

National Workshop Croatia: Satellite Remote Sensing for disaster management: New technologies for risk assessment, analysis and response

Developing precision agricultural
services over formerly data-poor
regions under the framework of
e-shape

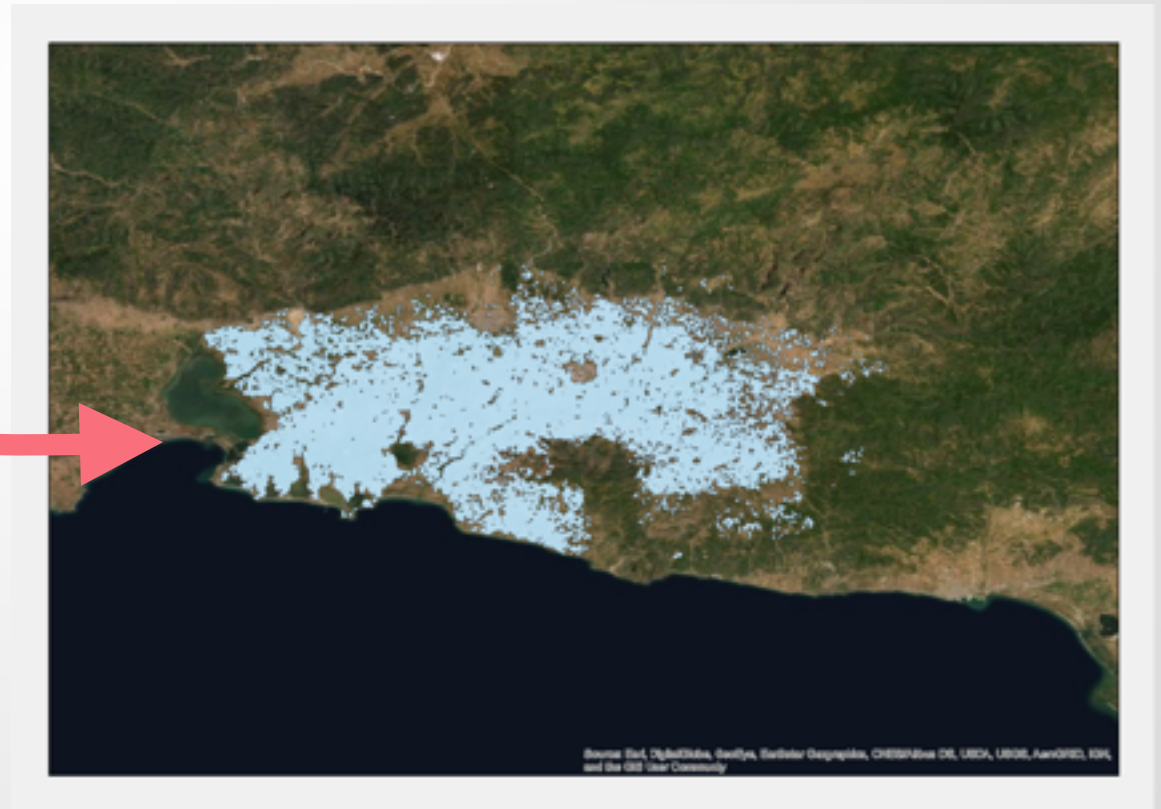
Dr. Nikolaos S. Bartsotas
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National Observatory of Athens
Institute of Astronomy Astrophysics, Space
Applications & Remote Sensing



AREA OF STUDY

Rodopi has an extent of ~ 2500 km², a big part of which features cotton crop. The region has the second highest cotton yield production in Greece.



PROBLEM STATEMENT

ROOT CAUSE

- Data scarcity in radar scans and in-situ observations.
- Current need to physically evaluate all reported damages with agronomists.
- Limited amount of information in terms of early warning.

RESULT

- Uniform insurance rates over a region/crop type.
- Payout delays after a destruction, part of the crop needs to remain intact.
- Difficult to efficiently consult the users in order to take necessary actions.

THE CHALLENGE

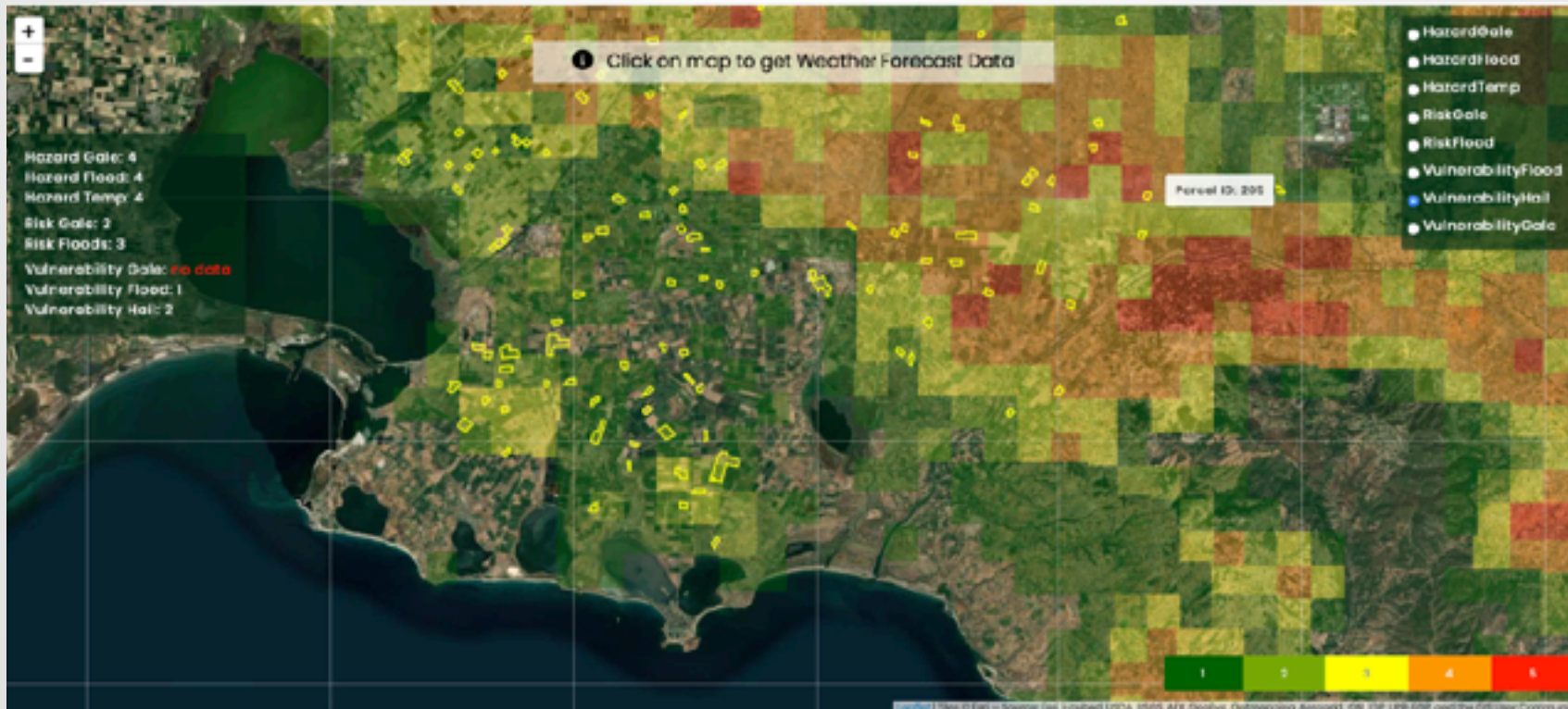
The effective combination of climatological, earth observational, in-situ and numerical weather prediction data towards a more sophisticated monitoring of the agricultural needs

