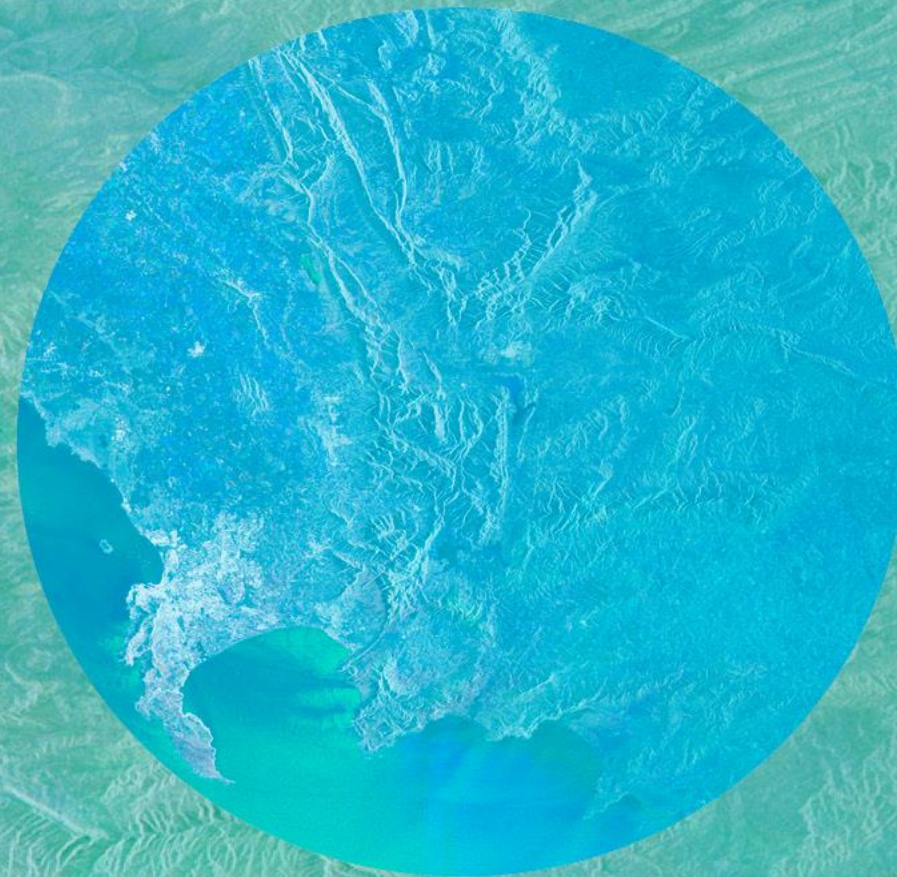


GEO WEEK & MINISTERIAL SUMMIT 2023

Flash Talk

#TheEarthTalks



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



GEO WEEK
2023 MINISTERIAL
SUMMIT

GEO GROUP ON
EARTH OBSERVATIONS

A MEASUREMENT, REPORTING AND VERIFICATION SYSTEM IN NEAR REAL TIME FOR GREENER LAND MANAGEMENT AND FUNDING

*Hakki Emrah ERDOGAN,
Vincenzo ANGILERI, Phillippe LOUDJANI, Wim DEVOS*

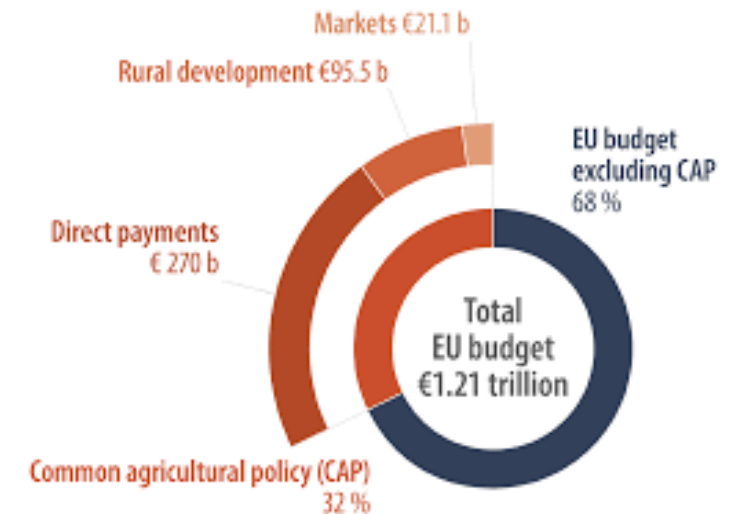
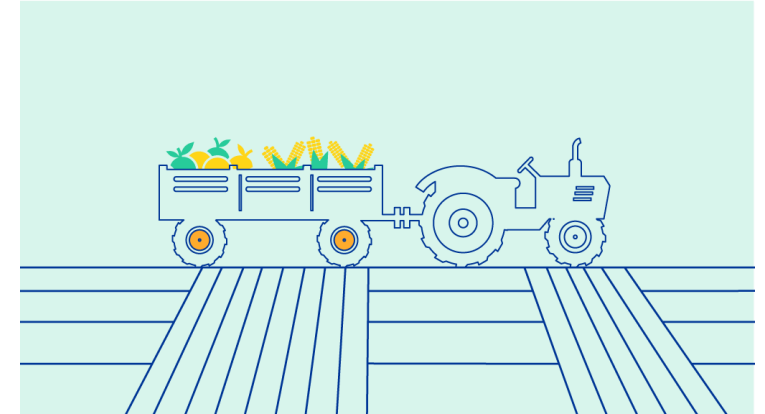
Joint Research Centre, Ispra, Italy
D5 - Food Security Unit



Need to MRV process

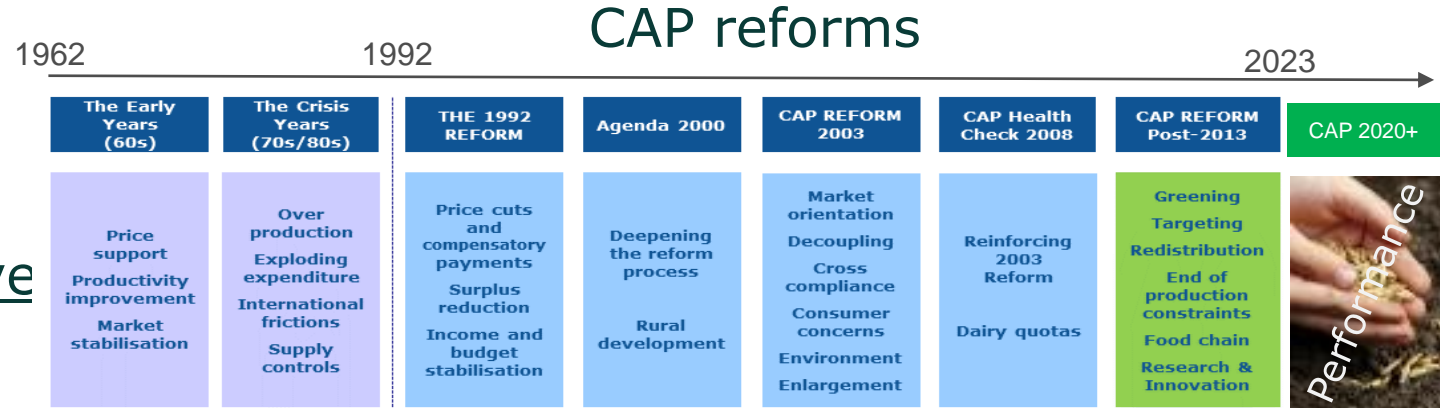
EU CAP 2023 -2027

- 7 million beneficiaries across the EU
- budget of €386.6 billion, 32 % of the total EU budget
- climate action with some 40% of CAP budget
- Eco-schemes for climate and environmental-friendly practices
- Member states draw up a strategic plan (SP).
- CAP performance-based system



History of CAP and technologies

Conditions continuously evolve



Direct payments

On-The-Spot Checks (OTSC)

CwRS (Control with Remote Sensing)

LPIS

CbM

Technology is also evolving



Ever evolving implementation with updates

... or upgrades

Nothing never definitive ...

JRC Check by Monitoring (CbM)

European Commission | Guidance and Tools for CAP (GTCAF) Home

Checks by monitoring

Technical Guidance

The CbM developed at the time when the Commission focused on legislating the performance based CAP. Only a single, early, CbM document achieved technical guidance status, all later JRC technical developments were published as voluntary methodology, technical report or tool.

