Harnessing AI systems and Drones for Cutting edge Innovation

AgFutura Technologies

Remote sensing and agricultural advisory

About us
Founded in 2016. Supporting the agricultural sector with innovative solutions in the field of digital and precision agriculture, agri-business development and international agricultural development;

A team of 12 full-time and 10 external experts a total of 22;

Private digitally based advisory system - RAMAS

Largest digital infrastruture and PA infrastrucure

Main Statistics

35+	European & national projects
100+	European partners
20+	National clients/partners
3	Platforms made
1	Software application

Introduction

Drones in agriculture

Types of drones

- 1.Fixed-Wing
- 2.Multirotors

Drone Sensors in Agriculture

- RGB (Red, Green, Blue) Cameras
- NDVI (Normalized Difference Vegetation Index) Cameras
- Thermal Cameras
- LiDAR (Light Detection and Ranging)
- Multispectral Sensors
- Orthophoto

What are the benefits of drones in agriculture?

01

Increase yield

Monitor crop health and address threats such as disease and plant stress through early identification, treatment and mitigation to maximize yield potential.

02

Cost savings

Better manage agriculture inputs such as fertilizer and pesticides by applying them only where necessary.

03

Season-long insights

Gain valuable insights at each growth stage, as well as before and after each harvest.

04

Leaf-level accuracy

High-resolution RGB and pan-sharpened multispectral imagery provide high-accuracy data that allow plant-level monitoring and analyses.

05

Improved planning

Plan irrigation and drainage before the growing season and evaluate it throughout.

06

Current field data

Drones allow regular cost-effective data capturing, providing high temporal resolution for change monitoring and detailed comparisons across growth stages and across seasons.

Ortophoto maps

A geospatially accurate and detailed 2D representation of a site.

Accurate orthomosaic maps help agronomists:

- monitor and manage fields (physical dimensions)
- better visual concept of the field and the crops
- used in machine learning applications such as crop counting and weed detection
- Support the operations of GPS guidance and auto steering for tractors

Index maps in agriculture

Vegetation indices provide information for various precision-agriculture practices, by providing quantitative data about crop growth and health.

Vegetation indices:

- Normalized Difference Vegetation Index (NDVI)
- Normalized Difference Moisture Index (NDMI)
- Normalized Difference Red Edge Index (NDRE)
- Normalized Difference Red Edge Vegetation Index (NDRE)
- Green Normalized Difference Vegetation Index (GNDVI)
- Normalized Difference Water Index (NDWI)
- Optimized Soil Adjusted Vegetation Index (OSAVI)
- Leaf Area Vegetation Index (LAI)
- Red-Edge Chlorophyll Vegetation Index (RECl)

Zonation maps

Field zonation based on NDVI Index

Zoning of agricultural field is essential for variable rate application systems and crop estimation analyses.

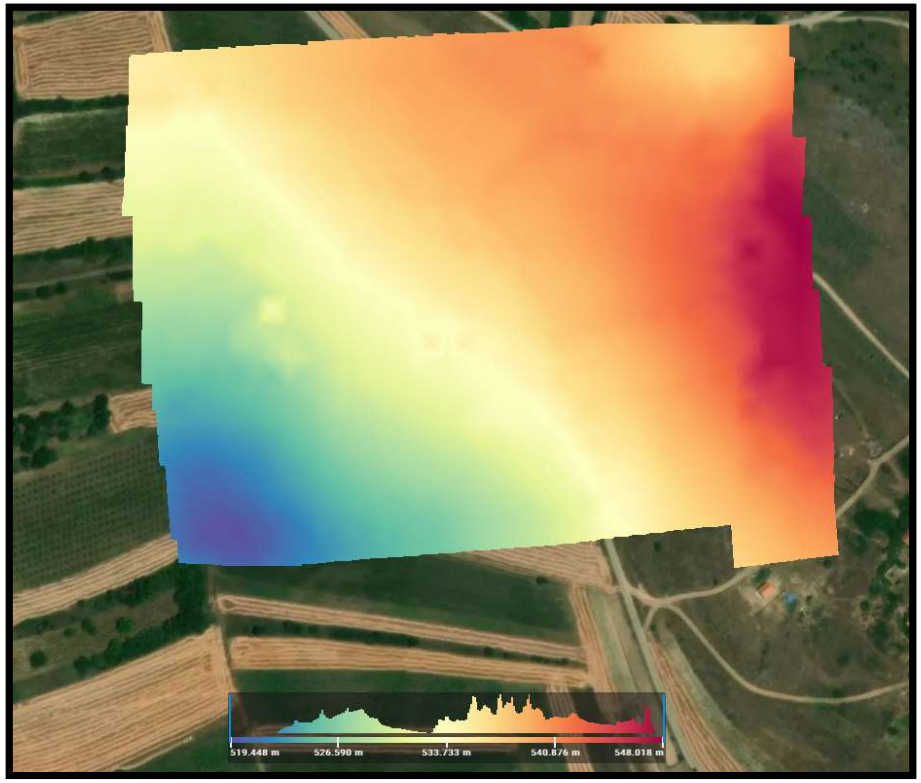
A crop zonation supports:

- Identification of yield trends in different field areas
- Implementation of variable rate technology based on productivity of each field zone
- Detection of problem field areas that require special attention
- Cost reduction by preventing fertilizer runoff
- Optimized soil sampling

Zone	Average value	Area [ha]
	0.17	0.14
	0.20	0.50
	0.23	0.39
	0.27	0.52
	0.31	0.21
Total:		1.76

Digital Surface Models

Digital surface models (DSMs) are digital representations of the elevation of the field and crop.
They can be used for irrigation planning, water flow analysis, and crop optimization based on slope direction.



What are the applications of drones in agriculture?

01

Yield prediction

Analyze growth, soil conditions and precipitation for current yield estimations.

02

Crop monitoring

Map and monitor crop health and growth stage and identify diseases and deficiencies early.

03

Crop spraying

Optimally manage crop inputs such as fertilizer and pesticides to reduce cost and environmental impact, without sacrificing yield.

04

Irrigation management

Monitor and assess optimal water usage, plan drainage and irrigation.

05

Harvest

Drones can assist with determining the optimal harvesting date and creating a plan, monitoring crop maturation and detecting kernel moisture content. They also offer the ability to create site-specific harvest recommendations.

Crop monitoring

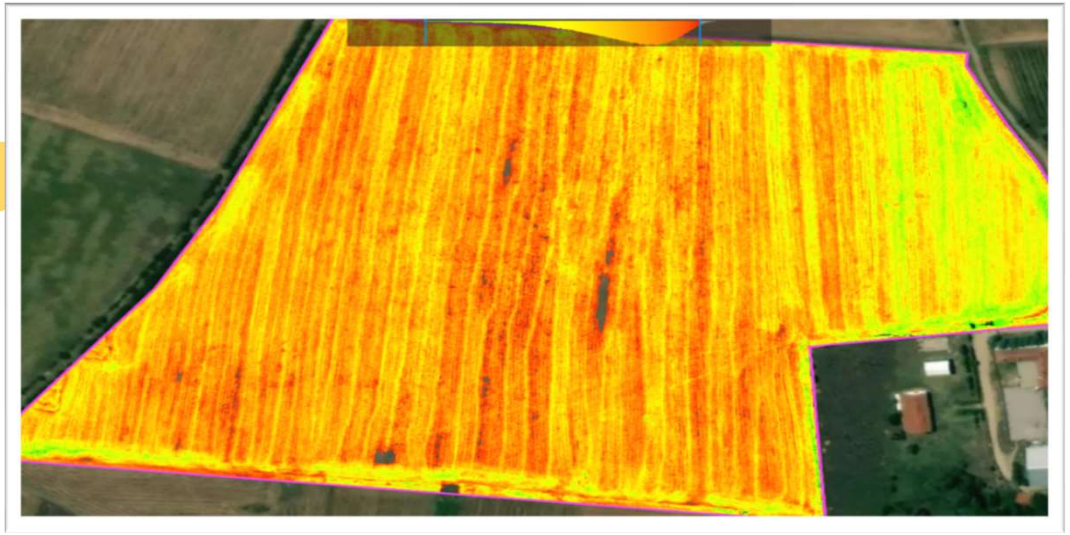
Health monitoring; nutrition monitoring

Combine multispectral indices for detailed crop, soil and water analyses such as

- canopy density
- leaf area
- plant vigor
- fertilizer requirements or foliar Nitrogen

