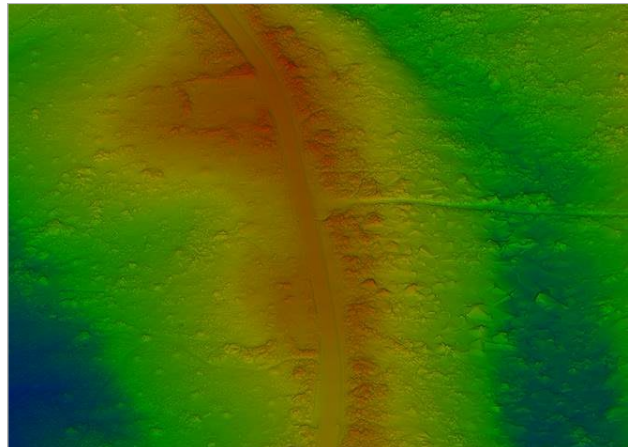
Temperature
40°-45° C
104°-113° F

Drone
Trinity
F90+

Time
20 x 58min
19 hours







Raphael Atimbire

Rocketmine

“Mapping 600 hectares in twenty flights is incredible and a real optimization in terms if planning efforts! The Trinity in combination with the Qube as a combo is a beast of a setup!“

QUANTUM SYSTEMS

Discovering hidden Maya sites

Yaxha National Parc, Guatemala

Create georeferenced 3D map of three excavated Maya sites (- **area mapping**).

Discover hidden Maya sites under dense rain forest canopy (--- **corridor mapping**).

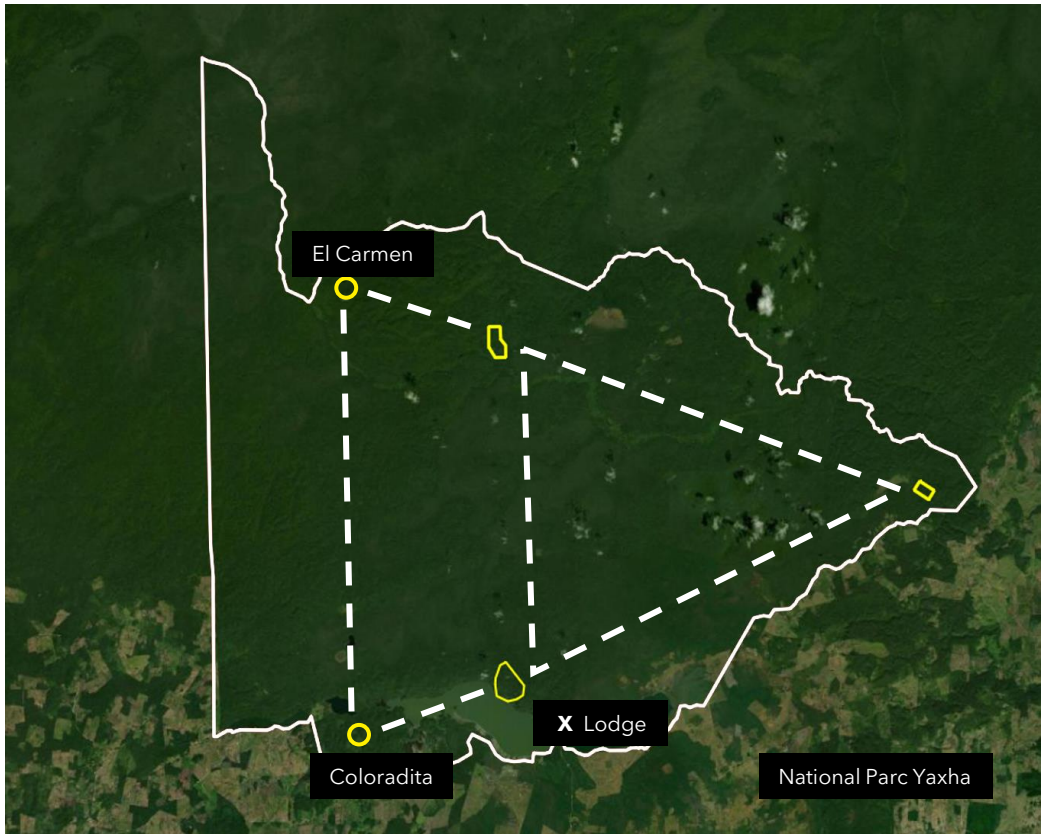
Aera of 6km² mapped with 3 LiDAR flights à 55min.