THE 4 PILLARS THAT EMERGED THROUGH CO-DESIGN:

1. Past: Adverse selection tool (Historical Risk / Hazard / Vulnerability)
2. Present: Damage Assessment
3. Future: High Level Monitoring
4. Future: Hi-resolution Early Warning System

I. ADVERSE SELECTION

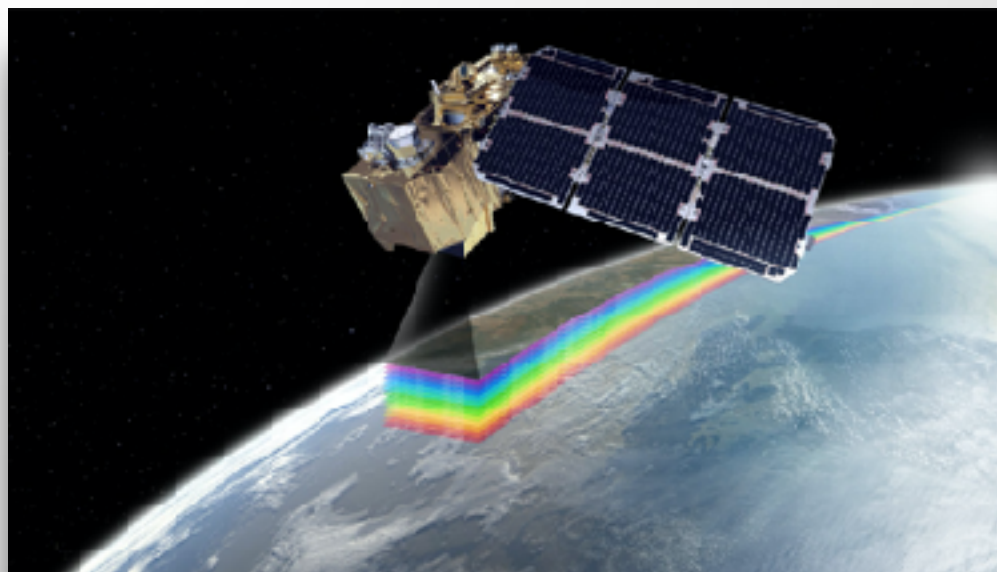
Identification of underlying risks associated with each agricultural parcel in order to support the everyday work of an underwriter.



2. DAMAGE ASSESSMENT

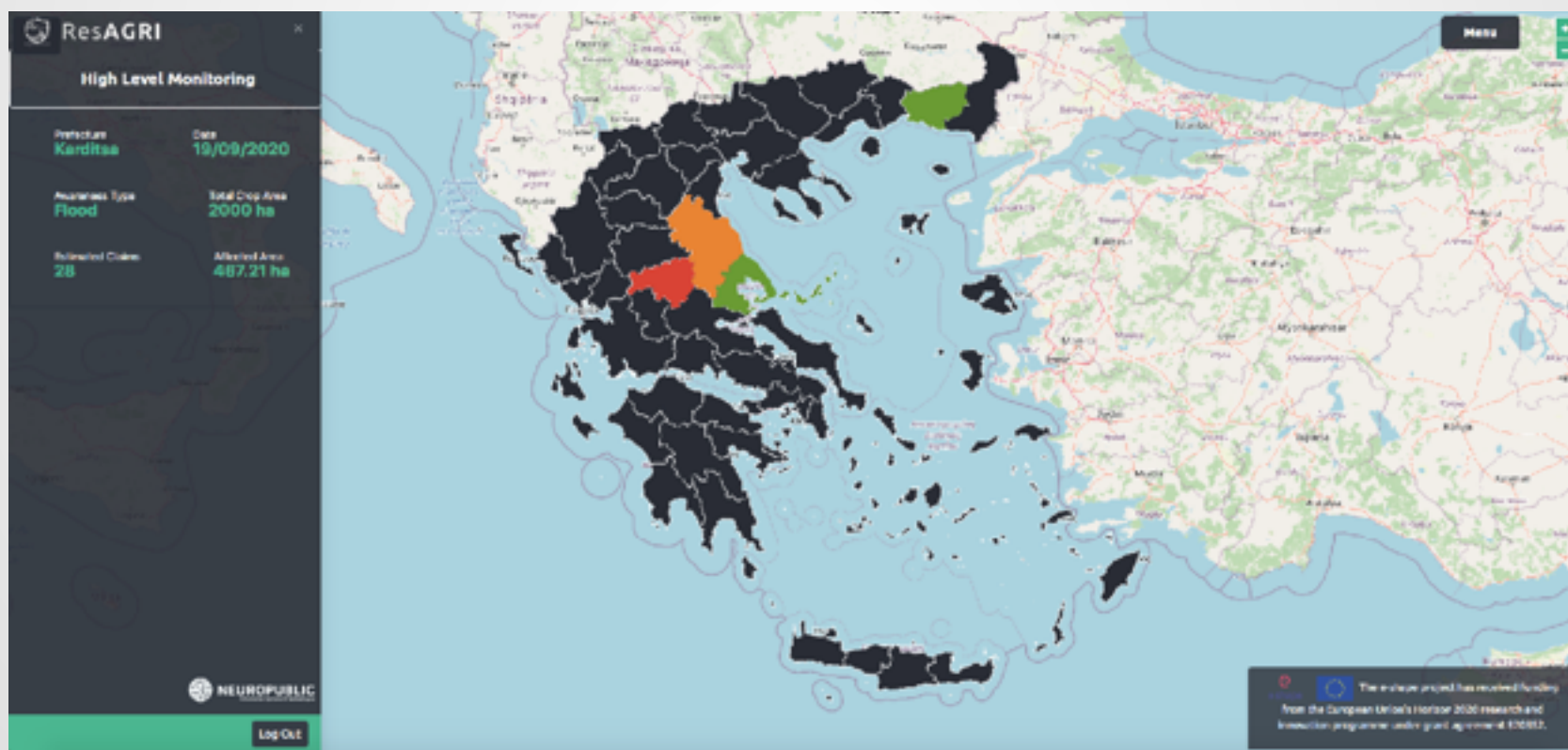
A quick estimation of the affected areas after a destruction is feasible through a combination of:

