Climaca

Blending Earth observations and agricultural knowledge through Artificial Intelligence towards a scalable monitoring and assessment scheme for agricultural ecosystems

1/2/2024 – 31/12/2025

Greece 2.0 NATIONAL RECOVERY AND RESILIENCE PLAN
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Who we are

climaca

Host Institution

ΕΘΝΙΚΟΝ ΑΣΤΕΡΟΣΚΟΠΕΙΟΝ ΑΘΗΝΩΝ
ΟΥΡΑΝΙΑ
1842
NATIONAL OBSERVATORY OF ATHENS

IAASARS

BEYOND
Centre of EO Research
and Satellite Remote Sensing

Cooperating Organization

ELGO - DIMITRA
HELLENIC AGRICULTURAL
ORGANIZATION - DIMITRA

100 ΧΡΟΝΙΑ ΑΓΡΟΤΙΚΗΣ ΕΡΕΥΝΑΣ
ΙΝΣΤΙΤΟΥΤΟ ΒΙΟΜΗΧΑΝΙΚΩΝ ΚΑΙ ΚΤΗΝΟΤΡΟΦΙΚΩΝ ΦΥΤΩΝ

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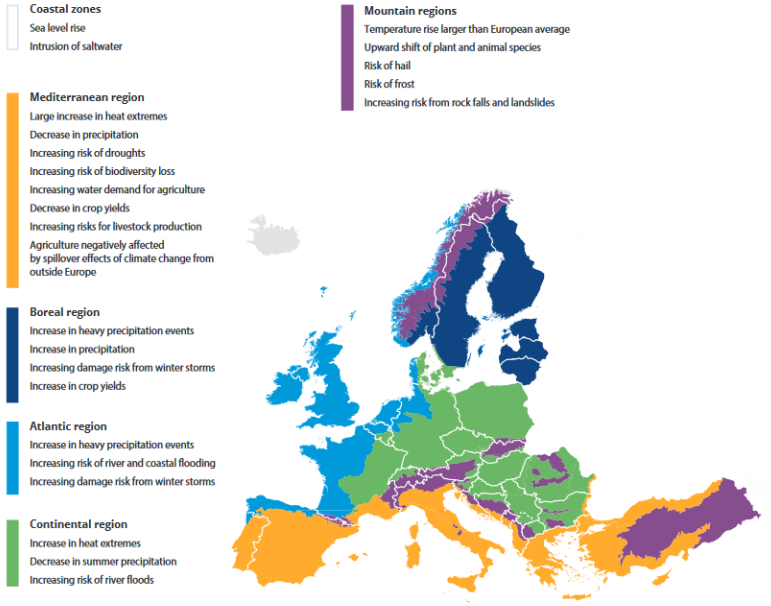
Why do we care about healthy agro-ecosystems?

Agricultural production impact: 52% of agricultural soils are moderately to severely degraded; it is a major factor in 80% of the loss of natural ecosystems; irrigation causes water scarcity problems in high-risk basins.

Agricultural production is under threat: a multitude of impacts of climate change on agro-ecosystems and crop production, affecting the price, quantity and quality of products and subsequently the agricultural income.

Map 1.2 Main climate change impacts on the agriculture sector for the main biogeographical regions in Europe



Source: Adapted from EEA (2017b).

