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WP6 - Pilot 3 Setup and Assessment

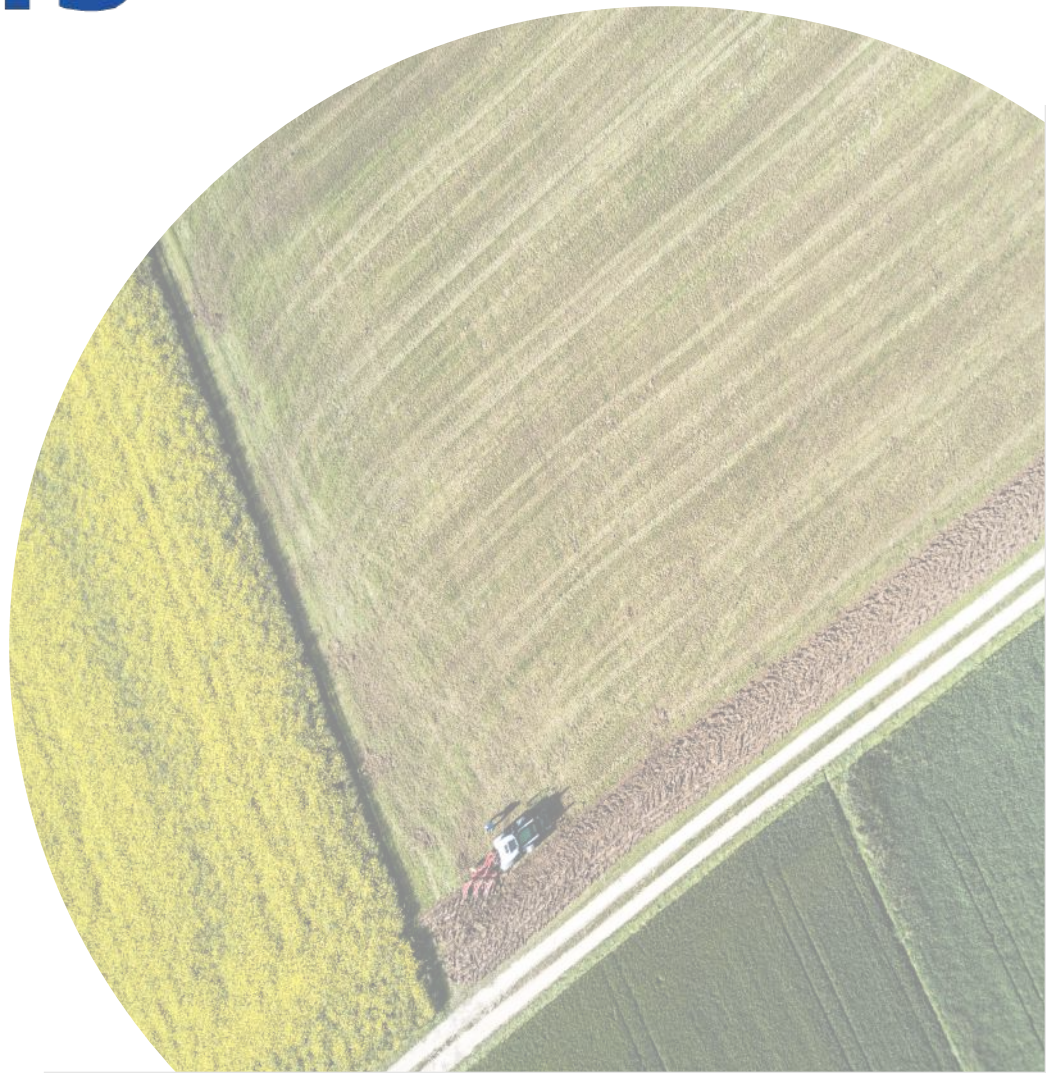
Blueberries in Lithuania and Serbia

Oskar Marko

WP6 coordinator

BioSense INSTITUTE

Online, 28th January 2021



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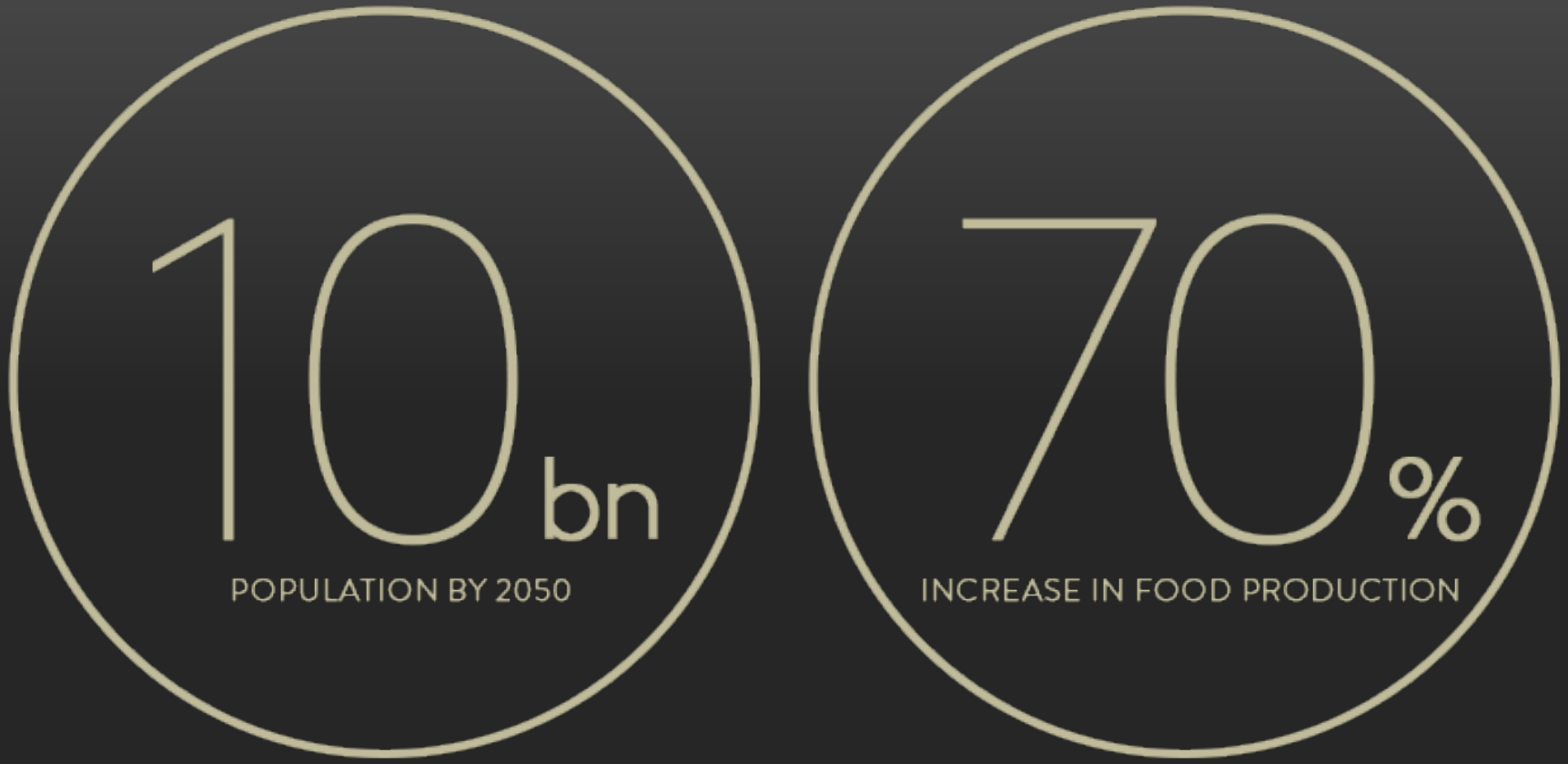
10 bn
POPULATION BY 2050
70%
INCREASE IN FOOD PRODUCTION

