Forest monitoring and assessment

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Presentation outline

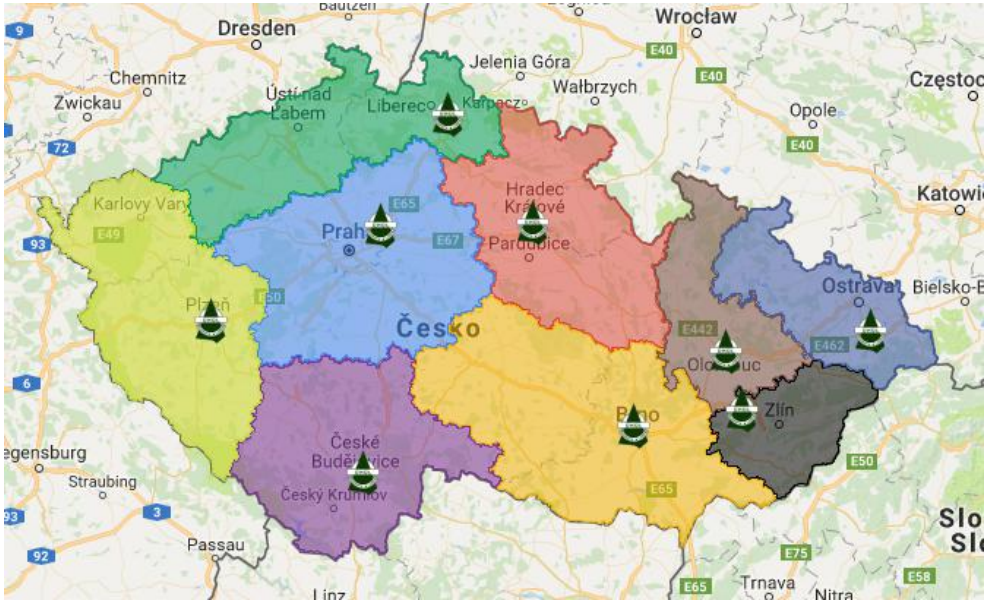
- Monitoring of the forest resources by remote sensing in Czech Republic
- Current trends and visions for future
- Research and technology in the Faculty of Forestry and Wood Sciences CULS

Monitoring of the forest resources by remote sensing in Czech Republic

- Mostly based on aerial scanning and photogrammetry
- Additional data sets available from satellite sensed data

- Main responsible entity : UHÚL Frydek-Mistek (The National Agency for Forest Management)

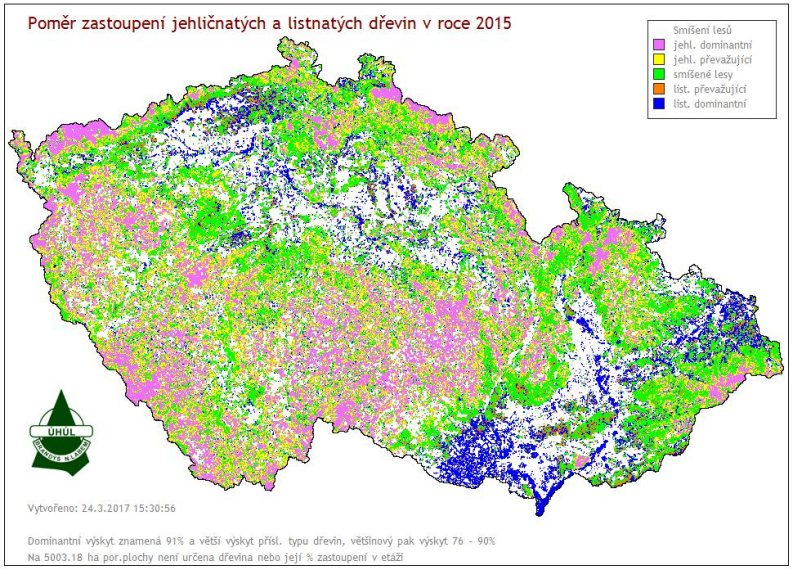
Division of GIS and Remote Sensing



Available public map outputs :

- Forest species composition and cover
- Land Cover Map (forests, other land types)
- Forest harvest delineation
- Trends of forest health status
- Vegetation anomalies (2015)
- Normalized Difference Infrared *Index* (*NDII*) (2000-2015)

http://geoportal.uhul.cz/dpzmap/



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Current trends and visions for future