Technical discussion documents

- WAGCAP DS CDP 2017 08 Discussion document on the **introduction of monitoring to substitute OTSC** JRC10855.pdf 5.031 kB
- WAGCAP DS CDP 2018 18 Second discussion document on the introduction of monitoring to substitute OTSC: **rules for processing applications in 2018-2019** JRC12018.pdf 3.789 kB
- WAGCAP DS CDP 2018 17 technical guidance on the **decision to go for substitution of OTSC by monitoring 2018** JRC12018_published.pdf 1.966 kB

The voluntary CbM QA methodology

IMPORTANT Despite the file names that hold "TD", this methodology never reached Technical Guidance status (in contrast to LPS QA) because the intended article was not introduced in the regulatory acts.

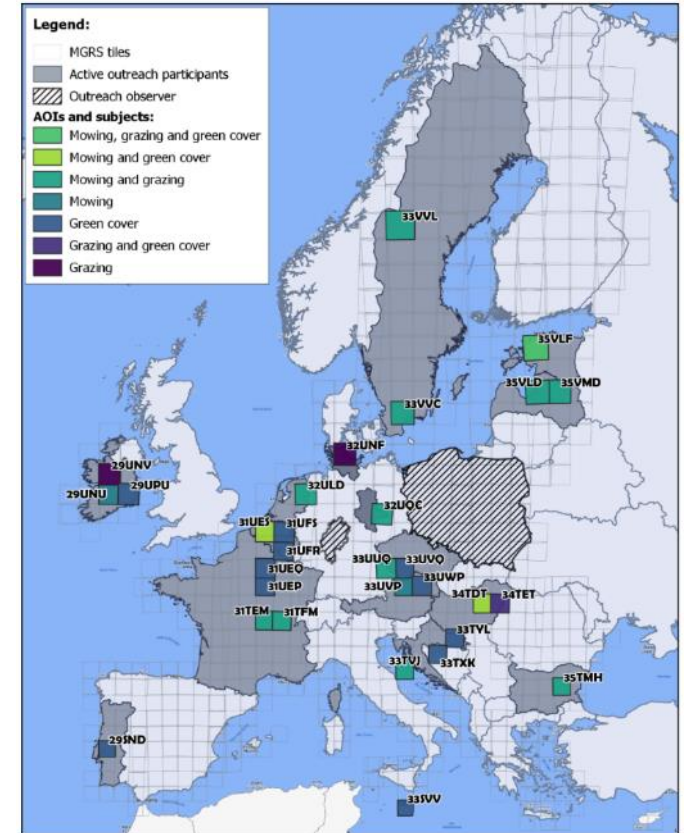
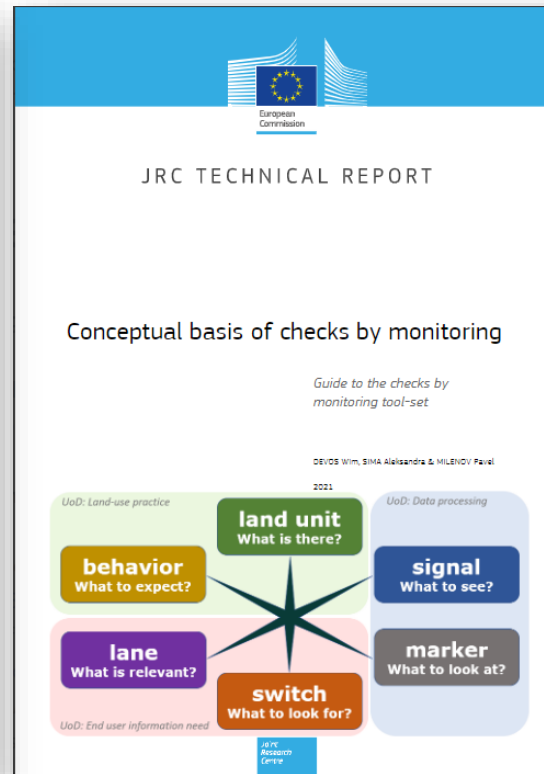
- WAGCAP Checks by Monitoring Quality Assurance: **development activities 2022** JRC128276_01.pdf 1.146 kB
- WAGCAP CbM quality assurance: **document set v1.2 2021**, a voluntary methodology proposed for 2020 and 2021
 - Inspection methodology 2021 v1.2 T5_CbMQA_1_2_1 1502201.pdf 1.889 kB
 - Annexes 2021 v1.2 T5_CbMQA_1_2_Annexes_04_4_21 kB
 - Presentation on multiple scheme conditions CbMQA_Sep2_multiple_Schemes.pdf 292 kB
- WAGCAP CbM quality assurance: **draft document set v1.1** (for joint development) 2020
 - Inspection methodology 2020 v1.1 T5_CbMQA_1_1.pdf 1.676 kB
 - Annexes 2020 v1.1 T5_CbMQA_1_1_Annexes_04_4_20 kB
- WAGCAP Checks by Monitoring quality inspection: EU requirements and methodology **technical note 2020** CbMQA_DD_1_1.pdf 1.056 kB

