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Presentation 1 - Crop identification and parcel measurement with VHR data + AEM issues.

Philippe LOUDJANI
JRC/ IPSC/ MARS Unit

Abstracts

Introduction of session 5.

Short summary of presentations and posters

Preliminary results

Comply with requested accuracy - In detail access to information land use / land cover information (comply with 'compliance', long term use).

New methodology to develop (advantage of image 'texture', expertise in photo-interpretation, good knowledge of studied area (landscape, environment...),

Keywords: CAPI, AEM

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9th Conference on CwRS, 27-28 November 2003, Köln, DE

Session 5

Crop identification and parcel measurement with VHR data

+

AEM issues

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Presentations

Processing of VHR imagery to optimize CAPI [general guidelines]
Hervé KERDILES (JRC, IPSC, MARS)

VHR experiment in Spain [SPOT5, Ikonos, QB, Crop]
Charo ESCUDERO (TRAGSATEC, Spain)

Test of the use of SPOT5 Pan super mode data in crop area estimate
Jorgen FORSGREN (METRIA, Sweden)

Evaluation of Ikonos data in the UK CHAR control zone [area]
Mike WOODING (RSAC, United Kingdom)

Substitution of archive aerial photographs by VHR data in Ireland
Tom McHUGH (ICON, Ireland)

AEMs compliance using VHR data [pilot study, land use]
Jean-Paul GACHELIN (SIRS, France)

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Posters

CwRS 2003, Use of VHR Quickbird data in site GLAU
EFTAS (DE)

Ikonos experimentation: image processing and photointerpretation
ONIC – SCOT (FR)

Using VHR satellite imagery for parcel measurement in Denmark
DIAS (DK)

Posters on VHR data pre-processing

Posters of VHR data providers

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- Preliminary results
- Comply with requested accuracy - In detail access to information land use / land cover information
  - Comply with 'compliance'
  - long term use
- New methodology to develop
  - Take advantage of image 'texture'
  - Expertise in photo interpretation
  - Good knowledge of studied area (landscape, environment...)
  - Only one or two images during the year
- Questions ???? Possibility of automatic classification

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Presentation 2 – Processing of VHR imagery to optimise CAPI

Herve KERDILES
JRC/ IPSC/ MARS Unit

Abstracts

For the 2004 campaign, Very High Resolution (VHR) imagery acquired by the Ikonos and Quickbird sensors will be provided by the Commission to most of the contractors on part of their control sites.

Due to the characteristics of this type of imagery (Pan and multispectral bands of different resolution, possible supply of several sub-scenes to cover one site, 16 bits data, file size of the order of several GB), the standard processing chain of remote sensing images needs to be adapted to VHR imagery.

General guidelines[1] on the processing chain will be presented. Emphasis will be put on standard techniques of resolution merge (also called PanSharpening) as a means of improving CAPI and because the reports from the 2003 VHR pilot studies showed an under-use of this technique. Ikonos and Quickbird data from 3 test sites in Spain, Germany and Hungary will be used to illustrate the results of the different PanSharpening alternatives.

Keywords: VHR, PanSharpening, CAPI.

[1] excluding the Orthorectification part fully tackled in the previous session

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Processing of VHR imagery to optimize CAPI

H. Kerdiles, J. Chmiel, C. Wirnhardt

JRC IPSC MARS

9th Conference on CwRS, 27-28 November 2003, Köln, DE

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Standard processing chain

- Orthorectification
- (Mosaicking, if n sub-scenes)
- Pan-sharpening if bundle image (P + XS)
- Other treatments: vegetation indices, classification...
- Reducing file size /conversion to 8 bits

VHR processing for CAPI 2

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Pan-sharpening

- Combine spectral information of XS bands with spatial detail of PAN band
- Result = new "XS" bands with PAN resolution
- Importance of coregistration of the P & XS bands
  -> make fusion before orthorectification
- Algorithms
  - Proprietary or public domain
  - variable degree of distortion of output colours
  - expertise of operator may be essential

VHR processing for CAPI 3

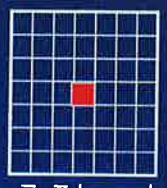
Algorithms (1/2)

- Multiplicative: $XS_{i\_new} = XS_i * P$
- Brovey (3 bands): $XS_{i\_new} = XS_i * P / \sum_{i=1}^{3} XS_i$
- Principal Components Analysis:
  - Compute PC1, 2, 3, 4
  - replace PC1 by P
  - reverse transformation
- IHS (3 bands): RGB to IHS, replace I (intensity) by P, reverse transformation

VHR processing for CAPI 4

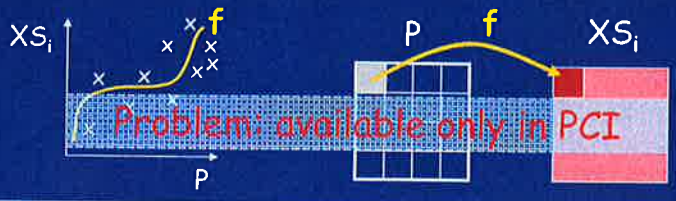
Algorithms (2/2)

- HFA (High pass Filter Additive)
  - Create edge image: Edge = P - $P_{mean\ 7x7}$
  - XS_{i_new} = XS_i + edge
  - Resample XS with cubic convolution



7x7 kernel

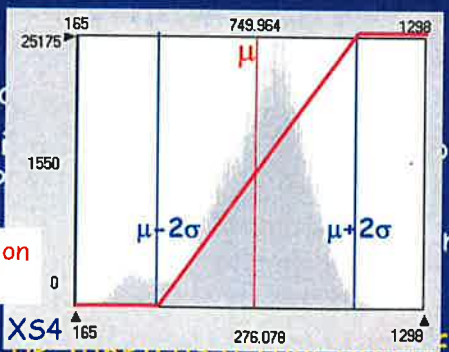
- Zhang - least squares technique (in PCI SW)
  - -> "minimum colour distortion, no operator dependency"



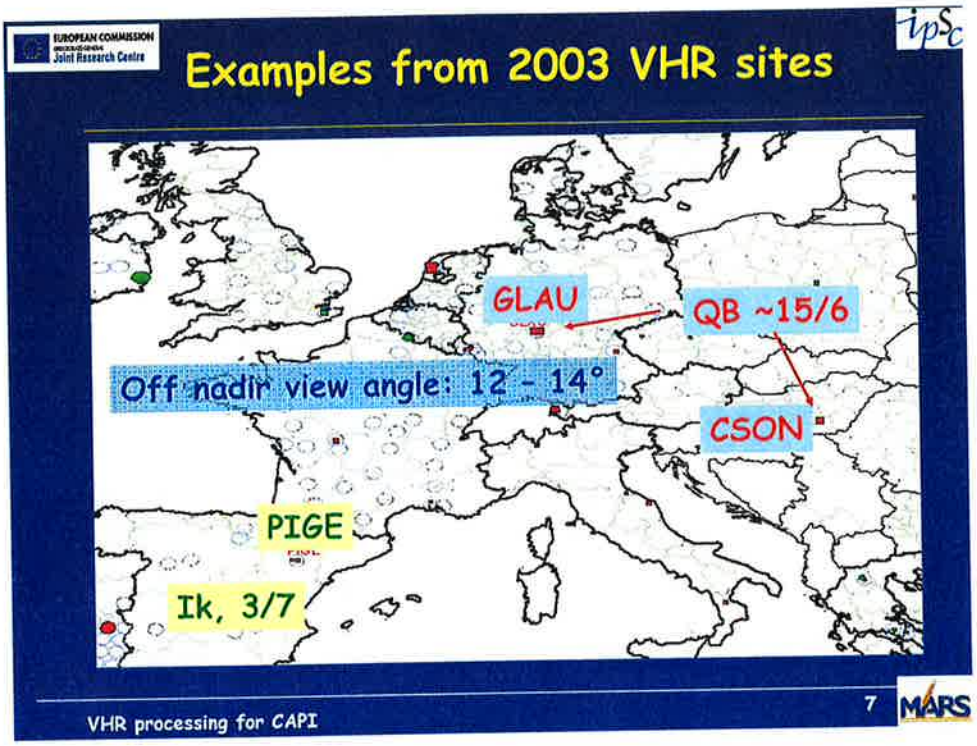
VHR processing for CAPI 5

Conversion to 8 bits, Compression

- Conversion 16 (11) to 8 bits
  - May be requested by CAPI SW
  - Classical dynamic enhancement (e.g. linear stretch)
- Compression
  - Based on pr
  - File size divi … le quality loss for CAP
  - Trad … mage
- Tiling
- Decisions to be taken as a function of HW/SW



VHR processing for CAPI 6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Examples from 2003 VHR sites
GLAU
QB ~15/6
Off nadir view angle: 12 - 14°
CSON
PIGE
Ik, 3/7
VHR processing for CAPI
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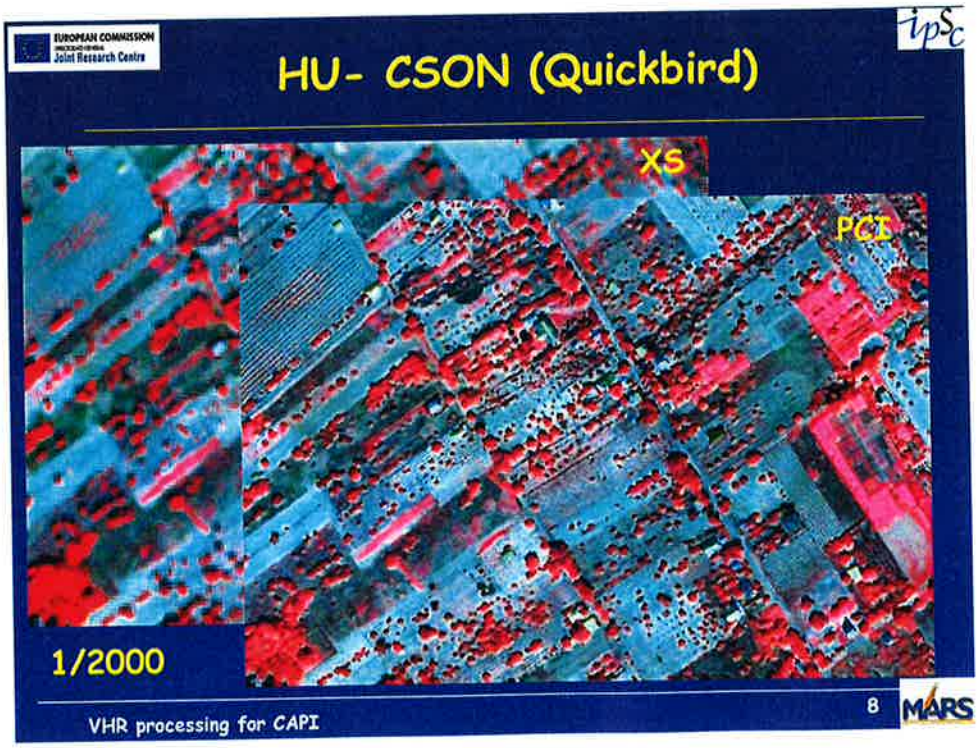
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HU- CSON (Quickbird)
XS
PCI
1/2000
VHR processing for CAPI
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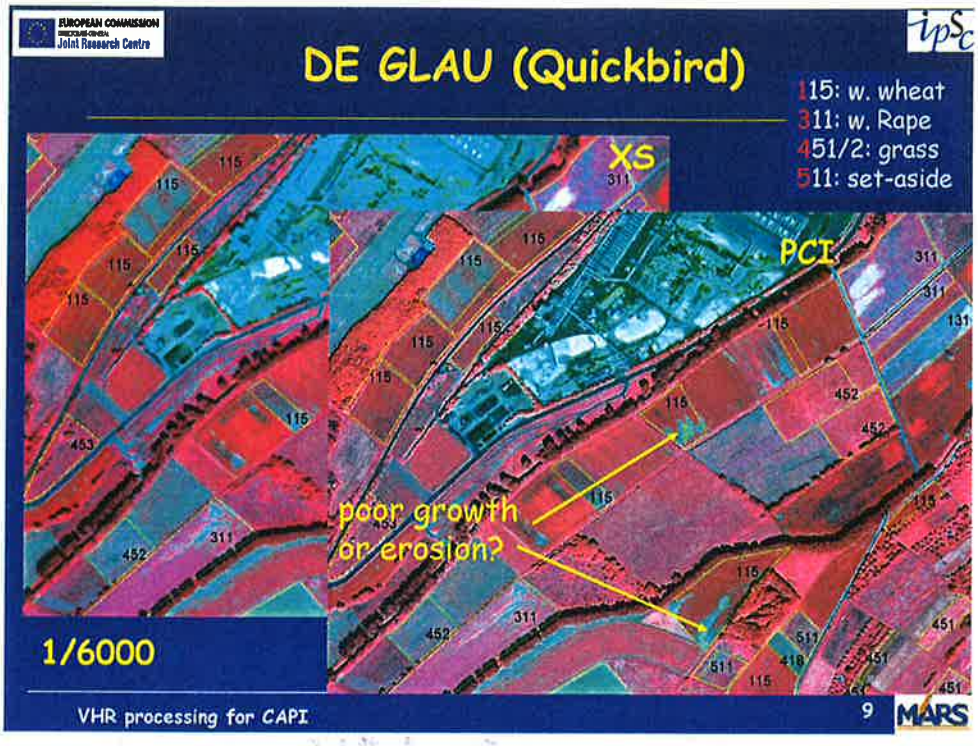

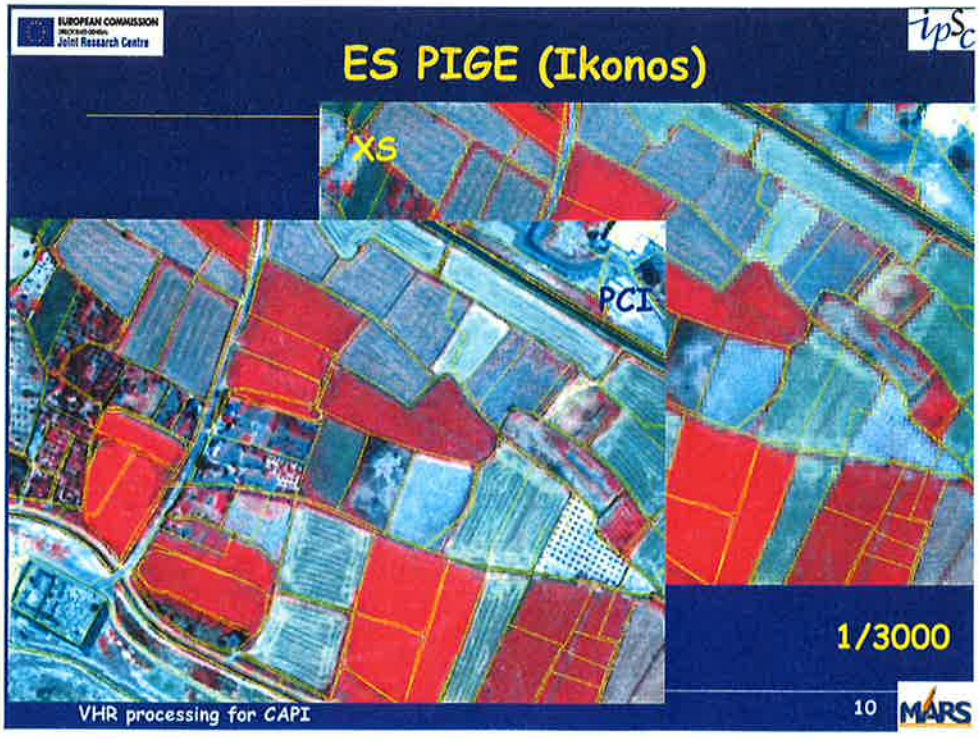

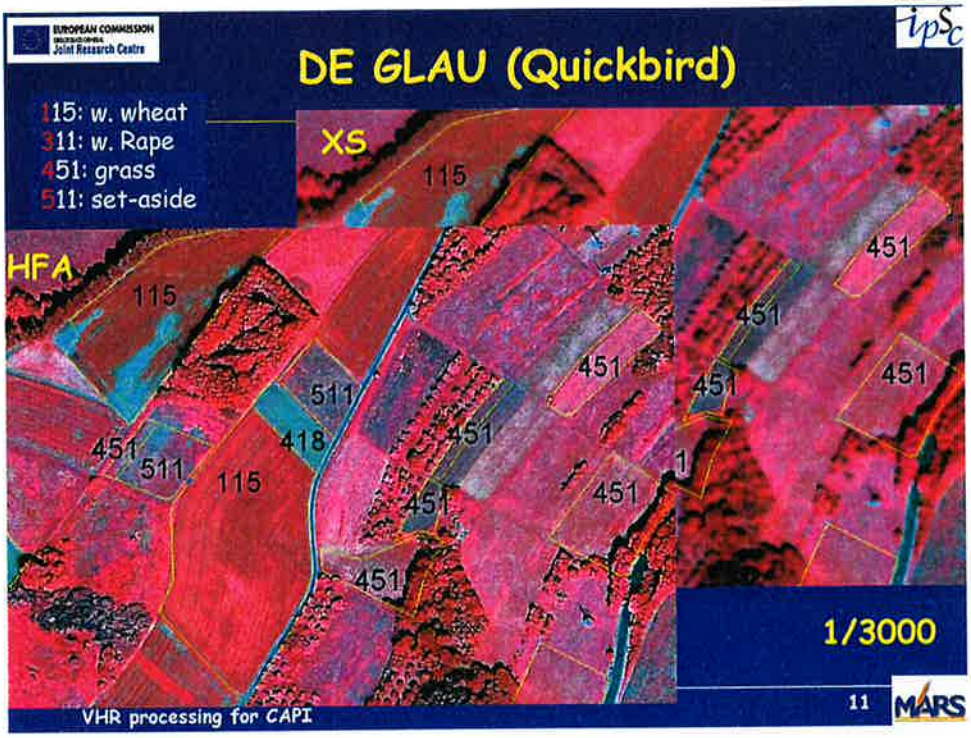
DE GLAU (Quickbird)
115: w. wheat
311: w. Rape
451: grass
511: set-aside
XS
HFA
1/3000
VHR processing for CAPI
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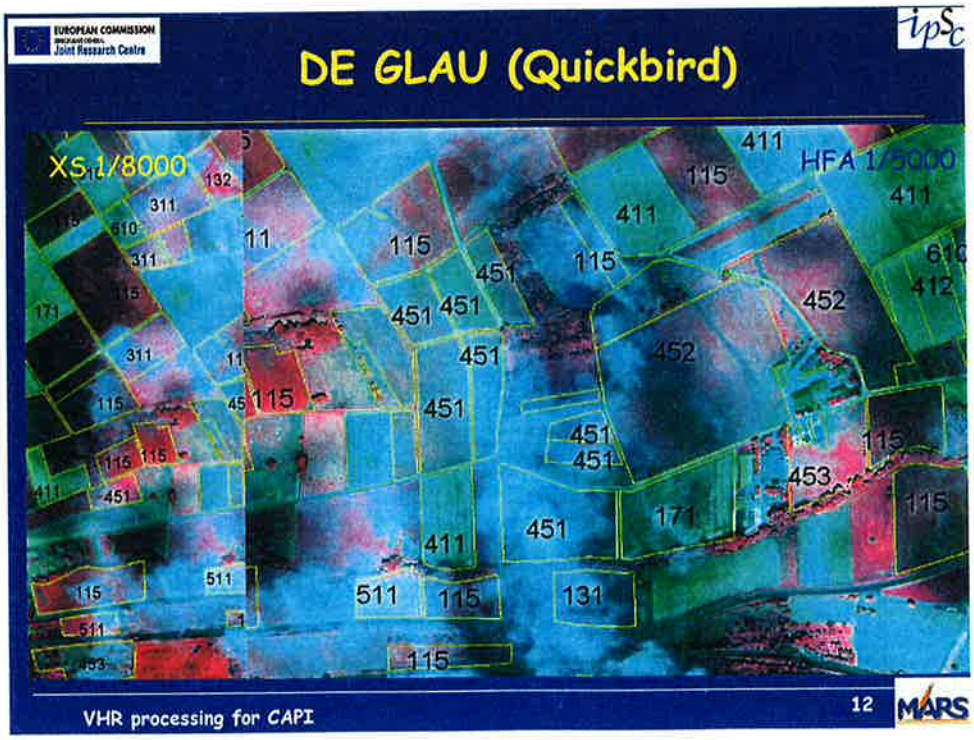
DE GLAU (Quickbird)
XS 1/8000
HFA 1/5000
VHR processing for CAPI
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Last remarks

- Processing order?
  - 1) orthorectif. of P
  - 2) orthorectif. of XS
  - 3) Pan sharpening
  - Conversion to 8 bits before or after Pan-sharpening

  or

  Recommended by providers:
  - 1) Pan sharpening
  - 2) orthorectif. of P+XS
- Need for new codes?
  - e.g. non conform set-aside (bush)?
- Need for CAPI guidelines?

VHR processing for CAPI 13

CAPI Guidelines with VHR

VHR processing for CAPI 14

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Presentation 3 – Test of the use of SPOT5 Pan Multispectral super mode data in parcel area estimation.

Jorgen FORSGREN
METRIA, SE

Abstracts

Metria have up till now basically used a combination of SPOT 10m Panchromatic data and one SPOT 20m Multispectral image, together with archive 1m aerial orthophotos for the interpretation of parcel boundaries in the Swedish CwRS project. Since the tolerances have been decreased we wanted to test if SPOT5 2,5 m multispectral data could be an option to new aerial orthophotos or VHR satellite data. The reasons why use of SPOT5 data could be a good solution are the coverage and cost aspects.

The method used for the test has been the following: Over the control zone where both SPOT5 2,5 m multispectral orthophotos and archive aerial b/w orthophotos were available, 150 parcels from the 2003 project were randomly selected. For each parcel, one operator performed the interpretation using the SPOT 5 ortho and the other using the aerial orthos. After this the measured area for each parcel was compared and for parcels where the result differed more than 2% or 0,1 ha the interpretation was checked once more in order to deduct if it was due to operator mistake or if the reason for the difference was due to the reference orthos.

The result was that out of the 150 parcels 35 were outside the 2% or 0,1 ha tolerances. The additional control showed that problems related to interpretation of the SPOT image was mainly connected to shadows from trees (9 parcels), problems from the b/w aerial orthos were mainly connected to difficulties to see borders between parcels within one agricultural block (21 parcels). The result indicates that SPOT5 data could be an option for the area estimation in the CwRS project.

Keywords: SPOT5, cost/coverage, parcel area estimation

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Test of the use of SPOT5 Multispectral super mode data in parcel area estimation

Jörgen Forsgren
Project Manager
Metria, Sweden

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Background

- A combination of 10 m Panchromatic, 20 m Multispectral and archive aerial orthophotos has been used in the interpretation of parcel boundaries in Sweden
- To meet the tolerance requirements in the CwRS, data with higher resolution must be used
- SPOT5 data is competitive regarding cost/coverage aspects

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Purpose of the test

- To get an indication if SPOT5 2,5 m Multispectral orthophotos can be used in the parcel boundary interpretation

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Method (1/2)

- Random selection of 150 parcels over one site from the 2003 project
- Each parcel was interpreted twice, based on SPOT5 orthophoto respectively aerial orthophotos

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Method (2/2)

- Comparison of the measured areas, sorting out the ones where the area differed more than 2% or 0,1ha
- Analysis of the parcels where the differences were outside the 2% or 0,1ha limits by an independent experienced operator

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Input

- 2003 project dossiers
- SPOT5 Panchromatic system corrected scene with 2,5 m resolution
- SPOT5 Multispectral system corrected scene with 10 m resolution
- B/W aerial orthophotos with 1 m resolution
- Block database over the relevant area

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Processing of SPOT5 images (1/3)

- Orthocorrection of the 2,5 m Pan image using 16 control points based on 1 m b/w aerial orthos and 50 m grid DEM, checked with 9 verification points resulting in RMSEx of 2,2 m and RMSEy of 1,6 m

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Processing of SPOT5 images (2/3)

- Orthocorrection of the 10 m MS image to 2,5 m pixelsize using the same points as above resulting in RMSEx of 2,5 m and RMSEy of 2,8 m

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Processing of SPOT5 images (3/3)

- The P image was stretched to avoid black pixels and further sharpened with a 3 by 3 edge enhanced filter
- Merging of the P band into three of the MS bands using Brouvey algorithm
- Stretching of the resulting image in order to optimise the interpretability

Interpretation

- Each parcel was interpreted twice by two experienced operators one performing interpretation using SPOT5 ortho the other using aerial orthos
- Each operator interpreting 75 parcels using SPOT5 ortho and 75 parcels using aerial orthos

Result (1/2)

- For 35 of the 150 parcels the area differed more than 2% or 0,1 ha
- In 9 of the parcels the difference was due to wrong interpretation, based on SPOT5 ortho, of boundaries in shadows from trees

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Result (2/2)

- In 21 of the parcels the difference was due to wrong interpretation, based on aerial orthos, of boundaries between parcels within a agricultural block
- In 5 of the parcels the difference was due to wrong interpretation, based on SPOT5 ortho, of boundaries between parcels within an agricultural block

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Illustration 1 - Boundaries in tree shadows (1/2)

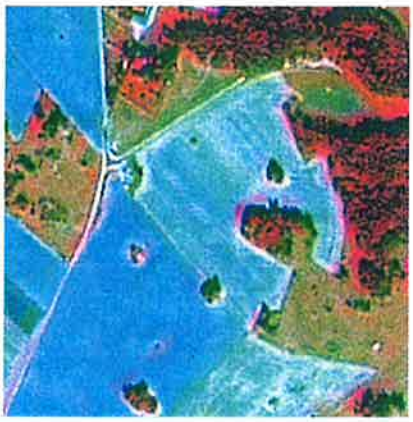

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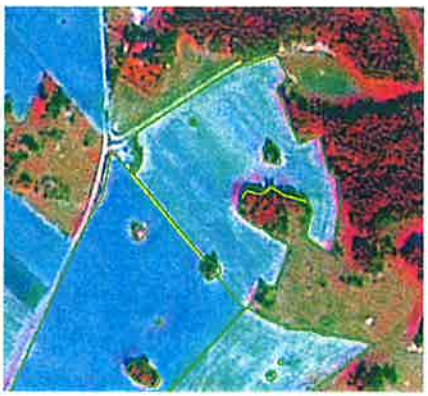
Illustration 1 - Boundaries in tree shadows (2/2)



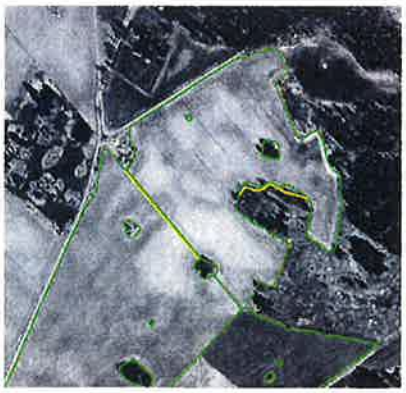


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Illustration 2–Boundaries between parcels in an agricultural block (1/2)

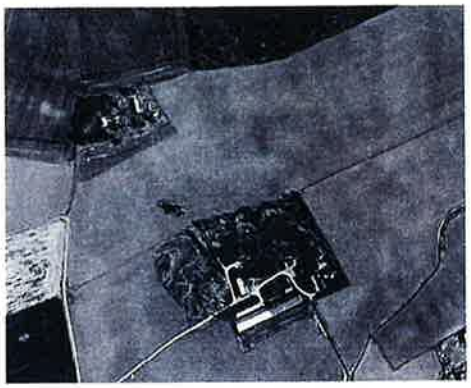

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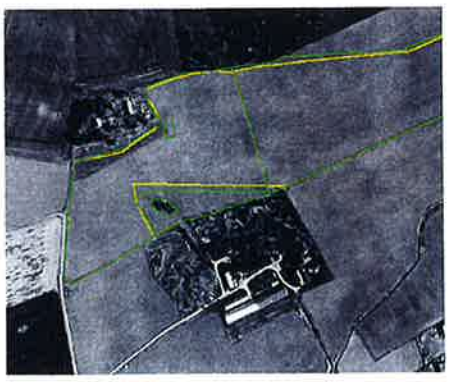
Illustration 2–Boundaries between parcels in an agricultural block (2/2)



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Conclusions

- SPOT5 2,5 m orthophotos seem to fulfil the requirements in the CwRS
- The advantages with SPOT5 orthos are the cost and coverage aspects
- The disadvantages with SPOT5 orthos are the resolution and the fact that there is only one satellite providing these images (compared to VHR satellites)

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Presentation 4 – Evaluation of Ikonos data in the UK CHAR control zone.

Mike WOODING
RSAC, UK

Abstracts

The UK remote sensing control work carried in 2003 has involved the use of SPOT, Landsat ETM and Radarsat satellite data, supplemented by archival aerial photography. Very High Resolution (VHR) satellite data offers potential for improving the accuracy of crop area measurement and crop interpretation, and a trial has been carried out to test the capabilities of Ikonos satellite data in part of the CHAR control zone. Pan-sharpened multispectral Ikonos data with 1 metre spatial resolution acquired on 8th August were used.

It had been hoped to acquire Ikonos data in June/July so that they could be used within the operational work, however the CAPI process involving crop interpretation and boundary adjustment was well advanced in the CHAR zone by the time the Ikonos data became available. The evaluation carried out has involved revisiting a sample of 22 farms to determine how the use of Ikonos data during CAPI would have affected the results. Records have been kept of all adjustments to parcel areas, and control diagnostics have been re-run to establish how the use of Ikonos data would have affected group and dossier level results.

The results of this evaluation clearly show the benefits of current year VHR data for undertaking remote sensing control work. The 1m. spatial resolution of Ikonos data enables crop boundaries to be mapped with a much higher level of precision that when using just 20m Spot data. The main benefit of VHR data is for accurate mapping of crop boundaries within fields with split cropping. Examples show there is a large margin of error when using 20m Spot data for mapping internal field cropping boundaries. Using VHR data one can position cropping boundaries to an indisputable, very high level of

precision. There are also benefits for identifying the precise within-field extent of cropping. Narrow strips were identified which had been included in the cropped area when using just Spot data, and also there was one case of the VHR evidence extending the cropped area.

In terms of results categorisation, the overall conclusion is that the use of current VHR data can tighten up the control work, leading to more field area discrepancies, group and dossier level reject cases. A relatively large number of farms, 6 out of 22, changed from accept categorisation to reject.