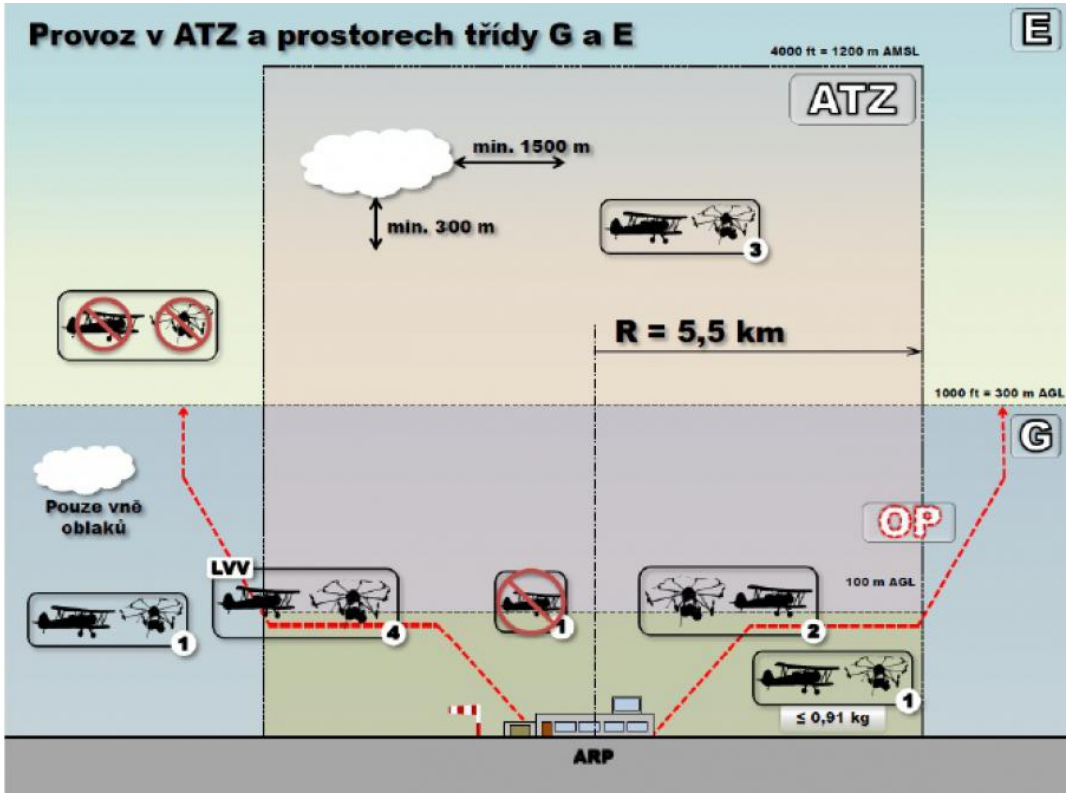
- The laser scanned data provided by second entity for aerial data acquisition

http://www.cuzk.cz/

are getting larger and larger attention by the forest stakeholder and decision makers.

Another big area of expected evolution and enhancement is utilization of Unmaned aerial vehicles (UAV)

- Europe is the leading country in UAV (more UAV in Europe than in the rest of the world)
- Legislation differs though
- So far only technical opinion published by EASA (industry development and privacy and security)
- In CR there is currently 300 m above ground level space for UAV utilization
- Certified pilots are required



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Drone types available:

1 - Copters

Octopter Steadidrone ei8ht

Quadrocopter DJI F450

Most recent: DJI S 900

Drone types:

2 - Planes

Maja airplane

Wings

Fixed wing

Available sensing equipment

Visible

Sony α6000

GoPro Hero

Multispectral

Sequioa

Thermo

FLIR Tau 2

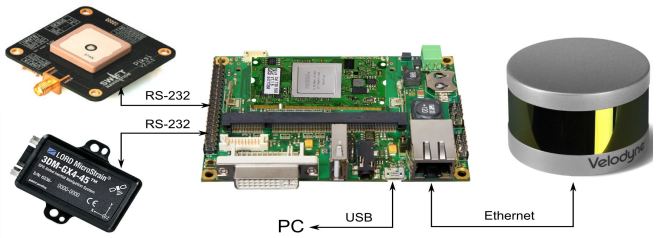
Workswell
Wiris

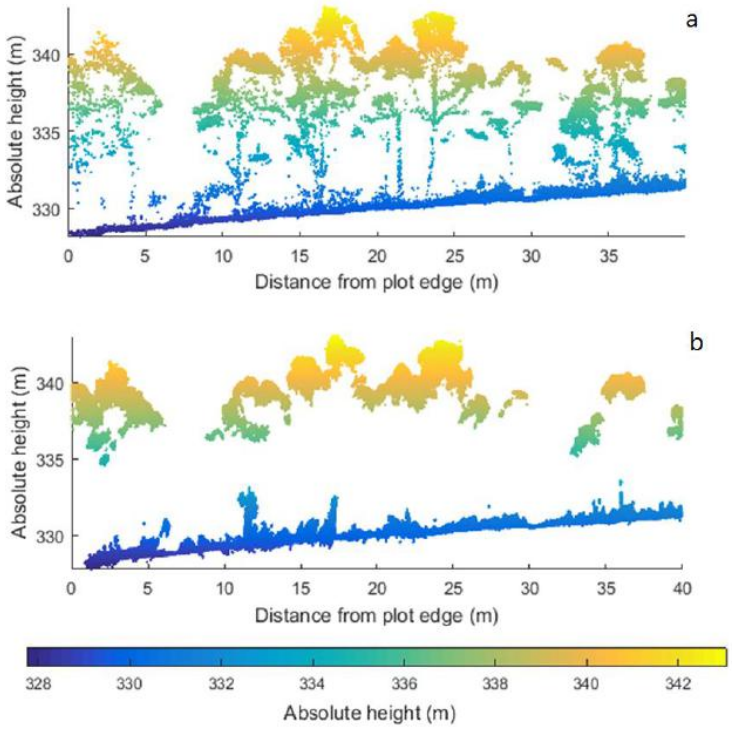
- Laser scanning

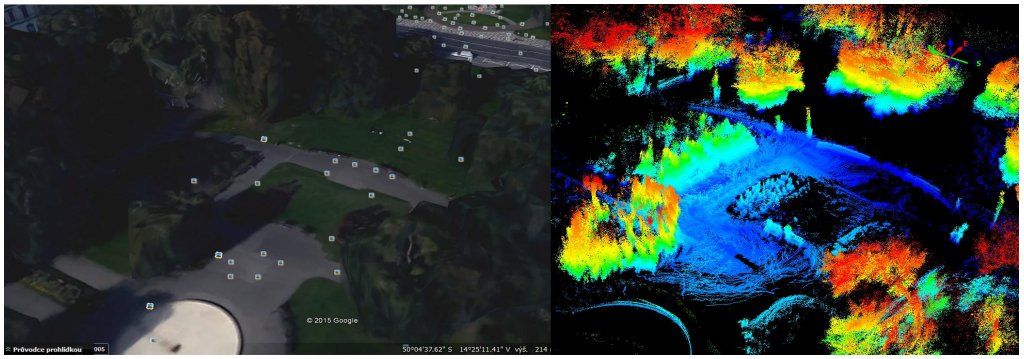
  Professional (dedicated) equipment

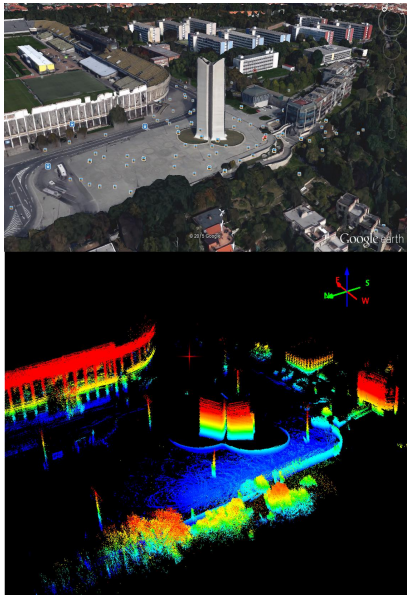