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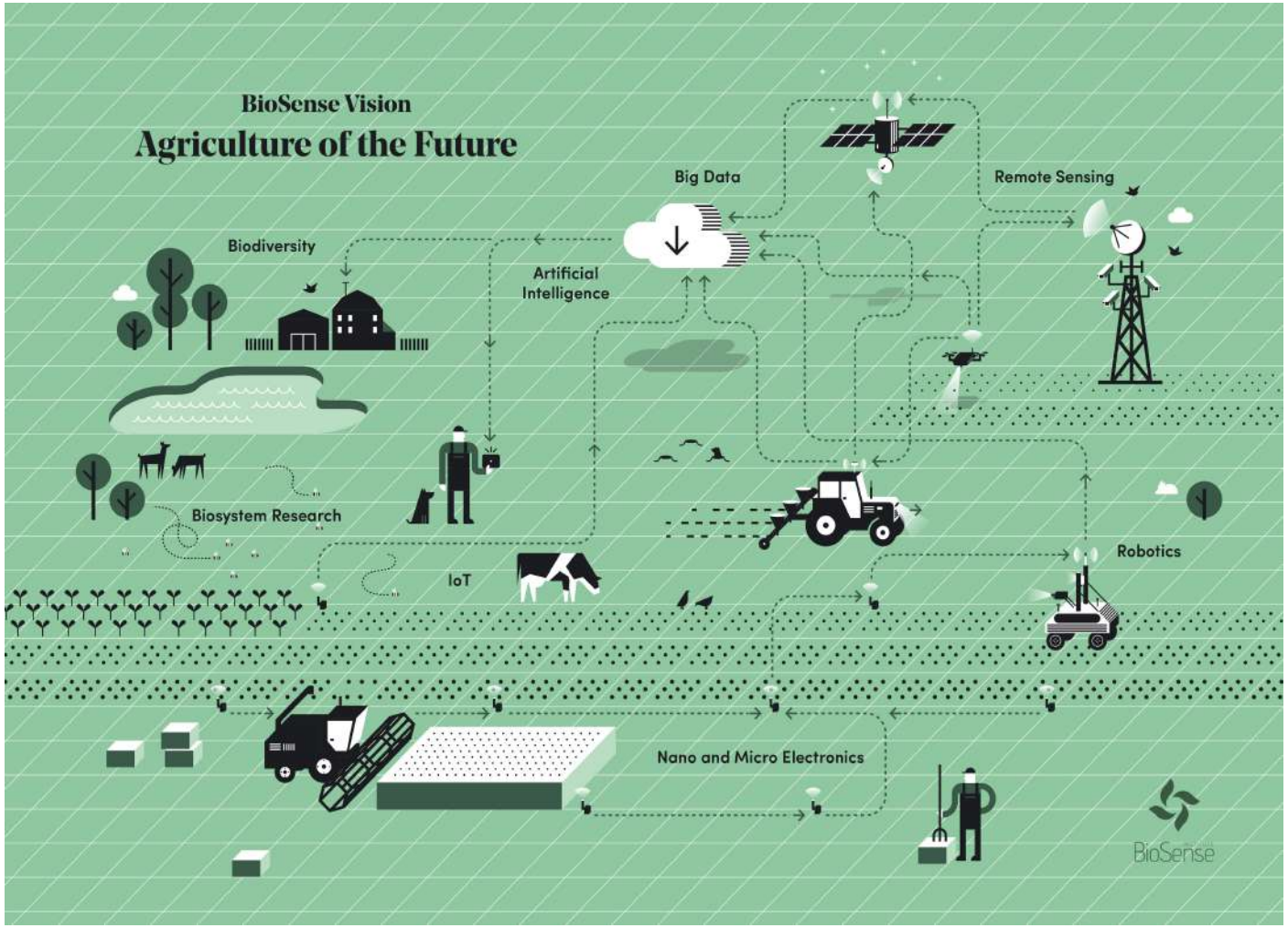
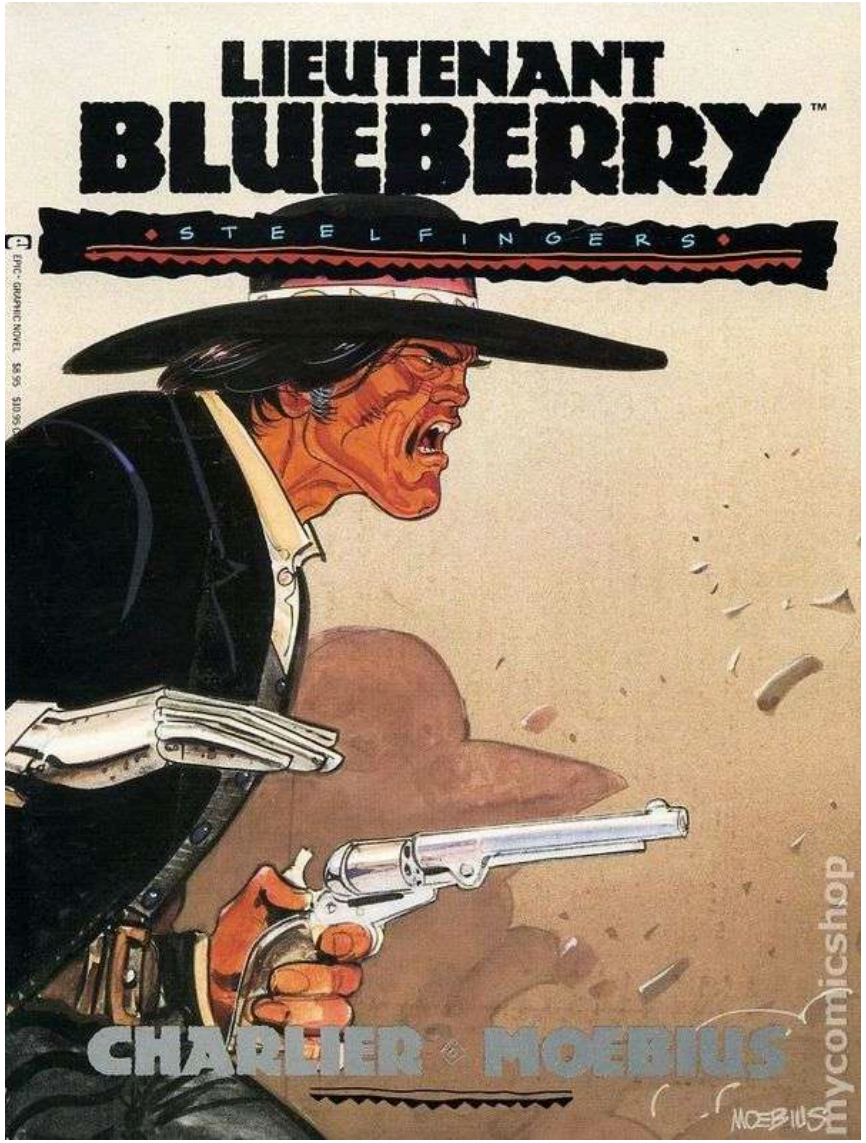


Blueberry

- Geeks vs. farmers



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1 Partners

Partners

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- BioSense (R&D Institute)
- Art21 (AgTech SME)
- AgriFood Lithuania (DIH)
- AgroSmart SIA (AgTech SME)
- Zeleni Hit (Farming SME)

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art21

AgroSmart

Zelenihit

AgriFood Lithuania DIH

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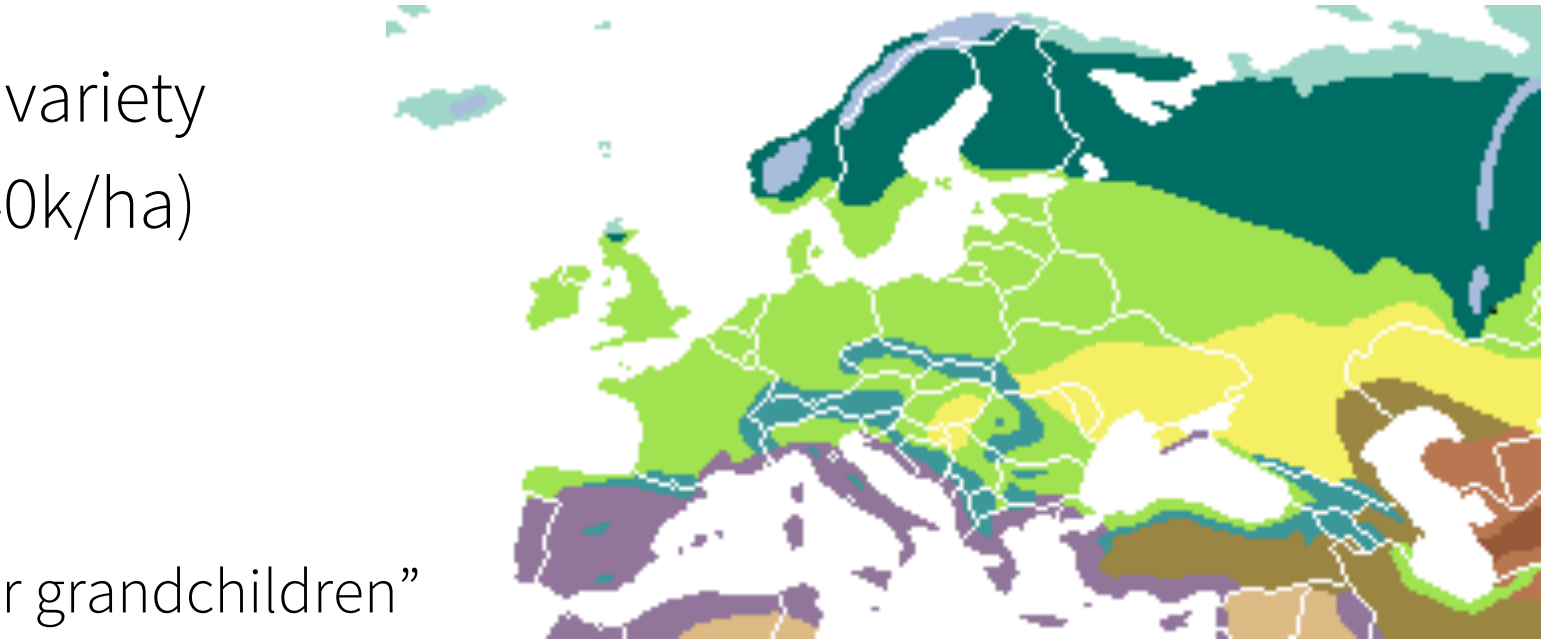
Blueberries

Blueberries

- Northern America
- Northern/southern variety
- High-value crop (€40k/ha)
- Grows for 50 years

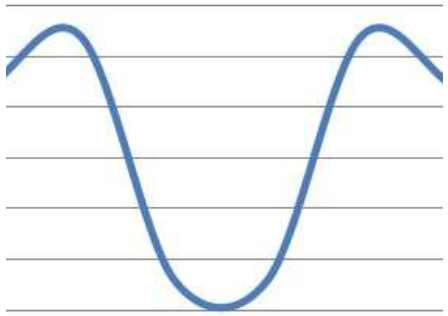


“something to leave for your grandchildren”

Pilots

- Northern and southern edges
- Slightly hilly terrain, lowlands

Outskirts of Belgrade, Serbia



Kaunas region, Lithuania

Blueberries

- 80% exports to NL and RUS
- Jam, juice, cakes…
- Health benefits (anti-aging, sight…)
- Area in RS and LT x2 from 2018
- 1000 -> 2000 ha in RS
- €80M

