User Consultation Platform: Agriculture introduction

European Commission

EUSPA
European Union Agency for the Space Programme

UE23
PRESIDENCIA ESPAÑOLA
CONSEJO DE LA UNIÓN EUROPEA

Stefan Schneider

07/11/2023 Sevilla

User Consultation Platform

All EU Space Program components with an integrated market/user driven approach

IRIS² GALILEO EGNOS

Copernicus Europe's eyes on Earth EUSST

Bodies influencing the market → Navigation Signal Providers → Chipset, receiver → Devices → Content & applications → Users

Bodies influencing → Data and services provision → Storage and processing → Content & Applications → Users

8 parallel sessions

Agriculture and Forestry

Environment

Road and Automotive

Rail

Public Transport

Resilient societies

Space

SST

Market & User **Knowledge**

Extended **Market and technology** monitoring and forecasting

Extended and synergic **User Consultation Platform**

Better understanding the **MS needs** and adding Copernicus Other Users satisfaction survey

Demand Support & users

A common **market segments** approach for all EU space downstream

Extended key account with **main players** of the value chain

Offer Creation

Creation of new "made in Europe" products and services.

Large implementation of end-to-end solutions leveraging synergies.

Supporting entrepreneurship, SME and start-sups

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Report on **Agriculture** and Forestry User Needs and Requirements

Applications covered in 2023 edition

Sub-segments	Applications	Types of Application Level of Investigation	
Environmental monitoring	Carbon capture & content assessment	C	○
	Environmental impact monitoring	C	○
Natural resources monitoring	Biomass monitoring	B	◑
	Crop yield forecasting	A	●
	Soil condition monitoring	B	◑
	Vegetation monitoring	C	○
Operations management	Asset monitoring	C	○
	Automatic steering	A	●
	CAP monitoring	B	◑
	Farm machinery guidance	B	◑
	Farm management systems	B	◑
	Field definition	B	◑
	Livestock wearables	B	◑
	Pastureland management	C	○
	Precision irrigation	A	●
	Variable rate application	A	●
Weather services for agriculture	Climate services for agriculture	C	○
	Weather forecasting for agriculture	C	○

Legend ● ● ● ◑ ◑ ◑ ○ ○ ○

EO only application
GNSS only application
Hybrid/synergetic application (combined use of EO and GNSS)

A ● An in-depth investigation

B ◑ A partial specification

C ○ Will be analysed in next versions

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Session Guidelines

Agriculture Session - Guidelines

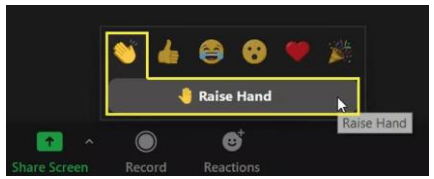
ZOOM rules

- **Raise your hand** for questions (menu bar - "Reactions" button – "Raise Hand") and simultaneously write your question in the chat ("To everyone")
- Wait for one of the sessions' **moderators to give you the floor**. Please note: due to time constraints, only some questions will be selected by the moderators
- Please remind to **mute yourself once finished** the intervention and **lower your hand** ("Lower Hand")
- If you are not a speaker, please **do not share your screen without** moderators' **consent**

Timing rules

- We kindly invite all participants to **respect the timing** indicated in the agenda. Not respecting our time constraints would have major impacts on the overall event
- To this end, we will let **speakers** know when their **interventions** shall be ending
- **Q&A/debate** sessions duration may vary depending on the time available. Please feel free to kick-off and feed the debates as soon as the floor will be open, to take advantage of the time at our disposal
- Reminder
- Please remember to fill in your information on the **list of participants** that is being circulating in the room

How to raise hand:



Thank you for your cooperation!

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Agriculture session - Agenda

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10:00	*Session Agenda presentation*	**Stefan Schneider**, EUSPA
10:10	*EU Space Programme Components current state and future services for users*	**Javier de Blas**, EUSPA
10:25	*Horizon Europe EGNSS Mission and Service related R&D activities and Contribution to Ionospheric Prediction Service*	**Javier Ostolaza**, EUSPA & **Leo Bibollet**, **Hanaa AL BITAR,** TAS
10:35	*Copernicus for Agriculture:*	
	CLMS for Agriculture	**Usue Donezar**, EEA
	C3S/CAMS for Agriculture	**Cristina Ananasso** & **Delphine Deryng** ECMWF
11:05	*Developing requirements from automation to autonomy & discussion*	**Georg Larscheid**, Claas
11:25	*GALIRUMI R&D project – EGNSS based robots for organic farming & discussion*	**Esther López**, Acorde - GALIRUMI H2020
11:45	*The EU SPACE opportunity for small and medium size farmers & discussion*	**Maurizio Laterza**, Planetek
12:05	*EU SPACE role within Regenerative Agriculture & discussion*	**Tamme Van Der Wal**, Aerovision
12:25	*SPACE4GREEN R&D project - EU Space and block chain for traceability and sustainability & discussion*	**Juan Pablo García**, Integrasys
12:50	*Conclusions and next steps*	**Stefan Schneider**, EUSPA
13:00	*Lunch*	

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KEY AREAS

EU Space Programme Components Status and future services for users

European Commission

EUSPA
European Union Agency for the Space Programme

UCP Agriculture

Javier De Blas (EUSPA)

UE23
PRESIDENCIA ESPAÑOLA
CONSEJO DE LA UNIÓN EUROPEA

A new EU Space Programme

EU space activities **under one umbrella**

EGNOS

EGNOS "Makes navigation signals more accurate and trustable for Safety-critical applications"

Operational in **400+ airports** & helipads in 23 countries

Galileo

Global satellite navigation and positioning system (GNSS)

More than **3 billion Galileo receivers** worldwide

Copernicus

Earth Observation (EO) and monitoring based on satellite & non-space data

Nr.1 world provider of space data and information (>20TB/day)

GOVSATCOM

Secure satellite communications for EU governmental actors

Rapid support over crisis areas

Space Situational Awareness (SSA)

Space Surveillance and Tracking (SST)

Space Weather Events (SWE)

Near-Earth Objects (NEO)

Others

Access to Space

Research & Innovation

Entrepreneurship

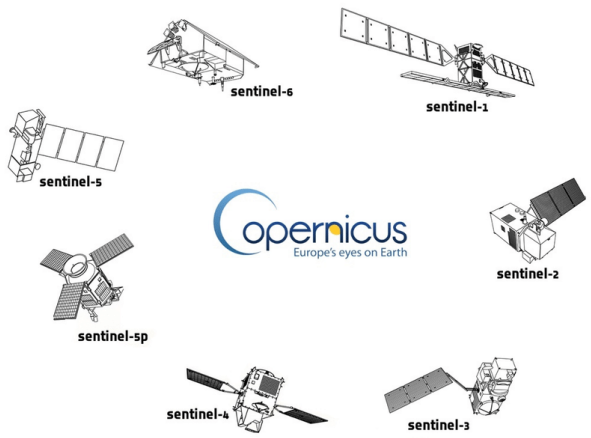
Certification & standardisation

Capacity Building

Copernicus

Copernicus components

SPACE



IN SITU

In Situ

SERVICES

Atmosphere Monitoring

Copernicus Marine Service

Land Monitoring

Climate Change

Security

Emergency Management

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Copernicus services

https://atmosphere.copernicus.eu/

IMPLEMENTED BY ECMWF

https://marine.copernicus.eu/

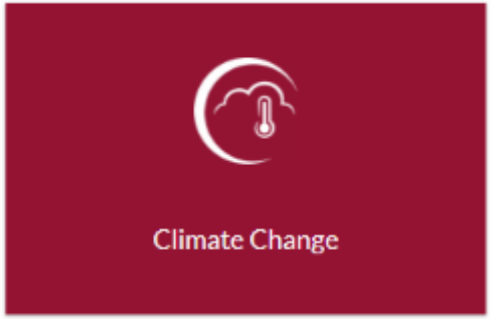
MERCATOR OCEAN INTERNATIONAL

https://land.copernicus.eu/en

European Environment Agency

Joint Research Centre JRC

https://climate.copernicus.eu/



IMPLEMENTED BY ECMWF

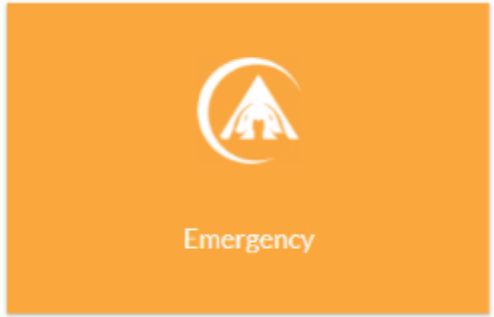
https://www.copernicus.eu/en/copernicus-services/security

SatCen European Union Satellite Centre

FRONTEX EUROPEAN BORDER AND COAST GUARD AGENCY

EMSA European Maritime Safety Agency

https://emergency.copernicus.eu/



Joint Research Centre JRC

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GALILEO and EGNOS

Galileo and EGNOS Services

Climate Change

Galileo Initial Services are provided to worldwide users **since December 2016**

Open Service (OS)	Freely accessible service for positioning and timing*
Public Regulated Service (PRS) – **Governmental Service**	Encrypted service designed for greater robustness and higher availability – secure satellite communication
Search and Rescue Service (SAR)	Locates people in distress and acknowledges that the distress signal has been received
High Accuracy Service (HAS)	Delivers high accuracy services, freely accessible
Under preparation	
Commercial Service Authentication (CS)	Delivers authentication services for commercial applications

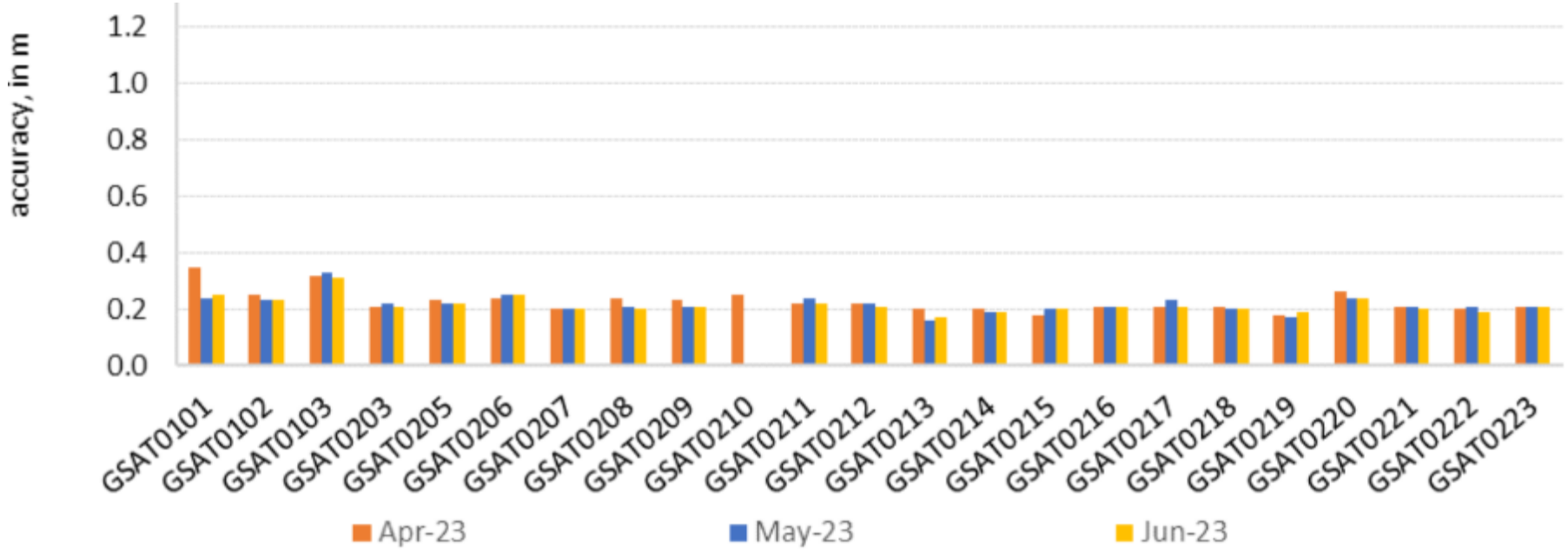
* OS Navigation Message Authentication (OSNMA) is currently under testing

EGNOS services are provided to users since **October 2009**

Open Service (OS)	Improving GNSS accuracy, intended mainly for high-volume satellite navigation applications for use by consumers
Safety of Life Service (SoL)	Providing a high level of integrity for users for whom safety is essential (e.g. civil aviation, in accordance with ICAO standards)
Data Access Service (EDAS)	Offering EGNOS data with greater added value through internet, intended mainly for professional or commercial use

Galileo Open Service

- Galileo entered Initial Operational Capability (IOC) phase in 2016. Since then, anyone with a Galileo-enabled device is able to use its signals providing free of charge outstanding seamless performance worldwide, in terms of ranging, positioning and timing.
- The Open Service ranging performance ranks first among all GNSS service providers.



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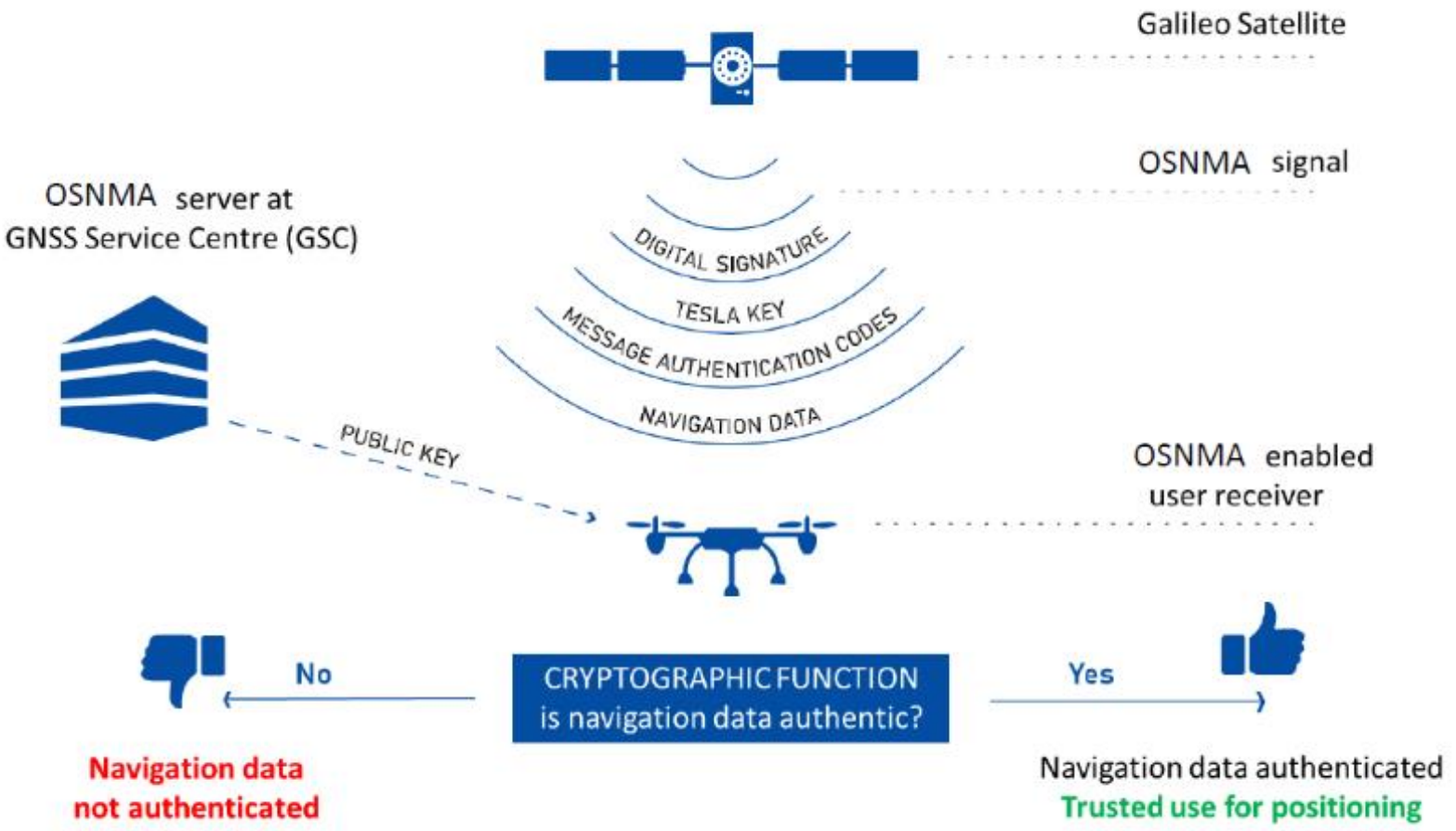
Galileo Open Service

- Galileo OS users can already benefit from an improved navigation message, being broadcast by the Galileo constellation since mid-2023, which considerably boosts their performance in terms of robustness and Time To First Fix (TTFF)

- An update of the Galileo Open Service (OS) Service definition Document (SDD) is planned for the end of this year.
- This fourth issue of the OS SDD will bring to the users:
  - new MPLs (e.g. Ranging rate accuracy, Ranging accuracy at high percentiles)
  - improvements of existing MPLs, such as the timeliness of certain Notice Advisory to Galileo Users (NAGU)
- This updated OS SDD will also introduce the OS Extended Operation Mode, which is characterized by a gradually degrading ranging accuracy with respect to the nominal operational mode, even in case the Galileo Ground Segment is affected by certain issues, thus increasing the robustness of the OS.

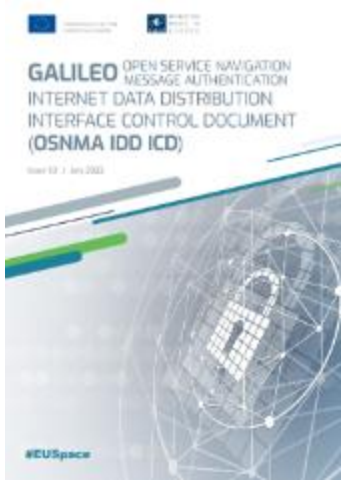
Galileo OSNMA

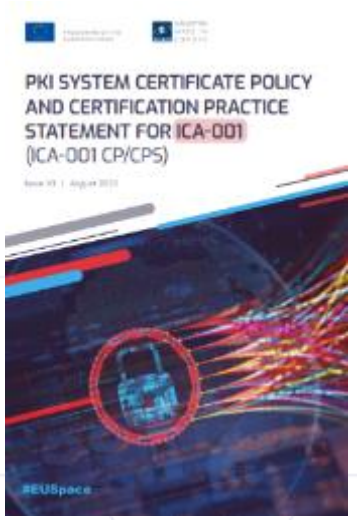
Scope



OSNMA status and roadmap

- OSNMA SiS ICD (final format) and Receiver Guidelines published in Dec'2022
- Transmission of SiS as per OSNMA SiS ICD (final format) since August 2023
- Operational cryptographic data to be published by end 2023
- Initial Service Declaration (Service Definition Document publication and signal switch to 'operational' mode) foreseen by Q1'24





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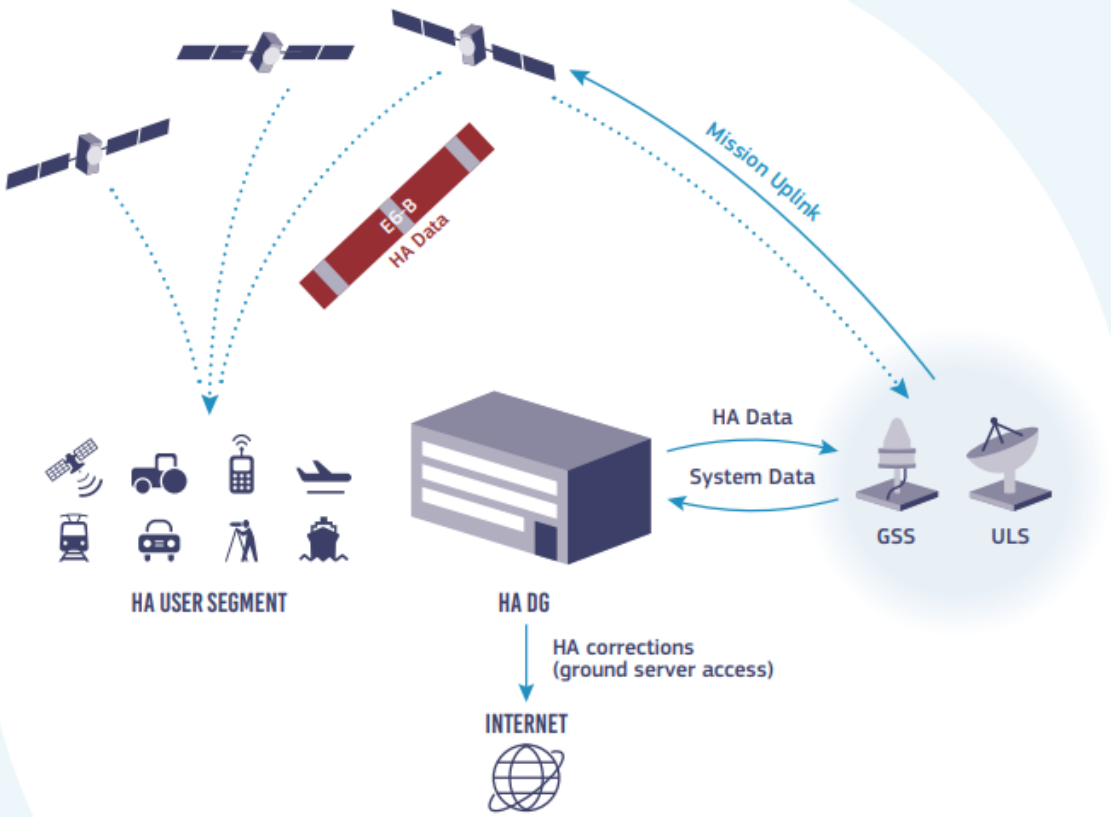
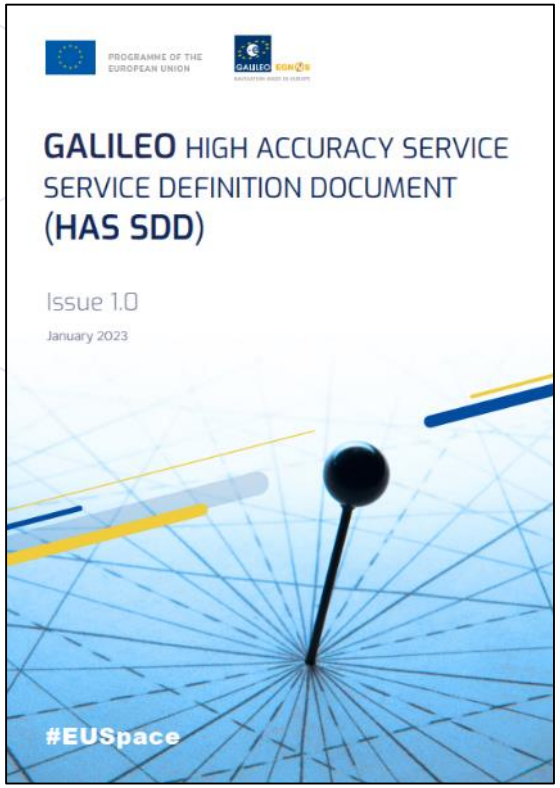
What is the Galileo HAS

- Galileo HAS provides precise corrections for satellite orbit, clock and signal biases
- Galileo HAS corrections distributed via
  - Galileo satellites, E6-B signal (1278.75 MHz)
  - Internet
- Typical accuracy in the decimetre level (after convergence), with Precise Point Positioning (PPP) receivers
- (Almost*) global coverage and free

