NIVA

NEW IACS VISION IN ACTION

Use of Sentinel images for the new CAP monitoring system: quality issues and potential solutions

Spatial Data Quality workshop
11-12 October 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 842009

Plan

- General context: CAP monitoring
- Short presentation of the NIVA project
- Quality issues of new CAP monitoring system
- Conclusions

Common Agricultural Policy (CAP) monitoring

CAP general principles

- In the context of Common Agricultural Policy, farmers may receive payments

- But they have to respect some conditions

- Controls are conducted by Paying Agencies
  - on declared areas :
    - use of LPIS (Land Parcel Identification System)
    - LPIS provides the boundaries of agricultural areas
  - on activities

Checking the activities: previous system (before 2023)

- By sampling : 5 % of farmers

- Source of controls:
  - satellite images (1-2 dates)
  - controls of the spot

- Controls often considered as unfair by farmers
  - “tracking the last m^2”
  - Exaggerated penalties

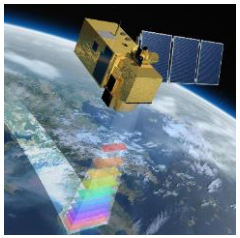
Checking the activities : new system (after 2023)

- Making advantage of Sentinel images
  - Good resolution (10 m for S-2)
  - High frequency
  - Free of charge

- To ensure continuous and exhaustive control of all parcels

Checking the activities : new system

Parcels with declared activities



Sentinel images

EO monitoring

Traffic lights at parcel level

Payment

No payment

Ask for secondary evidence (e.g. geotagged photos)

Checking the activities : new system

- Allowing farmers to change their declarations (done in May each year)

- General purpose is not to track red lights but to make them disappear

The new monitoring system mandated by the EU Commission is quite fairer than the old one.

What about practical implementation and quality issues?