- Observations from a sufficiently dense network of GAIASENSE smart in-situ stations in the area (12 over Rodopi, 255 nation-wide currently)
- High resolution (10m) Sentinel 2 imagery, able to derive NDVI measurements at a parcel scale.



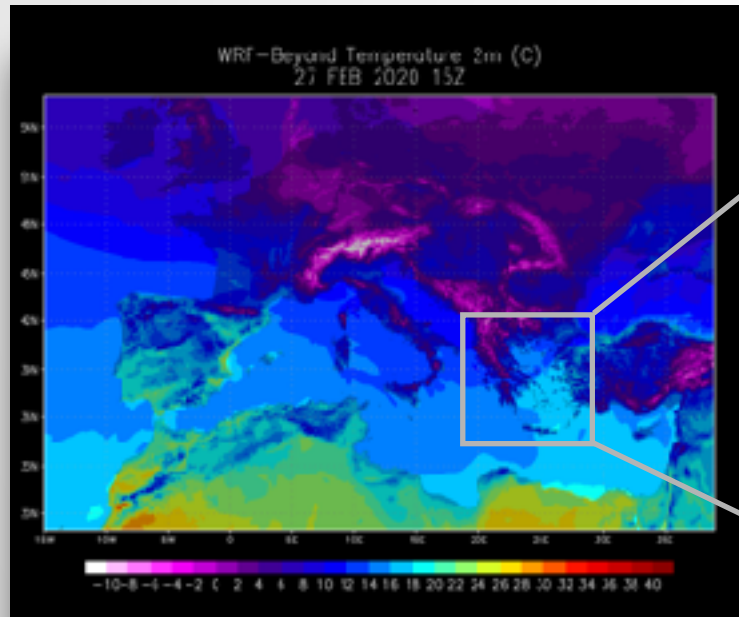
3. HIGH LEVEL MONITORING

Large scale insurance product/risk monitoring that allows for assessment of the risk at which the insurance company is exposed to from a higher level.

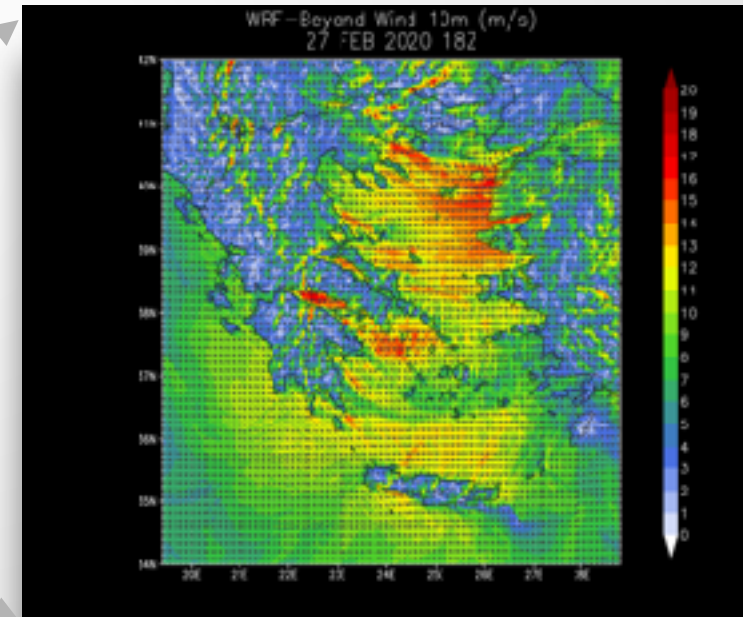


4. EARLY WARNING SUITE

Identification of underlying risks associated with each agricultural parcel in order to support the everyday work of an underwriter.



6x6 km grid spacing
1000 × 650 × 40
grid points



2x2 km grid spacing (convection resolving)
500 × 500 × 40
grid points

OF THE USERS, BY THE USERS, FOR THE USERS

- A **bottom-up** approach.
- Instead of developing a service and then explore the potential for its application, our research is **user-driven** and shaped according to user actual needs.
- Services are **co-designed** in order to maximise their future adoption in operational practices.
- Rapid prototyping of the main service, followed by development of satellite services.
- Three main sectors:
 - i. Agro-Insurance
 - ii. Farmers' Cooperatives
 - iii. Industry