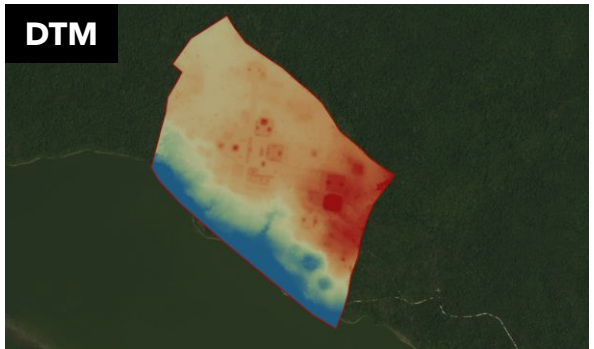
Triangle corridors surveyed with 7 LiDAR flights à 55min.

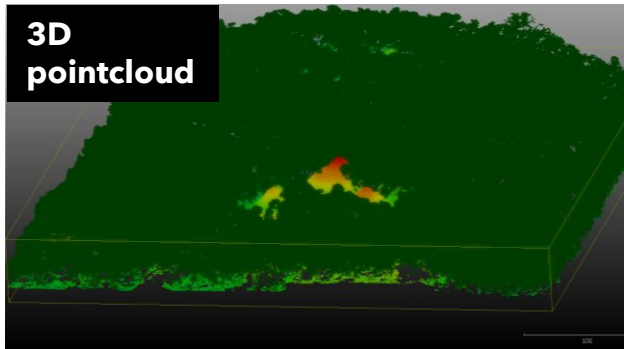
Reliable BVLOS operation in hot temperature, dense vegetation and hilly terrain