  Riegl, …

Model based equipment



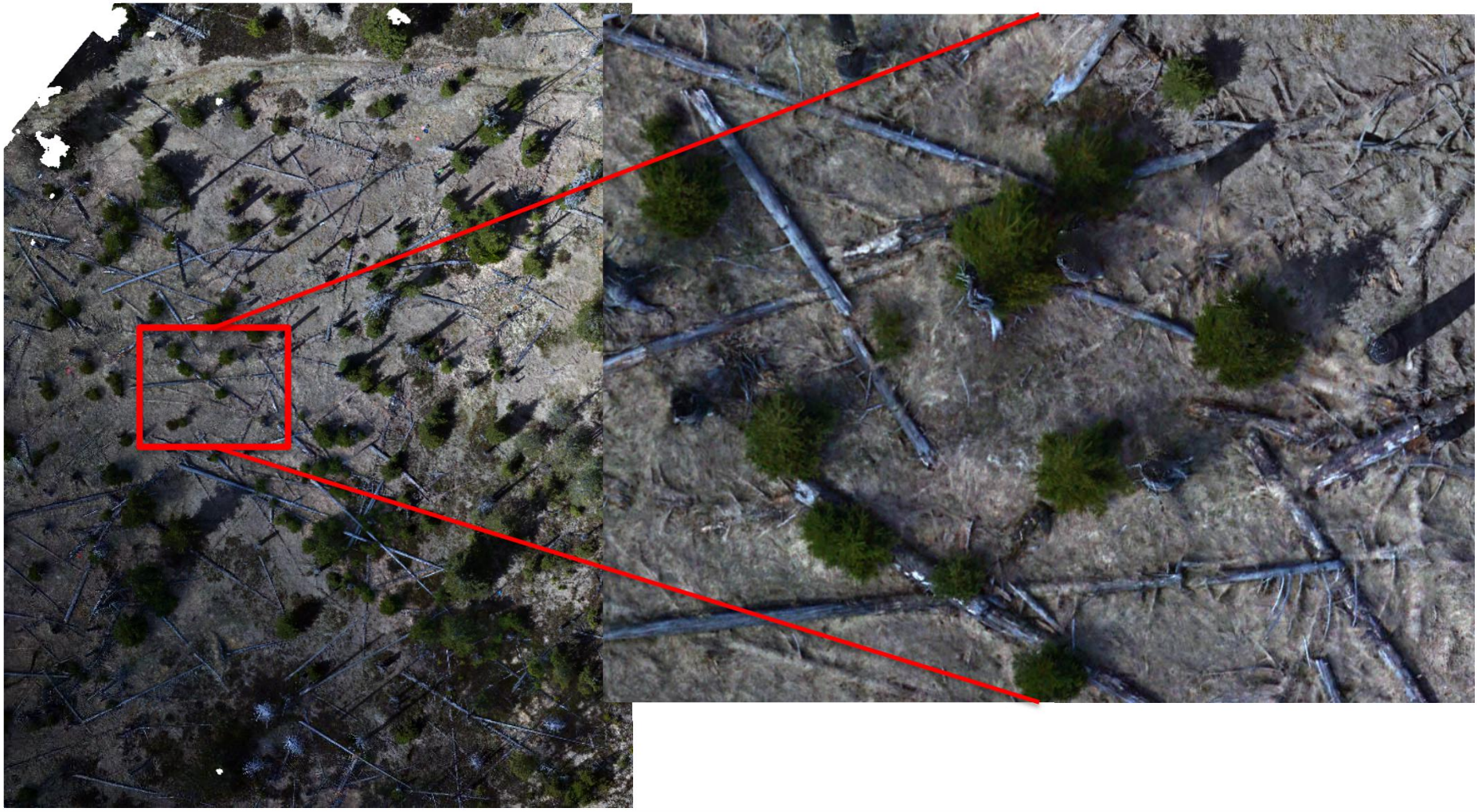




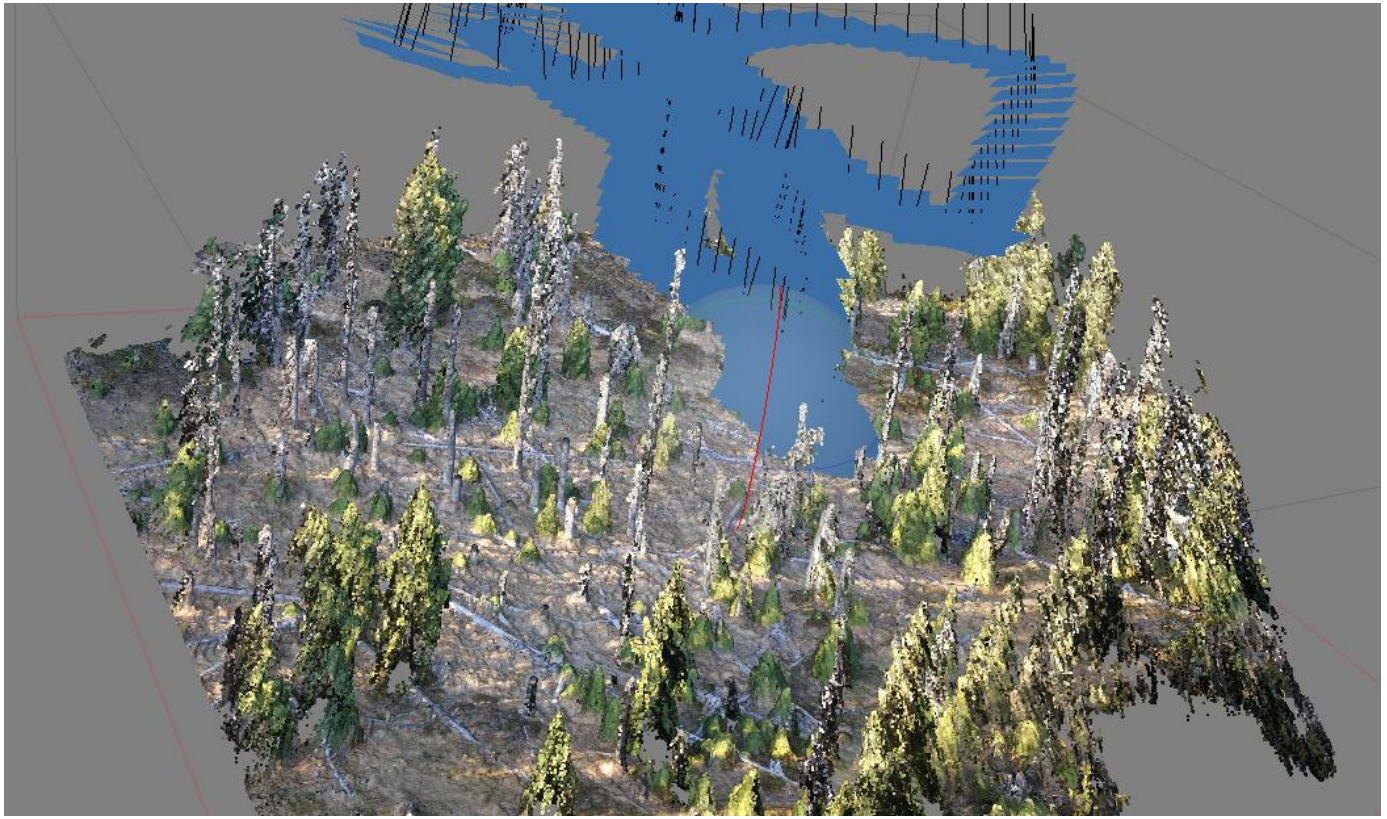


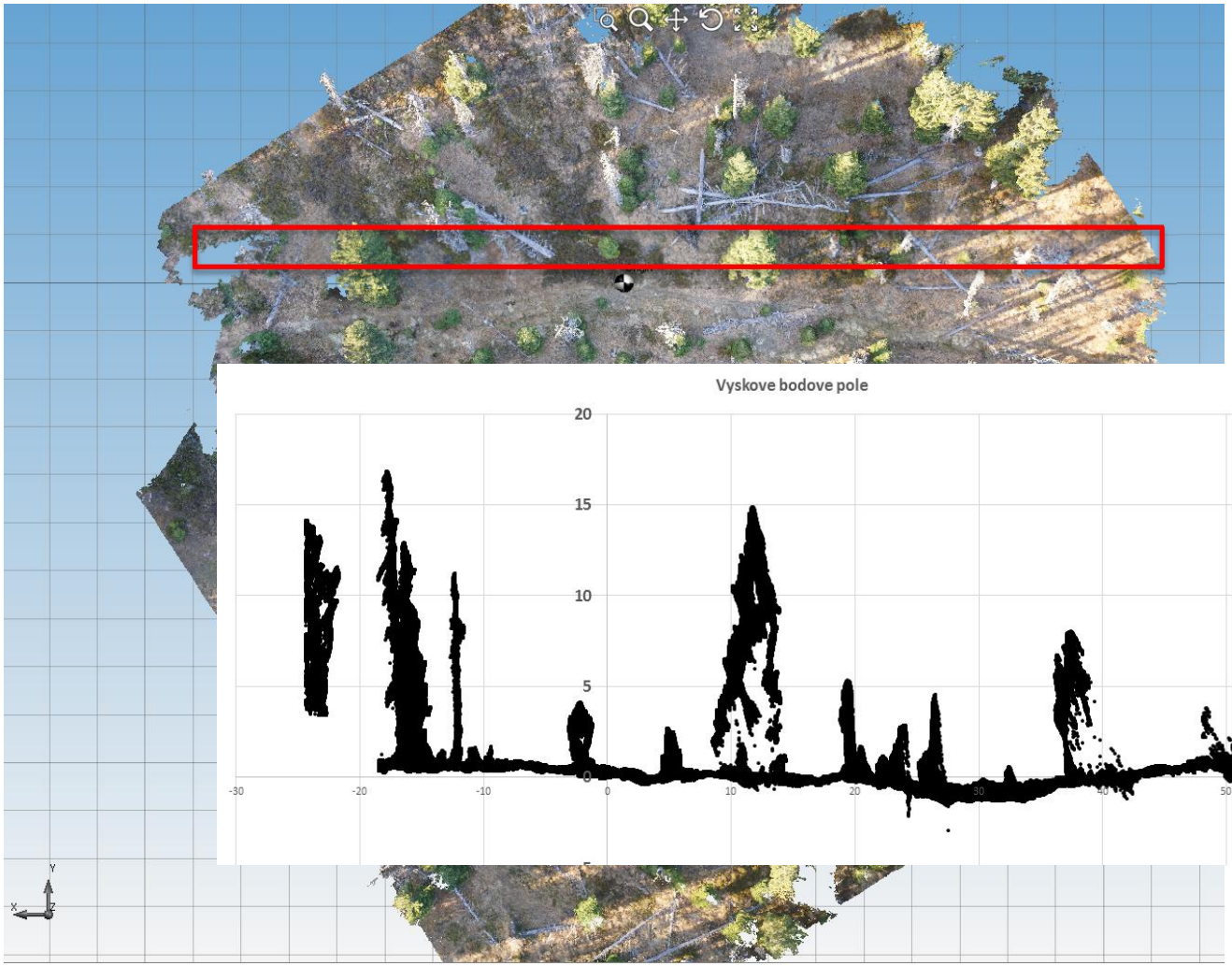
Wallace, L.; Lucieer, A.; Malenovský, Z.; Turner, D.; Vopěnka, P. Assessment of Forest Structure Using Two UAV Techniques: A Comparison of Airborne Laser Scanning and Structure from Motion (SfM) Point Clouds. Forests 2016, 7, 62

