PROCESSING OF UAV RECORDINGS IN AGRICULTURAL AREAS

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3rd Workshop
Investigation of the characteristics of surface shapes in rural environment based on point clouds and remote sensing data
Project ID: 2019-2.1.11-TÉT-2020-00171
June 6, 2023, Székesfehérvár

Óbuda University, Alba Regia Technical Faculty, Institute of Geoinformatics

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The need of UAV photogrammetry

- Aerial survey with UAV technology in agricultural areas is capable to give answers to the following questions:
  - Is the degree of change detectable for vegetation and soil characteristics?
  - What are the new analytical capabilities when using only RGB images taken with low altitude?
  - What new information does the high ground resolution?
  - Does combining 2D and 3D data help to solve some specific problems in image classification?
  - Can we combine or use UAV images together with satellite images?

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Example of UAV surveys

Area	Near Csömör	Near Pusztaszentlászló
Number of images	126	135
Avg, Flight height [m]	138	92
Elevation extent of terrain [m]	1.3	34.3
Avg, Image scale	1:24470	1:15310
Sigma0 [pixel]	1.38	1.18
Avg. GSD [cm]	3.7	2.4

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Algorithm in Inpho UASMaster

- Data collection (images, camera data, coordinates and descriptions of control points)
- Images (pre-correction of images)
- Approximate external information elements (from EXIF data)
- Camera data (preferably calibrated data)
- Coordinates of control points and their location on the images
- Specify expected errors
  - To measure image coordinates
  - Definition errors of connection points
  - INS/IMU measurement errors
- Measurement of control points
- Measurement of tie points
- Aerial triangulation
- Point cloud generation
- Making an orthophoto mosaic