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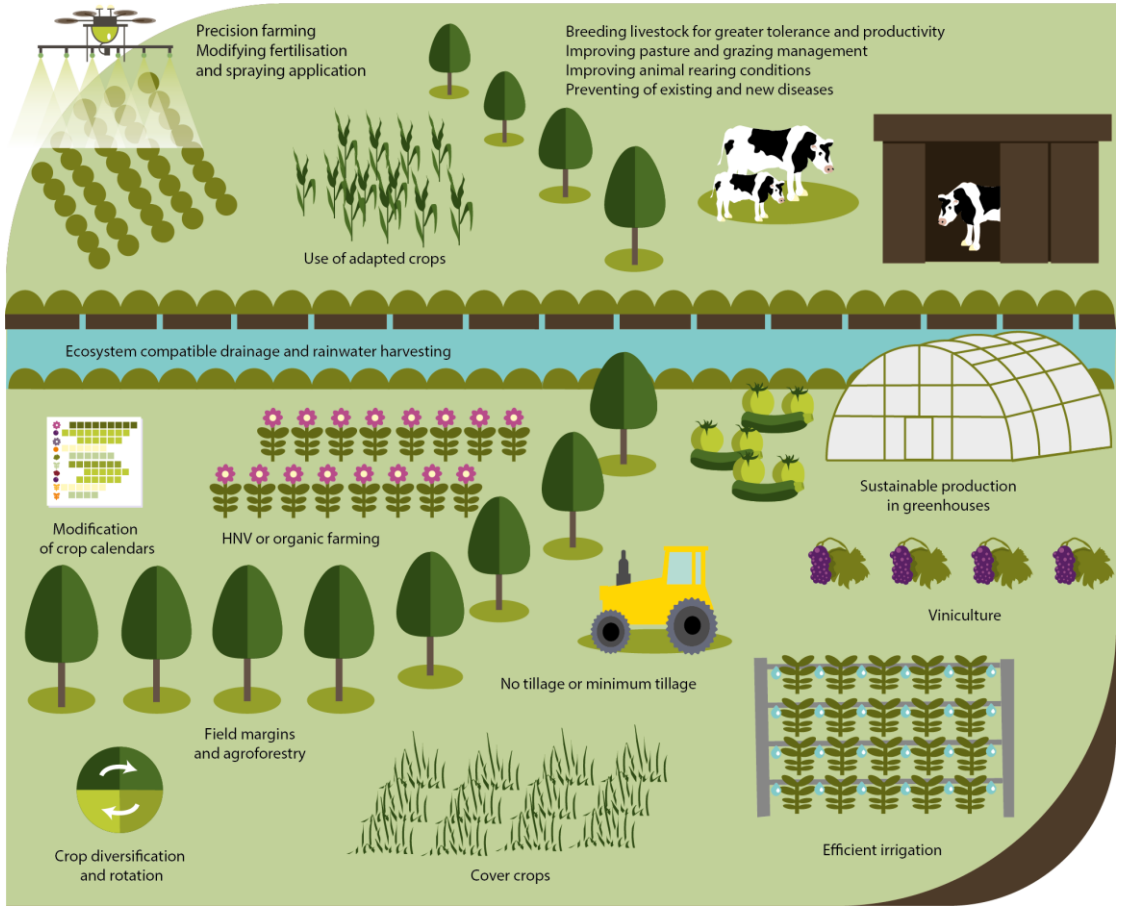
Ecological farming practices

Nature-based agriculture

A broad framework that includes ecosystem-based adaptation, natural climate solutions and green infrastructure. Nature-based agriculture includes practices for the protection, sustainable management and restoration of natural or modified ecosystems that address societal challenges effectively and adaptively, while providing benefits for human well-being. They transform agro-ecosystems from agents and recipients of impacts to providers of holistic solutions.

FAO and The Nature Conservancy, 2021



EEA, 2019

Aim: to assess the actual impacts of these practices on agro-ecosystems.

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Our aim

To establish data-driven and domain-aware developments to assess the impact of policy-relevant interventions on the overall sustainability and performance of agricultural ecosystems.

In this sense, big space-borne EO, advanced ICT technologies, and Artificial Intelligence (AI) will be the key enablers in developing actionable recommendations for policymakers to achieve resilient agriculture.