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Evaluation of Ikonos VHR Satellite Data in the UK CHAR Zone

Mike Wooding
Remote Sensing Applications Consultants, Alton, UK

Control with Remote Sensing, 27/28 November 2003

Evaluation Approach

- **2003 UK Remote Sensing Control based on use of SPOT, Landsat ETM, Radarsat and archival aerial photography**
- **Pan-sharpened multispectral Ikonos data with 1m. spatial resolution acquired on 8th August**
- **CAPI was well advanced in the CHAR zone by the time Ikonos data became available, so not able to be used operationally**
- **Evaluation has involved revisiting a sample of 22 farms to determine how the use of Ikonos data during CAPI would have affected the results**
- **Late timing of Ikonos image meant limited value for crop type determination, so evaluation limited to value for mapping crop boundaries**

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Ikonos Image Processing

- **7 individual Ikonos images received covering an area of approximately 20km x 25km (3 of approx. 10km x 10km and 4 of approx. 10km x 5km)**
- **3 largest images orthocorrected using Ikonos model in Erdas Imagine 8.6**
- **Used OS Landline data (1:2,500 scale) and OS 10m pixel DEM**
- **Orthocorrection RMS values for the 3 images: 1.04m, 1.10m and 1.10m**
- **Check point analaysis for 9 points on one of the images gave RMSE of 1.18m**

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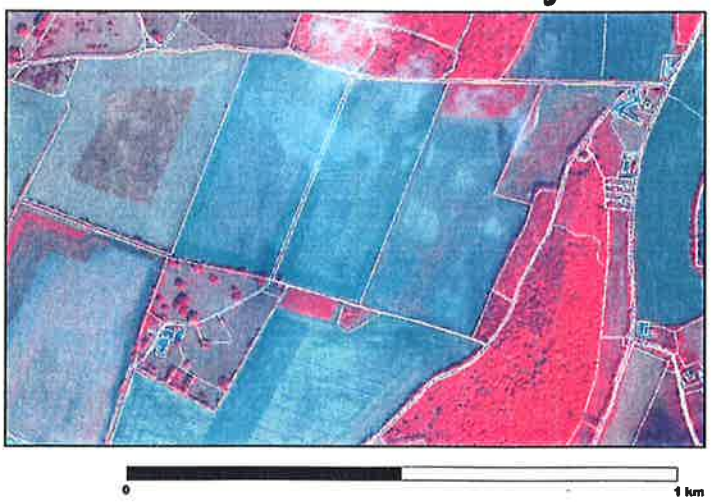
Orthocorrected Ikonos with OS Landline Overlay



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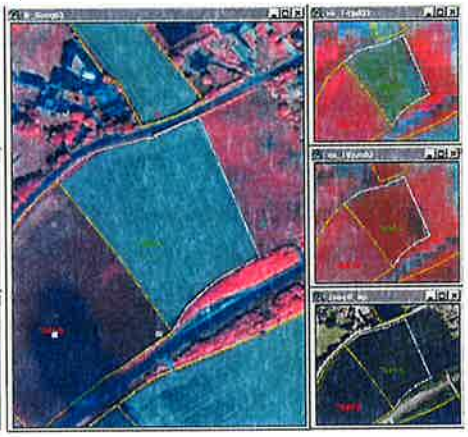
Example 1: Mapping internal crop boundaries

Without Ikonos

7665A = 3.16 ha

With Ikonos



7665A = 2.89 ha

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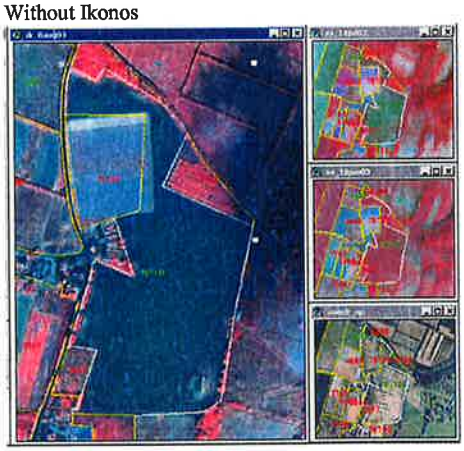
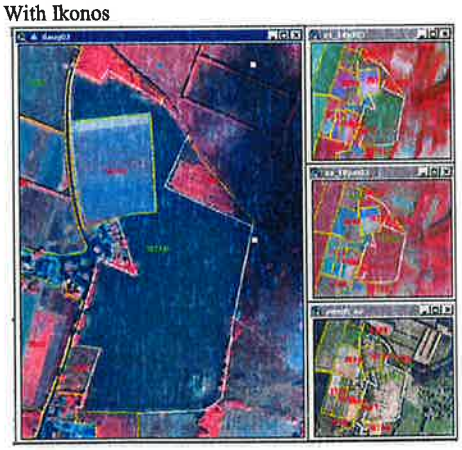
Example 2: Mapping internal crop boundaries

Without Ikonos



With Ikonos



7075D increased by 0.19ha; 7075F decreased by 0.19ha

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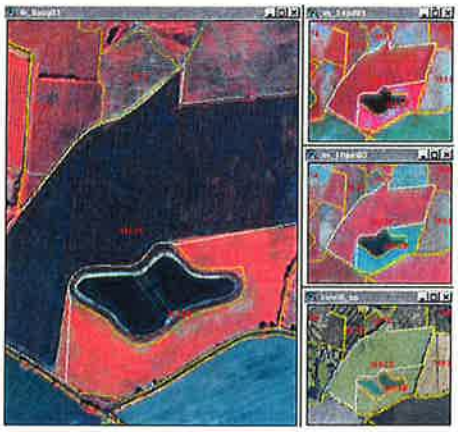
Example 3: Mapping internal crop boundaries

Without Ikonos



With Ikonos

4152B increased by 0.27ha, 4152C decreased by 0.27ha

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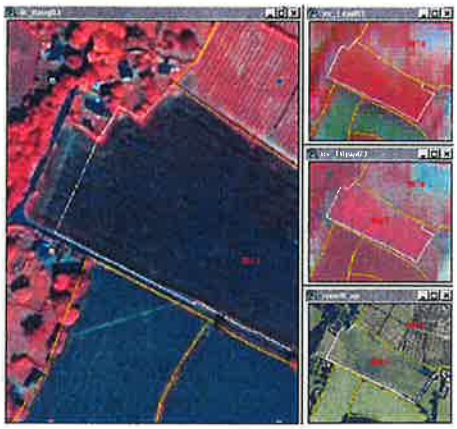
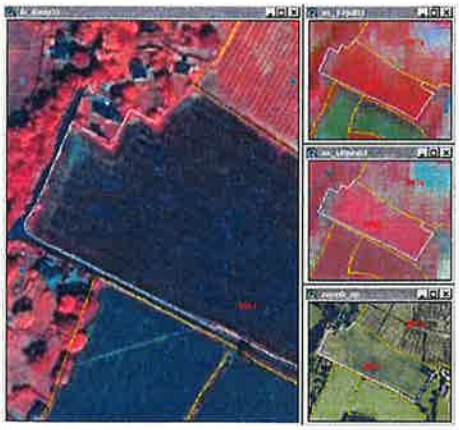
Example 4: Mapping crop extent

Without Ikonos



With Ikonos



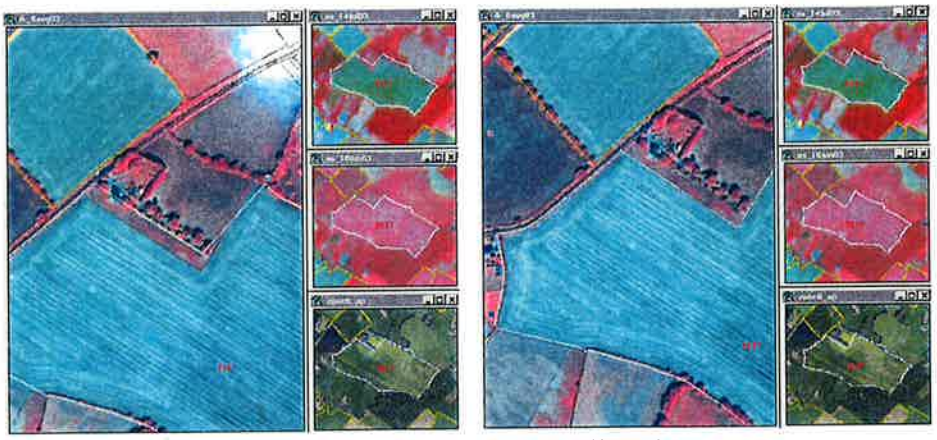
8063 increased by 0.29ha.

Control with Remote Sensing, 27/28 November 2003

Example 5: Mapping crop extent

Without Ikonos

With Ikonos



5237 reduced by 0.17ha

Control with Remote Sensing, 27/28 November 2003

Example 6: Mapping cropped margins

Without Ikonos

With Ikonos

5808 only changed by 0.02ha

Control with Remote Sensing, 27/28 November 2003

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Changes at Parcel Level

- **Boundary changes to 81 out of a total of 502 fields (16%)**
- **Most boundary changes only resulted in small changes to the measured area**
- **Largest change was 34.21 ha to 33.08ha, caused by removal of uncropped strip**
- **Area changes (negative and positive) added up to 13.66ha**
- **Applied technical tolerance (3m buffer, capped to 5%)**
- **Problem codes changed for 20 fields (8 fields OK to C3+; 1 field C3+ to OK)**

Changes at Group Level

Farm Number	Group with change	No VHR	With VHR
8328	Cereals	Pass (A1)	Pass (A2)
8287	Cereals	Pass (A1)	Fail (RF1)
8067	Cereals	Pass (A1)	Fail (RP1)
8242	Cereals	Pass (A1)	Fail (RP3)
8314	Set-aside	Pass (A1)	Pass (A2)
8355	Non EPS Forage	Pass (A1)	Fail (RP2)
8303	Cereals	Pass (A1)	Pass (A2)
8303	Set-aside	Pass (A1)	Fail (RF1)
8362	Set-aside	Pass (A2)	Fail (RP2)

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Changes at Dossier Level

Farm Number	No VHR	With VHR
8362	Accept Cat 1	Reject Cat 1
8303	Accept Cat 1	Reject Cat 4
8355	Accept Cat 1	Reject Cat 1
8242	Accept Cat 1	Reject Cat 1
8067	Accept Cat 1	Reject Cat 1
8048	Accept Cat 1	Accept Cat 2
8287	Accept Cat1	Reject Cat 4

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Conclusions (1)

- **The 1m spatial resolution Ikonos data enables crop boundaries to be mapped with a much higher level of precision than is possible using 20m Spot data**
- **Main benefit is for accurate mapping of crop boundaries within fields with split cropping, including narrow cropped margins**
- **Also valuable for identifying the precise within-field extent of cropping**
- **Some indication that farmers are given the benefit of doubt when using just Spot data (i.e. the boundary is positioned to give an area as close as possible to the declared area, unless there is clear evidence to do otherwise)**

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Conclusions (2)

- **The largest parcel area discrepancies are already being identified using Spot data, but the use of Ikonos data enables further fine tuning to an indisputable high level of precision**
- **A relatively large number of farms (6 out of 22) changed from accept to reject; no farms changed from reject to accept**
- **The use of Ikonos data improves the accuracy of the control work, leading to more field area discrepancies, group and dossier level reject cases**
- **When viewed against the higher costs of using Ikonos data, is this improvement in accuracy justified by the requirements/ financial returns from control inspections?**
- **Can Ikonos data suppliers provide the goods in terms of availability and coverage?**

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Presentation 5 – VHR Imagery – More than extra pixels

Tom McHUGH
ICON, IE

Abstracts

Ireland, because of its location, suffers form poor optical image acquisition conditions, even on apparently sunny days. A programme for updating LPIS ortho photos, is consequently slow. If used in the CwRS, VHR imagery offers the possibility to update the parcel boundary dataset in large blocks, with shorter turnaround times. The added advantage exists of focusing on concentrated areas of arable activity, where most land parcel change takes place.

In the 2003 campaign, a complete zone was covered with IKONOS data, PAN and XS, presenting the opportunity to test the following:

Ortho correction methods

- Image Interpretation parameters
- Image mosaicing and deployment

The data was received late in the campaign (August), and was used actively in the absence of other optical imagery.

Geo correction was a slower process, revealing some technical issues that will require further work. Image interpretation was also slower, possibly because more information is available to the interpreter. The enhanced resolution gave results not seen before, and in cases where subsequent checks in the field were carried out, were proved to be valid, for example hollows in land parcels.

The quality of the imagery in Pan mode was visually judged to be on a par with archive ortho photos, which are black and white. There is the added advantage of a more even distribution of contrast values. Both the Contractor and the Administration regard VHR image use as a success.

Keywords: ortho photos cloud LPIS CwRS VHR Geo correction resolution success

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The ICON Group

Substitution of archive aerial photographs by VHR data in Ireland

Tom McHugh
The ICON Group
IRELAND

The ICON Group

Contractor's Experience

This presentation represents the Contractor's experience using VHR data for the first time in the control

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Imagery Used 2002

Image type	Received
SPOT PAN:	3
SPOT 1, 2 or 4 XS:	3
Landsat TM:	1
Landsat ETM+:	1
Radarsat:	29
Others:	0
Total	**37**

No of Zones: 6

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Imagery Used 2003

Image type	Received
SPOT PAN 10m:	6
SPOT 1, 2 XS:	5
SPOT 4 Xi	13
SPOT 5 Xi	2
Landsat ETM+:	2
Radarsat:	32
Ikonos PAN	12
Ikonos COL (pansharpened)	12
Total	**84**

No of Zones: 6

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SPOT
Pan

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Ikonos
Pan

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Direct Comparison

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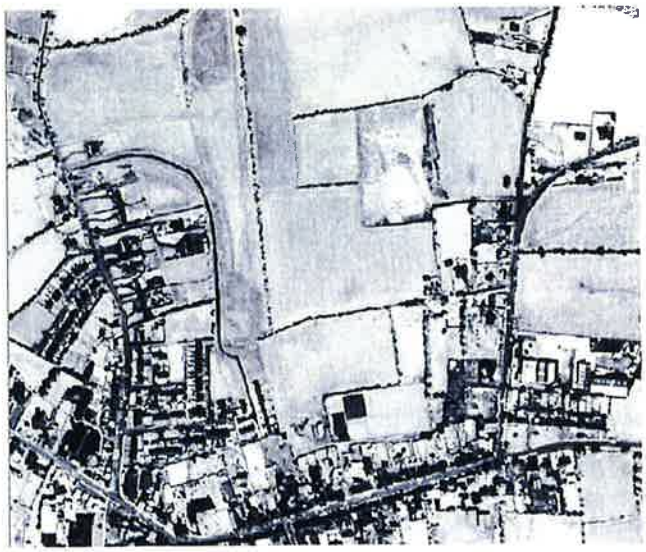
Ikonos Pan



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Ortho Photos

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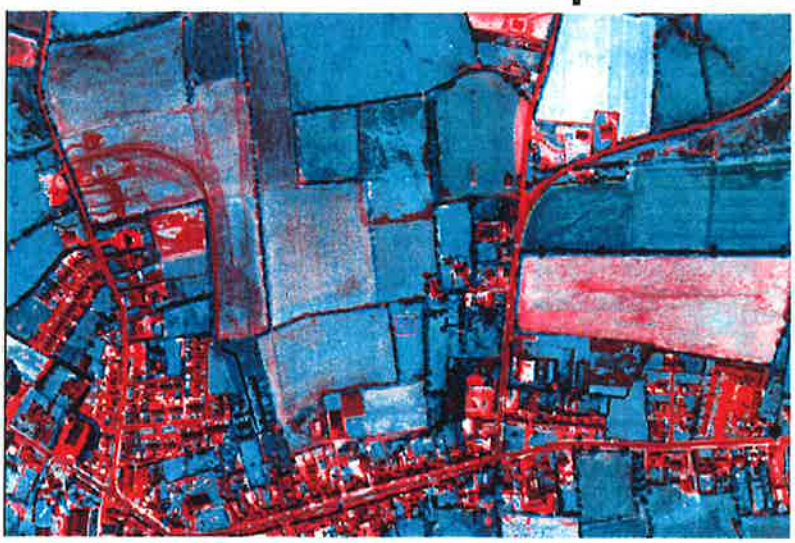
Direct Comparison



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Ikonos Pan

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The Impact of Boundary Validation With Ikonos

TINA Zone 2003	Parcels	Area (Ha)
Total Parcels Checked	13,978	6,874
Adjusted using Ikonos Data	1,591	728
% adjusted using Ikonos Data	11.4	10.6

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Ikonos Products Pan

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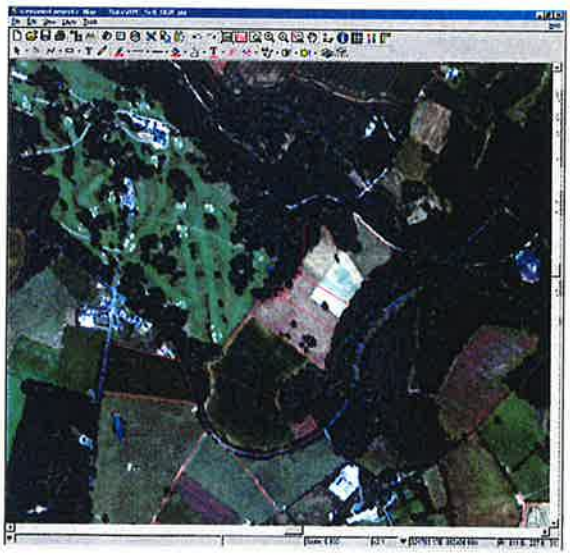
Ikonos Products Natural Colour



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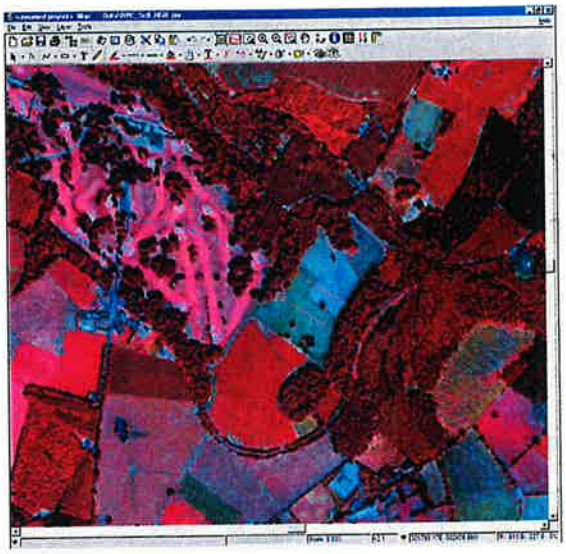
Ikonos Products Colour



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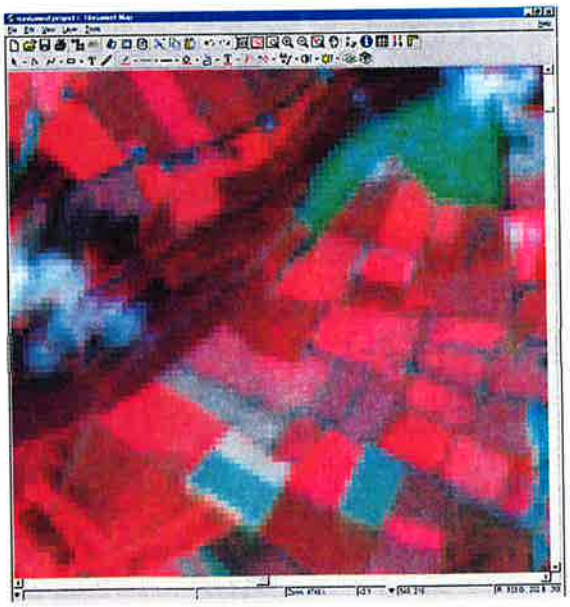
Ikonos Spot Comparison -Spot XS



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Ikonos Spot Comparison -Ikonos

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Ikonos Interpretation

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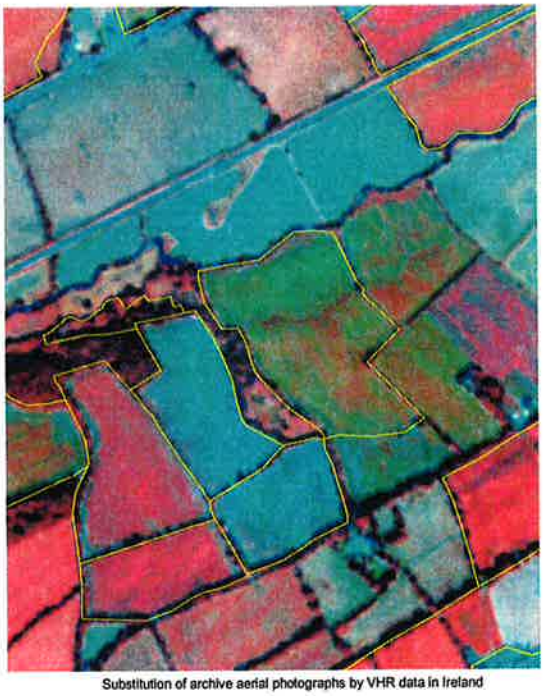
Ikonos Interpretation



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Tips

- Check the Software.
- Expect longer interp. times
- Train staff specifically on the product using sample images if possible.
- Plan for Field Visits.

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Issues

- More data means more decisions
- New Rules for handling confused signatures (scrub)?
- Weather problem policy?

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Conclusion

Subject to these points the data is easy to use and provides an enormous resource for the work of the control

Thank You

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Presentation 6 – The experience of using Spot5 Ms & VHR images in the Spanish Remote-Sensing Control of Arable & Forage Land (2003 campaign)

Charo ESCUDERO
TRAGSATEC, SP

Abstracts

In the 2003 campaign, the Spot5 Ms and VHR Ikonos & Quick Bird satellite images are used for a first time in the Spanish Control of Arable & Forage Land. This represents an important technological advance because of the Spanish's agricultural structure and landscape characteristics were the small size of parcels has been a traditional limit for the Remote Sensing Aids Control.
This presentation shows briefly the results of the VHR images orthorectification process using GPS points and the improvements reached in the photo interpretation phase. These are related with the following process: sub parcel divisions, crops identification in neighboring parcels, permanent crops identification, photo interpretation of crops in small parcels (minor than 0,3 ha) and narrow and elongated parcels.

Keywords: VHR satellite images, orthorectification, photo interpretation, Spain.

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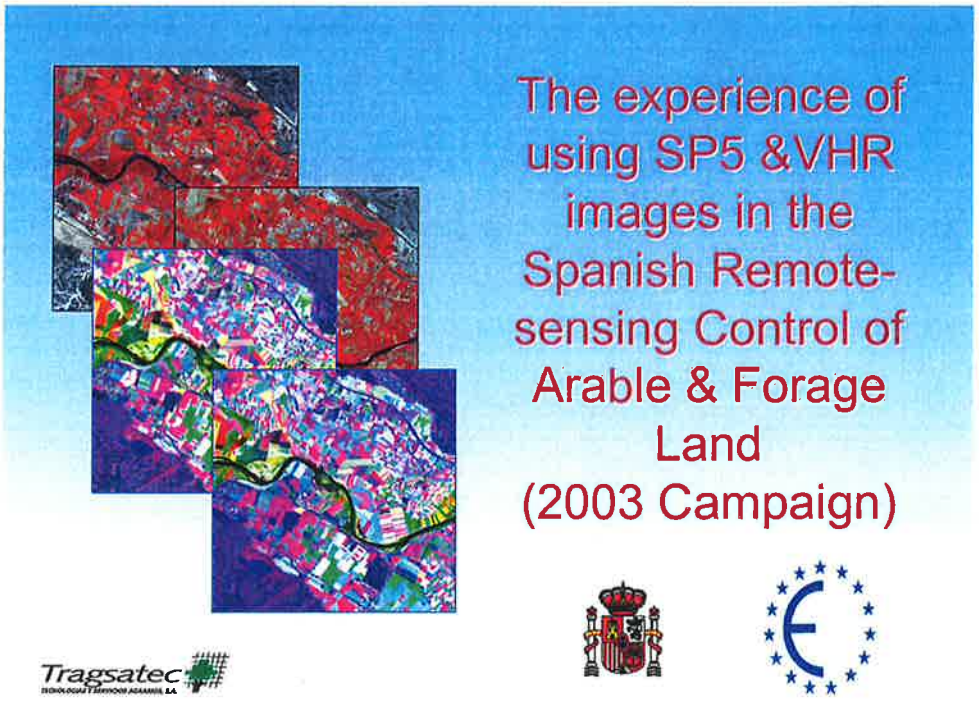

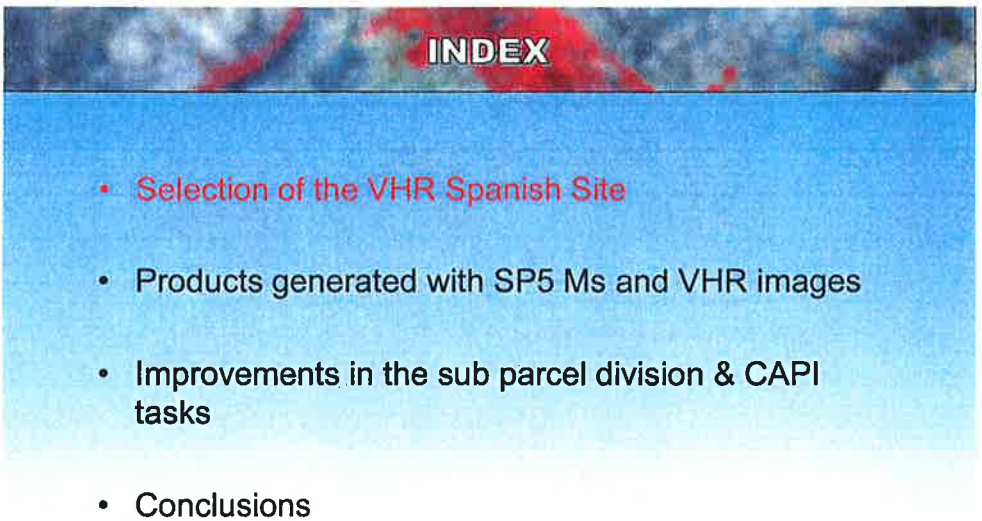

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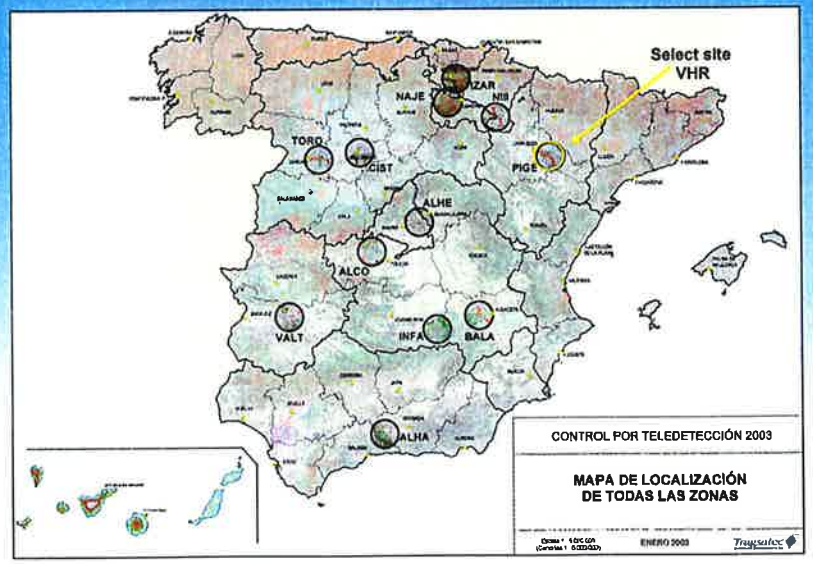
Satellite images in Spain. Campaign 2003

SITE	Autumns	1 Spring	2 Spring	Summer
ALHA	2002/11/02	2003/04/06	2003/05/12	2003/07/08
PIGE	2002/12/04	2003/03/06	2003/05/10	2003/06/20 2003/07/07 2003/07/16
ALCO	2002/11/07	2003/03/20	2003/05/02	2003/07/16
BALA	2002/11/10	2003/03/01	2003/05/03	2003/07/12
INFA		2003/04/06	2003/05/04	2003/07/11
TORO	2002/12/05	2003/03/19	2003/05/21	2003/08/01
CIST	2002/11/07	2003/04/04	2003/05/22	2003/08/01
VALT	2002/11/07	2003/04/04	2003/05/15	2003/07/16
ALHE	2002/11/07	2003/03/20	2003/05/18	2003/07/25
NIII	2002/11/26	2003/03/11	2003/05/03	2003/07/25
NAJE	2002/11/12	2003/04/05	2003/05/12	2003/07/20
IZAR	2002/11/26	2003/04/05	2003/05/22	2003/07/30

Spot XS 40% Spot 4XI 24% Spot 5XI 14% Landsat ETM+ 10% IRS LISSIII 6% Ikonos 4% Quick Bird 2%

Control Sites in Spain. Campaign 2003



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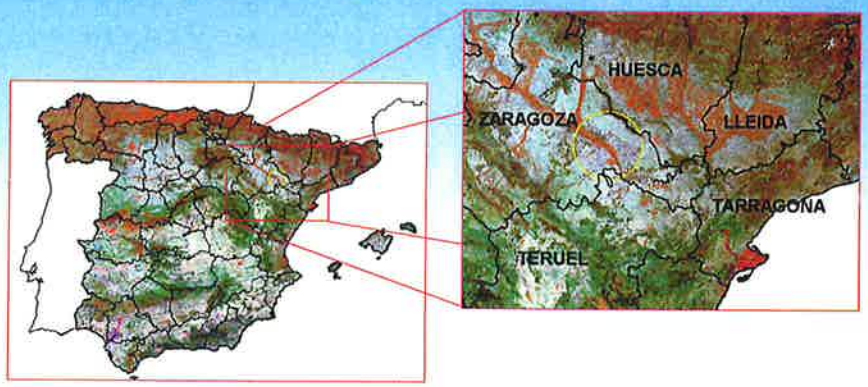
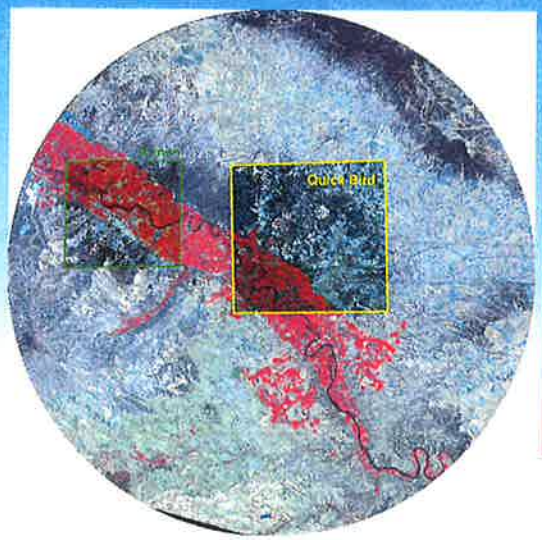
Selection of the VHR Spanish Site

- PIGE: Located in the Aragón Autonomous Community,on the banks of the Ebro river.
- Includes: irrigated lands and areas with rough topographical section.
- Mean size of land use parcels: 0,8 ha
- 60% of the sub parcels are <0,3 ha in the VHR sub sites



VHR images selected in the site



- 1 Quick Bird Ortho-ready Pan and MS bundle.

Satellite:	QB
Dated:	20/06/2003
Spatial Resolution:	Pan 0.6 m MS 2.4 m
Spectral Resolution:	Pan & MS

- 2 Ikonos Geo Ortho Kit Pan and bundle.

Satellite:	Ikonos
Dated:	07/07/2003
Spatial Resolution:	Pan 1 m MS 4 m
Spectral Resolution:	Pan & MS

Characteristic of HR (SP5) & VHR (IK- QB) images

Resolution	Band	Spot 5 XI	Ikonos	Quick Bird
Spatial	Pan	5 – 2.5 m	1 m	0.6 m
	MS	10 m	4 m	2.4 m
Spectral	Pan	480-710 nm	450-900 nm	450-900 nm
	Blue	—	450-530 nm	450-520 nm
	Green	500-590 nm	520-610 nm	520-600 nm
	Red	610-680 nm	640-720 nm	630-690 nm
	NIR	780-890 nm	770-880 nm	760-900 nm
	MIR	1580-1750nm	—	—
Radiometric		8 bits	11 bits	11 bits
Nominal watch width		60 km	11 km	16.5 km

INDEX

- Selection of the VHR Spanish Site
- Ortho-rectification of VHR images in PIGE site
  - Technical specifications and recommendations
  - Ortho-rectification Process
  - Ortho-rectification Results
- Products generated with SP5 Ms and VHR images
- Improvements obtained
- Conclusions

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Technical specifications and recommendations for HR (S5) & VHR (IK, QB) image ortho-rectification

- DTM
  - For Ik: Grid spacing < 25 m and Z < 10 m
  - For QB: Grid spacing < 15 m and Z < 6 m
- GCPs and Check Point quality three time better than the RMSE of the Technical Specification
  - Ik Pan (1 m), GCPs accuracy 0.5 m (RMSE 1.5 m)
  - Ik MS (4 m), GCPs accuracy 2 m (RMSE 6 m)
  - QB Pan (0.6 m), GCPs accuracy 0.3 m (RMSE 0.9 m)
  - QB MS (2.4 m), GCPs accuracy 1.2 m (RMSE 3.6 m)
  - S5 XI (10 m), GCPs accuracy 5 m (RMSE 15 m)
- Minimum number of GCPs required for ortho-rectification:
  - VHR: 2 to 4 points
- Number of GCPs required for checking:
  - VHR: minimum 12 point. Recommended 15 to 20 points
  - S5 XI: minimum 25 points.

