Mavi

AGENCY FOR RURAL AFFAIRS

Control With Remote Sensing in Finland

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Agency for Rural Affairs (Mavi)

- Mavi is responsible for the use of funds of the European Agricultural Guarantee Fund and the European Agricultural Fund for Rural Development in Finland.
- Acts as the paying agency in Finland administering the payment of appr. 2,5 billion EUR annually.
- Administers IT-systems for farmers aid applications and develops e-services.
- Agency founded in spring 2007

Terminology

- IACS = Integrated Administration and Control System
- LPIS = Land Parcel Identification System
- CAPI = Computer Assisted Photo Interpretation
- CwRS = Control with Remote Sensing
- OTSC = On-The-Spot-Check
- RFV = Rapid Field Visit (“quick check”)
- Reference parcel (rp)= a “field” in the possession of a single farmer
- Farmers block = an rp delineated by natural boundaries (ditch, road, etc.).
- Agricultural parcel = an ”polygon” within an rp consisting of a single crop
- Greening/cross compliance = environmental measures required by the EU

Mavi data

IACS	• Integrated Administration and Control System • Farmers aid applications
LPIS	• Main subsystem of IACS • Identification system for agricultural parcels (GIS)
REFERENCE PARCEL	• Area measurement → base for area based subsidies (€1.8 B)
CROSS CHECK	• Controls required by EU to verify payments

Finnish LPIS - Facts

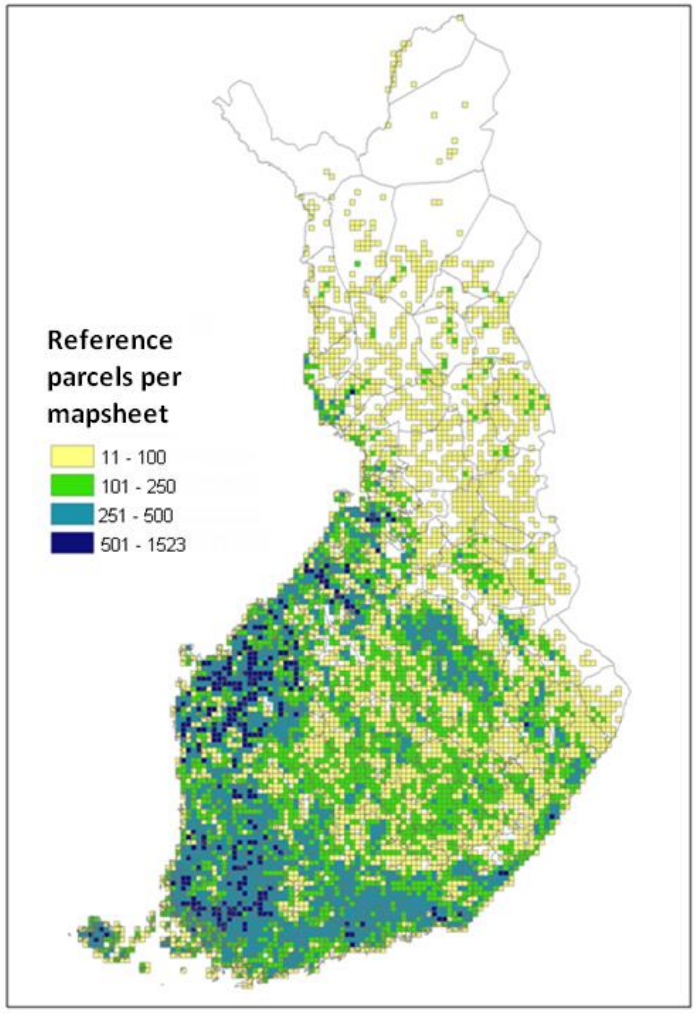
50 000 farms

1 M reference parcels

- Farmers block
- 2.3 M hectares

Aerial orthoimagery (CIR)