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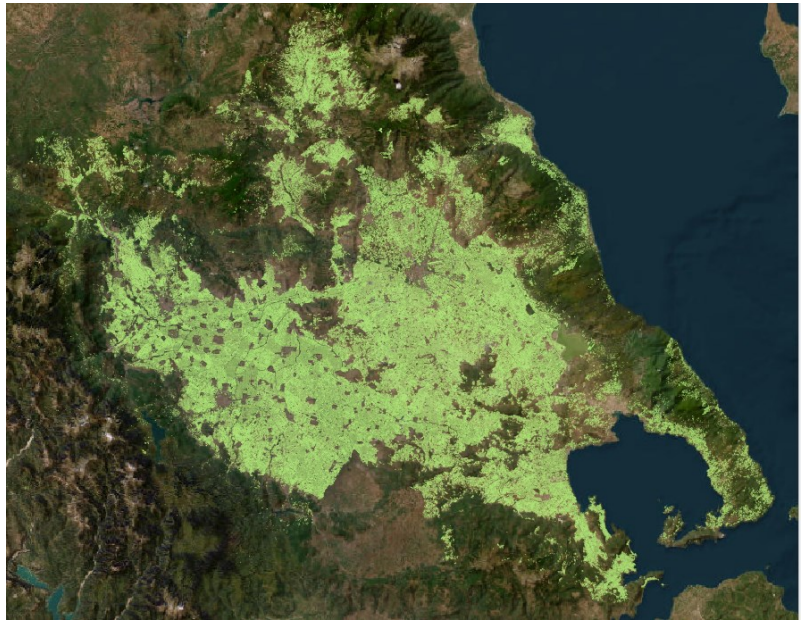
Study areas



Thessally

Flanders

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What we do: 4 research Working Packages

WP2

Data collection and Indicator Framework

WP3

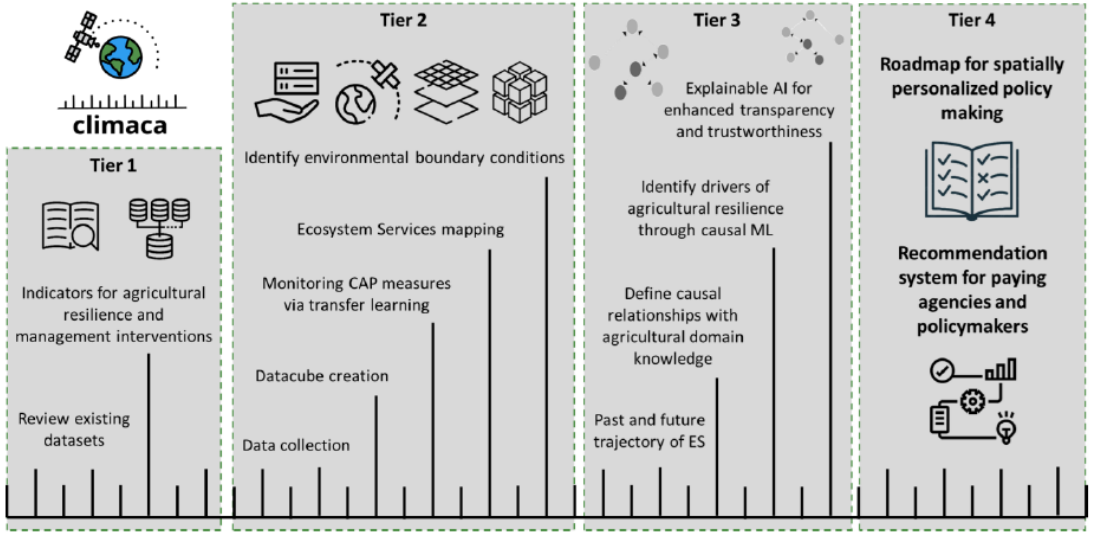
EO-based tools for monitoring agroecosystem practices and condition

WP4

Artificial Intelligence for Agricultural Resilience

WP5

Policy Recommendation System



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Agricultural practices & indicators framework

WP3

Agricultural Practices

- Agricultural Intensification
- Crop Rotation / Diversity
- Digestate
- Weed management

WP3

Agro-ecological indicators

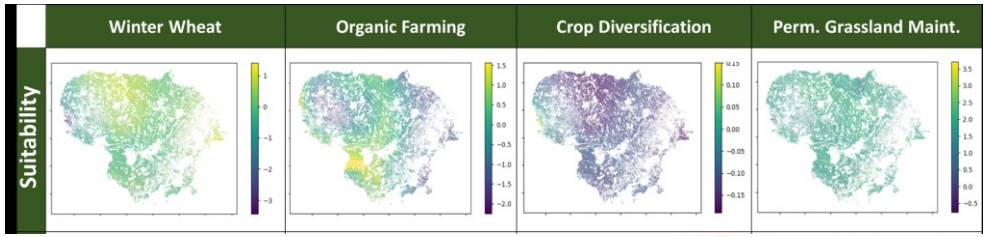
1. Organic matter
2. Soil erosion
3. Soil moisture
4. Estomated productivity