Technical reports

- Original 2021: Use of **geotagged photographs to evidence Land Cover and Land Use** across EU policies JRC116007_Geotag_report_V5_Final.pdf 6.161 kB
- WAGCAP **Guidance and technologies for a greener agriculture in Europe 2023** JRC121038_jrc121038_final_05042023.pdf 4.881 kB
- WAGCAP **Key CbM concepts** Conceptual basis of checks by monitoring: a partial revision of the earlier technical discussions 2022 JRC127676_final.pdf 1.716 kB
- WAGCAP **Documenting a CbM implementation**: a structured template for documenting agricultural land monitoring systems 2022 JRC116962_draft.pdf 2.121 kB
- WAGCAP **Proposed workflow** for optimization of land monitoring systems: Copernicus Sentinel time series analysis within the Checks by Monitoring framework 2022 JRC120819_draft.pdf 4.018 kB
- WAGCAP **Collection of Methods for Data Analysis** from Signal Selection to Marker Detection 2022 JRC118044_collection_of_methods_for_data_analysis_19sep2022.pdf 2.866 kB
- WAGCAP **Progress on Assessing the Suitability of the Future of Inland 2020** JRC120711_for_assessment_final22.pdf 9.579 kB
- JRC publications repository: **Planet HR Time Stacks tests** in the 2019 crop season 2020 JRC121118.pdf 2.804 kB
- JRC publications repository: **Applicability limits of Sentinel-2 data** compared to higher resolution imagery 2019 JRC119564.pdf 2.721 kB
- WAGCAP DS CDP 2018 18 **Second discussion document** on the introduction of monitoring to substitute OTSC: rules for processing applications in 2018-2019 JRC12018.pdf 3.789 kB
- WAGCAP DS CDP 2017 08 **discussion document** on the introduction of monitoring to substitute OTSC 2017 JRC10855.pdf 5.031 kB

Software tools

- CbM QA **template repository** for v1.1 and v1.2 in the registry
- **Signal Analyses** for Land Monitoring Systems SALMS R package can be found on jrc.cbm@maifedoc.eu
- Open source software tools for **parcel processing** of the Sentinel data streams can be found on our github.com page



