



ENVISION is developing and piloting innovative tools for the continuous, large scale and uninterrupted monitoring of farm management activities with regards to sustainability, in compliance with the CAP's agri-environmental objectives.

Welcome to ENVISION #4 Newsletter!

Can you believe it's already the end of the year 2022? The team of ENVISION has achieved many things this year. If you missed them, you can read about them in this newsletter. You are welcome to follow us on the five social channels and website, which links you can find at the bottom of this newsletter. In the next months ENVISION is planning more interesting events and activities that you would not want to miss.

"Take your time and look back. Feel proud about your progress! Believe in yourself, push your limits, experience life, conquer your goals, and be happy.
We wish you all the best in the New Year!"

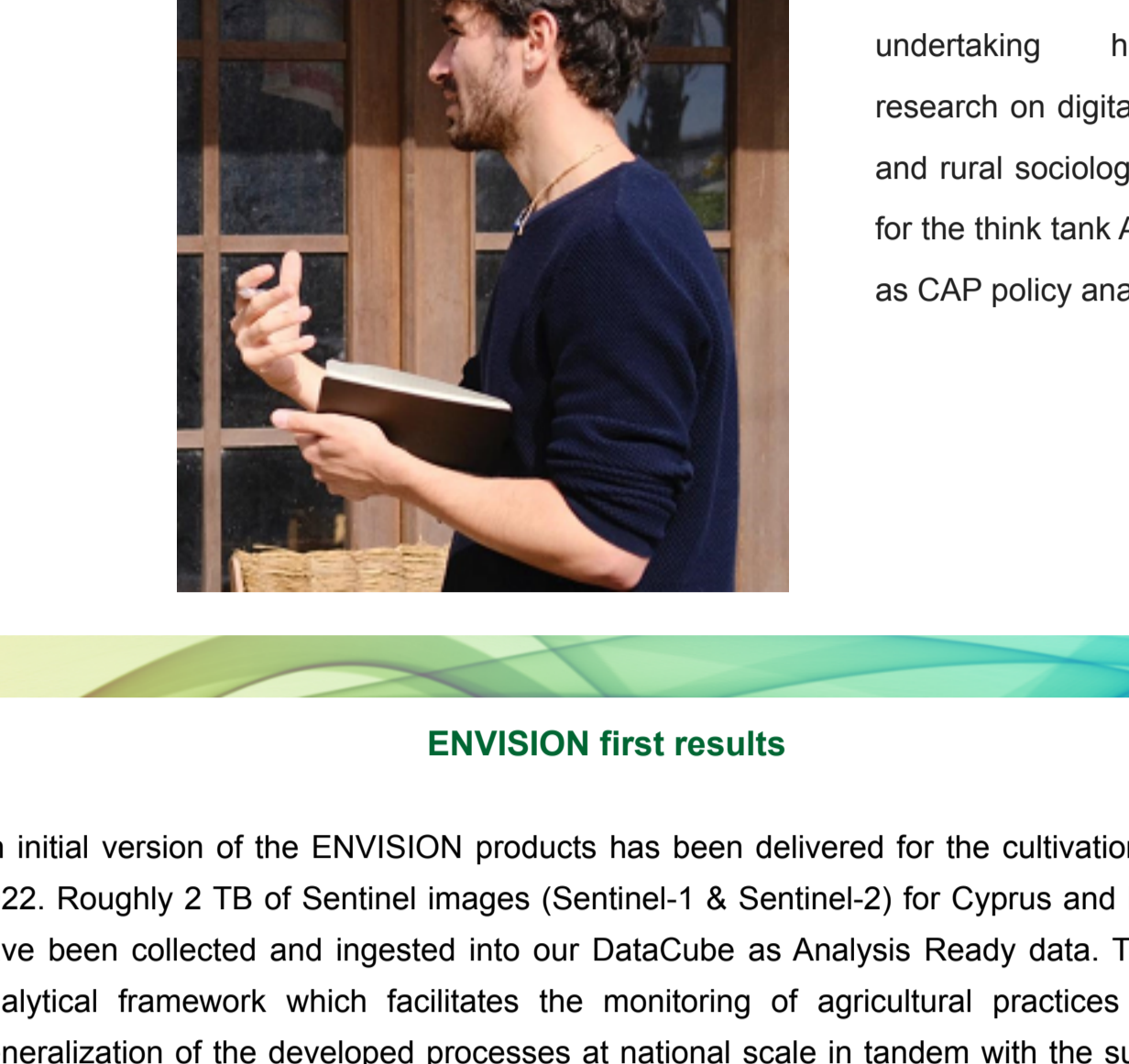
ENVISION consortium

ENVISION platform

During this period, the business cases implementation phase has been initiated, and the ENVISION platform has been populated with parcels and results! Ready for use! Always having in our minds that our solutions should fit the actual operational needs and requirements, we constantly assess the performance and completeness of the platform as well as the precision and accuracy of the services.