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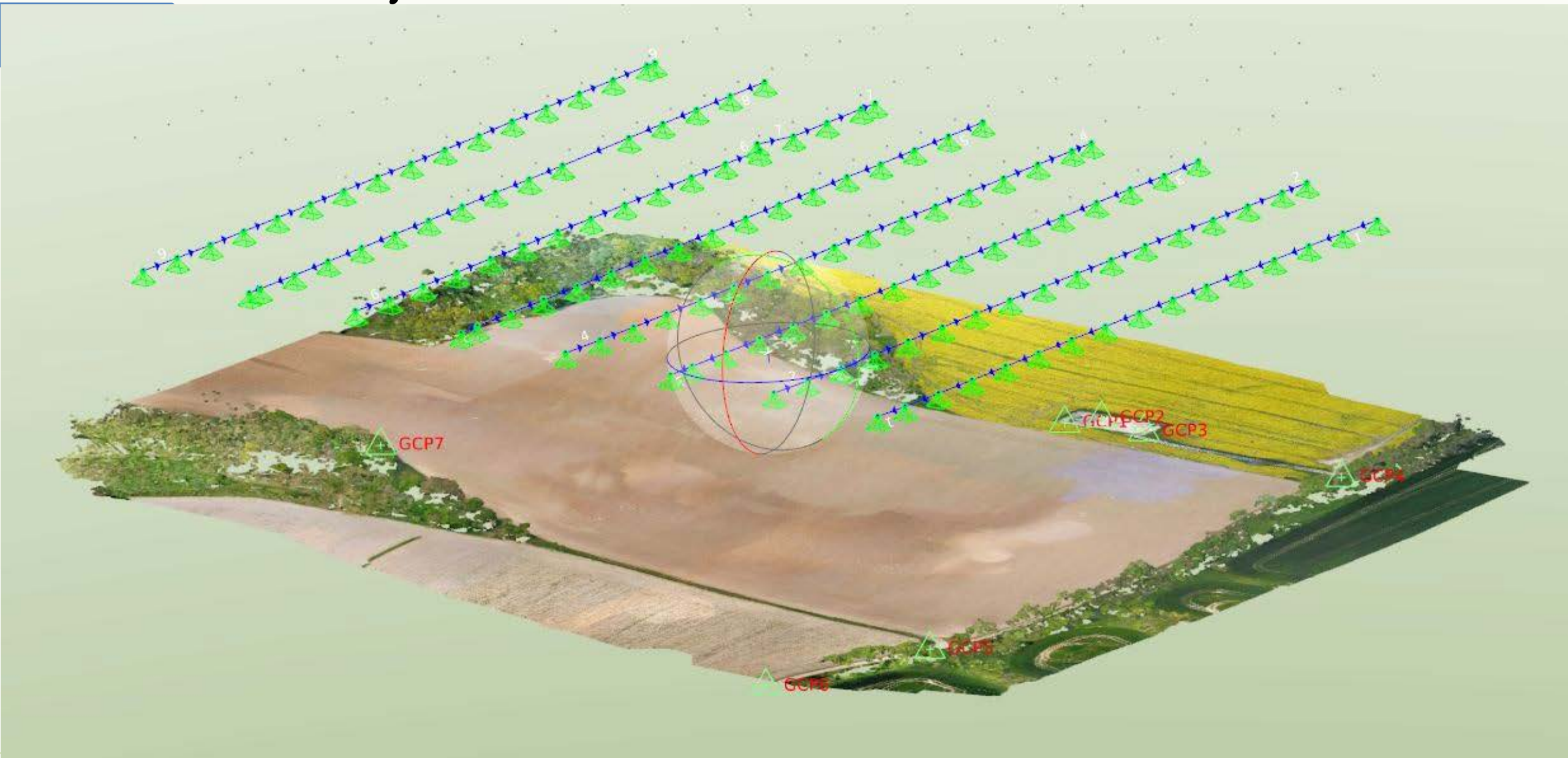
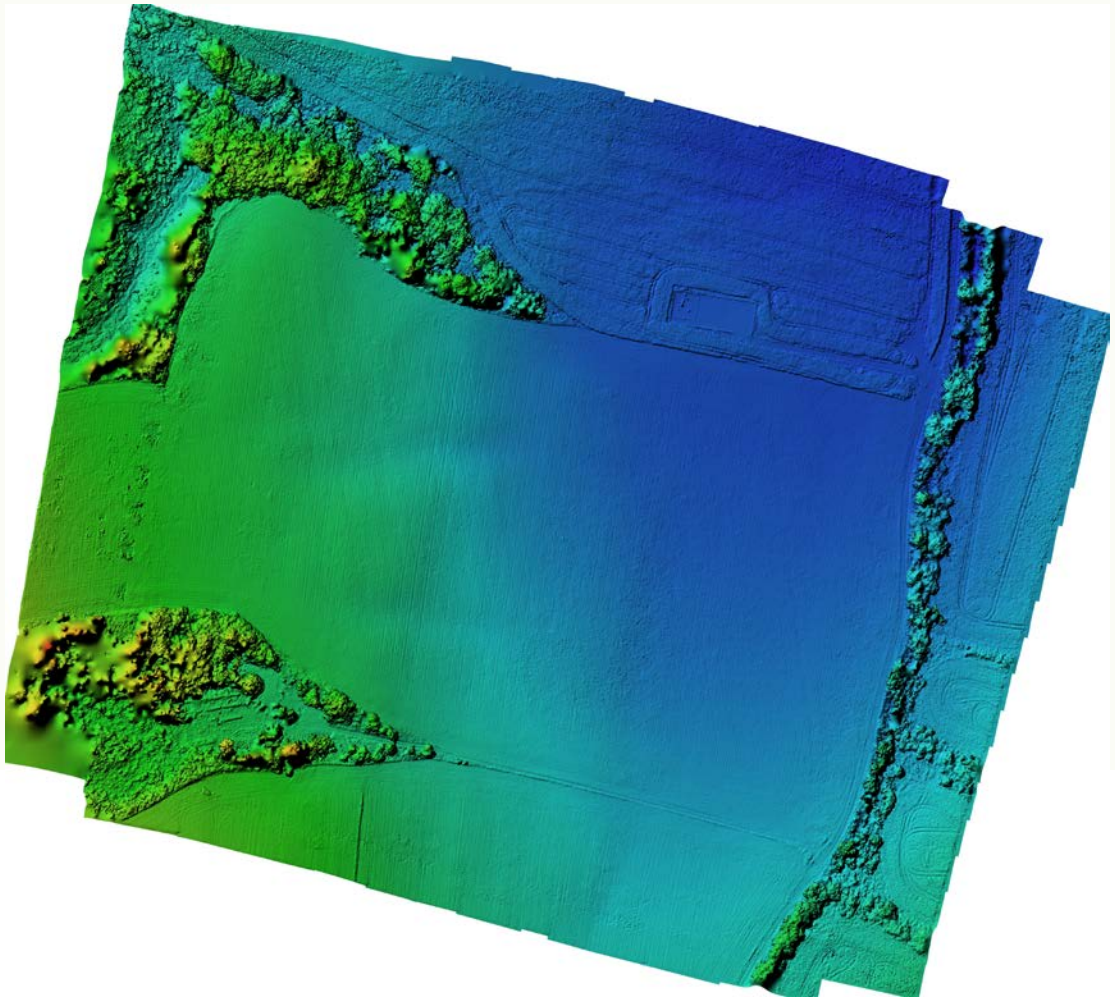
UAV survey of Area1