AGRO-INSURANCE SECTOR NEEDS

UNDERWRITING

The capability to tailor insurance costs according to parcel vulnerability

DAMAGE ASSESSMENT

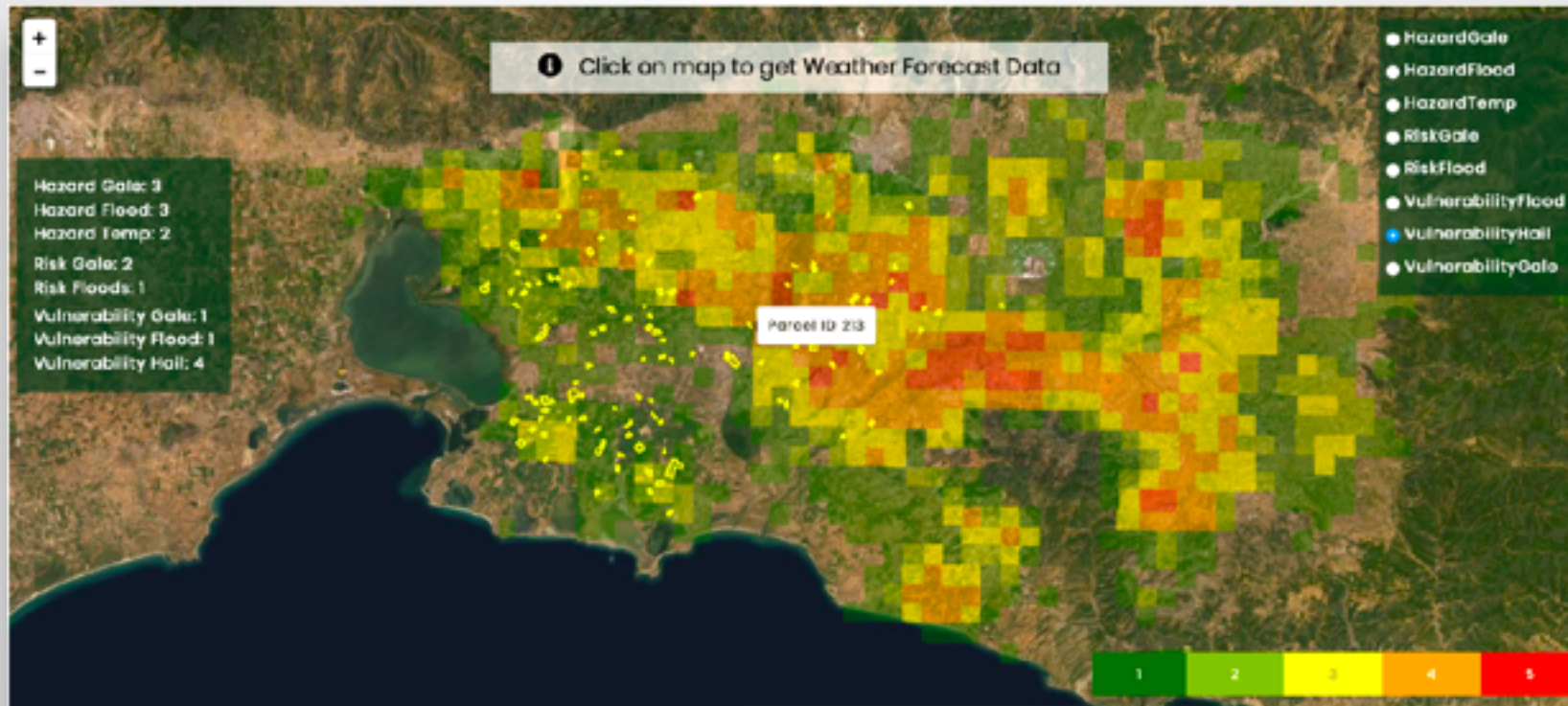
Reduce excessive physical evaluations and promote rapid payouts