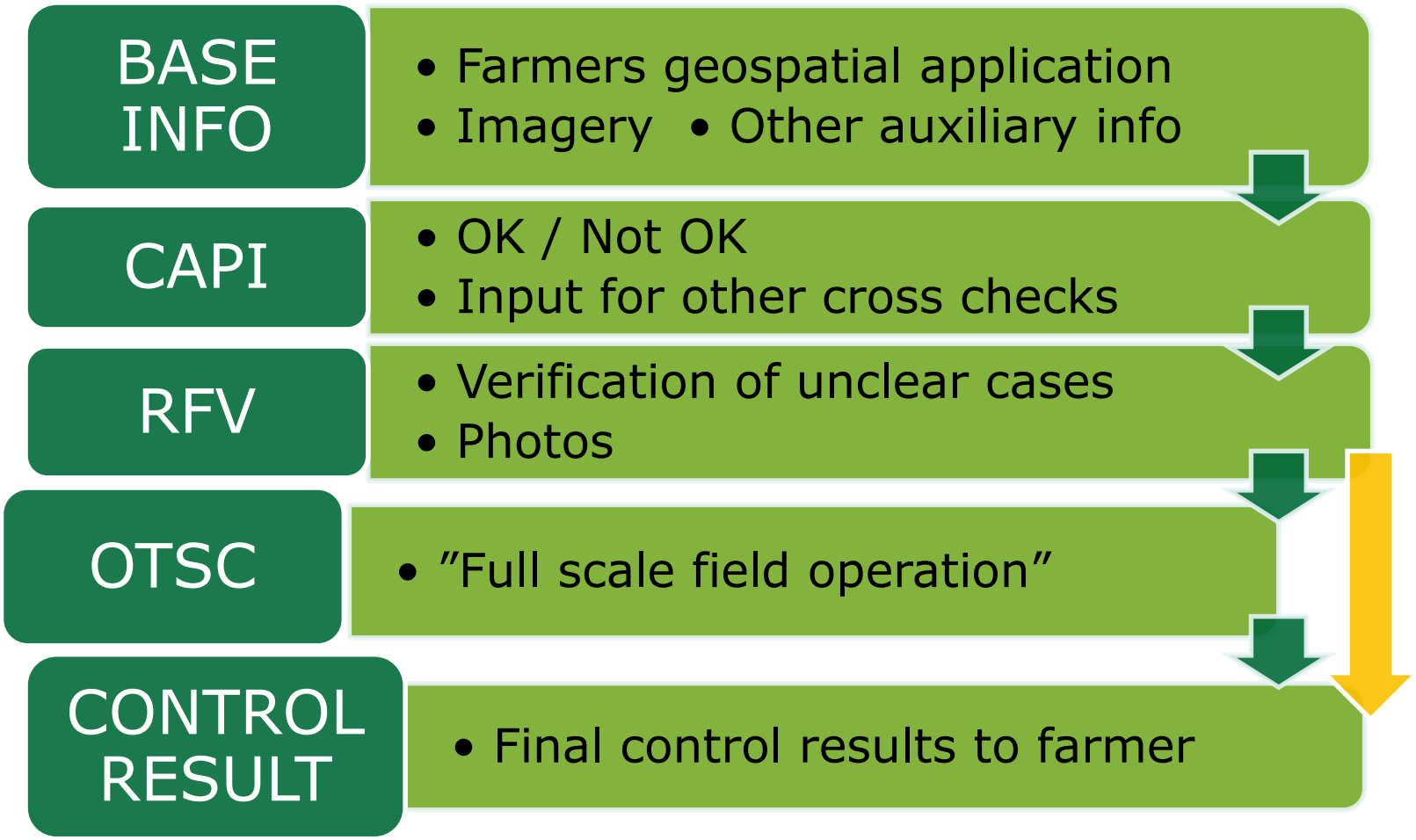
- 0.5 m pixel size
- 60 000 images



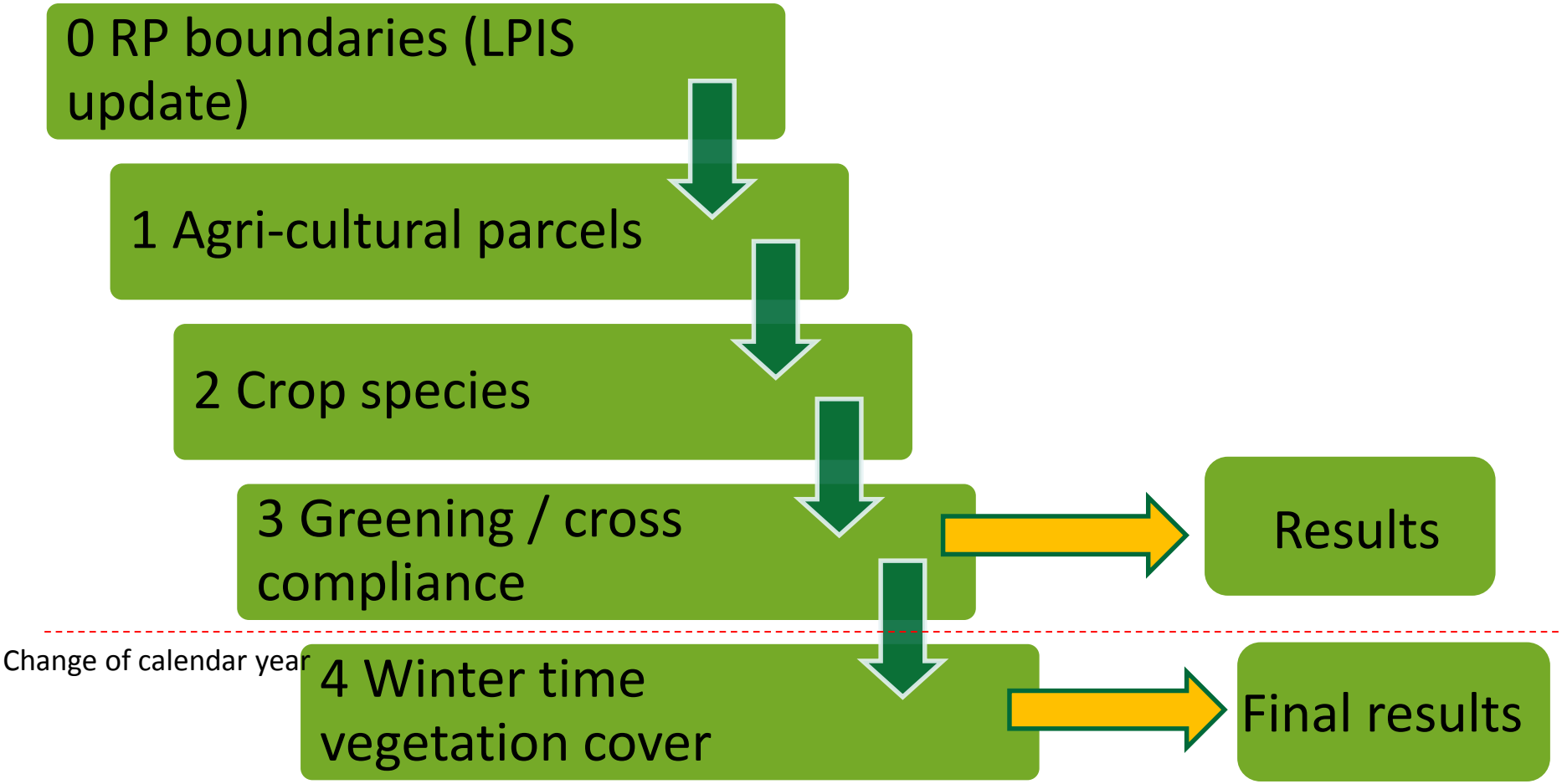
Finnish Controls – Annual figures

3 000 farms (5%)	• 70 000 rp´s
100 % OTSC	• 200 controllers
€ 12 M	• 4 000 € / OTSC