<https://wikis.ec.europa.eu/display/GUIDANCEANDTOOLSFORCAP/Checks+by+monitoring>

CbM Outreach Initiative 2021

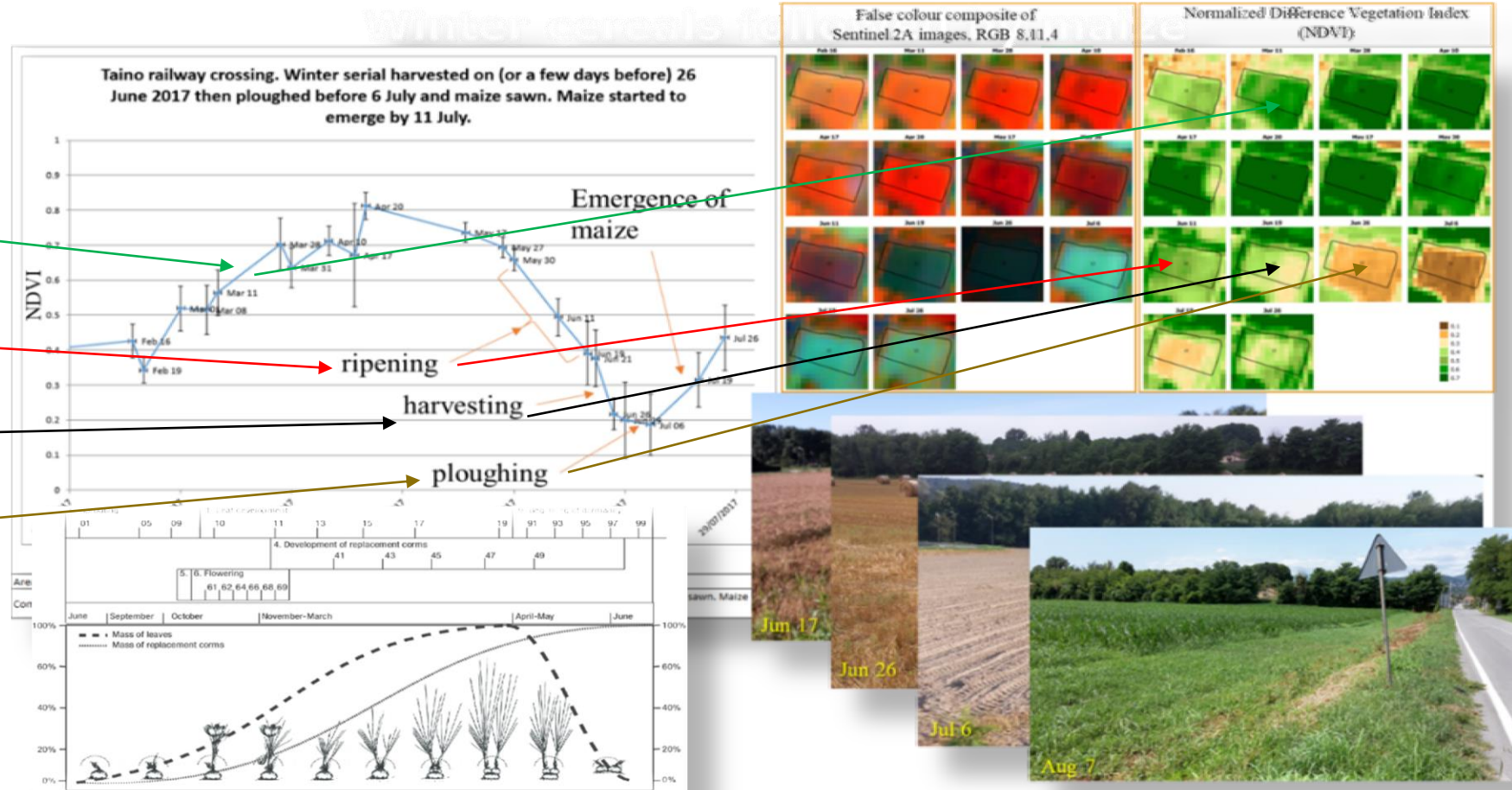
Check by monitoring: full territory monitoring

"From sequential a posteriori check to near real time monitoring"

Based on **automatic** identification with **Machine Learning** of predefined "**markers**" on temporal profiles

Temporal series hold information to allow discriminating LU/LC

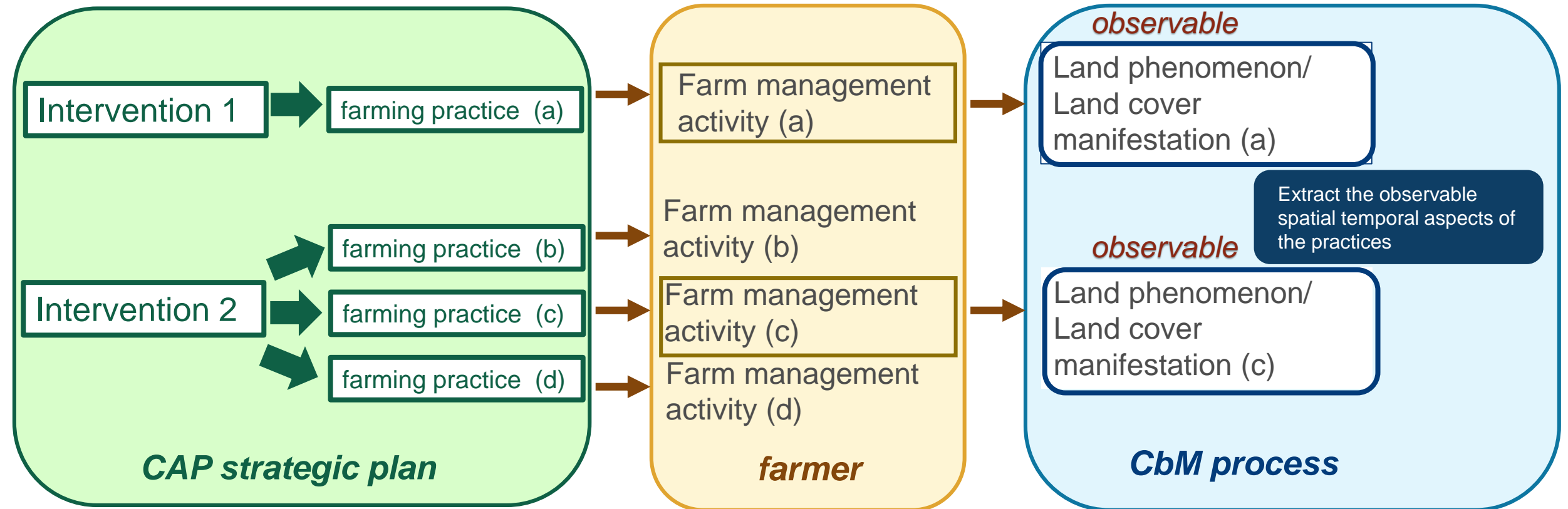
- **Plant growth**
- **Senescence**
- **Harvest**
- **Bare soil**