USAC TRICENTENARIA
Universidad de San Carlos de Guatemala

Universidad de Jaén







A new Era

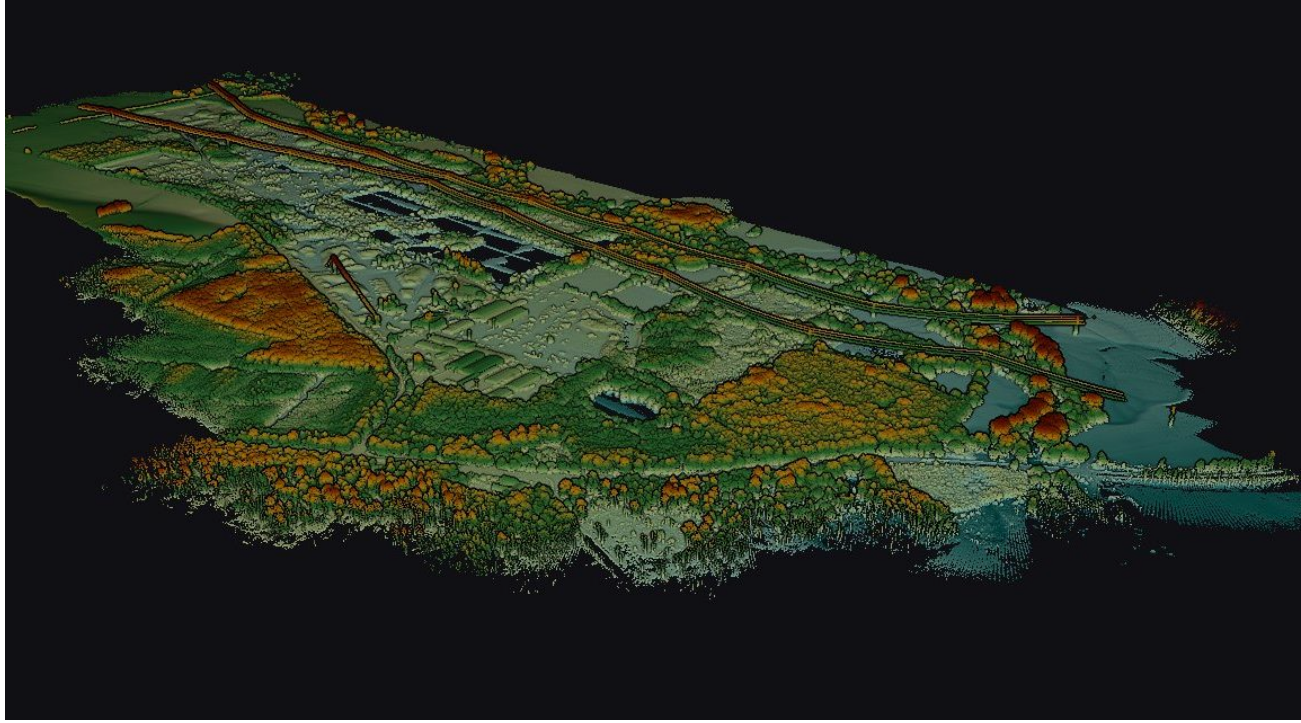
Introducing the next gen

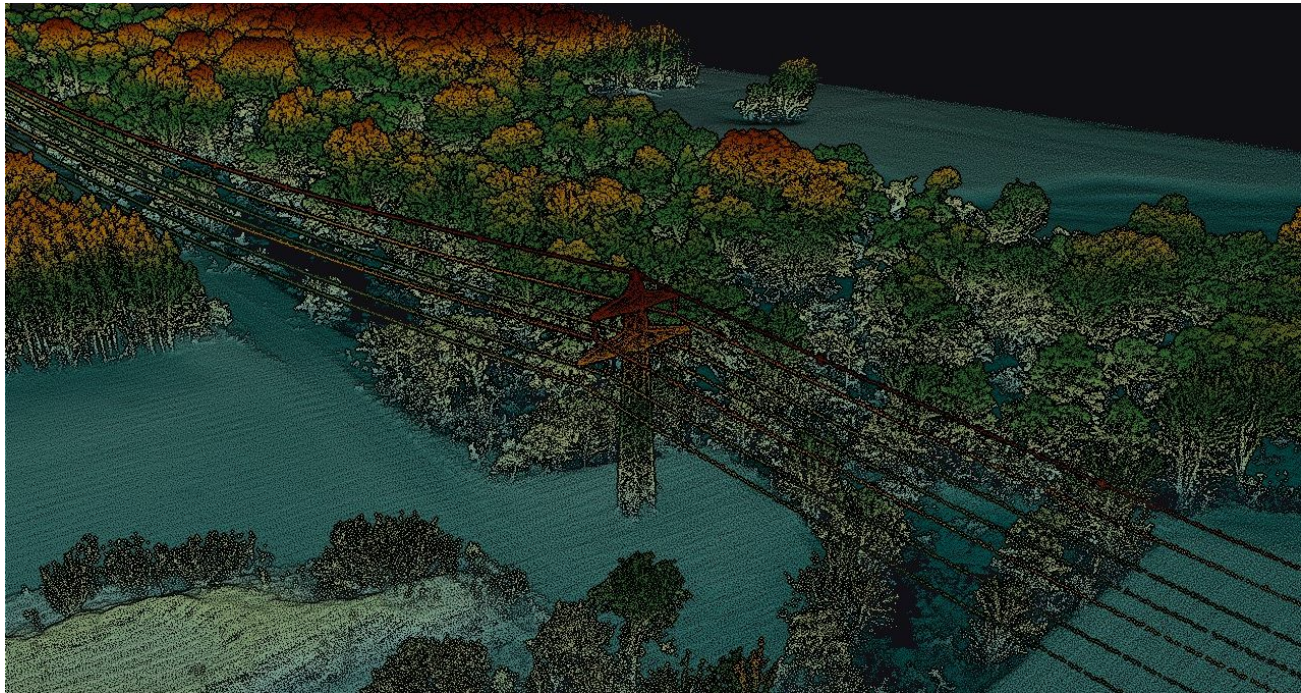
LiDAR technology moving at breakneck speed

YellowScan is bringing the latest innovation

Surveyor Ultra 3 provides three important new features and advantages:

- Single flight colourisation
- Improved penetration and performance
- Simplified workflows





Qube 640 LiDAR

Increasing efficiency to the max

Built on the Surveyor Ultra 3

Designed to work seemlessly with Trinity Pro fixed-wing UAV

- Continued deep and successful collaboration with YellowScan
- Custom integration to fit weight and size limits
- Direct communication for a truly automated workflow