Completed DEM of Area1



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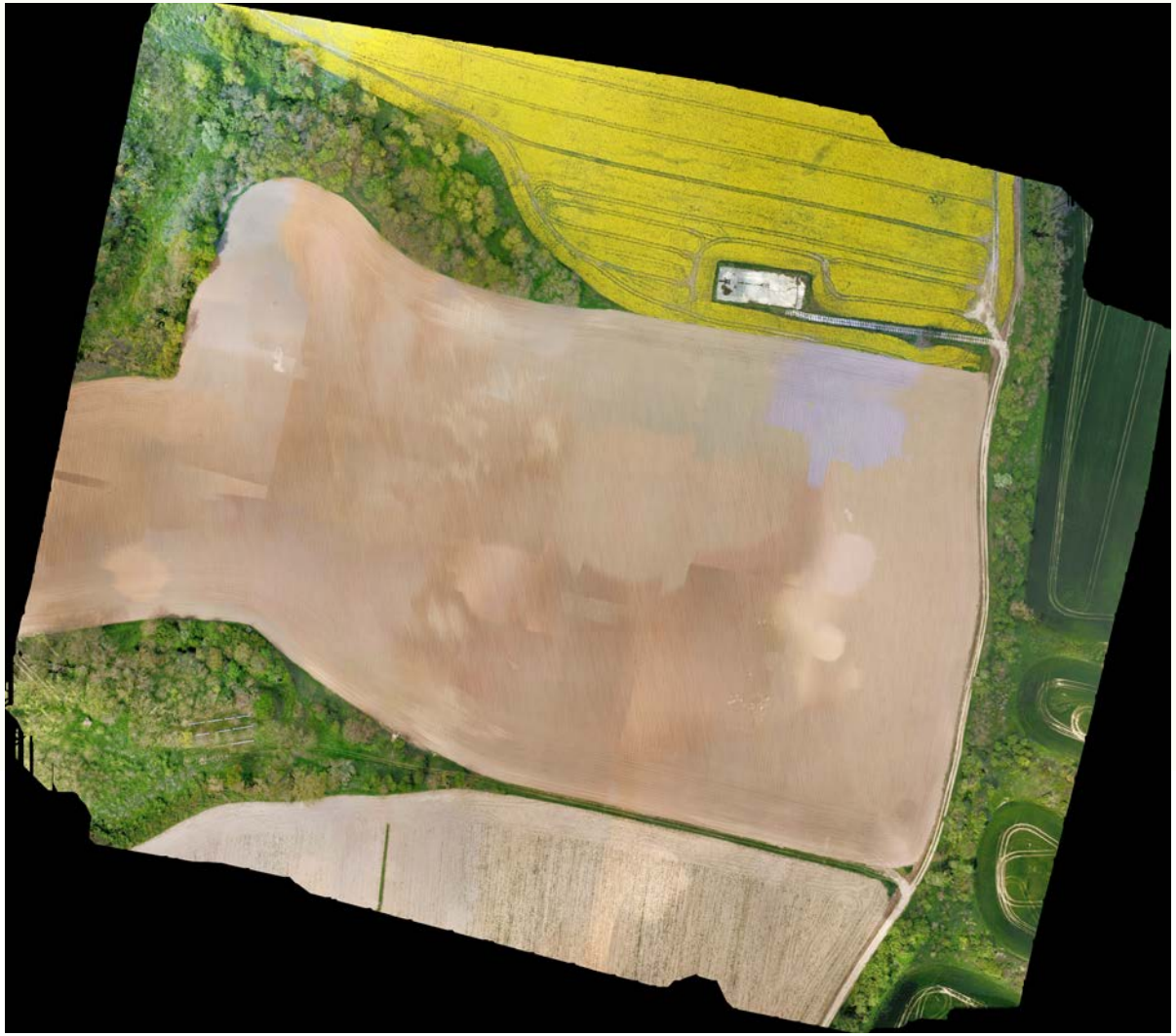
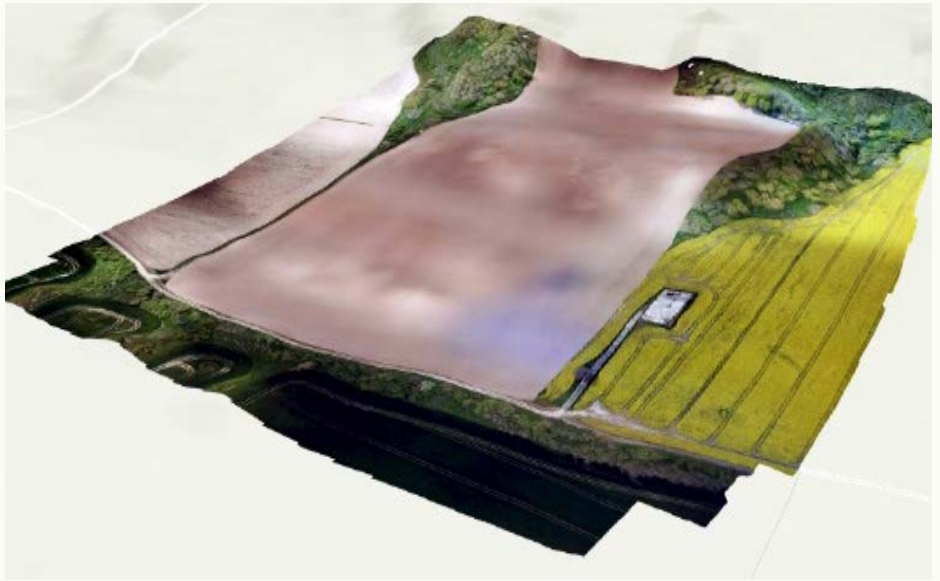
Completed orthophoto of Area1