Technical specifications and recommendations for VHR (IK, QB) image ortho-rectification (I)

- DTM
  - For Ik: Grid spacing < 25 m and Z < 10 m
  - For QB: Grid spacing < 15 m and Z < 6 m
- Number of GCPs required for VHR ortho-rectification:
  - 2 to 4 points
- Number of GCPs required for VHR checking:
  - Minimum 12 point. Recommended 15 to 20 points
- Accuracy of GCPs and check points: three times higher than the RMSE of the Technical Specification:

  Ik Pan (1 m), GCPs accuracy 0.5 m (RMSE 1.5 m)
  Ik MS (4 m), GCPs accuracy 2 m (RMSE 6 m)
  QB Pan (0.6 m), GCPs accuracy 0.3 m (RMSE 0.9 m)
  QB MS (2.4 m), GCPs accuracy 1.2 m (RMSE 3.6 m)

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Technical specifications and recommendations for HR & VHR image ortho-rectification

Sat/Sensor	Pixel size	RMSE	Maximum RMSE
Spot 5 XI	10 m	15 m	25 m
IK Pan	1 m	1.5 m	2.5 m
IK MS	4 m	6 m	10 m
QB Pan	0.6 m	0.9 m	1.5 m
QB MS	2.4 m	3.6 m	6 m

Technical specifications and recommendations for VHR image ortho-rectification (II)

Sat/Sensor	Pixel size	RMSE	Maximum RMSE
IK Pan	1 m	1.5 m	2.5 m
IK MS	4 m	6 m	10 m
QB Pan	0.6 m	0.9 m	1.5 m
QB MS	2.4 m	3.6 m	6 m

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Selection of the VHR images Site

HR image	
Sat/Sensor:	SPOT 5 HRG
K/J:	040/266
Dated:	16/07/2003
Spatial Resolution:	10 m
Spectral Resolution:	MS (4 bands)
Incidence angle:	L28.75°

VHR Images: files and formats

IKONOS Geo Ortho Kit Pan and MS bundle

Image file: Image.tif
Rational Polynomial Coefficients file: image_RPC.txt
Header file: image.hdr

Quick Bird Ortho-ready Pan and MS bundle

Image file: Image.tif
Image metadata fila: image.imd
Rational Polynomial Coefficients file: image.rpb

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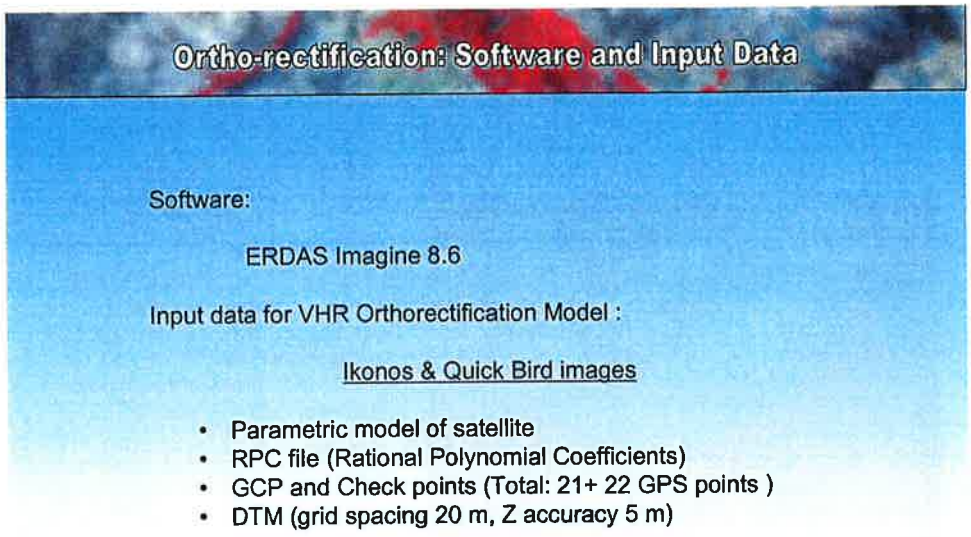
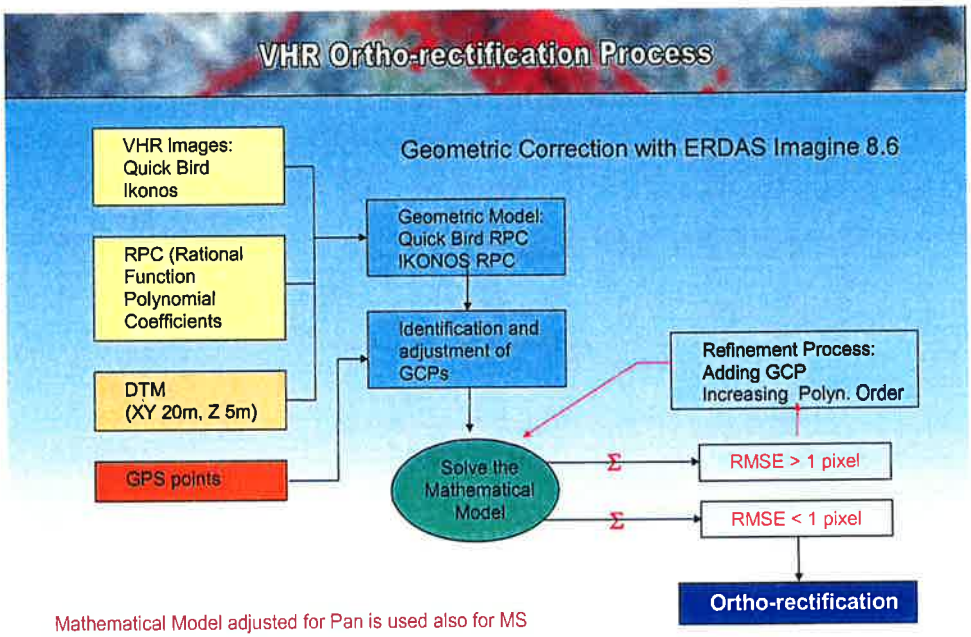




Mathematical Model adjusted for Pan is used also for MS

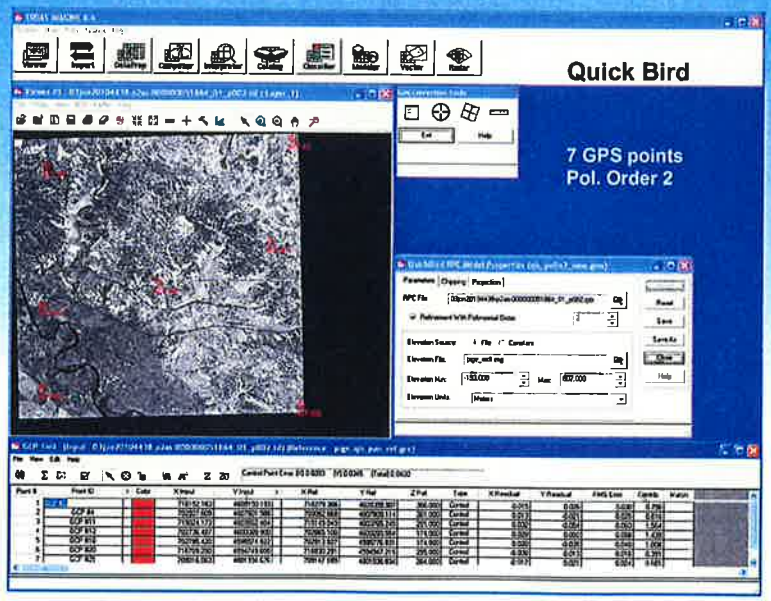
NOTE: 3 GCP's are required to solve a Polynomial Order 1 Function and 6 GCP's for a order 2

VHR Ortho-rectification: Accuracy Results

			Ortho-rectification Process RMSE (pixel)			
	Nº GCP	Pol. Order	X	Y	Total	Maximum
QB Pan	7	2	0.02	0.03	0.04	0.06
QB MS	7	2	0.33	0.15	0.36	0,63
IK Pan (Full)	5	1	0.41	0.48	0.63	0.71
IK Pan (Subs.)	18 *	2	0.27	0.46	0.53	0.87
IK MS (Full)	5	1	0.10	0.12	0.16	0.18
IK MS (Subs.)	18 *	2	0.07	0.11	0.13	0.22

18 *: 5 from full scene Ikonos, 10 from orthophoto B/W 1m and 3 form GPS

Scheme of the VHR Ortho-rectification Process



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VHR Ortho-rectification: Accuracy Validation

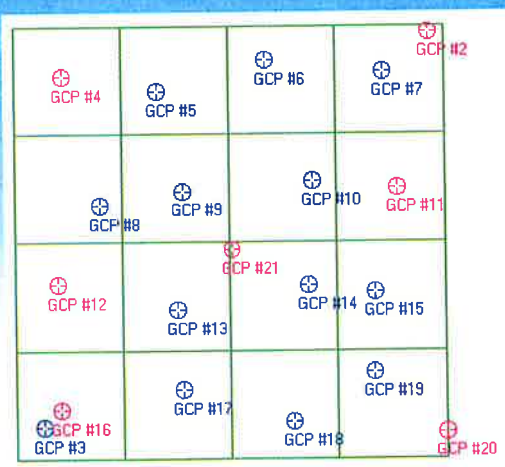
			Validation Process RMSE (meters)			
	Nº GCP	Pol. Order	X	Y	Total	Maximum
QB Pan	7	2	0.42	0.29	0.51	0.92
QB MS	7	2	1.17	1.08	1.59	2.75
IK Pan (Full)	5	1	0.77	0.77	1.09	2.05
IK Pan (Subs.)	18	2	0.20	0.08	0,21	0.97
IK MS (Full)	5	1	2.22	1.68	2.78	4.65
IK MS (Subs.)	18	2	0.99	0,79	1.27	1,07

Number of Check Points (CP): 12 minimum (different from GPS) over a 4x4 grid

Scheme of the Check Points Situation

Quick Bird

Site: PIGE
GPS points
Ground Control Points: 7
Check Points: 13



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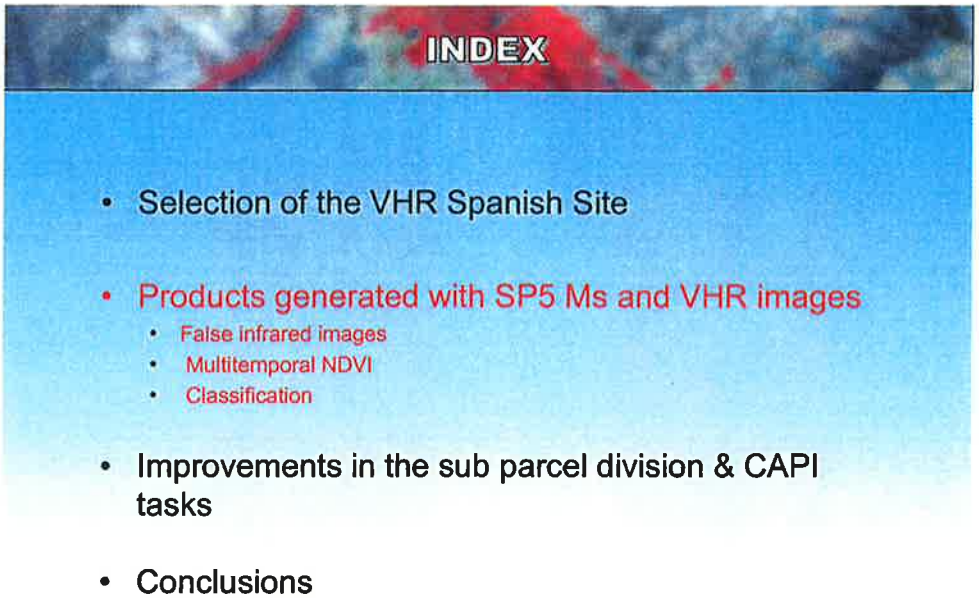

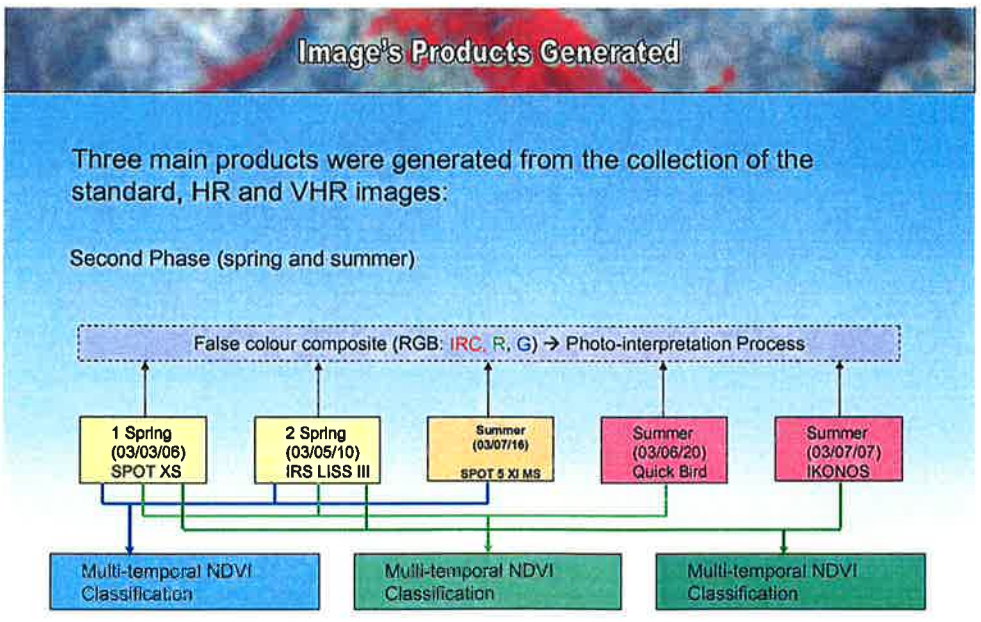

Note: There has been a large difference between the proposed and the real acquisition dates

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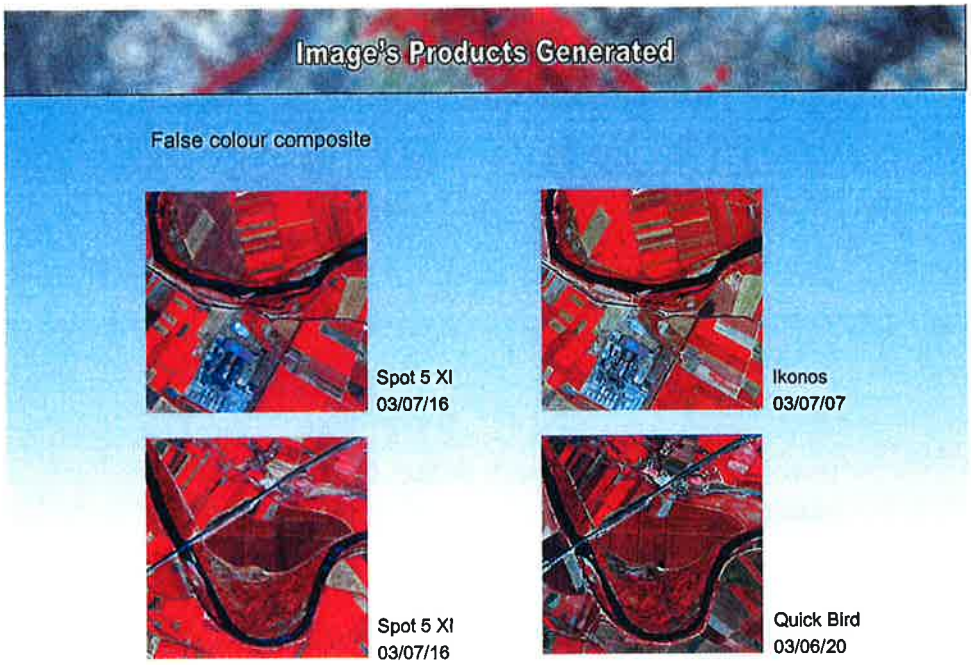

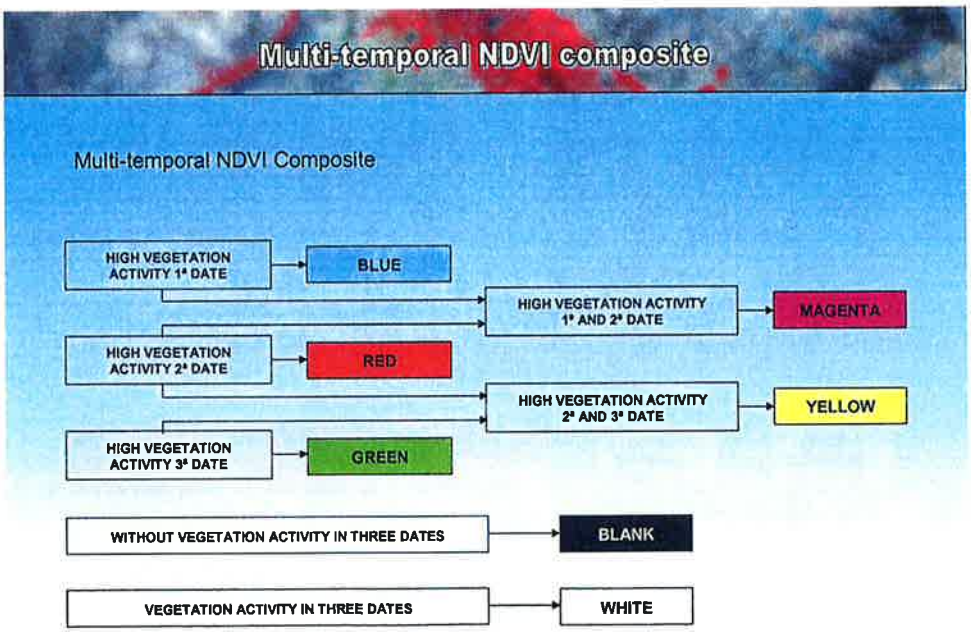

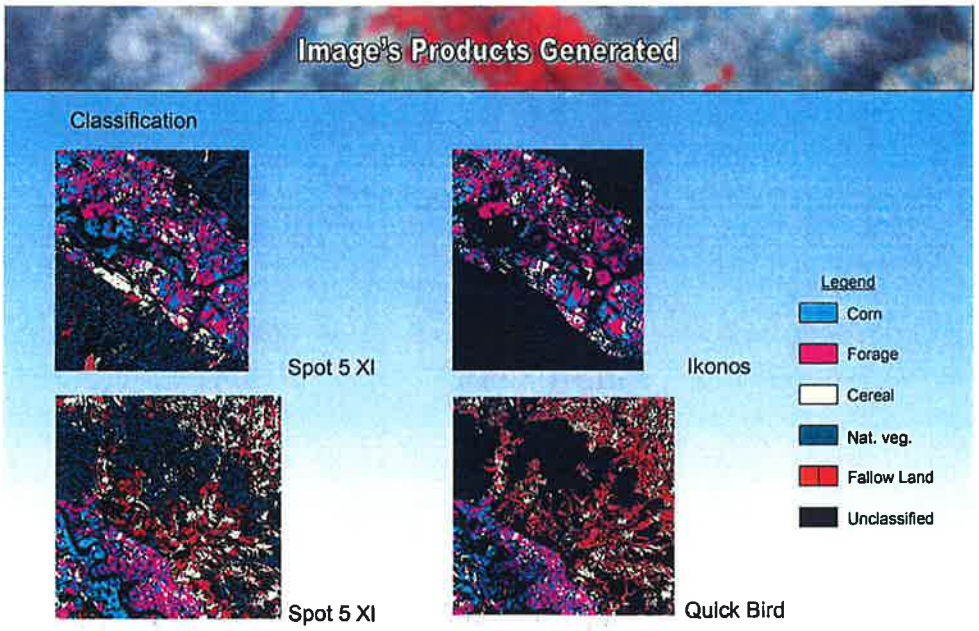

A Contingency Matrix is used to evaluate the accuracy of the classification.

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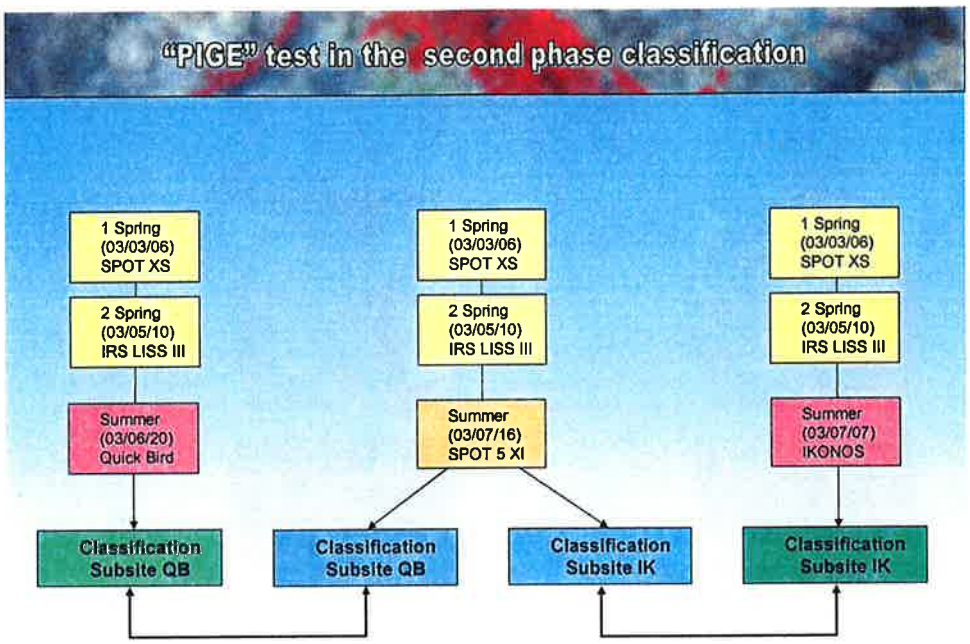

Declared crops in Ikonos subsite

IKONOS SCENE					
CROPS	CADASTRAL PARCELS		AREA (ha)		
	Number	%	Number	%	Mean parcel size
CEREAL	677	20.84	652	22.39	0.96
CORN	643	19.80	500	17.17	0.78
SUNFLOWER	1	0.03	8	0.27	8.00
OILSEEDS	1	0.03	0	0.00	0.00
LEGUMINOUS	15	0.46	13	0.45	0.87
PROTEIN CROPS	29	0.89	21	0.72	0.72
FORAGE	1,489	45.84	1,405	48.25	0.94
SET-ASIDE	267	8.22	192	6.59	0.72
NON ELEGIBLE CROPS	71	2.19	62	2.13	0.87
PERMANENT CROPS	39	1.20	11	0.38	0.28
OTHERS	16	0.49	48	1.65	3.00
TOTAL	3,248	100	2,912	100	0.90

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Statistical Confusion Matrix Analysis MR SP5 / MR IK

2nd phase classification: Two Spring MR images and the **SP5 (HR)** summer image.
Identification accuracy (>= 85%)

	Cereal	Corn	Forage	Fallow Land	Fruit Trees	Total
Cereal	94.83	0.00	2.59	2.58	0.00	100.00
Corn	0.95	97.14	1.90	0.00	0.00	100.00
Forage	0.93	1.63	97.20	0.23	0.00	100.00
Fallow Land	0.00	0.00	0.00	100.00	0.00	100.00
Unclassified	22.92	14.74	44.87	16.50	0.96	100.00

2nd phase classification: Two Spring MR Images and the **Ikonos (VHR)** summer image.
Identification accuracy (>= 85%)

	Cereal	Corn	Forage	Fallow Land	Total
Cereal	94.93	0.15	4.92	0.00	100.00
Corn	0.83	96.93	2.44	0.00	100.00
Forage	3.15	1.15	95.70	0.00	100.00
Fallow Land	7.69	0.00	0.00	92.31	100.00
Unclassified	30.22	17.62	44.61	7.55	100.00

IA: number of pixel of one radiometric class assigned to a land use class

Statistical Confusion Matrix Analysis MR SP5 / MR IK

2nd phase classification: Two Spring MR Images and the **SP5 (MR)** summer image.
Cartographic accuracy

	Cereal	Corn	Forage	Fallow Land	Fruit Trees
Cereal	42.64	0.00	0.43	2.78	0.00
Corn	0.39	90.75	0.28	0.00	0.00
Forage	1.55	3.48	59.40	0.93	0.00
Fallow Land	0.00	0.00	0.00	0.93	0.00
Unclassified	55.43	45.77	39.89	95.36	100.00
Total	100.00	100.00	100.00	100.00	100.00

2nd phase classification: Two Spring MR Images and the **Ikonos (VHR)** summer image.
Cartographic accuracy

	Cereal	Corn	Forage	Fallow Land
Cereal	52.17	0.08	0.76	0.00
Corn	0.48	74.50	0.53	0.00
Forage	9.72	3.53	83.07	0.00
Fallow Land	0.04	0.00	0.00	4.91
Unclassified	37.59	21.89	15.64	95.09
Total	100.00	100.00	100.00	100.00

CA: percentage of a field class correctly identify in the classification

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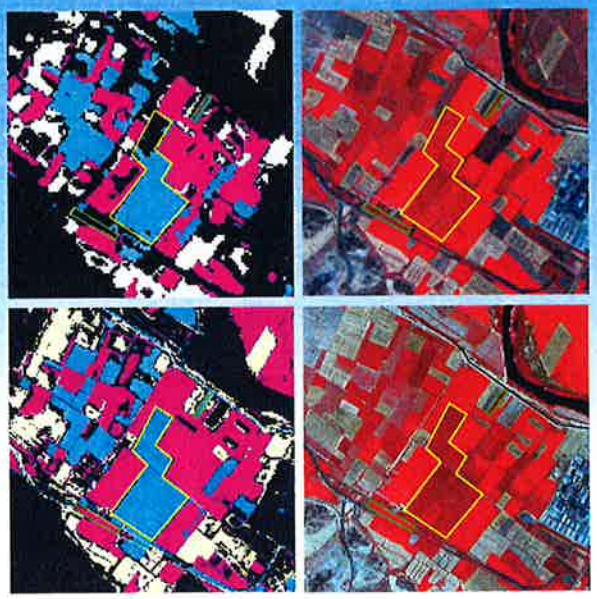
Statistical Confusion Matrix Analysis MR SP5 / MR IK

2nd phase classification: Two Spring MR images and the **SP5 (HR)** summer image.

2nd phase classification: Two Spring MR images and the **IK (VHR)** summer image.



Corn
Forage
Cereal
Unclassified

Declared crops in Quick Bird subsite

QUICKBIRD SCENE					
CROPS	CADASTRAL PARCELS		AREA (ha)		
	Number	%	Number	%	Mean parcel size
CEREAL	1,519	28.76	2,265	29.63	1.49
CORN	641	12.14	561	7.34	0.88
LEGUMINOUS	4	0.08	1	0.01	0.25
PROTEIN CROPS	59	1.12	49	0.64	0.83
FORAGE	2,040	38.62	2,487	32.54	1.22
SET-ASIDE	882	16.70	1,751	22.91	1.99
NON ELEGIBLE	67	1.27	17	0.22	0.25
PERMANENT CROPS	49	0.93	385	5.04	7.86
OTHERS	21	0.40	128	1.67	6.10
TOTAL	5,282	100	7,644	100	1.45

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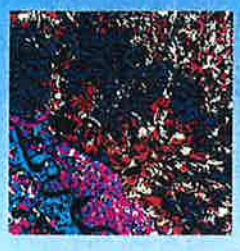
Statistical Confusion Matrix Analysis MR SP5 / MR QB

2nd phase classification: Two Spring MR images and the **SP5 (HR)** summer image.
Identification accuracy (>= 85%)



	Cereal	Corn	Forage	Fallow Land	Pasture	Natural Vegetat	Total
Cereal	96.17	0.68	1.58	1.58	0.00	0.00	100.00
Corn	0.00	98.60	1.70	1.70	0.00	0.00	100.00
Forage	0.34	1.52	97.90	0.25	0.00	0.00	100.00
Fallow Land	1.69	0.00	0.00	97.25	0.00	1.06	100.00
Nat. Veget.	36.54	0.00	0.00	55.45	0.00	8.01	100.00
Unclassified	10.12	25.00	43.80	15.49	4.96	0.62	100.00

2nd phase classification: Two Spring MR images and the **QB (VHR)** summer image.
Identification accuracy (>= 85%)

	Cereal	Corn	Forage	Fallow Land	Pasture	Natural Vegetat	Total
Cereal	98.70	0.65	0.33	0.24	0.01	0.06	100.00
Corn	0.05	92.04	3.30	4.61	0.00	0.00	100.00
Forage	0.38	0.54	97.44	1.58	0.06	0.00	100.00
Fallow Land	1.48	0.00	0.00	98.28	0.00	0.00	100.00
Nat. Veget.	5.69	4.85	1.60	0.00	0.00	87.92	100.00
Unclassified	22.98	19.19	26.10	24.75	3.83	3.15	100.00

Statistical Confusion Matrix Analysis MR SP5 / MR QB

2nd phase classification: Two Spring MR images and the **SP5 (HR)** summer image. Cartographic accuracy.

	Cereal	Corn	Forage	Fallow Land	Pasture	Natural Vegetat
Cereal	70.91	0.62	0.50	0.76	0.00	0.00
Corn	0.00	70.60	0.43	0.66	0.00	0.00
Forage	0.66	3.73	83.79	0.33	0.00	0.00
Fallow Land	1.33	0.00	0.00	50.22	0.00	15.15
Nat. Veget.	18.94	0.00	0.00	18.89	0.00	75.76
Unclassified	8.14	25.05	15.27	29.15	100.00	9.09
Total	100.00	100.00	100.00	10.00	100.00	100.00

2nd phase classification: Two Spring MR images and the **QB (VHR)** summer image. Cartographic accuracy.

	Cereal	Corn	Forage	Fallow Land	Pasture	Natural Vegetat
Cereal	75.27	0.64	0.11	0.17	0.12	0.87
Corn	0.03	73.60	0.91	2.46	0.00	0.00
Forage	0.76	1.41	87.58	2.74	3.02	0.00
Fallow Land	1.29	0.00	0.00	73.75	0.00	3.72
Nat. Veget.	0.15	0.16	0.02	0.00	0.00	40.63
Unclassified	22.51	24.18	11.38	20.88	98.87	54.78
Total	100.00	100.00	100.00	10.00	100.00	100.00

CA: percentage of a field class correctly identify in the classification

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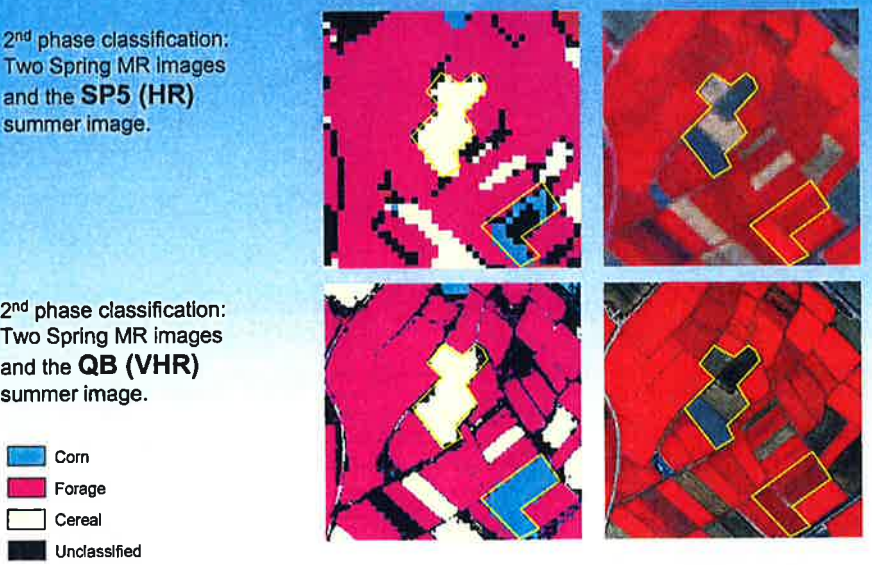
Statistical Confusion Matrix Analysis MR SP5 / MR QB

2nd phase classification: Two Spring MR images and the **SP5 (HR)** summer image.

2nd phase classification: Two Spring MR images and the **QB (VHR)** summer image.



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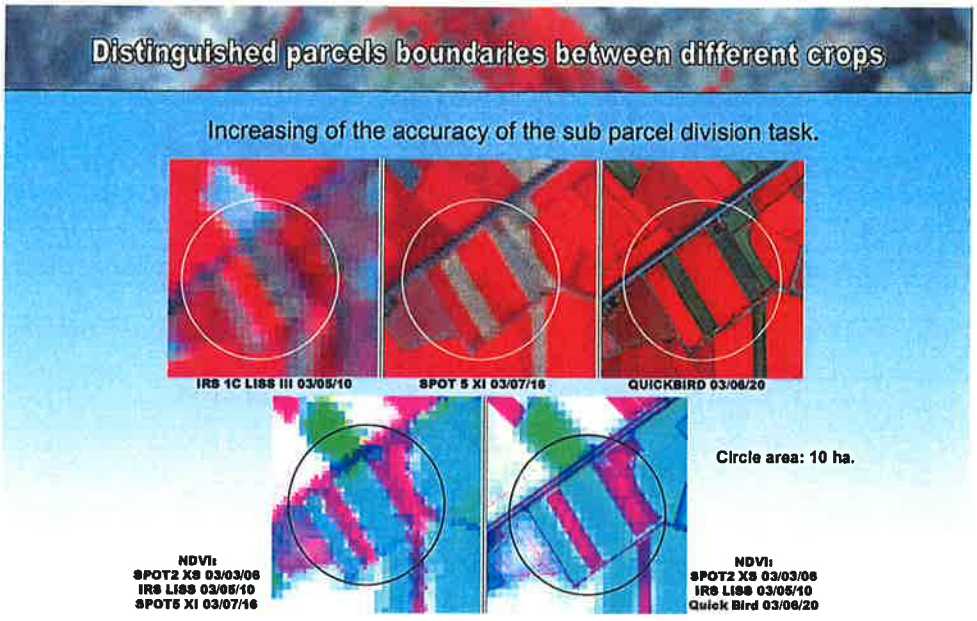
  - Crops identification in neighbouring parcels
  - Photointerpretation of small parcels (< 0.3 ha)
  - Crop Identification in narrow and elongated parcels (> 0,3 ha)
  - Permanent crops identification
  - others
- Conclusions


Distinguished parcels boundaries between different crops
Increasing of the accuracy of the sub parcel division task.
IRS 1C LISS III 03/05/10
SPOT 5 XI 03/07/16
QUICKBIRD 03/06/20
Circle area: 10 ha.
NDVI:
SPOT2 XS 03/03/06
IRS LISS 03/05/10
SPOT5 XI 03/07/16
NDVI:
SPOT2 XS 03/03/06
IRS LISS 03/05/10
Quick Bird 03/06/20

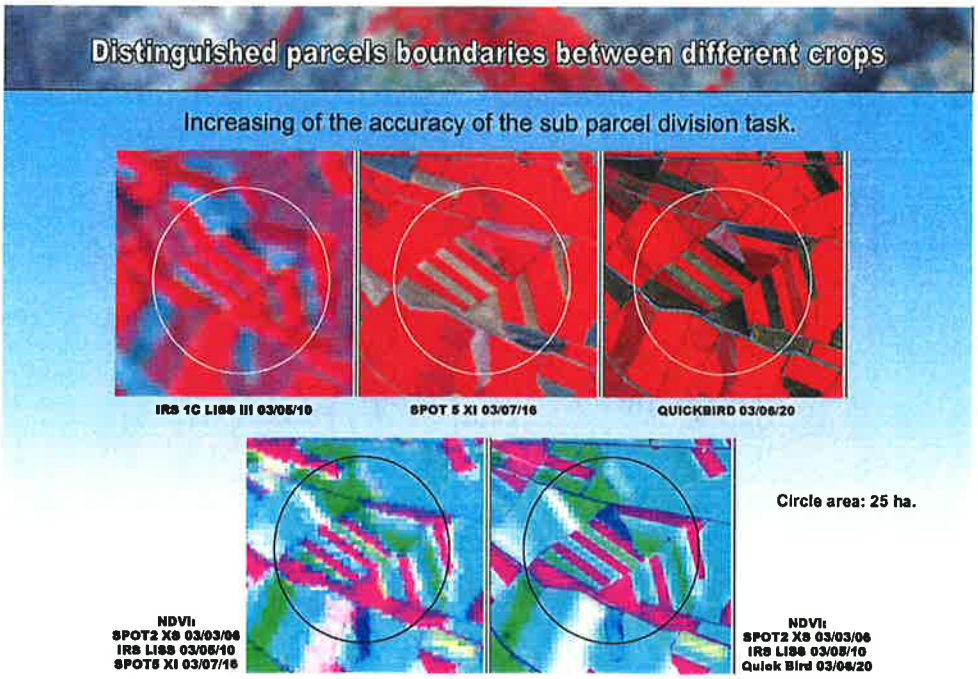

Distinguished parcels boundaries between different crops
Increasing of the accuracy of the sub parcel division task.
IRS 1C LISS III 03/05/10
SPOT 5 XI 03/07/16
QUICKBIRD 03/06/20
Circle area: 25 ha.
NDVI:
SPOT2 XS 03/03/06
IRS LISS 03/05/10
SPOT5 XI 03/07/16
NDVI:
SPOT2 XS 03/03/06
IRS LISS 03/05/10
Quick Bird 03/06/20

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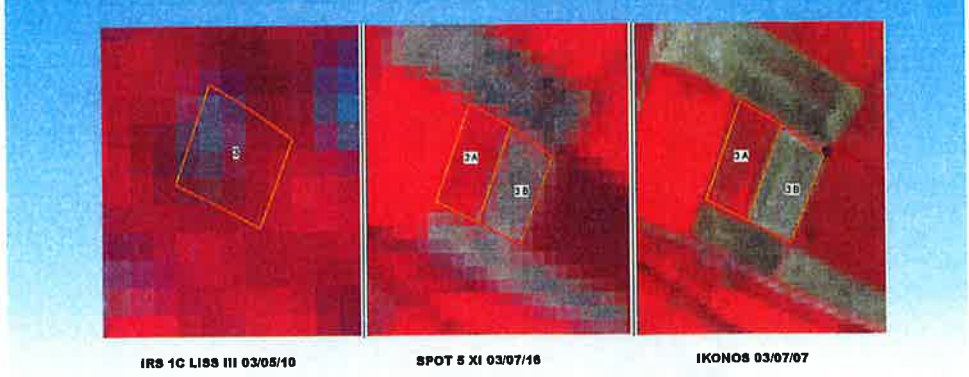
Photo-interpretation of small parcels (less than 0.3 ha)

The use of SP5 Ms & VHR images allows the photo interpretation of small parcels without taken into account the traditional limitation of 0,3 ha defined for MR images.