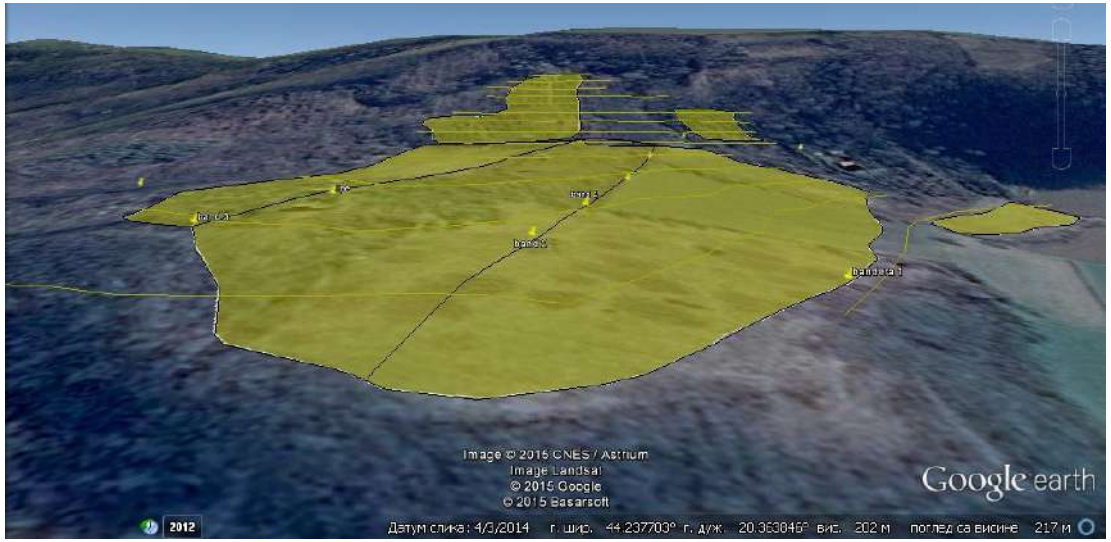
Growing

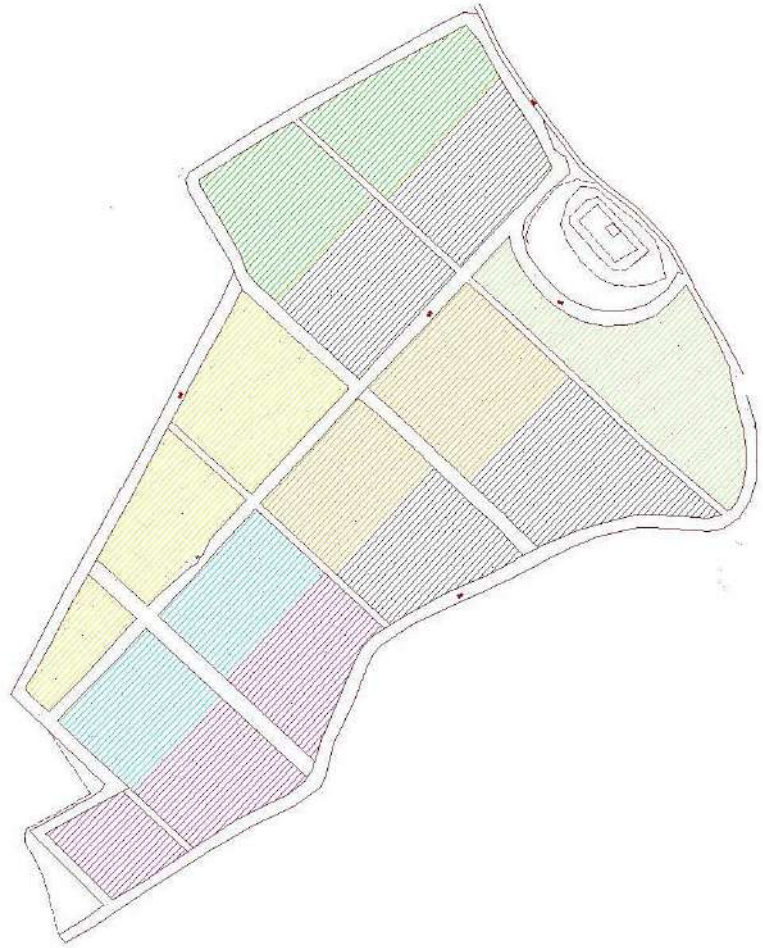
Growing

- Pots vs. ridge planting

Planning

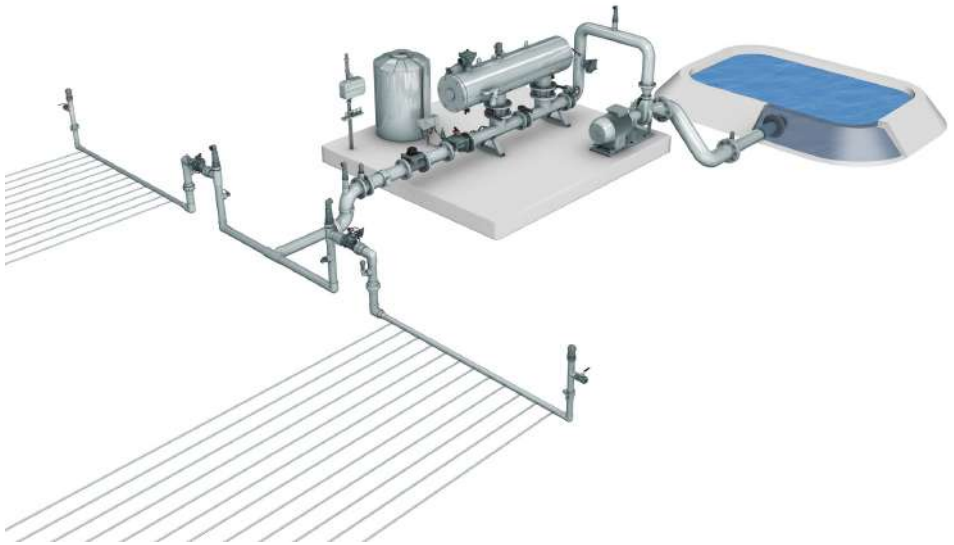
- Project preparation
- Analysis of soil, slope, terrain





Irrigation

- ”Drop by drop” irrigation
- Optimal amount and timing
- Fertigation



Soil

- 12 soil samplings per season
- 1 day per sampling at 10ha
- NPK
- Granules/fertigation
- Amount ~ **predicted yield**

Weeds and diseases

- Manual weed control:
  expensive human labour
  soil, munch and microbiome destabilised
  lower yield
- Targeted pesticide application:
  less pesticide used
  lower costs
  healthier produce

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3

Objectives

Business Problems

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Planning

Yield prediction

Sampling

Automated field soil sampling and analysis

Diseases

Early-stage blueberry disease detection

Spraying

Targeted and autonomous agrichemical spraying

General Objectives

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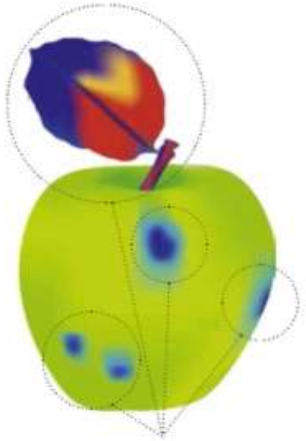
Detection

Integration of current and novel monitoring solutions

Assessment

Providing actionable insights for decision making and optimization



Action

Autonomous robot for operations in blueberry farms

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4 Detection

UGV Sensors

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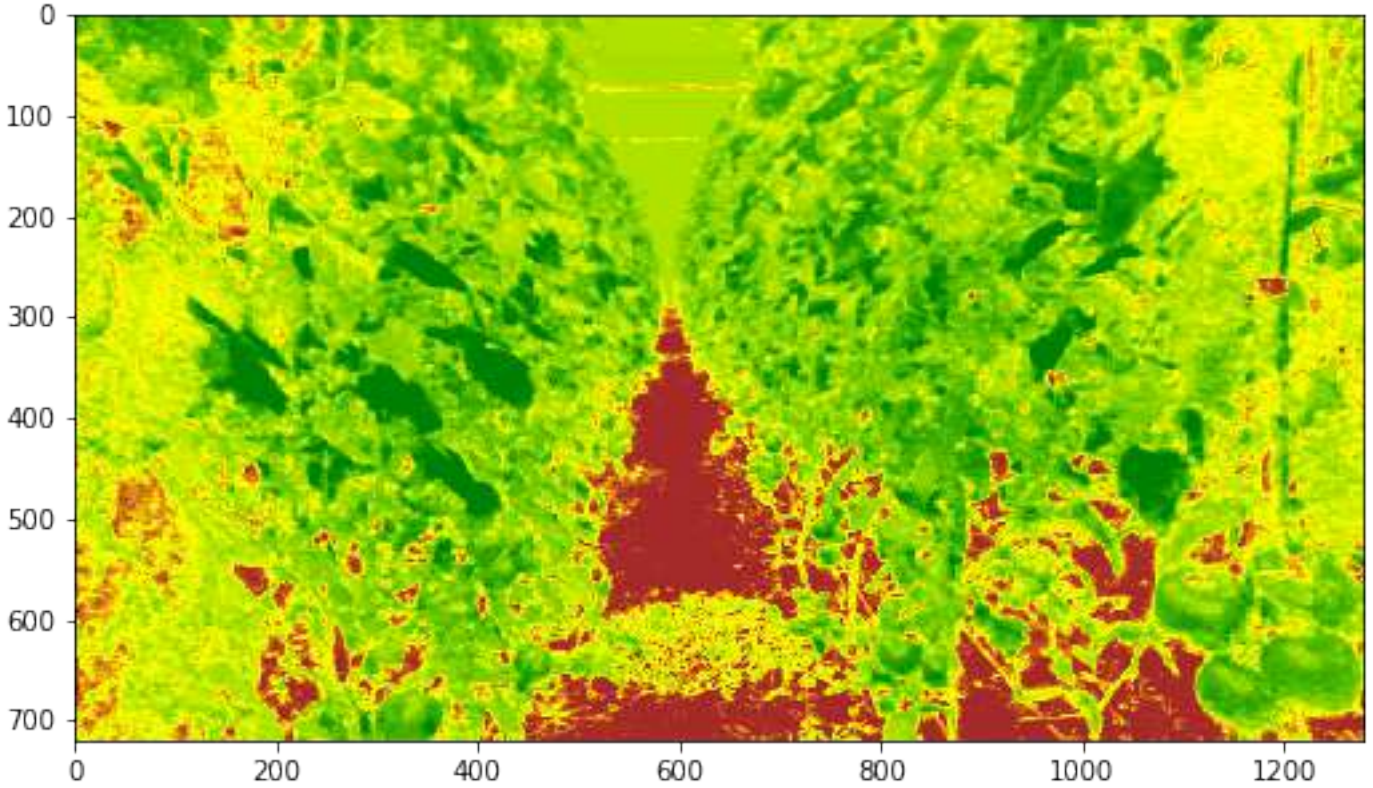
- Supporting UAV imagery



Deep Learning

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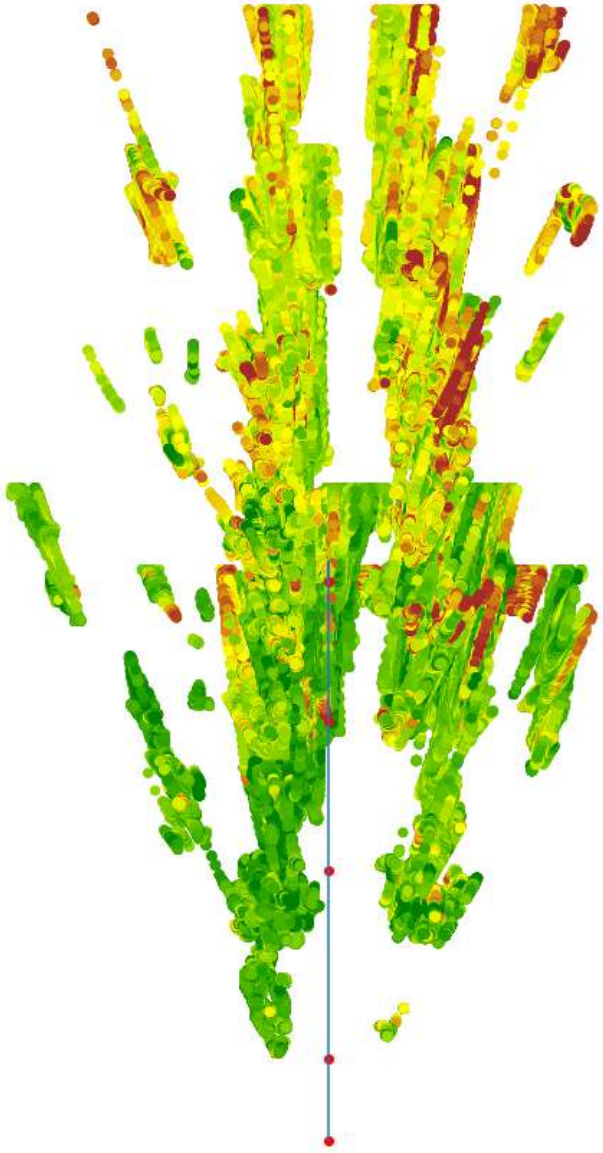
- Image segmentation and pattern recognition