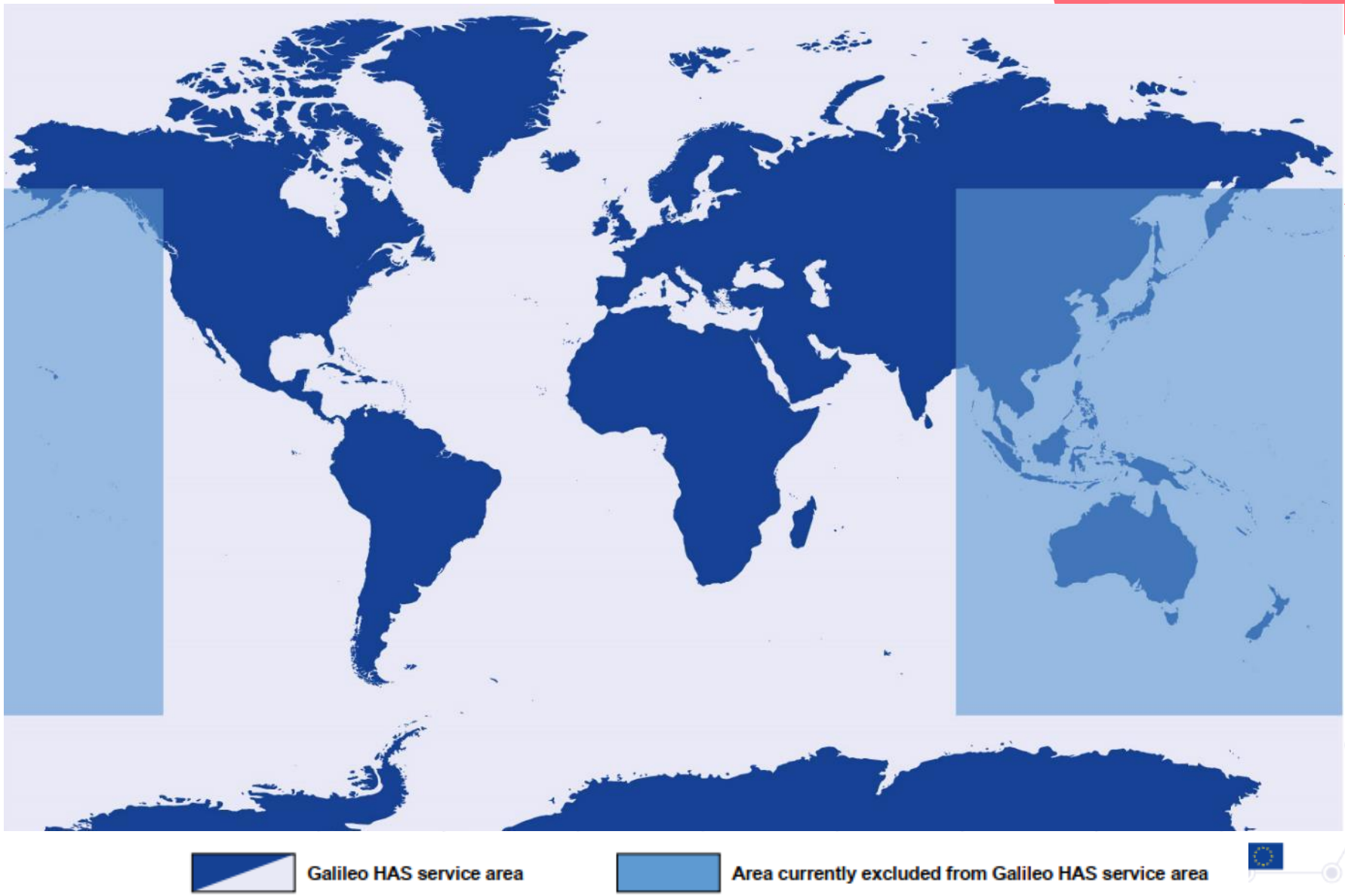


**global coverage of corrections but no global performance commitment yet*

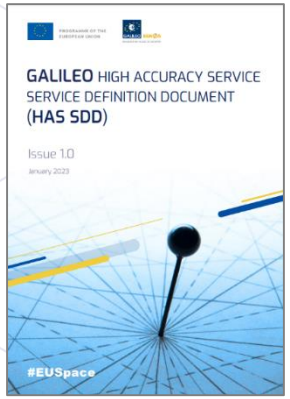
What is HAS – Initial Service Area



European Union Agency for the Space Programme (EUSPA), *HAS SDD [Online]: https://www.gsc-europa.eu/sites/default/files/sites/all/files/Galileo_HAS_SDD.pdf*

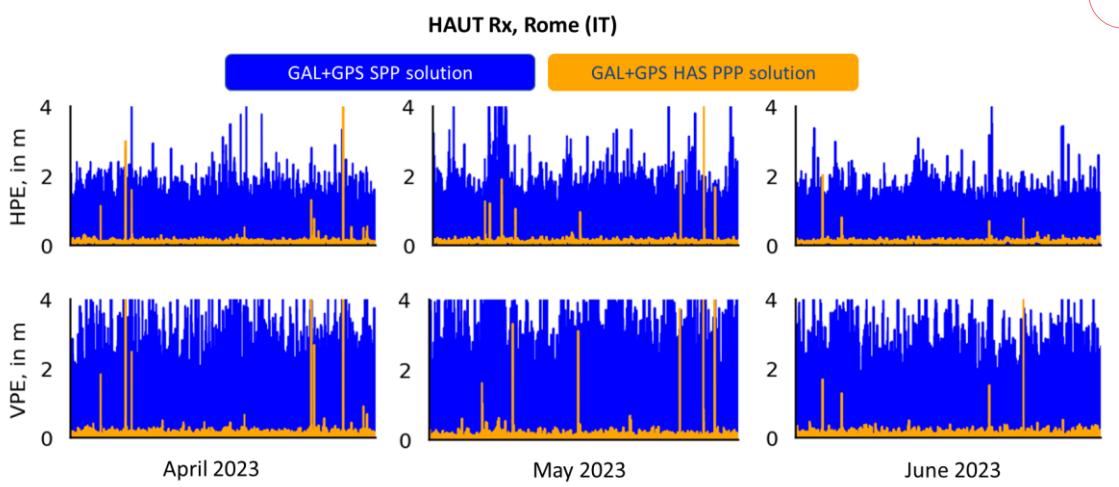


What is HAS - Initial Service Performance



- **Full compliance to HAS SDD MPLs** since HAS service declaration.

HAS MPLs	target	2023 February	March	April	May	June
accuracy of HAS corrections, in m						
orbit						
Galileo	≤ 0.20	■■	■■	■■	■■	■■
GPS	≤ 0.33	■■	■■	■■	■■	■■
clock						
Galileo	≤ 0.12	■■	■■	■■	■■	■■
GPS	≤ 0.15	■■	■■	■■	■■	■■
code bias						
Galileo	≤ 0.50	■■	■■	■■	■■	■■
GPS	≤ 0.50	■■	■■	■■	■■	■■
availability of HAS corrections, in %						
Galileo only (≥ 5 corrected satellites)	≥ 87	■■	■■	■■	■■	■■
Galileo and GPS (≥ 8 corrected satellites)	≥ 95	■■	■■	■■	■■	■■
service coverage, in %						
availability of corrections	100	■■	■■	■■	■■	■■
■■	SiS Dissemination | IDD Dissemination					

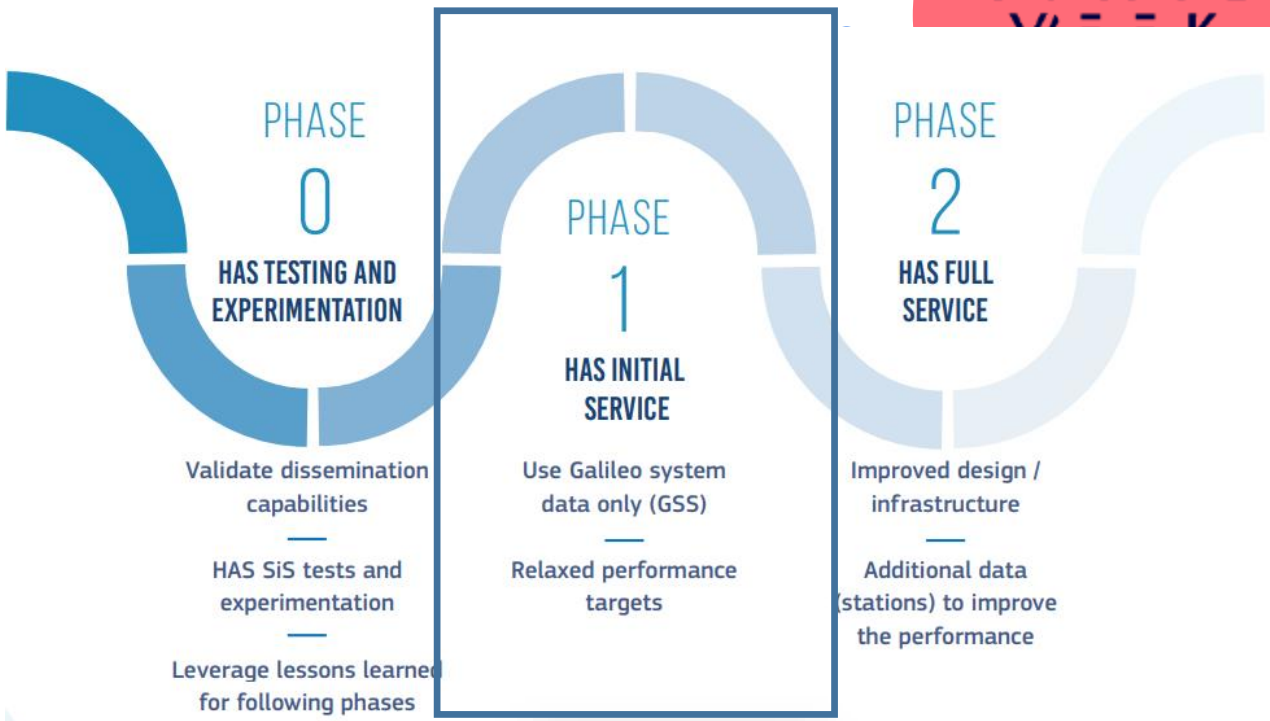


- **HAS Quarterly Performance Reports** regularly published at the GSC website (https://www.gsc-europa.eu/electronic-library/performance-reports/galileo-high-accuracy-service-has)

Galileo HAS
What comes next?

- **Short-term: use it!**
  - User segment development
    - More HAS-enabled receivers
    - HAS R&D actions
    - HAS Reference Algorithm publication
  - HAS based applications development

- **Mid / long-term: HAS Full Service**
  - Increased global performance (e.g. better accuracy)
  - Faster positioning in EU (atmospheric corrections)
  - HAS authentication and error characterization



https://www.gsc-europa.eu/electronic-library/programme-reference-documents

EGNOS Services

EGNOS services are provided to users since October 2009

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EGNOS services foreseen evolution

Primary means of navigation for Aviation in 2030

- Performance Based Navigation (PBN)
- Better availability (99.9%), more resilience, EU autonomy (with Galileo)
- New Airspace users (helicopters, small aerodromes, drones, …)

Maritime

- Initial service in 2023 for maritime and in-land navigation
- Towards autonomous vessels navigation and zero-emissions shipping
- Not only EGNOS: end to end solutions using HAS/OSNMA and Copernicus

Rail

- Making ERTMS accessible on all lines
- R&I substantial investment to prepare railway operators and signalling industry
- A new service under preparation, facing the challenge of Rail safety standards

Secure Satcom

IRIS²

Infrastructure for Resilience, Interconnectivity and Security by Satellite

Regulation 2023/588 in force since 20 March 2023

Signature of the Regulation by EP President and Swedish Presidency

REGULATIONS

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Space Surveillance and Tracking (SST)

Space Surveillance and Tracking (SST) Front Desk

- EUSPA manages and operates the **EU Space Surveillance and Tracking (SST) Front Desk**
- The Agency cooperates with the **SST Partnership** to provide **space safety services**:
  - **Collision Avoidance (CA):** risk assessment of collision between spacecraft or between spacecraft and space debris
  - **Re-entry Analysis (RE):** risk assessment of uncontrolled re-entry of artificial space objects into the Earth's atmosphere
  - **Fragmentation Analysis (FG):** detection and characterization of in-orbit fragmentations, break-ups or collisions

Space Surveillance and Tracking (SST) Front Desk

Users

200 ORGS

402 Satellites

- Services and Coordination Platform
  portal.eusst.eu
- Performance Reporting

- SST Helpdesk
  sst.helpdesk@euspa.europa.eu
- SST Taskforce

- User Consultation Platform
  7th Nov 2023 afternoon
- Communication

Agriculture session - Agenda

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KEY AREAS

Horizon Europe EGNSS Mission and Service related R&D activities + Contribution to Ionospheric Prediction Service

Leo BIBOLLET, Hanaa AL BITAR (TAS-F)

Javier OSTOLAZA (EUSPA)

European Commission

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Horizon Europe EGNSS Mission and Service related R&D activities

- In 2022, European Commission entrusted EUSPA with technical supervision of 2 non-delegated projects under Horizon Europe EGNSS Upstream 'Mission and Service (MAS)':
  - Applied R&D on EGNSS Authentication → E-GIANTS
  - EGNSS Additional dissemination means → IDEEAS

E-GIANTS

European GNSS Improved Authentication Solutions

EU SPACE WEEK 2023

- T0 (signature of the contract): 05/05/2023
- Duration 18 months
- Budget 720 k€

❑ **Objective:** to assess potential EGNSS authentication solutions that exploit the synergies between EGNOS and Galileo

Focus on:

- Improving the **performance and security** of the authentication services provided by EGNSS
- Supporting the definition of optimal **authentication solutions for EGNSS**, measure the **level of protection** achieved and the **impact** on the EGNSS service for non-aviation users

Thales Alenia Space
- Prime contractor of the project
- In charge of the coordination of the consortium at management and technical level
- Leads the SBAS and OSNMA key management study (WP1) and the SBAS Authentication for non-avation users (WP3)

Thales Services Numeriques
- Leads the additionnal disseminationand improvements to OSNMA work package (WP2)
- Particuratly in charge of the design of the OSNMA improved service, the Proof-Of-Concept and the roadmap

Thales SIX GTS
- Expertise in key management and security analysis
- Supports the SBAS and OSNMA key management study (WP1) and the SBAS Authentication for non-avation users (WP3)

Valdani Vicari & Associati
- Leads the user requirement assesments for all the work packages of the project

FDC
- Evaluates the impact of the proposed improved EGNSS authentication solutions at receiver level, assessing the induced cost and complexity

ESSP
- Expertise of EGNOS service provision
- Support for the consolidation of the SBAS key management and authentication provision scheme

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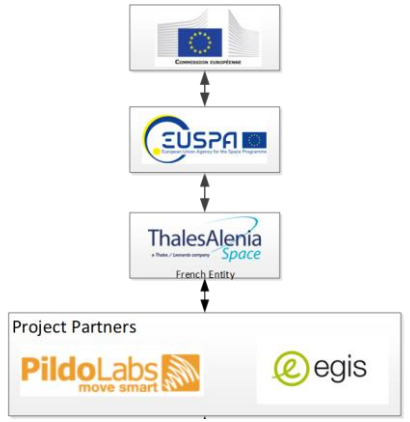
IDEEAS

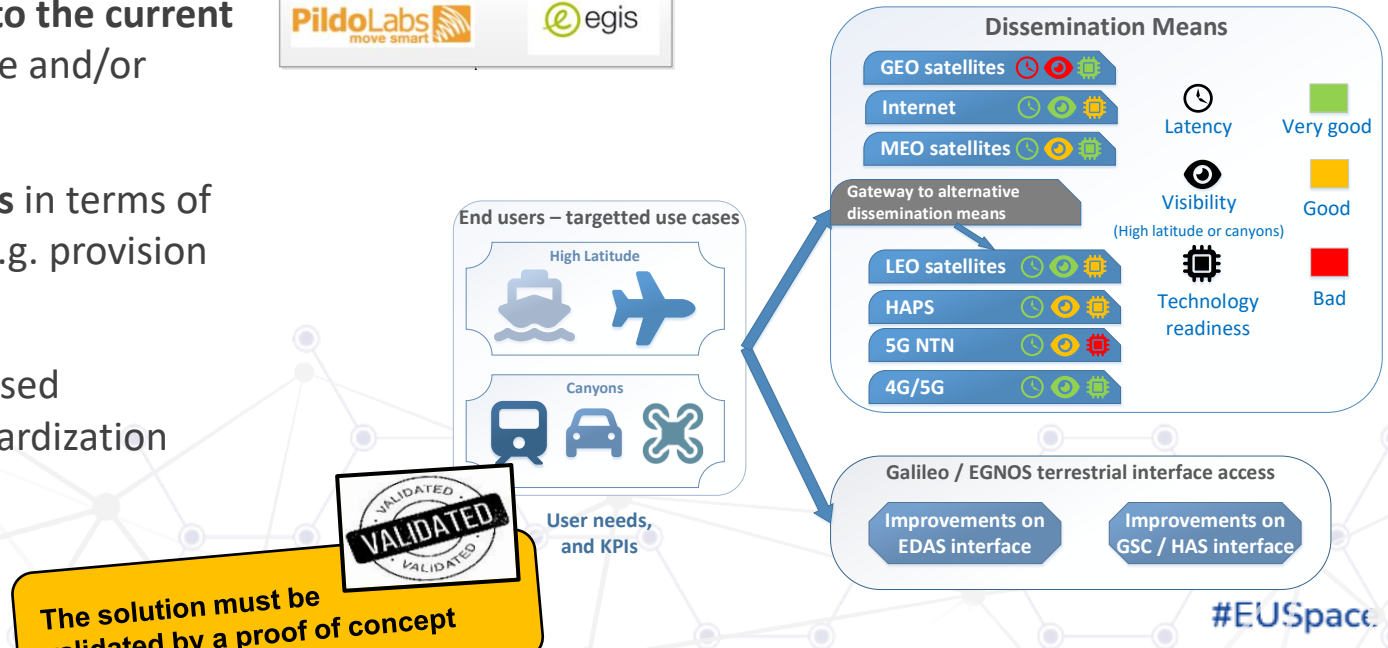
INNOVATIVE DISSEMINATION MEANS AS ENABLERS FOR EGNSS AUGMENTATION SERVICES

- T0 (signature of the contract): 14/03/2023
- Duration 18 months
- Budget 620 k€

❑ **Scope**:

- analyze and define the **cost-effective potential data delivery means complementary / alternative to the current EGNOS and Galileo HAS ones** either from space and/or from ground/air
- **improve the current dissemination capabilities** in terms of potential users and enhanced commitments (e.g. provision of integrity through EDAS)
- propose a meaningful timeframe for the proposed dissemination mean, taking into account standardization and user terminal activities
- perform a **proof of concept of the service**





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The results of both projects (e.g. user needs, concepts proposed, costs and benefits, implementation roadmaps) shall be validated by a representative set of stakeholders across different sectors.

To participate or if you have any question, please feel free to contact us:

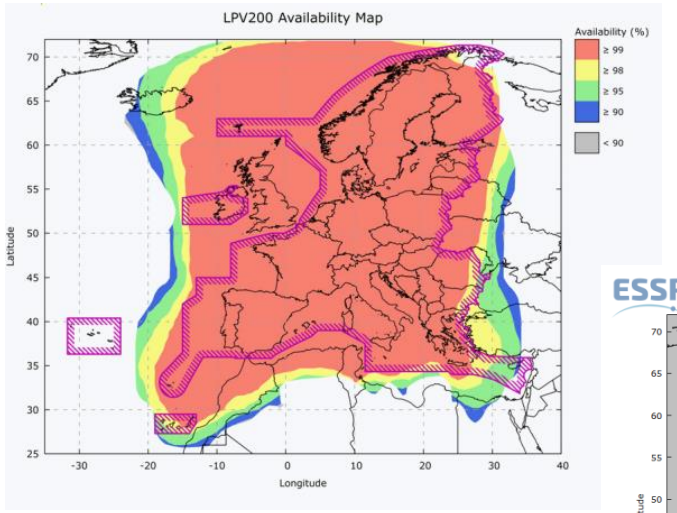
Contacts	E-GIANTS	IDEEAS
TAS	Leo.Bibollet@thalesaleniaspace.com	Hanaa.AlBitar@thalesaleniaspace.com
EUSPA	javier.OSTOLAZA@euspa.europa.eu	javier.OSTOLAZA@euspa.europa.eu

Contribution to Ionospheric Prediction

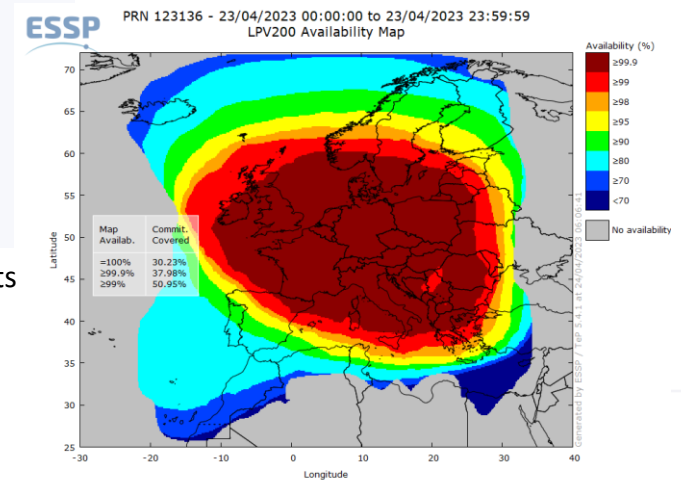
YES

https://www.discover-the-world.com/

BUT



EGNOS SoL SDD commitments



EGNOS SoL real performance

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Contribution to Ionospheric Prediction

Next steps 

- Assess main contributors to space weather impact on EGNSS (EGNOS and Galileo)
- Assess feasibility of predictions/forecast
- Assess impact on user operations
- Assess how to inform users on potential EGNSS underperformance
- Define an operational service concept

To participate or if you have any question, please feel free to contact us:

javier.OSTOLAZA@euspa.europa.eu

Agriculture session - Agenda

10:00	*Session Agenda presentation*	**Stefan Schneider**, EUSPA
10:10	*EU Space Programme Components current state and future services for users*	**Javier de Blas**, EUSPA
10:25	*Horizon Europe EGNSS Mission and Service related R&D activities and Contribution to Ionospheric Prediction Service*	**Javier Ostolaza**, EUSPA & **Leo Bibollet**, **Hanaa AL BITAR,** TAS
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KEY AREAS

Copernicus for agriculture - products

European Commission

EUSPA
European Union Agency for the Space Programme

UE23
PRESIDENCIA ESPAÑOLA
CONSEJO DE LA UNIÓN EUROPEA

UCP Agriculture

Usue Donezar Hoyos, European Environment Agency

Copernicus Land Monitoring Service

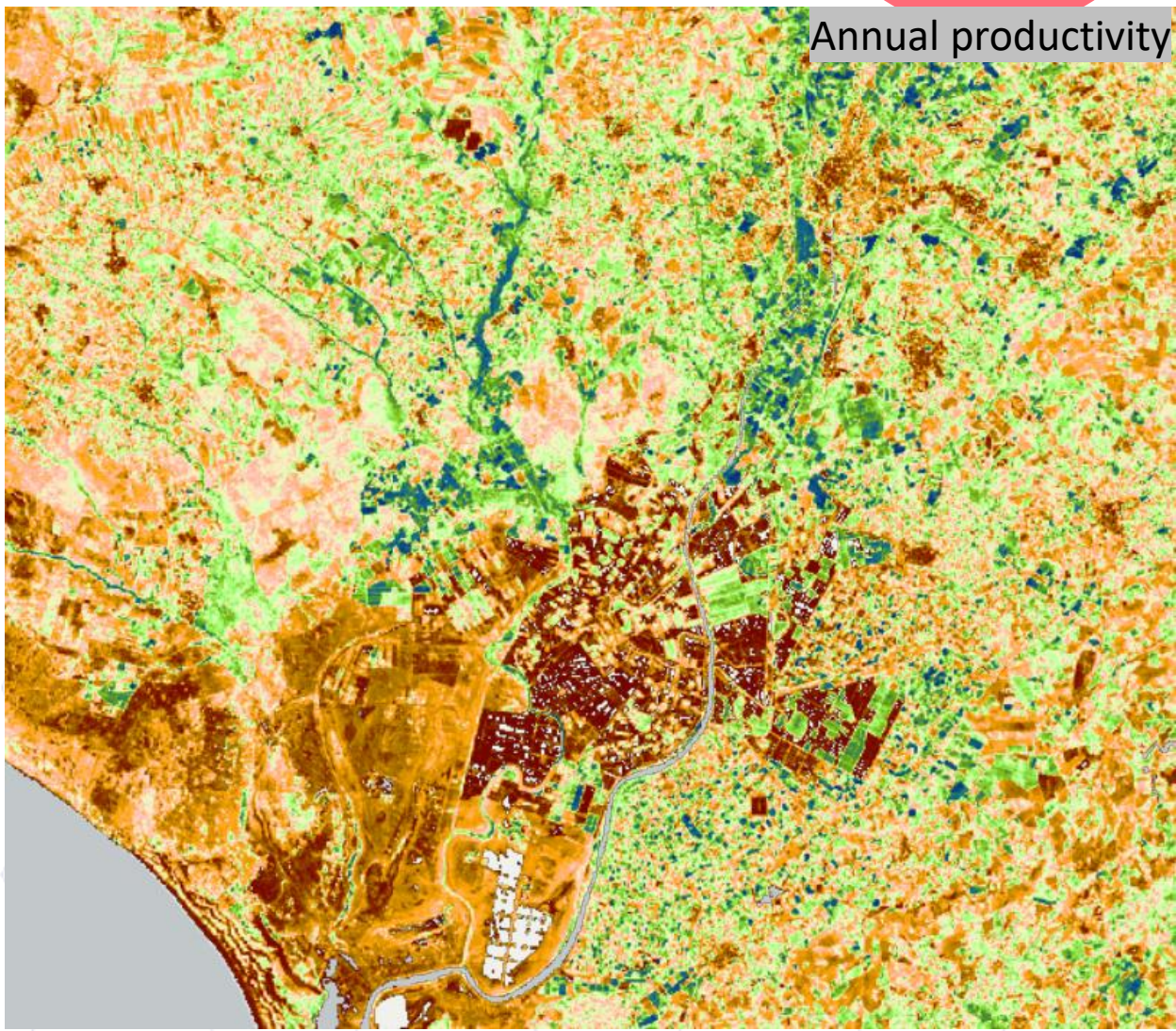
- **Geographical** information on **land cover and its changes, land use, vegetation** state, **water cycle** and Earth's **surface energy variables** on European and global levels for environmental applications
- **Harmonized** and **consistent** in time and space
- Products and manuals are free and open
- Implemented by JRC and EEA
- Website: https://land.copernicus.eu/

- Land cover and land use mapping
- Priority area monitoring
- Bio-geophysical parameters
- Ground motion monitoring
- Satellite data
- Reference and validation data