Scanning of high resolution data in disaster areas



Development of algorithms for automatic data extraction




Vyskove bodove pole
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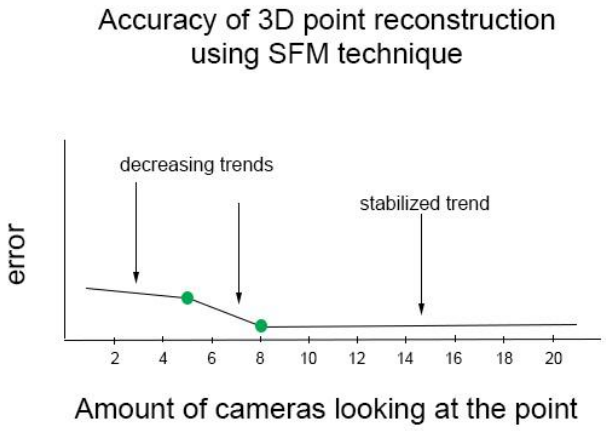
60

The methods are based on grey level intensity

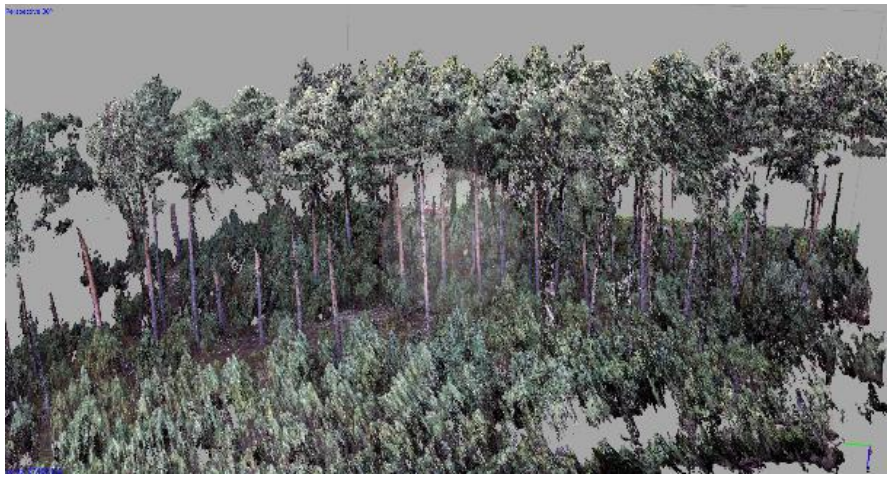
The novelty here is in height estimation from UAV clouds (Wallace 2016, Pulliti 2015)

The common consensus on 80% image overla does not apply here!



Please read:

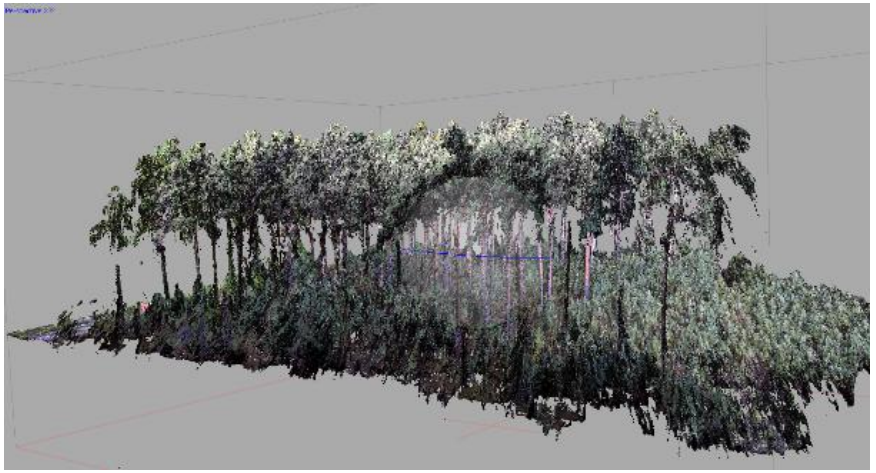
Surový, P.; Yoshimoto, A.; Panagiotidis, D. Accuracy of Reconstruction of the Tree Stem Surface Using Terrestrial Close-Range Photogrammetry. Remote Sens. 2016, 8, 123