+ 176° max. FOV	Selectable to increase productivity
+ 8 MP RGB camera	Simultaneous colorization
+ Hesai XT32M2X Scanner	Improved vegetation penetration

Trinity Pro

The perfect match for airborne LiDAR

Paired with the Qube 640 LiDAR, this is the ultimate solution for large-scale LiDAR mapping

- Knowledge edge and experience with drone-based LiDAR since 2018
- Fly faster, longer, and further than any other system in the market
- Fly in a wider range of environmental conditions than other platforms in the market
- Most integrated solution in the fixed-wing space

Archaeological research

Turkey, Lyrbe

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Lyrbe is a well preserved small ancient town close to Antalya.

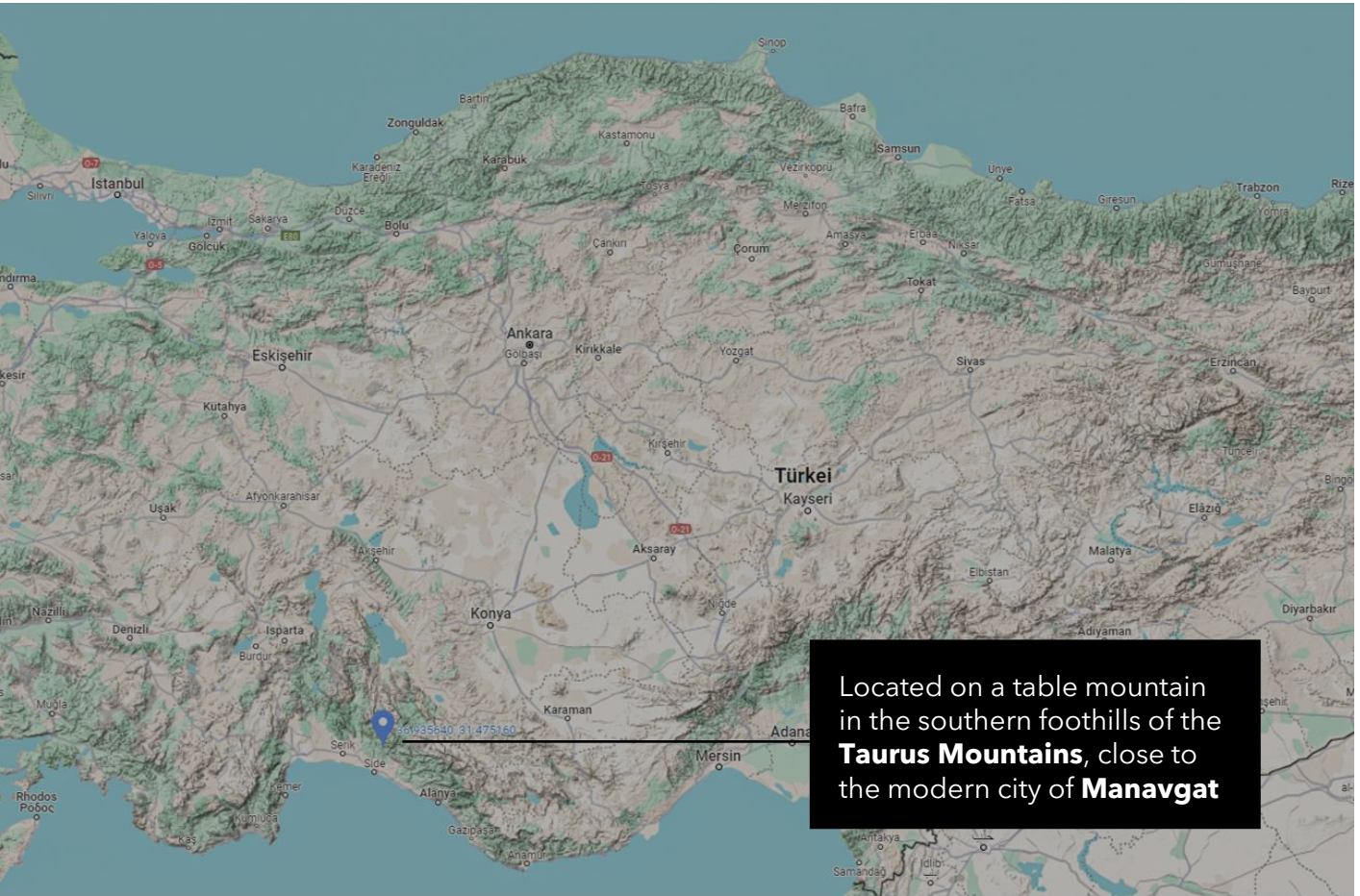
The market square (agora) is one of the best preserved from antiquity. So far, only a simplified exploration of this area has been carried out.