EARLY WARNING

High resolution forecasts to consult clients on approaching perils

FREUD PROTECTION

Avoid fraudulent client applications in vicinity to extreme weather events



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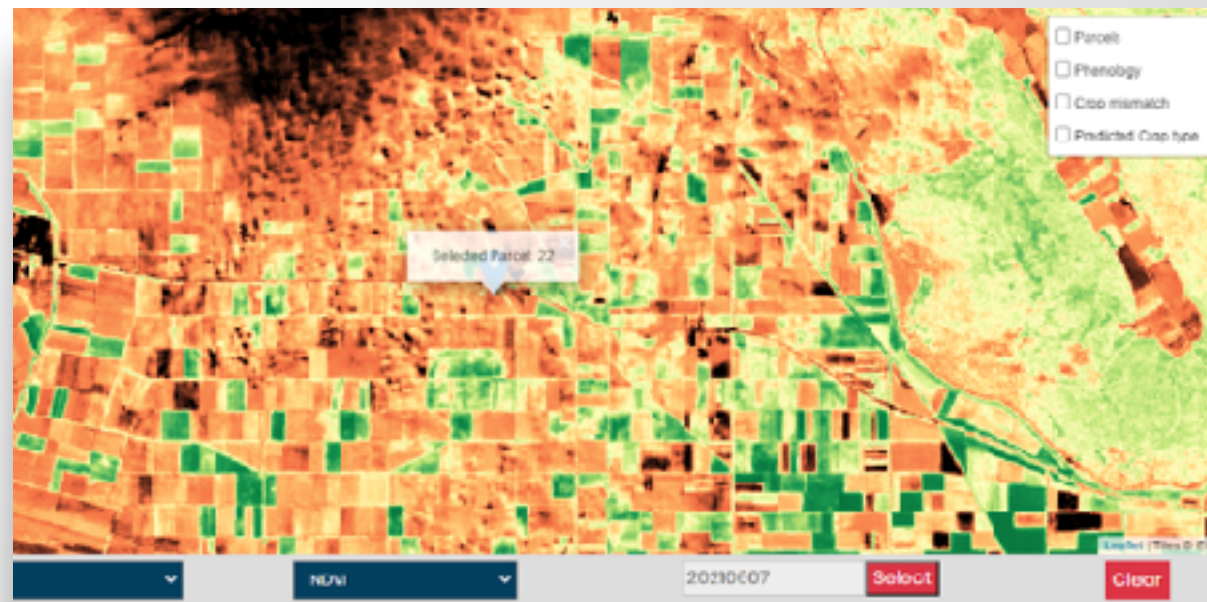
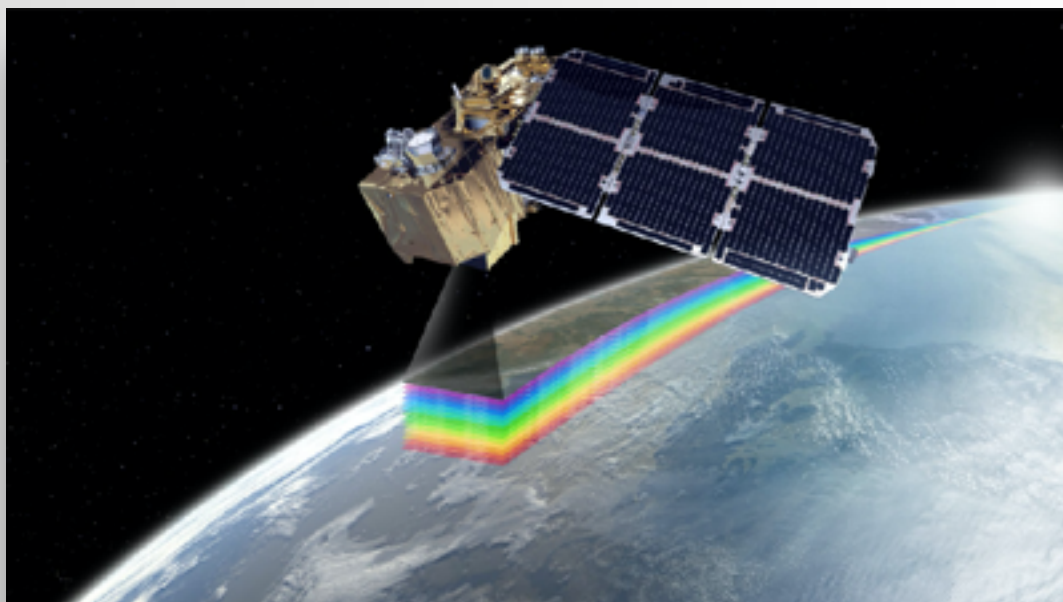
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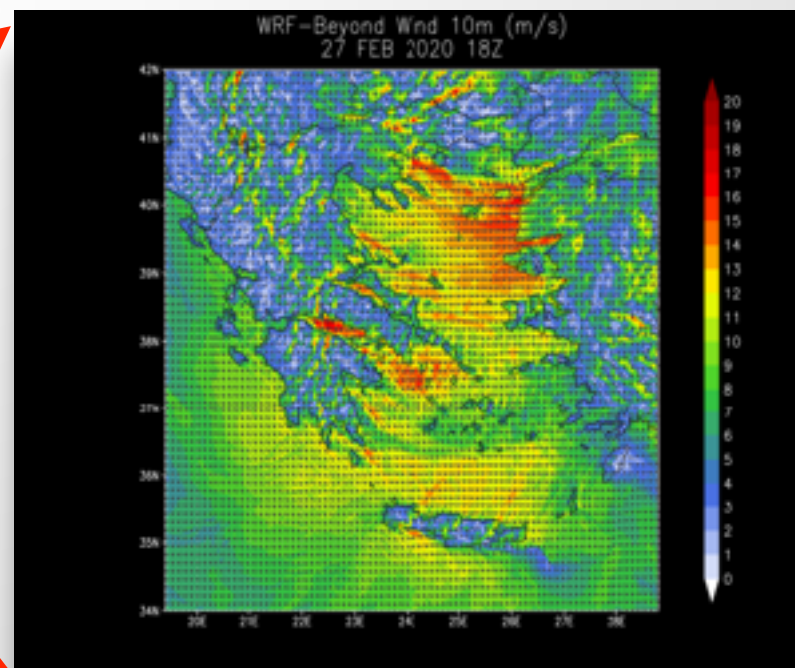
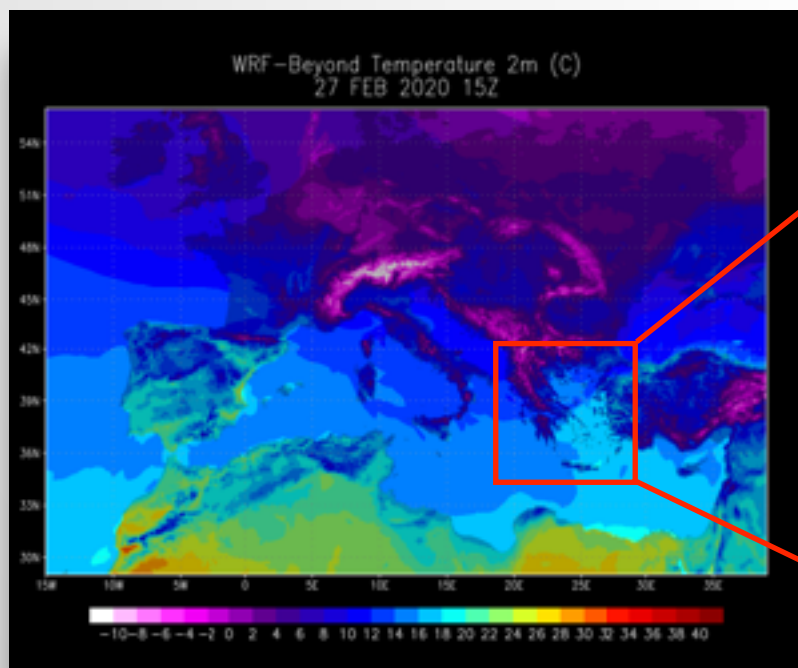
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ResAGRI Weather Risk

iLot Number	WRF-2day				GFS-10day			
	Extreme Temperature	Gale Winds	Heavy Precipitation Event	Hailstorm Risk	Extreme Temperature	Gale Winds	Heavy Precipitation Event	Hailstorm Risk
6295466982356								
6059046202034								
3753561273005								

Upload New File

FARMER COOPERATIVES SECTOR NEEDS

WHEN TO SEED?