UGV Sensors

- Lidar
- Autonomous navigation
- Point-clouds



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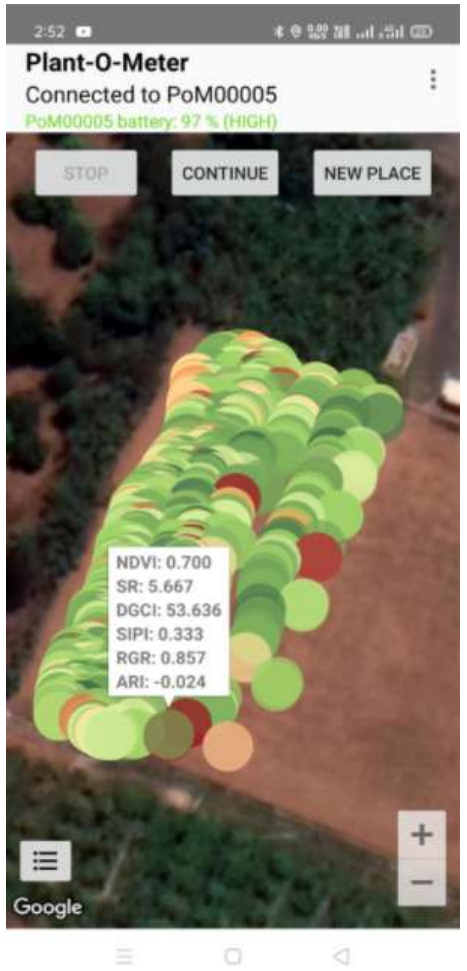
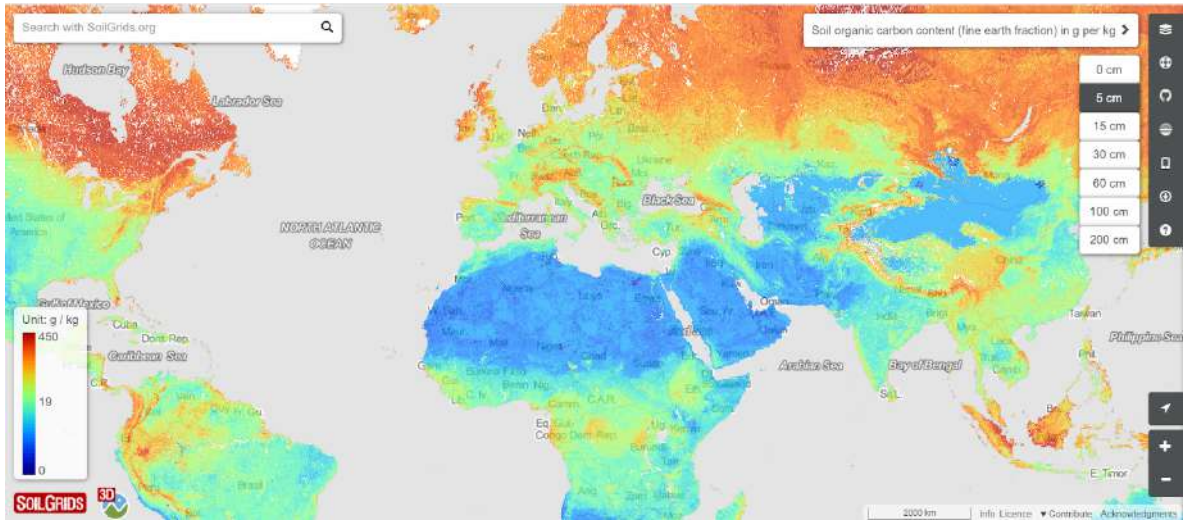
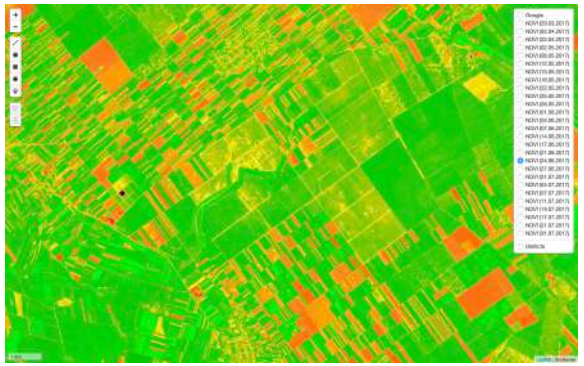
UGV Sensors