The other areas of the town are still unexplored.

To get a bare earth model to see structures hidden by vegetation, **Qube 640 LiDAR** is the technology of choice.

Archaeological research

Turkey, Lyrbe



Located on a table mountain in the southern foothills of the **Taurus Mountains**, close to the modern city of **Manavgat**

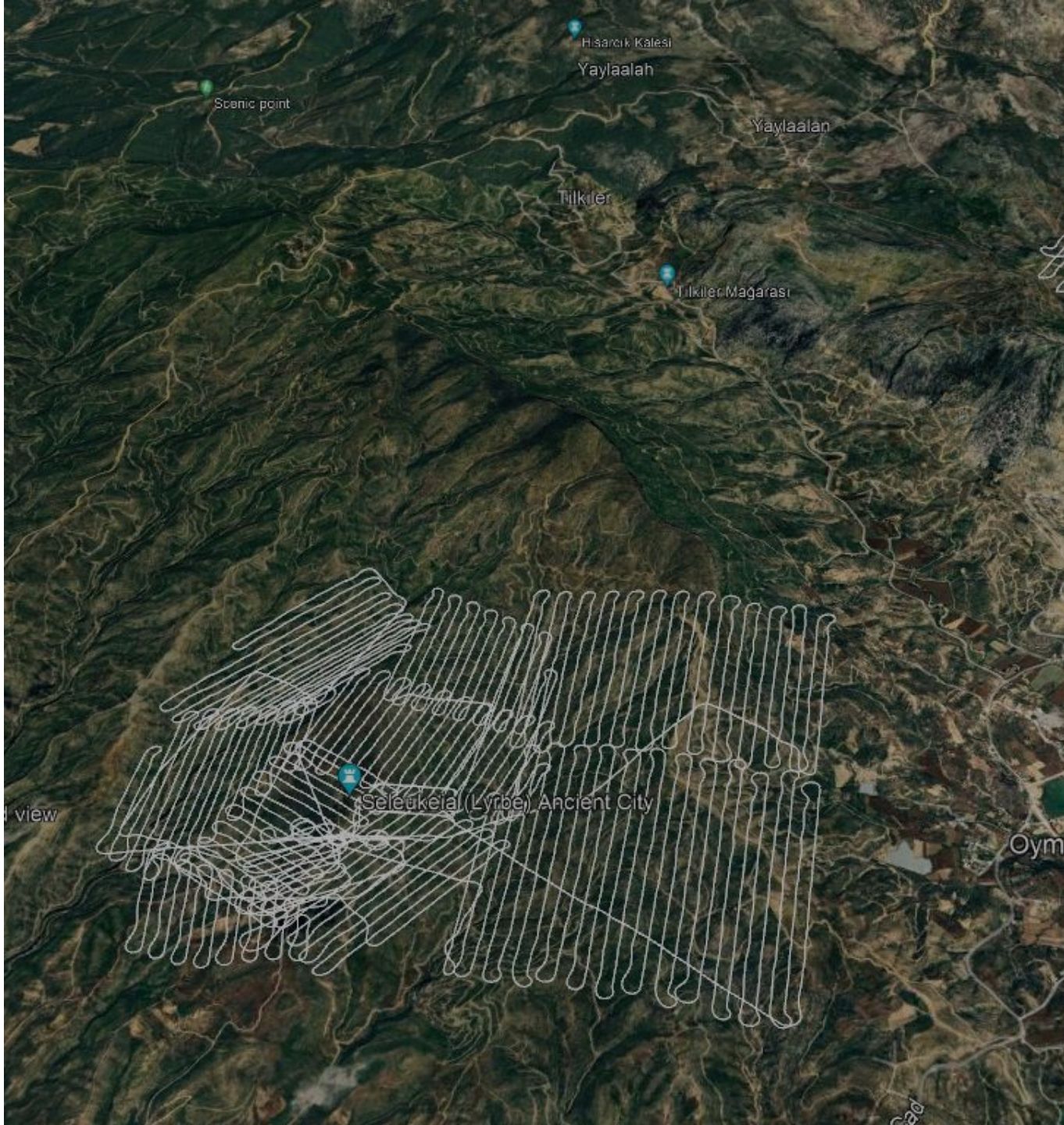
Archaeological research

Turkey, Lyrbe

Trinity Pro fixed-wing to cover the large area.