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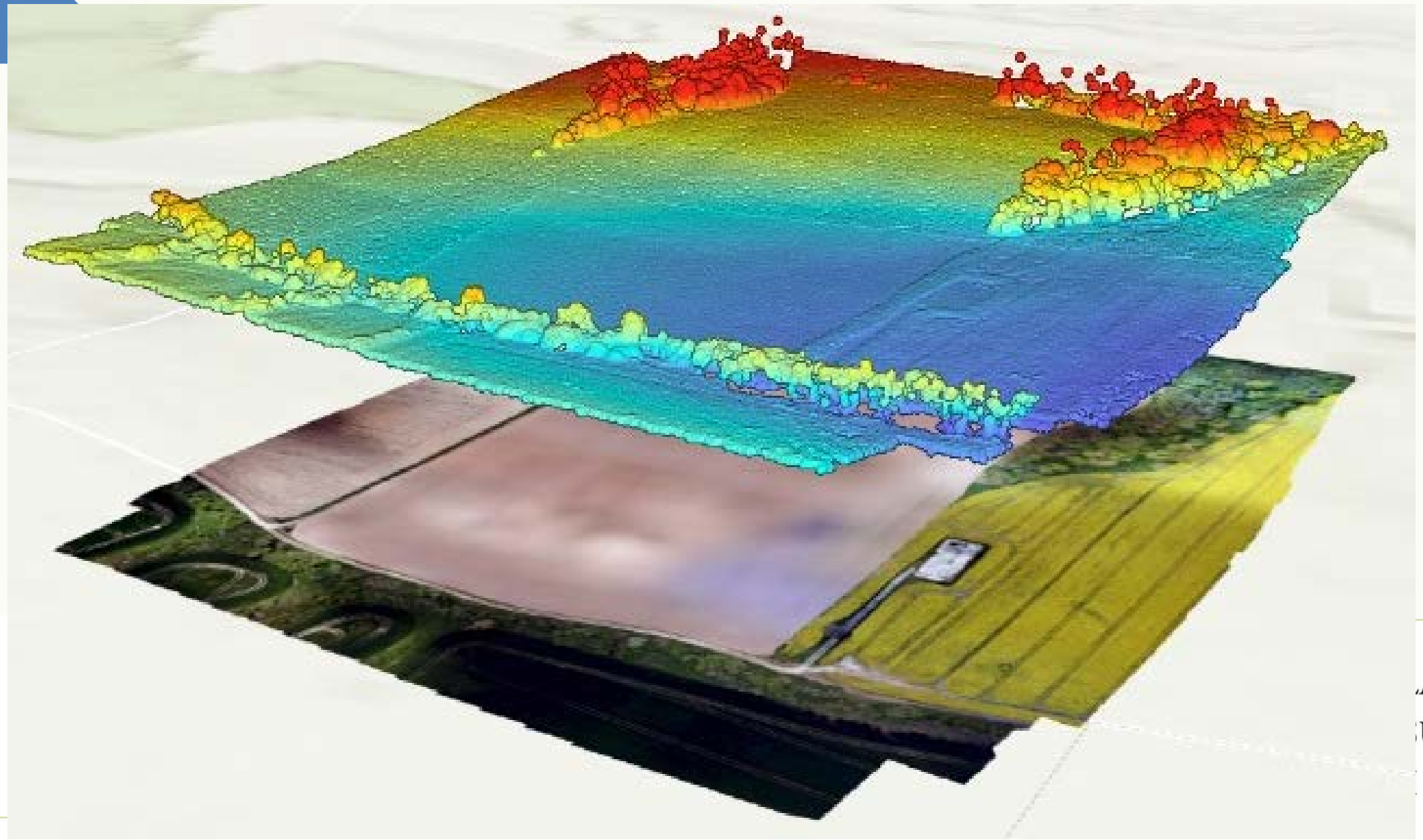