HR Vegetation Parameters

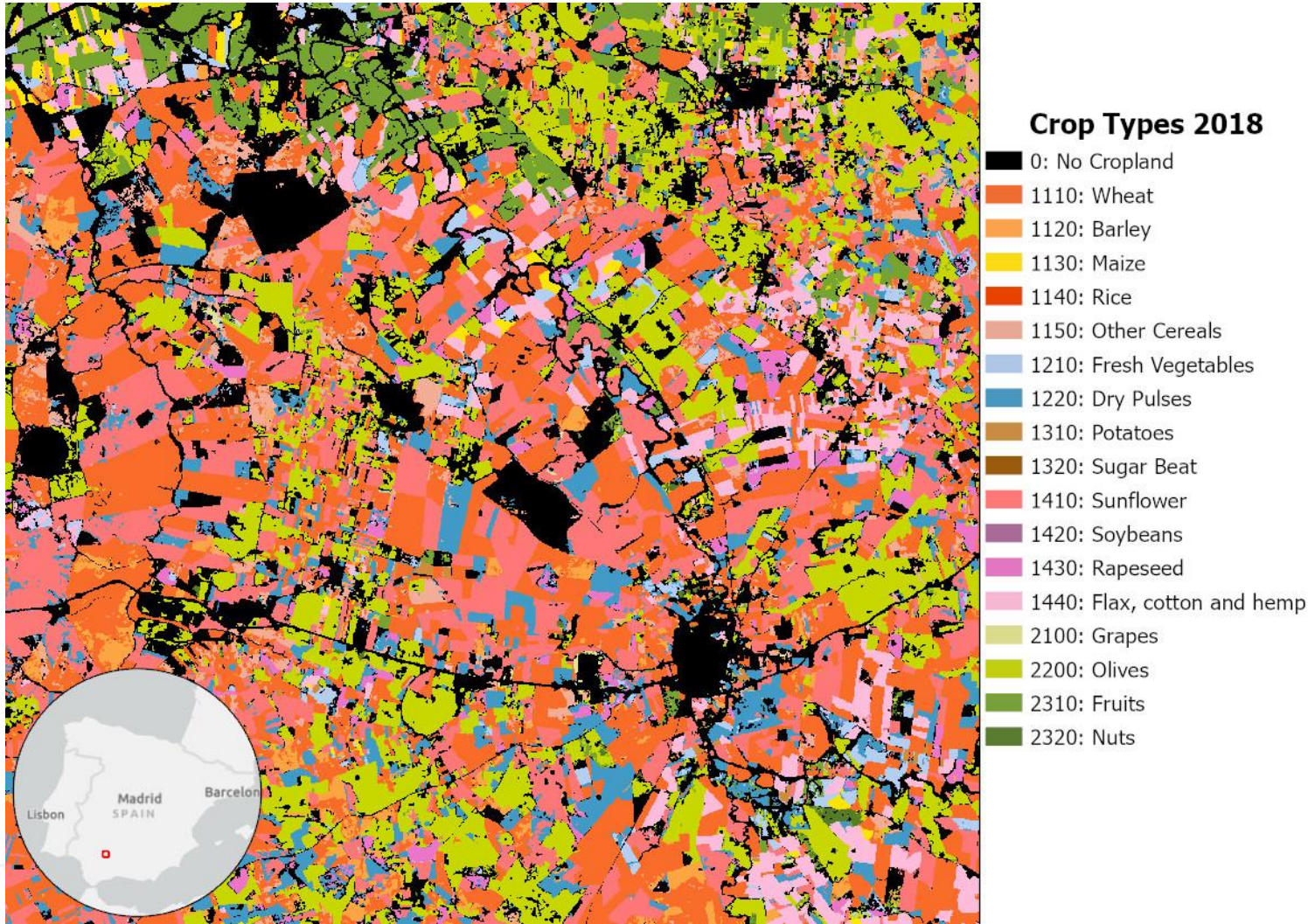
- Spatial resolution: 10 m, no MMU
- Update frequency: Daily/10-daily/Yearly
- Most recent reference layer: 2022/2023
- Examples of applications:
  - Mapping peatlands and modelling their CO_2 emissions
  - Assessing and adapting to drought impact
  - Biodiversity conservation

Upcoming webinar series: https://land.copernicus.eu/en/events/high-resolution-phenology-and-productivity-for-drought-impact-assessments



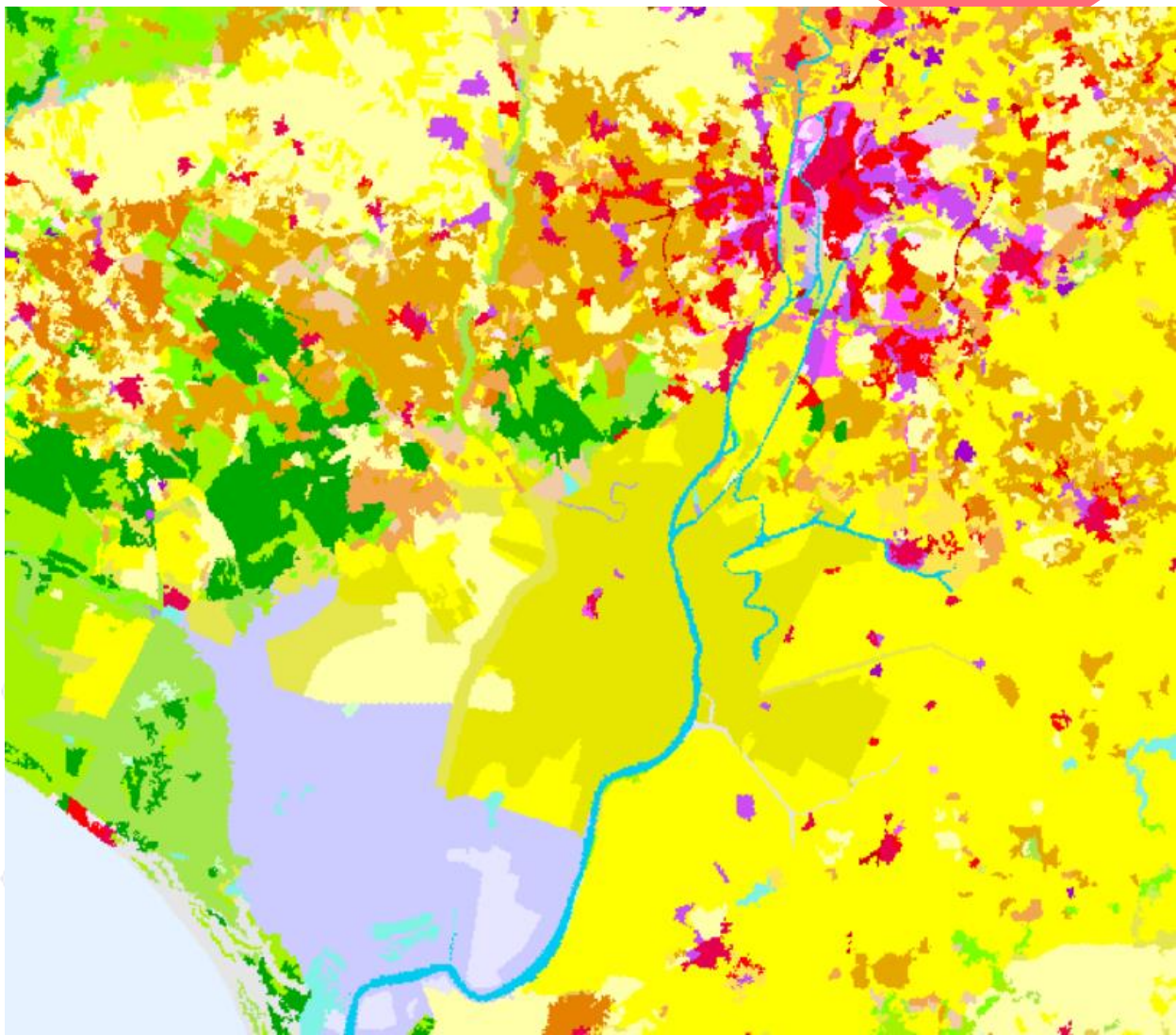
HRL Vegetated Land Cover Characteristics

- Spatial resolution: 10 meter
- Update frequency: Annual
- Most recent reference layer: 2021
- Examples of applications:
  - CAP
  - LULUCF



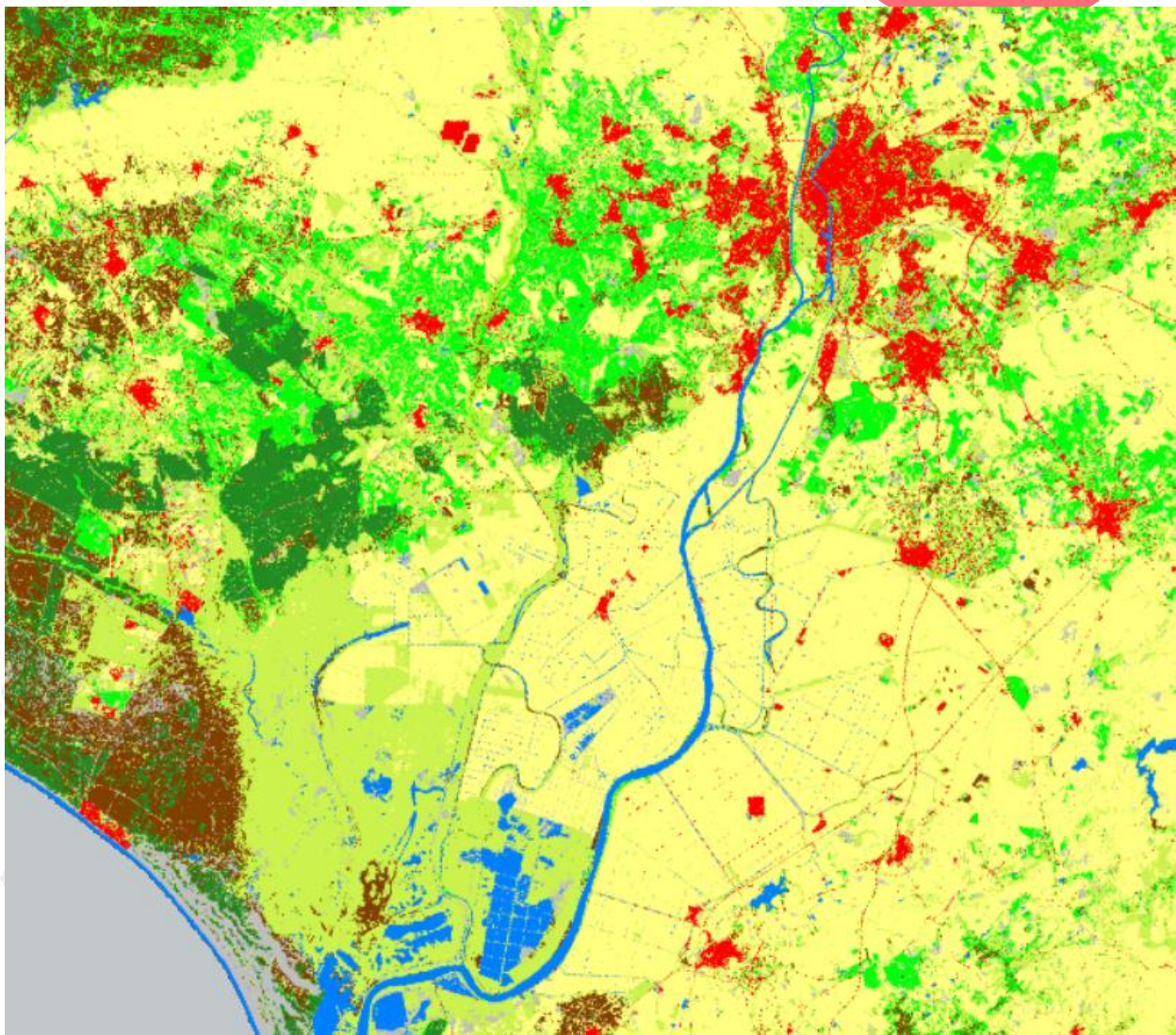
Corine Land Cover

- Spatial resolution: 25/5 ha MMU
- Update frequency: 6 years
- Most recent reference layer: 2018
- Examples of applications:
  - Habitat mapping
  - Impact assessment



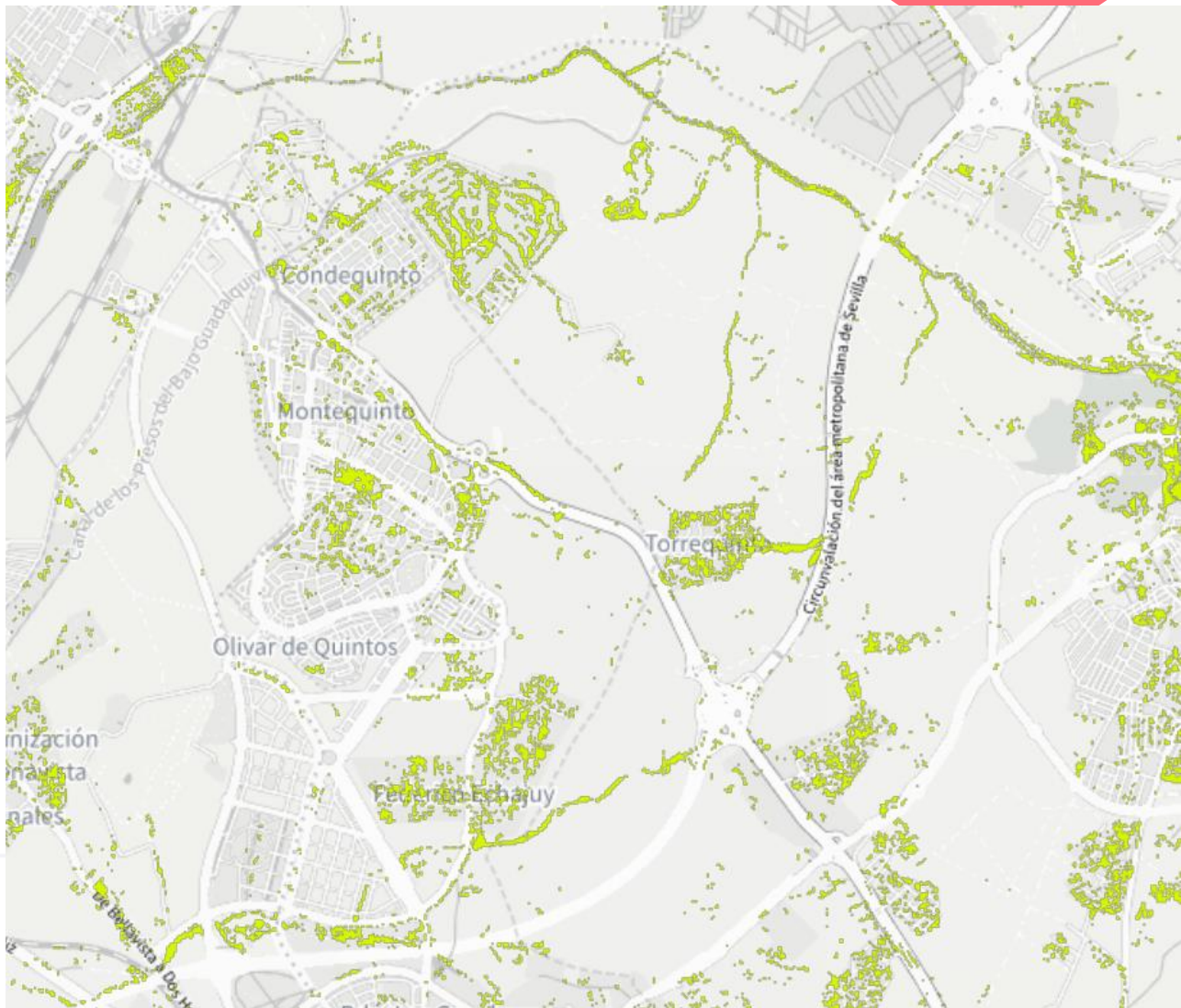
Corine Land Cover+ Backbone

- Spatial resolution: 10 m, pixel based
- Update frequency: 3 (soon 2) years
- Most recent reference layer: 2018
- Examples of applications:
  - Land cover classification
  - Impact assessment



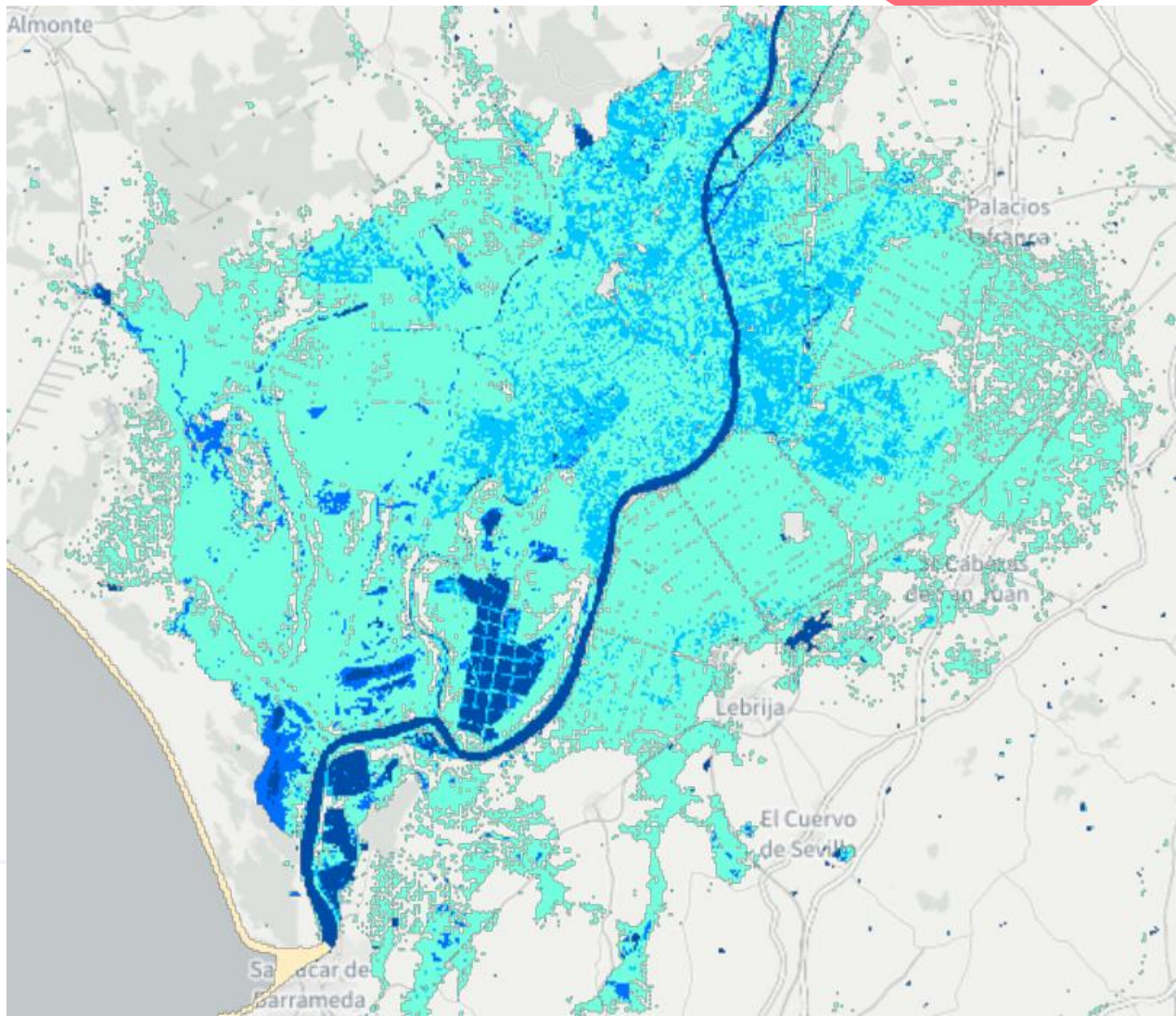
HRL Small Woody Features

- Spatial resolution: 5/100 m, vector layer
- Update frequency: 3 years
- Most recent reference layer: 2018
- Examples of applications:
  - CAP monitoring of Good Agro Ecological Conditions
  - Urban Greening



HR Water, Snow, Ice

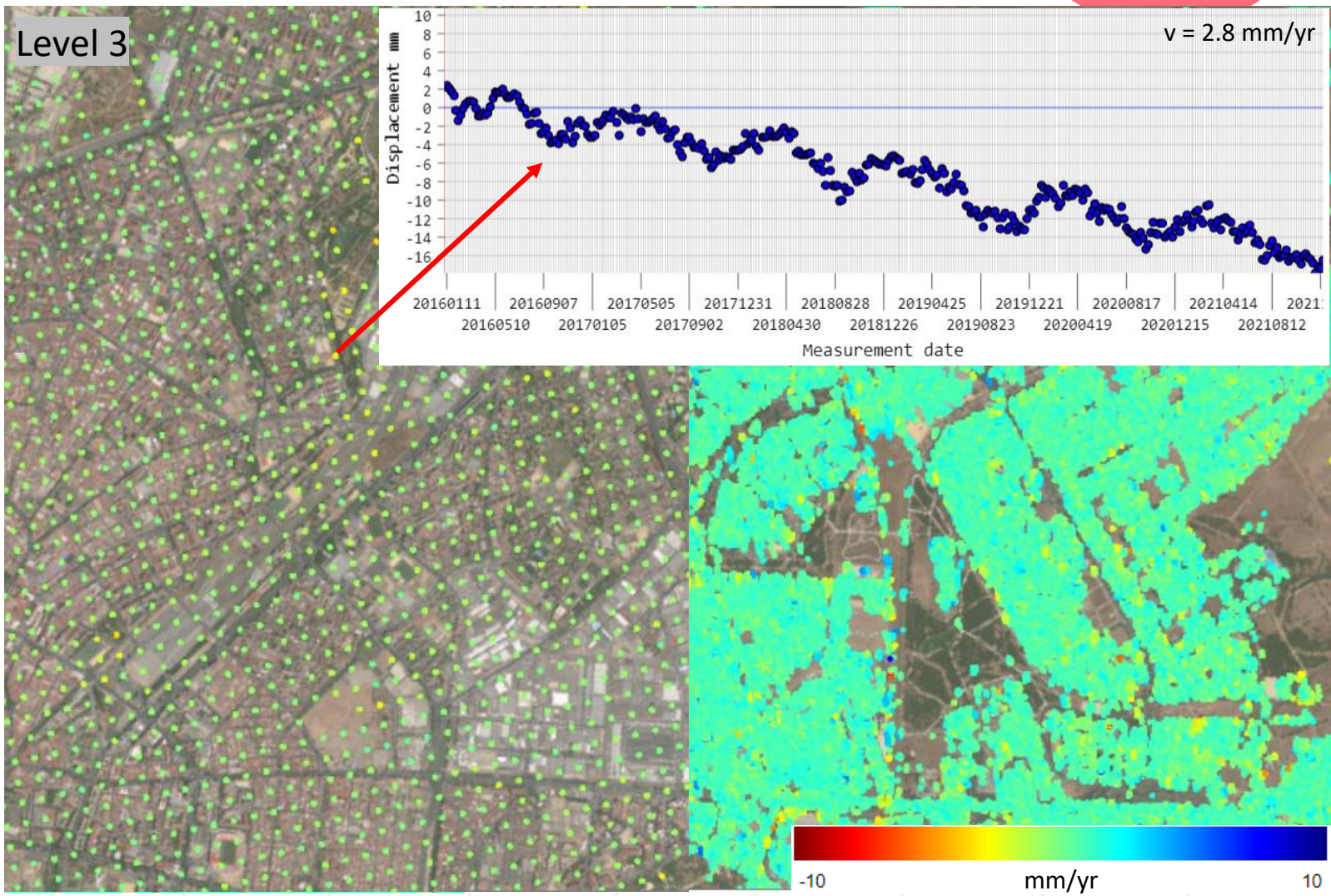
- Spatial resolution: 10m, pixel based, no MMU
- Update frequency: 3 years, moving to NRT starting on 2017
- Most recent reference layer: 2018
- Full integration of Snow and Ice and former HRL Water and Wetness
- Examples of applications:
  - Water reservoirs,
  - Drought monitoring,
  - Flood assessment



European Ground Motion Service

- Spatial resolution: 5x20/ 100x100 m
- Update frequency: Yearly, with time series
- Most recent reference layer: 2015 – 2022
- Example of applications:
  - Monitoring evolution → asset management and impact assessment

Webinar: https://land.copernicus.eu/en/products/european-ground-motion-service?tab=user_outreach



Thank you!