CWRS – Possible scenario



CAPI

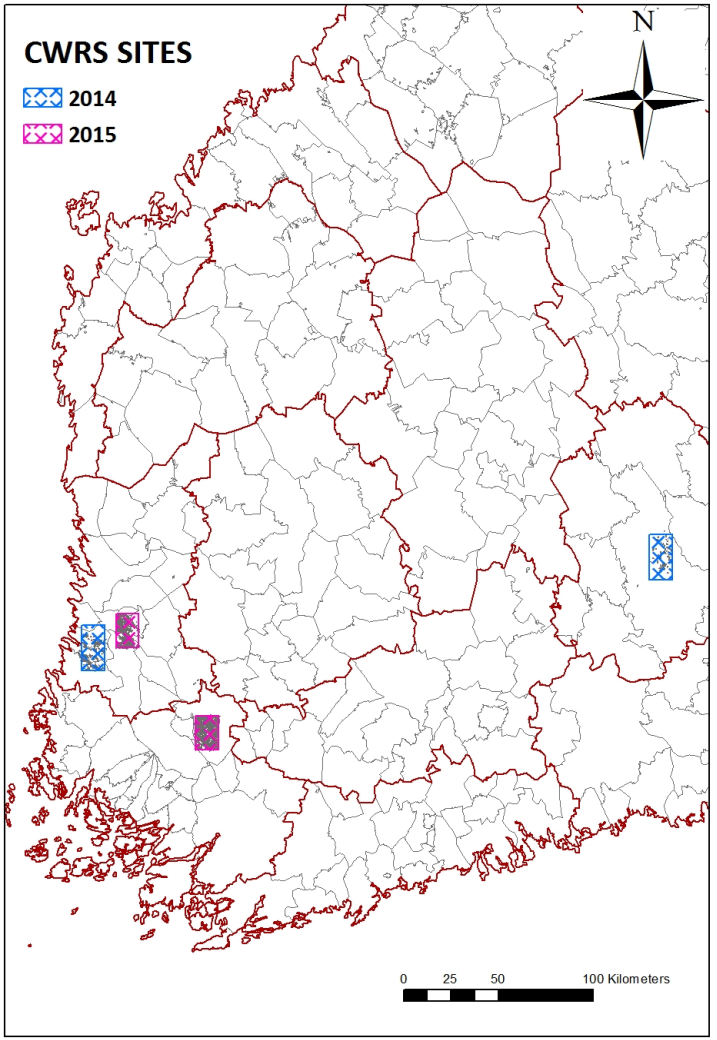

0 RP boundaries (LPIS update)
1 Agri-cultural parcels
2 Crop species
3 Greening / cross compliance
Results
Change of calendar year
4 Winter time vegetation cover
Final results

CwRS Pilot projects

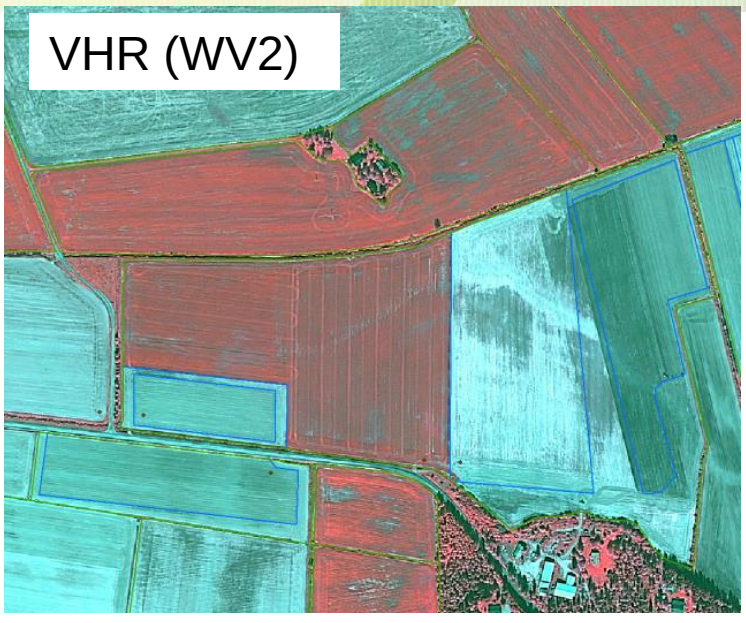
2013
- One site
- 20 farms

2014
- Two sites (12x24 km)
- 100 farms (50 + 50)

2015
- Two sites (12x24 km)
- 100 farms (40 + 60)