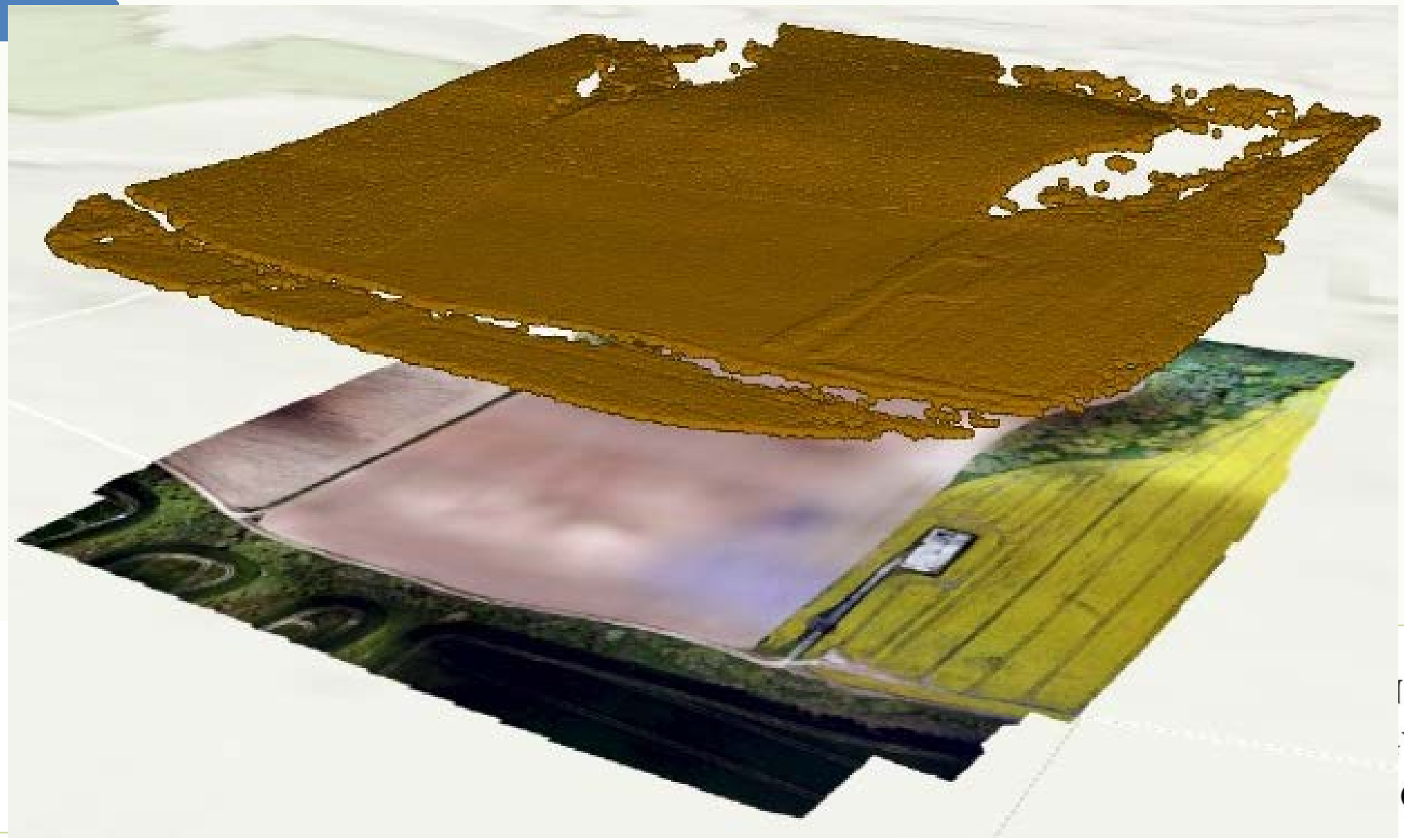
DDM and orthophoto of Area1