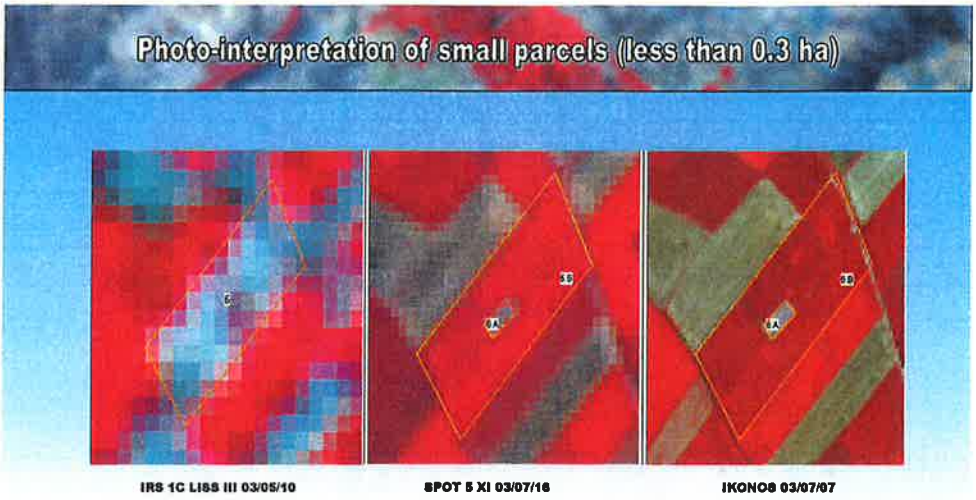
Image	Pixel size (m)	N° of pixel in a square parcel of 0.3 ha
Landsat / IRS Liss III / Spot 1–4	20	7.5
Spot 5	10	30
Ikonos MS	4	187.5
Quick Bird MS	2.4	503.9

Photo-interpretation of small parcels (less than 0.3 ha)

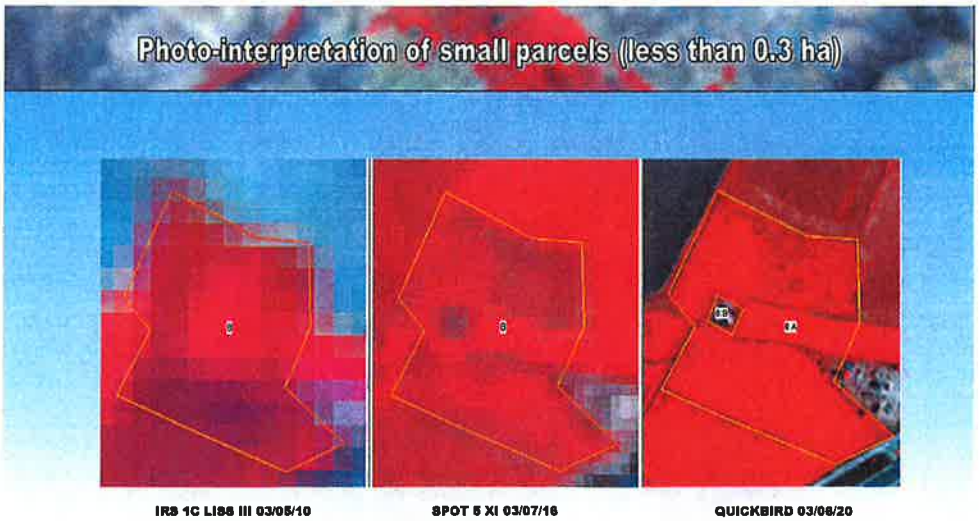


SUBDIVISION OF ONE CATASTRAL PARCEL

Parcel area: 3:A (0.298 ha) 3:B (0.299 ha)



Parcel area: 6:A (0.100 ha) 6:B (2.595 ha)



Parcel area: 8:A (3.600 ha) 8:B (0.070 ha)

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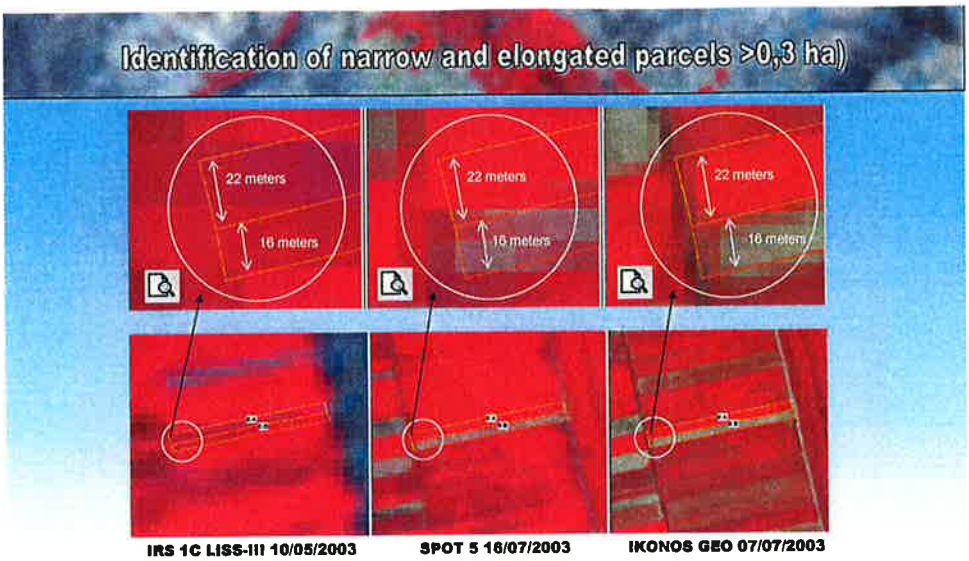
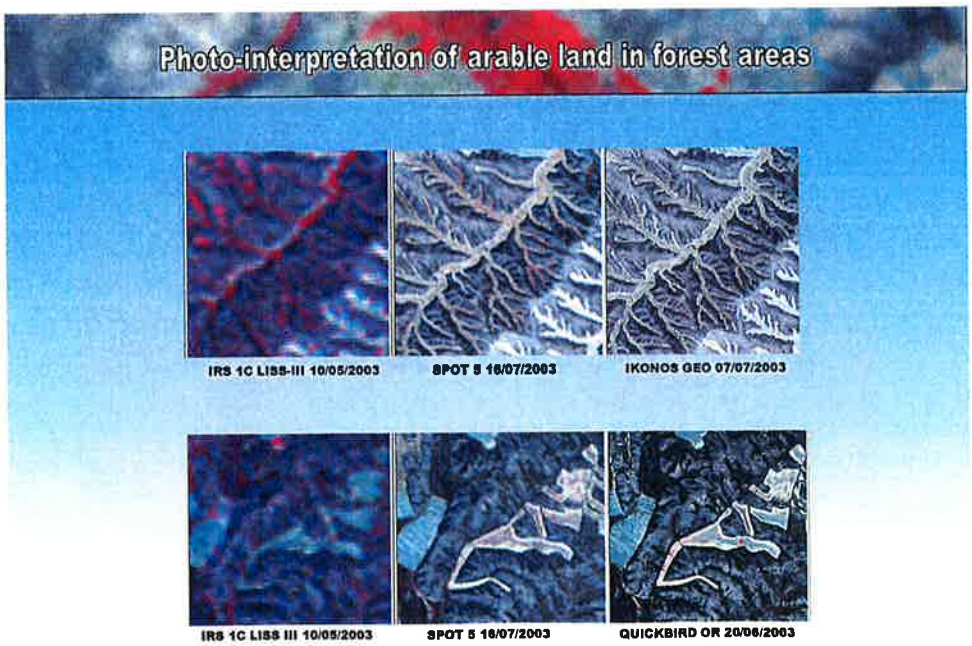


Parcel area: 8:A (0.685 ha) 8:B (0.575 ha)

Traditionally in these cases the subparcels were photo-interpreted with the code "Impossible photointerpretation" and checked during the Rapid Field Visit. The use of Sp5 Ms & VHR images allow us to solve this problem in many cases, reducing the field work.



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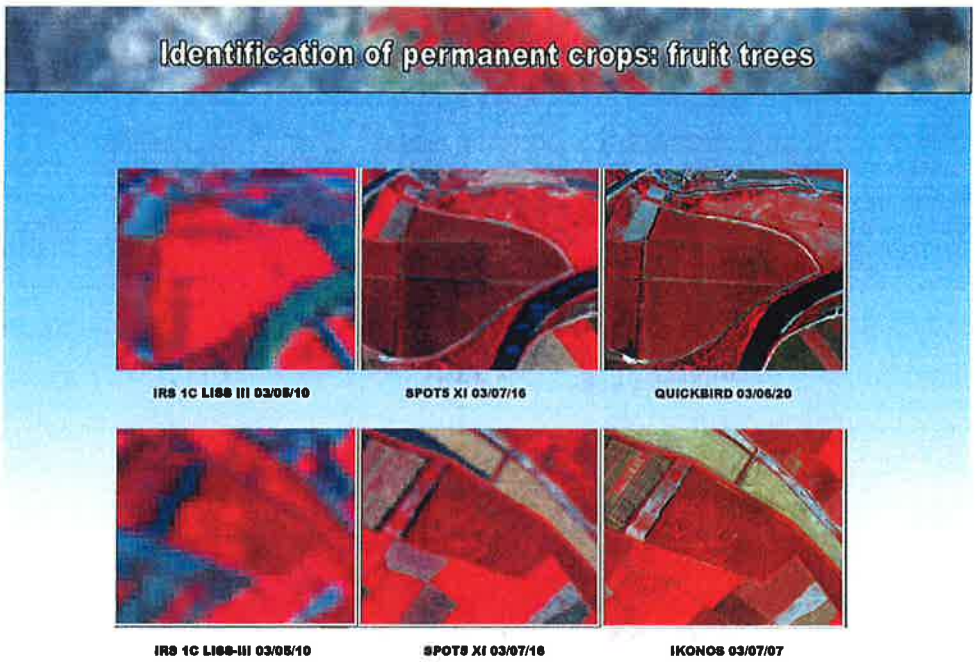

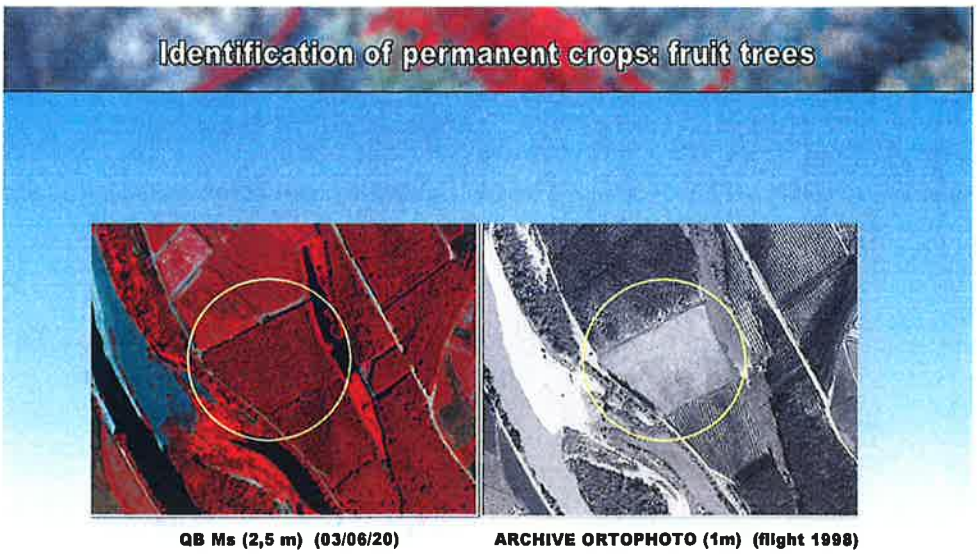

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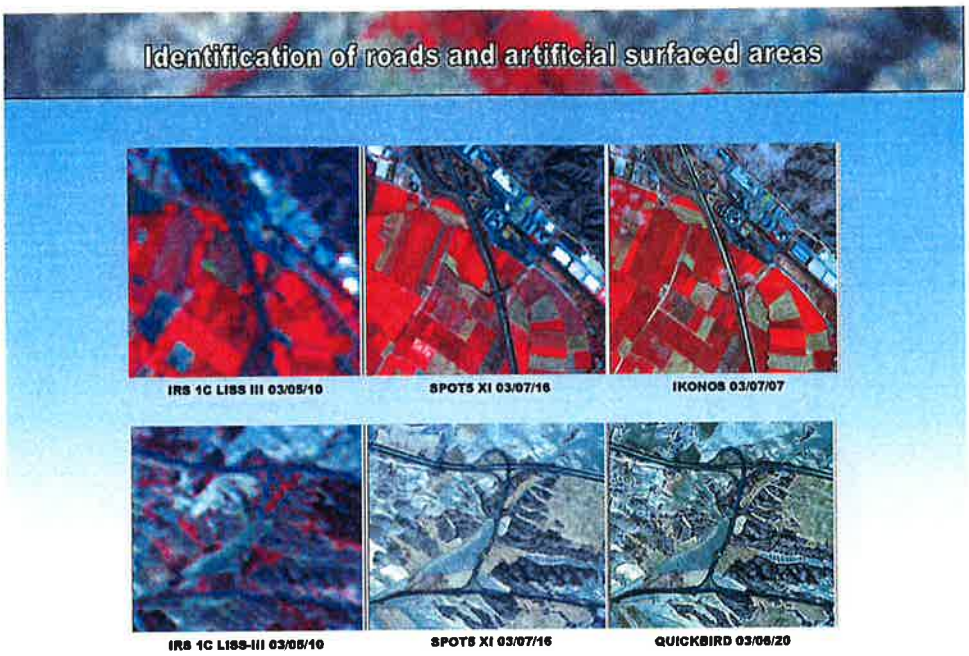

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- Conclusions
  - SP5 Ms & VHR comparison
  - Advantages
  - Disadvantages
  - Future recommendations

Main difficulties for the integration of VHR in the 2003 campaign

- The assumption of two GPS field campaign in the PIGE VHR sub sites.
- The VHR images supplied were too early for a optimum identification of the main summer crops in PIGE site (maize and forages)

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SP5 Ms & VHR comparison

- SP5 Ms image cover the whole site. Not mosaic needed
- SP5 doesn't need GPS field campaign for GCPs and check point capture
- SP5 Ms (10 metres) usually has enough spatial resolution for sub parcel division and crop identification of small parcels.
- Good relationship quality/price.

Advantages

- More accurate results in the task of measuring areas and crop identification
- Reduction of doubtful parcels in the photo interpretation process because having an area smaller than the established technical limit with habitual MR data (0.3 ha)
- Reduction of field survey visits

Future Recomendations

- The optimum date in Spain for HR and VHR data is usually the second spring
- More SP5 Ms images. One per site, if possible
- Test SP5 Pan (2,5 to 5 m) / Ms (10 m) compositions

Future Recomendations

For the use of VHR images:

- Higher hardware requirements
  - High data volume management.
    Data with16 bits per pixel
    IK Pan 191 Mb, IK MS 48 Mb
    QB Pan 1,334 Mb, QB MS 333 Mb
- Higher software requirements for VHR Block - orto rectification with rigorous sensor models, mosaics generation and refined colour balance tools.

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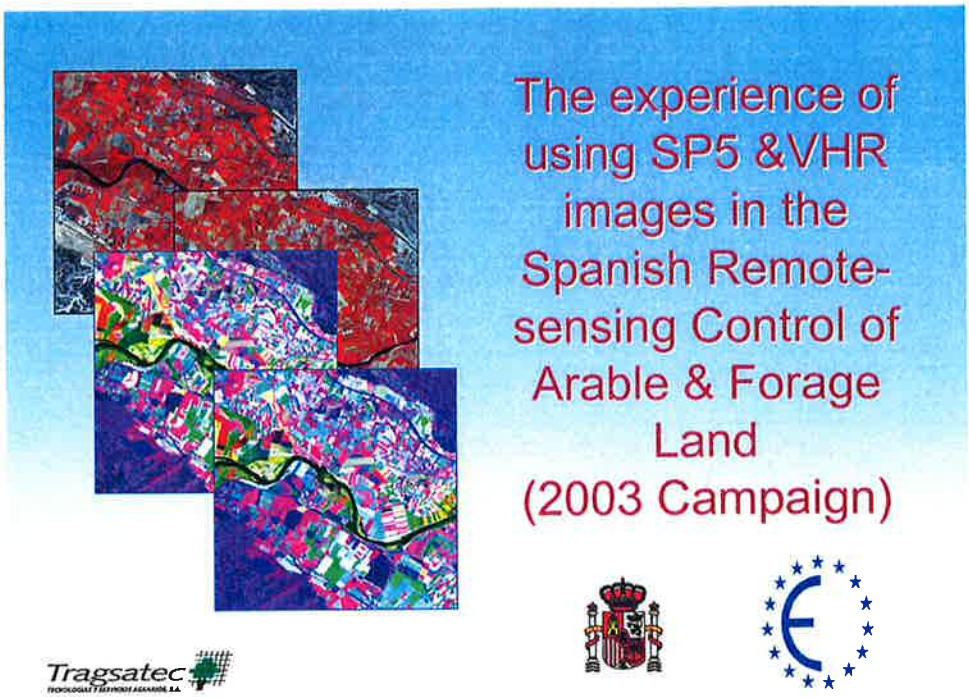

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Presentation 7 – Control assisted by remote sensing of Agri-Environmental Measures (AEMS)

Jean-Paul GACHELIN
SIRS, FR

Abstracts

The political and financial importance of **agri-environmental measures** does nothing but increase. Today, they have vocation to become **an essential element** of the common agricultural policy **second pillar**. The remote-sensing could prove to be an invaluable tool for the control of the implementation of the AEMs. But, before all, it is necessary to judge reliability and effectiveness of this tool. It is the goal of several pilot studies which are currently undertaken.

The presentation aims at exposing the experimentations carried out in various European countries on the control of agri-environmental measures (AEMs) by remote-sensing. Ashort preliminary will describe the areas and measures concerned as well as the types of constraints to be respected by the farmers. The use of very high-resolution images will be then exposed with the visualization of some examples. These examples show the potentialities of the use of QuickBird or Ikonos images for the observation and the control of the implementation of the AEMs.

The implementation of a possible control by remote-sensing is however slowed down by many constraints of regulation and technical nature (complexity of the declaratory support and schedules of conditions, heterogeneity of the commitments, etc).

The results obtained are however encouraging : the experimentation showed that control by remote-sensing of the AEMs is very effective for the checking of the surface and the occupation of the ground. More significant, the relatively recent use of a very high-resolution imagery authorizes a remarkably precise vision of the field reality and it becomes indirectly essential for the AEMs control. However, a control on the ground must necessarily supplement this first approach since many commitments are not observable.

Keywords: agri-environmental measures, remote-sensing, high-resolution, control.

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The objectives of the pilot study

To assess the potentialities, limits and added value of the use of remote-sensing for AEM control

- ***Which AEM can be controlled and which AEM cannot be controlled (by remote-sensing) ?***
- ***Which commitments can be controlled and which commitments cannot be controlled (by remote-sensing) ?***
- ***What kind of imagery does AEM control require ?***
- ***What are the more suitable dates for imagery (according to the AEM's) ?***
- ***How to envisage complementary field visit ?***

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Conference Control with Remote Sensing
27-28th of November 2003 - Köln

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Workshop on control of Area-related Measures Of the Rural Developement Plan
Pilot Study on use of remote sensing for AEM control in Limousin Area in France

The objectives of the pilot study

To assess the potentialities, limits and added value of the use of remote-sensing for AEM control

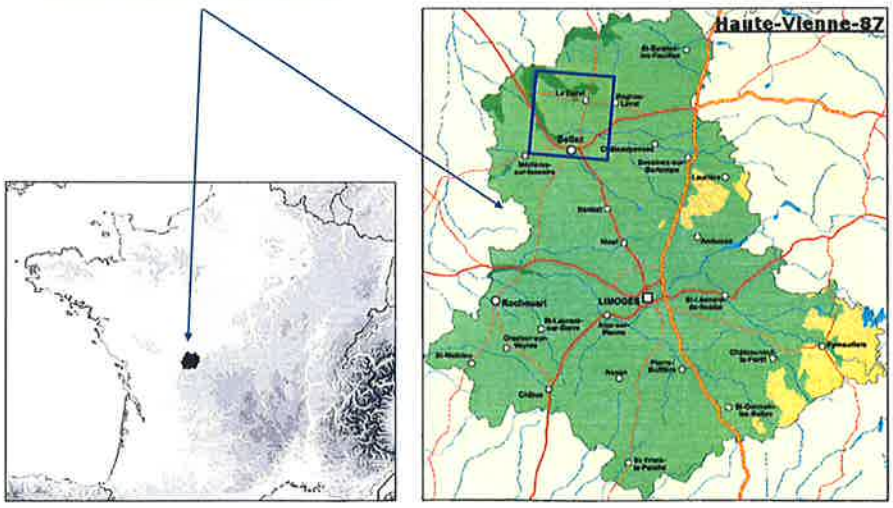
How to translate regulation and commitments in technical specifications

What are the benefits of remote-sensing in comparison of classic pedestrian control ?

What are the costs of the organisation involved by the use of remote-sensing for AEM control ?

Workshop on control of Area-related Measures Of the Rural Developement Plan
Pilot Study on use of remote sensing for AEM control in Limousin Area in France

The study area (France)



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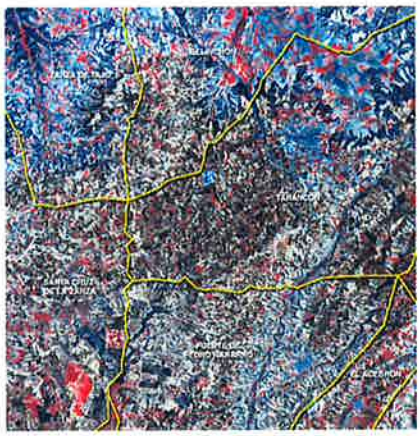
Workshop on control of Area-related Measures Of the Rural Developement Plan
Pilot Study on use of remote sensing for AEM control in Limousin Area in France

***The study area (Spain :* Cuenca - Castilla La Mancha)**



QB Image: 100 Km2

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Workshop on control of Area-related Measures Of the Rural Developement Plan
Pilot Study on use of remote sensing for AEM control in Limousin Area in France

***The study area (Spain :* Cuenca - Castilla La Mancha)**

QB Image: 100 Km2

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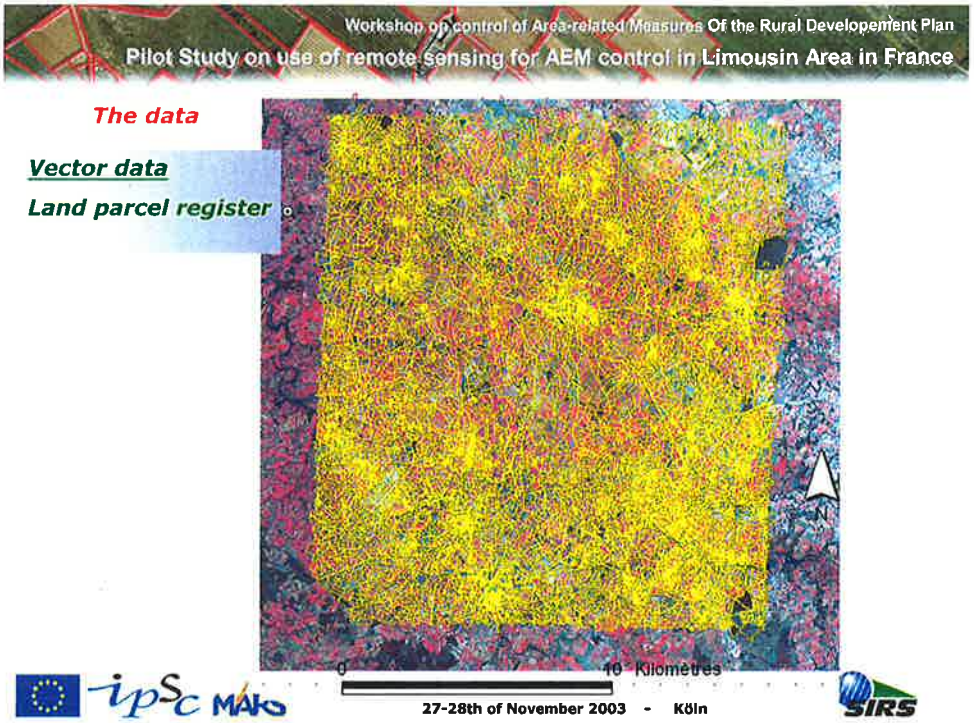

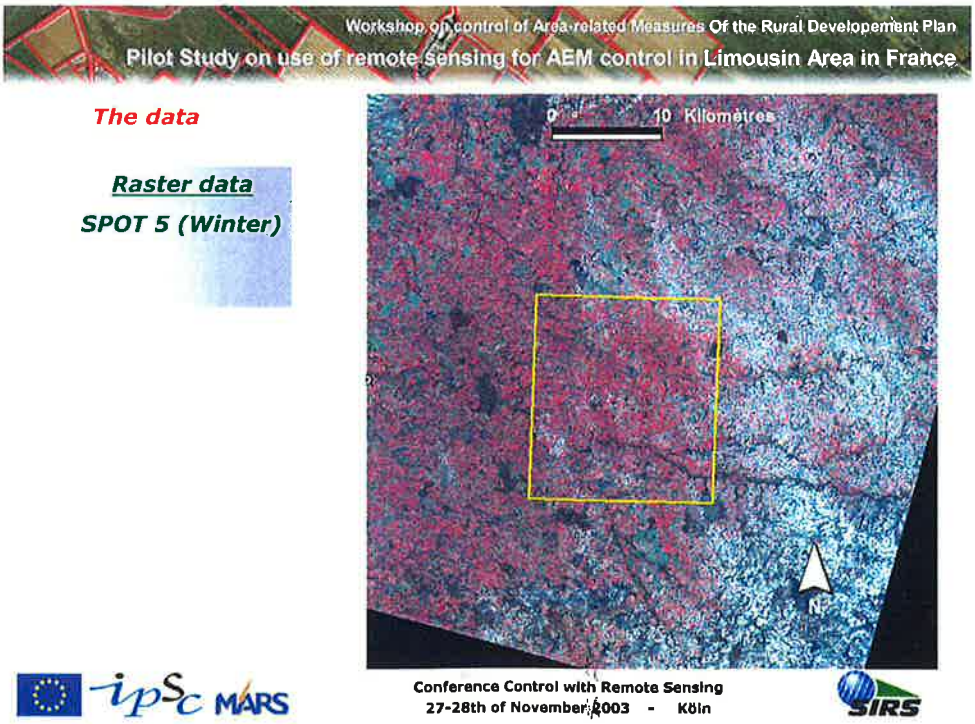

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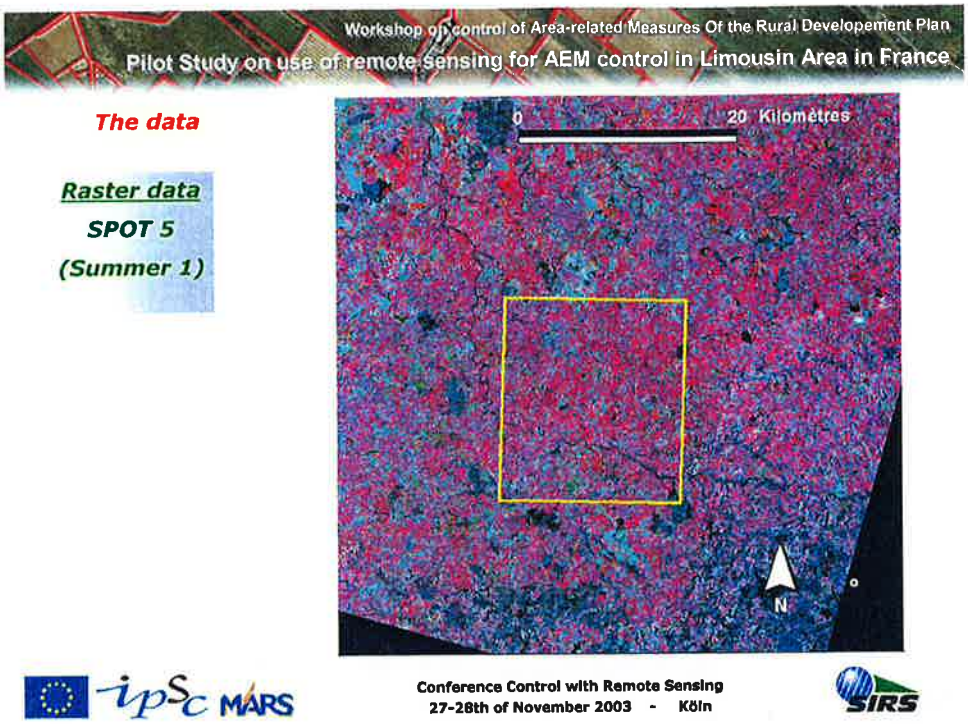

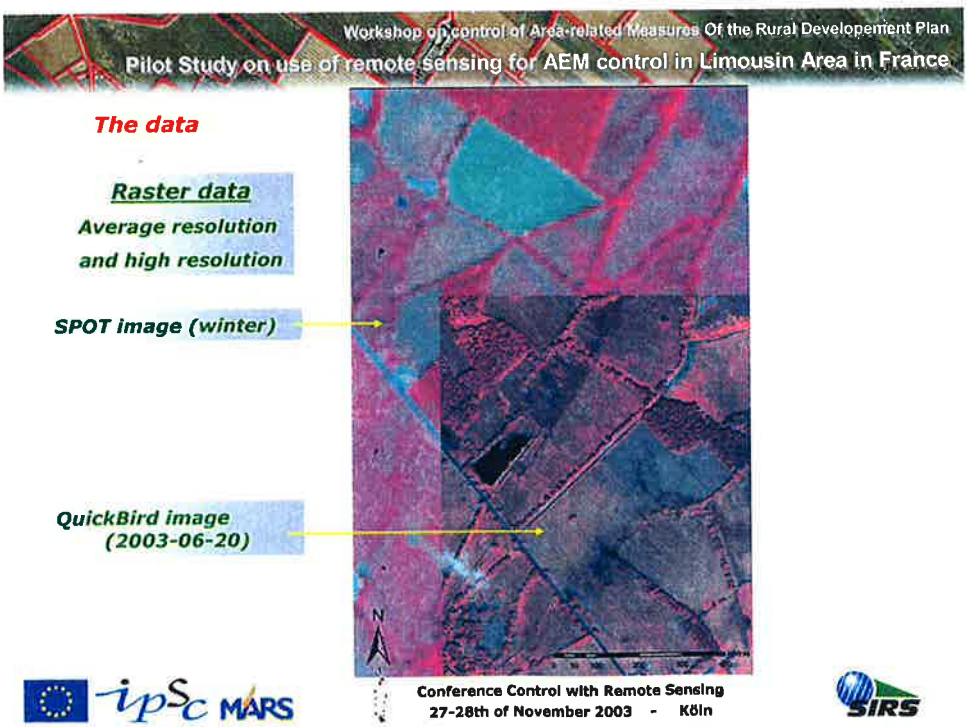

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Workshop on control of Area-related Measures Of the Rural Developement Plan

Pilot Study on use of remote sensing for AEM control in Limousin Area in France

The data

Raster data
QuickBird image
(Panchromatic)

Quicklook of Panchromatic
QuickBird image (2003-06-20)

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The data

Raster data
QuickBird image
(Multispectral)

Quicklook of Multispectral
QuickBird Image (2003-06-20)

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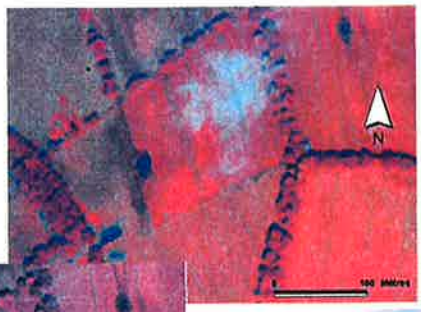

QuickBird image (Multispectral)

Bundle QuickBird image

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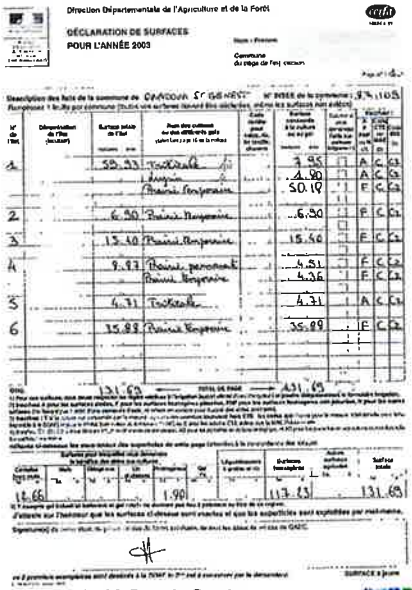
The data

Alphanumeric data

Farmer dossier



Direction Départementale de l'Agriculture et de la Forêt

DÉCLARATION DE SURFACES
POUR L'ANNÉE 2003

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The data

Alphanumeric data

Farmer Dossier

An extract

[illegible]

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The data **Alphanumeric data**

Commitments and schedule of conditions

N° action	Territoire	Cahier des charges	Montant de l'aide	termes de surcoût/bonne pratique et incitation financière
0602A02		2- haie mixte composée d'espèces buissonnantes et d'arbres de haut jet intermittents - entretien annuel et sommital de la haie buissonnante comme pour les haies basses - élagage des arbres de haut jet pour permettre le passage des engins en bordure de parcelle - remplacement des arbres de haut jet manquants par des arbres d'essence locale pour obtenir un minimum de 4 arbres pour 100 ml -résultat à atteindre lutte érosion – abri faunistique – abri et ombrage pour le bétail pour la haie buissonnante : épaisseur comprise entre 0,6 m et 2 m. hauteur entre 1 m et 2 m pour la partie arborée : 4 arbres de haut jet minimum, répartis de façon homogène PRECISION Les longueurs plafonds sont à rapporter à l'hectare de surface rattachée. Cette surface rattachée, considérée globalement pour chaque action, est la somme des surfaces des parcelles cadastrales traversées ou bordées par les éléments linéaires engagés.	Cas général *plafond 400ml/ha* Aide de base 3,3 F/ml Aide si CTE 4 F/ml Marge Natura 2000 20% Cas des éleveurs ovins *plafond 400ml/ha* Aide de base 4 F/ml Aide si CTE 4,8 F/ml Marge Natura 2000 0%	HAIE MIXTE *Pratique de référence :* Entretien uniquement à l'épareuse [illegible] 2 années sur 5 soit en moyenne : 73 F/an *Pratique préconisée :* Elagage (M.O.+ [illegible]) [illegible] soit 318 F 1 années sur 5 soit en moyenne : 64 F/an Evacuation des résidus de coupe (tracteur + benne) [illegible] soit 678 F 1 années sur 5 soit en moyenne : 136 F/an Taille haie [illegible] ½ h à 364 F/h soit 182 F 5 années sur 5 soit en moyenne : 182 F/an Remplacement des manquants 2 plants à 50 F soit 100 F M. O. 2 h x 75 F/h soit 150 F 2 années sur 5 soit en moyenne : 100 F/an total charges 482 F/an *surcoût pour 100 ml :* 409 F/an soit 4 F/an par ml de haie mixte

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The AEM's (France)

Reducing unplanted lands in winter

Planting of an intermediate culture on lands left unplanted in winter.