Usue.Donezar@eea.Europa.eu
https://land.copernicus.eu/

Copernicus Climate Change Service For Agriculture

Cristina Ananasso

Delphine Deryng (on line)

European Centre for Medium Range Weather Forecasts

European Commission

EUSPA
European Union Agency for the Space Programme

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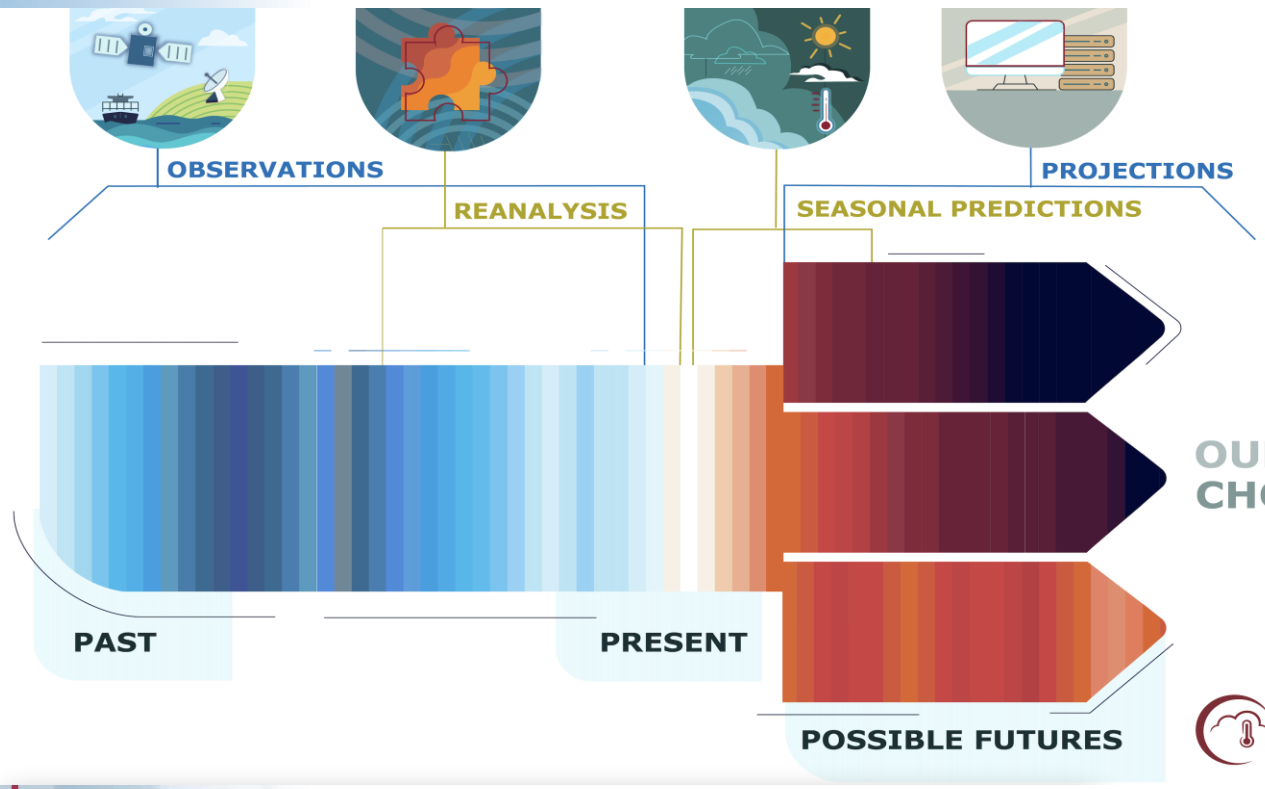
… all climate data you had always dreamed of and never dared asking

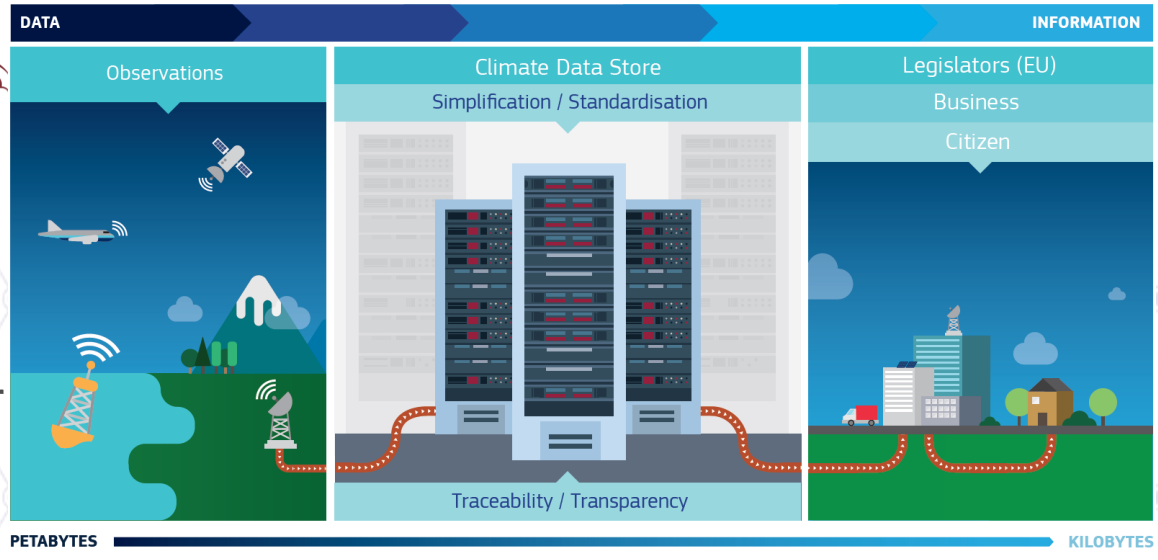


climate.copernicus.eu
cds.climate.copernicus.eu

Operational (not research)
Unrestricted **OPEN AND FREE**

Typical download: ~100 TB /day

Typical number of requests: 500k/day



- Regional climate datasets
- Sectoral datasets (energy, water, agriculture, extremes,..)
- Open source applications running on a cloud platfor and able to generate tailored indicators on the fly

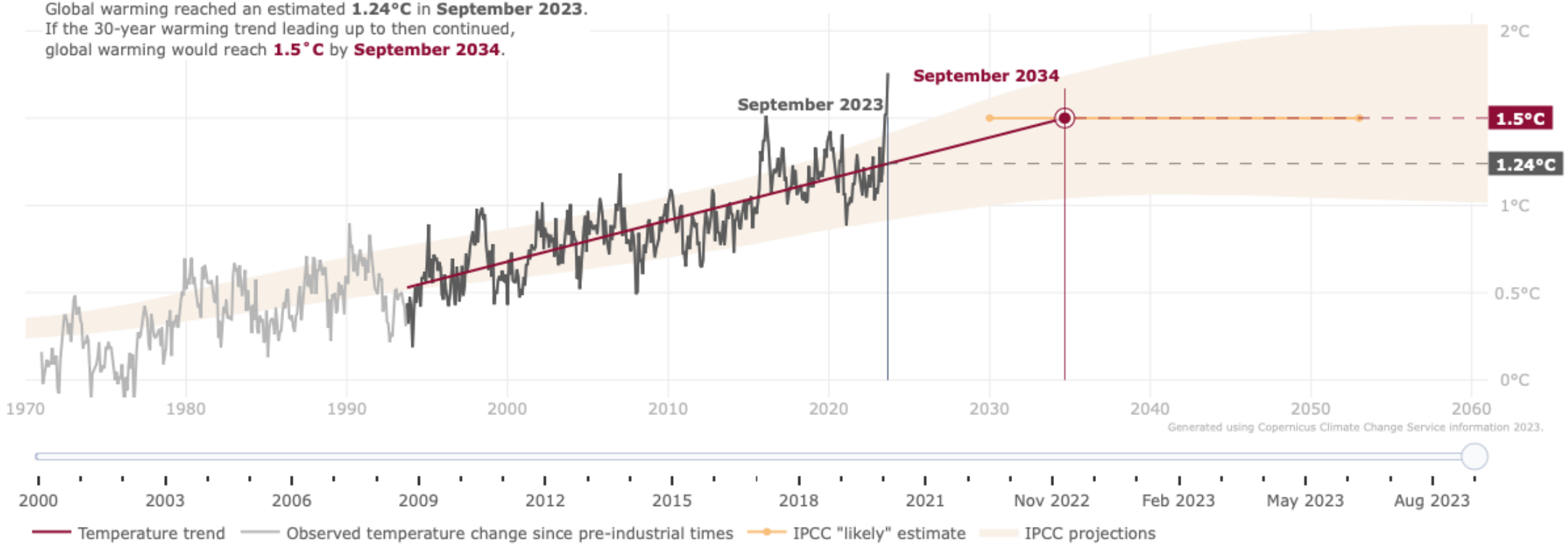
Climate Change

Trends in global mean temperatures

EU SPACE WEEK 2023

Warming trend

Global warming reached an estimated **1.24°C** in **September 2023**.
If the 30-year warming trend leading up to then continued, global warming would reach **1.5°C** by **September 2034**.



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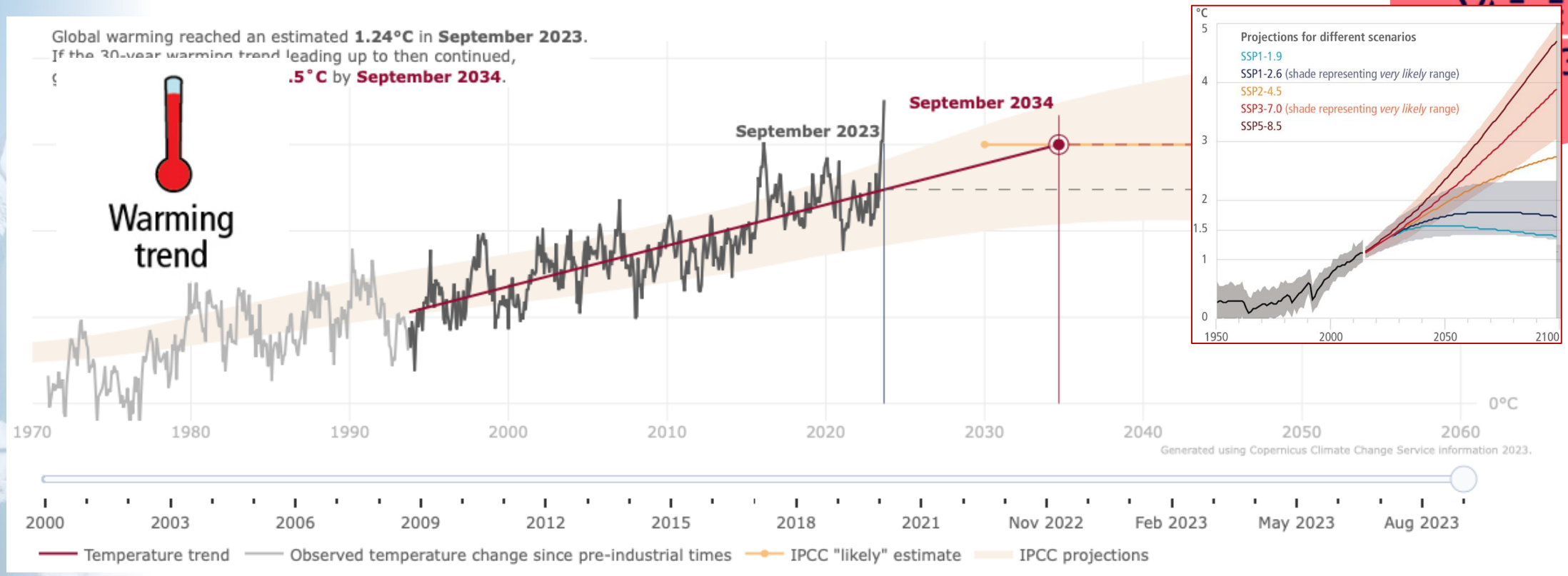
Climate Change

Trends in global mean temperatures



Climate-related drivers of impacts on crops

- Warming trend
- Extreme temperature
- Drying trend
- Extreme precipitation
- Carbon dioxide fertilization
- Frost

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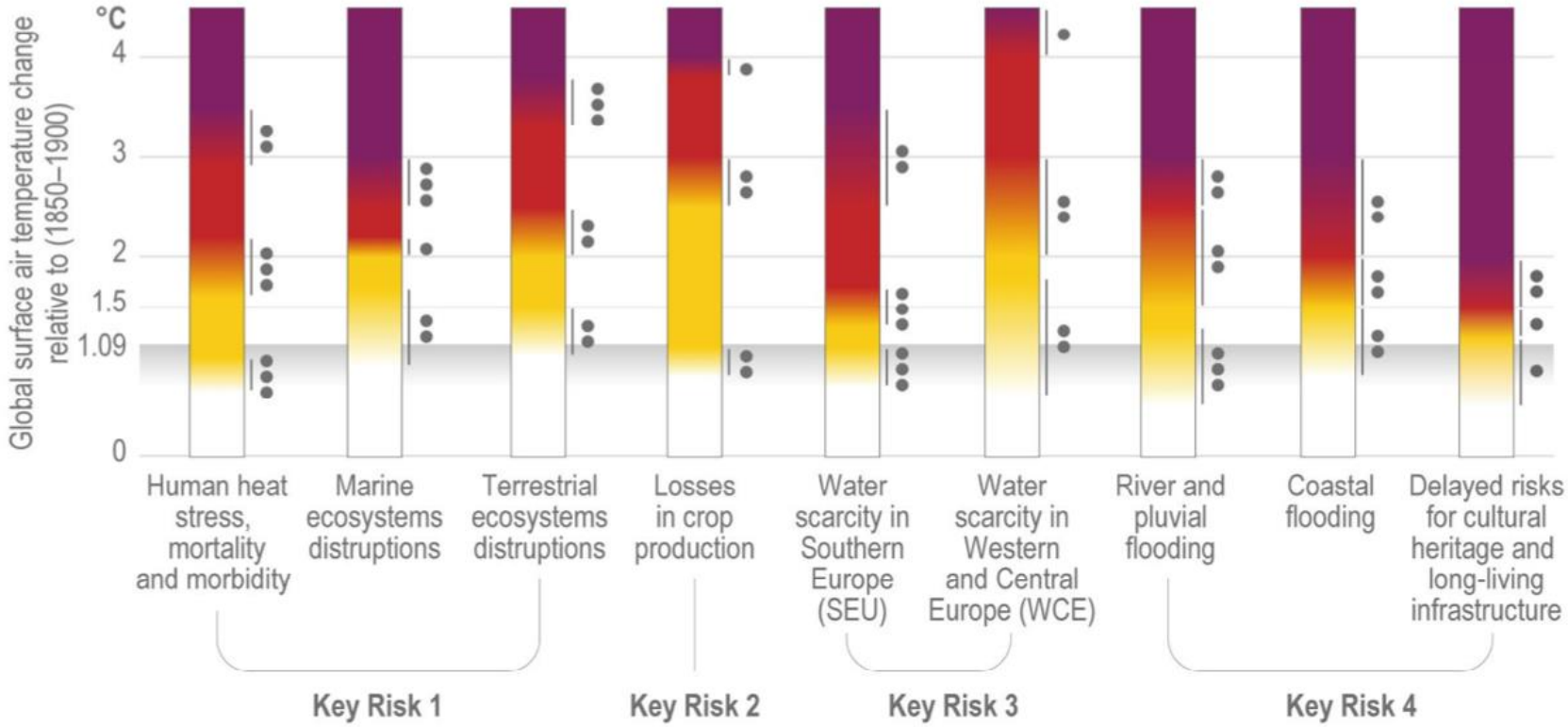
Climate Change

Climate change risks on European agriculture

EU SPACE WEEK 2023

Key risks for Europe under low to medium adaptation



Level of risk

- Very high
- High
- Moderate
- Undetectable

Confidence

Low → High

The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change. Confidence is provided for the change of risk level at given temperature ranges.

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Climate Change

Climate change risks on European agriculture

EU SPACE WEEK 2023

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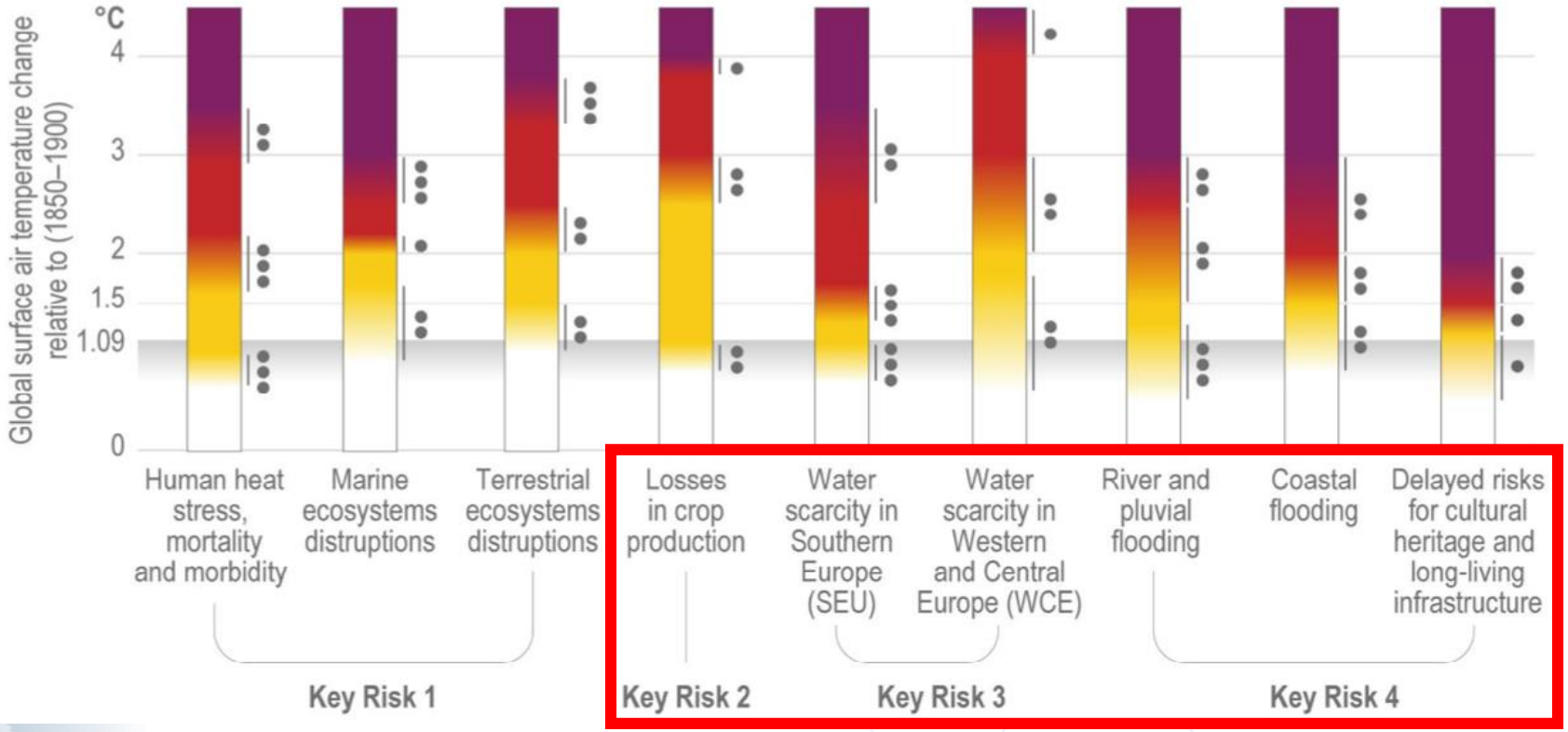

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- Undetectable

Confidence

Low → High

The ember colour gradient indicates the level of additional risk to society and ecosystems as a function of global temperature change. Confidence is provided for the change of risk level at given temperature ranges.

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Climate Change

Indirect drivers of climate change impacts on agriculture

- Pests, diseases
- Land degradation, soil erosion
- Sea level rise and coastal erosion
- Fires from extreme heat and droughts

Water Alternatives Photos_CC BY-NC 2.0

Shailendra Pratap_ imaggeo.egu.eu

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Climate Change

Adaptation

- Agronomic practices:
  - fertiliser, irrigation
  - shift in planting dates, cultivars
  - change in cropping density
- Agroecological practices:
  - tillage
  - diversification
  - agroforestry
- Technological innovation: genetic improvement
- Risk transfer strategy: insurance
- Planning with better information -> climate services (Copernicus)

steve-harvey-unsplash

EU SPACE WEEK 2023

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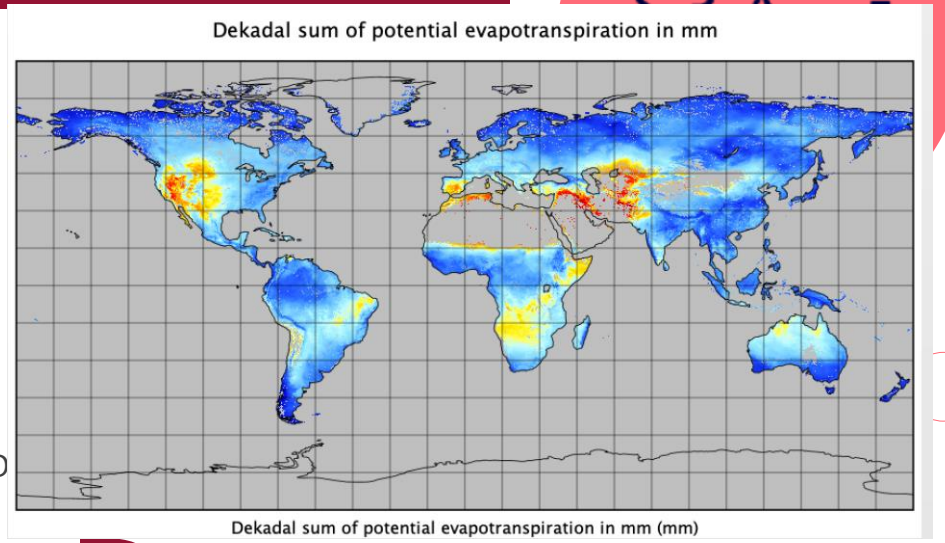
Climate Indicators for Agriculture

3 data product groups

4 :

1. Climate forcing data for crop models
   - all time scales, downscaled, bias corrected, model adapto
2. Agroclimatic indicators (generic & crop specific)
   - Growing degree days, huglin index, cold/heat stress days, insect flight in...
3. Climate enhanced Earth Observation based indicators
   - Dry Matter Productivity (crop specific), ET_{actual}, ...



All aggregated to crop specific
- phenological calendars
- growing areas

https://climate.copernicus.eu/global-agriculture-project

Climate Change

Climate Data Store: Agri Adapt application

EU SPACE WEEK 2023

- Agroclimatic indicators explorer for Europe from 1970 to 2100 : the application is the evolution of the EU LIFE AgriAdapt project
- Objective : explore agro-climate indicators present climate conditions (1970-present) and as well as comparing future climate scenarios (2011-2100)
- Spatial resolution : European continent, 0.25° x 0.25°
- ERA5-Land reanalysis : Historical time series and anomaly times series, 1981-2022
- Climate projection : 9 climate models, bias-adjusted CORDEX regional, RCP4.5 or 8.5,
- Indicators :

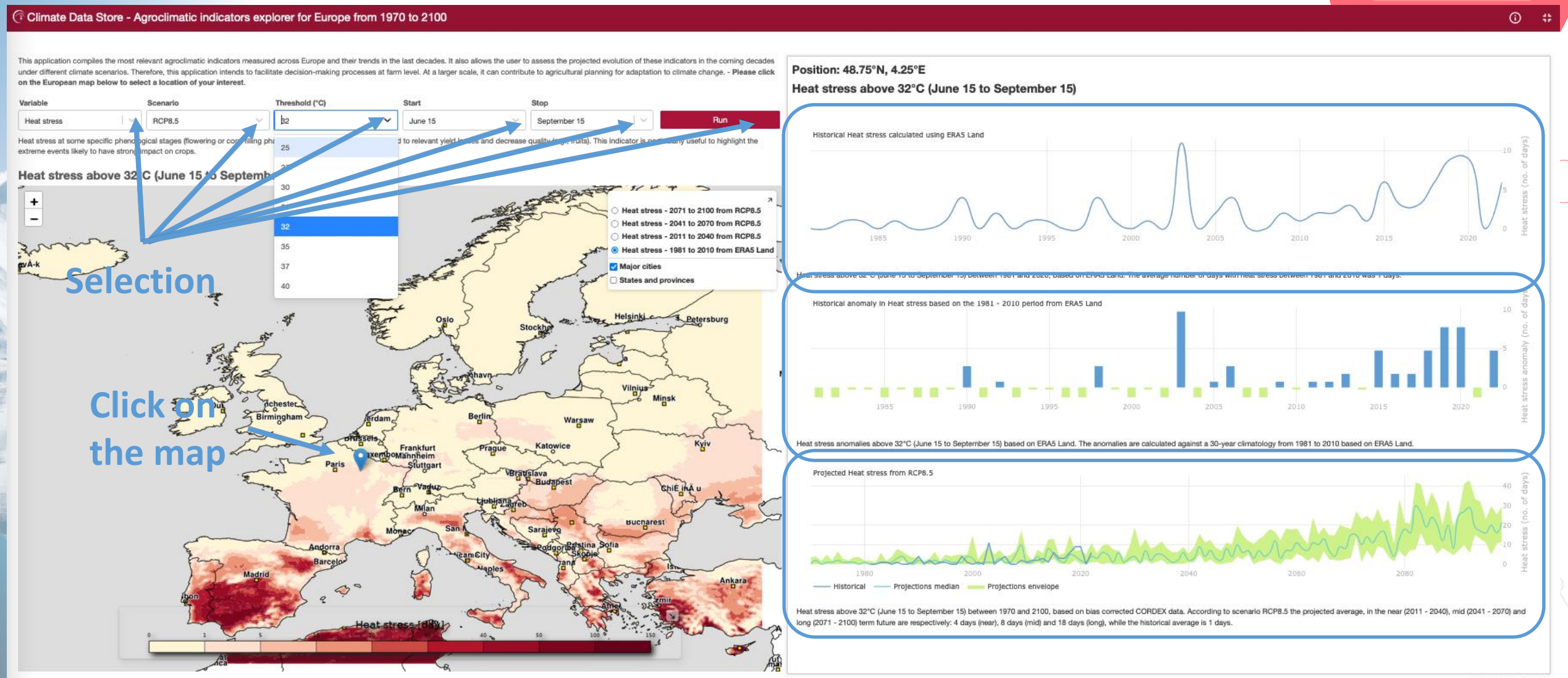
  Heat stress, Average temperature, Precipitation, Frost days, Days above 25°C, Date of last spring frost.