CwRS – imagery I



CwRS – imagery II

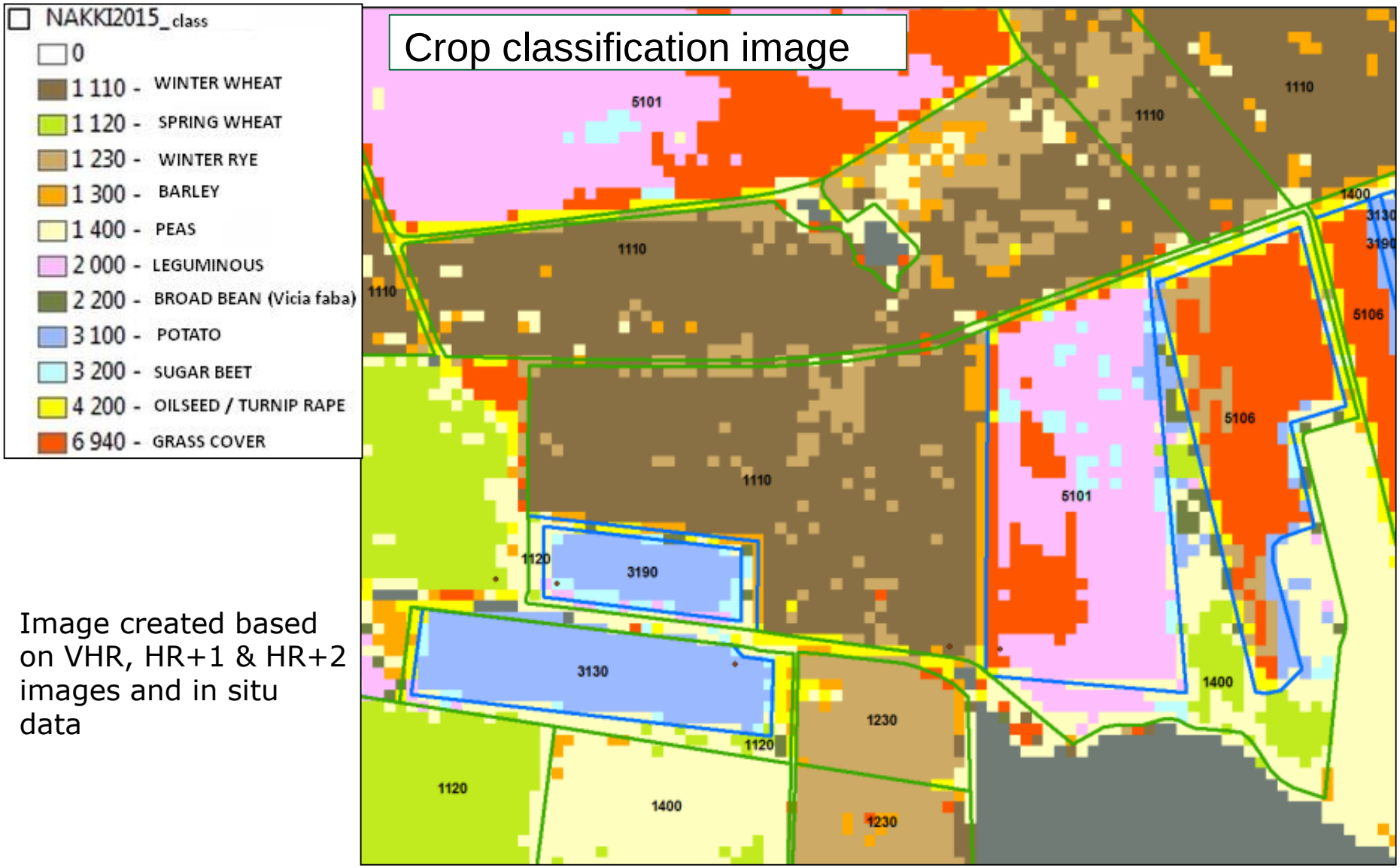


Image created based on VHR, HR+1 & HR+2 images and in situ data

Success

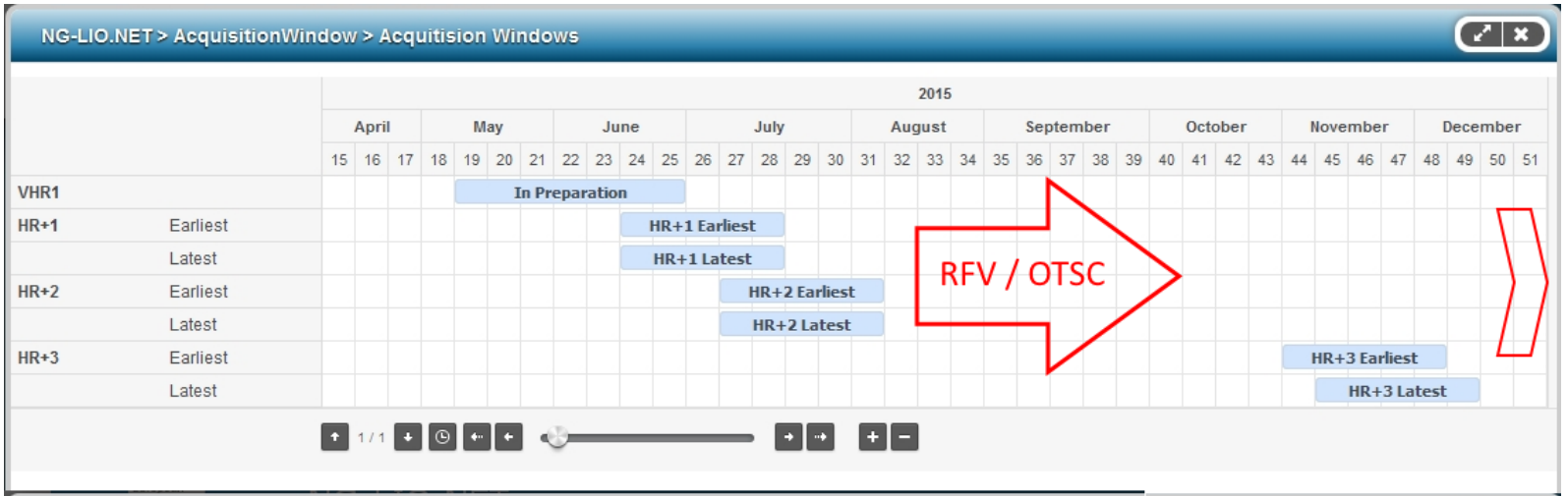
IMAGERY	• Basic processing • Crop classification image (+/-)
AGRICULTURAL PARCEL	• Delineation • Crop classification (+/-)
TIME & QUALITY	• Controller time saved • Centralised work
FARMER	• Less time required from the farmer

Challenges

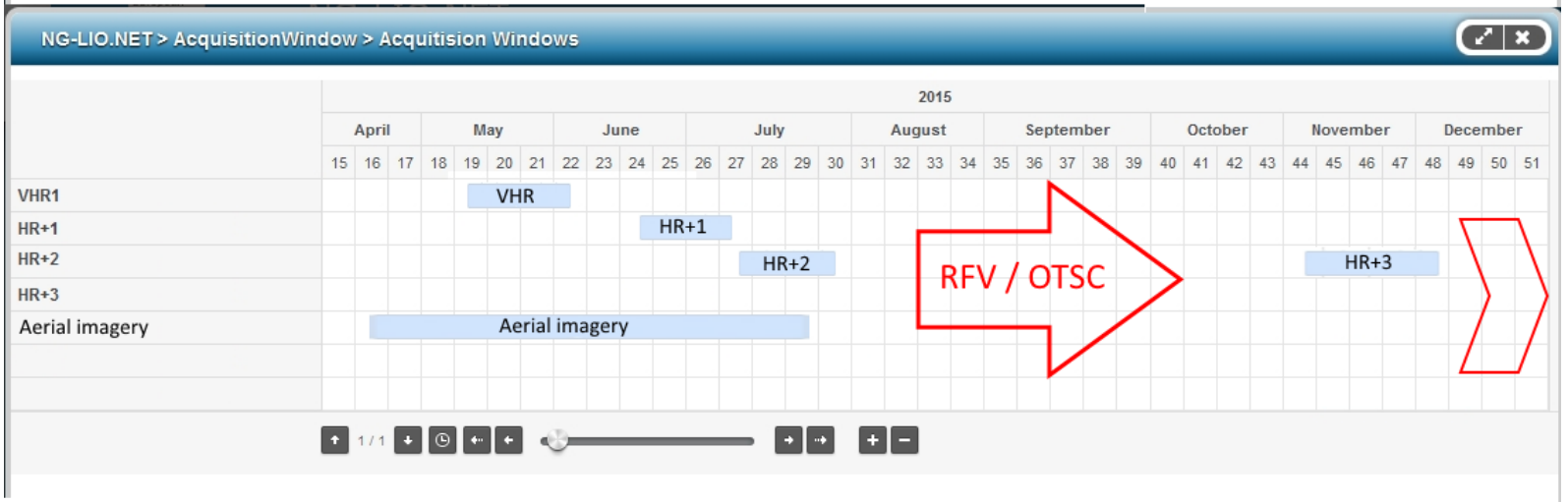
IMAGERY	• Acquisition windows • Processing (time)
FEATURES	• Interpretation of complex or combined features
APPLICANTS	• Farm structure • Application data quality
PROCESS	• Timetable