NIVA project

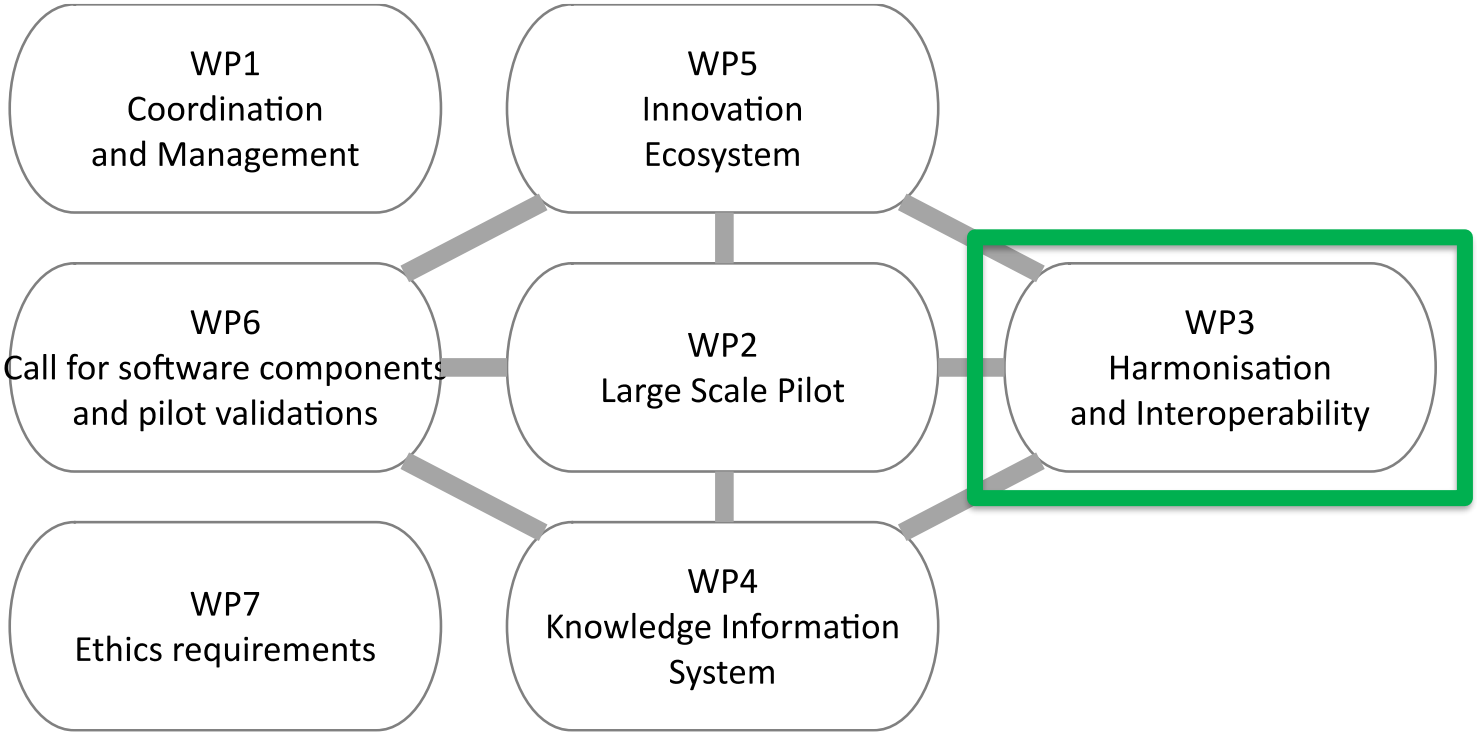
The NIVA project

- NIVA: New IACS* Vision in Action
- H2020 project
- Objectives:
  - –To develop e-tools to modernise the CAP
  - –To broader reuse of IACS data
- Consortium
  - 9 Paying Agencies
  - technical partners

  } 27 partners
- 3 years project (June 2019 to May 2022)

IACS : Integrated Administration and Control System (Information System of Paying Agencies)*