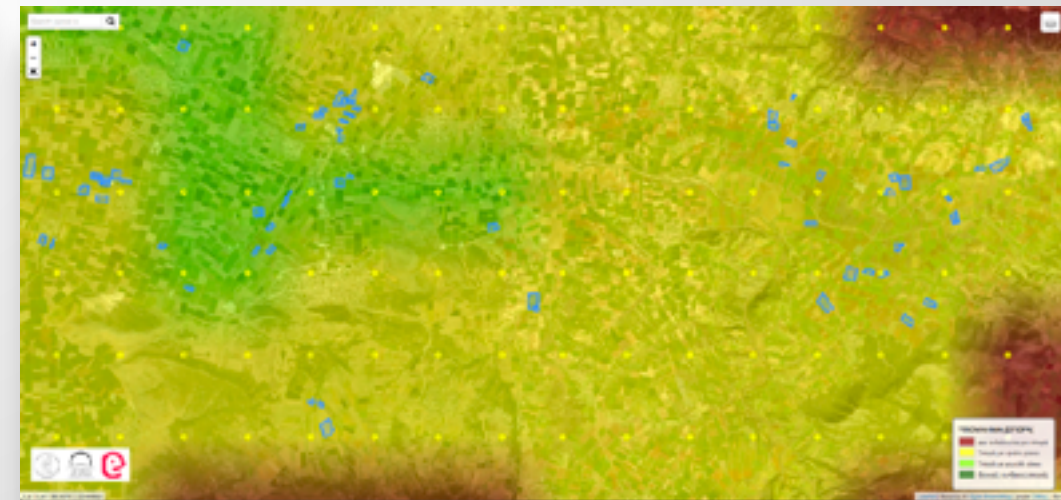
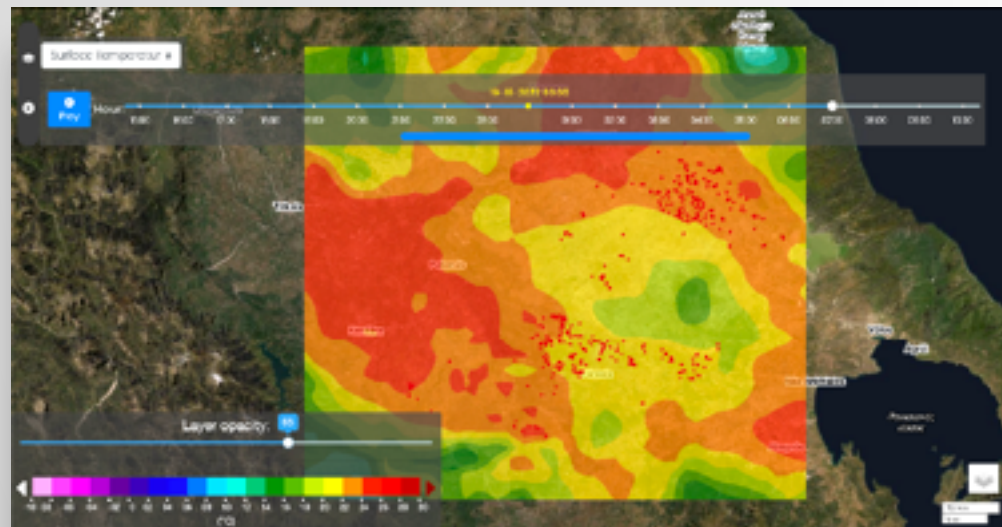
Via AI utilisation of soil &
atmospheric simulations

WHEN TO IRRIGATE AND FERTILISE

High resolution forecasts to consult
farmers on approaching weather perils

PHENOLOGICAL STAGE

e.g. to apply pix growth
regulator at squaring stage



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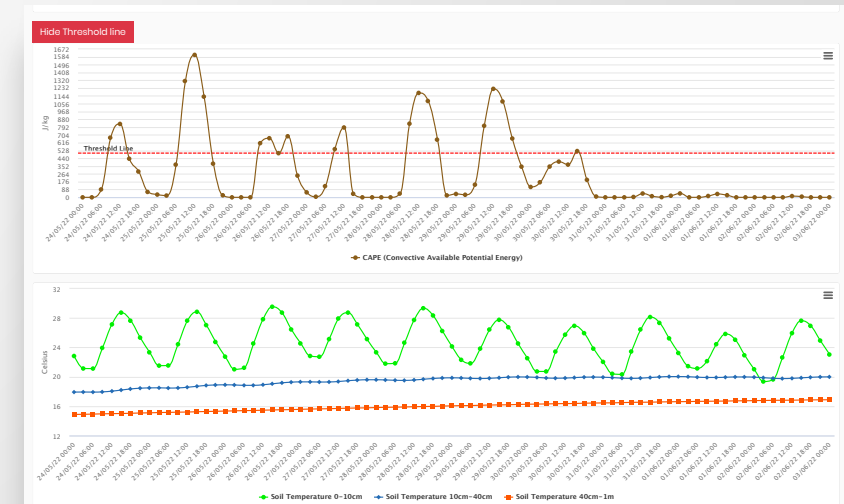
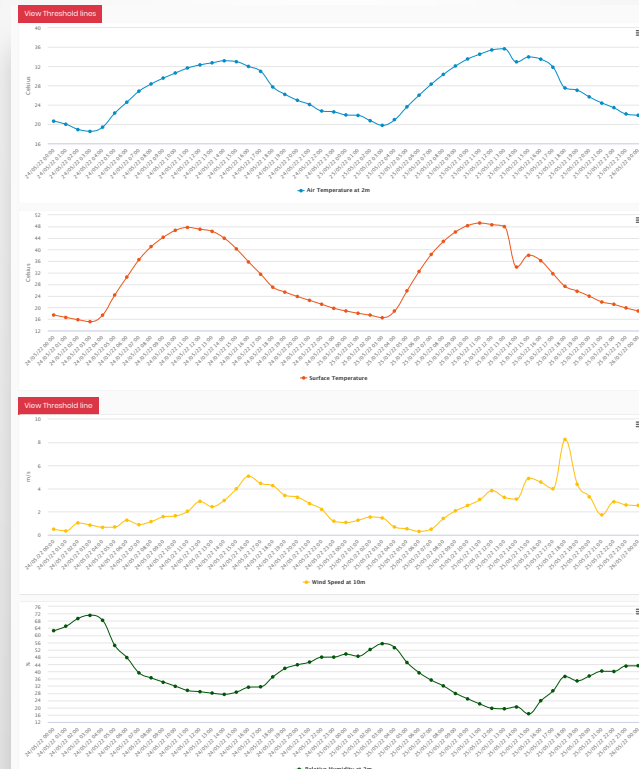
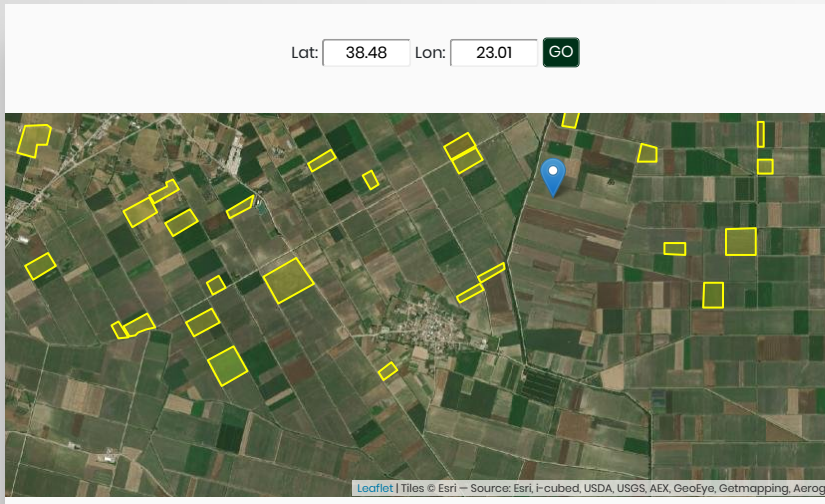
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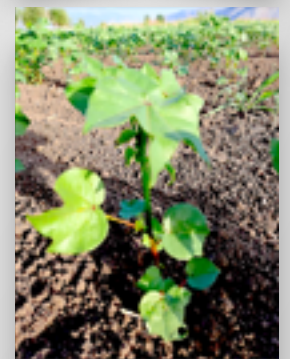
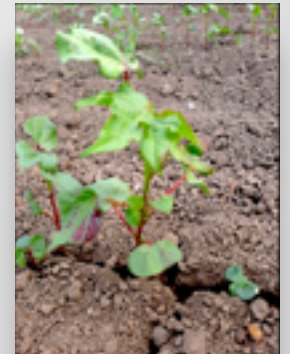
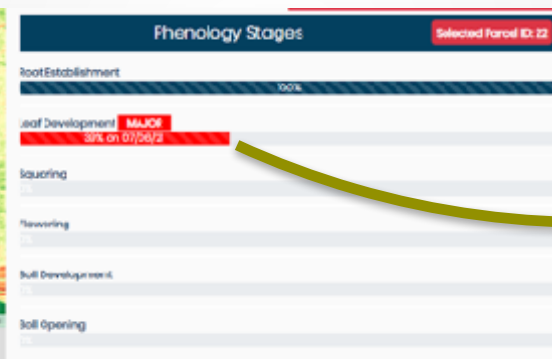
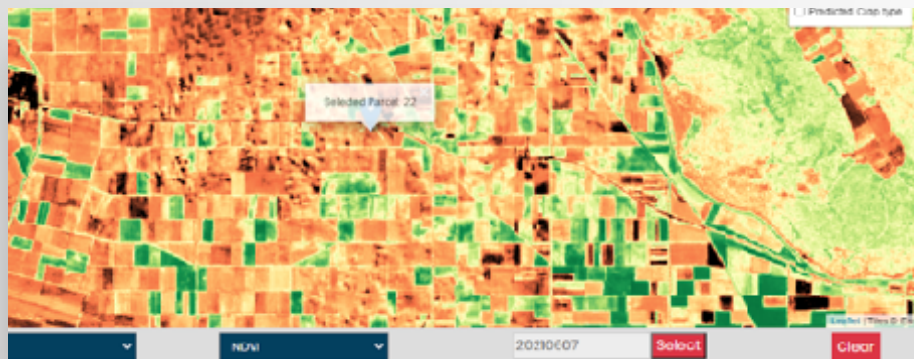
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AGRO-INDUSTRY NEEDS