Image acquisition

Current



Optimal



CWRS – Farm structure

RP´s dispersed over wide area

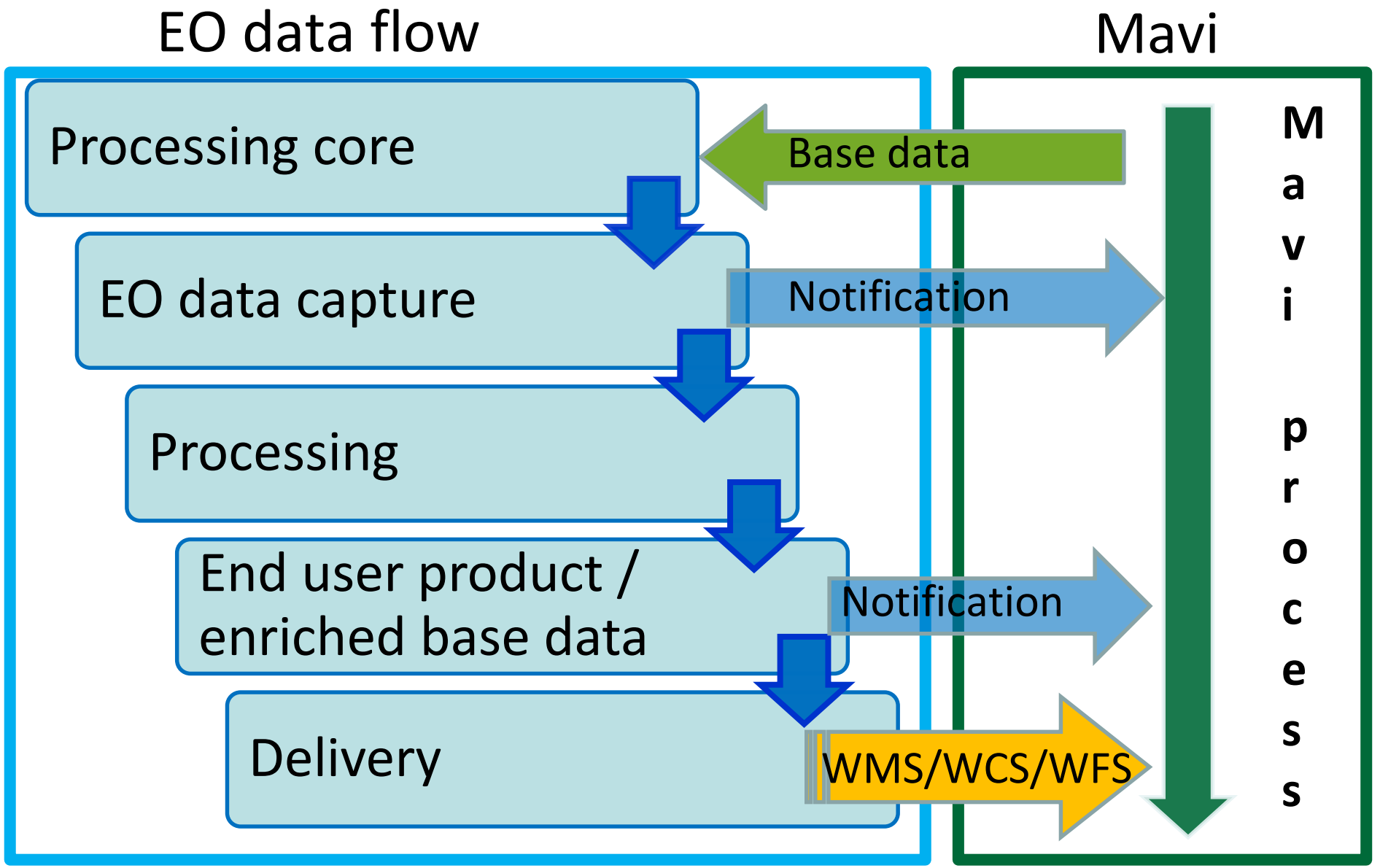
What have we learnt?

- Imagery is key – in all aspects
- Timetable is crucial – in all stages
- Focus – the features are there
- e-Controls – 100 %
- Process, process, process

What do we need?

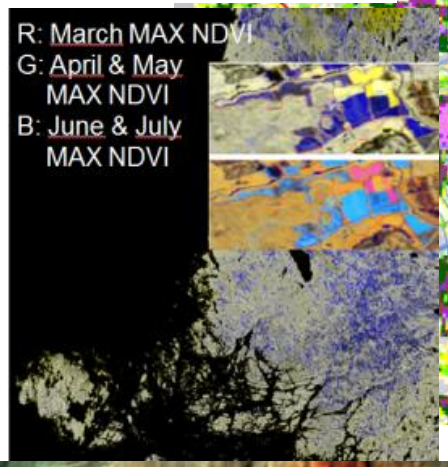
IMAGERY	• Multiple /flow of ready-to-use products • Quality
TIMETABLE	• Quick & reliable delivery
PROCESS	• Data transition / migration • e-Process

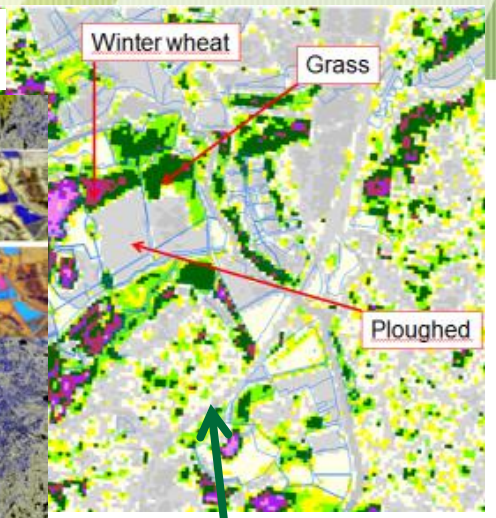
The ideal data delivery case…?