Focus on **markers** since **activities** more important than crops

Check by monitoring: full territory monitoring

Extract the qualifying elements of the interventions according to the CbM concepts

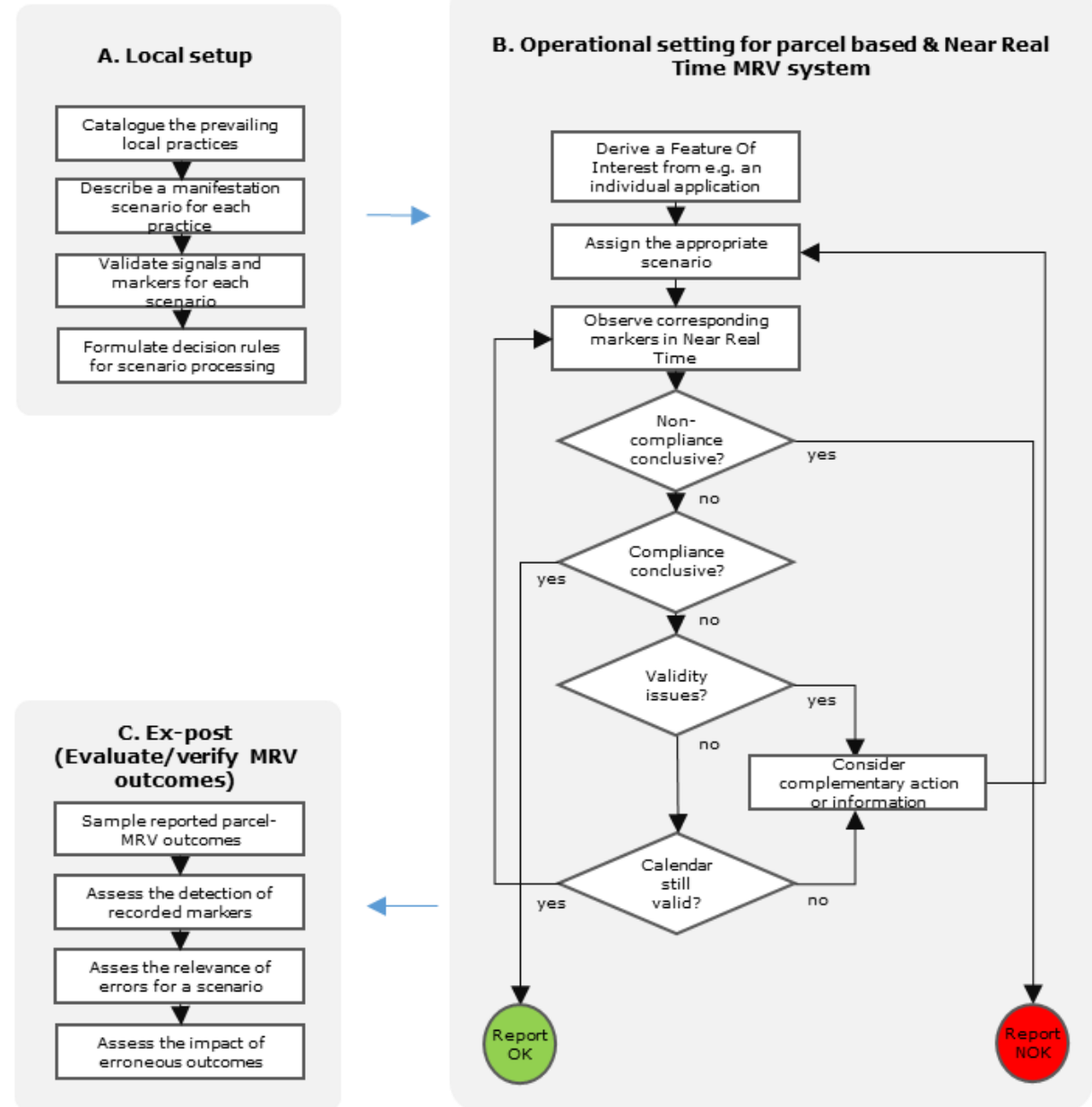


MRV workflow

a local setup for transforming scenarios into a sequence of activities

Operational Setting requires instantiating the Feature of Interest (FOI), that can be presumed from the Geospatial Aid Application (GSA). The result confirms or rejects the occurrence of a declared agricultural practice.

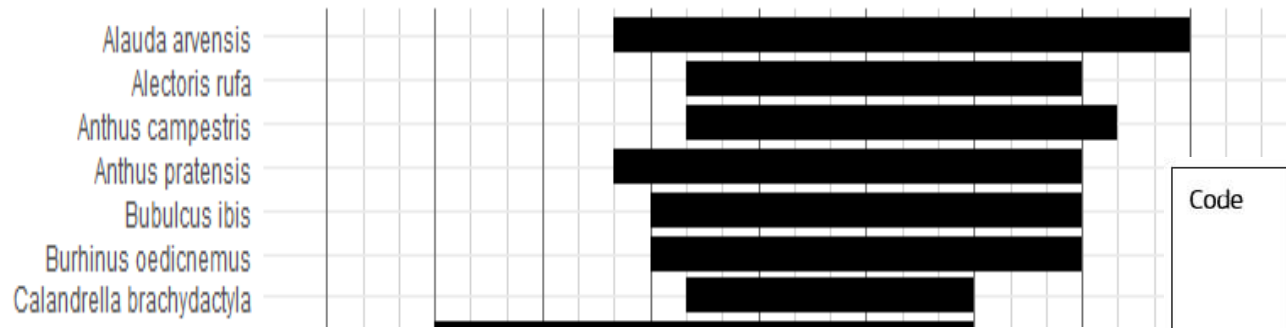
Ex-post evaluation of the results validates all system processing lanes.



Extending innovative process to monitor practices for environment and climate