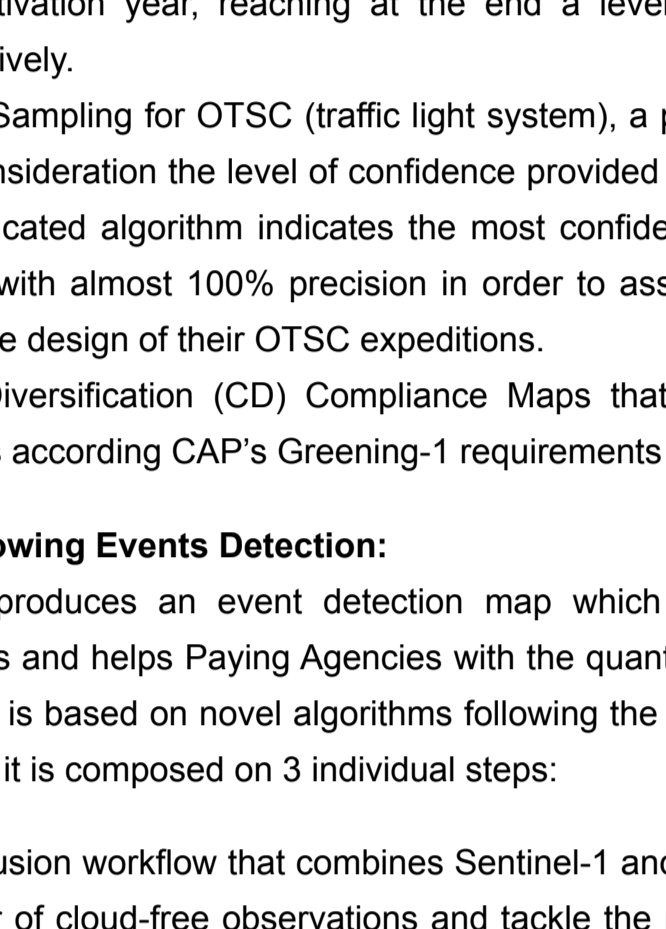
Another piece of good news, **the mobile application is ready to be released!** Get a snapshot of what is coming! Stay tuned!

[Contact us](#)



Welcome new member of the ENVISION Advisory Board

ENVISION Advisory Board comprises leading experts from diverse domains and sectors (e.g., Earth Observation, CAP monitoring, etc.). Advisory Board members will provide their expertise on the needs and problems of stakeholder groups and provide meaningful feedback on ENVISION goals, objectives and outcomes.



Matteo Metta is specialised in CAP and its monitoring and evaluation. Currently, he is undertaking his Ph.D. research on digital agriculture and rural sociology. He works for the think tank ARC2020.eu as CAP policy analyst.

ENVISION first results

An initial version of the ENVISION products has been delivered for the cultivation year of 2022. Roughly 2 TB of Sentinel-1 & Sentinel-2 for Cyprus and Lithuania have been collected and ingested into our DataCube as Analysis Ready data. This is an analytical framework which facilitates the monitoring of agricultural practices and the generalization of the developed processes at national scale in tandem with the substantial minimization of computational cost.