WP4

Impact modelling

1. Causal Machine Learning
2. Explainable AI

WP5: **On-line Policy recommendation system.**



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WP3: Satellite-based observation tools

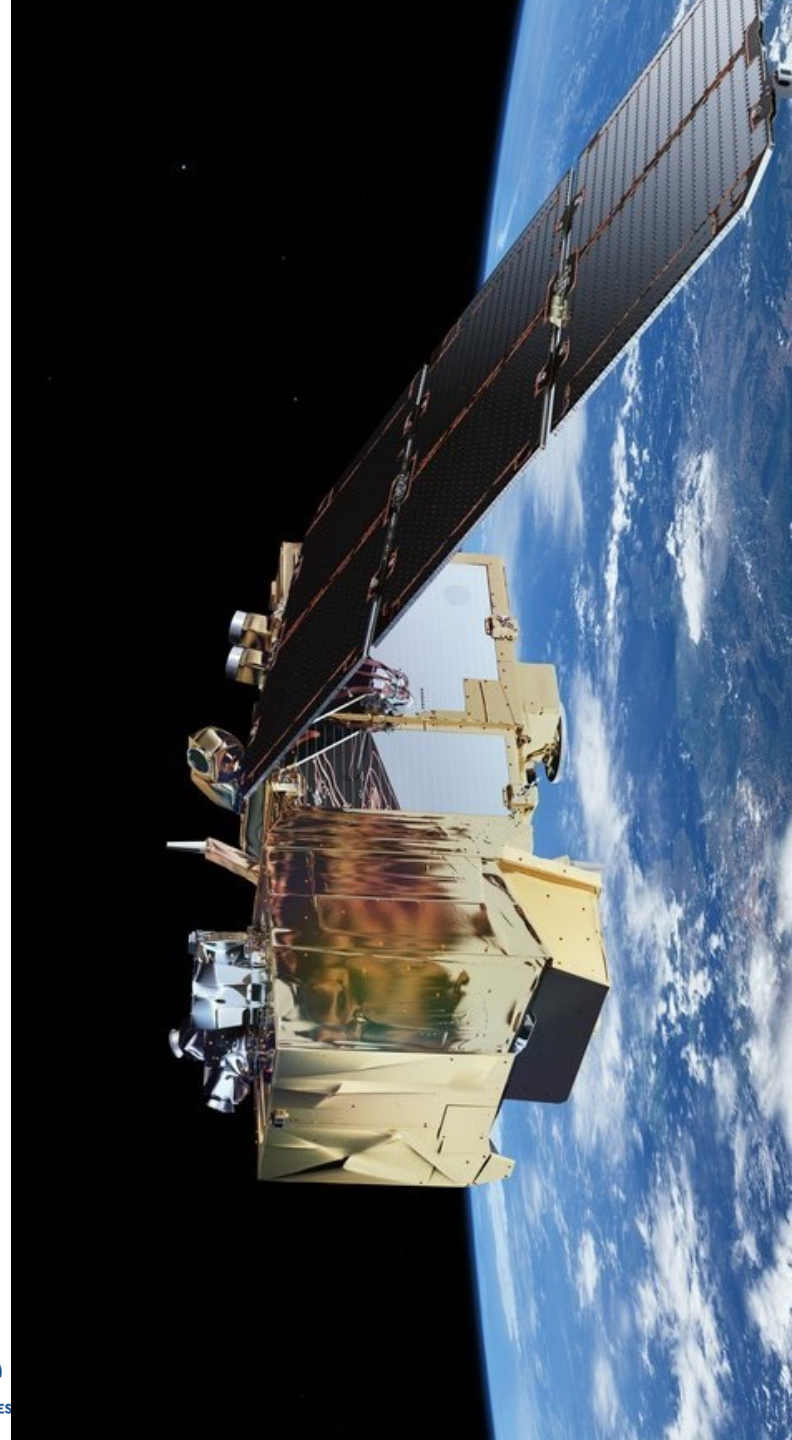
Mapping & Monitoring:

Agricultural Practices

1. Agricultural intensification.
2. Digestate application as soil improver.
3. Crop rotation / crop diversity.
4. Weed management in orchard farming.