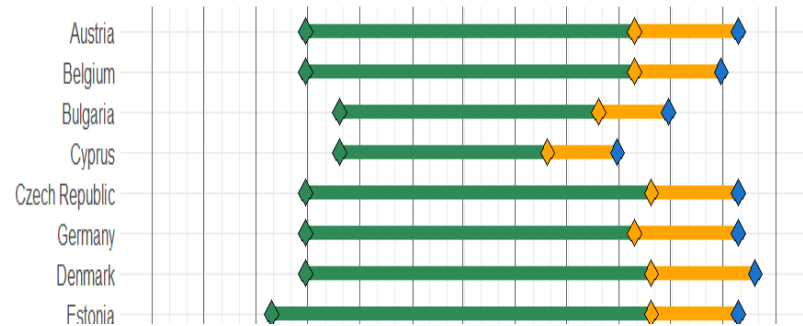
Study on ecological traits of the birds in relation to crop types and agricultural practices

Time of breeding of the species included in the farmland bird index



Code	Name	Needs addressed	Requirements	Relevance to birds	No. of ha (planned unit amount per ha, in EUR)
I 4.1	Areas with melliferous plants	6.P1, 6.P2, 6.P3	<p>Sowing of a mixture containing min. 2 melliferous plant species from a specific list</p> <p>No agricultural production (including grazing and mowing) until 31.08</p> <p>No crop protection products allowed</p>	Relevant to species which utilise field margins and fallow-like habitats, or ones feeding on invertebrates and weed seeds. See also I 4.12	3000 (269,21)