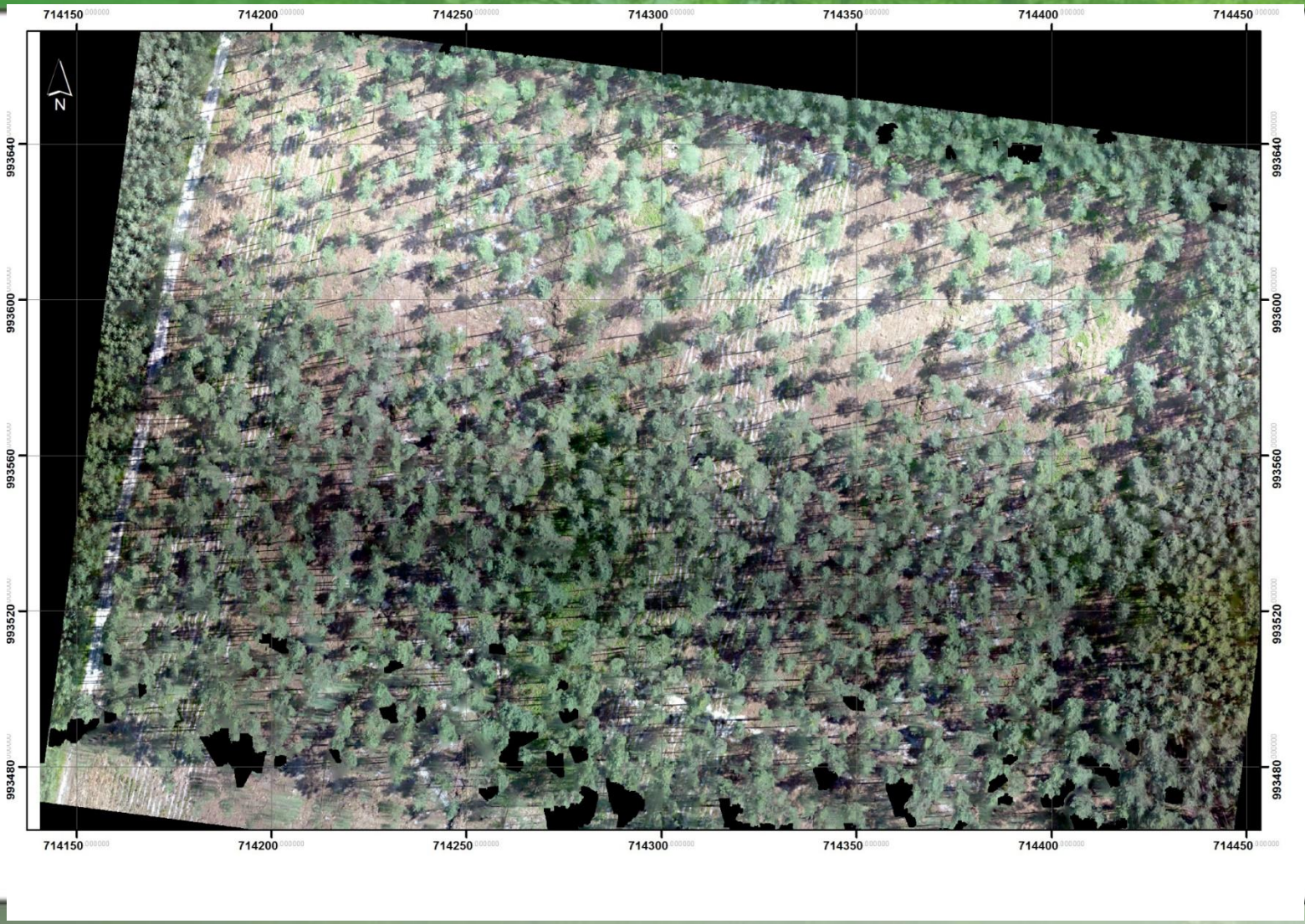


3D point clouds

Height is possible to measure automaticaly

Automatic analysis is advancing

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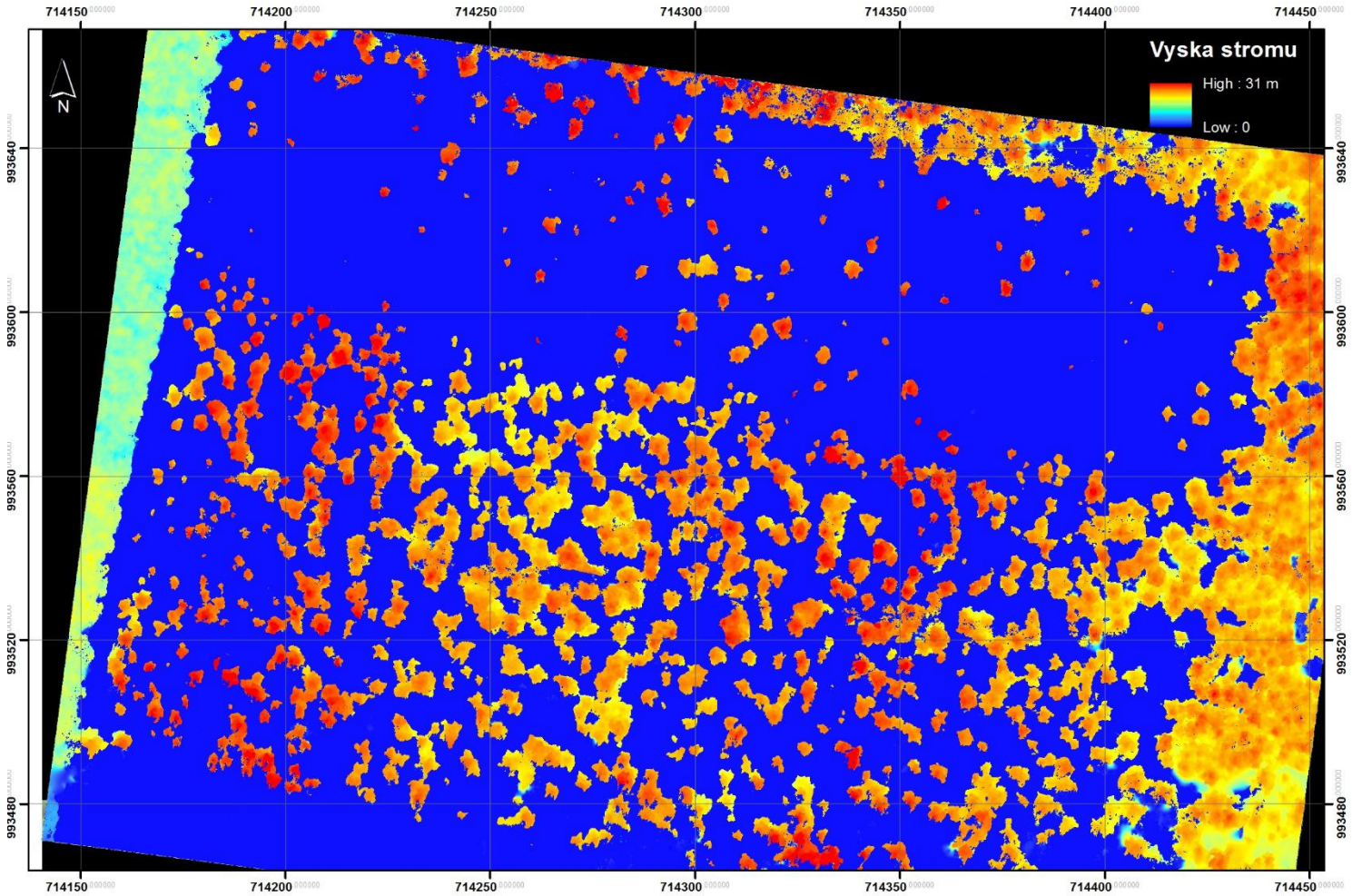