Arable to grassland reversion

Arable to grassland reversion.

Modifying soil work

Harvest or reaping of the parcel from the centre to the periphery.

Late use of the parcel.

Fixed elements of landscape

Restoration and maintenance of ponds and water spots.

Rehabilitation of ditches

Mending of banks.

Maintenance of hedges.

Extensive management of grasslands

Extensive management of grasslands by cutting (plus possibly grazing).

Extensive management of grasslands by compulsary grazing.

Fight against the drift of countryside

Opening parcel overgrown by brushwood and maintenance of this opening

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The AEM's (Spain)

1.- Extensification of agrarian production ; → 1.3.: Agri-environmental actions in crop rotation: non-irrigated sunflower rotation. Area: Cuenca

2.- Vegetal autochthonous varieties with danger of erosion ;

3.- Environmental techniques of rationalization in the use of chemical products ;

4.- Fight against erosion in sensible environments ;

5.- Protection of flora and fauna in wetlands (rice crops, sugar cane and cereal oversowing) → 5.1 Actions on rice cultivation areas Area: Valencia

6.- Specials systems of exploitation with high environmental interest ;

7.- Irrigation water safe and promotion of extensive production ;

8.- Protection of landscapes and prevention practices against forest fires;

9.- Integrated management of farms.

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Computer Aided Photo-Interpretation (CAPI) : a methodology into 3 steps

1st : Surface / length control

- Calculation surface tolerance : use of technical CAP recommendations (1,5 m x perimeter)

- Calculation linear tolerance : we have to propose a linear tolerance

2nd : Existence or not of the crops

-Identification of the presence of the contractualized elements on multitemporal images.

3rd : Evaluation of commitments respect

- Analysis of technical specification of each AEM

- Detection of anomalies

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Computer Aided Photo-Interpretation (CAPI) : a methodology into 3 steps

Example : restoration and maintenance of ponds and water spots (0610A)

- *Conditions :* are eligible the ponds of more than 10 sq. m. (0.1 are) and of less than 1000 sq. m. (10 ares). A pond is to be restored as soon as the water blade is only 10 cm thick in period of full water (February-March).
- *Commitments :*

- Initial brush clearing then annual maintenance of the water spot and accesses.
- Reshaping and dredging of the pond, in year 1 or 2.
- The restoration or rehabilitation is defined one year out of 5.
- Maintenance must be assured 4 years out of 5.
  - *Computer Aided Photo-Interpretation*
- Check the presence of the pond.
- Check the surface of the pond.
- Respect of the maintenance.

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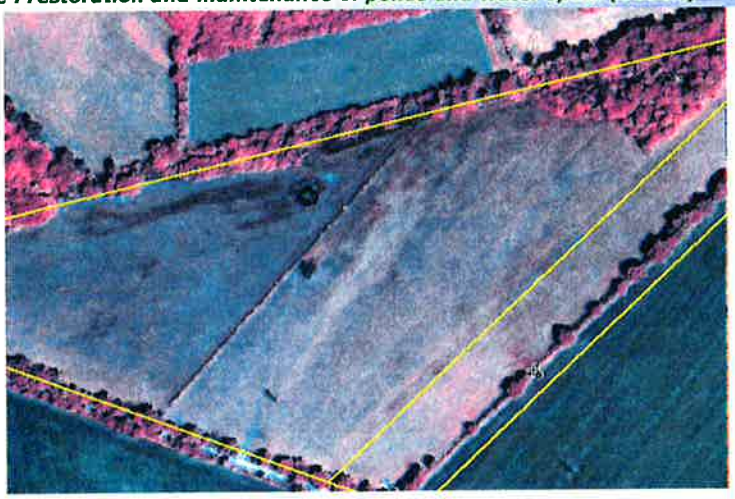

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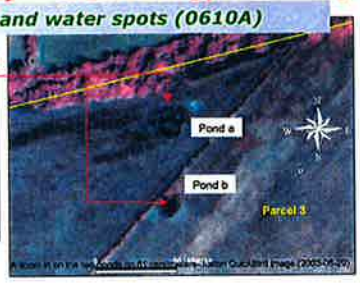
Computer Aided Photo-Interpretation (CAPI) : a methodology into 3 steps

Example : restoration and maintenance of ponds and water spots (0610A)

- Firstly, we detect the presence of the ponds.
- Secondly, we measure their area (within ArcView). This measurement is important for the eligibility of the ponds.
- The Spot v image is useless for such AEM. On the QuickBird image, it is possible to observe the state of the pond.



Parcel Number	Contractualized elements	Declared Surface /linear	Measured surface/ linear	Tolerance	Parcel diagnostic	Attributed surface/linear	Commitments		CAPI operators Explanation	Administration opinion (after last field visits)
3	Ponds and spots	8 ha (the whole surface of the parcel is contractualized)	8 ha (the whole surface of the parcel is contractualized)		OK	8 ha	Remarks for the experimentation : this AEM is rarely contractualized on our study area. - *Conditions* : are eligible the ponds of more than 10 sq. m. and of less than 1000 sq m.. A pond is to be restored as soon as the water black is only 10 cm thickness in period of full water (February-March). - *Commitments*: -initial brush clearing then annual maintenance of the water spot and accesses - reshaping and dredging of the pond, in year 1 or 2.	OK OK OK	- Two ponds are present on the parcels. Pond a : 150 sq.m. Pond b : 105 sq.m - There some tracks of brushwood at the north of pond a.	

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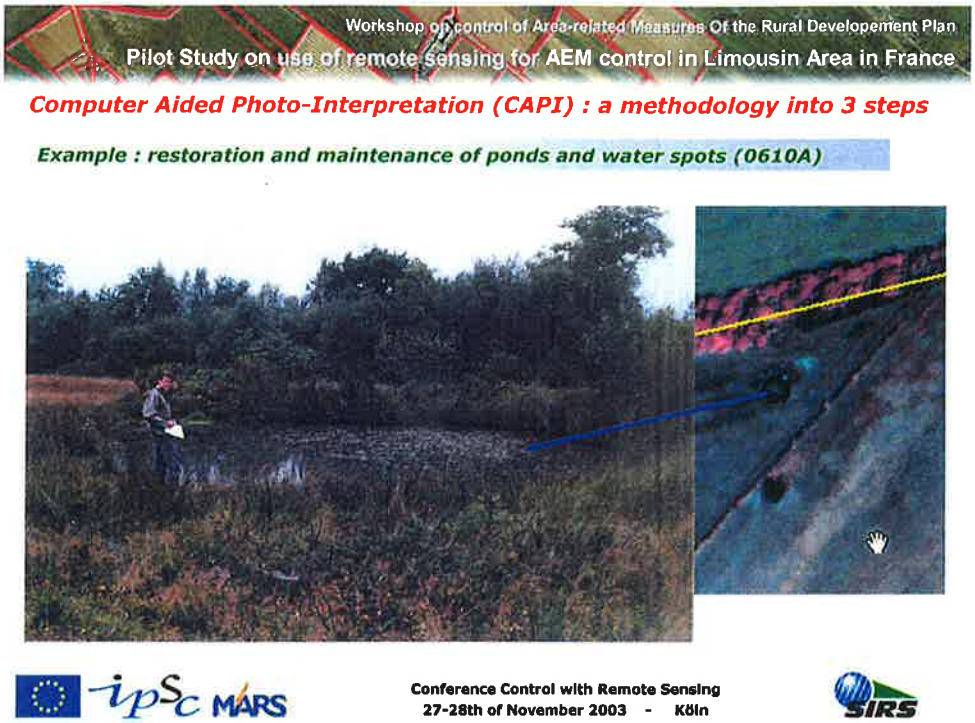

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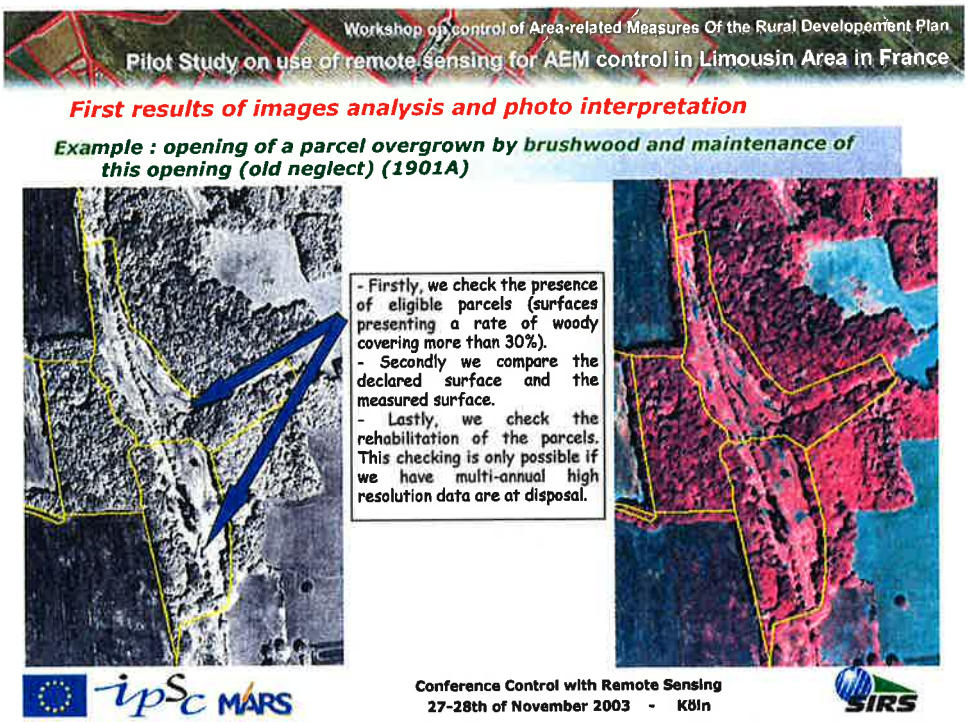

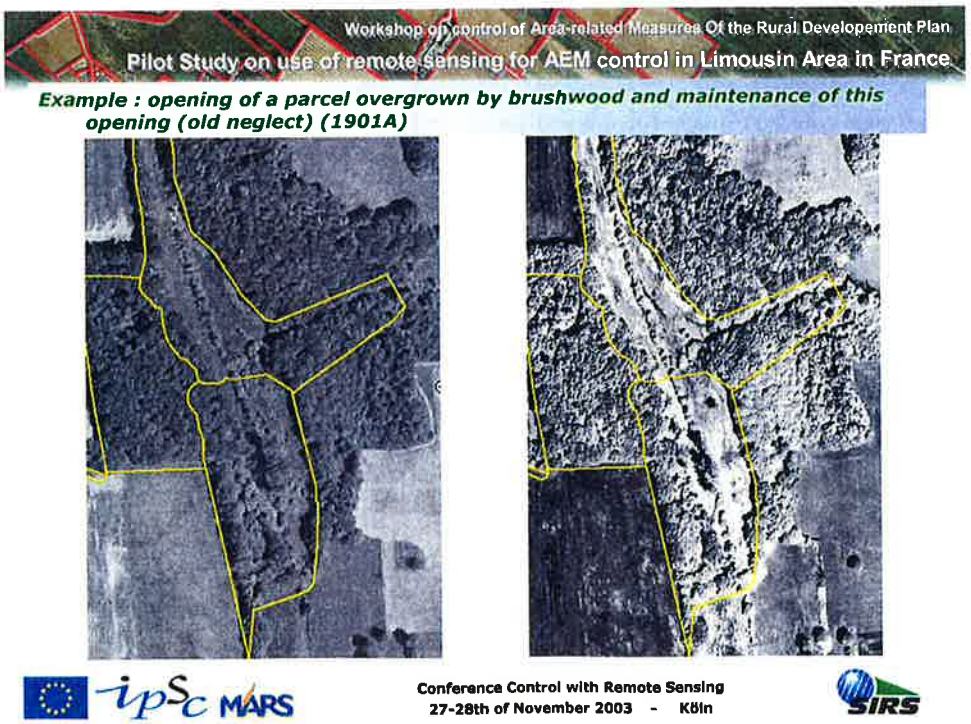

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First results of images analysis and photo interpretation

Example : opening of a parcel overgrown by brushwood and maintenance of this opening (old neglect) (1901A)

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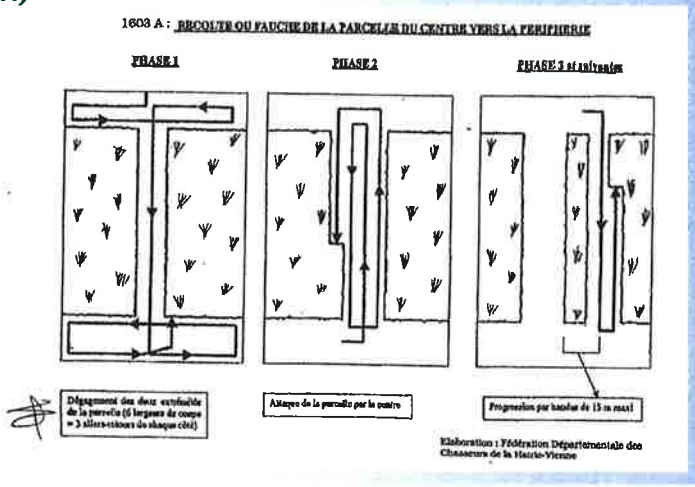
Harvest or reaping of the parcel from the centre to the periphery (1603A)



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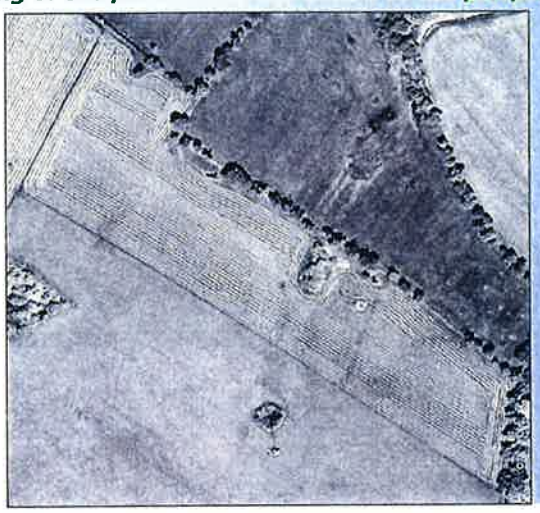
Computer Aided Photo-Interpretation (CAPI) : a methodology into 3 steps

Harvest or reaping of the parcel from the centre to the periphery (1603A)

- Panchromatic QuickBird Image
- Image acquisition date : 2003-06-20



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Computer Aided Photo-Interpretation (CAPI) : a methodology into 3 steps

Extensive management of grasslands by cutting (plus possibly grazing) or by compulsory grazing

CAPI method : 3 stages	Description
I. Surfaces control	⇨ Comparison between the surfaces declared by the farmer and the surfaces measured on the GIS.
	⇨ Control surfaces of the not declared perennial or temporary elements.
II. Occupation of the grounds control	⇨ Identification of the presence of grassiands on archive images.
III. Respect of farmers commitments control	⇨ Detection of maintenance anomalies.

- buildings
- ponds
- hedges
- groves
- Brambles, brushes
- Hay stacks storage
- Over pasturage
- .....
- Areas of overgrazing
- Non maintained wetlands
- Areas covered by wild plants
- Non maintained ponds

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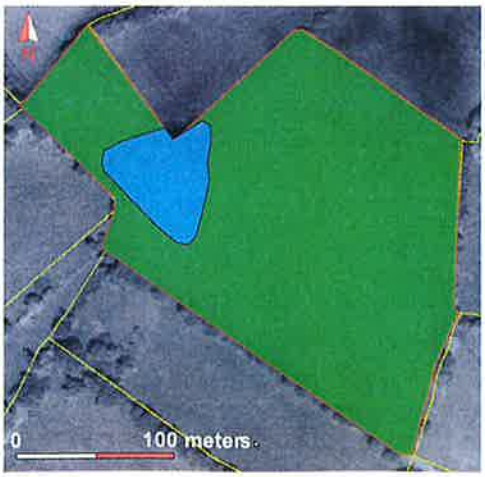
Extensive management of grasslands by cutting (plus possibly grazing) or by compulsory grazing

1st stage : control surfaces

Photo-interprétation

- the parcel has a surface of 4,16 ha.
- the farmer declares a surface exploited in grasslands of 3,68 ha.
- the photointerpreter cuts off the pond whose surface is 0,48 ha (on the piece).
- The declared surface (4,16 - 0,48) is in conformity with measured surface.



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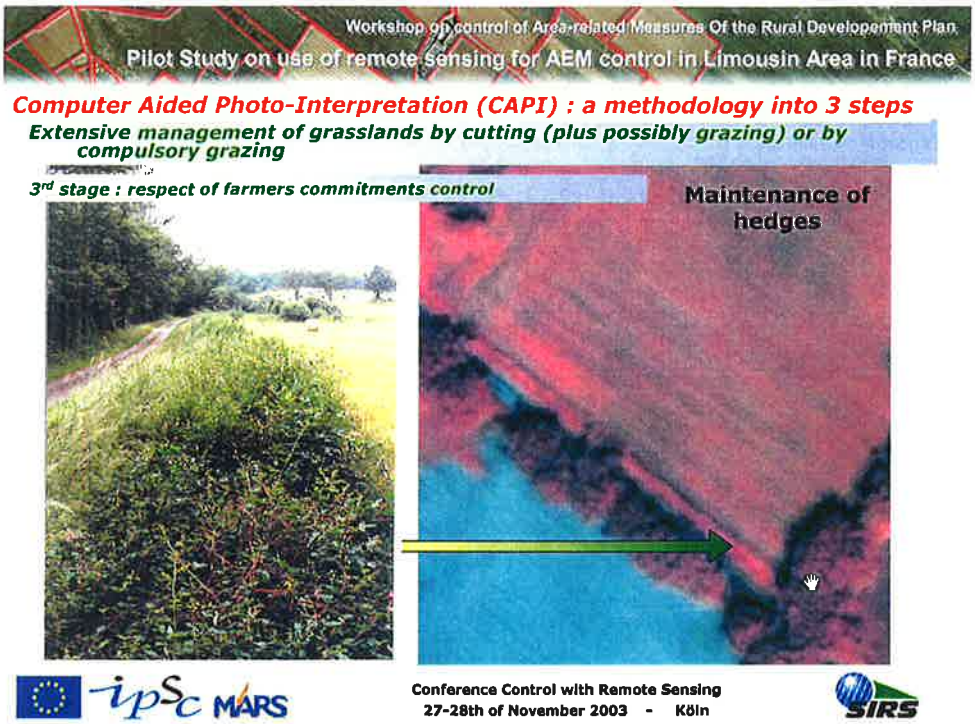

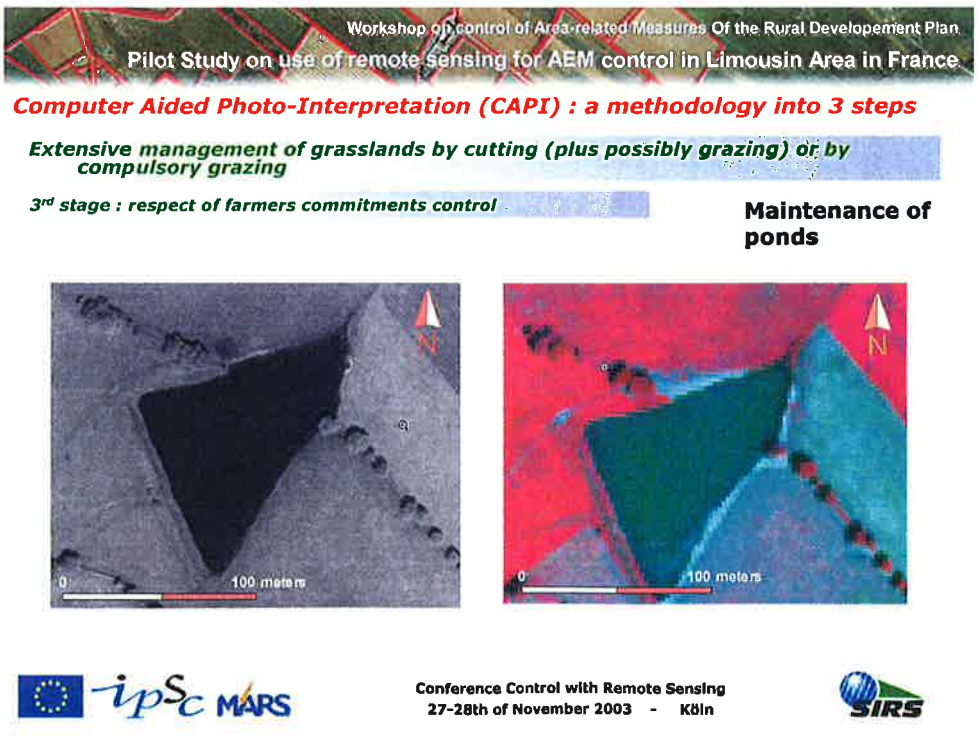

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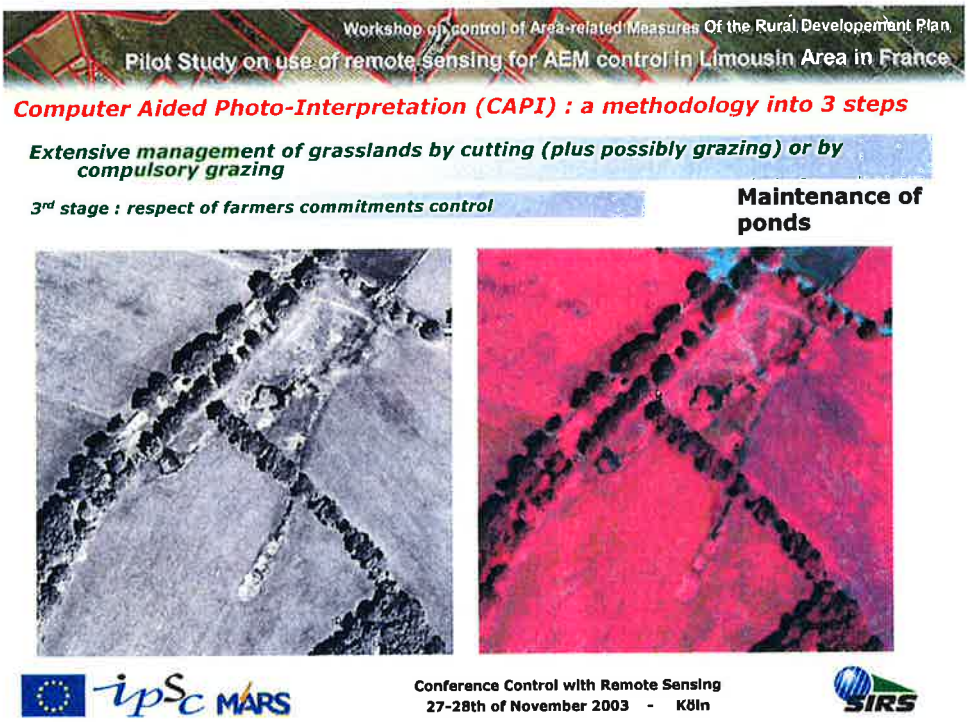

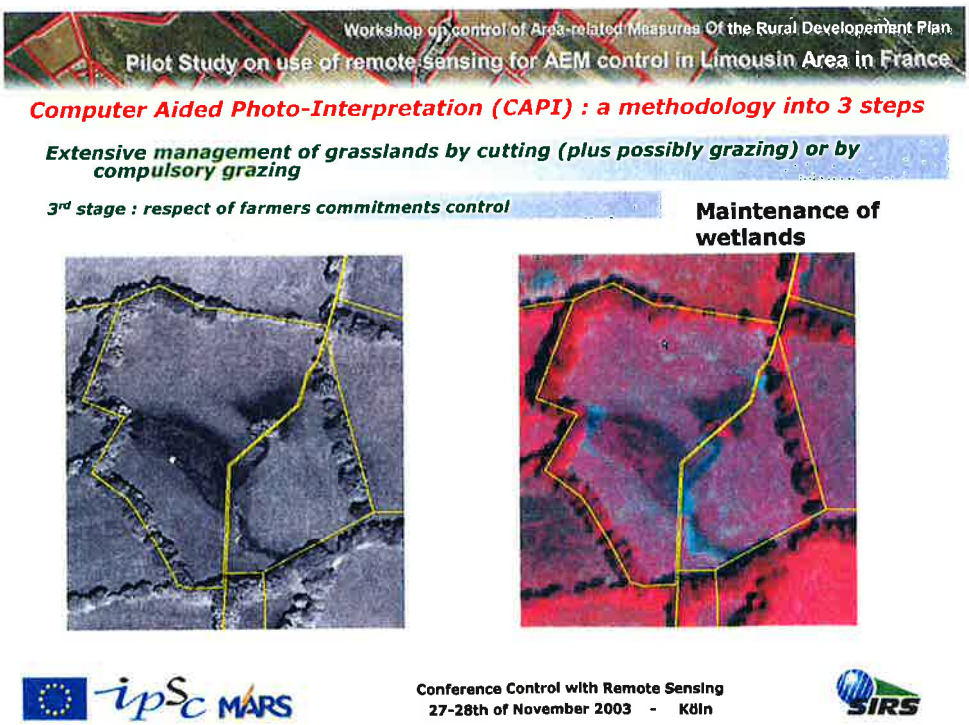

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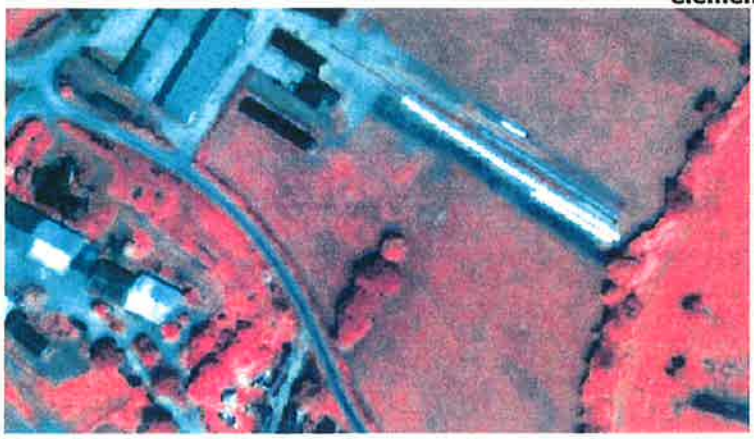
Extensive management of grasslands by cutting (plus possibly grazing) or by compulsory grazing

3rd stage : respect of farmers commitments control

Storage of perennial elements



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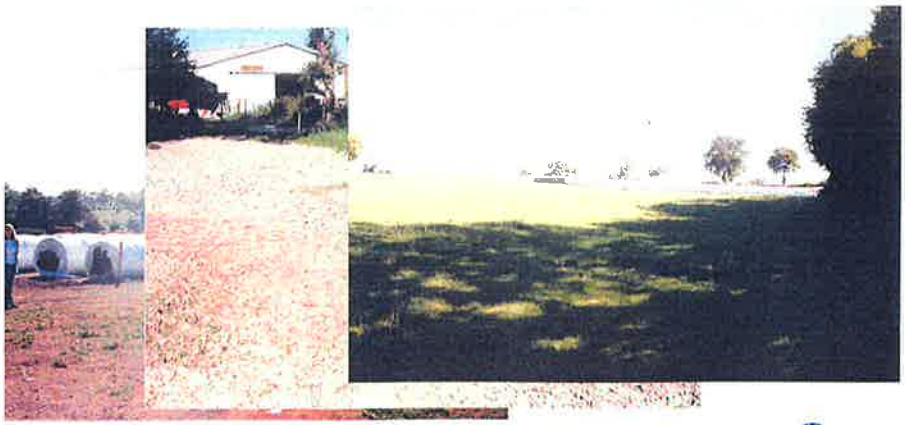

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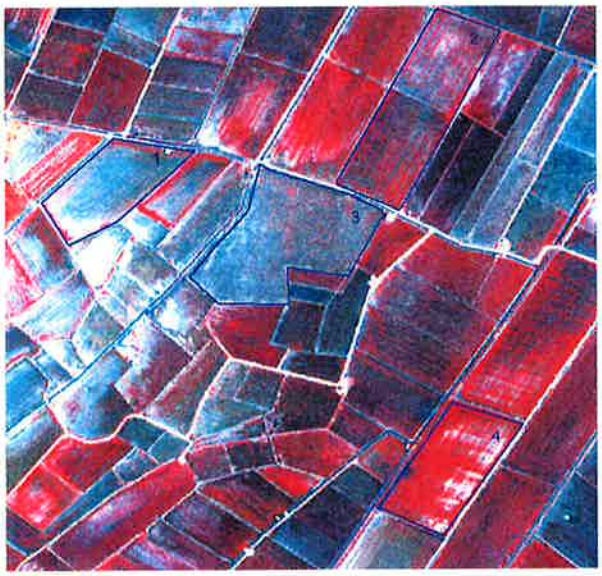

Measure 5.1.
Commitments:

-Flooding 4 months apart from normal cycle of crop

-Keeping rice crop for 5 years, without decreasing area

QUICKBIRD
17-JUN-02

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Measure 5.1.
Commitments:

-Flooding 4 months apart from normal cycle of crop

-Keeping rice crop for 5 years, without decreasing area

QUICKBIRD
22-DEC-02

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Measure 5.1.
Commitments:

-Flooding 4 months apart from normal cycle of crop

-Keeping rice crop for 5 years, without decreasing area

QUICKBIRD
04-MAR-03

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Measure 5.1.
Commitments:

-Flooding 4 months apart from normal cycle of crop

-Keeping rice crop for 5 years, without decreasing area

QUICKBIRD
21-JUL-03

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New challenges for control

What is the role of RS within control operations ?

Remote sensing techniques have several roles:

1 – RS techniques establish a common reference frame for control, organizing all other control operations on a clear geographical basis,

2 – RS techniques contribute to the fine tuning of the system. It was the case in Arable Lands and must be the case in the RDP,

3 – CAPI of 1 m resolution imagery (one or several dates) is
- **a key tool for the global analysis of discrepancies**
- **a indispensable tool to support all synoptic calculations in the field : tree count, location of specific areas, etc...**

4 – Unfortunately field inspections are indispensable to complete RS

According to J. Miguel Miranda

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Session 6 – Airborne digital VHR imagery

Chairman: Simon Kay - JRC/ IPSC/ MARS Unit

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Presentation 1 – High resolution Airborne Digital Sensor [ADS40] for photogrammetric and thematic applications

Andreas ECKARDT

DLR, GE

Abstracts

Leica Geosystems GIS Mapping (LGGM), in co-operation with the German Aerospace Center (DLR), has developed a digital airborne stereo sensor, the ADS40. This sensor completes the digital chain, beginning with image acquisition, continuing with stereo processing, and finally leading to digital products (e.g. orthophotos and maps). The new sensor provides imagery suitable for both high precision photogrammetric mapping and thematic data interpretation. This commercial stereo system based on the three-line principle. By assembling additional CCD lines into the same focal plane, the sensor is able to provide true color and multispectral images at the same time.

The new sensor is closing the digital chain for airborne photogrammetric data processing. The hardware is on the today's technological edge and can handle 120 MPixels/s with 14-bit radiometric dynamic and an SNR better than 8 bits. To achieve EMC in the airplanes and keep the excellent SNR for the entire system the data transfer between camera head and camera computer is based on a fiber connection. Special processing boards in the camera computer handles the real time correction and loss less and lossy JPEG compression. Compressed data will be bundled and sent to a mass memory. The storage system is a customized solution of a qualified mass memory in a standard industrial PC design.

Application examples demonstrate the main features of this digital sensor, like high spatial and radiometric accuracy, radiometric dynamics, high signal-to-noise-ratio, in-track stereo and multispectral capability and why ADS40 can be called measurement device.