Cultivated Crop Type Maps (CCTM):

Two iterations of Cultivated Crop Type Maps products have been provided for Lithuania (Mid-July and Early September) and Cyprus (Early April and Mid-May) pilot cases. Based on these maps, the following EO derived services are delivered:

- Dynamic Crop Type Classification, a series of classification maps which assists on the identification of cultivated crops and the verification of correct from the farmers declarations. The accuracy of the respective maps is gradually increasing throughout the cultivation year, reaching at the end a level of accuracy of 89% and 70%, respectively.
- Smart Sampling for OTSC (traffic light system), a precision-based routine that takes into consideration the level of confidence provided from the classification maps. This sophisticated algorithm indicates the most confident false declared cases as "High Risky" with almost 100% precision in order to assist Paying Agencies on the most accurate design of their OTSC expeditions.
- Crop Diversification (CD) Compliance Maps that displays the compliance of the farmers according CAP's Greening-1 requirements for Crop Diversification

Grassland Mowing Events Detection:

This service produces an event detection map which showcases the identification of mowing events and helps Paying Agencies with the quantification of grassland activity. The entire process is based on novel algorithms following the state-of-the-art on Deep Learning modelling and it is composed on 3 individual steps:

- Data Fusion workflow that combines Sentinel-1 and Sentinel-2 data to "increase" the number of cloud-free observations and tackle the problem of optical sparsity due to extended cloud coverage.
- Mowing Events Detection Algorithm, a process based on monitoring Sentinel-1 and Sentinel-2 images over time which identifies abrupt changes that consequently can be characterized as potentially mowing events.
- Mowing Compliance checks, taking into consideration the type of grassland and the time instance that a mowing event is detected from the DL model

Analytics on Vegetation and Soil Index Time-series

A series of analytical services consisting of:

- Runoff Risk assessment for the reduction of water pollution in Nitrate Vulnerable Area
- Buffer zones for the proximity to waterways nearby
- Minimum soil cover for Soil Erosion
- Stubble Burning Identification
- Other GIS querying functionalities such as buffer analysis, area calculation etc.

Finally, a new DataCube End Point service has been also developed, on which the users can make requests via FTP for certain parcels providing the parcels' ids, a time range and the name of the desired vegetation index/band via FTP. Currently, the service is being exploited by the CAPO-Cyprus in order to enhance the validation and the decision-making processes.

EV ILVO has been in close collaboration with LV to assess the suitability of the soil organic carbon model, considering the CAP needs for agricultural soil monitoring in Flanders. This evaluation process follows an agile approach, with iteration cycles to provide valuable feedback to the development team and highlight priorities and needs.

The co-development process, after four iterations, has achieved a significant increase in accuracy. However, by using XAI (Explainable AI) techniques, we have identified that the model's accuracy for specific soil types is not reaching the desired minimum levels to allow trusted quantitative comparisons at a parcel level, giving a signal for further enrichment of the training and validation sample set. Additional conclusions mention that there is potential to use SOC maps products as a benchmark and reference to farmers in maintaining SOC contents at an appropriate level and optimizing decisions for sustainable land use. In the following development iteration, the optimization will continue on topics related to the visualization of the results, including the refinement of the business logic, also considering the use of semantic technologies.

ENVISION business cases

The business case of Lithuania

The overall objective for the Common Agricultural Policy (CAP) period 2021-2027 is to move from the process of controlling the agricultural activity compliance with the requirements, to the increase of operational efficiency as well as prevention of irregularities by applying innovative technologies that enable performing the assigned functions in the most efficient way, replacing human and administrative resources by automated processes, creating new and simpler services for farmers.

The Area Monitoring System (AMS) should be in place to achieve the above objective. AMS requires joining the satellite observation data (e.g., from Copernicus) with GIS data originating from territorial Land Parcel Identification Systems (LPIS). One part of AMS, Checks by Monitoring (CBM), which is based on satellite data and photos sent by farmers about the carried out agricultural activities, is in the process of implementation. CBM enables farmers and the public to access data used in the processes of administration and control of the European Union (EU) and national support, thus ensuring overall transparency in decision-making. It allows to use the spatial data for more efficient farm management and, most importantly, for reduction of number of sanctions against real farmers, since they will be immediately notified of any discrepancies, thus getting time for rectification.

