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PHOTOGRAMMETRIC METHODS USED TO CREATE ORTHOPHOTO PLANS IN THE CONTEXT OF TERRITORY ORGANIZATION

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Abstract: A drone was used to map an area of 18.99 hectares with millimeter accuracy. The mapping process involved creating eight targets on the ground that were visible to the drone at a height of 60 meters. The coordinates of the targets were determined using GPS methods. Classical topographic methods have also been used to calibrate the drone's GPS for further correction and accuracy.

• INTRODUCTION

Drones are classified into fixed-wing drones and multi-rotor drones. FIXED DRONES AND MULTI-ROTOR DRONES The most popular and widely used are unmanned aerial vehicles (UAVs). In this way, many risks to which human operators could be exposed are eliminated if they have to carry out inspections at various targets, such as wind power plants, nuclear power plants, hard-to-reach quarries, viaducts, high-capacity overhead power lines etc.), surface mining operations, hydrology, meteorology etc.



• MATERIAL AND METHOD



The most popular and most widely used are unmanned aerial vehicles (UAV). In terms of use, drones are divided into the following categories:

- ☐ Unmanned aerial vehicle (UAV);
- ☐ Unmanned surface vehicle (USV);
- ☐ Unmanned underwater vehicle (UUV);
- ☐ Unmanned Ground Vehicle (UGV);
- ☐ Pseudo High Altitude Satellites (HAPS).



Drones are classified into fixed-wing drones and multi-rotor drones. Regardless of its use, the unmanned aerial vehicle runs on batteries or energy produced by their own photovoltaic cells.



Figure 1. Image of DJI Matrice 300 RTK drone

RESULTS AND DISCUSSIONS

In the first stage, a number of 8 targets were made on the ground, which were drawn with a phosphorescent color on the asphalt and at the interest of several streets to be visible from the drone during the flight.

Table 1. Coordinates of control points determined on the ground by GPS methods

X	Y	Z
X1 : x = 468185.552;	y = 177669.256;	z = 79.327m;
X2 : x = 467880.201;	y = 177153.128;	z = 79.775m;
X3 : x = 467727.594;	y = 177273.736;	z = 80.398m;
X4 : x = 467556.669;	y = 177411.467;	z = 80.077m;
X5 : x = 467472.329;	y = 176977.498;	z = 80.458m;
X6 : x = 467607.835;	y = 176866.165;	z = 78.974m;
X7 : x = 467316.817;	y = 176683.746;	z = 78.568m;
X8 : x = 466978.125;	y = 176815.202;	z = 79.312m;

After determining the points by classical topographic methods, before executing the flight with the help of the drone, for the established sector, a calibration of the RTK GPS drone from DJI was made to ensure additional corrections and better accuracy.



Figure 2. DJI 300 RTK matrix with D-RTK 2 GNSS mobile station

After determining GPS points by classical topographic methods, the flight plan was made, which was made with the help of software developed by DJI directly in the drone's field book.

By carrying out the flight plan, the following characteristics were determined: flight area in ha in our case of 18.99ha; flight height (60m); flight time in this case 22 minutes; camera resolution; time level for batteries; direction of flight and wind speed at the time of take-off; latitude and longitude for the measured sector; the flight speed that in that project was 5.9m/s.