The current research project is a survey project:

- The aim is to prepare for an excavation project.
- Mapping the city and its surrounding area in order to identify promising archaeological areas.
- So far, numerous ornaments and the city's water management system have been investigated.



Archaeological research

In the field of Lyrbe

Quantum Systems* and the researcher team of the Goethe University Frankfurt planned the missions together to ensure best data quality.

The local conditions:

- **Challenges** – topography, weather, wind
- **Why Trinity Pro** – large area, colorized point clouds and immediate commitment from QS to participate in the project
- **Complexity of the project** – flight permission from Turkish authority, flight areas in the mountains, complex flight planning

*Stefan Wurmser

Archaeological research

In the field of Lyrbe

Terrain required

- careful mission planning
- BVLOS flights
- safe paths and
- careful check of wind conditions

Data quality assessment onsite

The local school of the village Bucakşeyhler served as a base for charging batteries, evaluating data, writing reports etc.

Archaeological research

The Lyrbe data

Data processing

Cloudstation → .las in CloudCompare

.dtm, .dsm → ArcGIS Pro

Deliverables/ Output

Colorized point cloud, very accurate .dtm

Usage of output (software)

.las mainly in CloudCompare

.dtm/.dsm mainly in QGIS

Conducting analysis

Comparison of colorized point cloud with .dtm and texturized 3D models of some AOIs

Archaeological research

The Lyrbe data

What was the final outcome?

A very detailed dtm of the mountain on which Lyrbe lies and the surrounding terrain

Anything interesting found in the data?

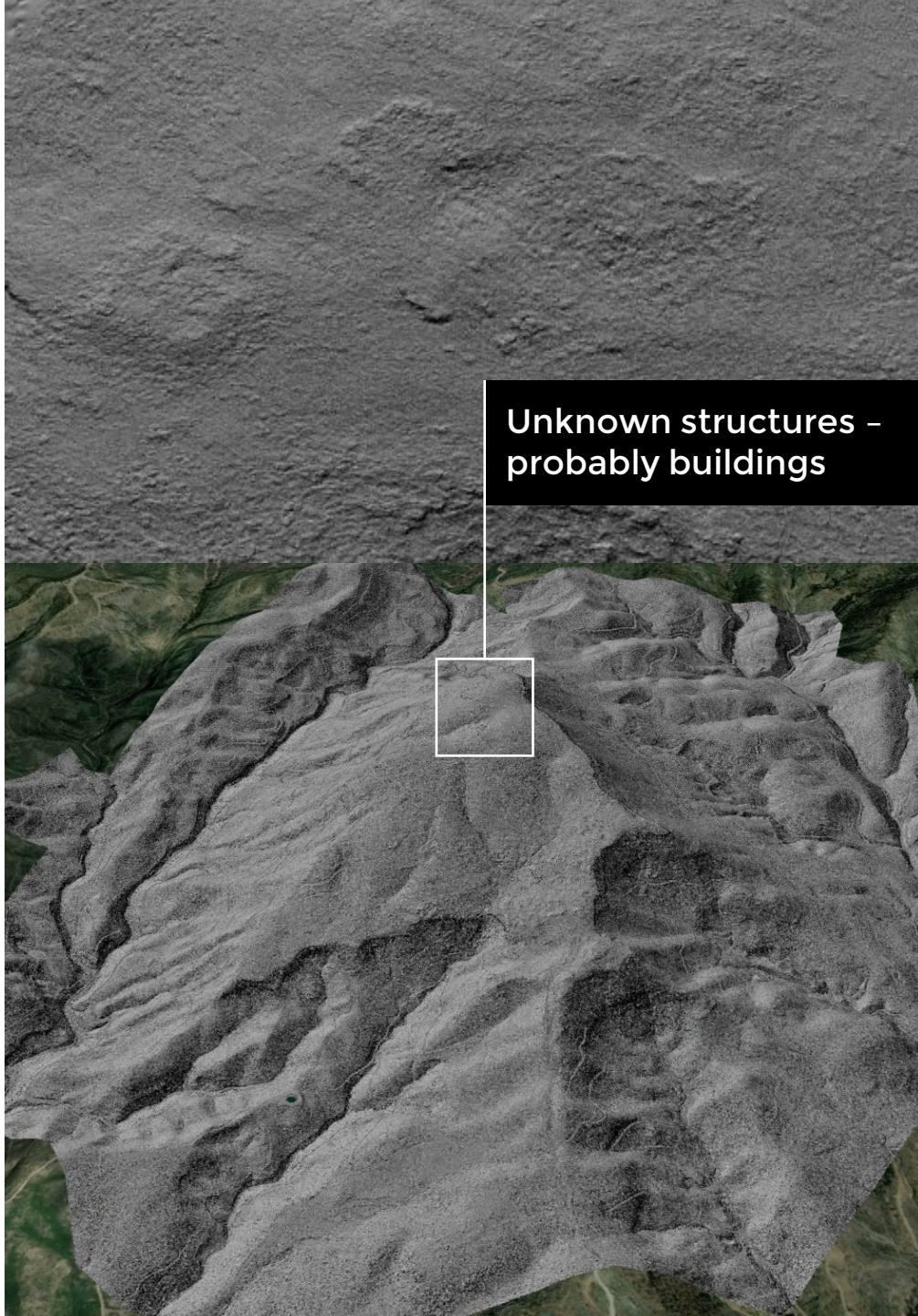
The buildings in the urban area extend further up the slope than previously known. The course of the city walls from different eras can be better reconstructed