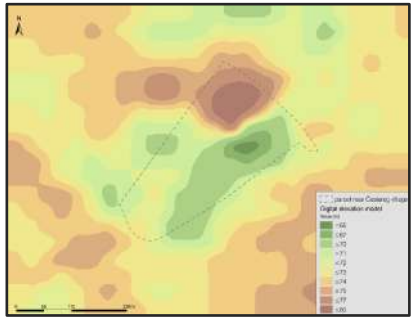
- Plant-O-Meter

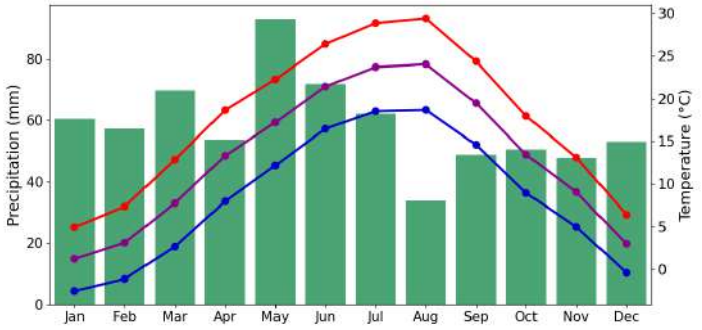


Open-Access Data



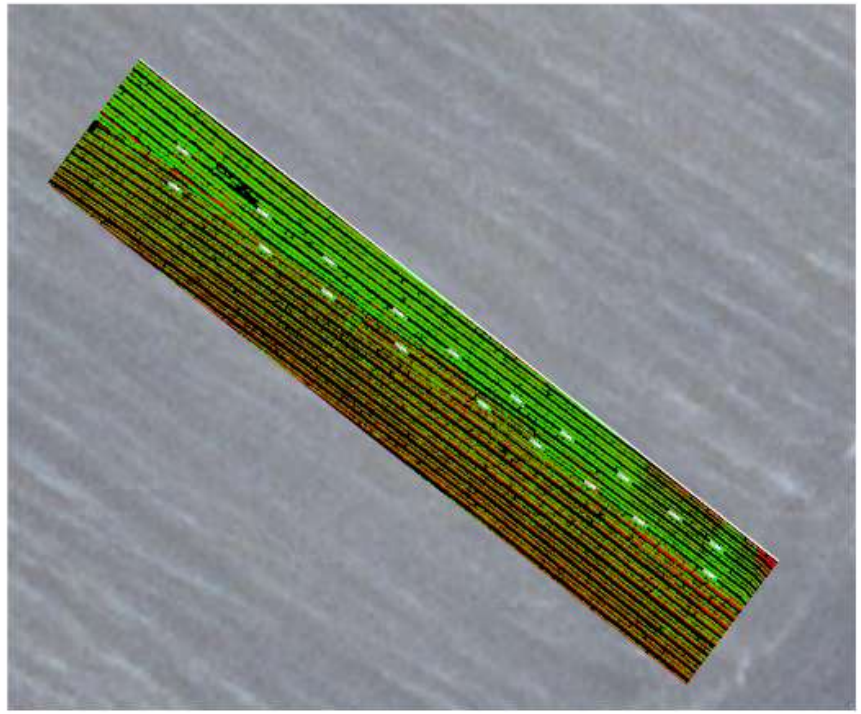


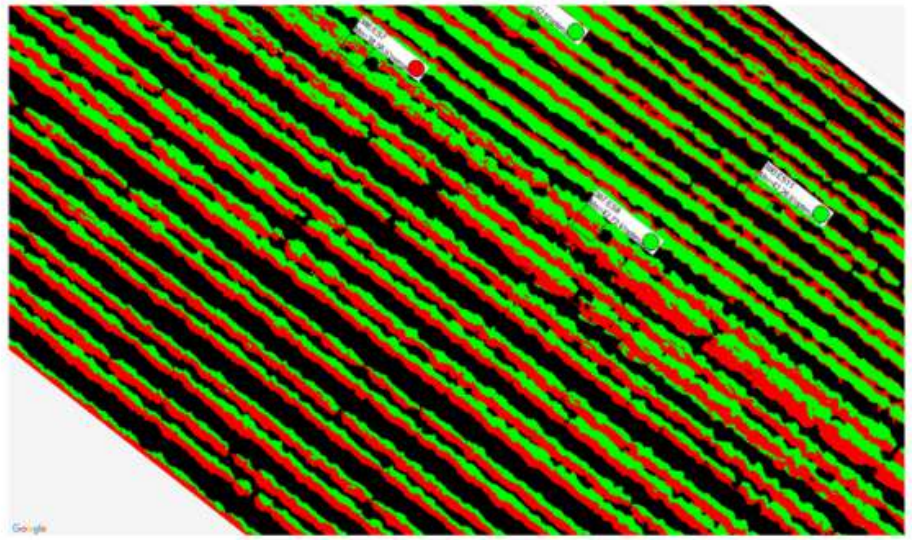




Drones

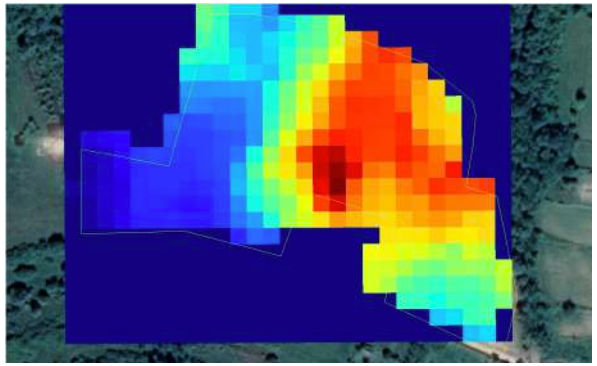
- Hyperspectral image analysis

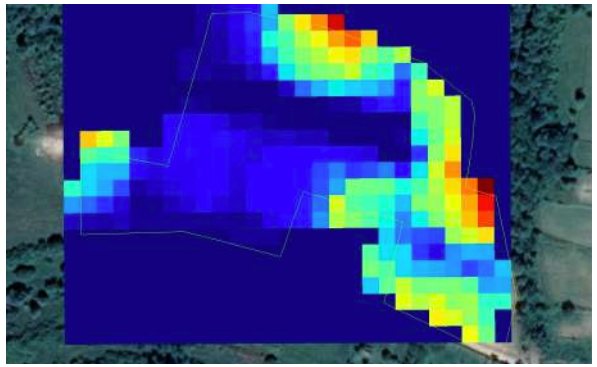


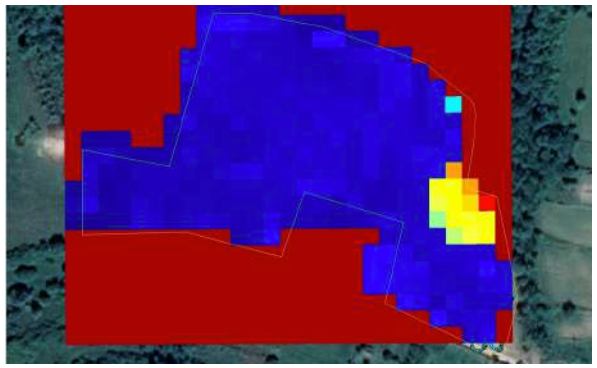


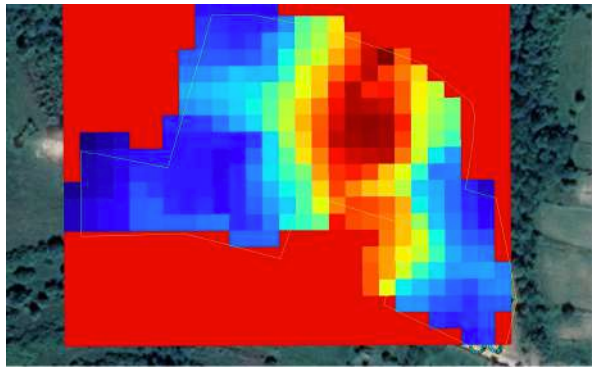
EM38 Probe

- Electrical Conductivity



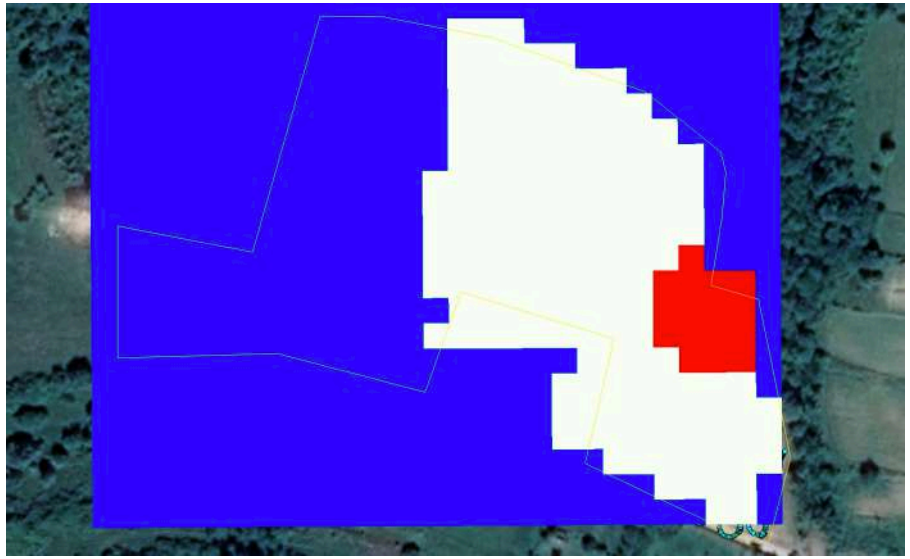


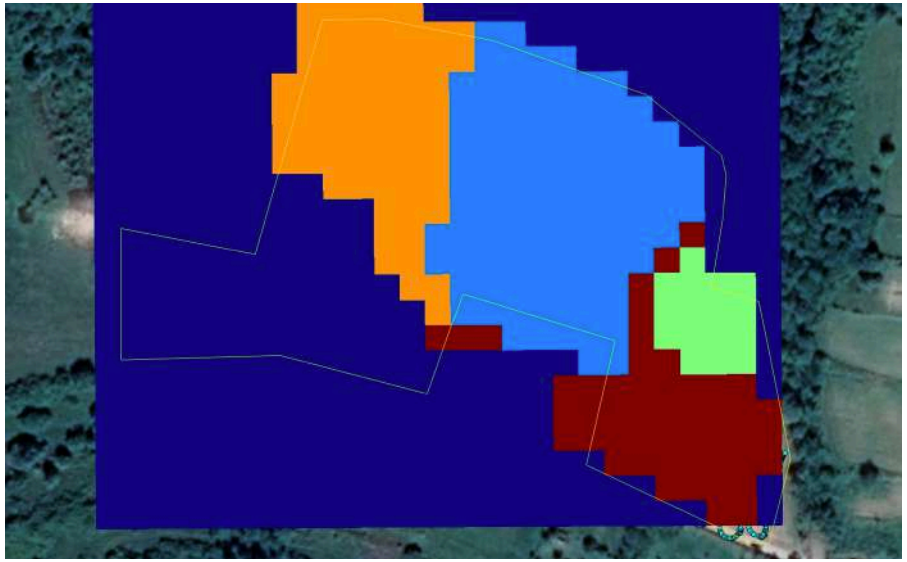




EM38 Zone Delineation

- Choosing the optimal number of zones





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Assessment

Operation management tools

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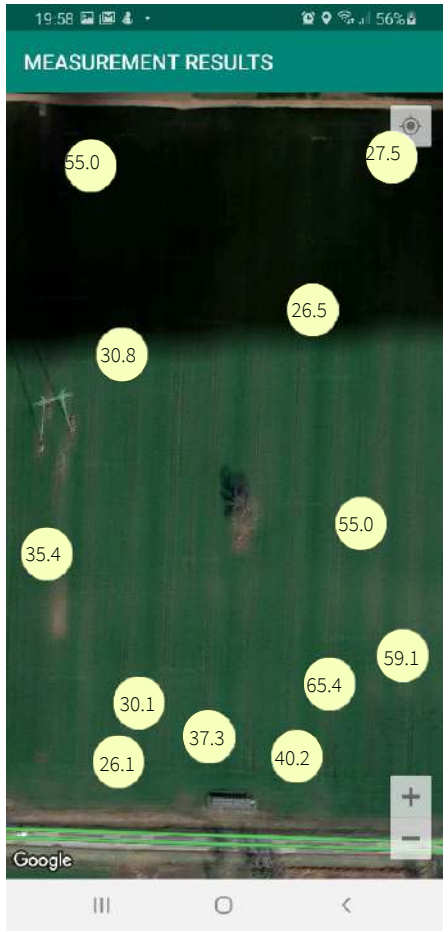
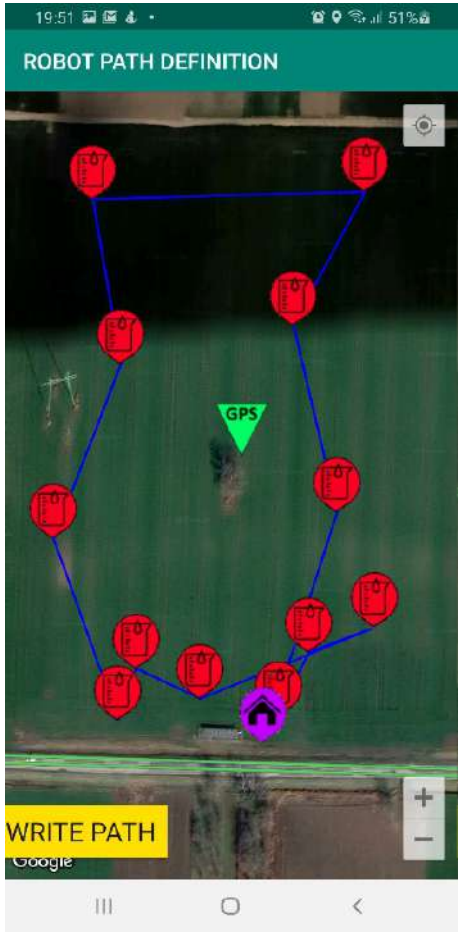
- Smart scheduling
- Path optimization
- Planning of operations





Decision-Support Systems

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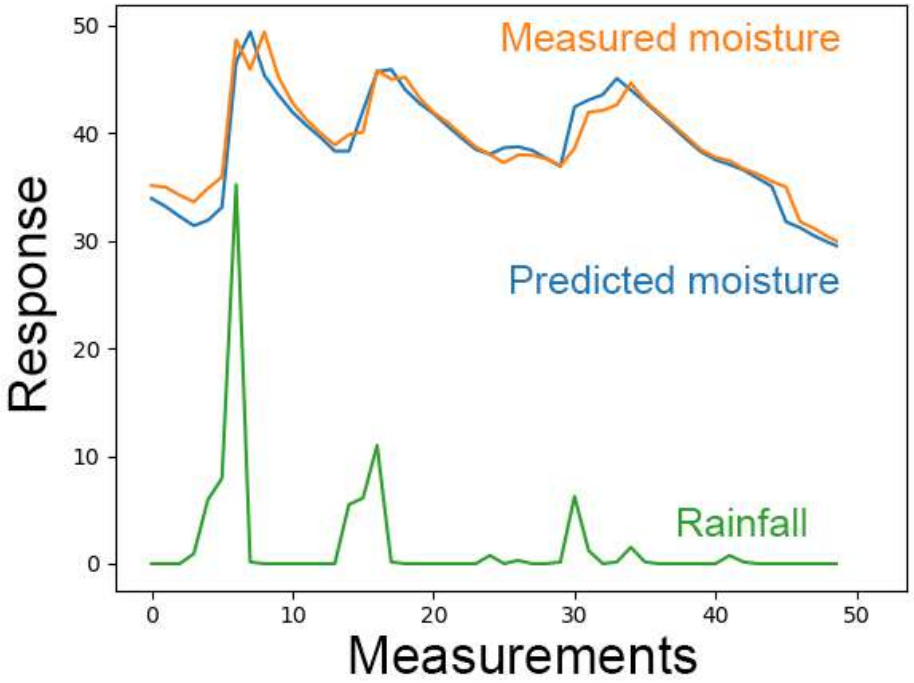
- Plant irrigation needs assessment
- Sustainable fertilization planning
- Optimal pesticide application
- Expert knowledge and best practices