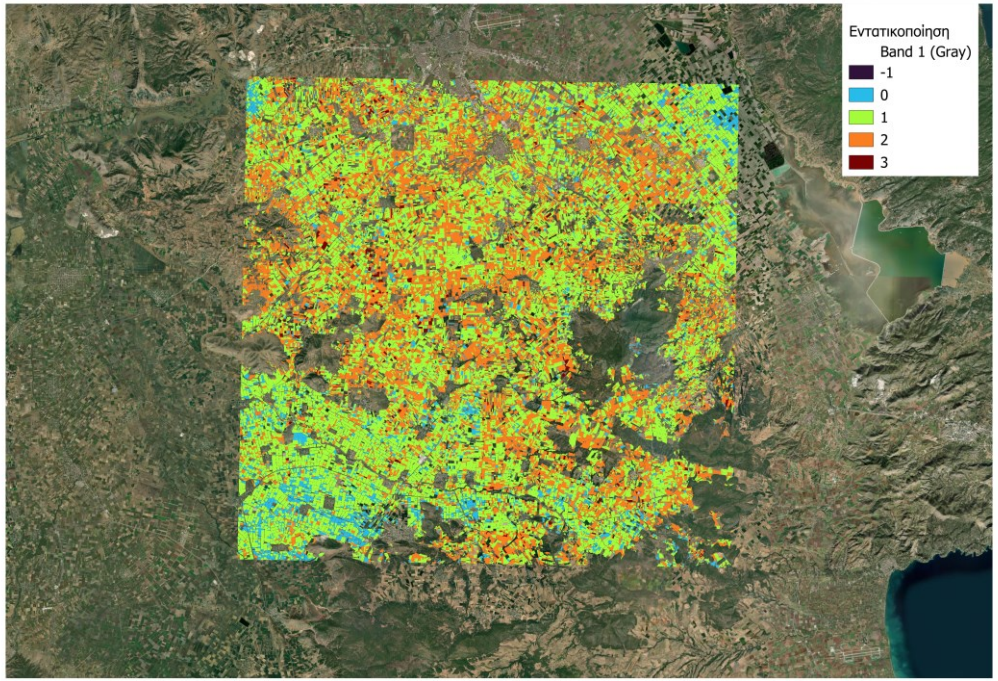
Agro-ecological health indicators

1. Soil Organic Carbon.
2. Estimated productivity (biomass).
3. Soil erosion.
4. Soil moisture.



Climaca's results for policymakers

- Framework for the holistic assessment of the agro-ecological health
- Algorithms for effective and timely CAP - ecological schemes monitoring
- Methodology and mapping of agro-ecological parameters
- Quantification of the impact of ecological agricultural practices on agro-ecological health
- On-line system with explainable and trustworthy recommendations and actionable advices



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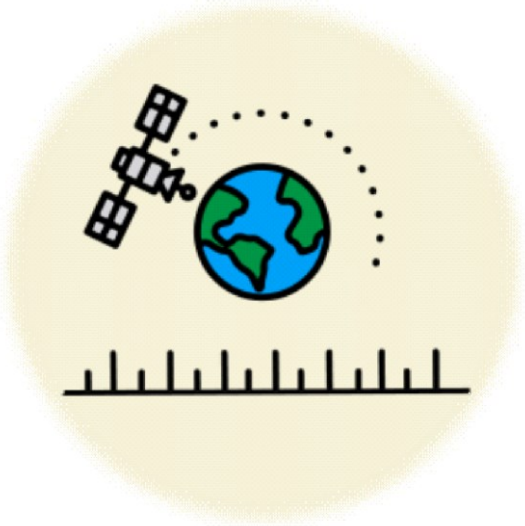

Get Involved!!!

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