SOWING MAPS & PEST CONTROL

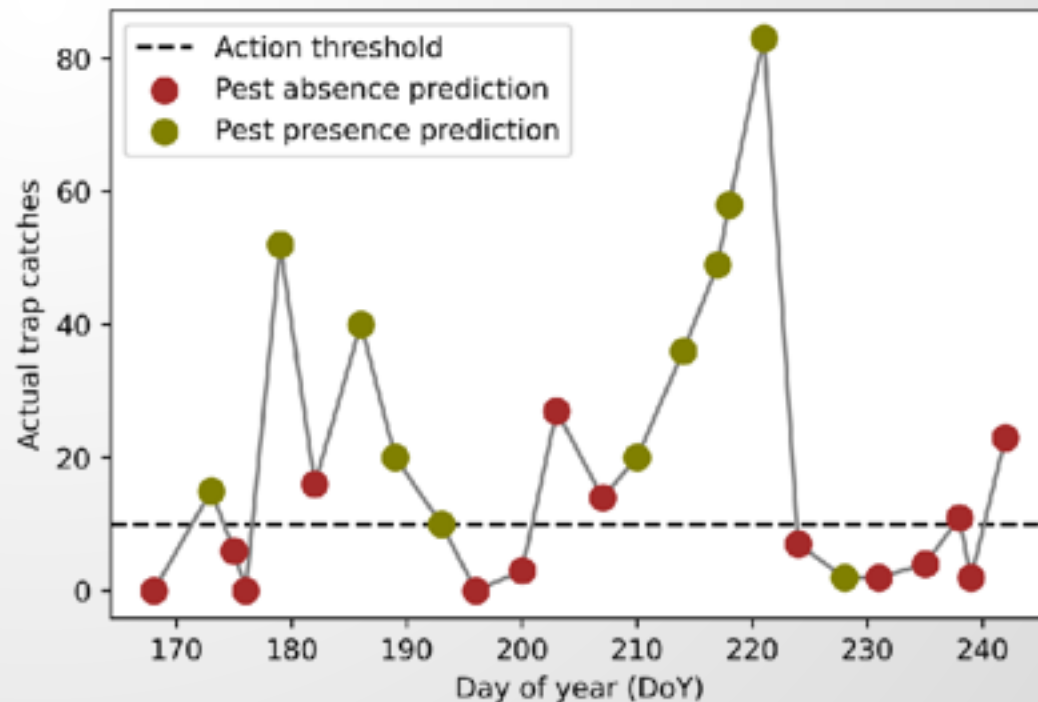
Sowing for additional crops &
regions, consult upon pesticide use

YIELD ESTIMATION

Accurate estimation of total yield
per hectare, months before harvest

INTRA-PARCEL INSIGHT

Identification of delays in crop
growth early in the season to
prevent production fallback