The NIVA project



(Main) source of today presentation

WP3 conducted some state-of-play about EO monitoring

Quality issues and potential solutions

Quality criteria

Reliability

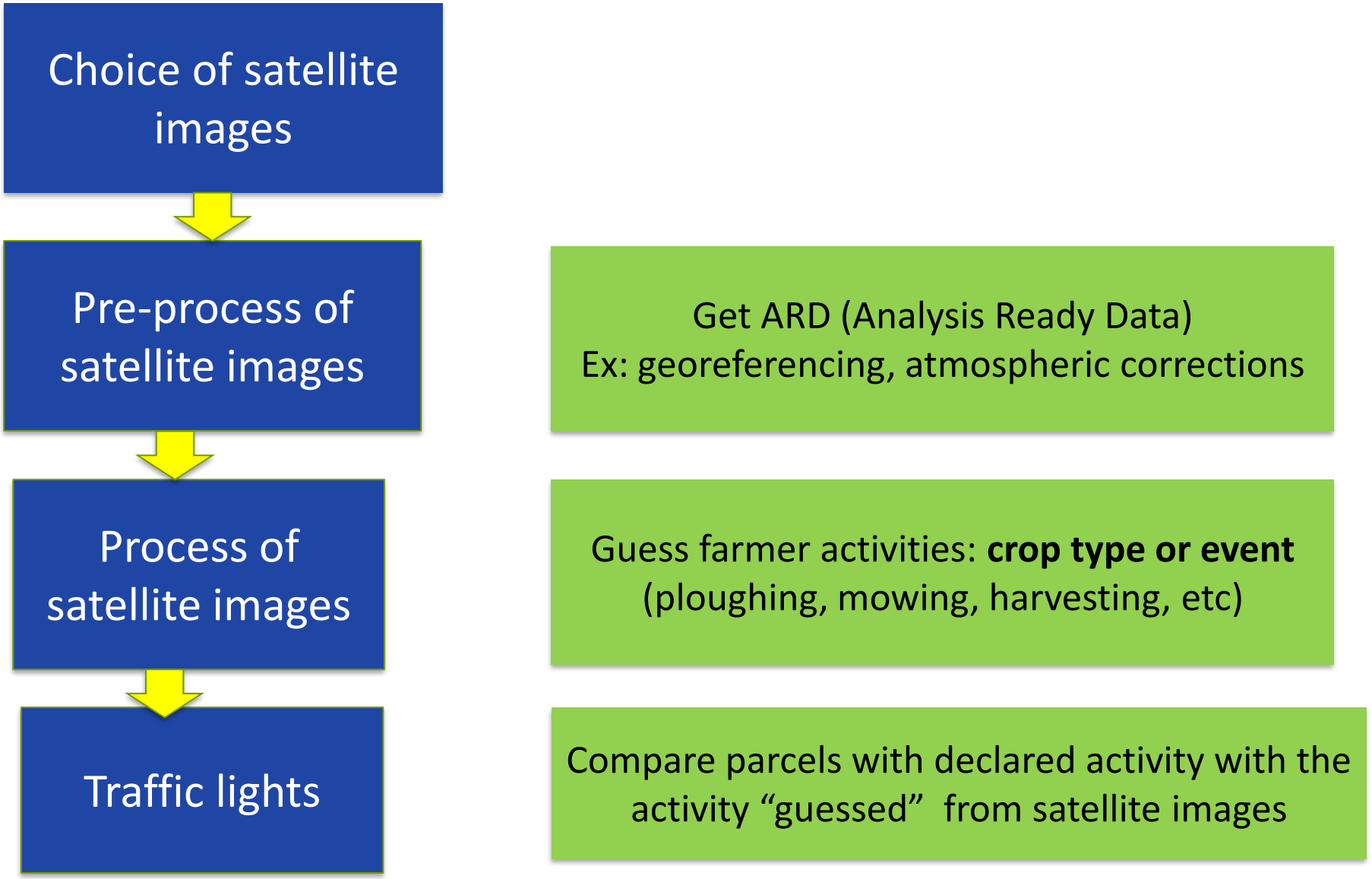
Reasonable control costs

Acceptability by farmers

Efficiency

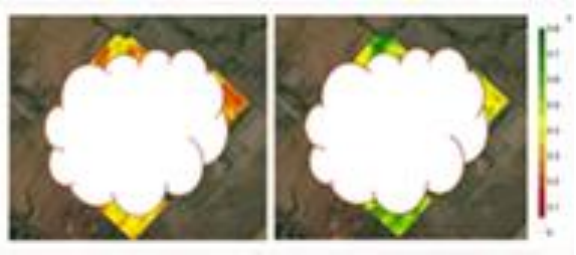
Transparency

EO monitoring phases



Choice of satellite images: quality issues

- S-2 images are the most adapted
  - Optic images easy to be interpreted
  - Rich semantic (13 bands)
  - High resolution (10 m)
- But optic images may be hidden by clouds



Significant issue in northern or mountainous areas

- 10 m resolution is not enough for small parcels

Choice of satellite images: potential solutions

- Against cloud issue, use of S-1 images
  - Radar data => weather regardless images
  - More difficult to process
  - Resolution: 30 m

Reliability

Efficiency

- To deal with small parcels, use of better resolution images (e.g. SPOT, Planet …)
  - Not free of charge
  - For **transparency** reasons, view to the images used in the monitoring process should be provided to farmers

Choice of satellite images: potential solutions

- Various approaches regarding definition of a “small parcel”

Pre-process of satellite images: quality issues

- Several options for cloud mask detection
- Choice of DTM may influence geo-referencing

- Main issues:
  - selection of valid pixels (balance reliability/efficiency)
  - transparency:
    - Likely limited impact on decision-making process
    - But necessary to benchmark various methods

Process of satellite images: context

- Machine-learning processes often used to guess the farmer activities

- Training data is generally coming from farmer declaration
  - limited number of errors or frauds
  - The AI process is robust enough to detect the “divergent” parcels