The Paying Agencies (PA's) in their approach for launching the CAP AMS on time are currently investigating solutions for Copernicus and commercial satellite data access as well as its processing. The ongoing projects contribute extensively to the implementation of AMS through modernisation of Integrated Administration and Control System (IACS) by making efficient use of digital solutions and e-tools, by creating reliable methodologies and harmonised data sets for monitoring agricultural performance while reducing administrative burden for farmers, PAs and other stakeholders. The objective will be achieved by providing a suite of digital solutions, e-tools and good practices for e-governance.

Taking into account the above, the National Paying Agency was keen to get a tested and validated ENVISION platform for being able to go ahead with an efficient and streamlined monitoring and control process. In the NPA's view, the main advantage of the ENVISION platform is that all monitoring results are in one place and can be easily displayed by selecting and filtering data by year, applicant ID, crop type and algorithm type. Together with additional layers selected by NPA team, ENVISION platform provides a useful tool for the PA's to be able to achieve the set goals on time.

The business case of Belgium

During this period, LV worked closely with EV ILVO. After EV ILVO organised a demonstration session to present the latest results of the SOC data product and show the visualisation of the SOC product on the platform, LV provided feedback on the results of the data product and on the visualisation of the product results. LV and EV ILVO will continue to work together in the coming months to interpret and visualise the results.

Furthermore, LV participated in workshops and demonstration session on other services developed for other BCs to provide input for the platform. LV will continue to provide feedback to create a user-friendly platform.

ENVISION events

18. BIOFEST - INTERNATIONAL ORGANIC FOOD FESTIVAL

A panel discussion on the topic of the digitalization of agriculture was held as part of the 18th BIOFEST, on Wednesday, October 12, 2022 at the Open University in Subotica. The panel's moderator and two participants were Mr Milan Šolaja, director of the Vojvodina ICTV Cluster. The panel broke into two parts: first was about the historical development of the field and the current state of the art, while second part was devoted to the future perspective.