  Adjustable threshold and/or period
- Documentation available

Climate

Agri Adapt application: interface

EU SPACE WEEK



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www.copernicus.eu
climate.copernicus.eu

Climate Change

Thank you for your attention

Copernicus Europe's eyes on Earth

European Commission

ECMWF

Agriculture session - Agenda

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KEY AREAS

Digital Solutions

Developing Requirements from Automation to Autonomy

EU SPACE WEEK 2023_7-9 NOV, Sevilla, Spain

Georg Larscheid
Vice President,
Global Digital Business,
CLAAS

CLAAS Product Portfolio.

Combine Harvesters

Forage Harvesters

Tractors

Mowers

Balers

Telescopic Loaders

Wheel Loaders

Software & Systems

Service & Parts

Today's living conditions are changing expectations of agricultural machinery engineering

World population is growing.

Agricultural area is shrinking.

Eating habits are changing.

People are mobile and globally networked.

Climate change is steadily proceeding.

Renewable energy sources are in demand.

Our Vision

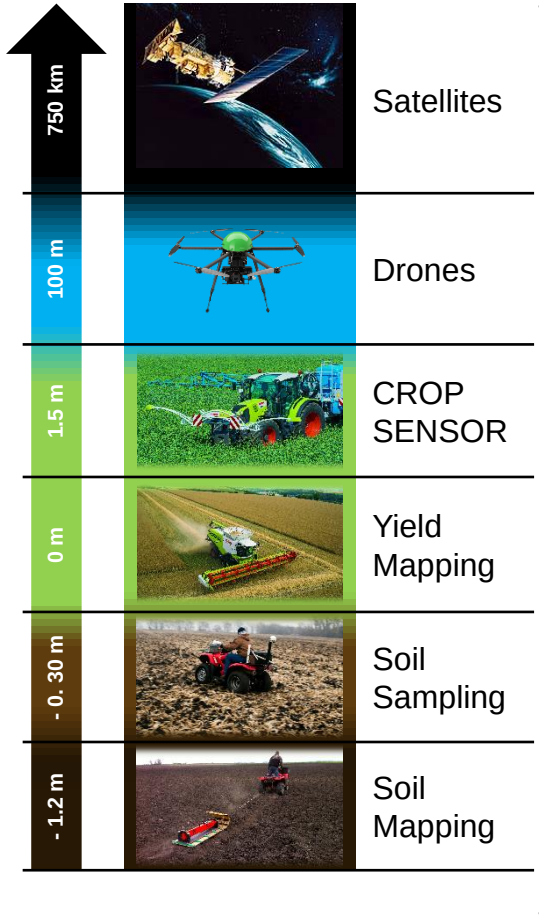
We enable farmers to be the best in their field.

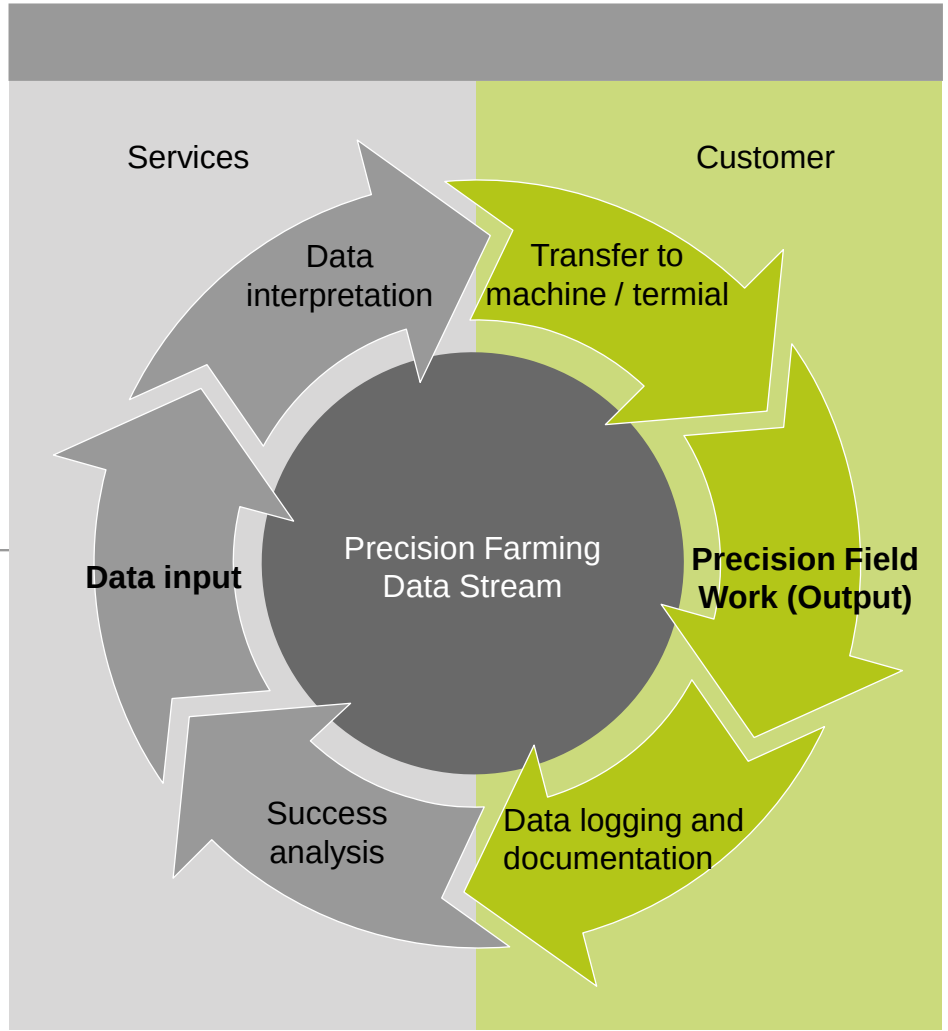
Precision farming applications during the year

Precision farming offers more possibilities with increased efficiency and sustainability.

Precision Farming is all about managing spatial- and temporal variability, in a field (outdoors)

Input





Output / Precision Field Work


Automatic seed drill control


Optimised fertiliser application


Automatic section control for sprayers


Optimised harvesting


GPS steering with route optimisation


Robots, swarm technology

It’s a Journey

CLAAS has been a pioneer in Precision Farming and will continue to invest

Precision

Automation

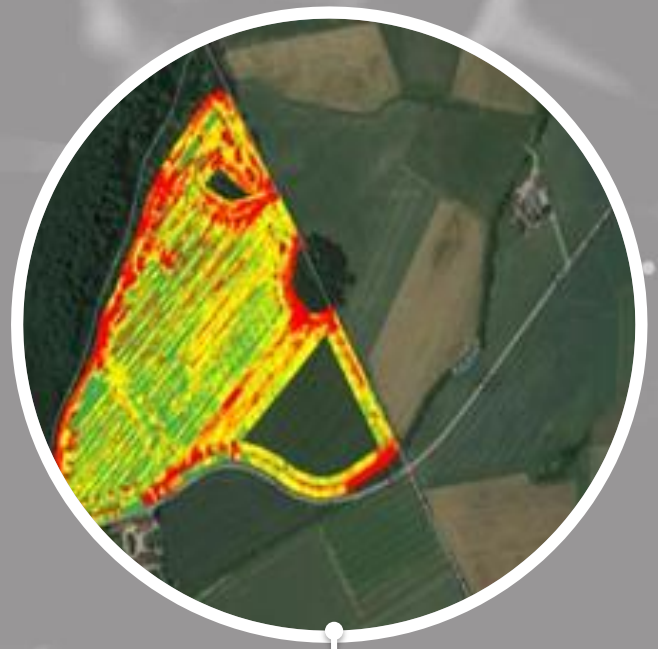
Autonomy

3A - ADVANCED AUTOMATION AND AUTONOMY

The open partnership for more efficiency

AGXEED AMAZONE CLAAS

Precise Positioning (GNSS)



Remote Sensing (Observation)

Communication (SATCOM)

Precise positioning, core-capability # I required for the Precision, Automation and the Autonomy journey

Our Requirement:

- Globally available, in-field, reliable and repeatable, cm-level accuracy positioning through GNSS established
  - through differential correction **cm-level accuracy** is obtained, either via satellite (i.e. EGNOS) or local terrestrial (RTK)
    - as mobileRTK becomes standard, outages occur due insufficient to cell-phone coverage in rural areas
      → driving need for supplemental SATCOM solution at affordable price point to ensure reliability
  - through sensor fusion, which is required to reach **mm-level accuracy** i.e. for single-plant localization (treatment)

Our Need:

- Continued, stable operation of GNSS network, as prof. farmers are fully relying on it
- More affordable SATCOM availability to improve RTK availability and stability
- Subsidy programs to encourage retrofit installations of older machine population

Our Achievement:

- est. > 50% of arable farm land is treated with GNSS-based auto steering and/or section control appl. technology

- accountable for higher application precision in fuel, fertilizer and chemical usage, leading to reductions of 5-15%

Remote Sensing, core-capability # II required for the Precision, Automation and the Autonomy journey

Our Requirement:

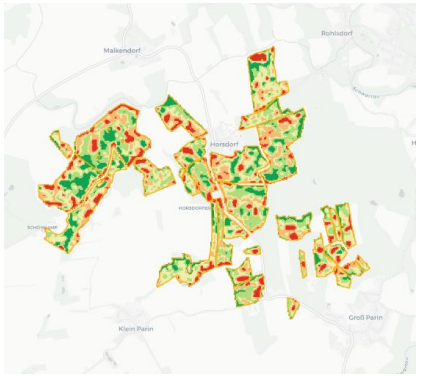
- Easy access to reliable, highly repetitive satellite imagery through Sentinel 2 (mainly via NDVI) available and proven, but:
  - Image repetition too low (i.e. every 5 days)
  - High risk of image disturbance due to cloud coverage

Our Achievement:

- est. > 10-20% of arable farm land is treated with GNSS-based VRT appl. technology
- lead to an est. < 5% reduction in application volume but slightly higher yields

Our Challenge:

Step1: Identifying spatial variability



Step2: Creating a variable rate (VRT) prescription based on crop- and/or field attributes

Our Need:

- Higher image repetition (i.e. every 1-2 days
- More research in image interpretation related to plant growth/health indicators

Communication, core-capability # III required for the Precision, Automation and the Autonomy journey

Our Requirement:

- Stable data communication, incl. rural areas, infrastructure to enable continues machine tracking at avordable price levels
  - currently mainly relying on mobile-/cell phone technology (4G) with too many outages in rural areas

Our Need:

Stable data communication infrastructure to enable continues machine tracking at avordable price levels for farmers

- coverage beats bandwidth
- required for broad adoption of autonomous machines in Ag

Summary

1. The availability of GNSS and Earth Observation programs from the EUSPA have enabled Agriculture & Forestry in the EU to become more efficient & sustainable over the past 20 years.

2. There is further potential identified to improve the efficiency and sustainability of Agriculture & Forestry, by enhancing the adoption of Precision & Automation solutions in the market.

3. Autonomous solutions are on the horizon, which in particular require SATCOM as a key enabler.

Developing Requirements for Growing Automation and Autonomy: Open Debate

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KEY AREAS

#EUSpace

GALIRUMI R&D project – EGNSS based robots for organic farming

User Consultation Platform Agriculture

Esther López Casariego (ACORDE Technologies S.A.)
esther.lopez@acorde.com

GALIRUMI H2020 Project

Galileo-assisted robot to tackle the weed rumex obtusifolius and increase the profitability and sustainability of dairy farming.

(partially funded by EC-EUSPA under GA 870258)

Main objective

Harness the possiblities that **GALILEO** brings…

… to deliver robot weeding for **herbicide-free weed control** in dairy farming

*Robotic weeding will **eliminate herbicide use and reduce exposure** of farm workers (remove obstacle for organic production).*

*Broad-leaved dock (Rumex obstusifolius) is a **problematic weed** that expands and cover large parts of t farm if uncontrolled.*

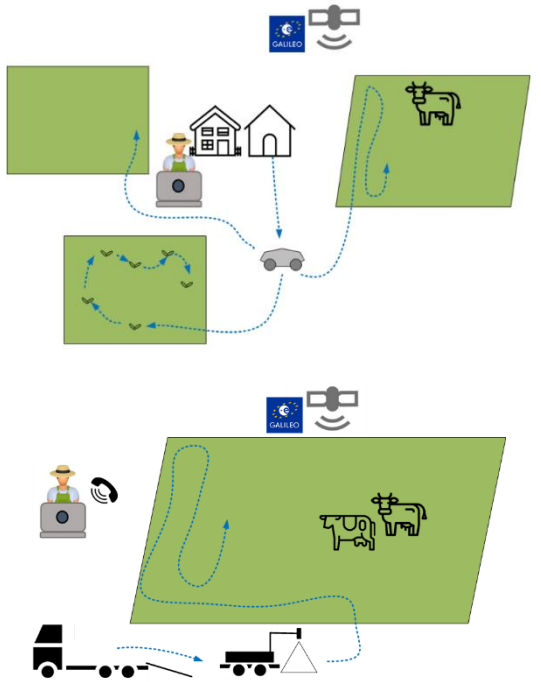
#EUSpace

Objectives

- Integrate **GALILEO** receiver
- Improve **weed** detection
- Construct electrocuting and laser prototype **robot**
- Software for robot **navigation** and mission planning and control
- **Field-test** robots in operational environment
- Evaluate **business** model

Benefits: will reduce…

- **Labour** for weeding
- Weed management **cost**
- **Damage** to grass from the application of herbicide
- **Impact** of dairy farming on the environment
- Dairy cow **discomfort**



EU SPACE WEEK 2023

GALIRUMI

#EUSpace

Consortium

End users KOO, PEK and IDE will provide **user requirements as well as operational scenarios**. This input will be forwarded to ACO, DTU, WR and STE who are responsible for **design and development** of the robotic systems.

Area of expertise	ACO	WR	DTU	KOO	PEK	STE	IDE
Hardware integration	X	X	X				
Embedded systems	X		X				
Robotics		X	X				
EGNSS	X						
Vision algorithms			X				
Agriculture machinery				X	X	X	X
Weeding machinery						X	
Lasers		X					
Farm sites				X	X		X
End user				X	X		
Market access						X	X

GALIRUMI

GALIRUMI

#EUSpace

https://www.youtube.com/watch?v=n9cW9N9rDaA&t=6s

Benefits from GALILEO adoption

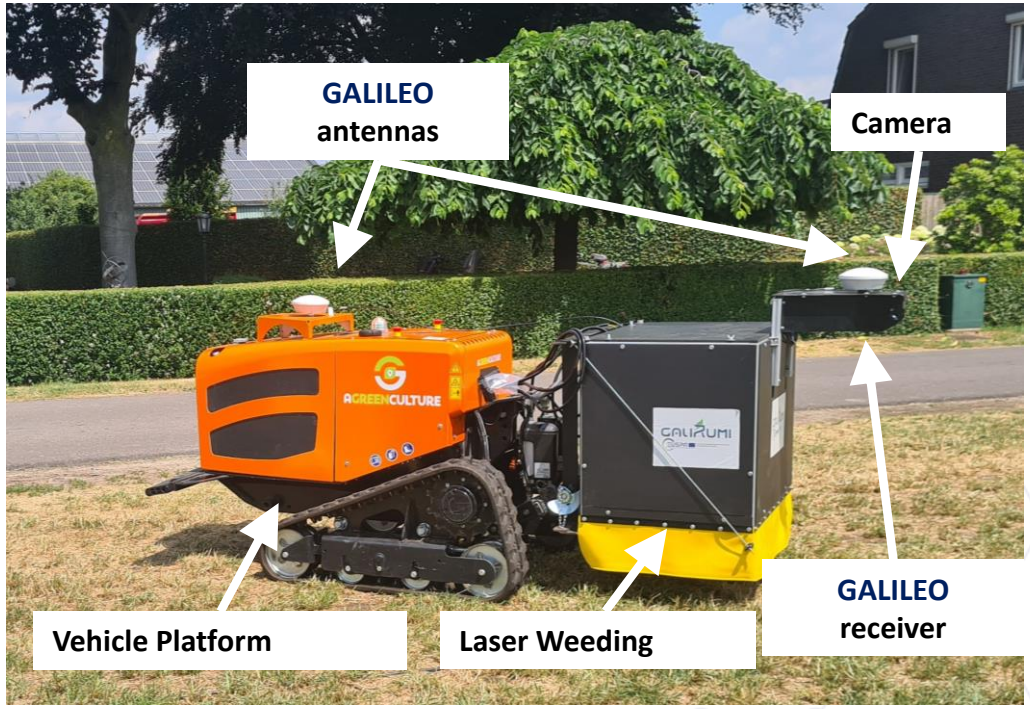
- GALILEO **differentiators** (multiple frequencies with modern modulations) enable robust navigation for autonomous agricultural robots even in locations where other GNSS do not work sufficiently well.
- GALIRUMI **benefits** from GALILEO adoption:
  - Better **resilience to multipath** due to more robust modulations, appropriate for scenarios without a clear vision of the sky due to near obstacles
  - An improvement of the **availability of satellites** in sight when used in combination with other GNSS constellations
  - **Sub-metric position** accuracy using E1+E5 (AltBOC) frequency bands without RTK corrections
- New GALILEO **improvements**:
  - High Accuracy Service (HAS). <20 cm **accuracy** without using RTK corrections
  - OS Navigation Message Authentication (OS-NMA). **Authentication** of navigation data: resilience to spoofing

#EUSpace

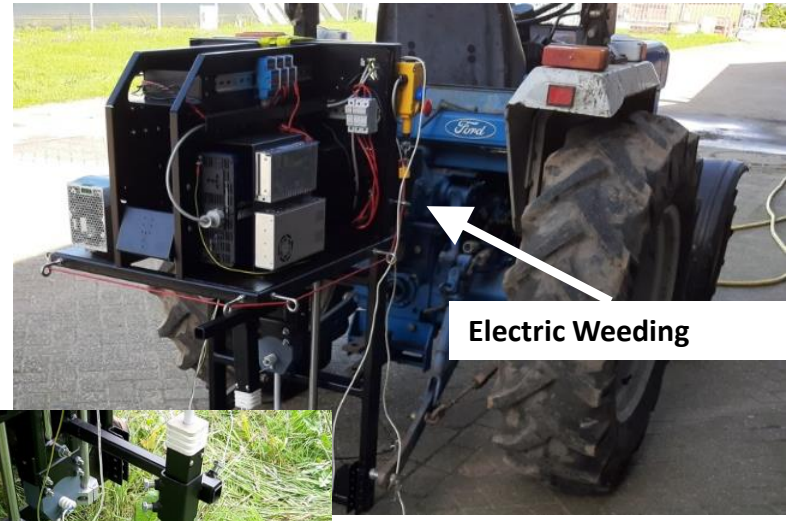
GALILEO integration

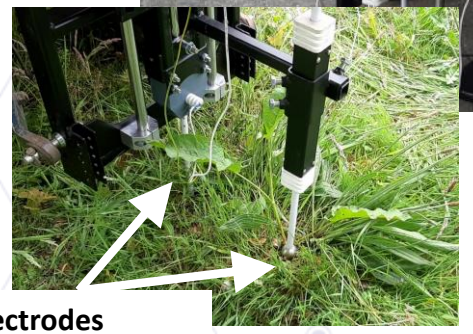
- Laser and electric weeding platforms developed
- Navigation and positioning based on GALILEO dual-receiver (heading)

Laser Weeding in GALILEO based navigation platform



Electric Weeding tool





Field test in operational envirnoment

Demonstrations in Netherlands, France and Denmark, attended by farmers

GALIRUMI

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Agriculture session - Agenda

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KEY AREAS

The EU Space Opportunity for Small and Medium Sized Farmers

European Commission

EUSPA European Union Agency for the Space Programme

UE23 PRESIDENCIA ESPAÑOLA CONSEJO DE LA UNIÓN EUROPEA

User Consultation Platform Agriculture

Maurizio Laterza, Planetek Italia

The Overview

Agriculture activities

Agriculture is one of the business sectors of Planetek Italia since years.

Some projects in which we took part:

EUGENIUS

EO AFRICA

ReDOX
Remote Early Detection of Xylella

RESO
REsilienza e SOstenibilità delle filiere ortofrutticole e cerealicole per valorizzare i territori

CRITE
Coffee Rehabilitation In Timor-LEste

Water and Food Security Planning in Indonesia for ADB

IRMAT+
Irrigation Management Tool +

Experimental service for agricultural parcels' monitoring for AVEPA

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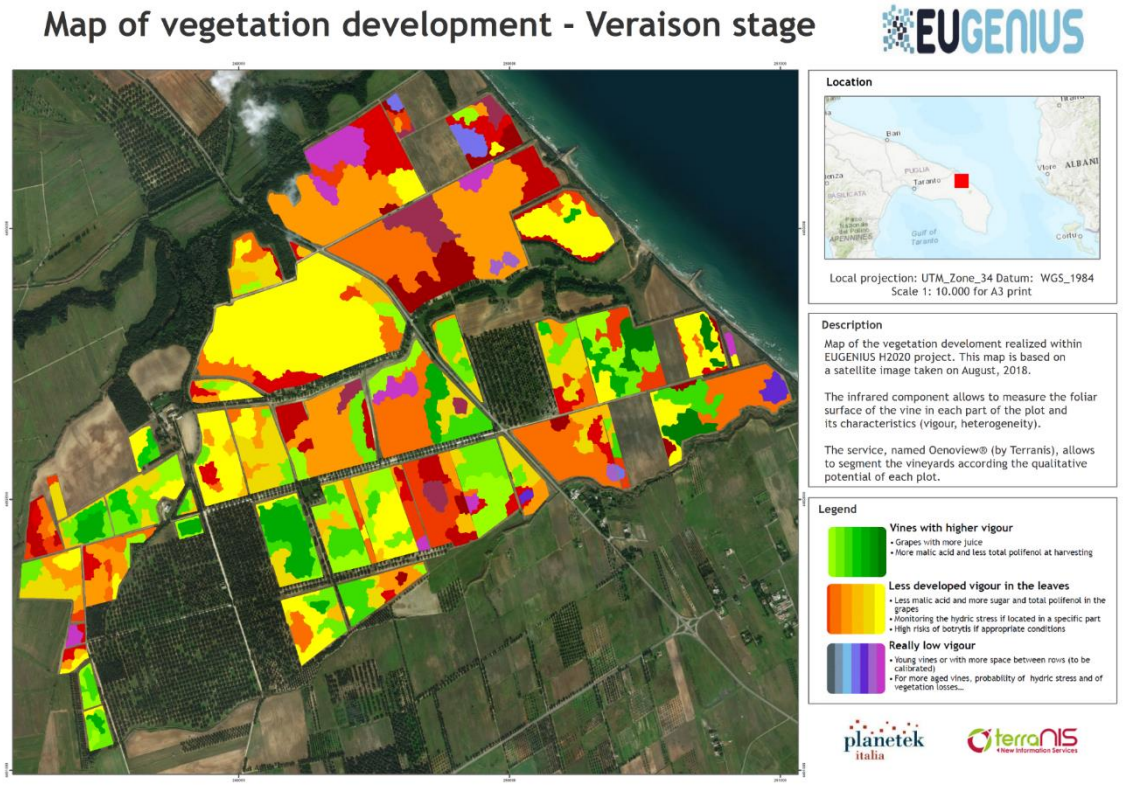
The Story

- EUGENIUS « European Group of Enterprise for a Network of Information Using Space »
- **Market: Precision Farming for viticulture**
- **PARTIES INVOLVED**: **Planetek Italia** (EO data provider) and **Tormaresca** (the winery)
- **OBJECTIVE**: The goal is to understand
  - how gradually incorporating Space data into their work can help the winery support their growers in optimising the process and resources through the adjustment of what is needed against what is available **(costs)**
  - how the level of interconnection and interdependence between the users and the project promoting EO data

- The market target:
  - Agronomic consultant, Italy
  - The winery (the market actor in Italy), and
  - The association of farmers in Italy (the vineyard)
- The technical actions are:
  - Support for the selection of sampling points for laboratory analysis, cost-effectively and efficiently
  - Support with agronomic advice on fertilization and irrigation
  - Identification of other structural criticalities



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COMMERCIALISING TECHNOLOGY IN SMEs: THE ROLE OF EUROPEAN R&I PROJECTS

Raffaele SILVESTRI, Francesco PETRUCCI, Savino SANTOVITO

Dipartimento di Economia e FinanzaUniversity of Bari

- ✓ the present research has primarily focused on the **project relationship emerged** between ***Planetek*** and ***Tormaresca*** to understand:

  1. how the **new technology** has been progressively **implemented** in the user's setting through progressively developing and adapting both project resources and firms' resources;

  2. how the **project context** has **influenced**, and has been influenced by, **the emerging relationship** and the underlying process of resource interaction.