Process of satellite images: quality issues and potential solutions

- Availability of training data
  - Depends on the condition to be checked
  - Not enough, e.g. for rare crop types
  - Not at all, e.g. for forbidden practices

- Strategy to choose training data is key => to be documented

- Making more robust models
  - sharing training data between countries

Process of satellite images: quality issues and potential solutions

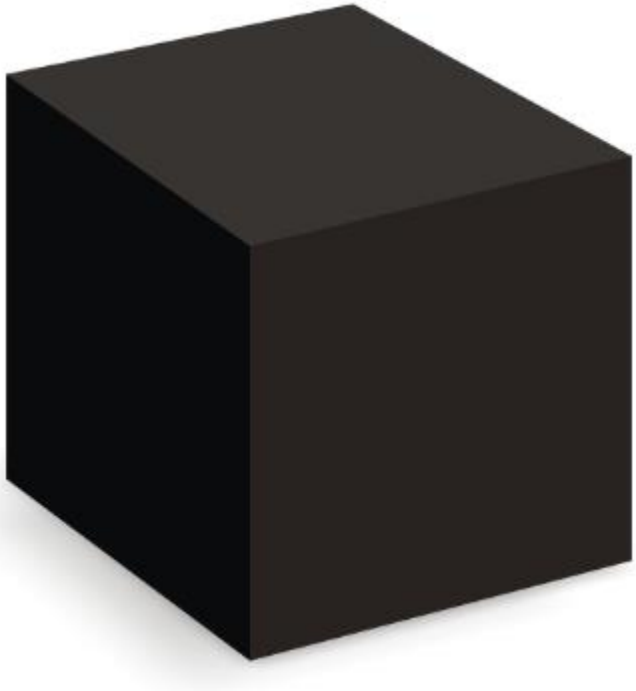
- Lack of reference data
- No mean to measure the reliability of a method or to compare 2 methods
- JRC guidelines for quality control focus on the process part; visual controls mandated on sample set of parcels

Process of satellite images: quality issues and potential solutions

- Lack of transparency: IA results considered as not understandable by human beings

- At least, farmers should be given view to the images used in the EO monitoring
  - No issue with free Sentinel images
  - To be taken into account for higher resolution and not free of charge images

Decision on traffic lights: quality issues



- Very limited communication from Paying Agencies
- Likely, choice of thresholds to decide if results of EO monitoring confirm or not farmer declarations is seen as difficult and a bit arbitrary

Conclusions

Need for efficient EO monitoring

Acceptability by farmers

- In the new control system, the main limitation is the requirement of secondary evidences
  - It requires farmer contribution
  - Geotagged photos seem the most promising solution
  - More or less accepted by farmers : should not be too often
    - **not too many "yellow lights" from EO monitoring**
    - organisational issues
  - Process of geotagged photos
    - Need for automation

Need for EO monitoring benchmarking

- There have been lots of experimentations about EO monitoring
- But it is difficult to compare them
- It is important to document all the decisions that influence the quality of CAP payment decision
  - Transparency
  - Method benchmark => process improvement

Need for EO monitoring benchmarking

- Some NIVA deliverables may help for standardised documentation of EO monitoring process
  - https://www.niva4cap.eu/wp-content/uploads/2021/09/D3.5Recommendations-for-standardised-connections-between-IACS-and-other-applications_v1.0.pdf
  - https://www.niva4cap.eu/wp-content/uploads/2021/11/D3.2-Common-Semantic-Model-M12-v1.1.pdf

Conclusion

- The new monitoring system looks quite fairer
- But it is raising lots of technical and organisational issues
- Need for consolidation
  - Should be implemented soon in EU
  - But still years of work to get strong quality ensured system ?

NIVA
NEW IACS VISION IN ACTION

Thank you for your attention!

This project has received funding from the european union's horizon 2020 research and innovation programme under grant agreement no. 842009