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6 Action

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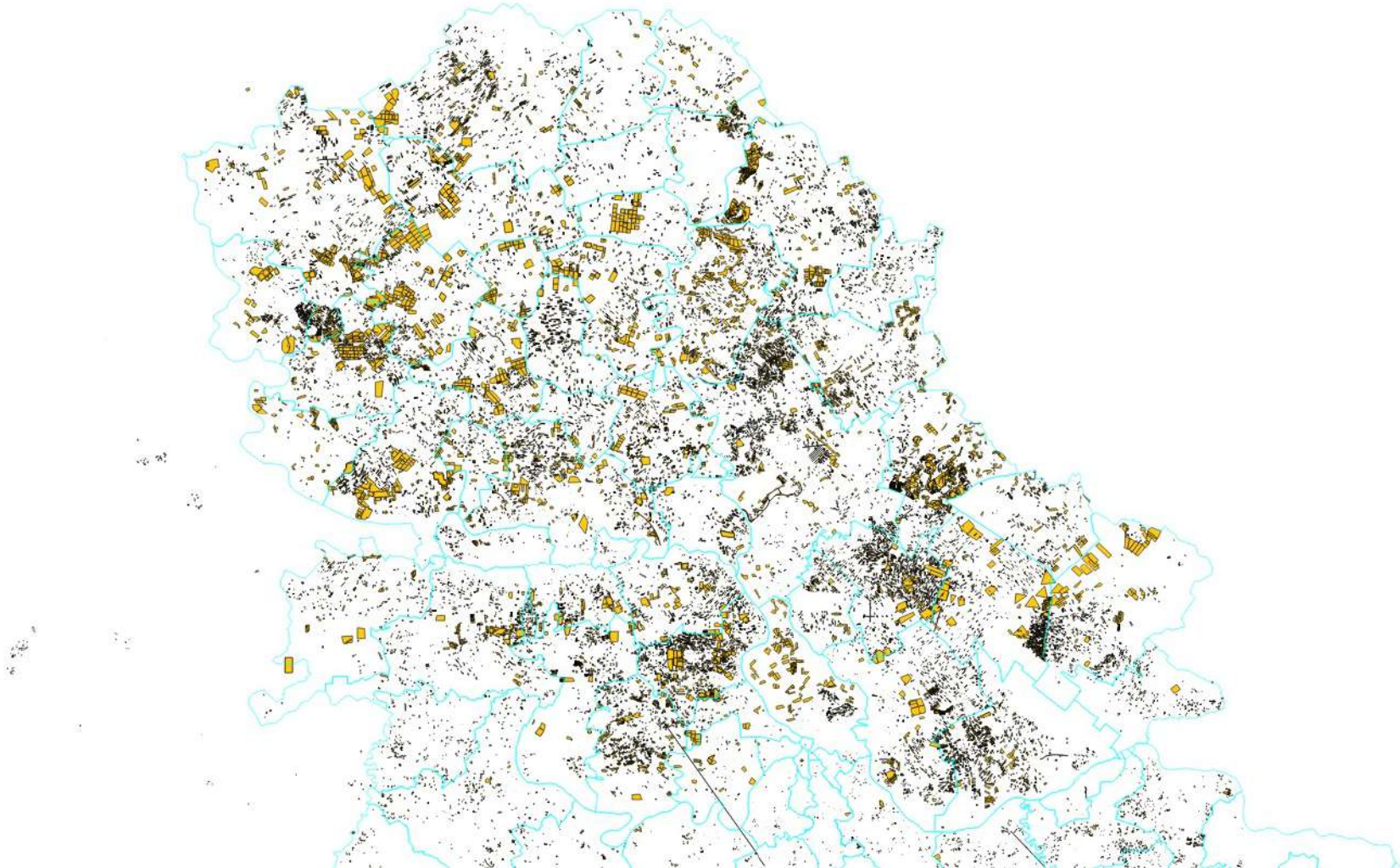

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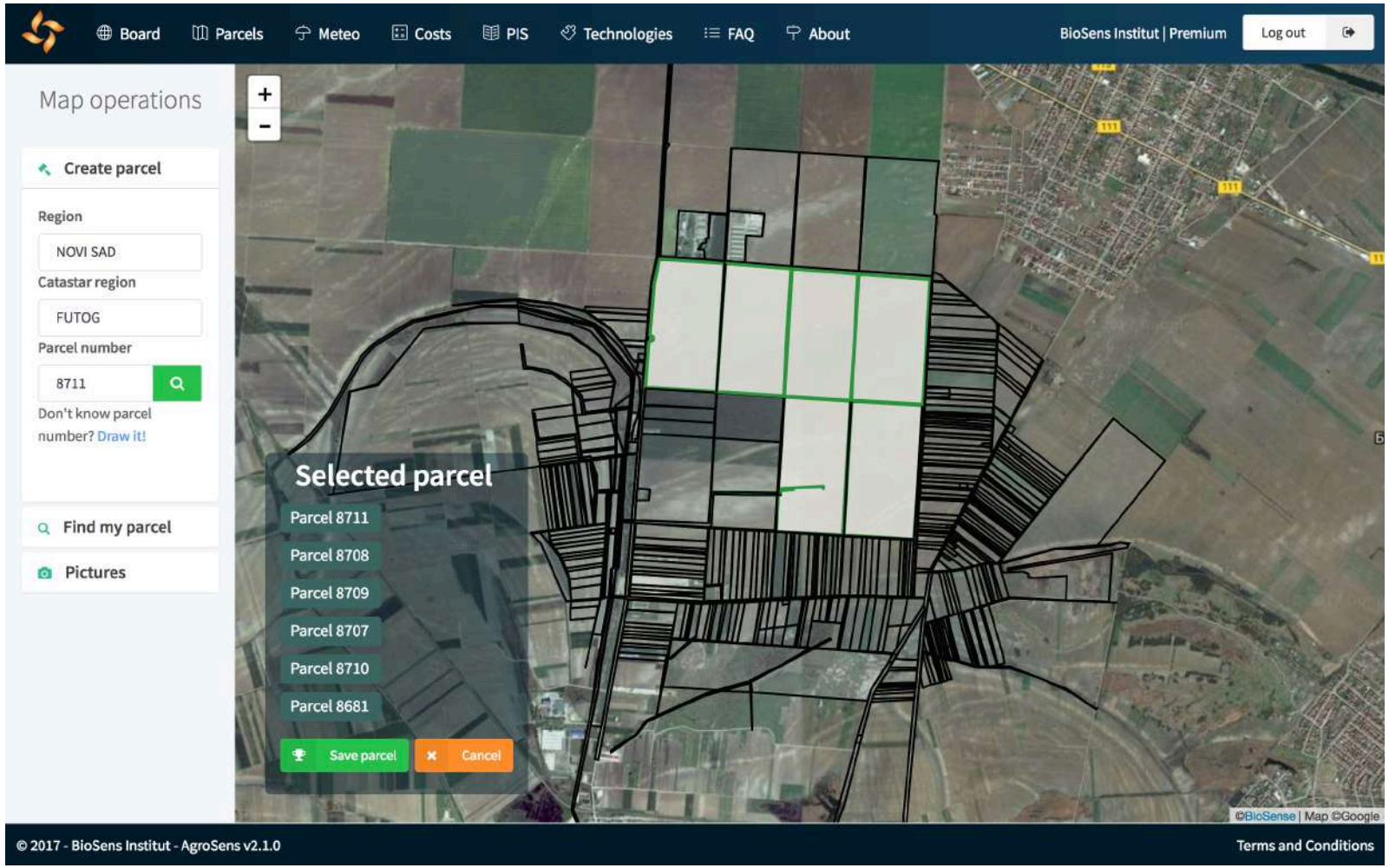

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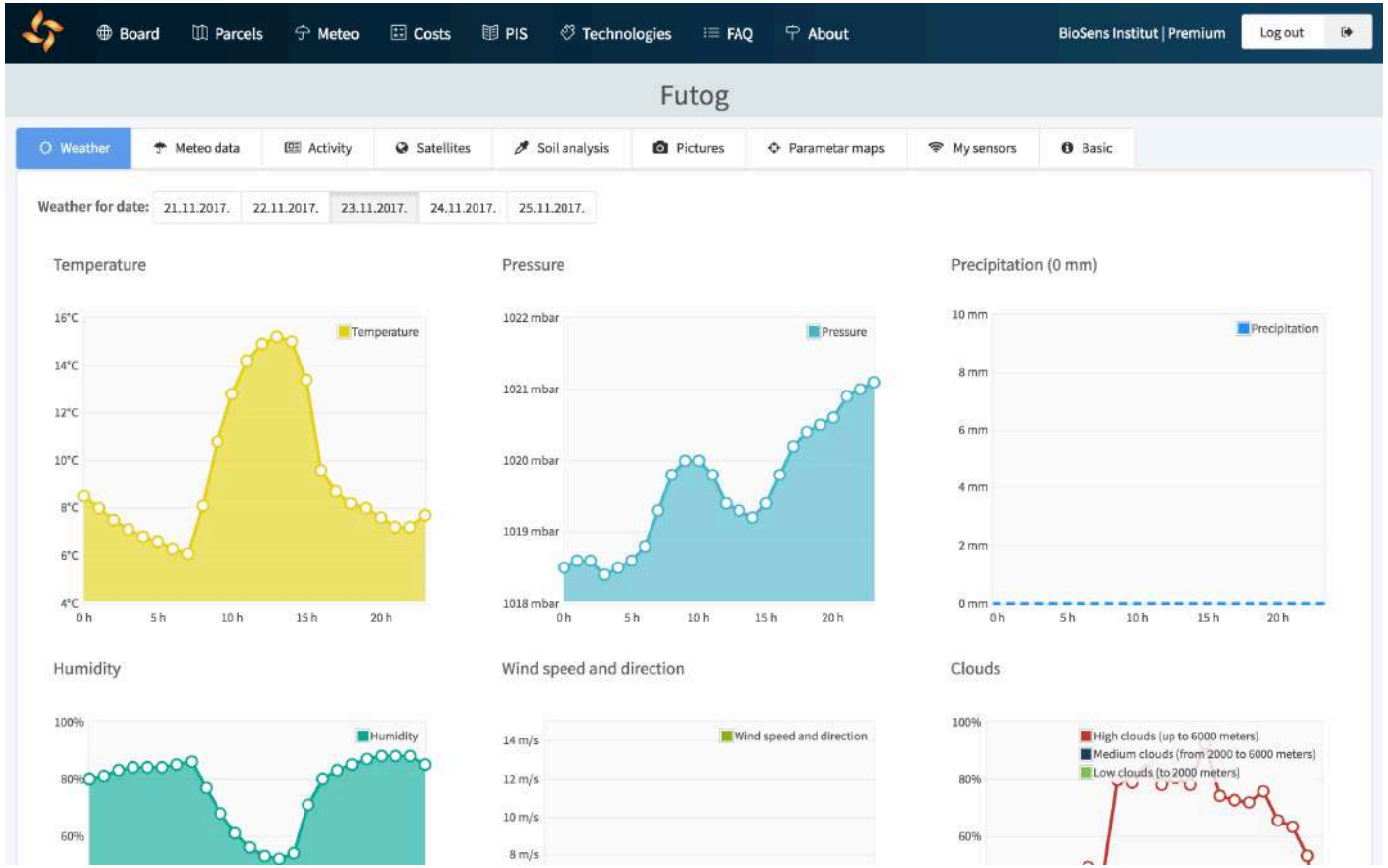