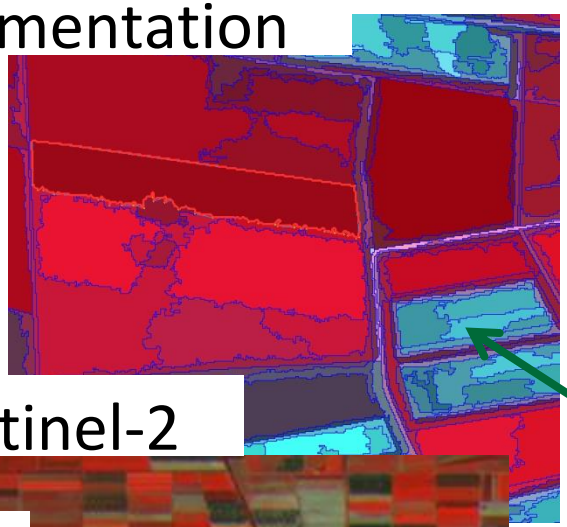
What´s next…?

LS8 NDVI

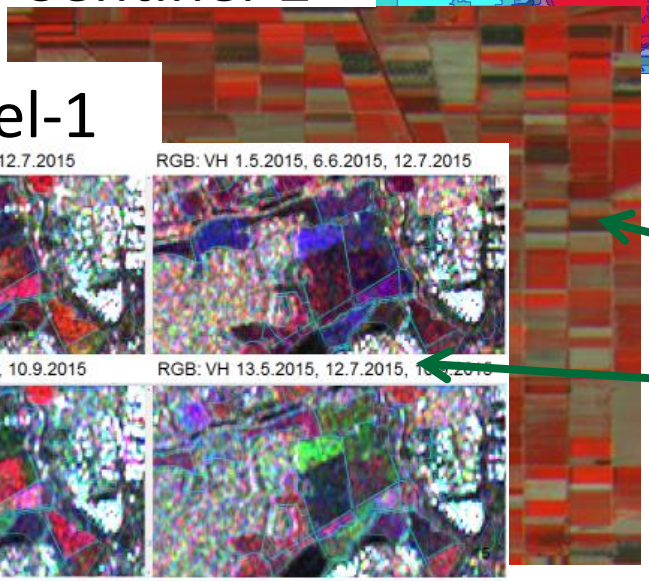




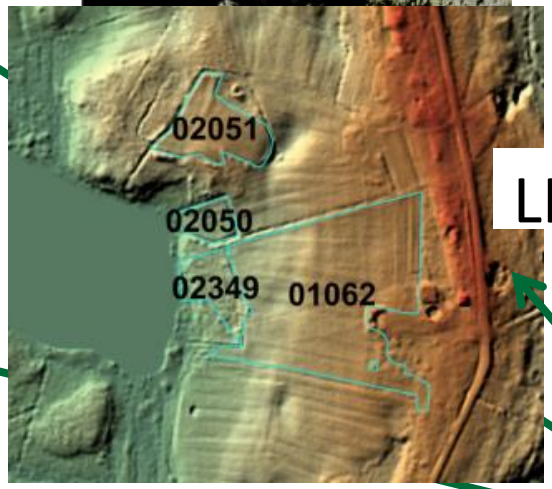
Segmentation



Sentinel-2



Sentinel-1



LIDAR data

ALL TOGETHER?

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AGENCY FOR RURAL AFFAIRS

Thank You!

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Satellite based products for monitoring agricultural areas

- End-user: Agency for Rural Affairs (MAVI)
  - Control of EU agricultural subsidies

- Need tools and processes to
  - Decrease the work-load of control and
  - Shorten the time used for control (strict timeline from EC)
  - Advance the payments to farmers

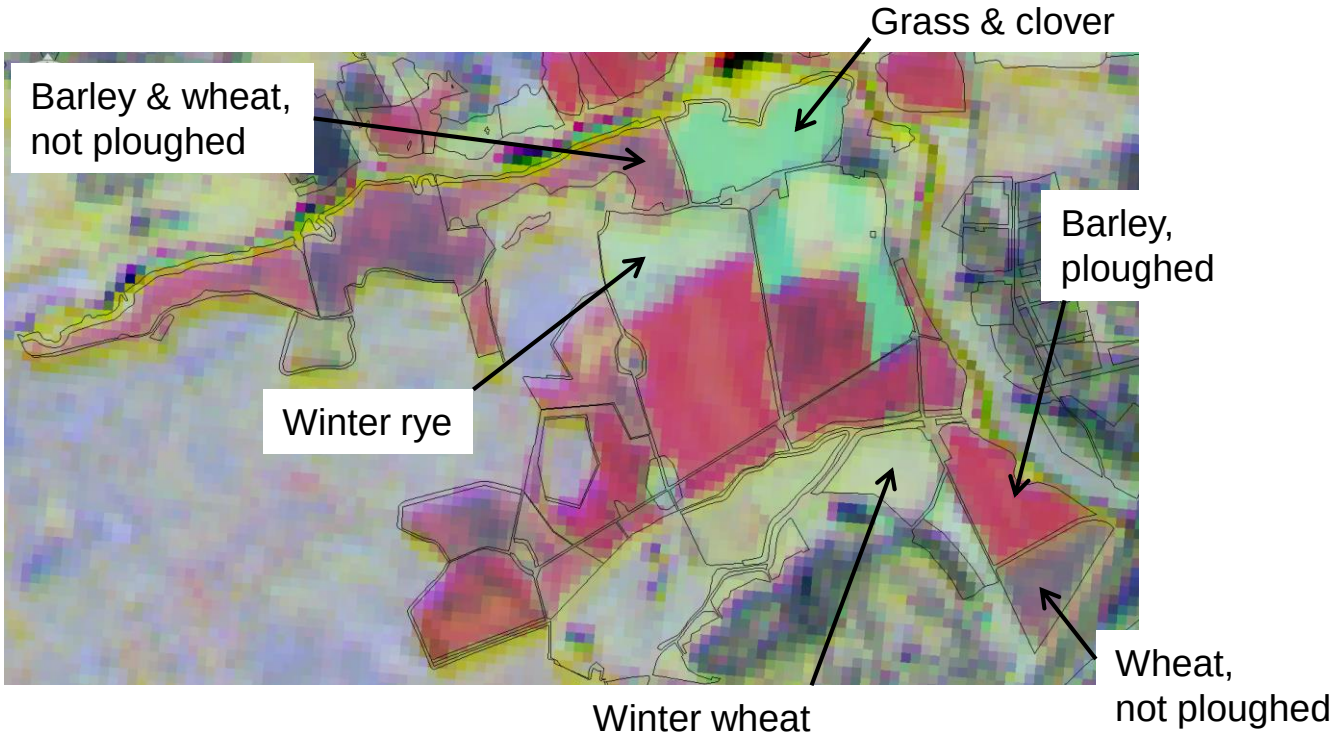
- Specific needs
  - Crop classification (as accurate as possible)
  - Simple classifications answering specific control requirements: (e.g.)
    - Winter time vegetation
    - Summer time vegetation
    - Identification of soil preparation schemes
      - Ploughing, light ploughing, harrowing