The study conclusion

It successfully works if

the customer:

- Has clear goals
- Is open to change
- Has the needed resources
- Manages the value chain production, transformation, comercialization

The bottlenecks and the mitigation actions

Capacity of innovation

- **The bottleneck**: small farmers have limited capacity of innovation:
  - the average value of Utilised Agricultural Area (UAA) per farm in Italy was 11,1 hectares in 2020 (although growing) [1];
  - almost two-thirds of the EU's farms were less than 5 hectares in size in 2020 [2]
- **The mitigations**:
  - work together with agronomists and associations of farmers
  - act on the whole agricultural supply chains

[1] 7°Censimento generale dell'agricoltura: primi risultati.
[2] Farms and farmland in the European Union - statistics. Farms in 2020.

Credit facilities

- **The bottleneck**: smaller agri-food innovators that focus on digital, data-driven offerings find it particularly difficult to access financing in order to grow ([1]), also because credit facilities related to buying digital services are very few or absent
- **The mitigation**: provide farmers' associations with effective means to lobby for having more opportunities of credit facilities related to digital services

[1] European Investment Bank. Feeding future generations. How finance can boost innovation in agri-food – Executive summary. 2019.

Awareness

- The bottlenecks:
  - often farmers are not fully aware of satellite capabilities
  - often farmers are not able to choose the best solutions for them
  - training actions are needed
- The mitigations:
  - provide training opportunities
  - provide farmers with pilot cases and success stories

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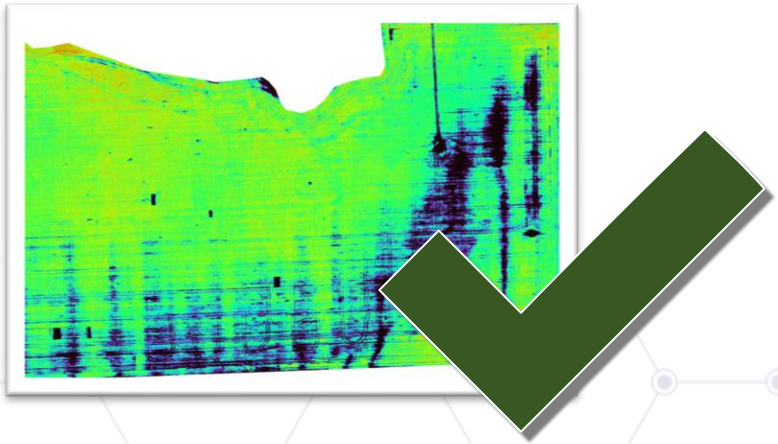
Certifications from independent parties

- **The bottleneck**: there is lack of certifications about service accuracy and reliability by a third party (different from the vendor)

- **The mitigation**: identify independent actors and collaborate with them to get a third-party certification of the service

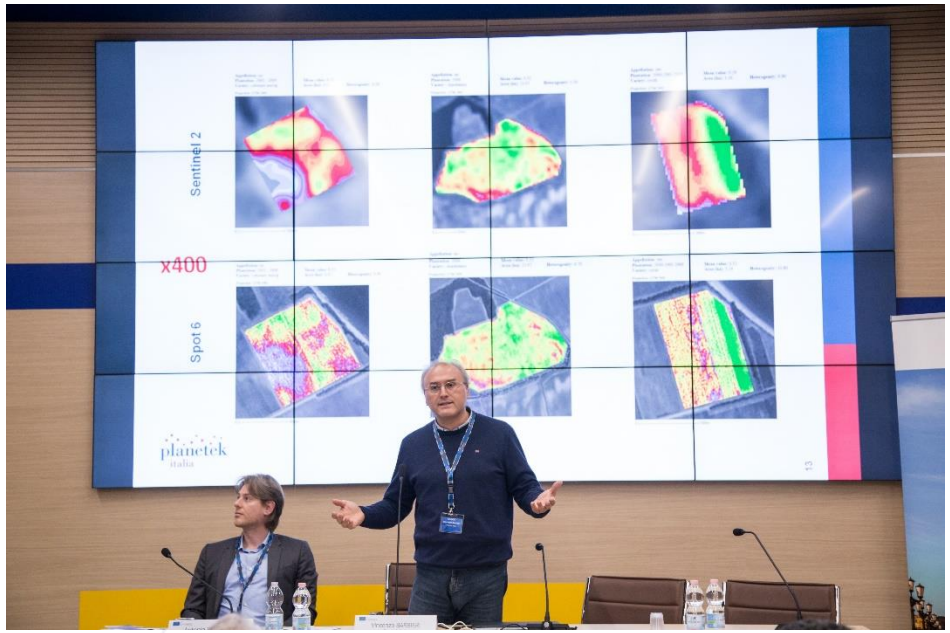


The Success Stories

Professionals training: ISMEA open school

- ISMEA *(Istituto di Servizi per il Mercato Agricolo Alimentare)* organized in 2022 the Copernicus open school to train Italian agronomists in Campania and Veneto

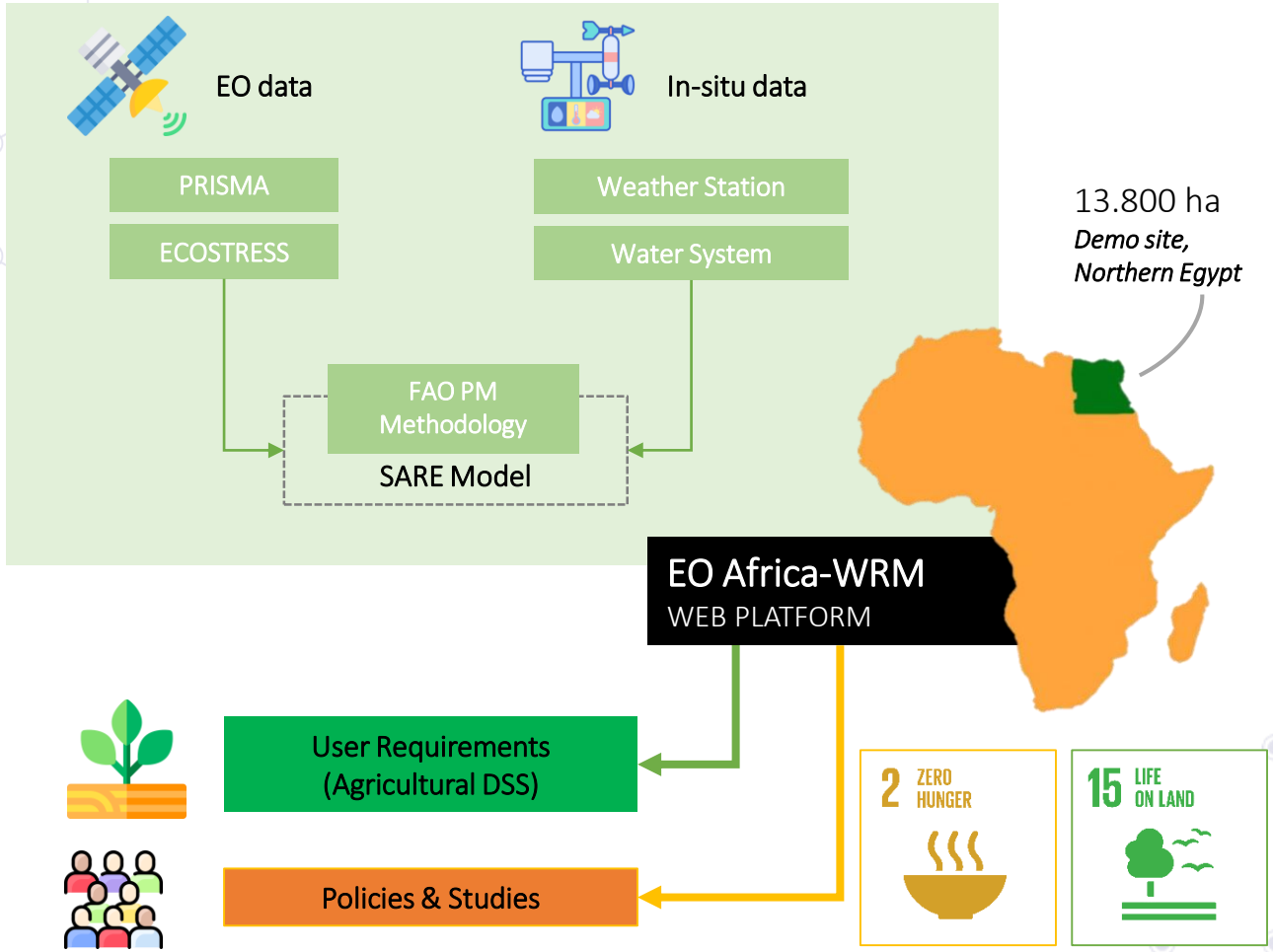
- Planetek Italia participated as a trainer presenting some use cases for precision farming and CAP, and organized a 1-day hackathon



The Story

- **TITLE**: EO AFRICA Water resource management – *A support to farmers and planners to improve irrigation water management*.
- **PARTIES INVOLVED**: **Planetek Italia** (Space data provider), **Planetek Hellas** (partner), **International Centre for Advanced Mediterranean Agronomic Studies Bari** (CIHEAM Bari) (partner), National Authority for Remote Sensing & Space Sciences, Egypt (NARSS) (stakeholder), and October sixth for agricultural projects company (stakeholder).
- **OBJECTIVE**: To estimate crop water stress and evapotranspiration, exploiting ECOSTRESS and PRISMA data by experimental EO analysis techniques

One of the main bottlenecks is water loss due to the failure to rationalize water consumption in an all-consuming sectors like agriculture. In this context, the goal is to employ thermal Earth Observation data to accurately estimate the effective crop water consumption represented by the actual evapotranspiration.



Objective

To estimate crop water stress and evapotranspiration, exploiting ECOSTRESS and PRISMA data by experimental EO analysis techniques. Sentinel-2 data are used as support for comparative purposes.

Outcomes

- Prediction and mitigation of crop stress as a result of water losses (evapotranspiration)
- Precision irrigation planning and scheduling as a result of data-driven water use optimisation
- Better policies on regional water management, allocation, and distribution

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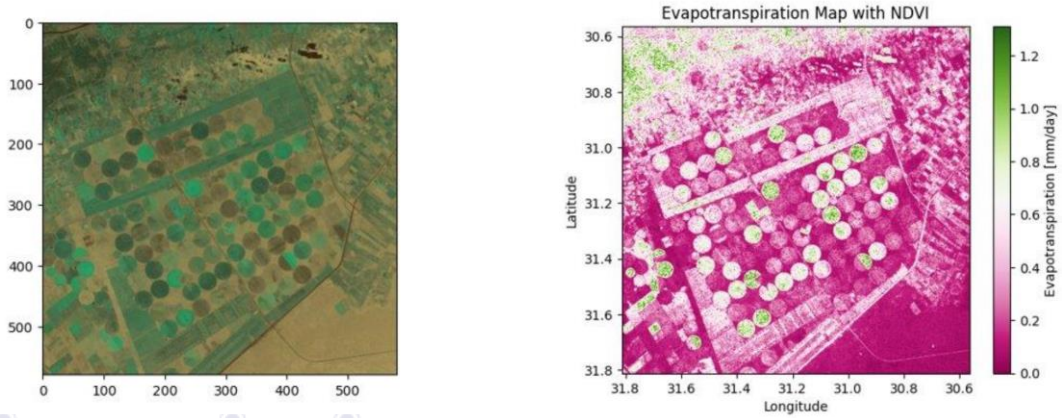
Specific objectives

- Crop growth monitoring;
- Stressed crop monitoring;
- Yield prediction;
- Water productivity;
- Water use efficiency.

Engaging small farmers with space data requires a holistic approach that combines technology, training and support. It is essential to adapt the approach to the local context and the specific challenges faced by small-scale farmers in the targeted region.

The main objective of engaging small farmers to space data can be summarized in enhancing sustainability and farmers income based on data-driven decision making.



Demo site:
*(**Left**)Initial area of interest captured on June 2023.*
*(**Right**) Prototype of evapotranspiration map for crops calculated with Prisma and Ecostress data (June 2023), depicting several pivots.*

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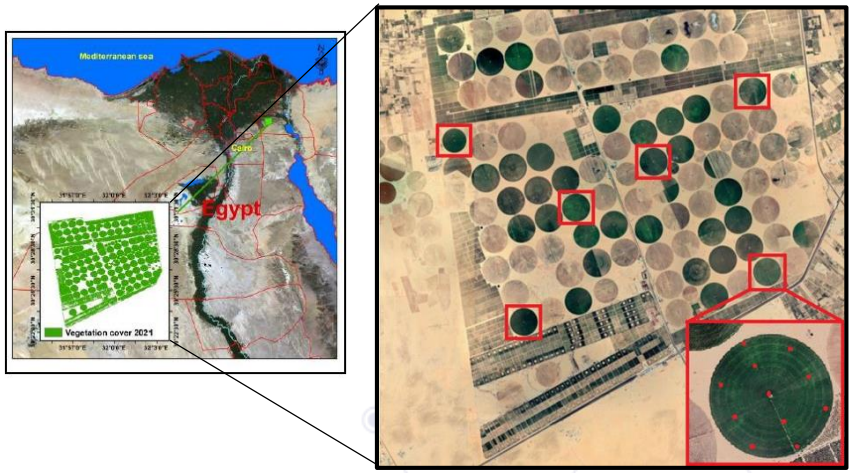
Planetek Italia with the support of CIHEAM Bari made **important steps to engage small farmers with space data**, including:

- Understanding the specific needs of small farmers, faced challenges
- Organizing workshops and training sessions to educate farmers about the benefits of space data
- Offering basic training on how to access and interpret space data and integrate it into their farming practices
- Presenting real-cases examples of improved yields with reduced water consumption;
- Strengthen the technical and analytical skills of local agricultural advisors to effectively use space data and support small farmers



Demo site:
"October sixth for agricultural projects" company in El Salheya El Gedida, a city in Sharqia Governorate, in the north of Egypt

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KEY AREAS

#EUSpace

SPACE and REGENERATIVE AG

European Commission

EUSPA
European Union Agency for the Space Programme

UE23
PRESIDENCIA ESPAÑOLA
CONSEJO DE LA UNIÓN EUROPEA

UCP Agriculture

Tamme van der Wal

Take away message

- Transition to regenerative farming is taking off;
- Protecting soil quality and improving carbon levels is essential;
- Data is essential to re-balance ecology and economy for farmers (and other stakeholders);
- Monitoring and benchmarking are crucial data analyses tasks supporting the transition;
- Space data is relevant to make objective and scaled data monitoring solutions;
- 3 important steps to make that happen.

Regenerative Agriculture

Mainstream farming (extractive agriculture):

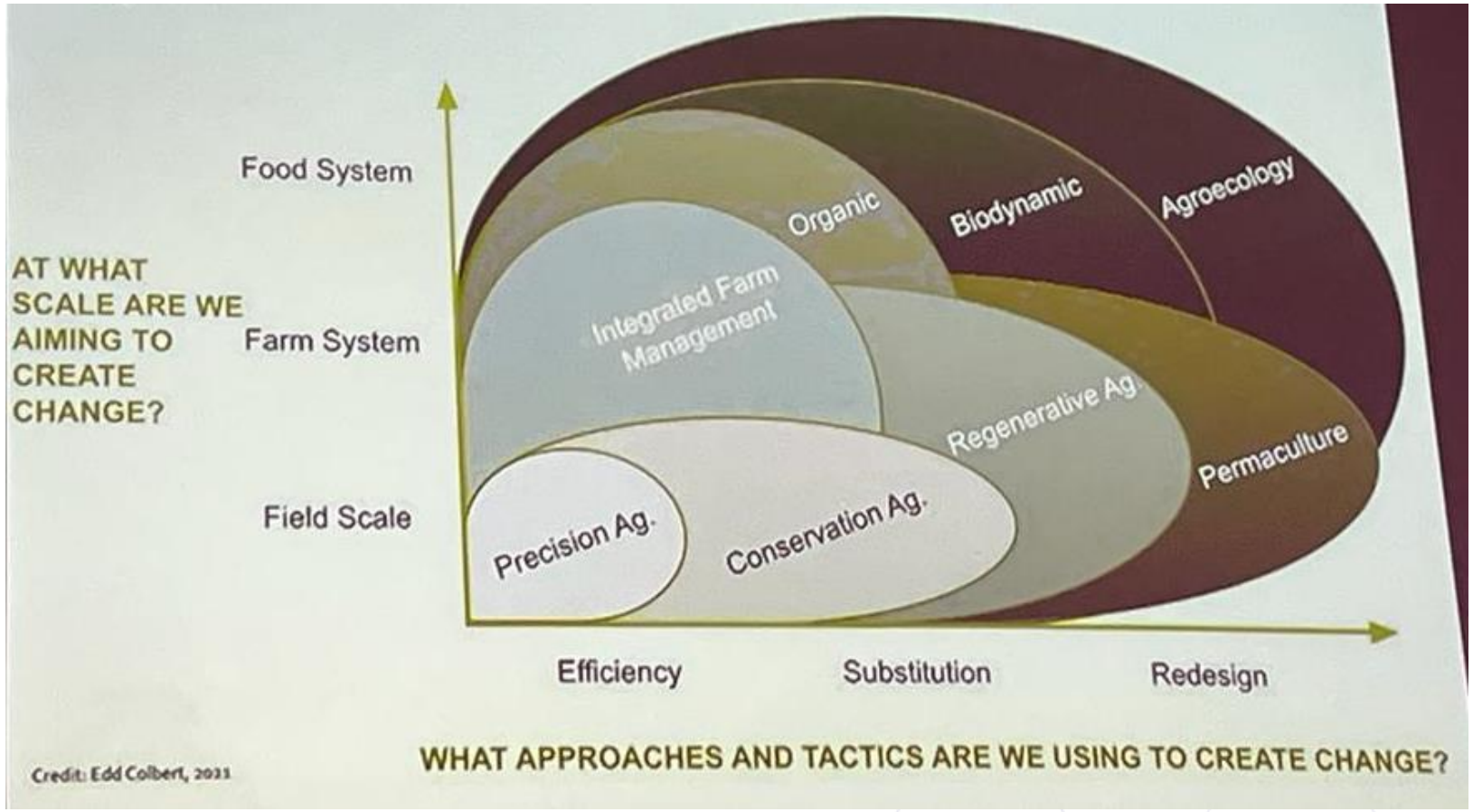
- Declining yield levels
- Increasing risks
- More and more machines, fertilisers, PPP

Regenerative farming:

- Conservation of soil / soil health
- Climate smart practices
- Stable yields → better margins

- Technology can help to make the transition (IoT, data, AI, robotics, etc.) to agro-ecological practices.

Regenerative Agriculture



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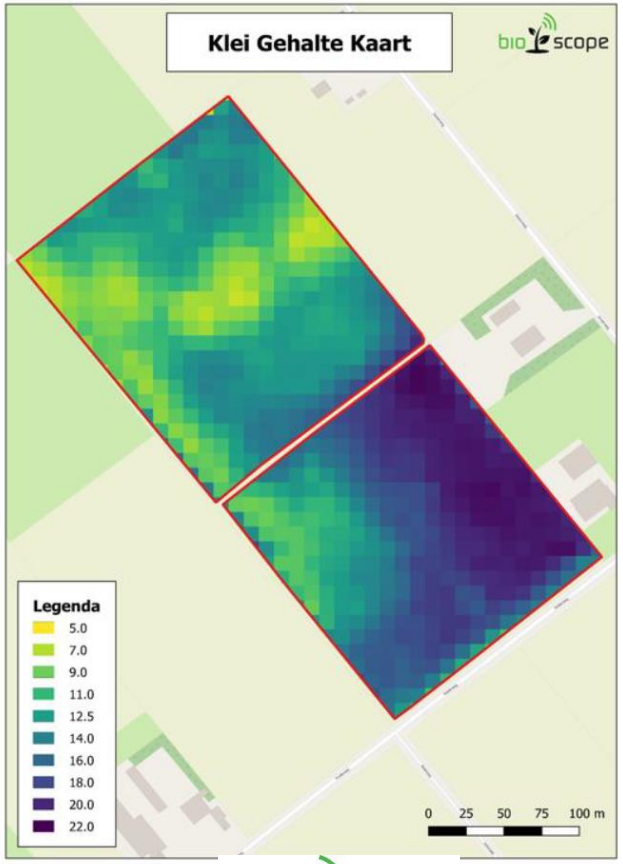
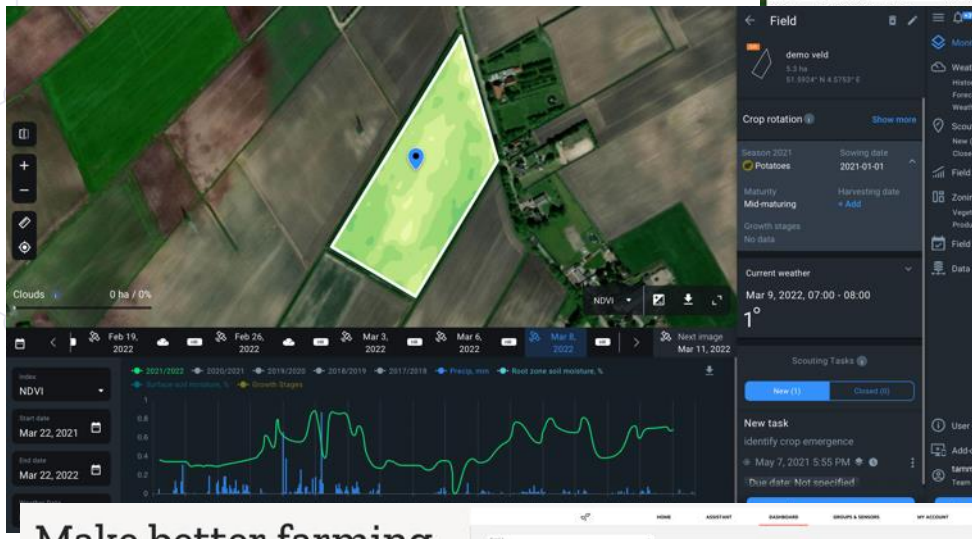
Role of EO in transition to ReGen Ag

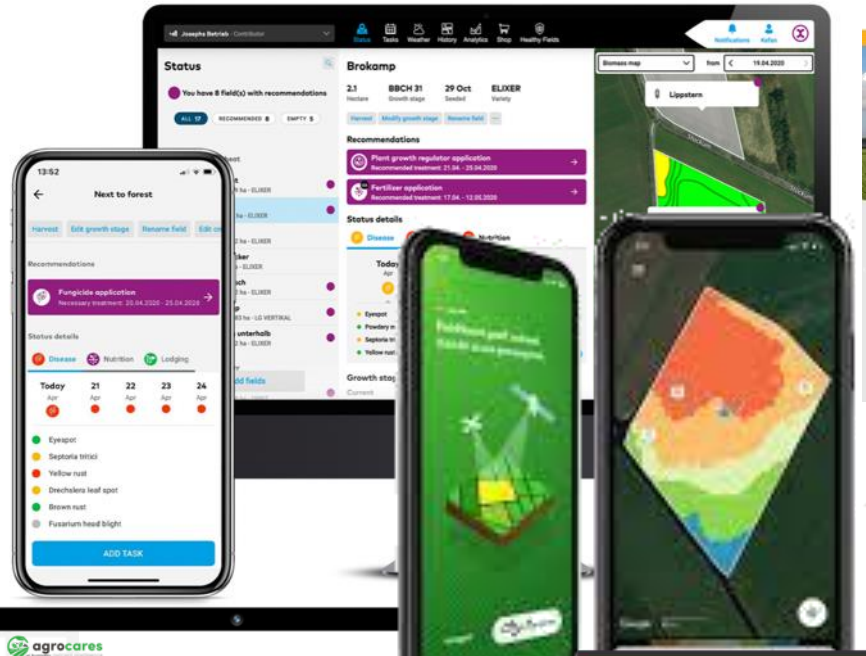
- Monitoring of fields, farms, regions, countries
  - Scouting, Benchmarking, Performance indicators
- Applications maps
  - Translate spatial differences in applications differences
- Monitoring of practices (e.g. for certification / insurance)
  - Crop Rotation;
  - Tilling; Harvest; Cover crops;
  - Applications (manure/water).

