

Varese, March 5-6, 2014

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# Why this presentation?

See also:

[http://mars.jrc.ec.europa.eu/mars/News-Events/DMC-workshop-2012/Milenov\\_Lemajic\\_Tarko\\_LPISQA\\_Image\\_Quality\\_KO\\_2012\\_corr](http://mars.jrc.ec.europa.eu/mars/News-Events/DMC-workshop-2012/Milenov_Lemajic_Tarko_LPISQA_Image_Quality_KO_2012_corr) Observations from the LPIS QA screening regarding CwRS image quality

Many issues seem to persist

[http://mars.jrc.ec.europa.eu/mars/content/download/3202/16164/file/7\\_MR\\_AGRI.pdf](http://mars.jrc.ec.europa.eu/mars/content/download/3202/16164/file/7_MR_AGRI.pdf)

Image quality could be a factor!

Image should visualize the agricultural parcel in question.

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## Results audits 2012-2013 <sup>(3)</sup>

### On-the spot checks - Remote sensing

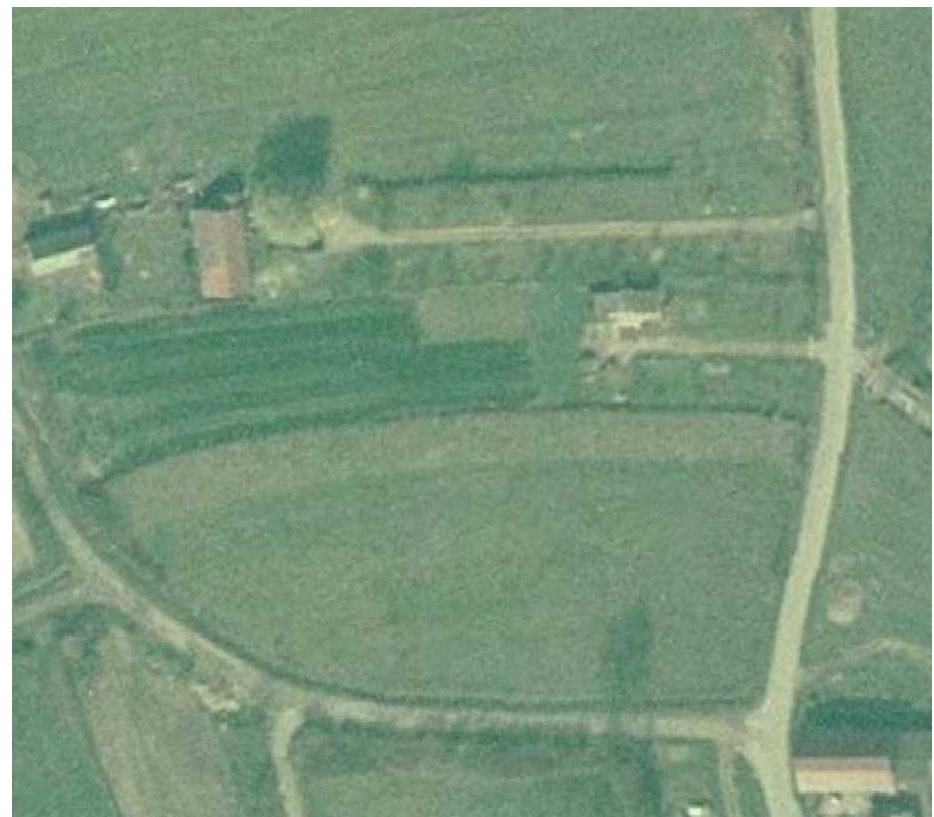
- In 34 out of 44 PA's (**75%**) classical OTSC reveal materially more error than RS OTSC.  
Avg diff. is 228% but sometimes >500%
- In 10 PA's RS OTSC reveal more error than classical  
Avg difference is 43%

**AND NOW ?**

# Outline

- Image quality constraints (Data quality issues)
- When to detect (Quality control)?
- Causes of these image quality issues
- Measures to prevent image degradation
- Conclusion(s)

# Insufficient image radiometry



If photointerpretation not decisive RFV  
for the whole image: € ?

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## Presence of image artefacts



No canvas for reliable area measurement: classical OTSC

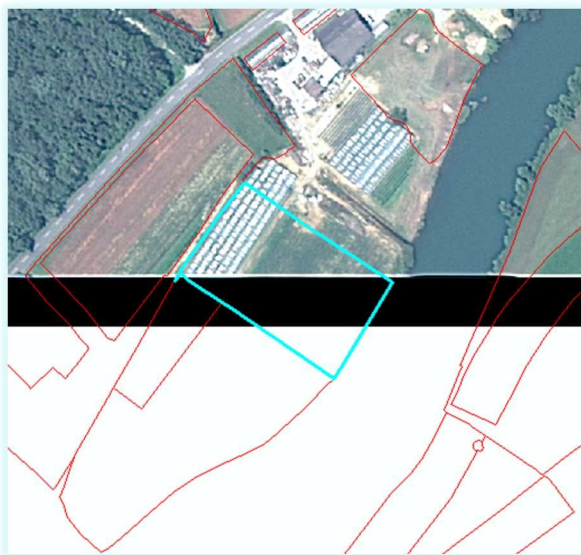
## Image geometry outside specifications



No canvas for reliable area measurement classical OTSC  
for the whole image: € ?