- Remote sensing has been tested in pilots, but pilots have not developed to full services due to timing and lack of sufficient imagery

Landsat-8 OLI/ Sentinel -2

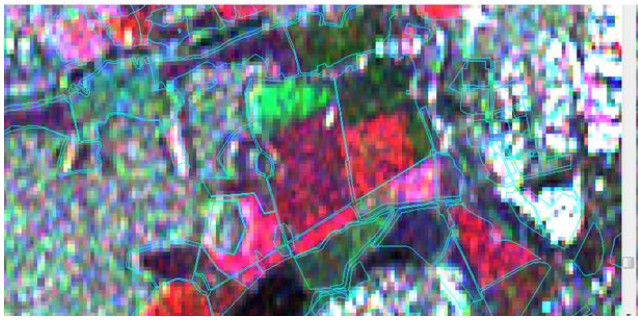
- Time-series of vegetation index images provide information for crop classificatoin
  - Hindered by frequent cloud cover

Haltiala
R: 3.7.2015
G: 25.5.2015
B: 13.3.2015

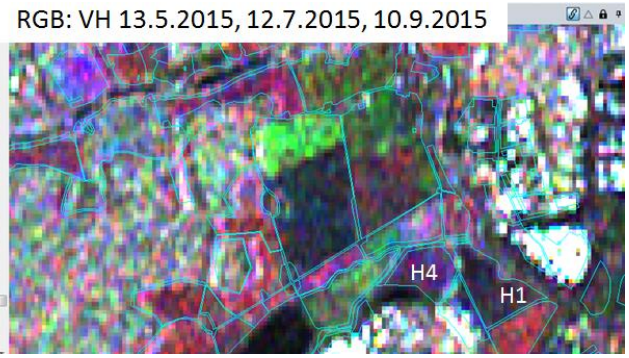


Sentinel-1 SAR

RGB: VV 13.5.2015, 12.7.2015, 10.9.2015

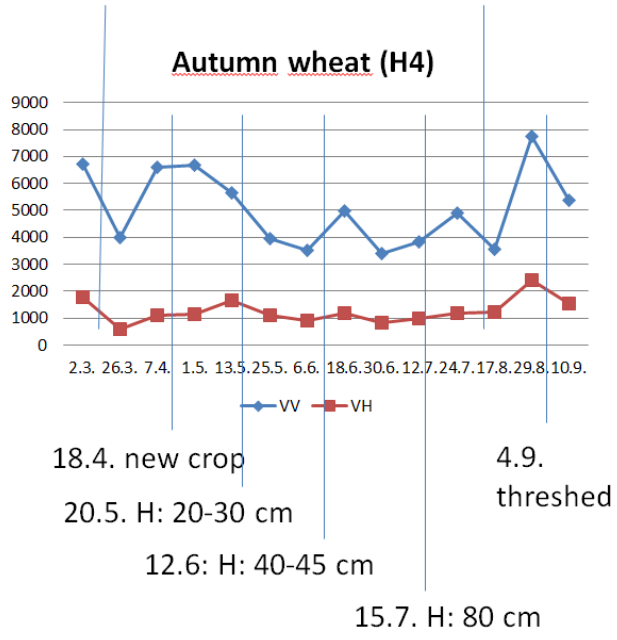


RGB: VH 13.5.2015, 12.7.2015, 10.9.2015



12.3. no snow

13.8. H: 90 cm



18.4. new crop

20.5. H: 20-30 cm

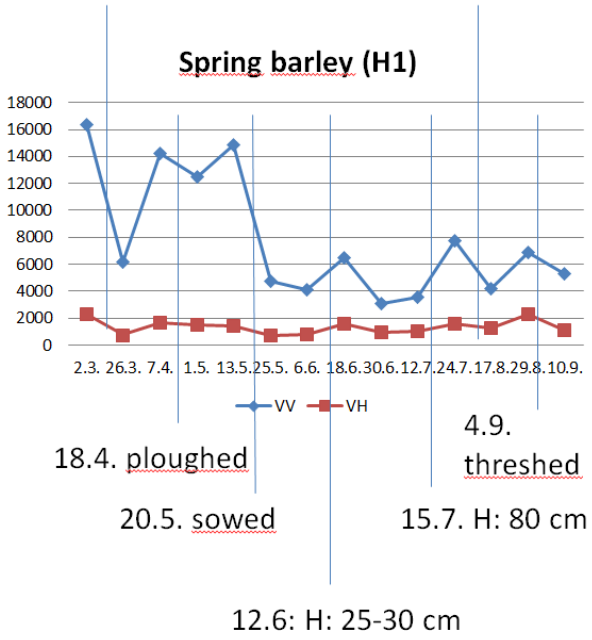
12.6: H: 40-45 cm

15.7. H: 80 cm

4.9. threshed

12.3. no snow

13.8. H: 85 cm



18.4. ploughed

20.5. sowed

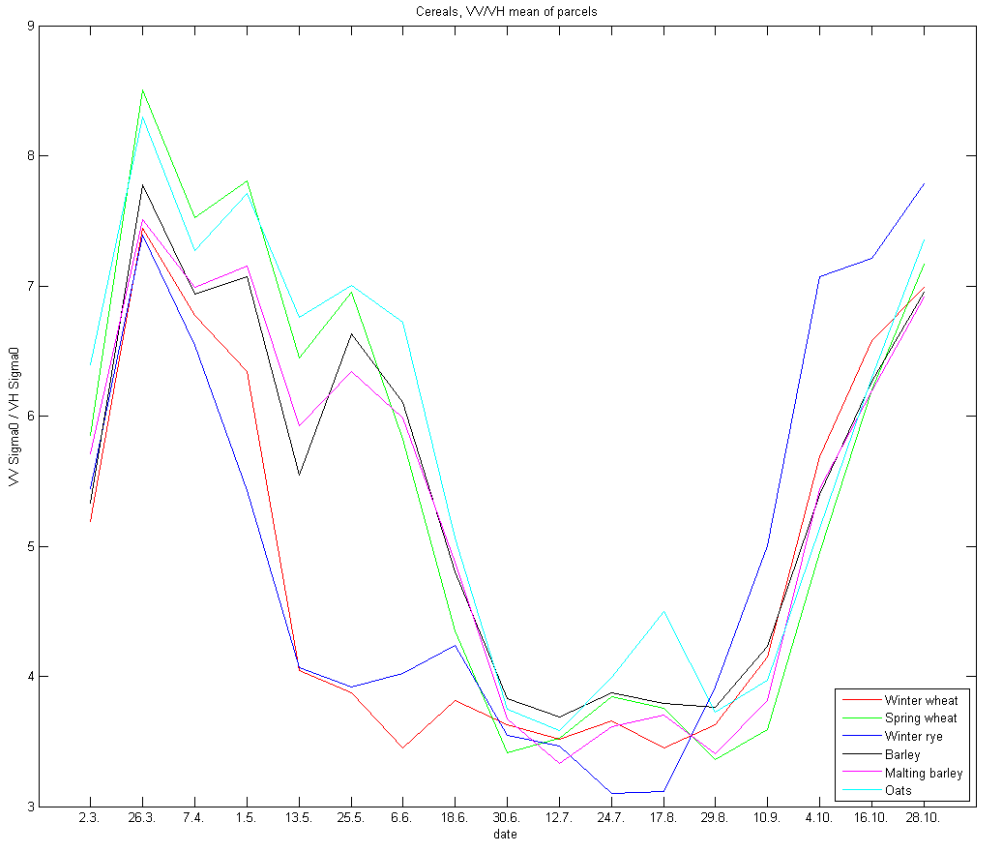
12.6: H: 25-30 cm

4.9. threshed

15.7. H: 80 cm