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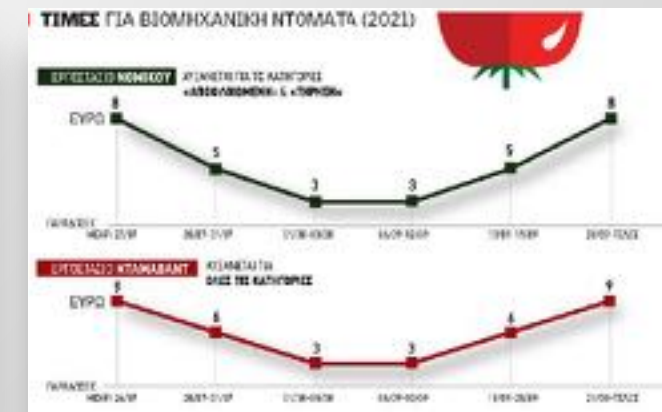
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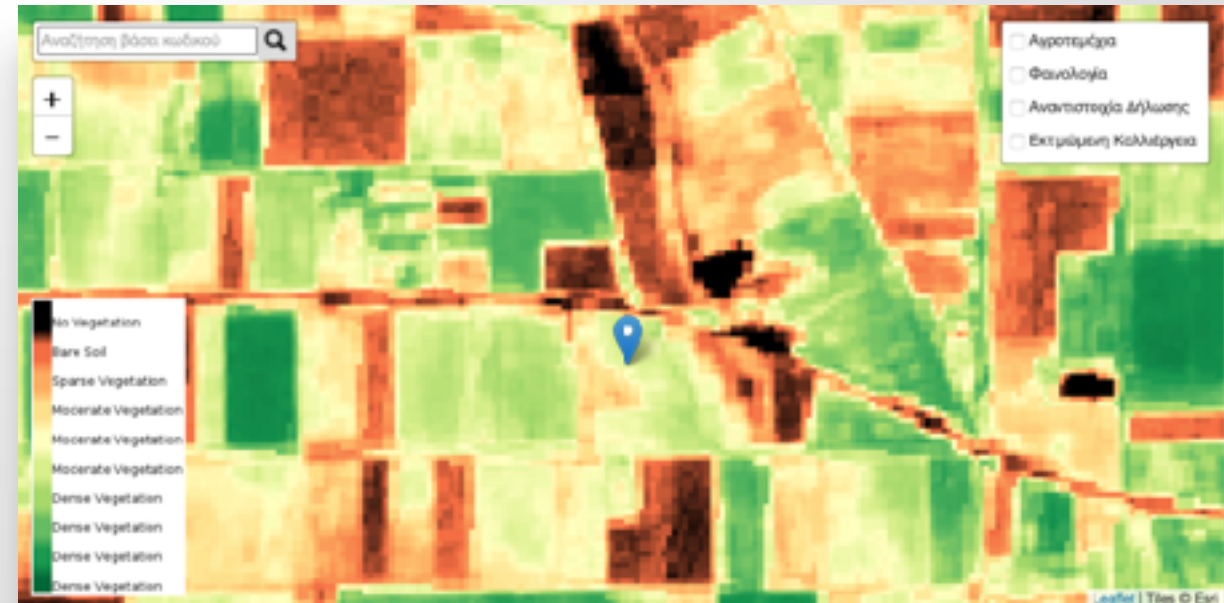
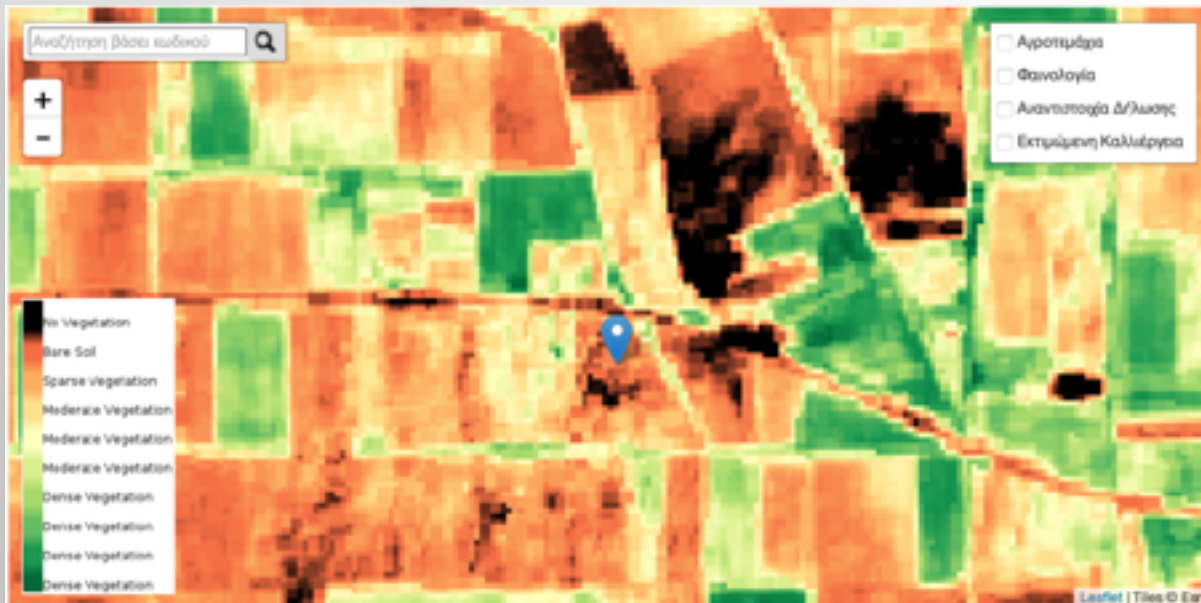
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USER TESTIMONIES



Looking into the future: A Testimony from Interamerican

In the context of the agro-insurance product development through the “Imagine” innovation program of Interamerican, nowadays we are researching a digital system in risk taking and claims management as well as an ecosystem around it.

Through close collaboration and co-design with the National Observatory of Athens, a service is developed under the framework of e-shape Horizon 2020 project, that utilises earth observational, numerical weather prediction and meteorological station data.

We have been commenting and proposing improvements based on our operational needs along the way of this research project, towards the development of an online platform from NOA that provides historical hazard, vulnerability and risk factors as well as early warning parameters over an area of 950 hectares in of Northern Greece for cotton crop. The service under development appears very promising and is at a stage that already provides useful information to support our decision taking through a user-friendly online platform. Upon its completion we look forward into implementing this information in our daily practices.

“The soil temperature forecasts in different soil depths from ReSAgri prove to be accurate as our field observations verify and an essential source of information for us in order to estimate the optimum seeding time”.

Giannis Zannias
Orchomenos Cotton
Cooperative





Thank you

<http://www.resagri.eu>

<http://agrowth.beyond-eocenter.eu>