These include:

- Normalized Difference Vegetation Index (NDVI)
- NDRE which is sensitive to chlorophyll content in leaves and can also be used for mapping variability in fertilizer requirements
- Color Infrared Composites
- OSAVI (Soil Adjusted Vegetation Index) maps

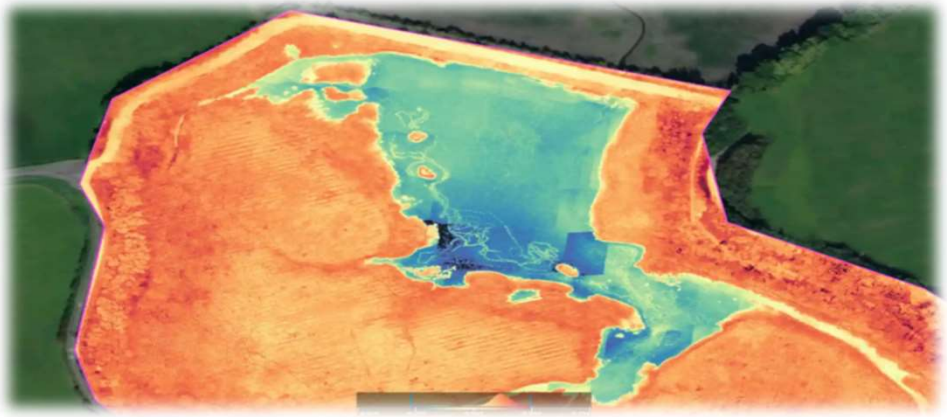


Crop monitoring

Irrigation

- **Normalized Difference Moisture Index (NDMI) can be used to**:

Regularly monitor water content in crops,
Determine field/farm zones with water stress,



Harvest

Determination of harvesting operation date and creation a harvesting plan

- Monitoring crop maturation
- Detection of kernel moisture content
- Creating site-specific harvest recommendations

Index detects moisture levels in vegetation:

- **Normalized Difference Vegetation Index (NDVI)**
- **Normalized Difference Moisture Index (NDMI)**

Spray application

Variable Rate Application (VRT)

-Input of fertilizers, pesticides,water

- Ensures application only where needed
- Saves time & costs
- Minimizes pesticide waste

ICAERUS

Innovations and Capacity building in Agricultural Environmental and Rural UAV Services

Funded by the European Union
Grant agreement N° 101060643

About ICAERUS

Project Information

Title: Innovations and **C**apacity building in **A**gricultural **E**nvironmental and **R**ural **U**av **S**ervices

Proposal number: 101060643

Status: Active

Duration: 4 years Start Date: 01 July 2022

Overall Budget: € 5,914,703.00 **Funding:** € 5,458,276.25 - EU contribution & € 465,426.75 - UKRI

Funding scheme: Research and Innovation action **Funded under:** Horizon Europe

Project Officer: Alessandra SASSO **Financial Officer:** Charlotte PONT

Activity: HORIZON-CL6-2021-GOVERNANCE-01-21

Topic: Potential of drones as multi-purpose vehicle – risks and added values

What challenges are we tackling?

The big picture: Drones are currently used to varying degrees in EU Member States.