KEY WORDS digital airborne sensor, CCD line scanner, high resolution digital airborne camera, stereo airborne camera system, automatic sensor control, multispectral measurement device, staggered CCD, measurement device; modular stereo camera


DLR
High resolution Airborne Digital Sensor [ADS40] for photogrammetric and thematic applications
Dr. Andreas Eckardt
DLR-BA-OS
Department of Optical Information Systems [OS]
Tel.: +4930-67055-530/539
Rutherfordst. 2, 12489 Berlin, Germany
DLR
Member of Hermann von Helmholtz-
Association of National Research Centres (HGF)
Köln 28.11.2003, 9th Annual Conference on Control with Remote Sensing of Area-based Subsidies


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Leica Geosystems
Partnership
LGGM
DLR (German Aerospace Center)
Airborne Digital Sensor
Leica Geosystems
DLR
ADS 40
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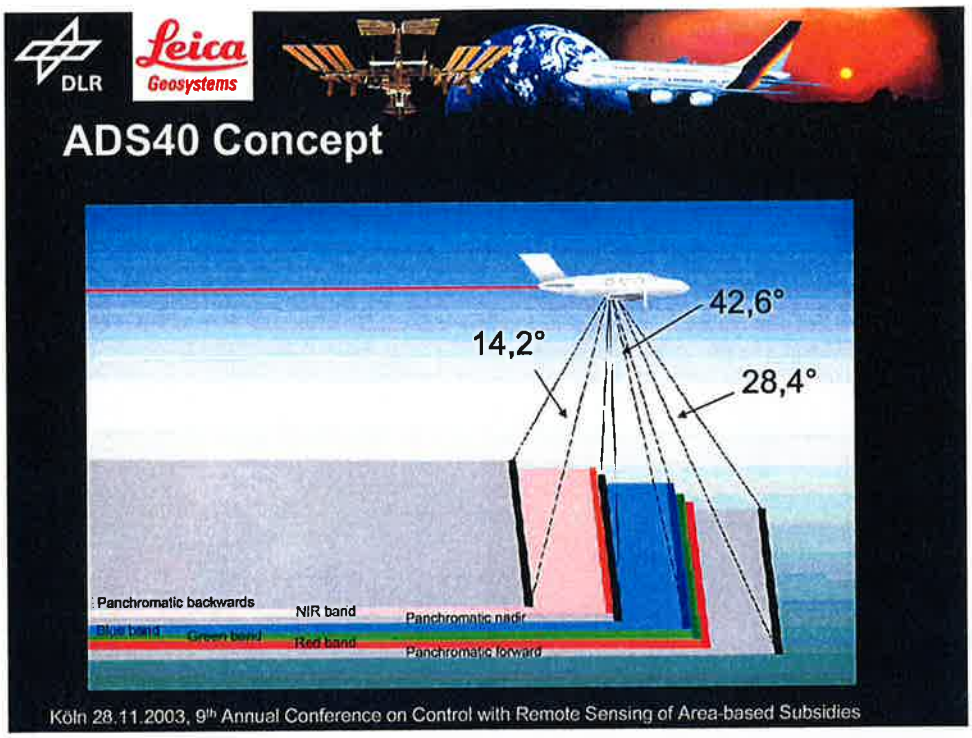
DLR
Leica Geosystems
ADS40 Concept
42,6°
14,2°
28,4°
Panchromatic backwards
NIR band
Panchromatic nadir
Blue band
Green band
Red band
Panchromatic forward
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DLR
Leica Geosystems
ADS40 System
GPS satellites
ADS40 system
1 Sensor head SH40 with:
- Digital optics DO64
- IMU
2 Control unit CU40 with:
- position & attitude computer POS
3 Mass Memory MM40
4 Operator interface OI40
5 Pilot Interface PI40
6 Mount PAV30
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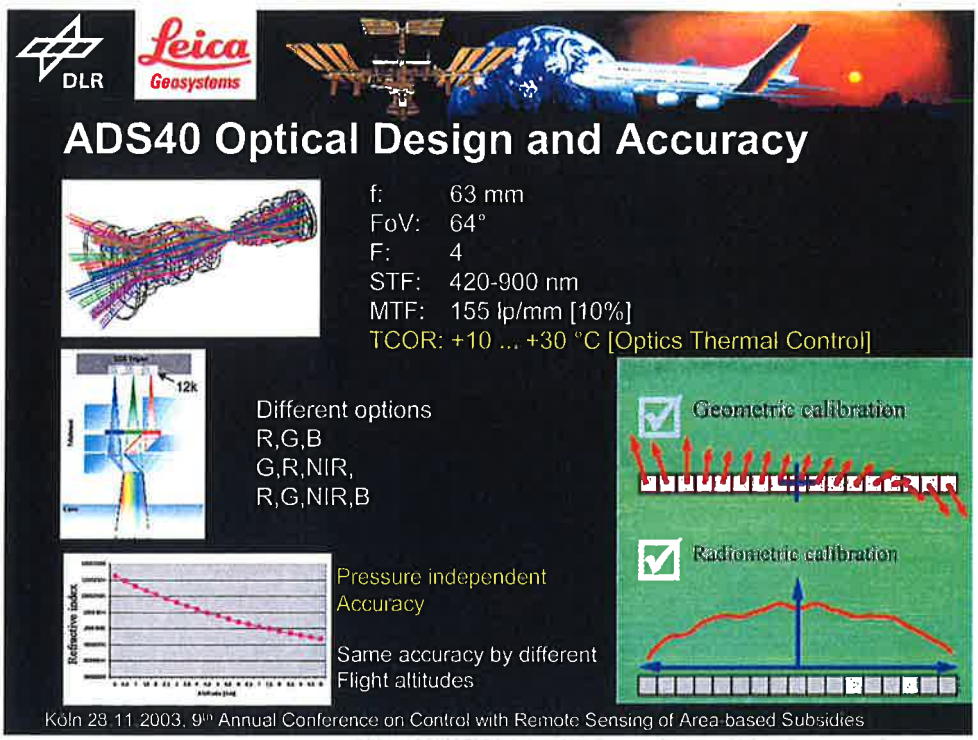

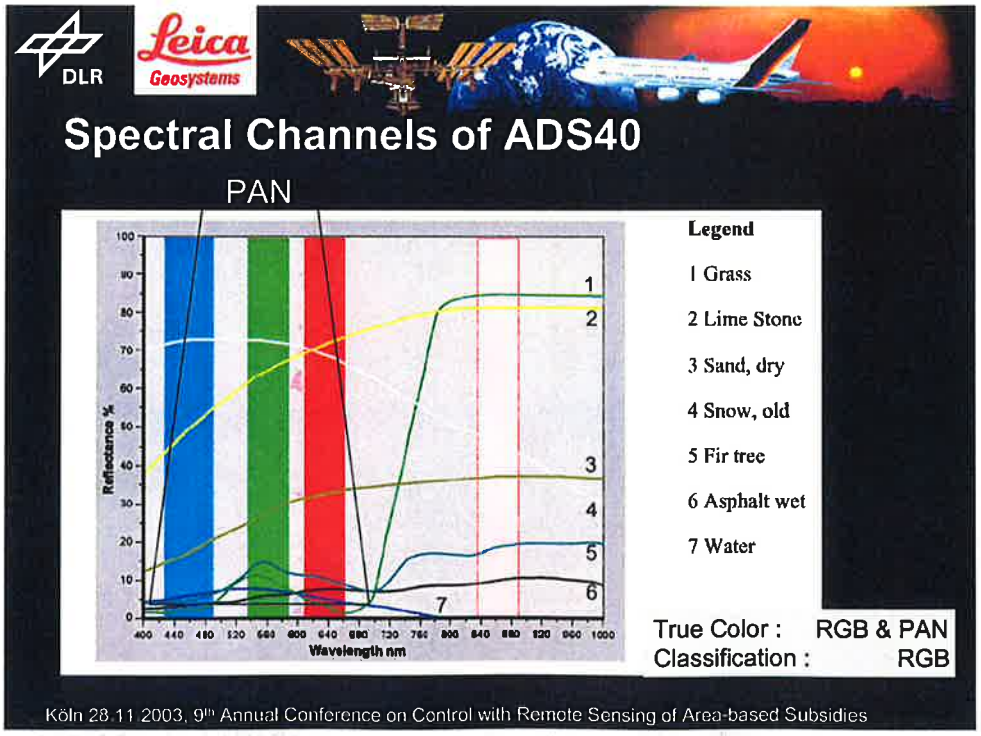


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Leica Geosystems
ADS40 image
PAN-Image
RGB-Image
False Colour
Waldkirch CH 6/2003
GSD 15 cm
Köln 28.11.2003, 9th Annual Conference on Control with Remote Sensing of Area-based Subsidies


DLR
Leica Geosystems
ADS40 image [R,G,NIR – nadir looking]
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ADS40 from the Camera to the Measurement System

ADS40 technical Parameter :

1) Pressure stabilised Optics
2) Temperature stabilisation /compensation (CCD & Optics)
3) Accuracy observation
4) Geometric accuracy better 1/3 pixel
5) Radiometric accuracy 8 Bit
6) Dynamic range 12 Bit [14 Bit]
7) Real time compensation of fixed pattern noise PRNU/DSNU
8) Customised Data format
9) Electronic Environmental Control
10) Full automatic Sensor Control
11) Multivalent Sensor Arrangement

➔**Goal of the ADS40 Project**
Flight Option with one or without Ground Control Points as a radiometric / geometric Measurement System

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Conclusion

✓ High Resolution Airborne System ADS40 include :
- **24.000 Pixel, Stereo, RS, True Color** Capability
- **Pressure** compensation (pressure stabilized optics)
- **Temperature** stabilization / compensation
- **Accuracy** and **Orientation** data control and processing

✓ **Geometric Accuracy ≤ 1/2 pixel**

✓ **Radiometric Accuracy ≥ 8 Bit**

✓ **Dynamic Range** has to be between **12 up to 14 Bit**

✓ **Automatic Sensor Control**

ADS40:
Measurement System for Airborne Applications

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Presentation 2 – Study on the acquisition of digital airborne data for agricultural control purposes

Gilles PICHON

ISTAR, FR

Abstracts

End of 2002, the MARS Unit of the JRC issued a tender to evaluate digital airborne imagery suitability for remote sensing in CAP. The project comprised the acquisition of aerial data using a digital sensor, and processing of a range of products including a digital terrain model and 50cm ortho-imagery. ISTAR company was selected with a proposal based on an ADS40 camera (the pushbroom sensor developed by Leica Geosystems) for the acquisition, and the use of ISTAR's processing software suite for the production.

The 750 km² test area was located in southern France, in the Alpilles region that displays a wide range of environments and crop types. The acquisition was done is Spring 2003 with a Beechcraft flying at an altitude of 5,000m, and using different sidelaps (20% to 60%) for test purposes while along-the-track stereo was ensured by the three panchromatic channels of the ADS40. A GPS station was set-up during the flight for connection with the on-board integrated D-GPS/INS navigation system.

The data were processed in June/July in the ISTAR's computer center, comprised of 40 parallel nodes and 6 terabytes on-line,. From download of the raw data (84 Gigabytes), the automated production process was made of the following steps: single aerotriangulation for the whole area using 10 GCPs, Digital Elevation Model computation using an autocorrelation, multi-stereo approach, Digital Terrain Model filtering, orthophoto restitution and mosaicking. The deliverables, displayed during this presentation, included a 2m resolution Digital Elevation Model as well as 50cm panchromatic, RGB and IR orthophotos.

Radiometric and geometric quality of all layers has then been analyzed by the MARS Unit, with results described in another presentation of this session.

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ISTAR

Study on the acquisition of digital airborne data for agriculture control purposes

CONFERENCE PRESENTATION
Köln, November 2003

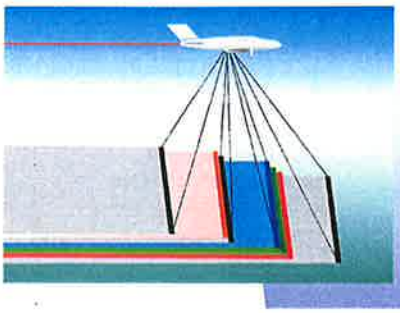
Project description

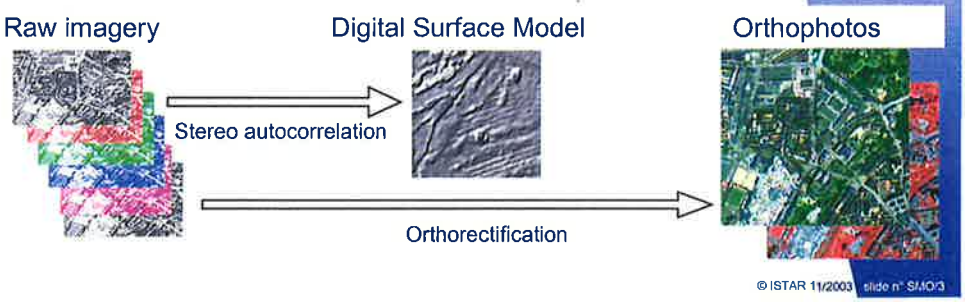
- **Response to the JRC Tender for airborne digital imagery evaluation in 2002**
- **Acquisition with a Leica ADS-40 system on a test region (St-Remy/Les Alpilles, France) in Spring 2003**
- **Processing and delivery (June/July 2003) of**
  - Orthophoto CIR, RGB and Panchromatic,
  - DSM (Digital Surface Model) and DTM

All-digital imaging approach

EADS

- **Pushbroom principle**
  - Multiple CCD line-scanning
  - Stereo Backward, Vertical, Forward
  - Simultaneous multispectral bands





Acquisition

EADS

- **Area of interest**
  - 750 km²
  - 20% sidelap (5 flight lines)
  - 60% overlap (5 flight lines)
- **Field survey**
  - GPS station during flight
  - 10 GCP collected by TopoSat
- **Aircraft**
  - Beechcraft-200 operated by AvDef
  - Flight altitude 5,000m
- **Camera system**
  - ADS-40 operated by Leica
  - Integrated GPS/INS navigation system (Applanix)
  - 84 Gb of raw imagery acquired (7 channels)

Courtesy Leica Geosystems

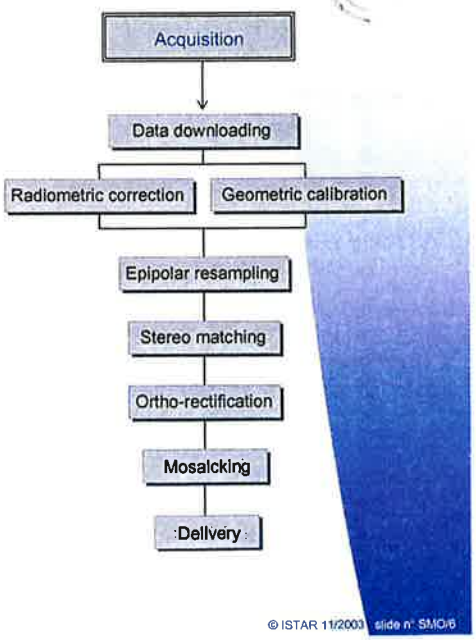
Orthophoto Processing

EADS

- **ISTAR software suite**
  - 14 years of continuous R&D efforts
  - Unique algorithms and methodology
- **Computing centre**
  - 40 parallel nodes
  - 6 Terabytes online
  - 1 Gb/s SAN architecture
- **Experience**
  - Digital airborne operations for 4 years
  - 200,000+ km² processed (Europe, US)
  - Skilled production operators
  - Dedicated Quality Control
- **Delivery**
  - Set 1: 6 weeks after acquisition
  - Set 2: 10 weeks after acquisition

Workflow

EADS



Aerotriangulation

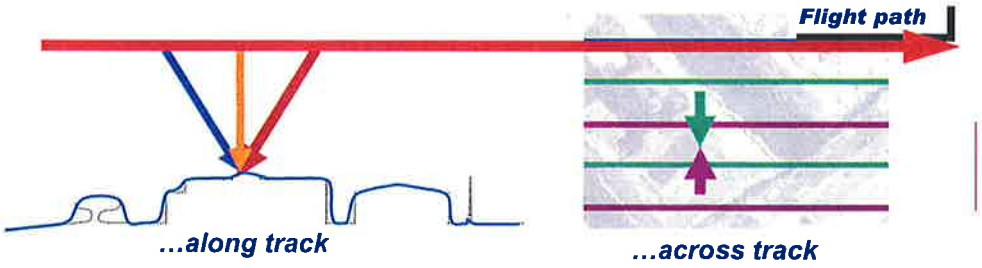
EADS

- **During the flight**
  - Dual-frequency GPS base station
  - Integrated inertial unit (IMU) on-board
- **Post-processing of navigation data**
  - Continuous estimation of aircraft trajectory
- **Only few Ground Control Points needed**
  - 8 points used for the whole 750km²
- **Excellent accuracy**
  - Stable sensor calibration
  - 10-20cm RMS residues

DSM from stereo auto-correlation

EADS

- **As many as six stereo pairs are used to *hypercorrect* each pixel**

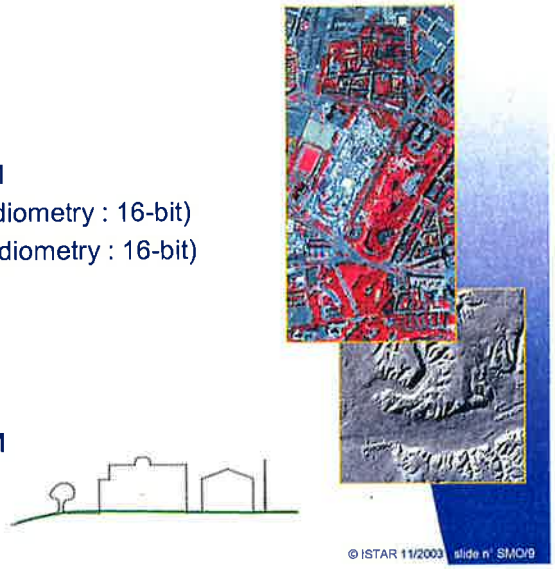


...multiple combined stereo pairs, merged in a detailed Surface Model

Deliverables : set 1

EADS

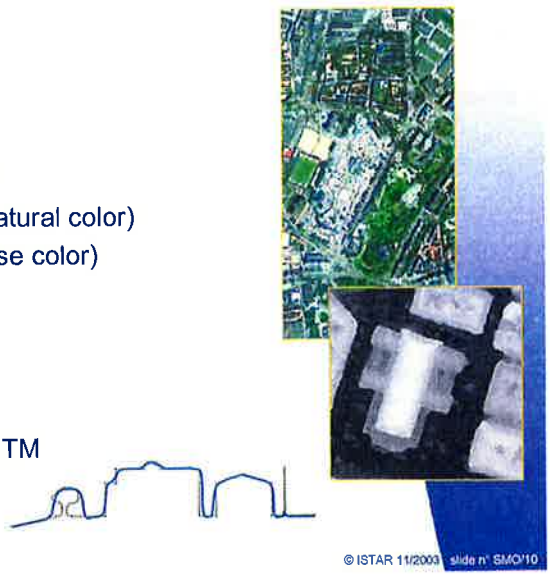
- **Ground Orthophoto(s)**
  - Pixel size 50cm
  - 20% sidelap imagery
  - Orthorectified on a DTM
  - Panchromatic (initial radiometry : 16-bit)
  - InfraRed band (initial radiometry : 16-bit)
- **Digital Terrain Model**
  - Pixel size 2m
  - Extracted from the DSM



Deliverables : set 2

EADS

- **True Orthophoto(s)**
  - Pixel size 50cm
  - 60% sidelap imagery
  - Orthorectified on a DSM
  - Pan-sharpened RGB (natural color)
  - Pan-sharpened CIR (false color)
- **Digital Surface Model**
  - Pixel size 2m
  - Possibility to extract a DTM



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RGB True Orthophoto 50cm

CIR True Orthophoto 50cm

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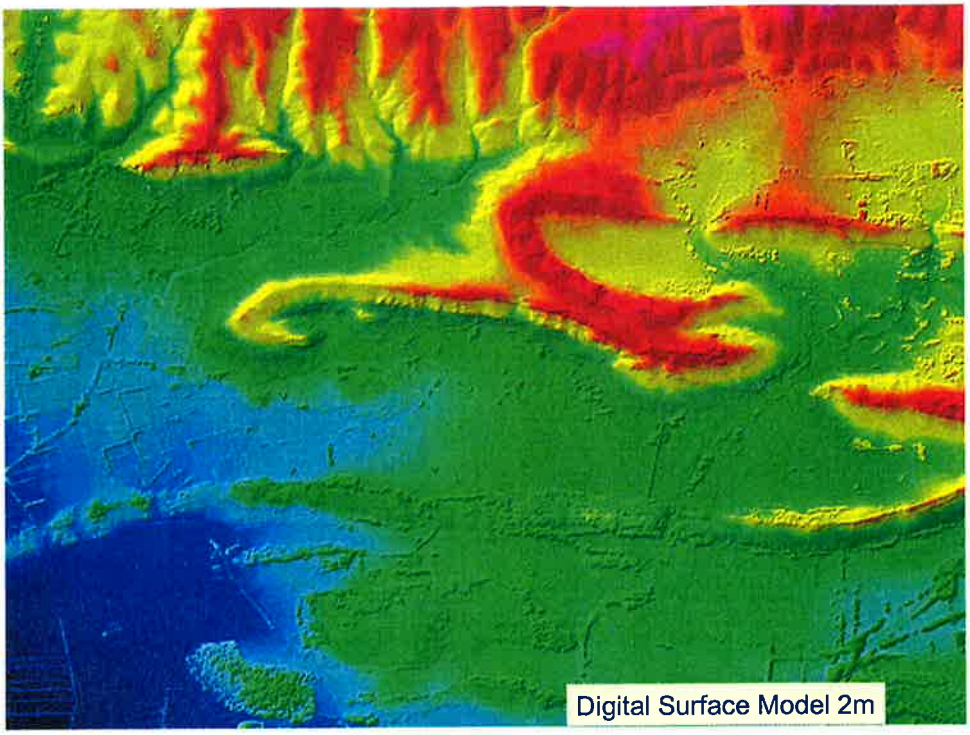

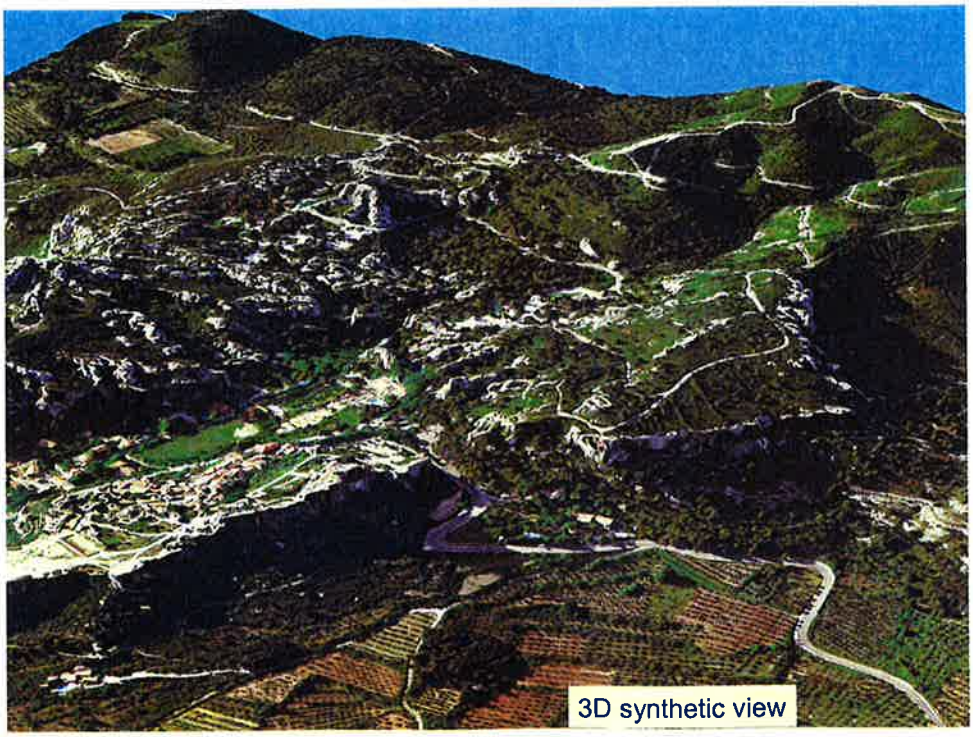

Another (large) case in the US

- End-user:
  US Department of Agriculture
- First use of Aerial Digital Camera Technology by the USDA
- Area of interest:
  State of Nebraska (**200,000 km²**)
- Deliverable:
  1-meter color orthophoto mosaic

Project Team:

North West Geomatics, Horizons, EarthData

 slide n° SMO/15

Nebraska project: Facts & Figures

- **Acquisition:**
  - Using 2 aircrafts equipped with an ADS40 sensor
  - 196,000 km² acquired within 30 days (33 lifts)
  - 6,000 km² / lift
- **Production:**
  - ISTAR processing software used to generate 1m color orthophoto over 72% of the area (production by EarthData)
  - 143,500 km² processed in 45 days after acquisition
  - Use of an existing DTM (USGS data)

Global project completed in less than 3 months (July-Sept. 2003)

 slide n° SMO/16

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Presentation 3 – Assessement and Quality control of ADS40 image deliverables

Peter SPRUYT
JRC/ IPSC/ MARS Unit

Abstracts

The presentation summarises the quality control of the instrument validation campaign carried out by ISTAR on behalf of the JRC. The QC results show that:

- The flight was executed with a correct coverage of the zone
- The geometry of the True orthoimage was well inside the predicted quality
- The geometry of the Ground orthoimage was also high, although a marginal systematic error was detected
- The DSM and DTM produced were of exceptionally high quality
- The image radiometry was excellent, with no outliers or saturation, despite imaging taking place at a sub-optimal time (early evening) for some zones.

Keywords: ADS40, orthorectification, quality control

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Quality control ISTAR flight using ADS40 digital airborne camera

Peter SPRUYT, JRC ISPRA (MARS unit)
(Simon KAY)

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Test site history

- Located in the south of France (Les Alpilles)
- A Number of GCP's already available from past projects
  - QC of 1997 (Olistat) airborne flight
  - Estimation of influence area-measurements on ortho and non ortho-rectified imagery
- Moderately hilly terrain conditions
- Different agricultural zones
  - From permanent crops (olives, wine)
  - To more arable type (mostly cereals, maize, sunflower)

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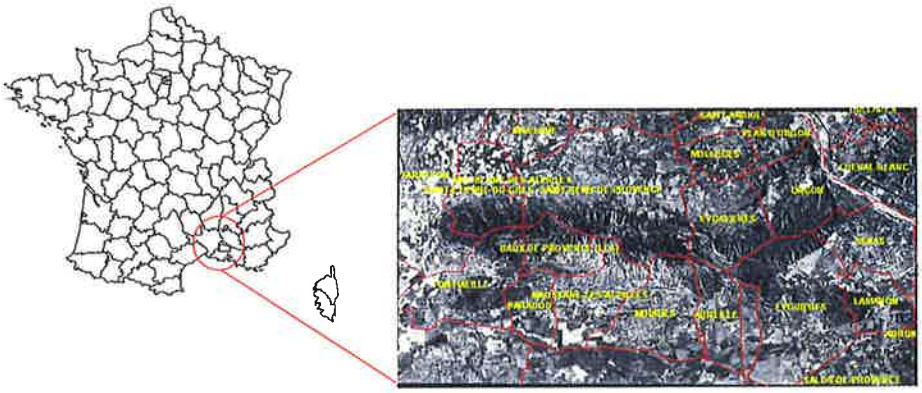
Les Alpilles test site

- Geographic location



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Flight Details

- Height: 5,000m, similar to most IACS flights
  - 4,000m to 6,500m
- Good date, poor time:
  - 14 may 2003, 2nd attempt
    - Start time 16:22 pm
    - End Time 19:03 pm
      - Sun-angle at limit,...rather long shadows in most part of the project

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Products delivered

- Ground ortho product
  - 0.5 m resolution IR and PAN images divided into 40 tiles
  - A 2 m Ground digital terrain model divided into same tiles as mentioned above
- True ortho product
  - 0.5 m resolution True orthoimage RGB divided into 32 tiles
  - 0.5 m resolution True Orthoimage CIR divided into same tiles as mentioned above
  - A 2 m digital surface model

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GPS campaign for Checkpoint measurement

- Decimeter Precision GPS measurements made
  - Using dual frequency carrier phase (ashtech Z –surveyor)
  - Max 20 km from reference station
  - 5 seconds epoch interval
  - 15 minutes occupation time
- To avoid issues related to checkpoint quality: better then 3 times announced RMSE of ortho-rectified product
  - Expected accuracy better then 75 cm RMSE
  - Checkpoint precision should be < 25 cm
    - Using our carrier phase GPS receiver we have achieved <5cm precision during measurement (fits into the requested precision for checkpoints)

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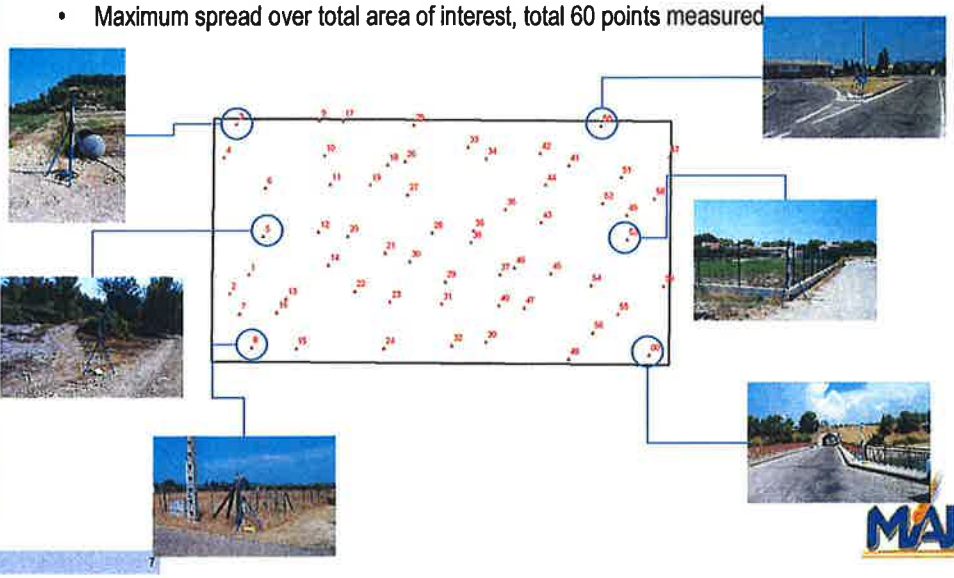
Distribution of checkpoints

- Maximum spread over total area of interest, total 60 points measured



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Geometric Quality control

- Results for *True Ortho* and *Digital Surface Model*
  - Expected accuracy by contractor ISTAR
    - For true ortho = absolute planimetric accuracy (XY) better then 0.5 to 0.75 m
    - For the Digital Surface Model = absolute vertical accuracy (Z) of around 2 meters
  - Geometric Quality control calculated by JRC
    - Using 35 precise GPS points
    - No bias found, no outliers
    - For planimetric accuracy fits perfect in the announced quality
    - For the vertical accuracy better result then expected

mean x	mean y	mean z	rmsX	rmsY	rmsZ
0.06	-0.18	-0.13	0.43	0.42	0.34

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Geometric Quality control

- Results for *Ground Ortho* and *Digital terrain Model*
  - Announced accuracy by contractor ISTAR
    - For ground ortho = absolute planimetric accuracy (XY) no sure knowledge of precision, expected >0.75 m
    - For the Digital terrain Model = absolute vertical accuracy (Z) of around 2 meters
  - Geometric Quality control calculated by JRC
    - Using 60 precise GPS points; acceptable result, one outlier
    - Note the bias of 1 pixel in X and Y
    - The vertical accuracy is better then expected

meanX	meanY	mean Z	RMSEx(m)	RMSEy(m)	RMSEz(m)
0.43	-0.40	-0.03	0.88	0.72	0.60

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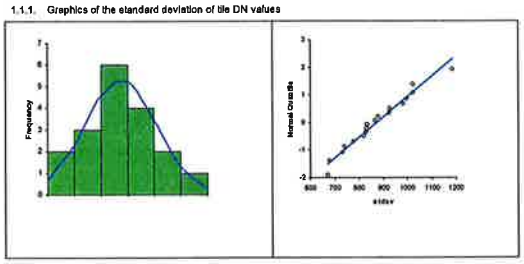
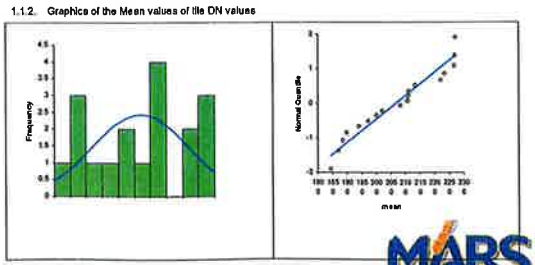
Radiometric Quality Control

- B/W Ground ortho
  - No saturation observed
  - No outliers
  - Mean value is normally distributed

1.1.1. Graphics of the standard deviation of tile DN values



1.1.2. Graphics of the Mean values of tile DN values



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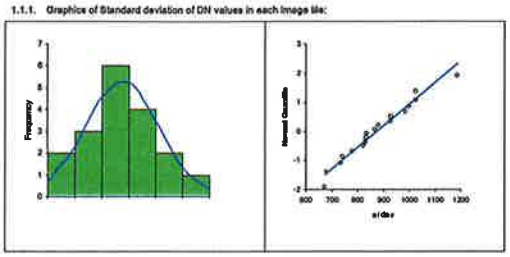
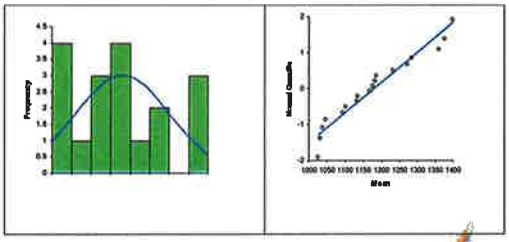
Radiometric Quality Control

- Infrared Ground ortho
  - No saturation observed
  - No outliers
  - Mean value is normally distributed

1.1.1. Graphics of Standard deviation of DN values in each image tile:



1.1.2. Graphics of the Mean values in each image tile



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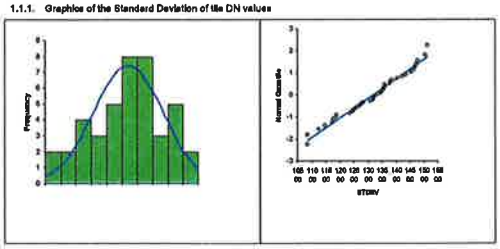
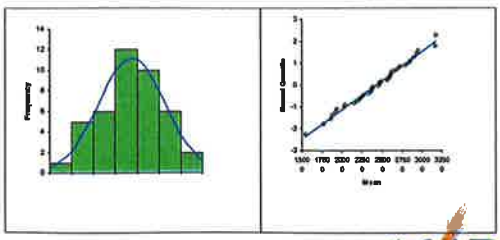
Radiometric Quality Control

- RGB True ortho
  - No saturation observed
  - No outliers
  - Mean value is normally distributed

1.1.1. Graphics of the Standard Deviation of the DN values



1.1.2. Graphics of the Mean Value of the DN values



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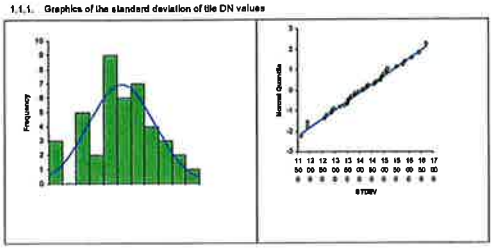
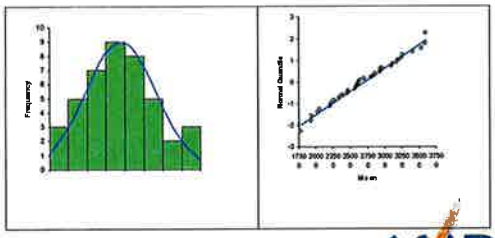
Radiometric Quality Control