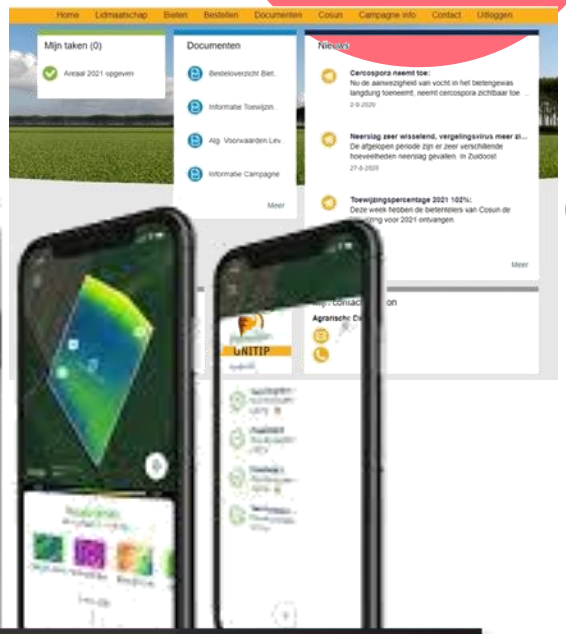


#EUSpace

Many platforms

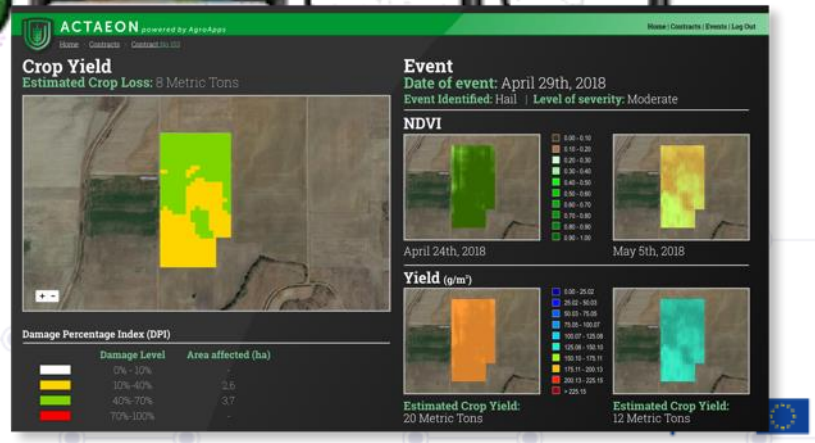






Make better farming decisions with the Farm21 assistant

- Actions and warnings
- Decision-making support
- Analyze your data with widgets
- AI assisted predictive analysis
- Share data with crop consultants
- API integration with other platforms



EU SPACE WEEK 2023

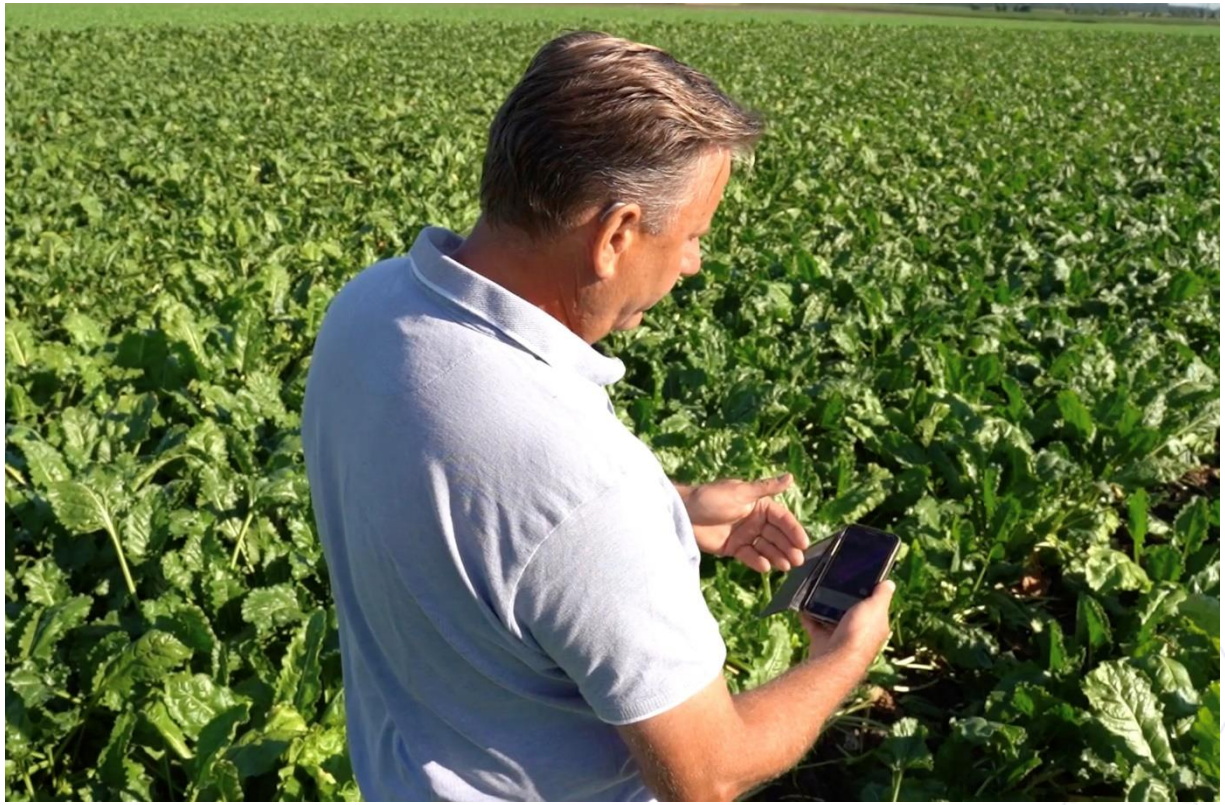
Cosun LEDENPORTAAL

3 steps to support farmers with space

- 1. Start quick and small → involve farmers (awareness)
  - Demonstrate
  - Collect feedback / criticism
- 2. Think data / information → Beat the farmer in information value (attitude)
  - Set clear monitoring goals
  - Scope (what's in and what's out)
- 3. Make monitoring valuable → change the farmer's frame (action)
  - Address farmer's entrepreneurship
  - Address the agricultural ecosystem

1. Involve the farmer

Easy and affordable tools



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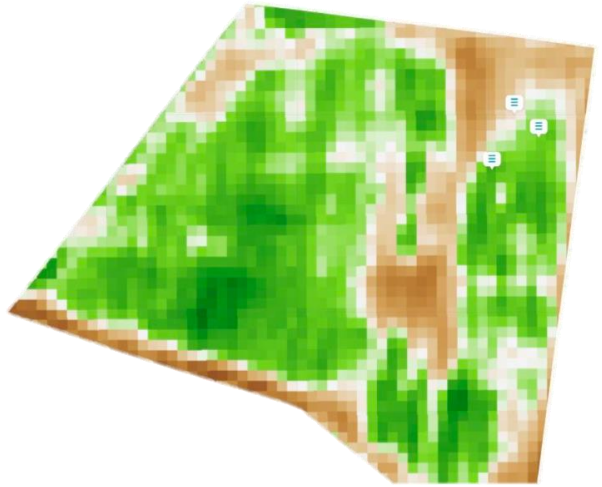
2. Beat the farmer in information value

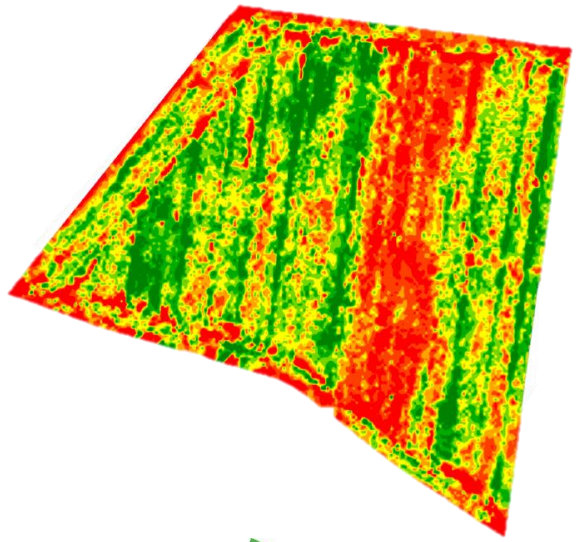
Benefits of EO

- Overview
- Whole spectrum
- Timely / Low latency

Do not bother farmers with:

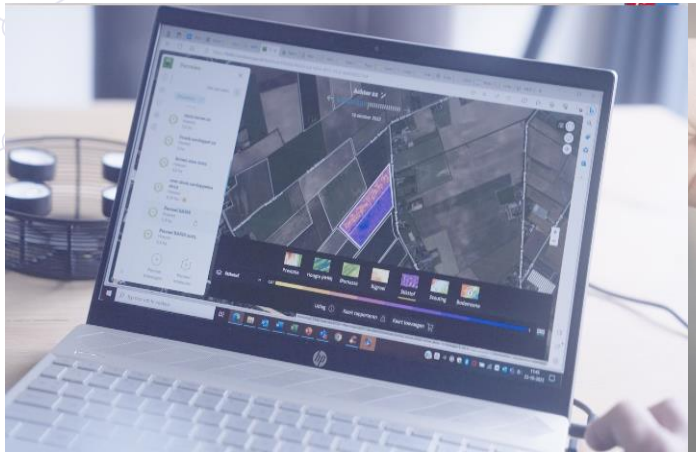
- Cloud cover
- Atmospheric disturbances
- Geometric errors





3. Change the farmer’s frame

Use data in daily processes



bioscope

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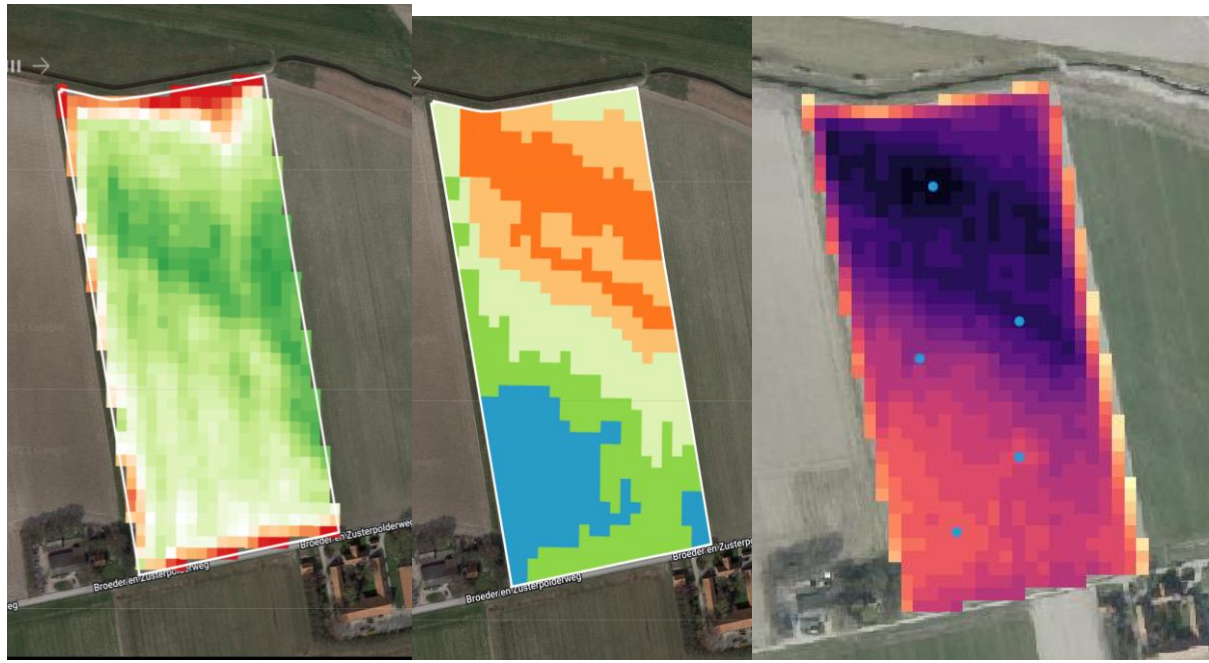
Soil carbon monitoring

- Advancements in ‘measuring’ carbon
- EO only looks at ‘topsoil’
- What is relevant? 30cm? 100cm?
- Carbon dynamics → when to measure
- Annual increase in carbon levels = uncertainty level in lab analyses



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EU Space Role within Regenerative Agriculture: Open Debate

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KEY AREAS

#EUSpace

SPACE4GREEN (HE Project)

EU Space & Blockchain for traceability and sustainability

European Commission

EUSPA
European Union Agency for the Space Programme

UE23
PRESIDENCIA ESPAÑOLA
CONSEJO DE LA UNIÓN EUROPEA

UCP Agriculture

Juan Pablo García – INTEGRASYS S.A.

Outline

- SPACE4GREEN Project: General concept
- Use cases and demonstrators
- Current implementation and integration
- Conclusion

SPACE4GREEN Project: General Concept

SPACE4GREEN: Overview

EGNSS applications for the Digital Age (HORIZON-EUSPA-2021-SPACE-02-53)

Planning	Consortium	Budget	Funding rate	Statistics
GA signature **17th Oct. 2022** Project start **1st Nov. 2022** Project end **31st Oct. 2024**	9 partners 5 countries	2.95 Millions €	~79% [avg.]	Call 50 proposals Topic **10 proposals**

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement Nº 101082630

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SPACE4GREEN: Overview

EGNSS applications for the Digital Age (HORIZON-EUSPA-2021-SPACE-02-53)

Consortium

9 partners

5 countries

INTEGRASYS — Spain — **COORDINATOR**

ceit — Spain

A.C. of PELLA — Greece

guardtime — Estonia

ITC Inovacijsko tehnološki grozd / Innovation Technology Cluster — Slovenia

AgroApps — Greece

omnia sustainable innovations hub — Cyprus

cooperativas agro-alimentarias Andalucía — Spain

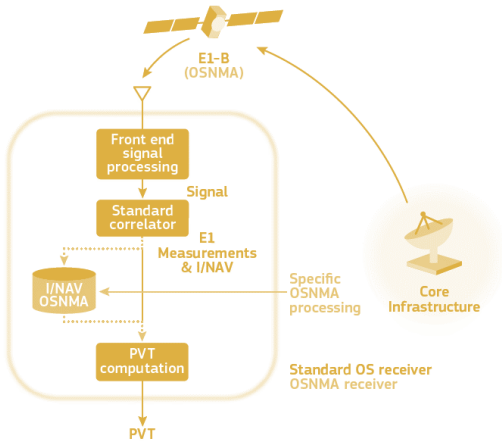
Denominación de Origen Protegida Aceite de Lucena — LUCENA — Spain

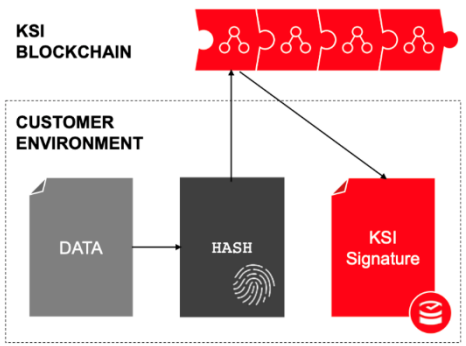
#EUSpace

SPACE4GREEN: Core Concept

SPACE4GREEN seamlessly combines blockchain technology and Galileo OS-NMA signals to provide a comprehensive solution that effectively tackles common challenges across multiple sectors.

This harmonious fusion of technologies serves to boost operational efficiency, reduce costs, and empower a more self-reliant and dependable certification process within the framework of SPACE4GREEN.





B2B platform + **Key technologies** + **SDK** + **Operational Scenarios**

GALILEO

Copernicus
Europe's eyes on Earth

Distributed Ledger

IPFS

2 Use Cases

6 Pilots

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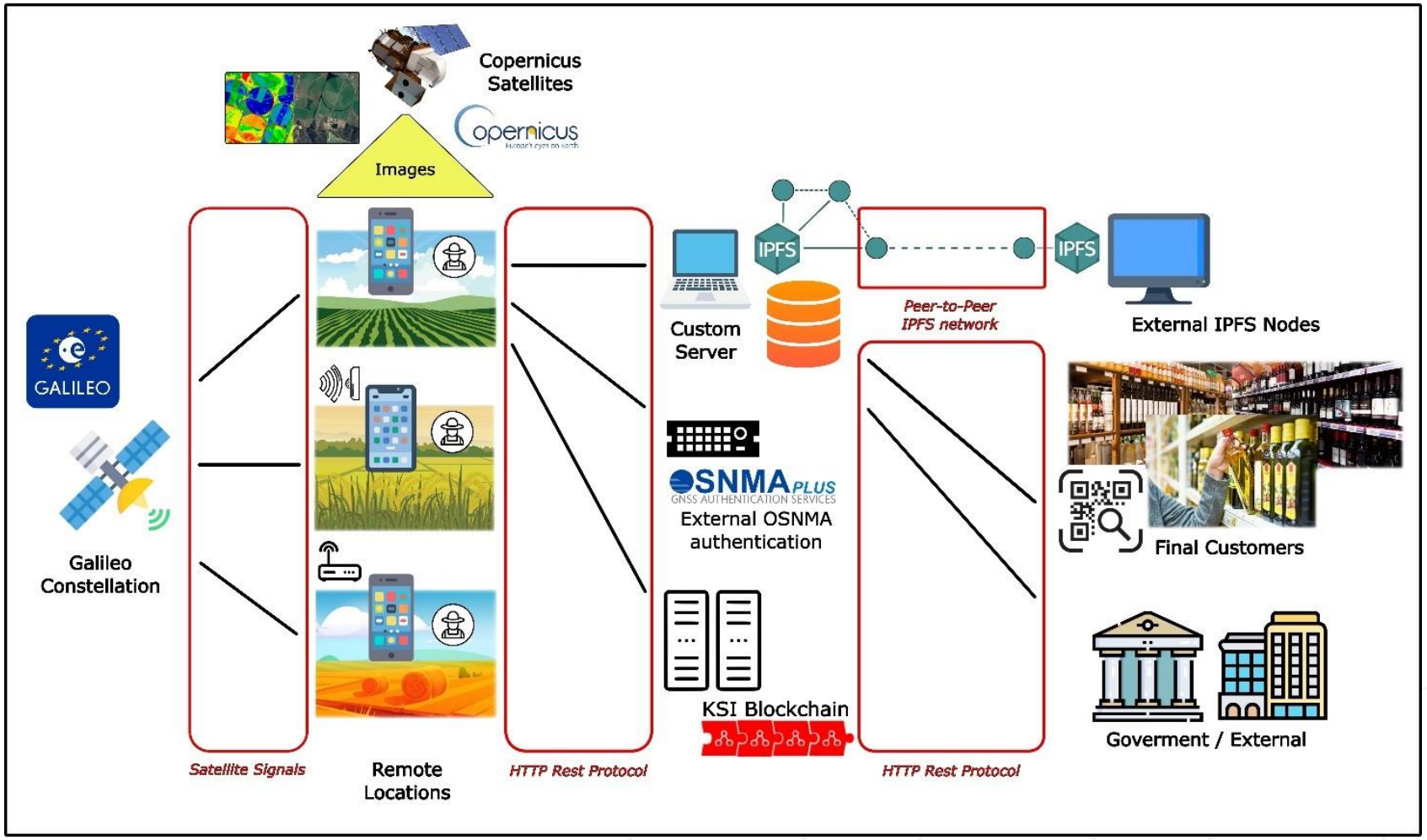
SPACE4GREEN: Use Cases and Demonstrators

General Scheme of the Use Cases



Demonstration Case 1: Transparency, Traceability and Trust in Local Food Production [Slovenia, ITC]

"SPACE4GREEN introduces and demonstrates an advanced traceability system that leverages the power of blockchain technology while enhancing its records with verified information of position and time, thanks to the cutting-edge Galileo OS-NMA."

- **Enhanced Transparency:** Integration of blockchain technology and Galileo OS-NMA for unparalleled transparency in local food production.
- **Consumer Empowerment:** Access to accurate and trustworthy information empowers consumers to make informed food choices.
- **Support for Local Economies:** Increased consumer trust drives demand for local products, supporting local businesses and agriculture.
- **Food Safety and Quality:** Verified information ensures safe and high-quality food products for consumers.
- **Environmental Benefits:** Promoting local production reduces carbon footprint from long-distance transportation.

Demonstration Case 2: Enhancing Common Agriculture Policy Rules Monitoring and Auditing [Spain, CAAND]

"SPACE4GREEN introduces and demonstrates the enhancement of monitoring and auditing of the common agricultural policy's schemes."

- **Efficiency and Accuracy:** Improved CAP monitoring processes enhance efficiency and accuracy in data collection and analysis.
- **Faster Audits:** Streamlined audit procedures lead to quicker identification of compliance issues and more timely aid disbursements.
- **Enhanced Transparency:** Better data traceability and validation processes increase transparency in CAP monitoring.
- **Better Policy Decision-Making:** Real-time, accurate data empowers data-driven policy decisions to address agricultural challenges.
- **Cost Savings:** Efficient audits and reduced administrative burdens result in cost savings for the CAP program.
- **Sustainable Agriculture:** The system supports sustainable farming practices by targeting incentives and interventions effectively.
- **Compliance Assurance:** Improved monitoring capabilities reduce the risk of non-compliance, benefiting farmers and the CAP program.

Demonstration Case 3: Transparency and Traceability of Olive Oil [Spain, LUCENA]

"SPACE4GREEN demonstrates how the advanced traceability system allows consumers to have convenient access to the most pertinent and authenticated details regarding extra-virgin olive oil production."

- **Enhanced Brand Integrity:** advanced traceability enhances the reputation and integrity of Appellation of Origin Lucena's Olive Oil.
- **Quality Assurance:** powered by blockchain and Galileo OS-NMA, ensures the accuracy of Extra Virgin Olive Oil's origin and quality.
- **Market Competitiveness:** LUCENA gains a competitive advantage by offering verifiable product authenticity.
- **Consumer Confidence:** Buyers can trust in the authenticity and quality of the product, fostering loyalty.
- **Regulatory Compliance:** The system helps in meeting and exceeding regulatory requirements and standards.
- **Data-Driven Decisions:** Valuable data assists in making informed decisions and responding to market trends effectively.

Demonstration Case 4: Traceability and Authenticity of Wine [Cyprus, OMNIA]

"SPACE4GREEN introduces and demonstrates how the enhanced traceability increases the added value of the local wines and opens new market horizons for the benefit of the producers and the local and national economy."

- **Enhanced Traceability:** By facilitating accurate documentation of the origin of Cypriot wines, enhancing transparency and consumer trust.
- **Quality Assurance:** Improved traceability and sustainability measures result in higher-quality Cypriot wines.
- **Competitive Edge:** Cypriot wines gain a competitive advantage by emphasizing their unique origins, sustainability, and quality.
- **Promotion of Local Culture:** By helping the preservation and promotion of the cultural identity of the region through its wines

Demonstration Case 5 : Environmental Sustainability Index of Cotton & Vineyards Cultivation [Greece, ACP & AgroApps; Cyprus, OMNIA & AgroApps]

"SPACE4GREEN introduces and demonstrates a ground-breaking solution – ESI (Environmental Sustainability Indicator)- that revolutionizes the assessment, monitoring, and improvement of sustainability practices within the agricultural sector."

- **Data Precision and Integration:** Space4Green ensures precise location data integration through Galileo and EGNOS, enhancing sustainability assessments for ESI.
- **Blockchain Integration:** Space4Green strengthens ESI's data security and transparency via blockchain, safeguarding supply chain sustainability records.
- **Environmental Sustainability Compliance:** ESI facilitates compliance with stringent environmental sustainability standards by providing biodiversity, soil, water, and greenhouse gas indicators.
- **Transparency and Supply Chain:** ESI offers supply chain traceability to meet consumer demand for sustainable products, building trust and tapping into growing markets.
- **Data-Driven Decision-Making:** ESI provides accurate and up-to-date agricultural data for informed decisions, optimizing resource use, increasing efficiency, and reducing operational costs.