Monitoring

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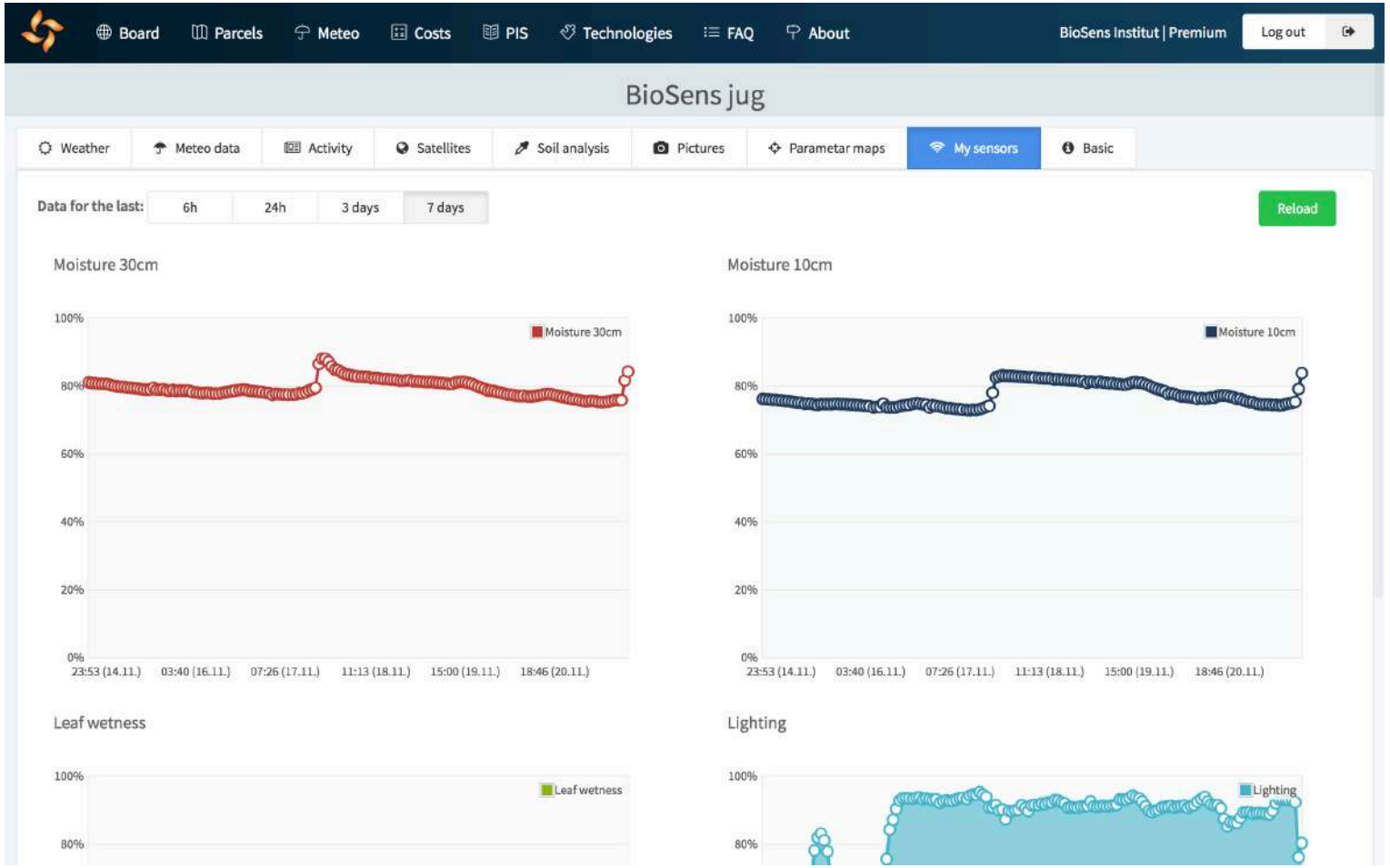

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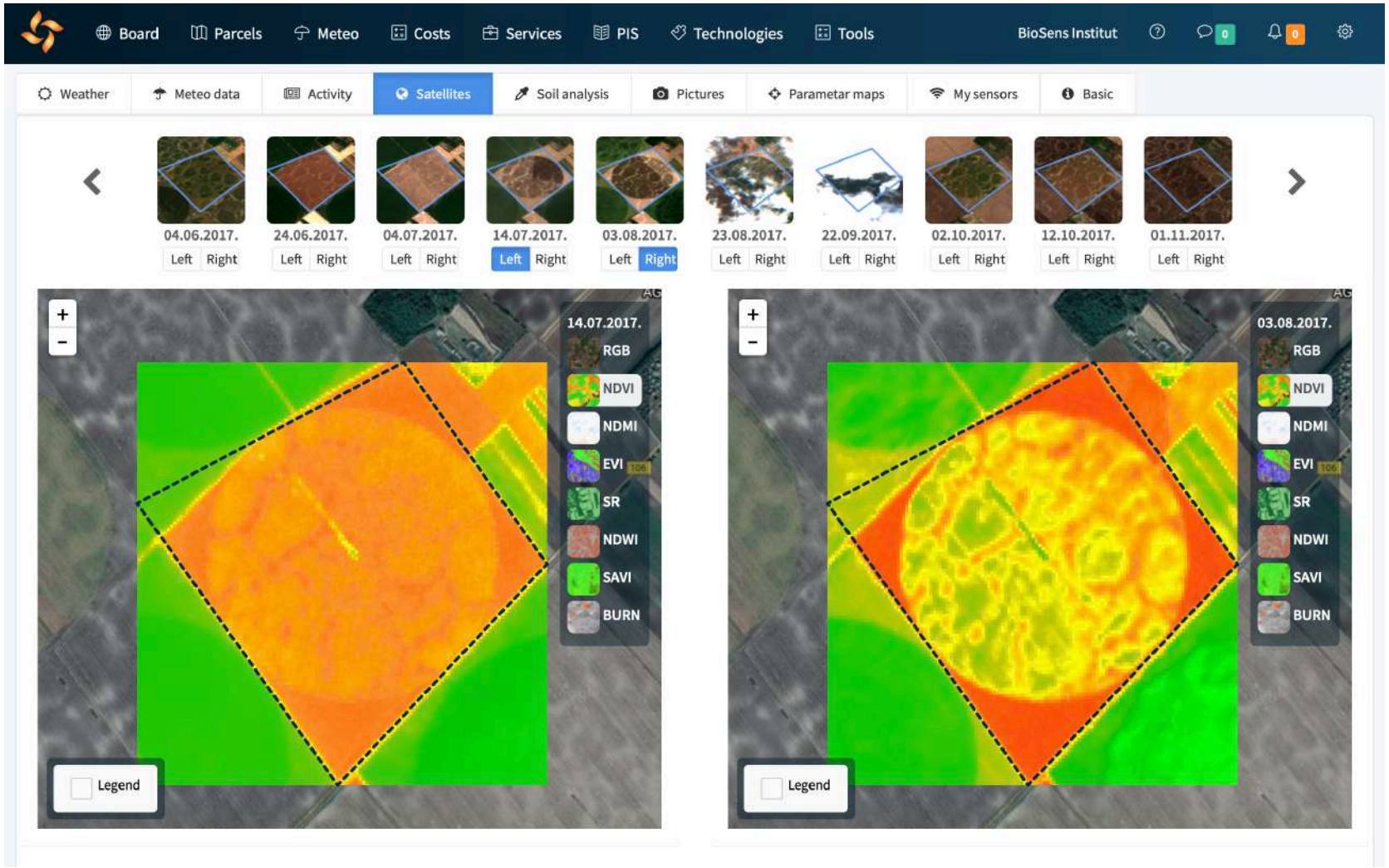

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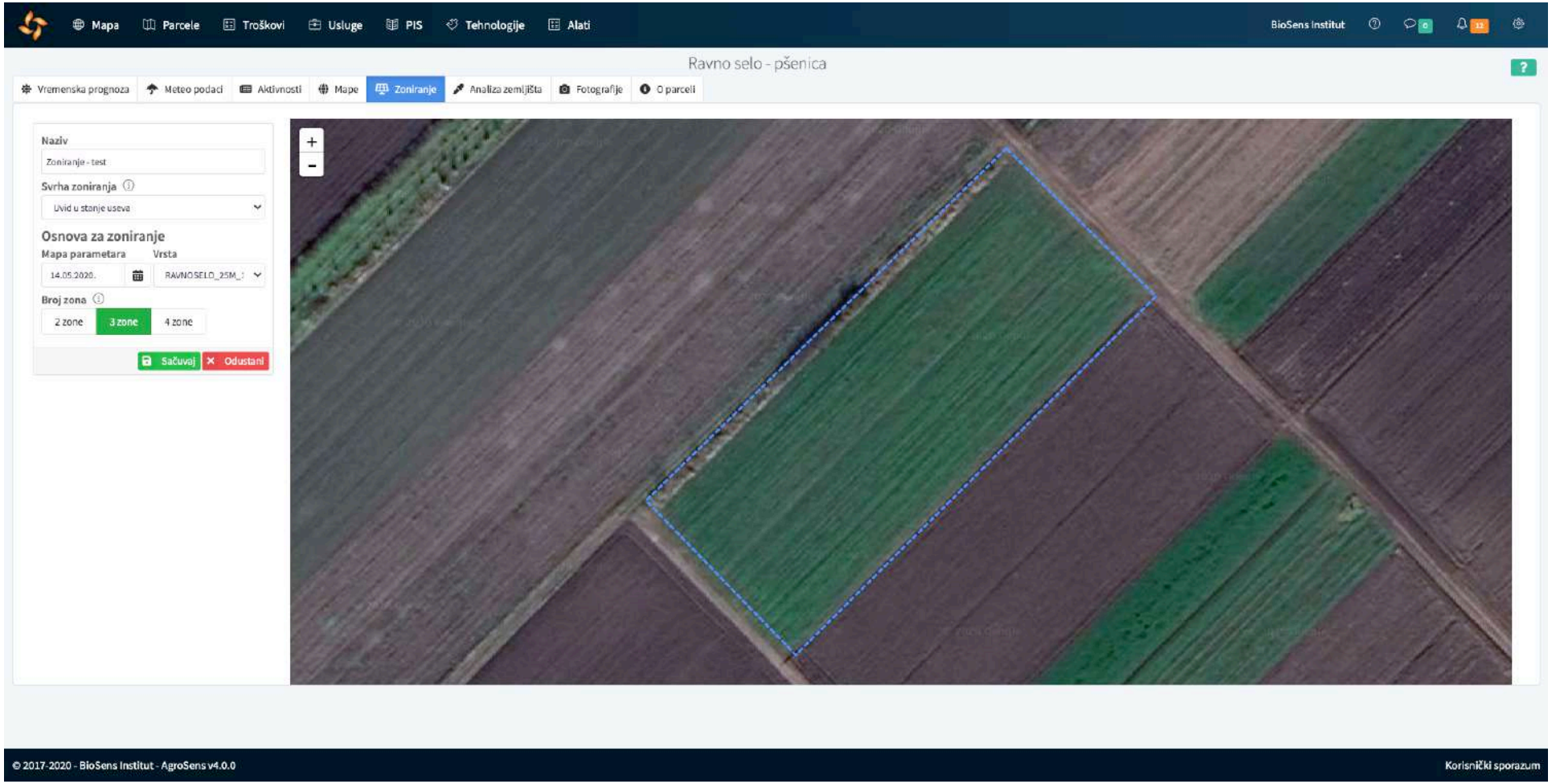