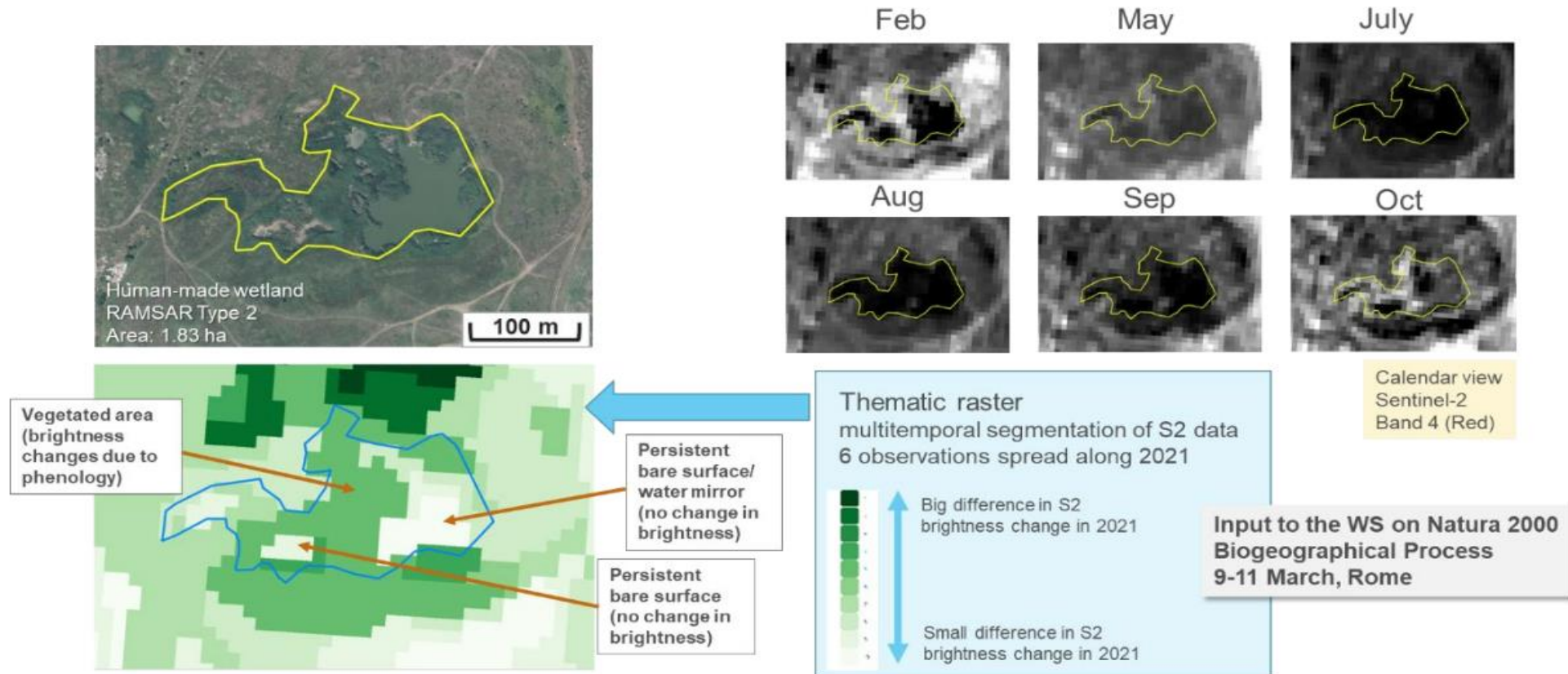
Phenology of winter wheat in the EU countries



Eco-schemes in a MS with impact on birds

Extending innovative process to monitor practices for environment and climate

Assessing the land cover changes in wetlands and the potential impact of land use by studying vegetating behavior on multitemporal Sentinel data



Conclusion

- Recent innovations (especially Sentinel data) allow for a paradigm shift
- A cost-effective approach for analysing the eligibility and effectiveness of area-based funding linked to land use
- The CbM solution represents a parcel based dMRV methodology that imposed compliance checks on a parcel's land cover and agricultural use.
- This system holds potential for more generic LC/LU continuous monitoring applications.
- Uniquely significant for guiding policymakers and decision-makers, as it offers an instrument to help achieve multiple policies' targets

The way forward

- The use of innovative AI/ML processes based on Sentinel data need to be complemented by other innovative technologies such as geotagged photos, drones or even field sensors.
- Potential for carbon certification and several other sector-specific initiatives (e.g., sustainable coffee production, organic agriculture, sustainable cocoa production ...)

Thank you and keep in touch



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