Sentinel-1 SAR

- The average VV/VH Sigma0 ratios of cereals from Nakkila and Loimaa test areas



Pilot/demonstration summer 2016

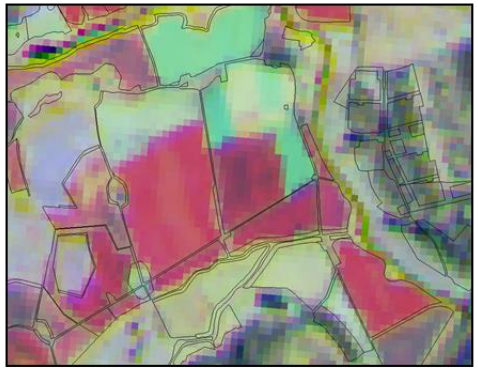
- Data products:
  - Winter time vegetation (yes/no)
  - Summer time vegetation (yes/no)
  - Generalized crop classification
    - Autumn cereal
    - Spring cereal
    - Fallow
    - Beans
    - Oil plants
    - ..

Pilot/demonstration summer 2016

Data collection

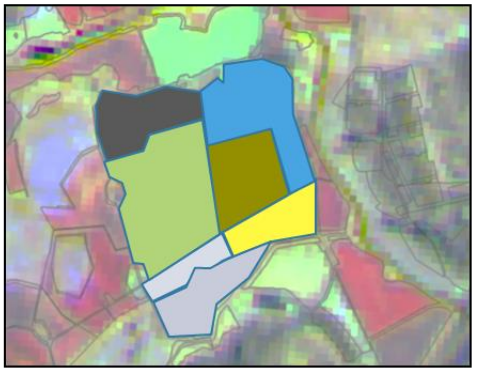
Landsat-8 OLI NDVI Time-series

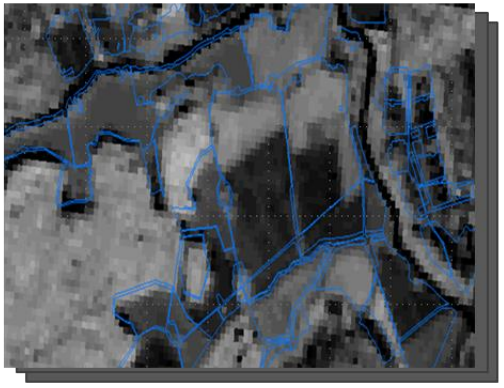
Visualization (during product development)



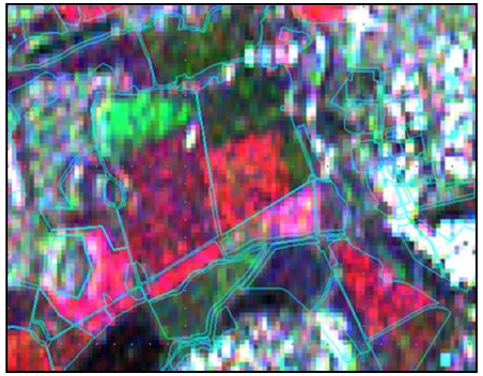
3.7.2015 25.5.2015 13.3.2015

Classification





Sentinel-1 IW Time-series



13.5.2015 12.7.2015 10.9.2015

Data to MAVI

Demo products 2016:

- Winter time vegetation
- Summer time vegetation
- Generalized crop classification