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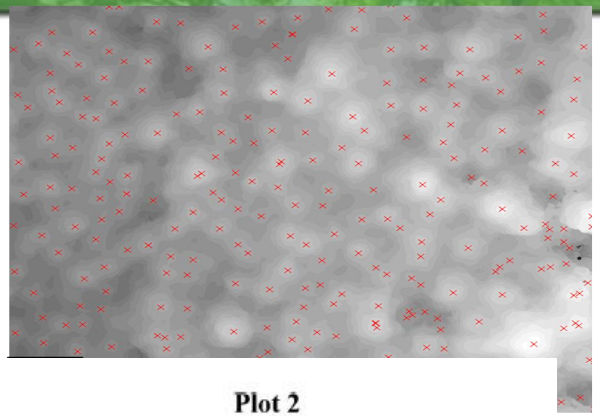
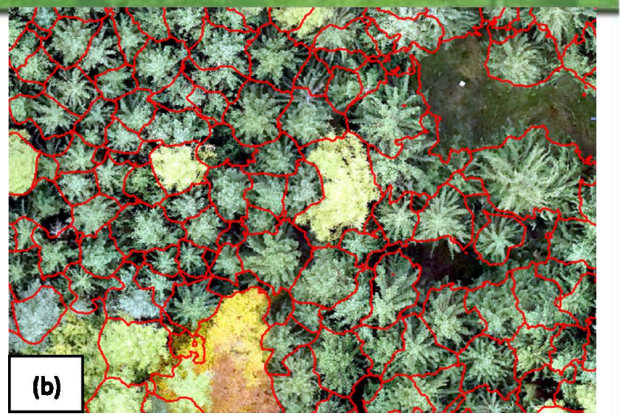
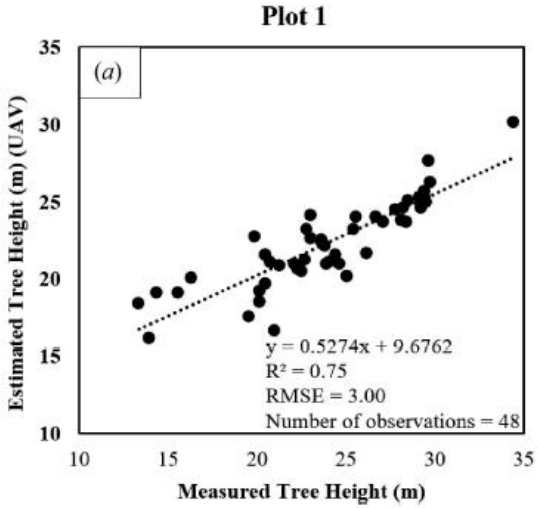
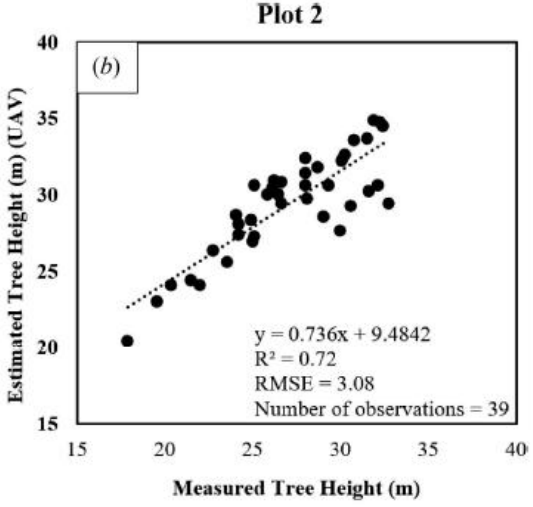