Filtered DDM and orthophoto of Area1



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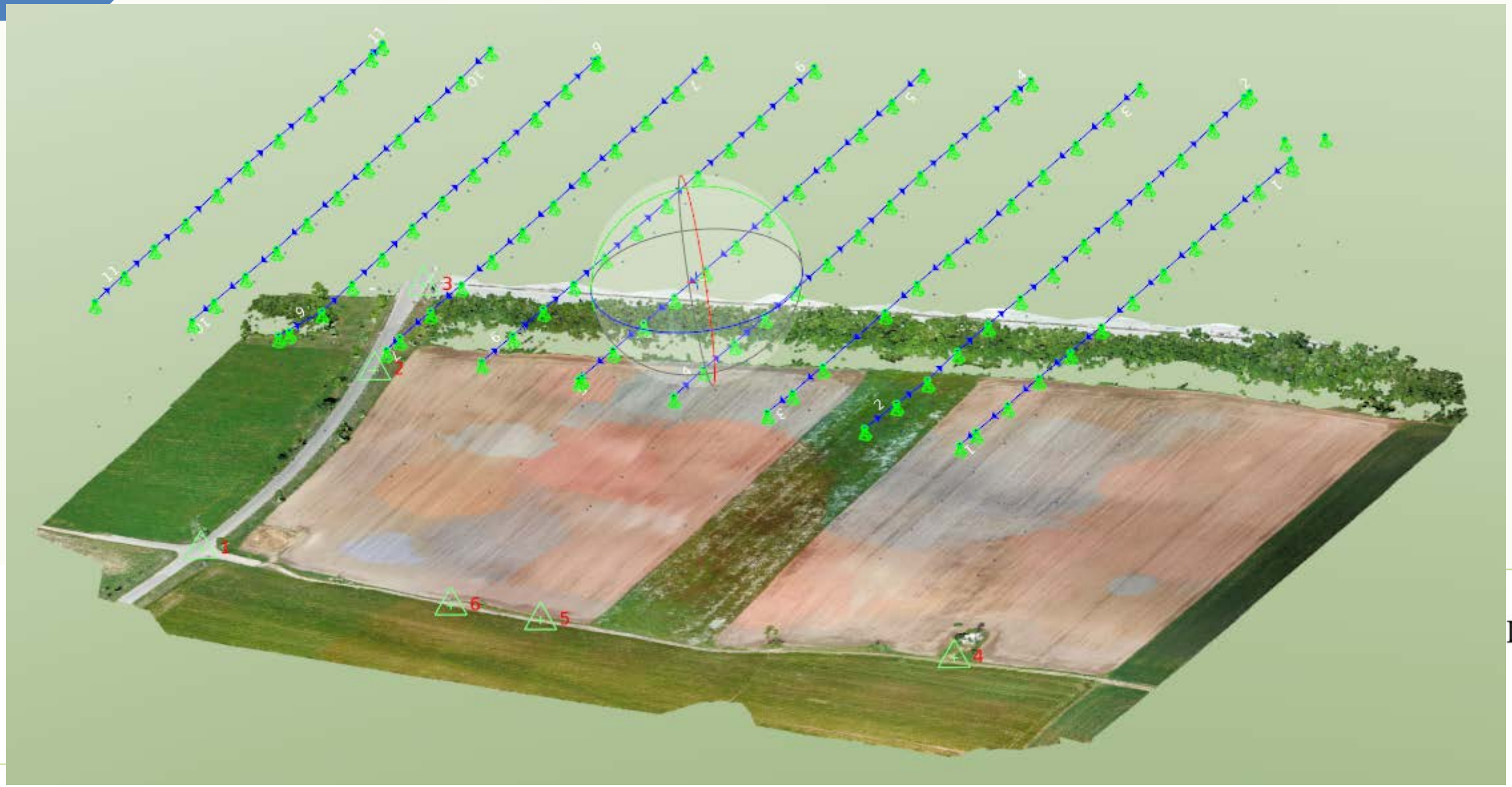
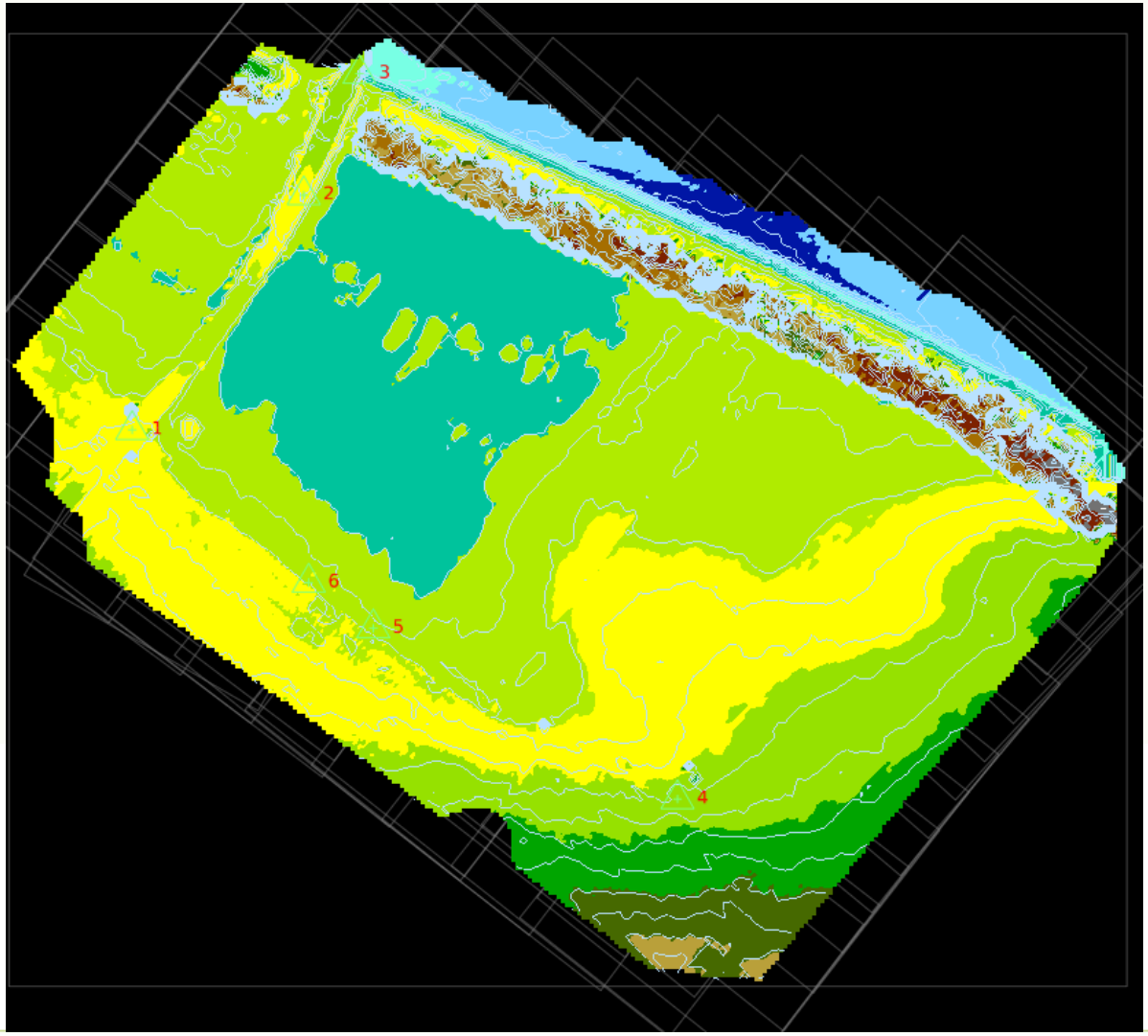
UAV survey of Area2