- CIR True ortho
  - No saturation observed
  - No outliers
  - Mean value is normally distributed

1.1.1. Graphics of the standard deviation of the DN values



1.1.2. Graphics of the Mean Value of the DN values



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Conclusions and recommendations

- Geometry
  - Very accurate True Ortho imagery
  - Ground ortho within expected precision
    - Systematic shift of about 1 pixel in X and Y
    - But still much better than the standard IACS specification
  - DSM and DTM well within the expected accuracy
- Radiometry
  - Very good results
  - No saturations nor outliers

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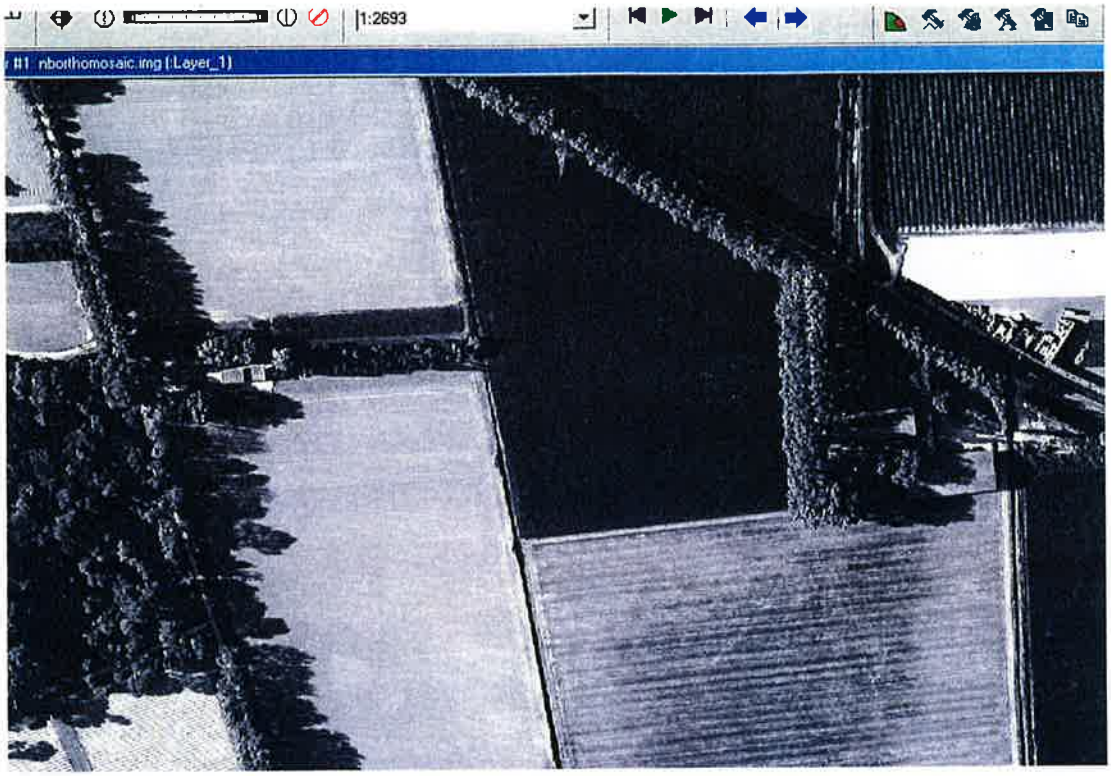

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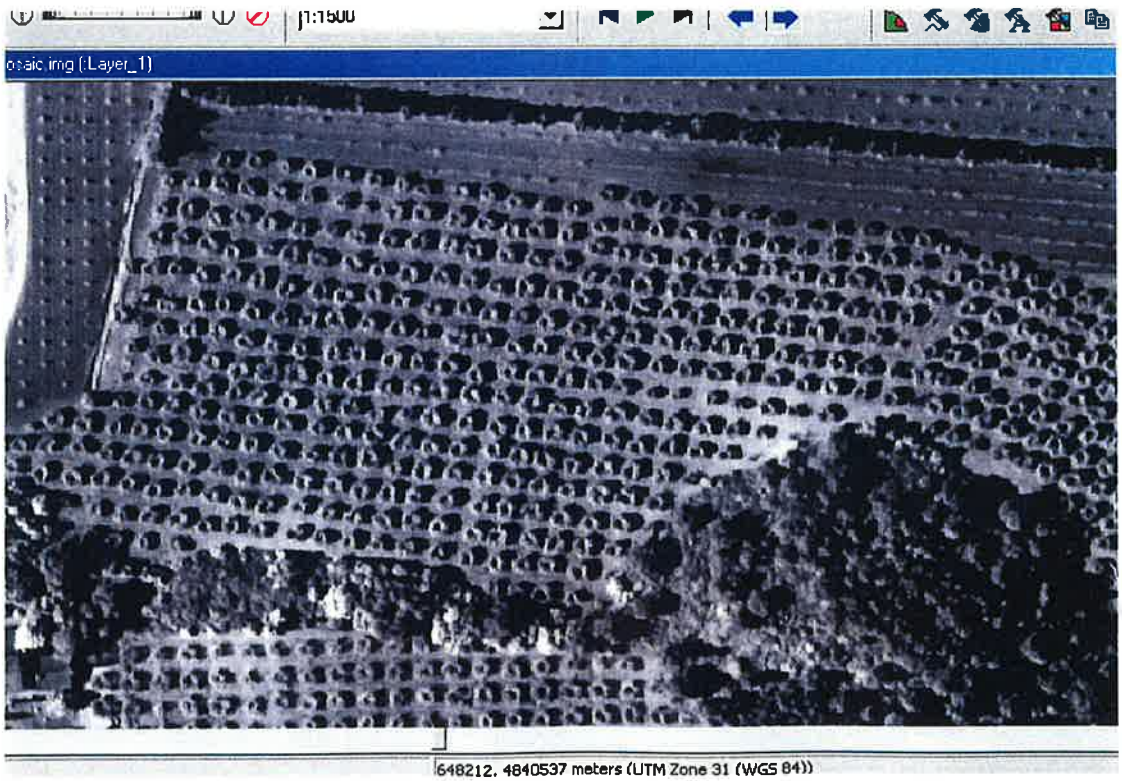

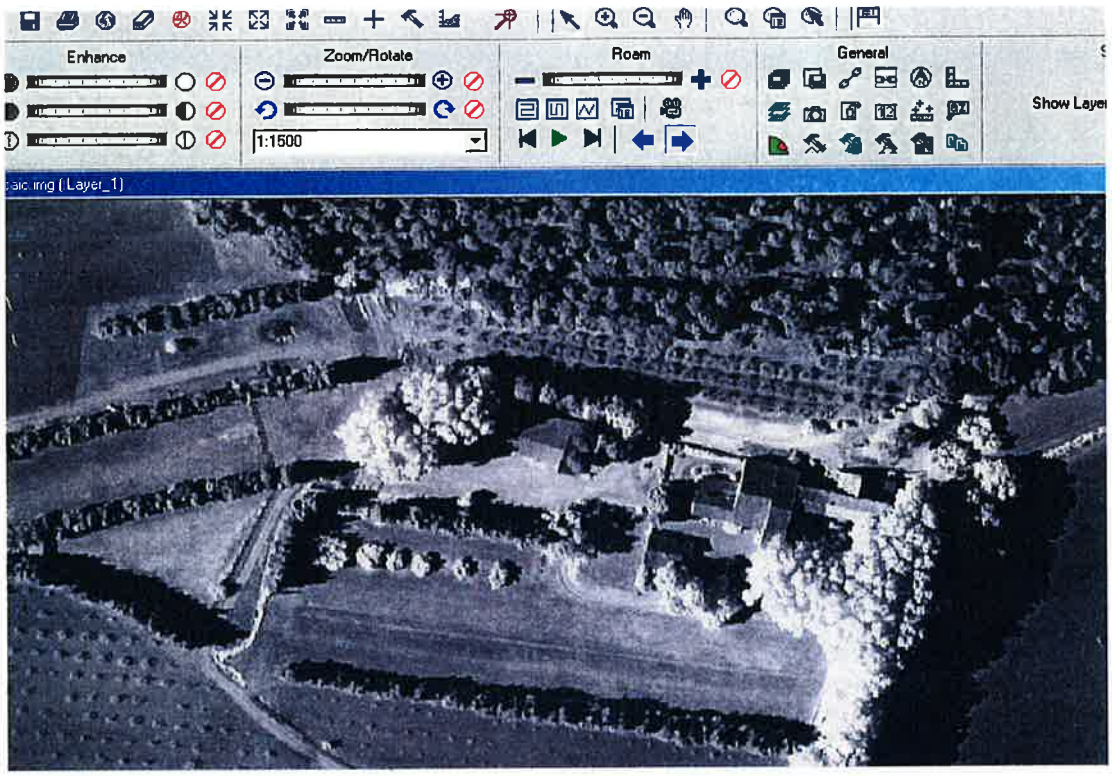
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Session 7 – Preparation of 2004 years CwRS Campaign

Chairman: Pär Åstrand - JRC/ IPSC/ MARS Unit

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Presentation 1 – New issues in the specifications

Pär ÅSTRAND
JRC/ IPSC/ MARS Unit

Abstracts

The presentation gives a status situation of the 2004 years ITT, thereafter goes through the main points changed in the new CTS. At the end main new docs relevant for 2004/5 are mentioned.

The main new issues in the CTS for 2004 are:

- selection of control sites (chapter 3.1)
- selection of applications (3.2)
- VHR imagery, change in HR acquisitions (4)
- land use checks SAPs (5.3)
- eligibility dates for new MS (5.6)
- decision rules and technical tolerances (6) (recs 3 2003)
- simplified QC
- archiving of databases
- Annex 1 (9 countries participating / complementary information participating to the ITT)

Keywords: ITT Invitation to Tender, CTS Common Technical Specifications, SAP Single Area Payments Scheme

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new issues in the CTS

- 2004 years ITT status
- new issues in the Common Technical Specifications (CTS) for 2004
- other new docs / regs for 2004/5

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2004 years ITT status

- pre - publication issued on 05/11/2003
  - no: 2003/S 213-191366
- final publication date XX/YY/ZZZZ
  - no. 2003/S XXX _YYYYYY [N° S 234 of 04/12/2003] (see TED website)
- end date to ask for doc (at respective MS Administration) – 20/12/2003
  - CTS, National Addendum, any other doc...
  - National Addendum - contains detailed complementary information on method proposed for the controls, important dates, deliveries and any specificities (issued by the MS Administration)
  - CTS will be available on MARS website, and sent out to all MS Administration at publication date
- time limit for receipt of tenders
  - specified in National Call for tenders
- participating MS and new MS (8 MS, 1 new MS)
  - CY, DE (4 Länder), GR, IE, LU, NL, PT, SE, UK (England)

http://ted.publications.eu.int/

http://mars.jrc.it/control/

CTS – new issues / author P Åstrand 9th Annual CwRS Conference, November 2003, Köln, DE

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CTS for 2004 ITT

- CTS revised
  - < 28/10 revised by JRC and DG AGRI
  - 28/10 – 12/11 revised /commented on by the MS Administrations
  - final edits and available from date of publication of the ITT
    - 04/12/2003

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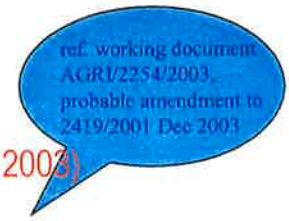
main new issues in the CTS for 2004

- selection of control sites (chapter 3.1)
- selection of applications (3.2)
- VHR imagery, change in HR acquisitions (4)
  - acquisition, management, processing of the imagery
- land use checks SAPs (5.3)
- eligibility dates for new MS (5.6)
- decision rules and technical tolerances (6) (recs 3 2003)
  - tolerances to be applied to each measured parcel
    - max. 5% of area measured, 1.5m on perimeter, min/max abs. tolerance 0.02,1.0 ha



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main new issues in the CTS for 2004

- continued..decision rules and technical tolerances
  - the introduction of new technical codes (ineligible set-aside, T6/A1 codes)
  - the modification of some thresholds (completeness test, codes for small parcels).
- simplified QC (chapter 7.4)
- archive (until 31/12/2005) (chapter 7.9)
- Annex 1
  - 9 countries / complementary information participating to the ITT

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selection of control sites (chapter 3.1)

- the Commission intends to cover with VHR Quickbird, Ikonos, and/or EROS data indicatively 30% of the area controlled by the MS and new MS
  - > 45.000 KM² (MS 40.000, new MS 5000 KM²)
  - indicative values and depending on sites and VHR pricing
- new MS
  - the Commission is NOT able to confirm the financing before the date of entry 1st of May, 2004

CTS – new issues / author P Åstrand 9th Annual CwRS Conference, November 2003, Köln, DE

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selection of control sites (chapter 3.1)

- VHR satellite image site
  - a rectangular envelope containing the actual control site
    - e.g. a polygon defining an administrative unit or a cluster of dossiers
    - use IACS GIS, use 2003 years declarations for definition of sites, and for efficient risk analysis
    - if usage with HR data, the polygon resides within the circle of radius 25km
  - the rectangular envelopes will be defined by the Administration in conjunction with the Commission taking into account the characteristics of the VHR scenes
  - optimization of the VHR image acquisition
    - the sites will normally be dedicated to a specific sensor (Ikonos or Quickbird)
    - pursue 50% / 50% division between Ikonos or Quickbird
  - the actual control site will be defined by a polygon in which the controlled area should be at least 25 to 30% of the polygon area.

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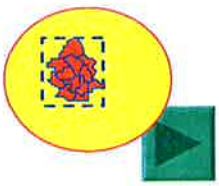
selection of applications (chapter 3.2)



- Member States may select "all" applications falling within a control zone (as per 2419/2001 article 23).
- an applicant will be considered as falling within a control zone if at least 80% of the claimed area falls in the zone.
- selecting geographical clusters of applications (i.e. all the applications falling in a predefined area) presents the advantages of optimizing the acquisition of satellite images
  - enhance the detection of parcel overlaps and/or multiple declarations from different applications.
- if the Member State decides not to select "all" applicants falling within the control zone
  - risk based selection performed at application level (as per article 19)

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VHR imagery, change in HR acquisitions (chapter 4)

- VHR data will be bundled images
  - include 1 PAN band, 4 MSP bands (Ikonos, or QB)
  - no more HR PAN
    - VHR required for area measurement tolerances
    - SPOT 5 "super-mode" in exceptional cases
  - SPOT 5 in sub scenes (VHR site) where possible
  - bundle replaces spring 1 or spring 2 window
    - approx. 11/2 months
    - define start date so that delineation of crop is possible
- most efficient site sizes
  - Ikonos 30x30km
  - QB 14x56km (reduced to 13x56 to fit EROS backup)

Image Courtesy: EUSI, Ikonos

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VHR imagery, change in HR acquisitions (chapter 4)

- distance between sites, contiguous sites
  - in case of large number of sites (eg. 200)
    - IKONOS approx. 200 km apart
    - QB if E/W distance 100km, N/S 175 - 200km,
  - no. of sites will in 2004 be much less (70-90)
- backup
  - EROS (1.8m PAN) window open for 2 months
  - QB / Ikonos may backup each other if no satellite efficiency lost
  - SPOT 5 super mode backup (?)
- if EROS backup, and no MSP VHR
  - HR MSP window opened at critical time
  - under discussion to open anyway…

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VHR imagery, change in HR acquisitions (chapter 4)

- Cloud Cover (CC)
  - under discussion how to manage best practice
- elevation angle
  - release above lat.50, under discussion how to manage best practice
  - orthocorrection accuracy depends on DEM not on angle...
- VHR site covered by different satellites / different resolutions / different dates
  - tolerance difference...
  - mosaicking problems, CAPI problems
- formats / sw

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VHR imagery, change in HR acquisitions (chapter 4)

- to do:
  - setup of image validation procedure
    - JRC, image providers (January 2003), ongoing...
  - define VHR sites/windows
    - JRC (HK, PÄR, CW), MS Administrations, new MS Administrations
    - started negotiation with 5 MS, and 2 new MS
    - in order to succeed in 2004 CwRS Campaign we need to have all defined by February 2004

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VHR imagery, change in HR acquisitions (chapter 4)

- maximum 1D absolute rmse changed

DATA TYPE	MAX RMSE
aerial photographs, VHR PAN 1 m satellite imagery (eg. QB, Ikonos)	2.5 m
EROS 1.8m satellite imagery single scene	2.5
EROS 1.8m satellite imagery vector scene (> 27 km)	3.5m
SPOT 2, 4 multispectral	30 m
SPOT 5 multispectral	15 m
IRS multispectral	40 m
RADARSAT	20 m
LANDSAT TM	50 m

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land use checks SAPs (chapter 5.3)

- single area payment SAPs defined in amendment to Counc. Reg.1259/1999
  - into force by date of Accession 1st May, 2004
  - cf. National Addendum
  - 8/10 new MS probably will apply this scheme

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land use checks SAPs (chapter 5.3)

- crop groups to be controlled:
  - the SAPS group (total of arable crops + forage + permanent crops + vegetable gardens)
  - cf. National Addendum for top-ups crops or crop groups
  - eligibility, and min. agricultural parcel size
- the control of national top-ups
  - similar to the control of the IACS crop groups
- the control of SAPS
  - require sketch maps provided by the farmers to describe the land use of their production blocks
  - focus on removing the ineligible areas (such as buildings, woody areas, or water bodies) inside these blocks
  - "Good Agricultural and Environmental Conditions" GAEC (cf. CAP Reform Annex IV) (cf. National Addendum)

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land use checks SAPs (chapter 5.3)

- GAEC
  - doubtful cases identified by CAPI should be reported with appropriate codes in order to decide upon complementary inspections
    - grasslands covered with bushes or ferns
    - arable parcels with trace of erosion
  - additional measures (e.g. inspections) should be defined by the Administration to control these specific conditions.
- SAPs in general
  - contractors are recommended to use appropriate codes to flag any specific problem which may be linked to the quality of the SAPS declarations (alphanumerical form or sketch maps). These codes may lead to rapid field visits or contact with the farmers according to specific procedures (cf. National Addendum).

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eligibility dates for new MS (chapter 5.6)

- defined in the Accession Treaty
  - parcels under "permanent" crop (grassland, orchards, wood, etc.) on dates varying between 31.12.2000 and 1.12.2002 - NOT eligible for arable aid.
- eligibility for SAPS
  - land part of new MS utilized agricultural area and maintained under GAEC at 30 June 2003
- purpose
  - avoid an undue increase of arable lands following the implementation of IACS
- use of LPIS or LPIS orthos
  - to provide clear information of the eligibility of the reference parcels
  - use extra photo-interpretation of the orthophotos from the LPIS to solve doubtful cases
  - otherwise requested evidence to farmers (cf. National Addendum).

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other new docs for 2004

- recommendations 1, 2, 3, 4, site selection, orthoguidelines...
- Council Regulation (EC) no. 2419/2001
- Council Regulation (EC) no. 1259/1999
  - new Article 1b on SAPs
- Council Regulation (EC) no. 1782/2003
  - new Reformed CAP
  - application regulation in spring 2004...(?)

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other new docs for 2004

- recommendations 1,2,3,4, and site selection document
  - scheduled release recs. 1,2,3 April 2004
    - doc 2213 on site selection 2004 will move into recs 1 (on site selection, satellite programming, image acquisition and delivery)
  - recs 4 May/June 2004
  - recs should "normally" not include new issues that where not included in the CTS, but give detail
    - exception if new Reg. / new doc from DG AGRI
- ortho guidelines
  - earlier version 1999
  - new version today including VHR sensor, aerial scanner etc...

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Thank you !

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other new regs for 2004 / 2005

- Council Regulation on the Reformed CAP (published the 21/10/2003)
  - Council Reg (EC) N° 1782/2003
    - main text on single payment, cross compliance, etc (69 pages)
  - Council Reg (EC) N° 1783/2003
    - short amendment to 1257/99 on rural development (8 pages)
  - Council Reg (EC) N° 1784/2003
    - Common organization of market in Cereals (18 pages)
  - Council Reg (EC) N° 1785/2003
    - Common organization of market in Rice (18 pages)
- Commission Regulation – application Reg. on the CAP Reform
  - Spring 2004 (?)

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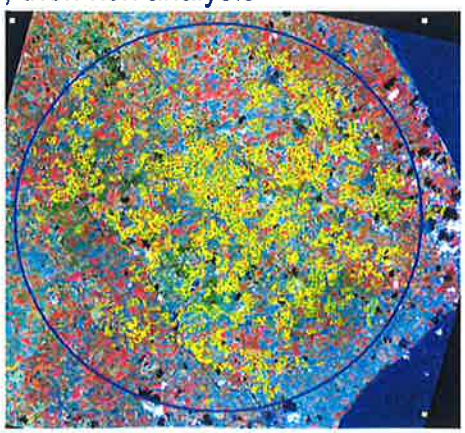
selection of control sites / applications

- initial gross selection, then risk analysis
- art 19 inside circle



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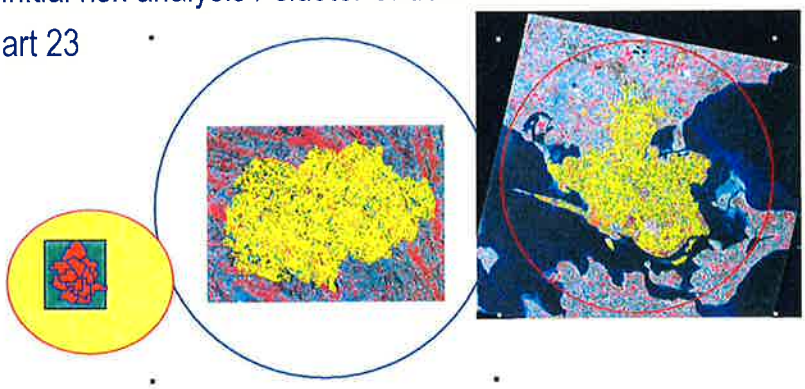
selection of control sites / applications

- initial risk analysis / cluster of dossiers to define sites
- art 23



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VHR 2004 (status 1)

- MS Administration received doc. 2213 on site selection
  - corrigendum 1
- know their approximate area envelopes
- issue of risk analysis
  - need time to solve....
  - performing negotiation with JRC
- scared of failure
  - aerial photography

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VHR 2004 (status 2)

- MS received, or being negotiated
  - VHR – DE, ES, GB, IE, LUX
- new MS received, or being negotiated
  - VHR – EE, MT

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Presentation 2 – Definition of CwRS Sites: past, present and future optimisation

Olivier LÉO
Csaba WIRNHARDT
JRC/IPSC/MARS Unit

Abstracts

The selection of the sites for the control with remote-sensing is the initial stage of the CwRS methodology. A "control site" can be defined by the intersection between a sample of dossiers to be controlled and a geographic area of interest, on which earth observation data (satellite images, aerial photos) have to be acquired and processed, but also on which reference maps have to be provided and possibly digitized.
One of the main specificity of the control with remote sensing is the selection of a geographic cluster of applications, but this selection has to comply with the principle of risk analysis and random selection, described in the Com. Reg. 2419/01.
The Commission has, since 93, provided to the National Administrations guidelines for the definition of the CwRS sites, in order to optimize the acquisition of high resolution imagery, but also to reduce the fixed costs of the CwRS.
These guidelines have to be replaced in a historic context: The offer of high resolution data was relatively low and the sites were defined to optimize the acquisition success rate. The digitization of paper reference maps could represent till 30% of the costs of the controls.
The availability of Very High Resolution satellite data, as the implementation of the digital LPIS by January 2005, will modify completely this context and should lead to a re-engineering of the site definition in the coming years.
The presentation will analyze the functionalities and concepts linked to the site definition, review the various characteristics of the CwRS sites and provide representative examples in the MS.
A second part will focus on the efficient use of the digital LPIS to optimize site selection in the future.

Keywords: Control, Remote Sensing, site selection, IACS, LPIS

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CwRS Site definition: past, present & future ?

Olivier LÉO, Csaba WIRNHARDT
http://www.mars.jrc.it

9th conference on Controls with Remote sensing

Köln, 28-29 November 2003

Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft

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A general approach ...

- Context and concerns
- Purpose and objectives (Why?)
- Object (What?)
- Modalities (How ?)
  - *Functions*
  - *Procedures*
  - *Tools Software & hardware*

From General to specific

Technical / Mechanical approach

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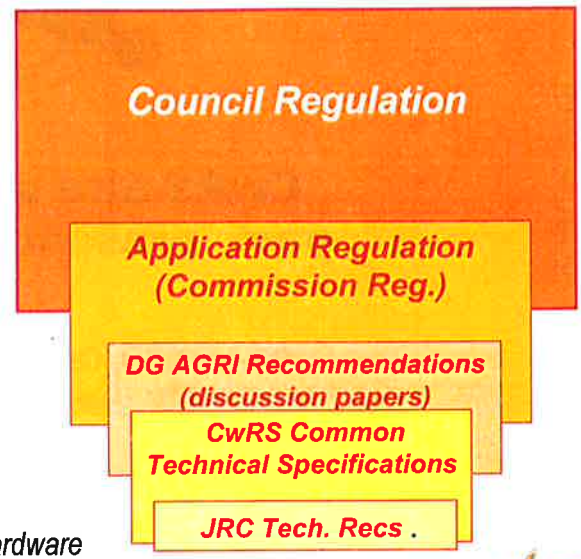
A general approach ?

- Context and concerns
- Purpose & objectives
- Object (What?)
- Modalities (how ?)
  - *Functions*
  - *Procedures*
  - *Tools Software & hardware*



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Wouldn't be easier to fix everything?

- Different levels of importance
- With different periods of updating
  - Council Reg : +/- 10 years
  - Com. Reg : 3- 5 years
  - Discussions papers : 1-2 years
  - Specs and Rec: Yearly...
- Modalities are specific for country /region
  - and linked to technologies

Flexible modalities are essential to reach targets

- *To clarify responsibility (subsidiarity principle)*
- *To optimize implementation, improve of methods & systems...*

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Site Selection:

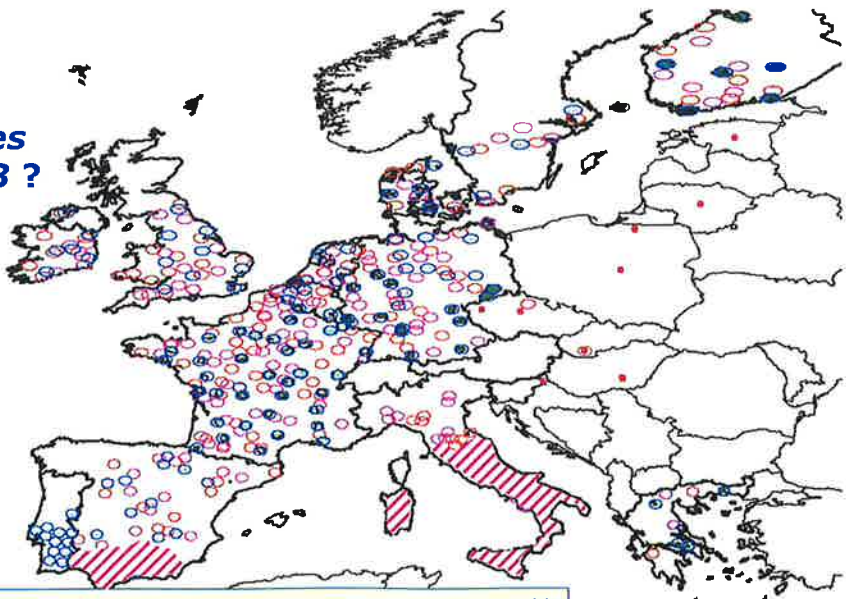
- Is a simple function of control with remote sensing
- is implemented in MS by different way (procedures)
- Site definition has been strongly influenced by available data / systems and is specified in technical documents

- CwRS is one of the modalities of on the SPOT checks and has to be fully compliant with the Regulation

Avoid a "mechanical" approach

Reconsider the whole process from general to specific...

CwRS sites in 2001-03 ?



No this sites are only the one for which HR satellite were programmed !
Missing large parts of ITALIA and ANDALUCIA (Orthophoto only)

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So, what is a CwRS site ?

1st Answer: a **25 km radius circle,** containing a minimum of **500 dossiers or 10.000 ha** to be controlled ?

Yes, but not always...

1. Such sites are only one of the possible modalities in Europe
   - Italia covers whole provinces since 93...
   - Mini-sites are used in Andalusia since 94
   - Portugal has "Landsat TM" sites (180x180 km) in Alentejo / Ribatejo since 98

2. The first definition is only linked to the use of HR data
   - And was made progressively (3 years) to optimize rate of success according different the different satellite systems (SPOT, TM, IRS...)

...in fact a restrictive definition linked to an historical context

©M.VanDeSteene.94

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Other types of sites: Andalusia

Andalusian Mini sites

- ***2002: 20 mini-sites , mean 410 dossiers + 6000 ha controlled.***
- ***2003: 23 mini-sites , mean 420 dossiers + 6900 ha controlled***
- ***Risk analysis per municipio (90 for 2003)***
- ***Compact clusters of applications***

Mean characteristics (2003)

- ***Gross area 450 km2 (aerial Flight)***
- ***AOI 1/3 : 160 km2***

Smallest sites:

- ***50 -100 km2***
- ***30-150 farmers***
- ***1000- 3000 ha)***

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Other types of sites: Italia

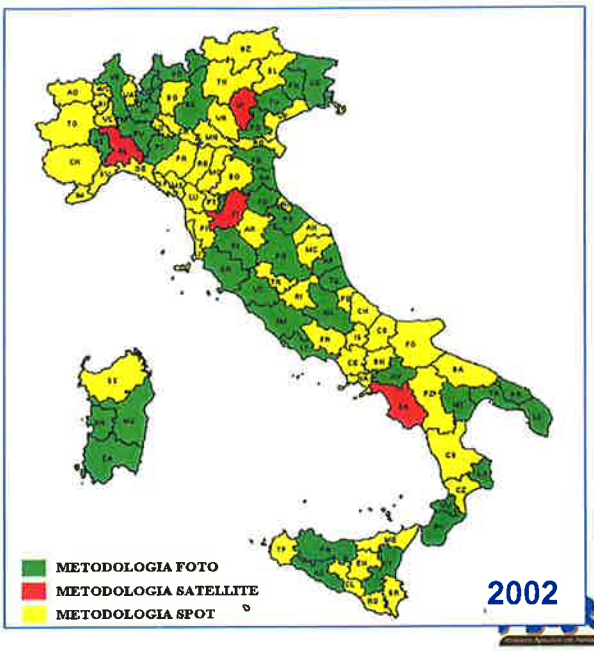
Whole Provinces Selected

1. *CwRS photo: Ortho photos of the current year and rapid field visit*
2. *CwRS "satellite" : Satellite and orthophotos of current year and RFV.*
3. *"SPOT": "Traditional" field inspections (with LPIS support).*

1 & 2 Provinces selected / Risk analysis + 15 % dossiers selected / Risk .

3: Rest of the country: 5 % with R analysis.

All categories contains also a random samples.



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Origin of "EAGGF" circular sites

Two main constraints in 93-95:

- Digitization of paper cadastre... represented 1/3 of the CwRS costs
- Characteristic of satellite images (scenes of 60x60 km for SPOT)
- ⇨ *Definition of rather large sites and large cluster of dossiers*

In a different context :

- Availability of Digital LPIS in 2005
- Arrival of VHR data

Necessity of a re-engineering of the site definition ...

without destabilizing the whole system

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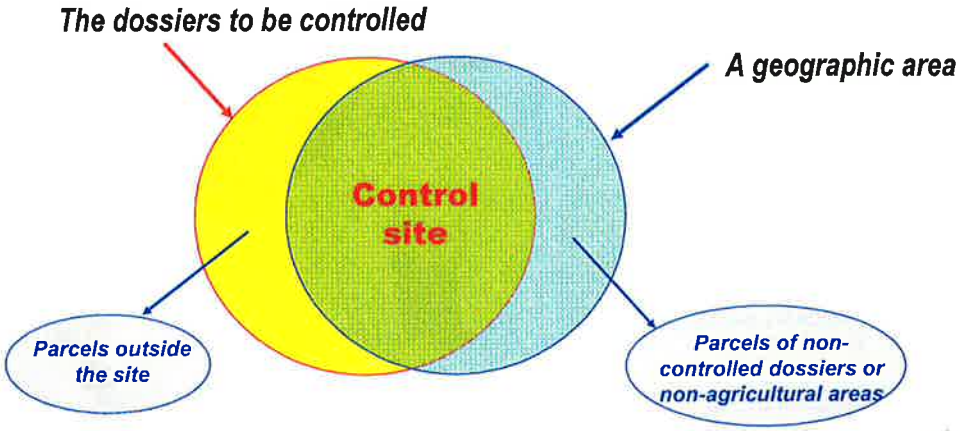
So, what is a CwRS site ?

- **More conceptual and generic answer :** the CwRS site is the intersection between:



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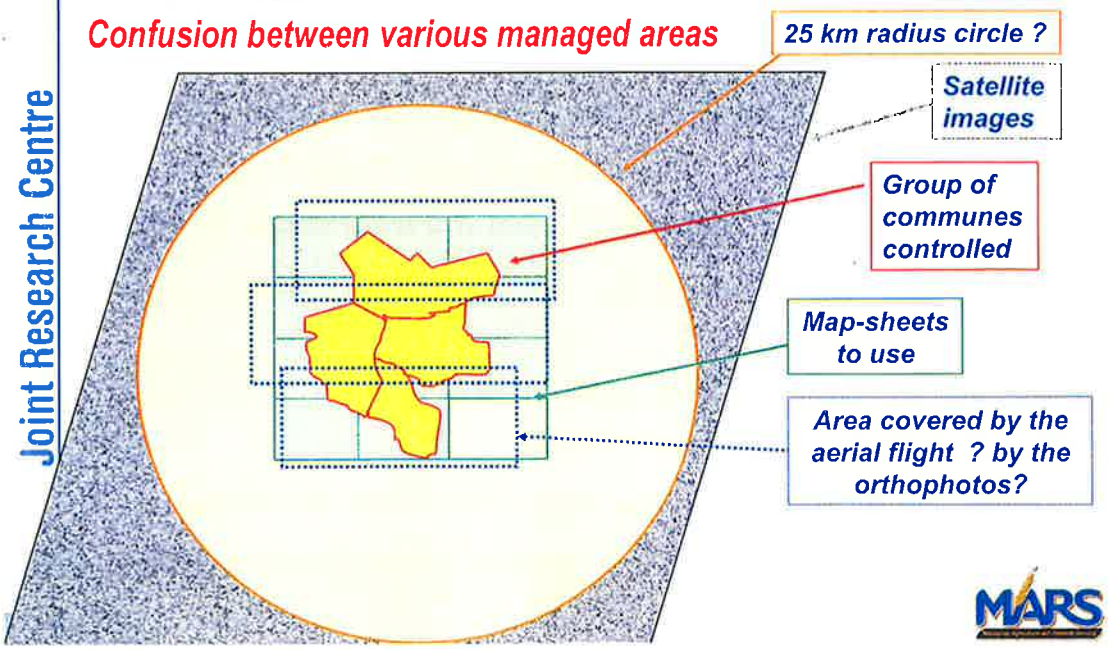
and what are its real extension ?