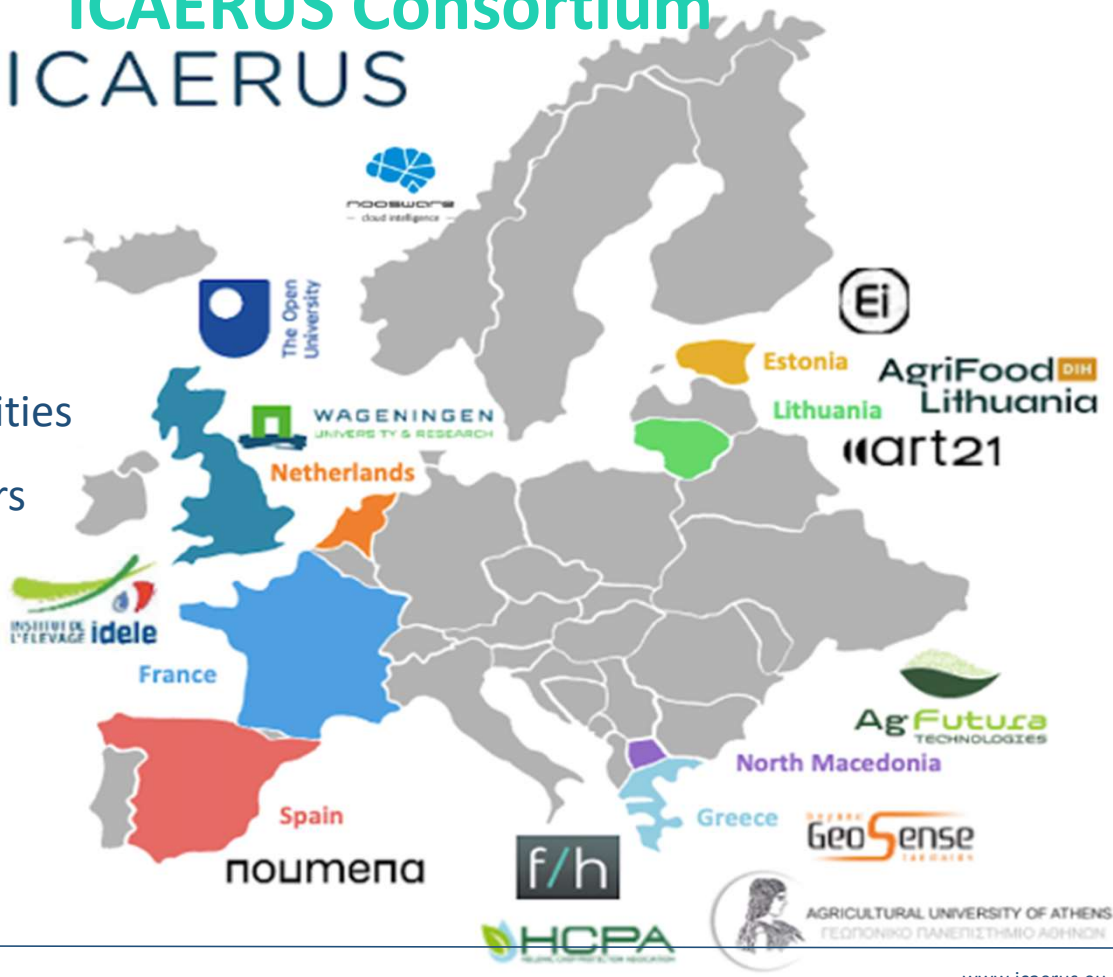
The multi-purpose application of drones brings **socio-economic**, **environmental** and **regulatory challenges** that limit their current use across Europe.

- Costly investment
- Knowledge gaps, data protection and technology misuse
- Environmental conditions significantly limit the use of drones
- Regulatory restrictions
- Safety regulations

Who we are?

ICAERUS Consortium

- ✓ 3 European research institutes and universities
- ✓ 6 industry stakeholders and technology SMEs
- ✓ 4 NPOs



ICAERUS Use Cases & Open Call Trials

Thank you for your attention!

Mario Petkovski

mario.petkovski@agfutura.com

www.agfutura.com

AgFutura Technologies

@agfuturatechnologies