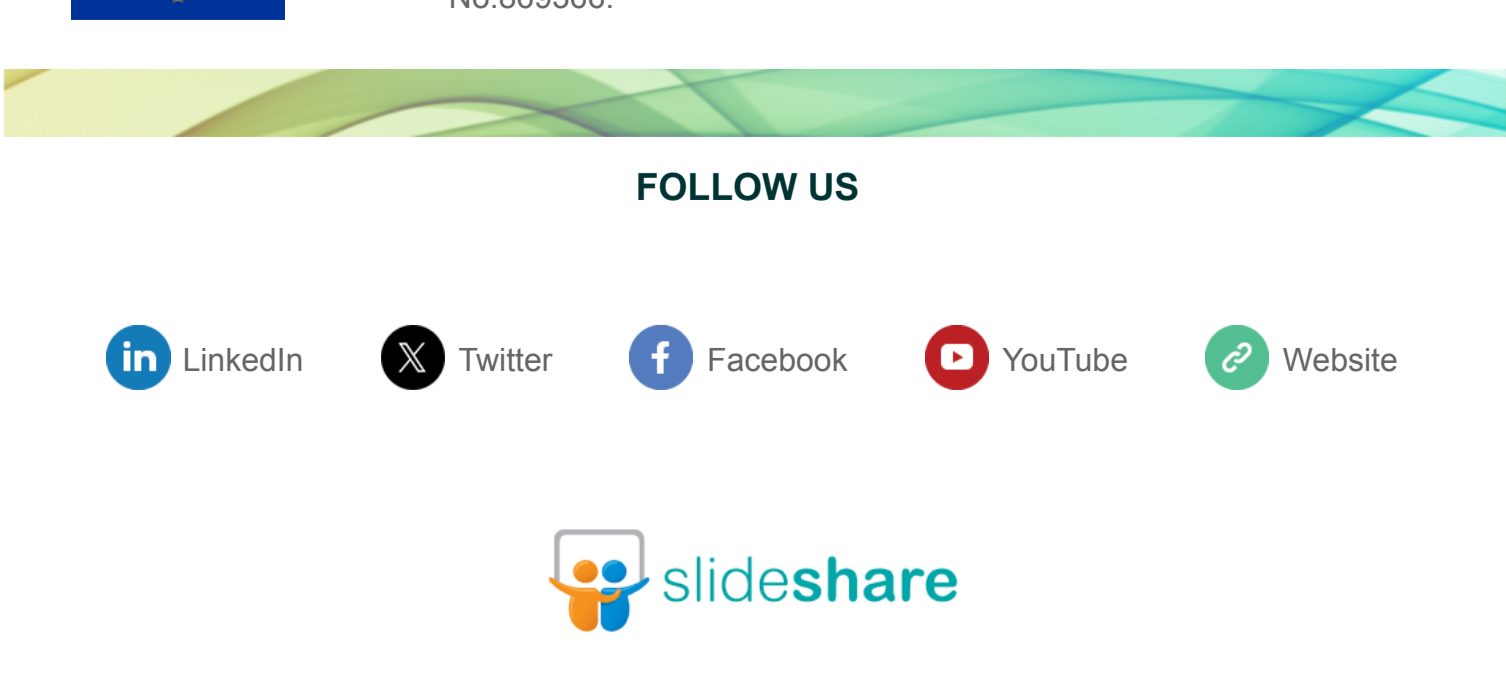


ENVISION services assisting CAP requirements, developed by the National Observatory of Athens - NOA

NOA organized a webinar to reach audiences such as Paying Agencies, Research Institutes, Farmer associations and industry to showcase services that NOA has developed in the framework for ENVISION, such as Grassland mowing events detection, Analytics on Vegetation & Soil Index time-series and DataCube End Point service, as well as Cultivated Crop Type Maps.

The recording and the presentation are available on:

- <https://www.youtube.com/watch?v=PwU-Mr3G-cc&t=1398>
- Grassland mowing events detection, Jason Tsardanidis: <https://www.slideshare.net/EnvisionH2020/grassland-mowing-events-detection>
- Analytics on Vegetation & Soil Index time-series and DataCube End Point service, Thanassis Drivas <https://www.slideshare.net/EnvisionH2020/analytcs-on-vegetation-soil-index-timeseries-and-datacube-end-point-service>
- Cultivated Crop Type Maps, Jason Tsardanidis <https://www.slideshare.net/EnvisionH2020/cultivated-crop-type-maps>



ENVISION project meeting

2nd ENVISION project meeting took place on the 10th and 11th of November in Athens. We reviewed the previous work done so far and discussed the next steps in the following months of the ENVISION project.



ENVISION publications

Maria Ioannidou, Alkiviadis Koukos, Vasileios Sitokonstantinou, Ioannis Papoutsis and Charalampos Kontos.

Assessing the Added Value of Sentinel-1 PolSAR Data for Crop Classification
MDPI Remote Sensing

<https://www.mdpi.com/2072-4292/14/22/5739>

Drivas, T., Sitokonstantinou, V., Tsardanidis, I., Koukos, A., Kontoes, C., Karathanassi, V.

A Data Cube of Big Satellite Image Time-series for Agriculture Monitoring
IEEE 14th Image, Video, and Multidimensional Signal Processing Workshop (IVMSP 2022)

<https://arxiv.org/abs/2205.07752>

Sitokonstantinou, V., Koukos, A., Drivas, T., Kontoes, C., & Karathanassi, V. (2022). **DataCAP: A Satellite Datacube and Crowdsourced Street-Level Images for the Monitoring of the Common Agricultural Policy**
In International Conference on Multimedia Modeling (pp. 473-478). Springer, Cham.

https://link.springer.com/chapter/10.1007/978-3-030-98355-0_41

PROJECT PARTNERS

Organizations from 7 countries (Greece, Lithuania, Belgium, Cyprus, Serbia, United Kingdom and Slovenia) working together in the 3 years of the project duration. Join us on the journey of developing sustainable agriculture through advanced Earth Observation solutions and practices.

TIMELINE

September 2020 – August 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 869366.

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