Why they were happy with the data quality?

They now have a huge pool of data that can be further analyzed, and interesting findings can be investigated in a more targeted manner

Did the colorization help, and was speed of capture important?

The colorization allows finds such as walls to be assigned more easily. Speed was important to cover as large an area as possible within the permitted investigation period



Archaeological research

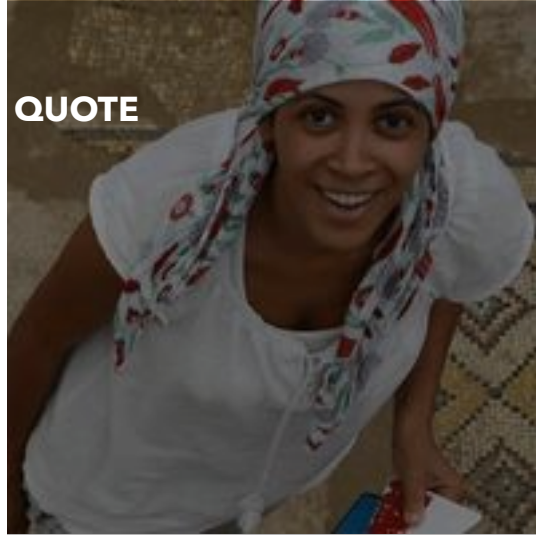
Lyrbe final comments

Lessons learned

Trinity Pro and Qube 640 LiDAR solution delivers good results even in mountainous terrain and unfavorable weather conditions and works absolutely reliably.

Next steps

QS stays in contact with the archaeology team at the University of Frankfurt and will probably be invited back for the next campaign in spring 2025. The team currently has almost 1,000ha of data to evaluate.



Dr.Işıl Işıklıkaya-Laubscher

Goethe Universität Frankfurt am Main

"We are impressed with the performance of the Trinity Pro in conjunction with the Qube 640. The ancient city of Lyrbe is located in a forest that has been affected by wildfires and is accordingly difficult to access. The results of the Lidar scan now allow us to see for the first time structures that are hidden under vegetation and not visible on conventional orthophotos. This allows us to understand the city plan of Lyrbe.

QUANTUM SYSTEMS

Trinity Pro with Qube 640

Unmatched efficiency

Yellow Scan and Quantum Systems are both dedicated to:

- Coming up with innovative solutions providing added value
- Keeping our product portfolios state-of-the-art
- Striving to unlocking untapped potential in the surveying world

Questions?

Thank you

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