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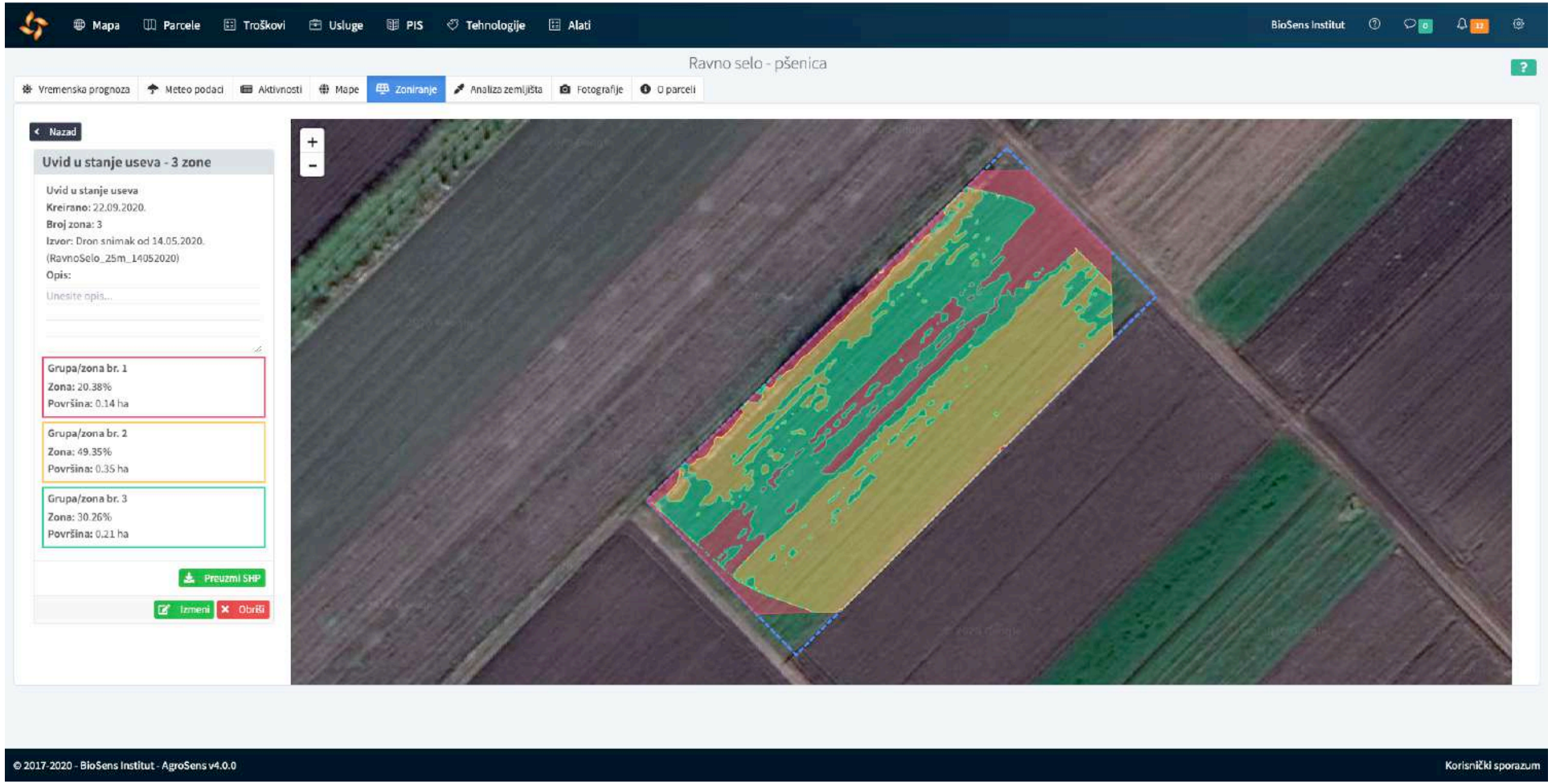

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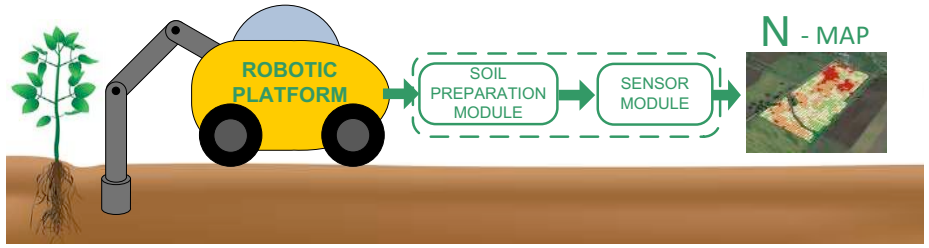
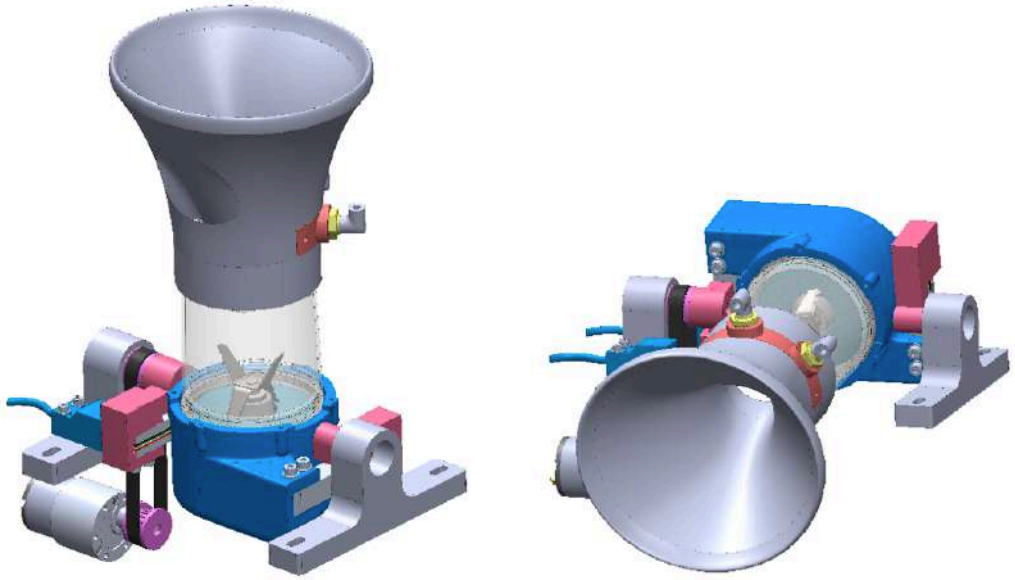
Soil Sampling

- Drone + EM38
- Zone delineation (ML clustering)
- Optimal sampling points
- Field sampling
- Map generation



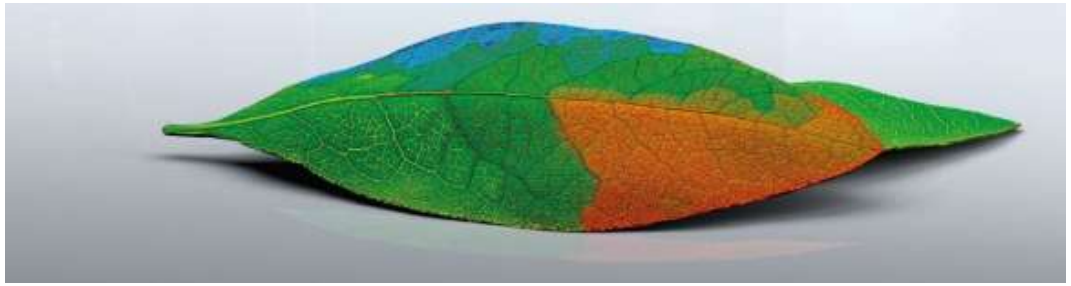
UGV Spraying

- Mixing with water
- Disposal



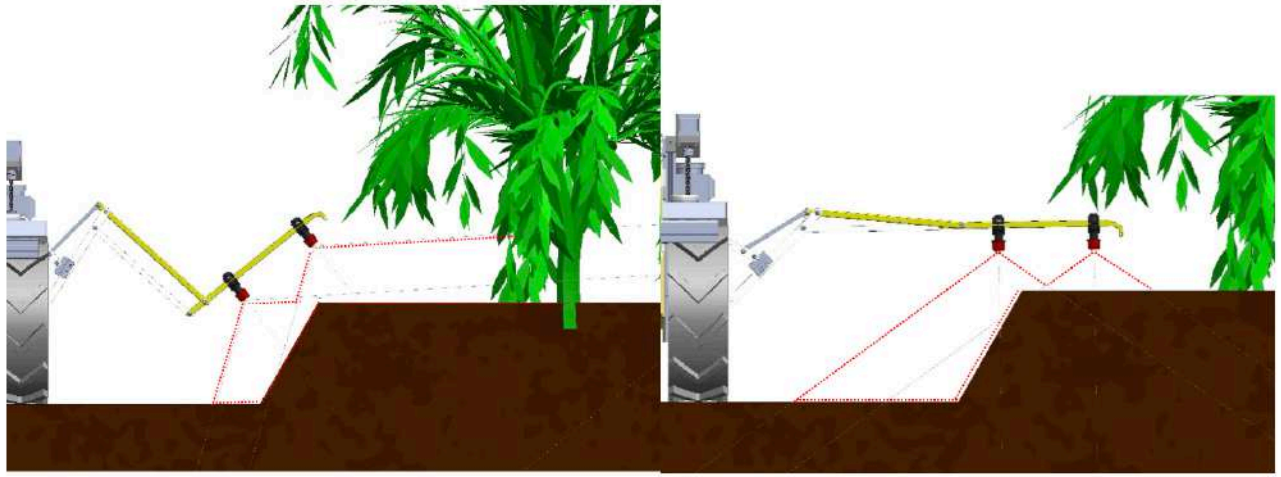
UGV

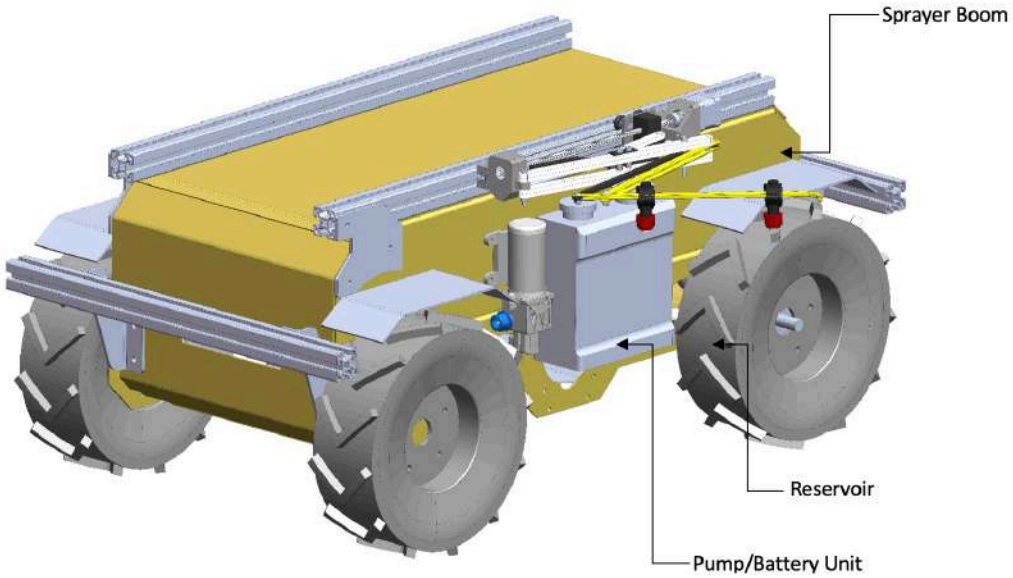
- Precision spraying
- Operation management tools
- FMIS
- DSS
- Demonstration on the field



UGV Spraying

- Overview of the components
- Adjustable spraying angle





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