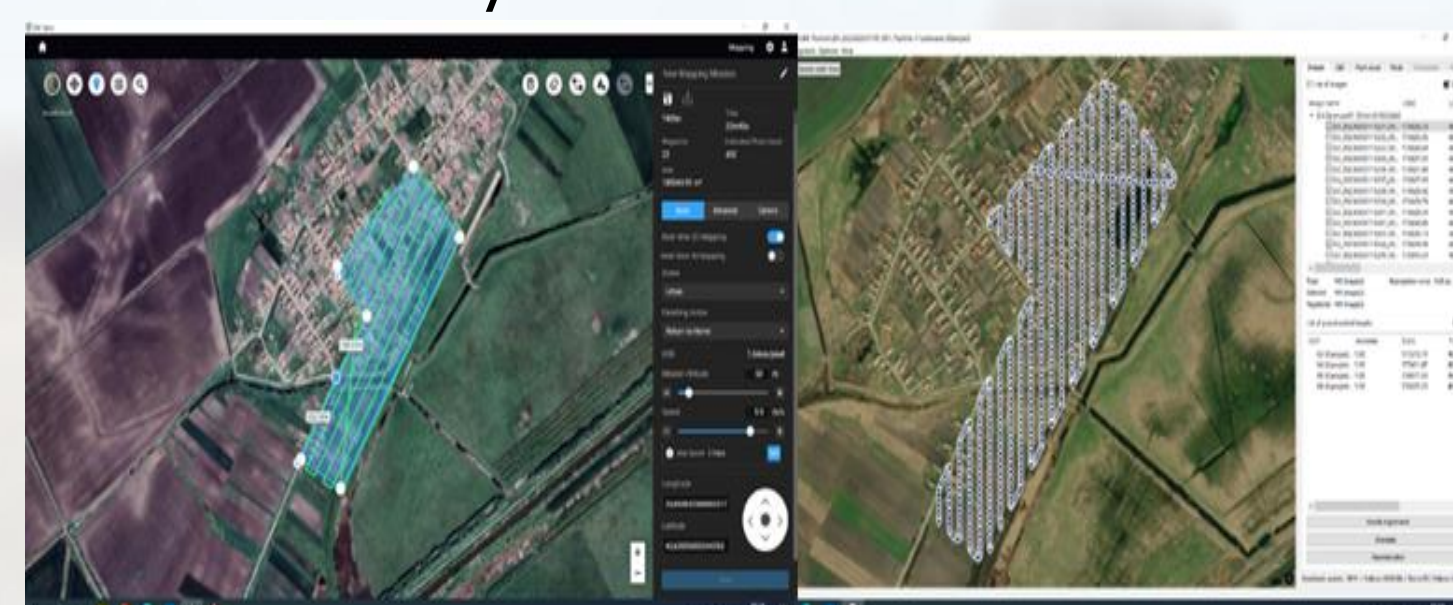


Figure 3. Flight plan for the sector to be measured

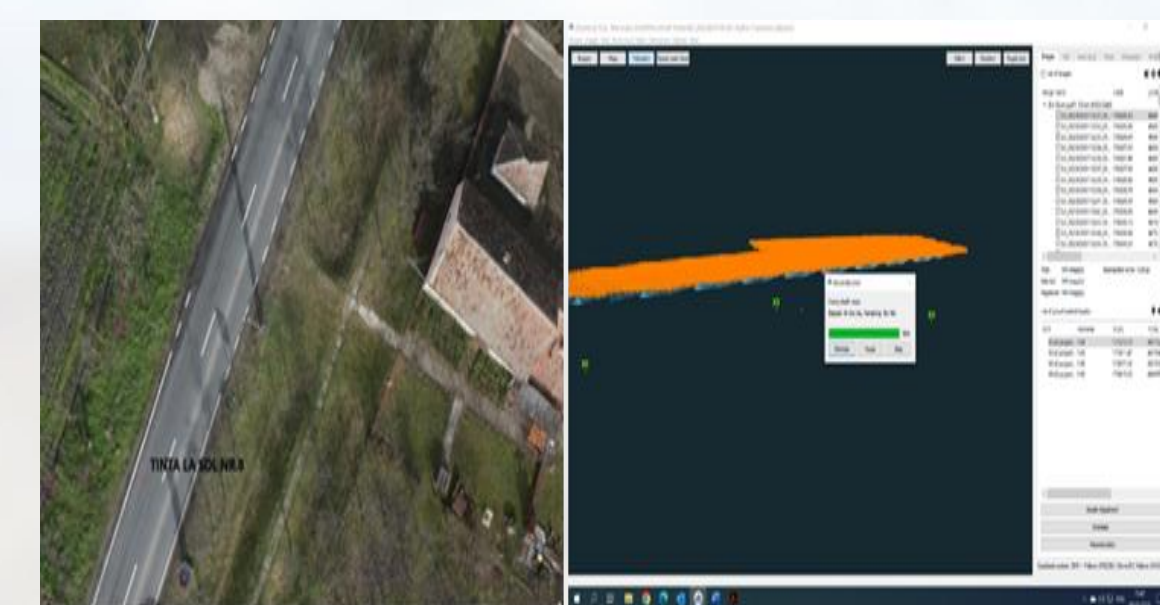


Figure 4. Ground Point Control and processing the images taken from the drone

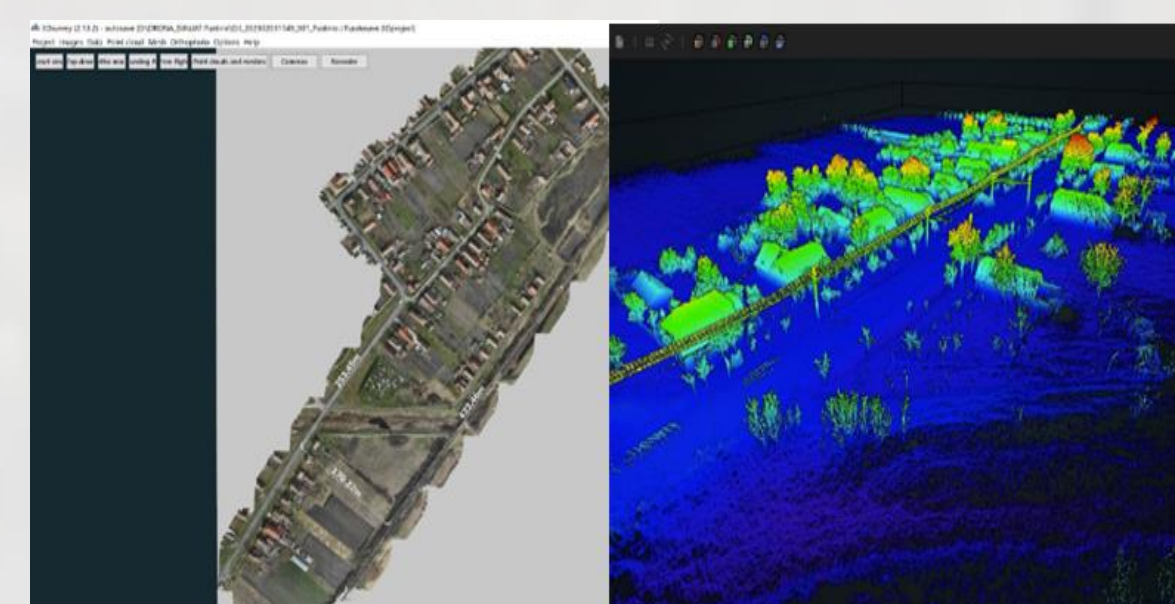


Figure 5. The point cloud resulting from image processing and the digital terrain model

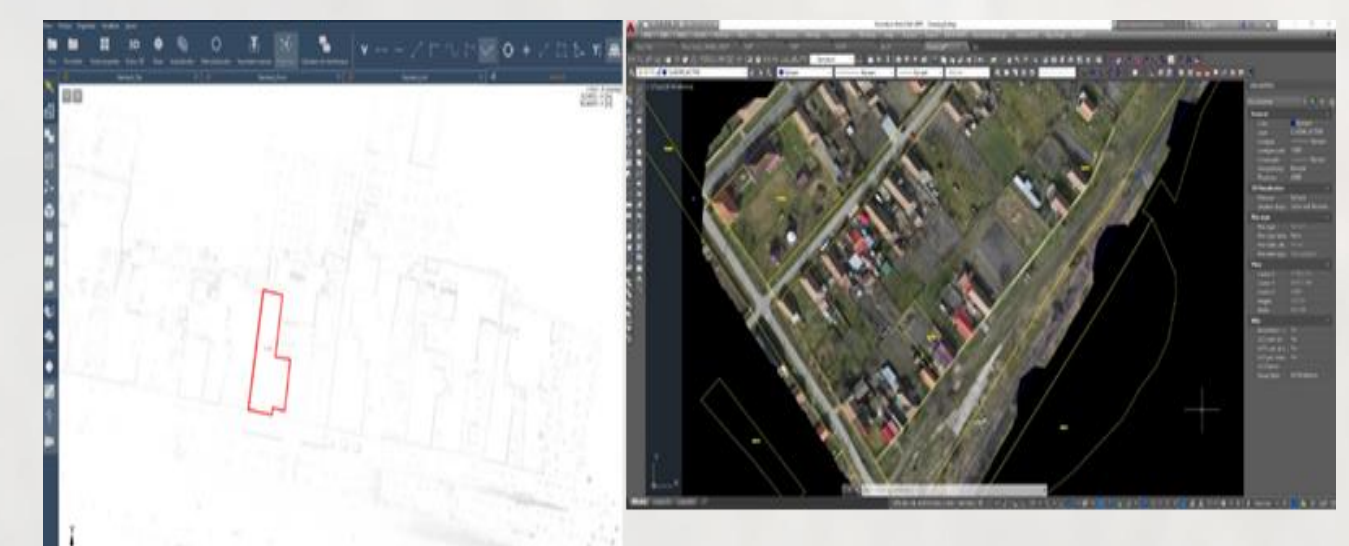


Figure 6. Cadastral sector and property limits superimposed on the orthophoto plan

• CONCLUSIONS

The use of UAV (Unmanned Aerial Vehicle) technology in creating orthophotoplans offers numerous advantages in the fields of cartography, topography, urban planning, and more. Here are some of the most important uses of UAV technology in this context: efficient mapping; rapid updates; cost-effectiveness; personnel safety; land change monitoring; urban planning and development; precision agriculture.