SPACE4GREEN: ESI module case

Environmental Sustainability Index of Cotton & Vineyards Cultivation

-> User logs in the S4G App

-> Selects a parcel to register an activity

-> Selects the activity

-> Fills in the requested details

-> Submits the activity

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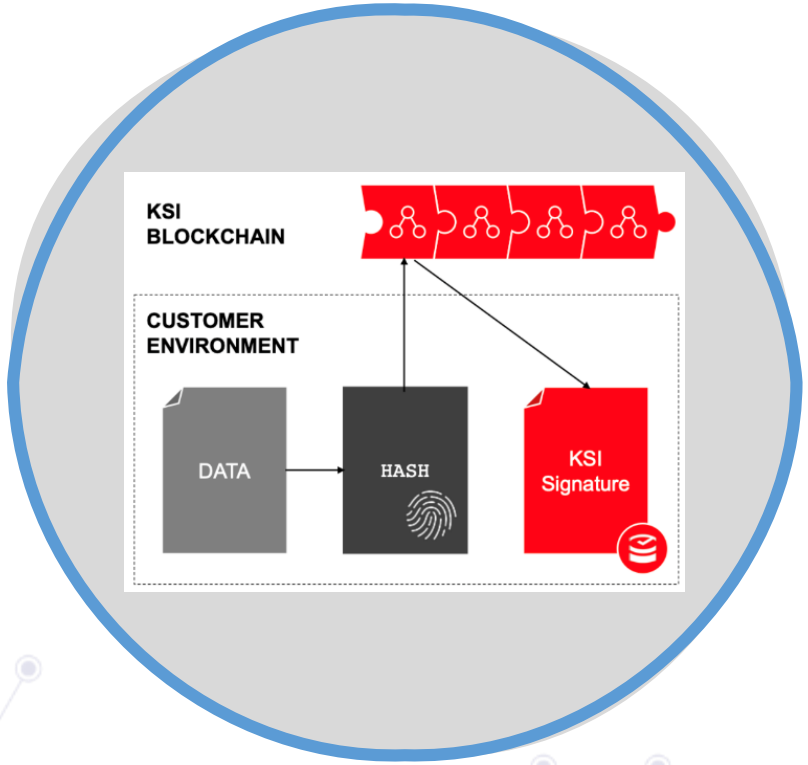
Environmental Sustainability Index of Cotton & Vineyards Cultivation

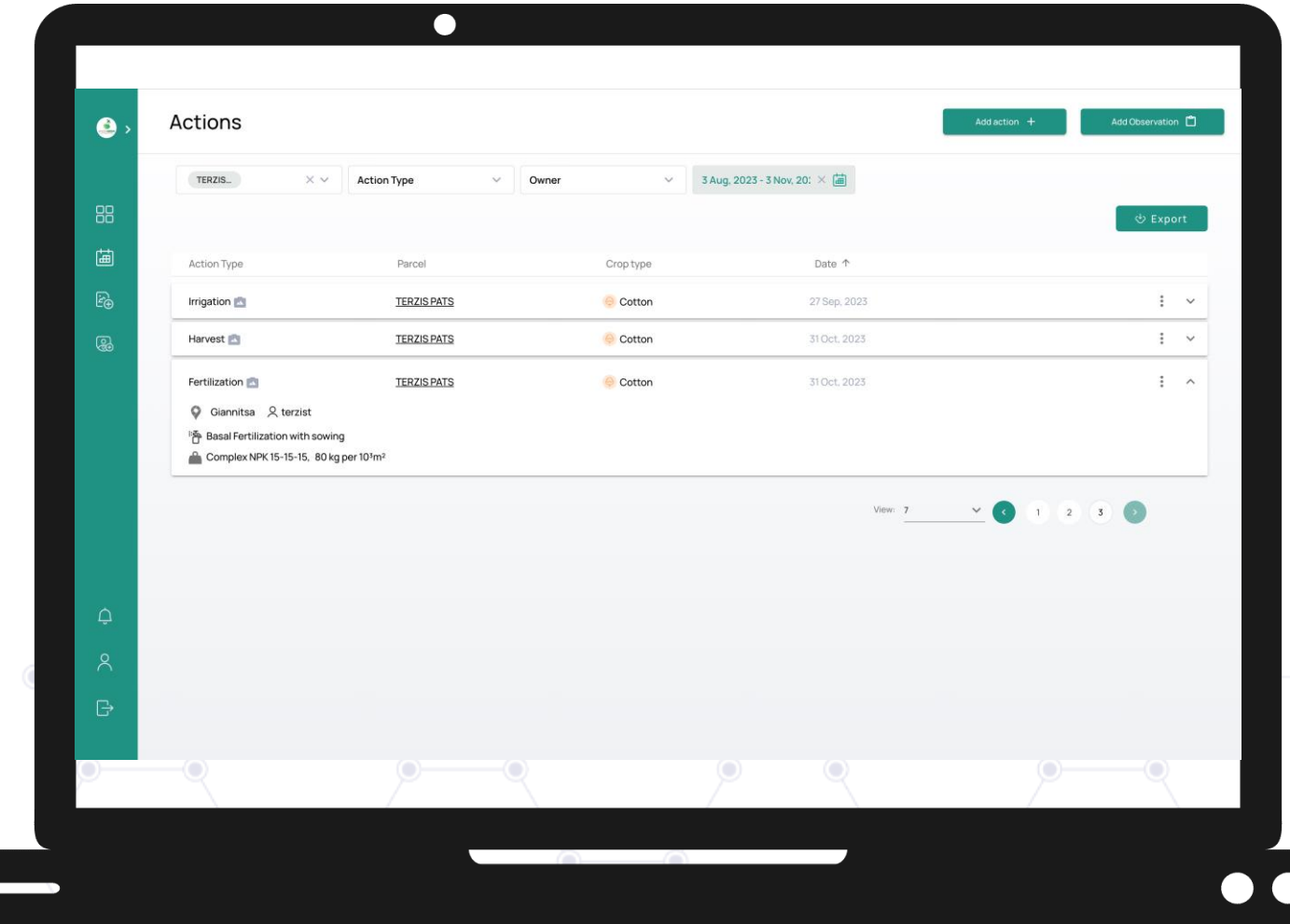
- > S4G App geolocates and timestamps the activity and makes the respective register on the blockchain

-> At the same time in the ESI Platform



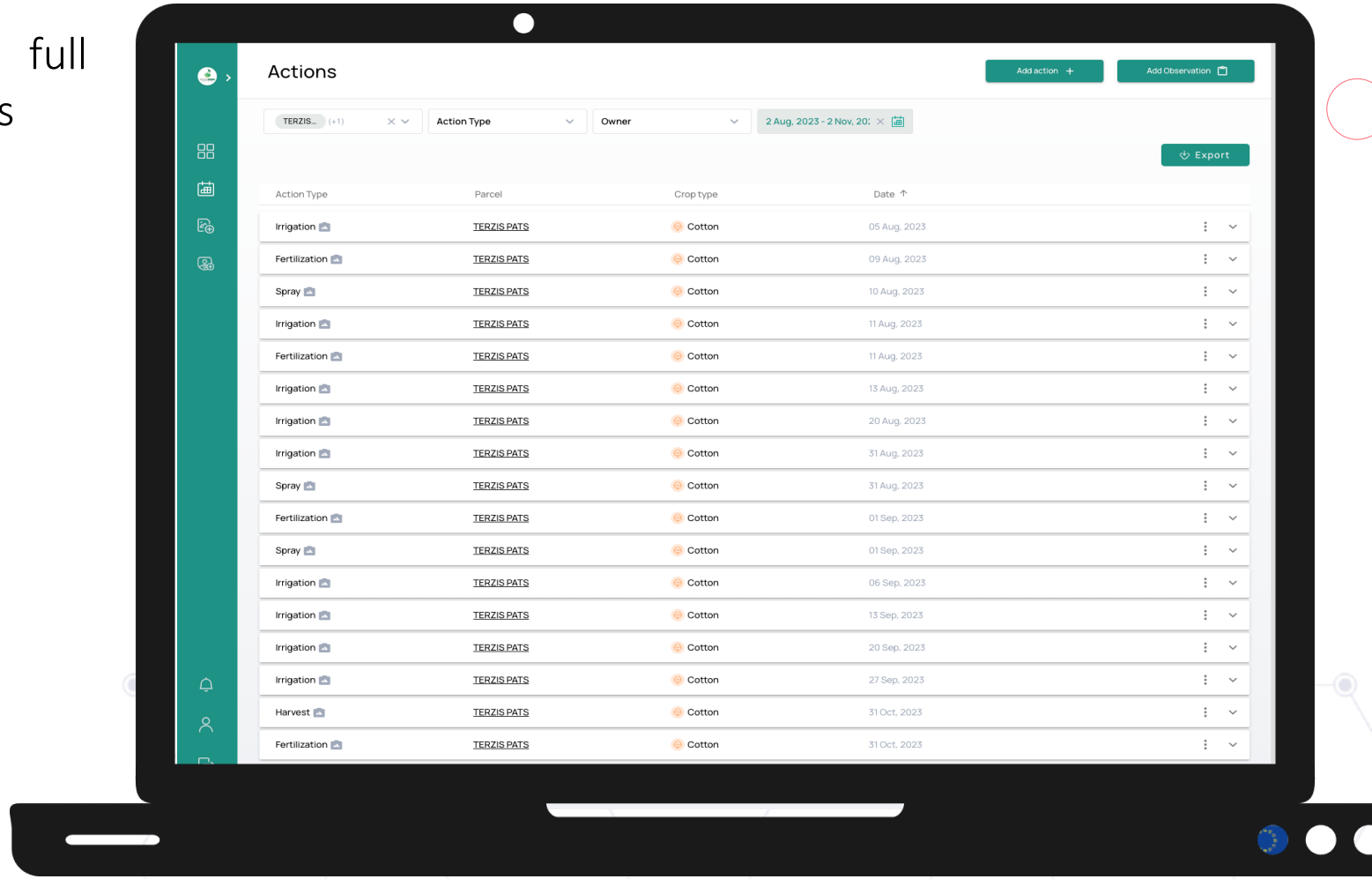
Environmental Sustainability Index of Cotton & Vineyards Cultivation

->The parcel specific calendar is being populated with every incoming activity



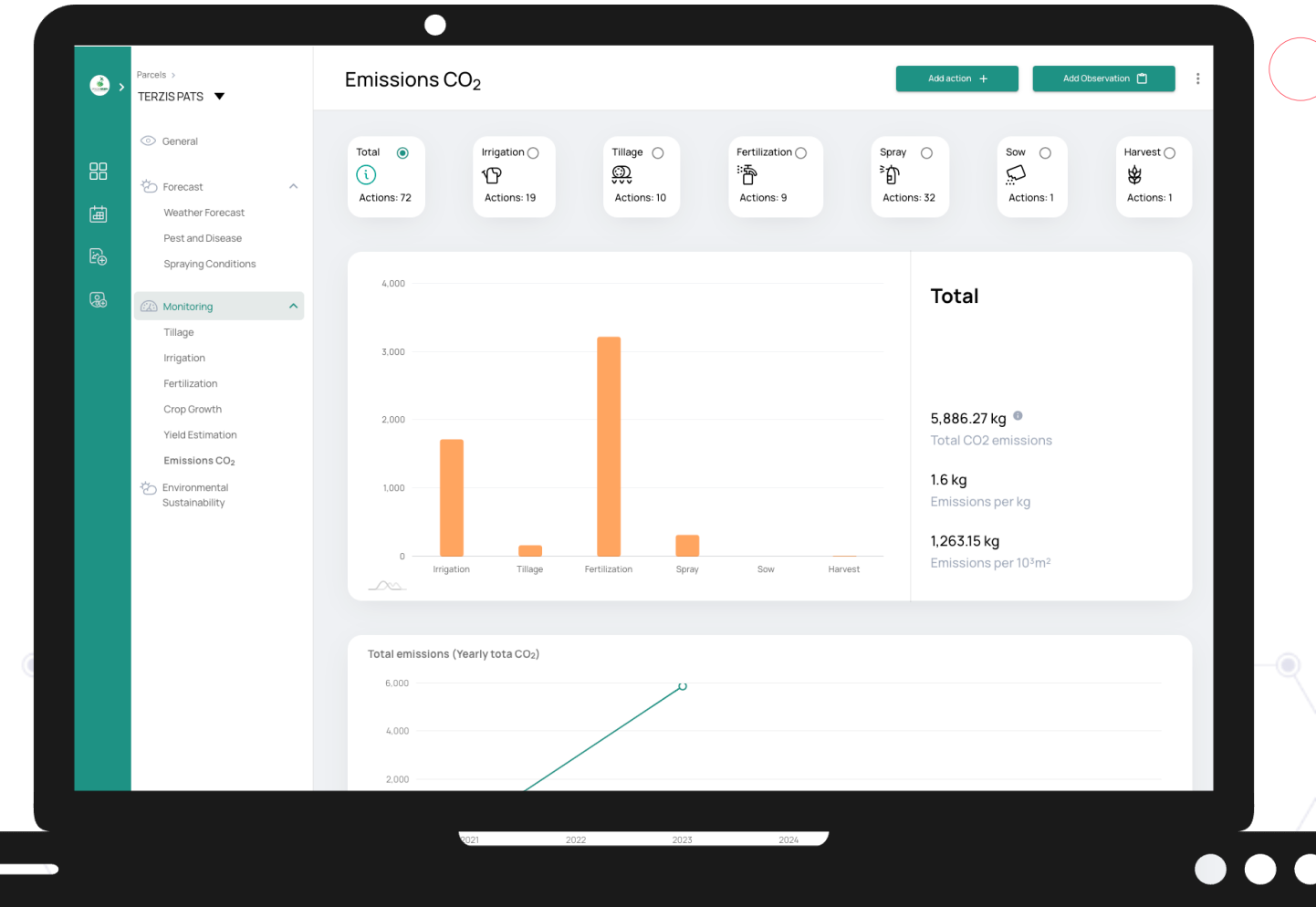
Environmental Sustainability Index of Cotton & Vineyards Cultivation

->Activities are aggregated, and the full calendar for each of the parcels appears



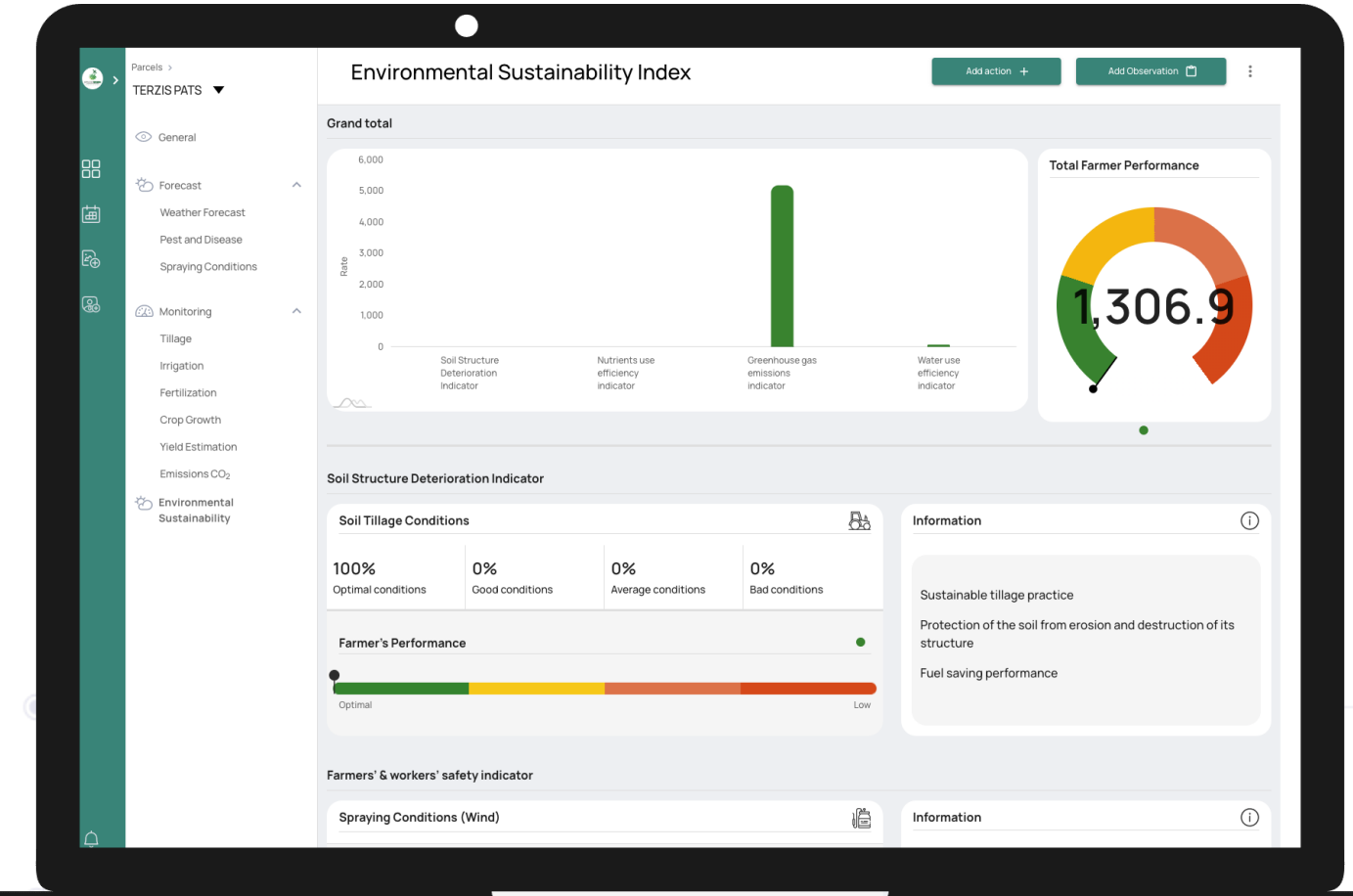
Environmental Sustainability Index of Cotton & Vineyards Cultivation

-> With every activity the respective CO2 emissions are calculated



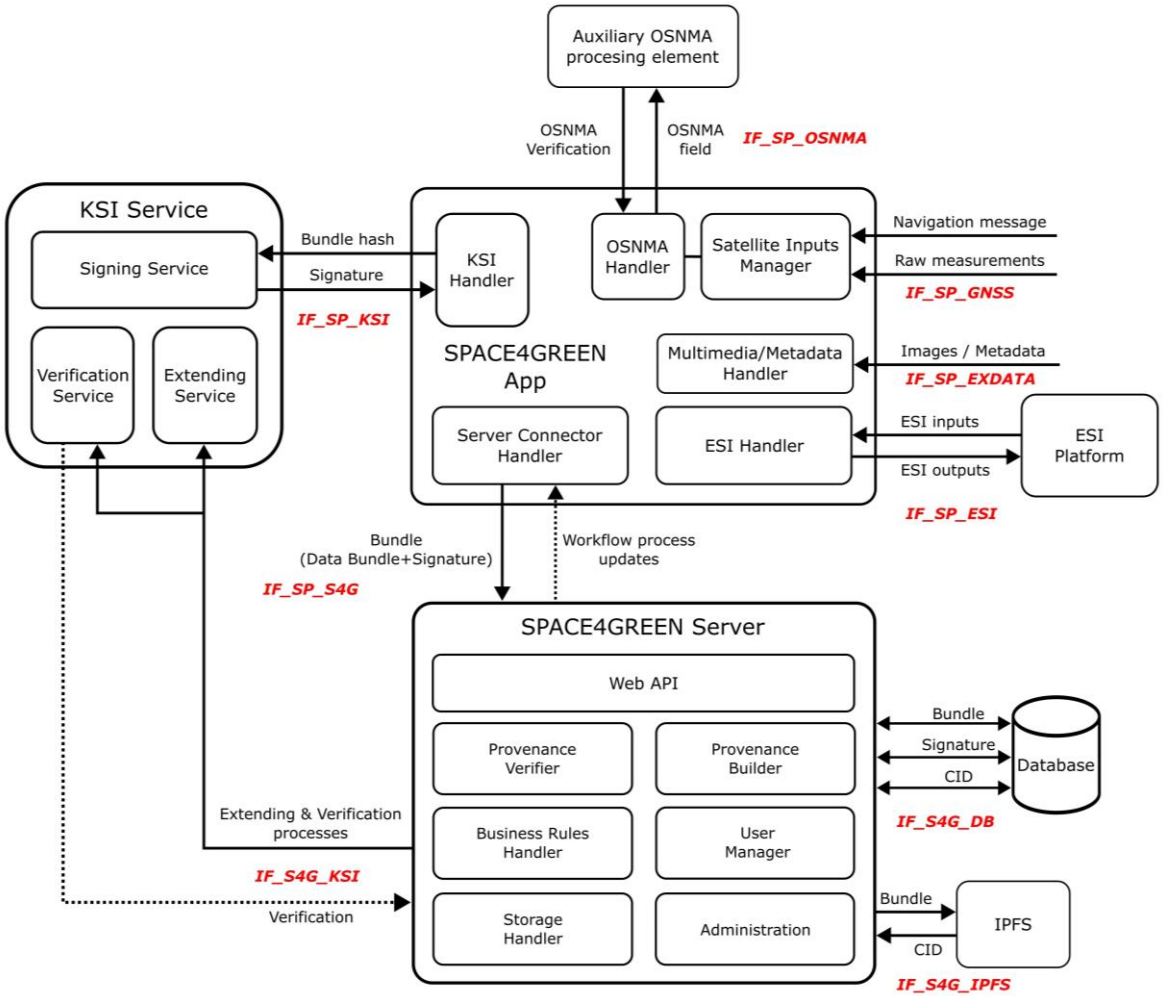
Environmental Sustainability Index of Cotton & Vineyards Cultivation

->And finally at the end of the crop season the ESI Score is calculated



SPACE4GREEN: Current implementation and integration

Implemented SPACE4GREEN architecture



- SPACE4GREEN App V1
- SPACE4GREEN Server V1
- KSI Service: Blockchain
- Auxiliary OSNMA processing element: Galmon device.
- ESI Platform V1
- IPFS preliminary tests
- Spoofing tests

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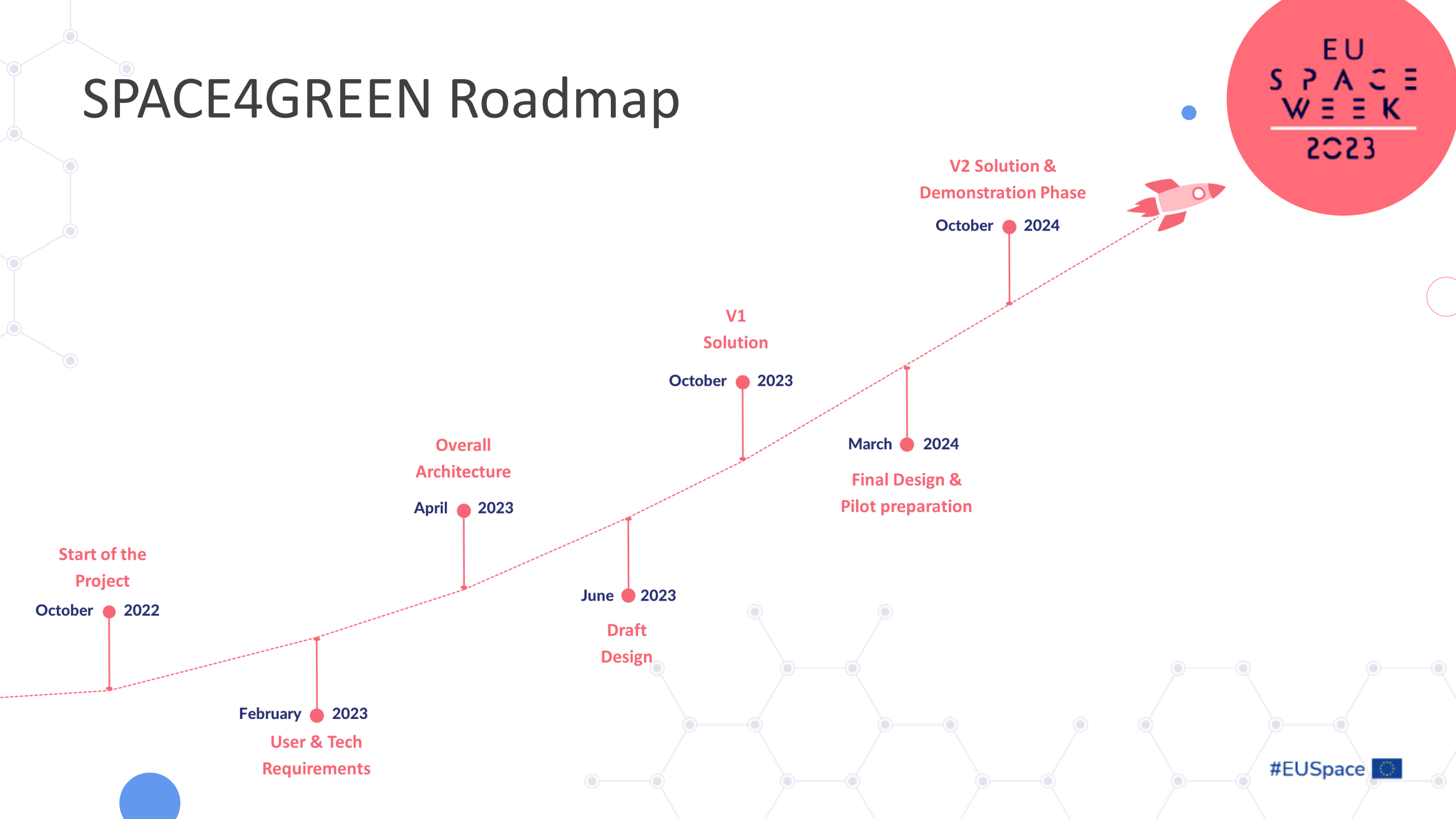
SPACE4GREEN Roadmap



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Conclusion

To sum up…

- Galileo OS-NMA & Copernicus enable more accurate navigation and timing
- Galileo OS-NMA & Copernicus support traceability and sustainability
- Versatile solution with multiple applications in the agrifood industry: short food supply chains, CAP management, olive oil & wine production, sustainable crops.
- Trusted information that can be easily shared among agri-food stakeholders.
- Smartphones are uncapable of fully decoding OSNMA fields near real-time: Auxiliary OSNMA processing element.
- Demonstration phase from March 2024 to October 2024.

Agriculture session - Agenda

10:00	*Session Agenda presentation*	**Stefan Schneider**, EUSPA
10:10	*EU Space Programme Components current state and future services for users*	**Javier de Blas**, EUSPA
10:25	*Horizon Europe EGNSS Mission and Service related R&D activities and Contribution to Ionospheric Prediction Service*	**Javier Ostolaza**, EUSPA & **Leo Bibollet**, **Hanaa AL BITAR,** TAS
10:35	*Copernicus for Agriculture:*	
	CLMS for Agriculture	**Usue Donezar**, EEA
	C3S/CAMS for Agriculture	**Cristina Ananasso** & **Delphine Deryng** ECMWF
11:05	*Developing requirements from automation to autonomy & discussion*	**Georg Larscheid**, Claas
11:25	*GALIRUMI R&D project – EGNSS based robots for organic farming & discussion*	**Esther López**, Acorde - GALIRUMI H2020
11:45	*The EU SPACE opportunity for small and medium size farmers & discussion*	**Maurizio Laterza**, Planetek
12:05	*EU SPACE role within Regenerative Agriculture & discussion*	**Tamme Van Der Wal**, Aerovision
12:25	*SPACE4GREEN R&D project - EU Space and block chain for traceability and sustainability & discussion*	**Juan Pablo García**, Integrasys
12:50	*Conclusions and next steps*	**Stefan Schneider**, EUSPA
13:00	*Lunch*	

KEY AREAS

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Conclusions and next steps

CONCLUSIONS

Thank you for your active participation to the Agriculture User Consultation Platform!

Your feedback and inputs are of key importance to us, as they will feed into the **Report on Agriculture and Forestry User Needs and Requirements.** The report will be published in **early 2024** (on EUSPA website)

NEXT STEPS

- The **minutes** of today's session will be soon made available online
- From **14.00 to 17.00** today you are welcome to join the **Forestry User Consultation Platform.**

Thank you!