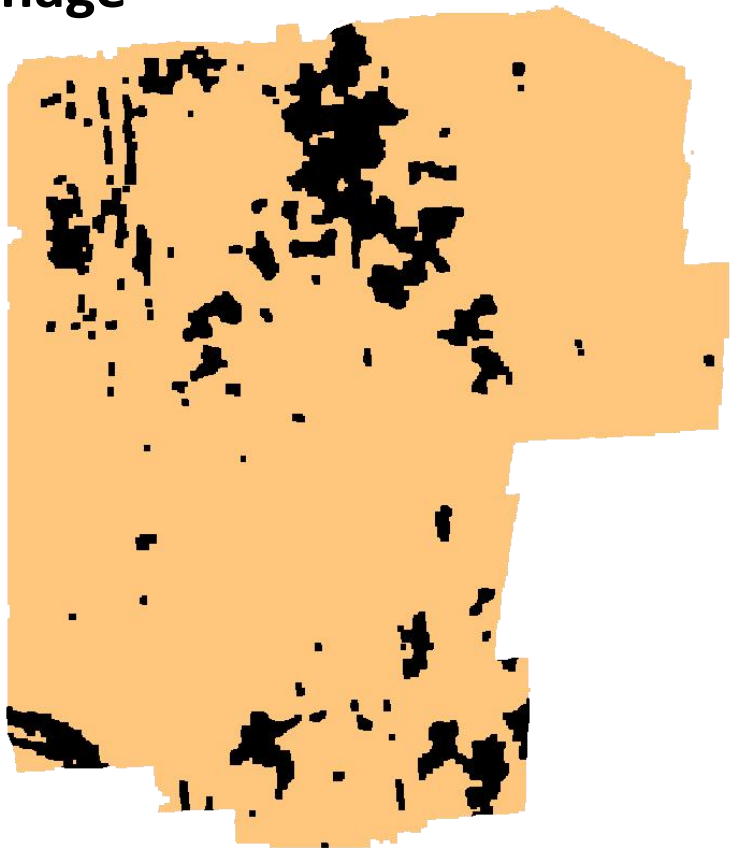






Panagiotidis D, Abdollahnejad A, Surovy P, Chiteculo V (2016) Determining tree height and crown diameter from high-resolution UAV imagery, International Journal of Remote Sensing

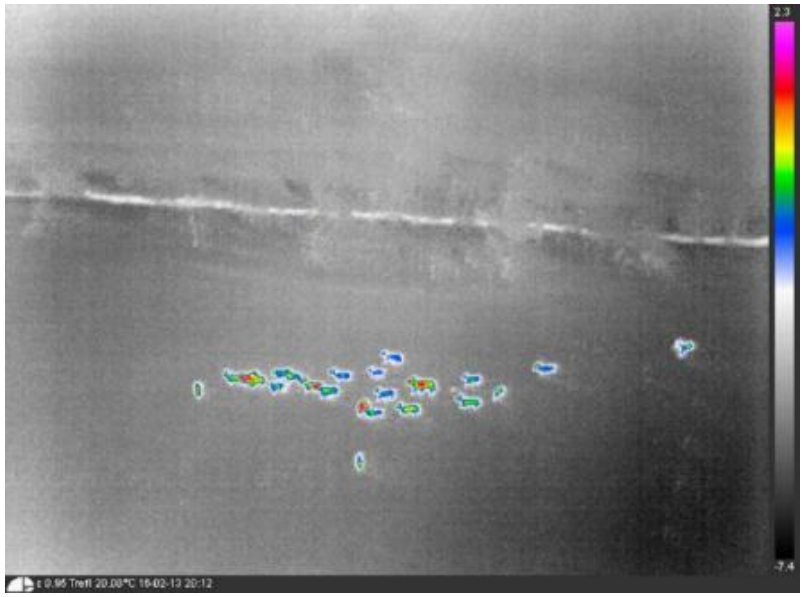
Automatic detection of crop damage

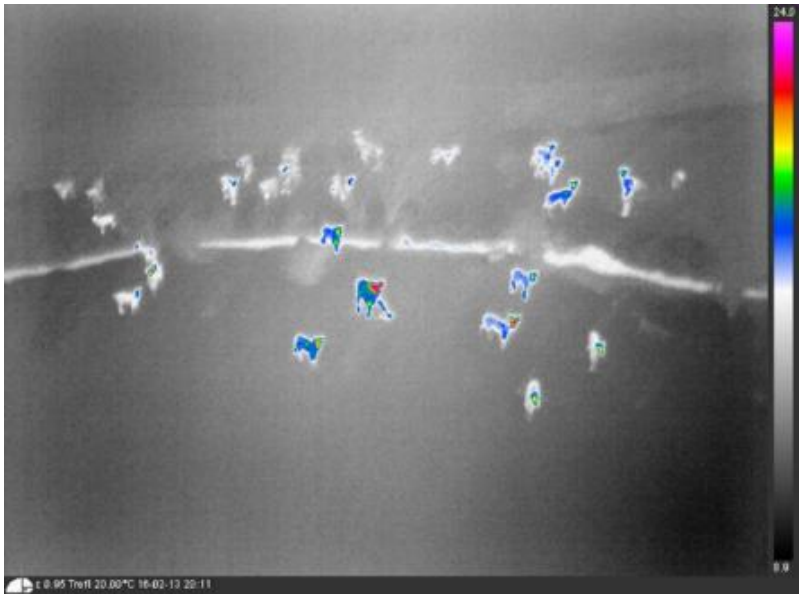


Manually detected crop damage

UAV thermo camera = animal detection

Combination of optical and thermal camera





Area for 16+1 cooperation

- Testing of prototype devices, verification of data collection procedures in forest environment, derivation and processing of point clouds
- Data acquisition by current hi-tech forest mensuration tools
- Data processing for inventory purposes
- Forest health monitoring by remote sensing (visible and multispectral images)

Thank you for your attention