Completed DEM of Area2



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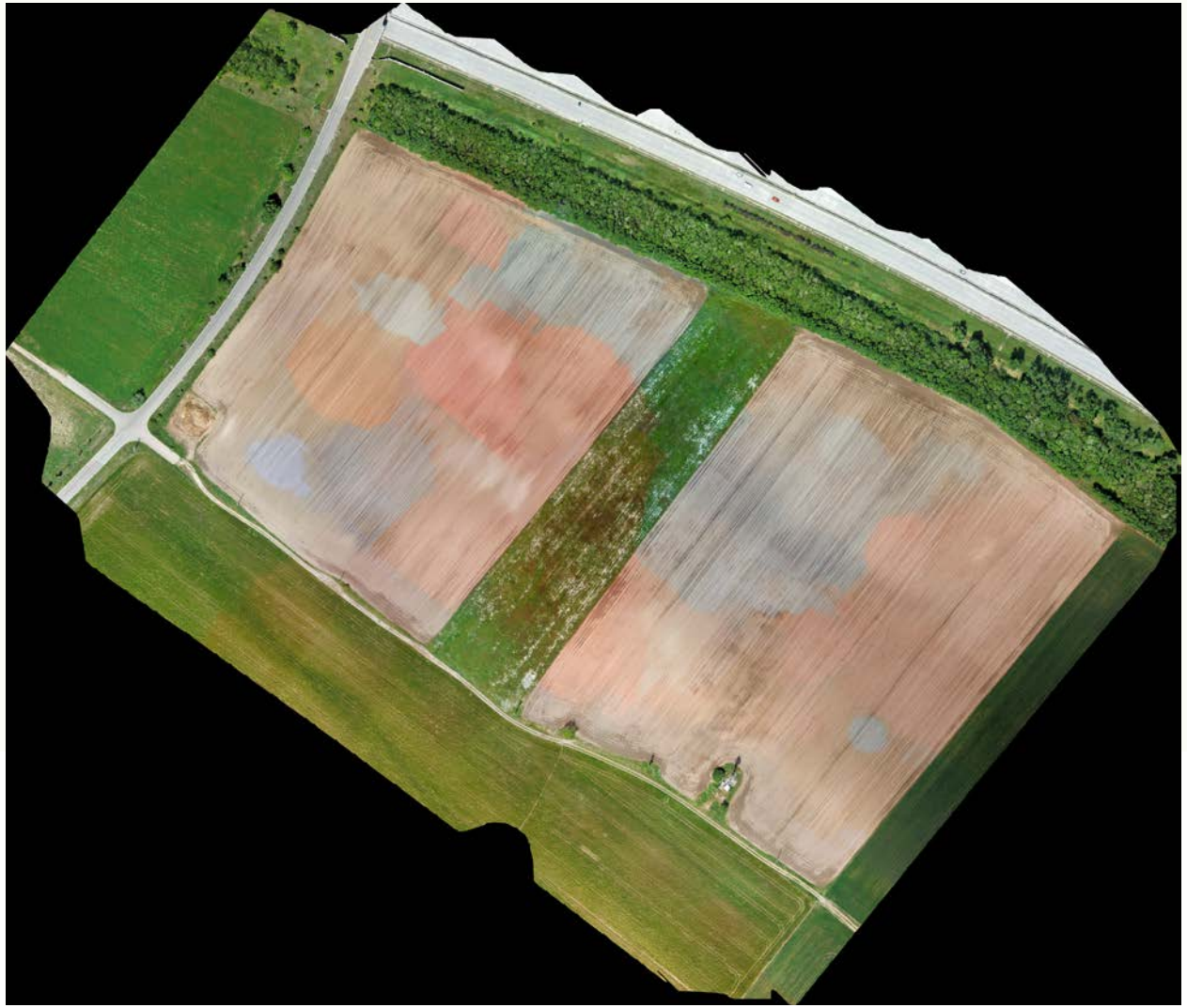
Completed orthophoto of Area2



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Planned investigation

- UAV survey at 4 times. Before sowing, during sprouting, mid-season and before harvest.
- Production of surface models. Calculation of surface model differences.
- Maize yield determination considering plant density and height. Infer LAI, etc.
- Examination of the relationships between relief conditions and vegetation growth. Consideration of other parameters: solar radiation, precipitation, soil erosion..

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THANK YOU FOR YOUR ATTENTION!

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