## CwRS skipping codes

## reported CAPI constraints



T2 - Parcels falling outside all current year images and that cannot be checked by CAPI

T4 - CAPI impossible due to cloud on one image (the interpreter should check that CAPI is not feasible with the remaining images available)

C4 - the code is the result of some interpretation and an indication of possible disagreements with the declared land use or area (possible some follow-up action like RFV)



## CwRS skipping codes

C4 - the actual poor quality of image + the inability for interpretation

reported CAPI constraints





# EU extend of reported CAPI constraints

(indicative, as detected during LPIS QA)

In 2012, CwRS VHR imagery is used in more than 80% of the cases

To check 42500 RP (preselected parcels),

- 1613 RP's (3.8 %) was skipped because of T2 reason (RP not covered with image)
- 793 RP's (1.9 %) skipped because of T4 reason (clouds, haze)
- 188 RP's (0.4%) skipped because of C4 reason (LUI interpretation not possible with given image)

# Data quality issues - generalized

Inconsistencies in CwRS image processing and quality observed during the screening of 2012 ETS data:

- evidence of local DEM errors
- degraded pixel size for the sensor's GSD
- radiometry issues degrading image content
- usage of image with worse data content where a better alternative was available

# CwRS image parameters

Satellite imagery – TS by JRC

Airborne imagery – TS by MS

## Orthorectification

- Common specification: Guidelines for best practice and quality checking of ortho imagery
- Ancillary data:
  - GCP's
  - DEM data

Check specification of external ortho-imagery for compliance!



# Internal quality control

Should be introduced in every step:

- Preparation work + planning
  - data acquisition parameters
  - raw / acquired data
  - orthorectification process (+ mosaicking + radiometry)
  - final product control @ delivery (+ data format + coverage)
- 
- detect issues of radiometry, artefacts and geometry
  - take appropriate remedial action

# Quality control of external ortho's

Use ancillary image from national SDI for control purposes

But look out for degradation of the image quality:

- Radiometry (compression)
- Geometry (pixel size recalculation)
- Temporal aspects

Use of services

- Toggle with multi-temporal imagery

## Actions to prevent poor image quality

- inventory typical and past issues
- design objective test procedure with “realistic” acceptance threshold
- verify the usability aspect of the test
- perform that test against for every data set candidate

Typical PD CA cycle, based on local experience

Contractual implications

- Investigate option of image enhancement during CwRS.

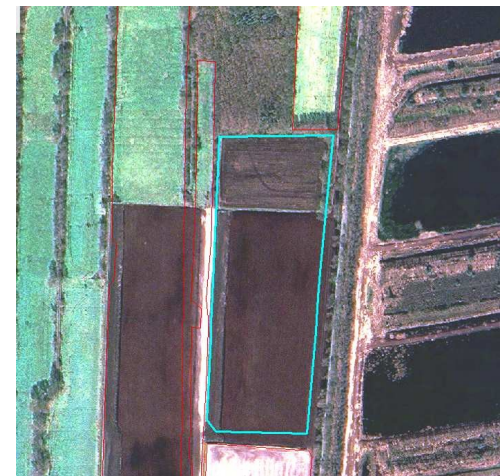
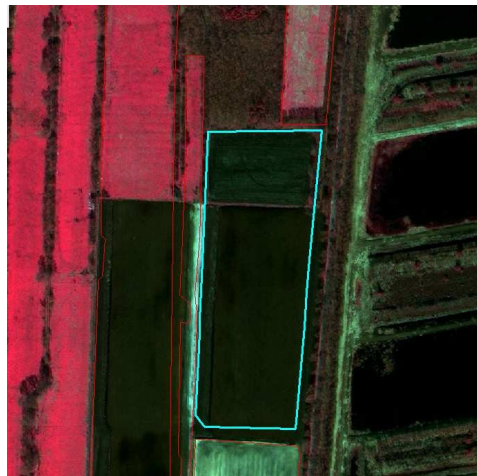
Much more skills of the CwRS inspector required!



# Backstopping for poor radiometry

- Investigate option of image enhancement during CwRS.

Much more skills of the CwRS inspector required!



# Conclusions

Image quality is essential... poor image quality  
causes extra costs (RFV)  
requires more skilled operators (mitigation)  
introduces extra risks (@re-performance)

“best practice”: image quality control is the key remedy:

- Technical specifications could need investigation
- External data: (before delivery/use), formal acceptance of:
  - predecessors (ancillary data)
  - final ortho product
- Ensure that all procedures are applied correctly
  - Assign responsibility for the quality
  - Step by step control
- Metadata needs to be extended with quality metadata

Thank you!