Confusion between various managed areas



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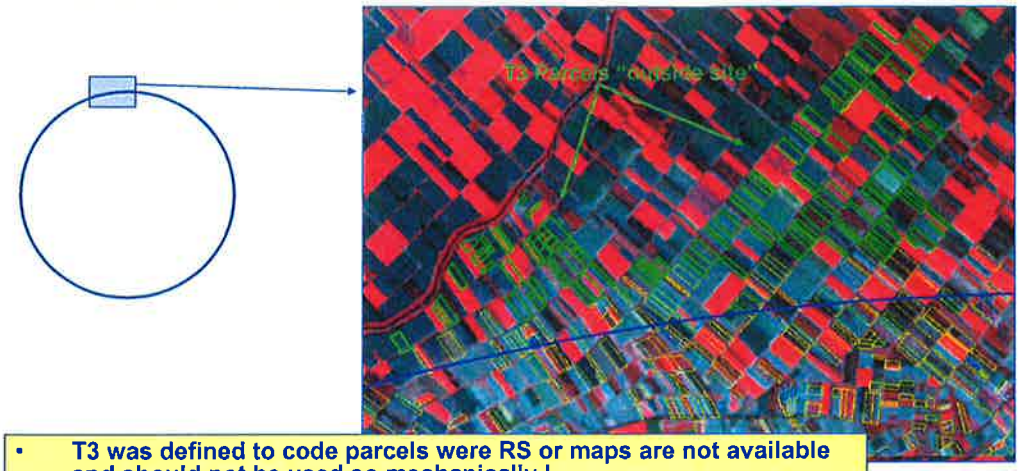
Possible confusions!

Should a contractor not CAPI the parcels declared outside the 25km radius circle ... even if covered by RS data ?



- T3 was defined to code parcels were RS or maps are not available and should not be used so mechanically !
- *The 25 km circle is a convention* to manage image acquisition ...

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Possible confusions between the area !

Approximations due to Administrative boundaries:

- Dossiers are "located" in the IACS by the Address of the beneficiary (Commune)
- But parcels to control may be located in neighboring communes
- Administrative boundaries are also including large non agricultural areas (lakes, mountains, forest...)

An old tip for site selection with non-GIS IACS

- ***Core communes to control***
- ***Plus a ring of neighboring communes***

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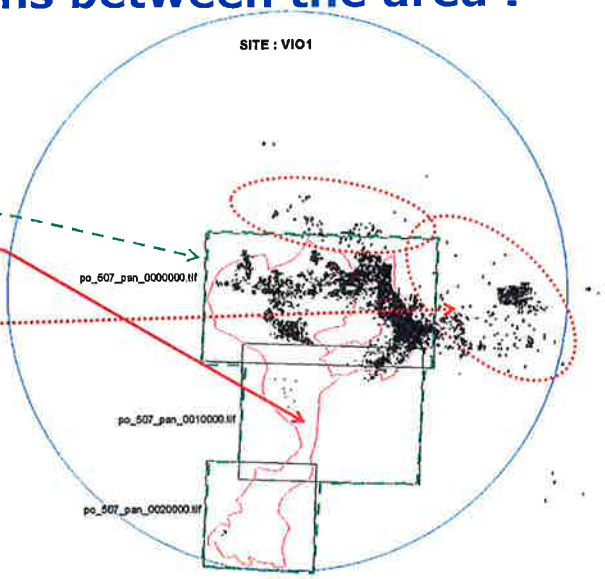
Possible confusions between the area !

A dramatic error when defining VHR image coverage :

- *AOI approximate by Administrative boundaries,*
- *But, communes contains large mountainous areas*
- *And many parcels are locating in plains of neighboring communes....*



For VHR data, an efficient definition of geographic AOI becomes essential:
- *Imagery is much more expensive...*
  30 € / km2 instead of 1 € / km2
- *sites are smaller*

Now, use of digital LPIS for the site selection !

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In summary:

- The 25 km radius circle is a conventional target
  - to manage HR image acquisition
  - (or to predefine a geographic area)
- The real geographic area to manage Is the area of interest (AoI)
  - Where images have to be acquired
    - Preferably cloud free
  - But more generally where data have to provided to contractor
    - LPIS vectors maps,
    - Orthophotos, DTM, etc...
- This AoI may correspond or not to the circle

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Modalities to define a CwRS zone :

Reg. 3508/92 and 2419/01:

- *Minimum of 5% dossiers to be checked on the SPOT*
- *Selection including both Random and Risk analysis procedures .*

- Control of dossiers and not geographic area
  - obligations of control ,
  - consequence of the control (penalties, sanctions)
  - and thus risk criteria ..... are applied at Dossier level

- NB: This doesn't mean that risk analysis should not include possible criteria from parcels (or LPIS) such as
  - change of parcels,
  - presence of new parcel declared,
  - presence of parcels with some types of anomalies...

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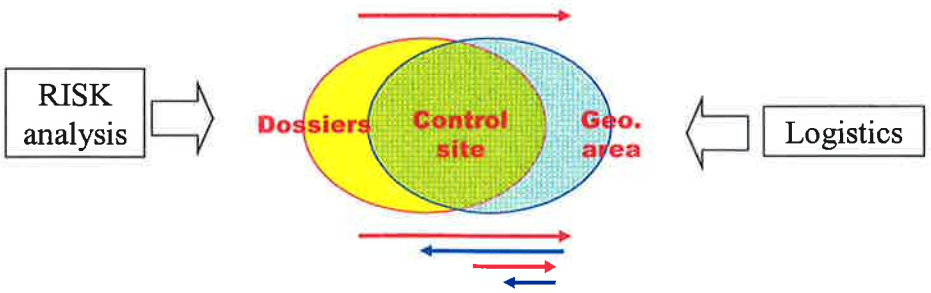
Modalities to define a CwRS site

Definition of CwRS zone should ideally start from dossiers

- Cluster of dossiers to control ⇒ Definition of the geographic area to acquire & manage



In practice, iterative process to optimize the site selection

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Risk analysis ?

Regulation foresee both

- A Risk analysis ... to target efficiently the control
- And a random sample to be representative of the general situation

Cf. Art. 19 and 23 Reg. 2419/01

However an apparent absence of risk analysis

- doesn't mean that the sample is random...
- but only that the risk analysis is poor.

Cf finding of Court of auditors

CWRS is a modality of control: Main specificity = Geographic cluster of dossiers

- Sites are sometimes clearly based on risk analysis: cf communes approach in FR
  - But larger the cluster of dossiers, weaker this R. analysis (if no generalized frauds)
- Some other are decided for "logistical" concern (geographic rotation)
  - This is still a risk analysis, but poor, generally not documented...

Ex: "this district was not controlled by RS in the last 2 campaigns"

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Risk analysis ?

A randomly selected Control site ?

- A site defined by the random coordinates of its centre, could be considered as a random site
- but the sample of dossiers selected by this way, will have a poor representativeness at national / regional level
  - *The n dossiers of the sample are not really independent*
  - *It's a geographic cluster with possible correlations ...*

In summary:

Smaller sites and smaller clusters of dossiers

- *will improve the risk analysis of the CwRS*
- *but could also possible represent random samples ...*

This point is a general concern and should be follow-up in 2004...

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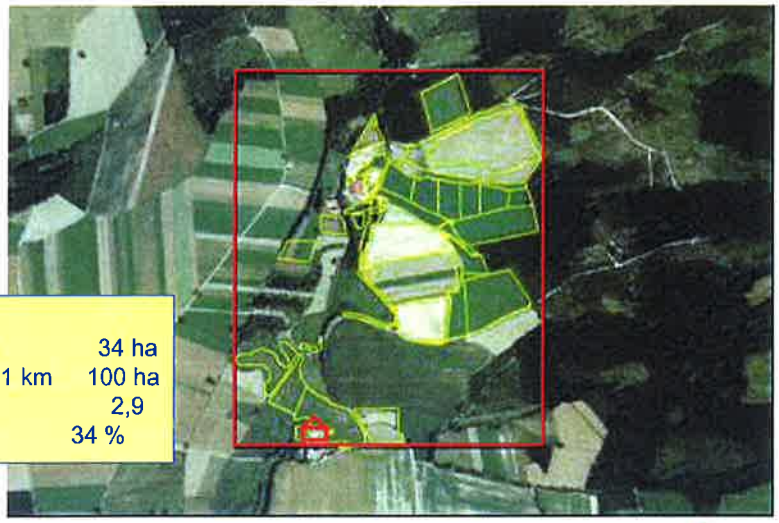
Geographic extension of a farm



Farm 2	
32 parc., Total net area	34 ha
Geographic box: 0,9x 1.1 km	100 ha
Dispersion factor :	2,9
Net/ gross ratio	34 %

SWA2 site / DE

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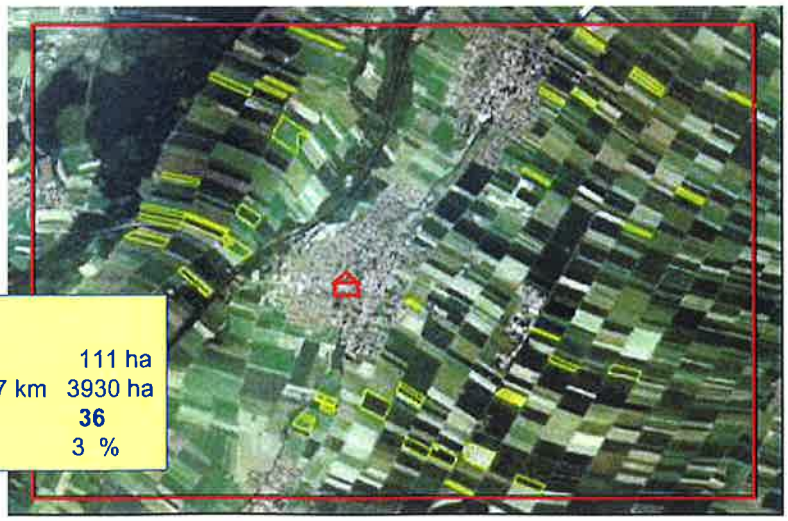
Geographic extension of a farm



Farm 3	
40 parc., total net area	111 ha
Geographic box:5,1x 7.7 km	3930 ha
Dispersion factor :	**36**
Net/ gross ratio	3 %

SWA2 site / DE

NB: The median value for this zone is 3.3 %

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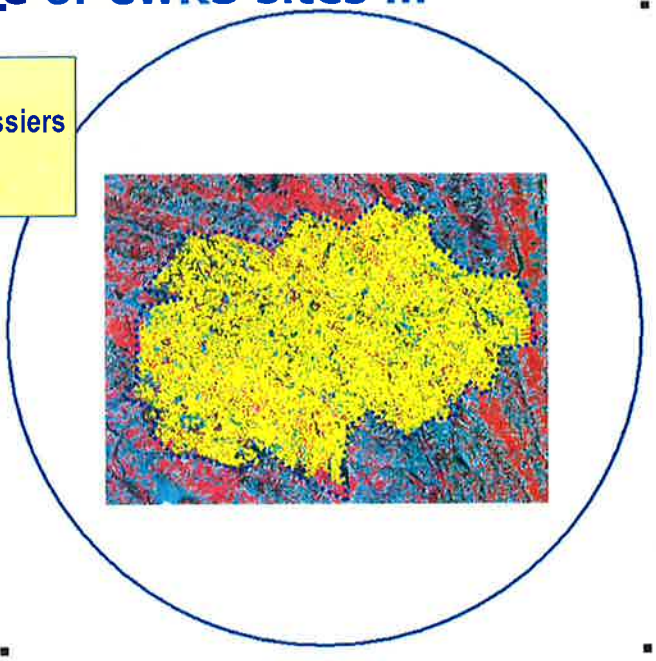
Some example of CwRS sites ...

FRANCE:

- Compact cluster of dossiers
- The AOI is a sum of Communes



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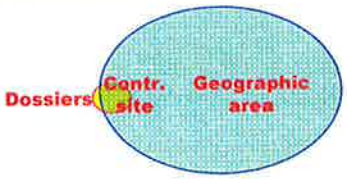
In case of Control with Remote sensing

- Controls are made for geographic clusters of dossiers
  - A main reason: cost efficiency:
    - *Image scene minimum coverage Non digital LPIS*
  - Resulted in the recommendations of the JRC (25km, 500 dossiers, 10000 ha).

    NB: this minimum of 10 000 ha represents
    - *5 % of the gross area of the 25 km Radius*
    - *2,8 % of the total area of a SPOT scene ...*



  - *One general concern: Geographic dispersion of the farm parcels*
    - *Concept of net /gross ratio*
    - *Net area of the parcels / gross area of the rectangle containing the parcels*
  - *Easy to analyze by LPIS*
    - *Conditions also field inspection, maps sent to farmers, etc...*

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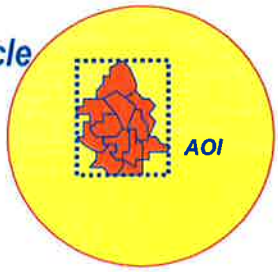
Present type of CwRS sites :

Two types of geographic clusters within the circle

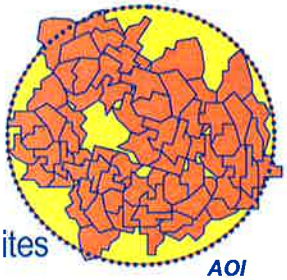


1. Compact clusters of dossiers

- "All" the dossiers of the communes are controlled
- Area of interest AoI much smaller than basis circle

2. Loose clusters of dossiers

- A sample of dossiers are controlled within communes
- Total AoI similar to circle .



These morphologies corresponds +/- to 2 strategies of site definition

1. Initial risk analysis /cluster of dossiers to define sites
2. Initial gross selection, then risk analysis

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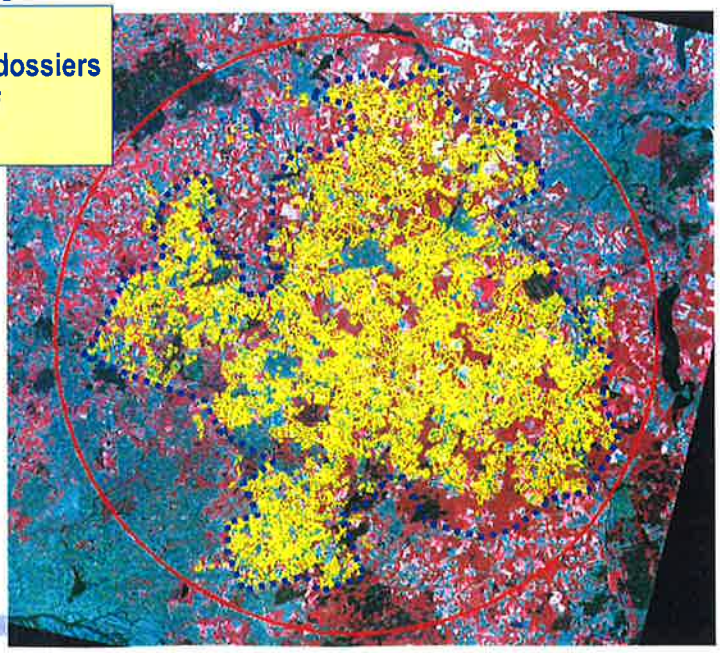
Some example of CwRS sites ...

DEUTSCHLAND

- **Compact cluster of dossiers**
- **The AOI is a sum of Communes**



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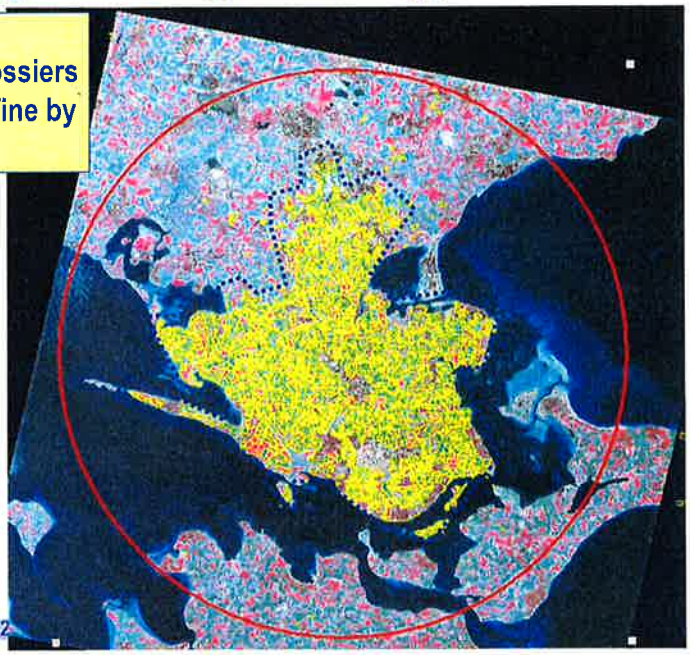
Some example of CwRS sites ...

DENMARK

- Compact cluster of dossiers
- The AOI is mainly define by the environment



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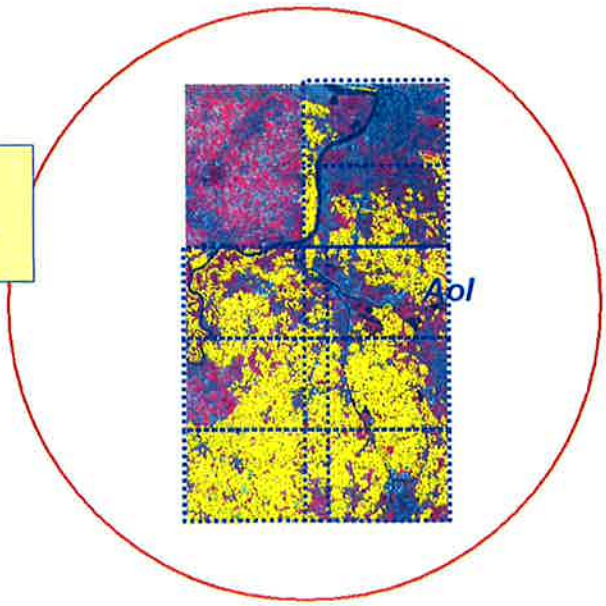
Some example of CwRS sites ...

BELGIUM :

- Compact cluster
- The AOI is defined by a number of orthophotos map-sheets



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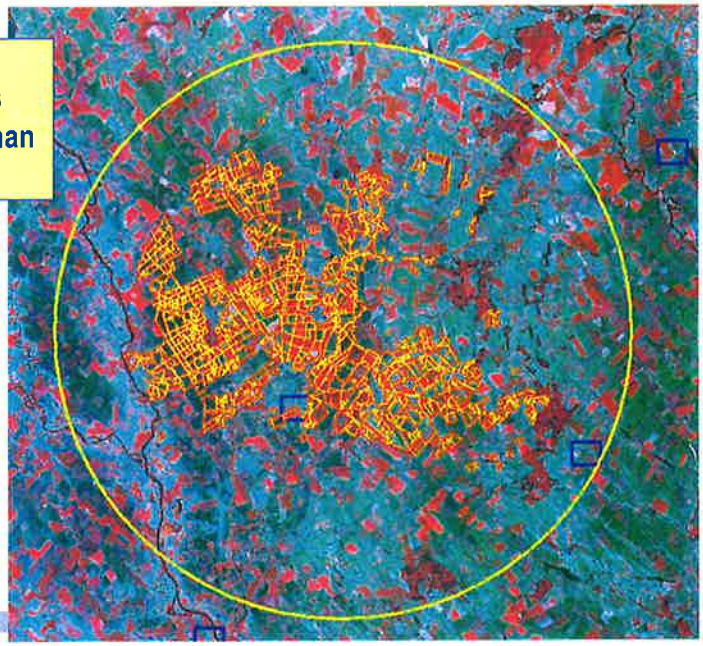
Some example of CwRS sites ...

SLOVAKIA:

- A cluster of dossiers
- The AOI is smaller than the circle



CwRS Site definition: past, present & future ?

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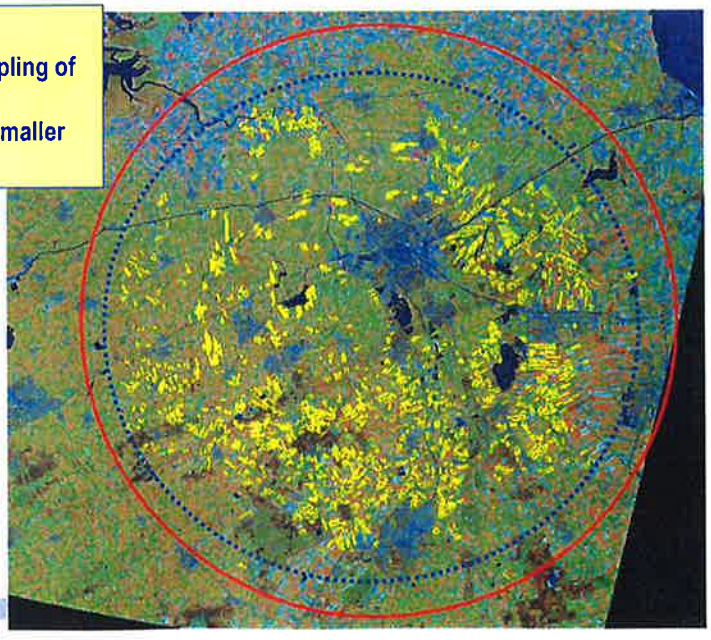
Some example of CwRS sites ...

The NETHERLANDS

- Loose cluster (sub- sampling of dossiers)
- The AOI is here slightly smaller than the circle



CwRS Site definition: past, present & future ?

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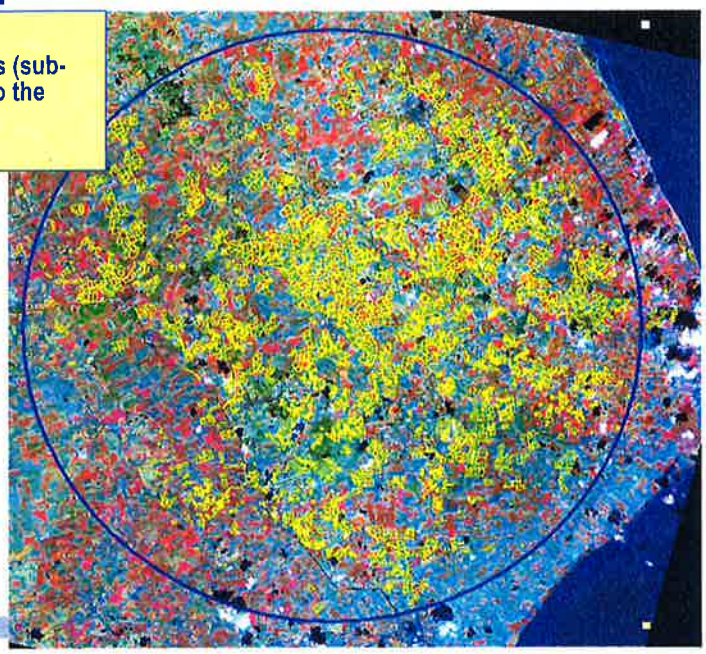
Some example of CwRS sites ...

ENGLAND

- Loose cluster of dossiers (sub-sampling of dossiers into the zone)
- The AOI is the circle



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Possible mean-term evolution

Small sites are "beautiful"

- **Smaller clusters of dossiers allow**
  - a more efficient risk analysis
  - a more distributed sample
- Easier logistic for decentralized offices (Country boards, Lantwirtschaftliches Ämter)
- **but Cost of VHR requires to control enough area within the site...**
  - Compact cluster (all dossiers)
  - or at least 25% to 30% of the gross area
- **NB: another alternative ...**
  - Regional orthophoto coverage (for LPIS updating and control)
  - Plus sample of dossiers selected by risk analysis.

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Future orientations: site's characteristics

- preferably a compact clusters (all dossiers)
- But main criteria is **Net / Gross area ratio : > 25 %**
- to optimize the high cost of the VHR data...

Net /gross ratio based on Aerial photos

MS	Contractor	Photos from LPIS	Photos from archive	Photos acquired for RS Control	No. sites	Tot. area covered and prod. (km2)	Gross area per site	mean dossier per site	net area per site	Mean ration net/ gross
BE	CTS	yes	yes	no	4	4 000	1 000	501	199,3	19,9%
DE	EFTAS	no	no	yes	7	11 618	1 660	507	352,7	21,3%
DE	GAF	no	no	yes	14	12 403	886	723	229,5	25,9%
DK	DIAS	yes	no	no	4	3 200	800	576	285,5	35,7%
ES	DAP	no	no	yes	20	7 382	368	413	59,9	16,3%
ES	TRAGSATEC	no	(2 sites ye	no	13	26 000	2 000	1570	592,1	29,6%
FI	NLS	yes	no	yes	7	16 800	2 400	323	105,1	4,4%
FR	SCOT	no	yes	(yes for 3 site	13	*3 000*	1 000	883	572,4	57,2%
FR	SIRS-ONIC	no	no	yes	9	*9 000*	1 000	572	344,8	34,5%
FR	ONIC	no	yes	no	13	*19 500*	1 500	572	344,8	23,0%
GR	ERASTOTHE	yes	yes	no	3	1 950	650	933	51,5	7,9%
GR	METRISI	yes	yes	no	1	800	800	3528	345,1	43,1%
IE	ICON	yes	yes	no	6	11 400	1 900	944	537,4	28,3%
IT	FINSIEL	no	yes	yes	45	135 000	3 000	1012	268,6	9,0%
NL	GEORAS	no	no	yes	4	3 437	859	533	86,3	10,0%
PT	GEOTEC	yes	no	yes	12	24 000	2 000	525	93,8	4,7%
SE	METRIA	no	yes	no	4	7 650	1 963	493	361,1	18,4%
UK	RSAC	N/A	N/A	N/A	9	17 100	1 900	400	431,9	22,7%

Analysis on 2002 CwRS sites

CwRS Site definition: p

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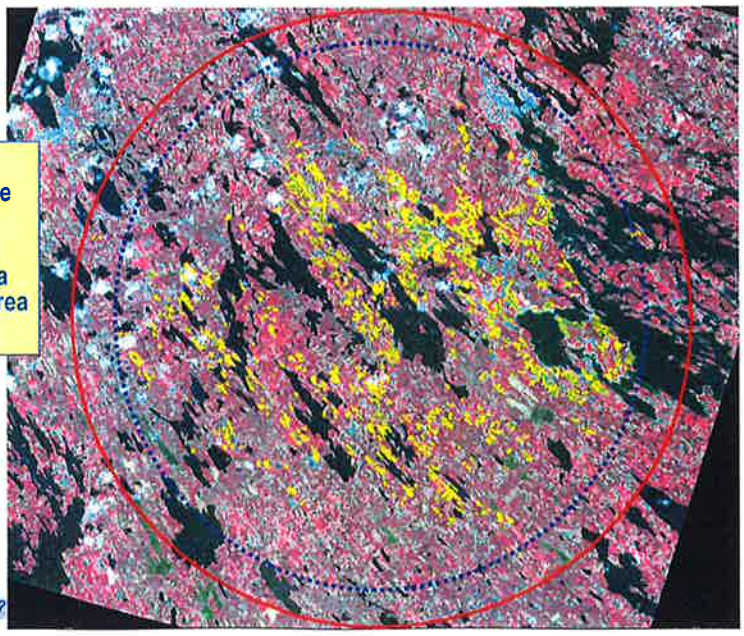
Some example of CwRS sites ...

FINLAND :

- The AoI is +/- the circle
- But the Landscape (importance of lakes and forests) result in a very low net / gross area ratio



CwRS Site definition: past, present & future ?

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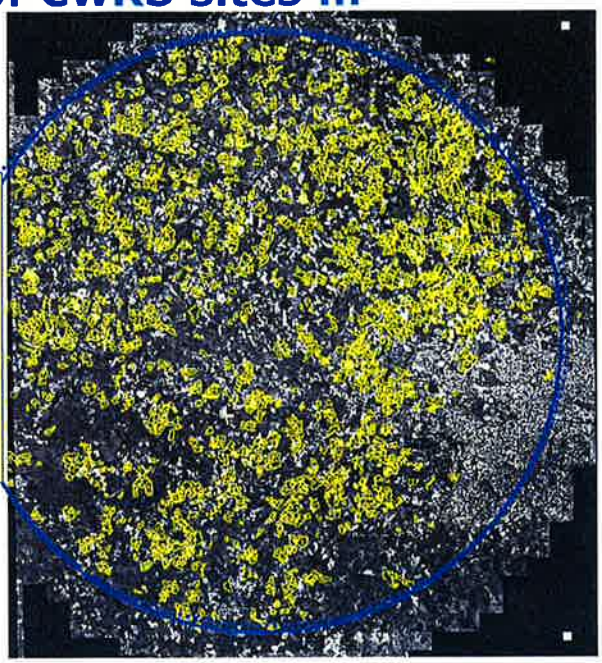
Some example of CwRS sites ...

IRELAND:

- The AoI is the circle
- Loose cluster of dossiers
- For a good reason (importance of application with forage only)
- Cf Summary Stats:
  - 1998: 72 %
  - 2001: 43%
  - 2002: 4% forage only dossiers



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Possible future evolutions

But how smaller sites ?

- **if we extrapolate "andalusian" system to EU**
  - From 130 sites to ..... 500 for EU15
  - to 650- 800 sites for EU 25.
- **Digital LPIS can manage it ... but what are the operational capacities of the VHR systems ?**

Necessity of a phasing ... to reduce risks

- Adapt the site characteristics to the systems
- Optimize acquisition by competition between image providers

It will take 2 or 3 years and 2004 is the first one !

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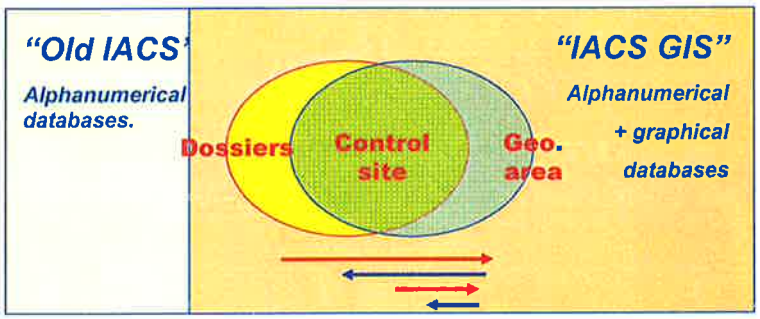
How to improve Site selection ?

- Use of appropriate risk analysis
- Benefit from the synergy between IACS and GIS



- GIS functionalities possible approaches and scenarios

Csaba Wirnhardt !

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Vielen Dank für Ihre Aufmerksamkeit !

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Presentation 3 – Future of QC

Hervé KERDILES
JRC/ IPSC/ MARS Unit

Abstracts

A Quality Control in support to the MS administrations has been performed by MARS on a sample of 6-8 contractors per year up to now. This quality control is made on a so called QC site for which each contractor has to provide the data used and his results (imagery, vectors and DB in a predefined format). A point on the delivery of the 2003 QC data will be made and attention will be brought on particular points that need to be checked before delivering the QC data.

Due to the entry of 10 new MS in 2004 and considering that CwRS has reached maturity in the 13 MS using CwRS, there is a need to focus the MARS support on these new MS as well as to speed up the delivery of the QC results for the EU 15 2003 contractors that will be subjected to QC. The simplified QC approach that will be tested on 2 contractors in 2004 will be briefly presented as well as alternatives to the JRC QC.

Keywords: QC, CwRS

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Future of QC

H Kerdiles, JRC IPSC MARS

9th Conference on CwRS, 27-28 November 2003, Köln, DE

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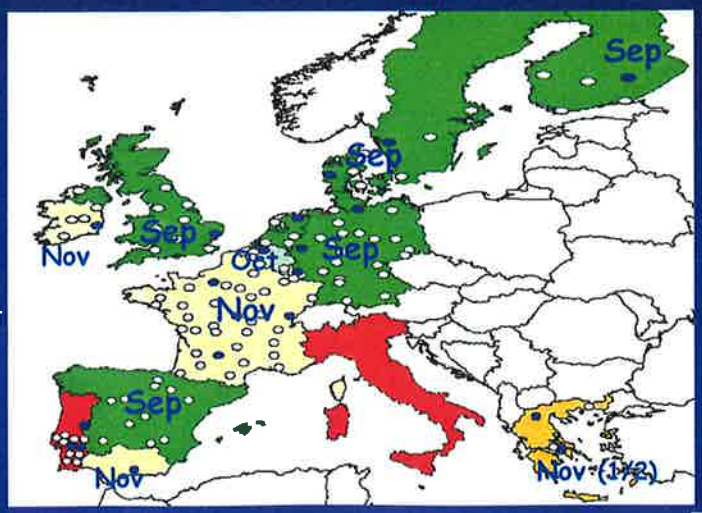
Delivery of 2003 QC data (EU 14)

- On 28/11, 11/14 MS delivered - PT, IT, ½ GR missing



New MS (9 CwRS pilot studies): EE, SK

Future of QC 2

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Comparison with 2002 QC data delivery

- Same delivery pattern as in 2002

Improvement in timing for FR, (UK, BE,NL)

PT incomplete

Future of QC 3

Particular points to check before delivering QC data

- If > 10 ortho tiles, please deliver ortho frame (shp file or .txt file with ULC, LRC of orthos)
  - Alternative = ortho mosaic
  - Please do not forget ARCHIVE ortho !

X	Y
Z	

- In DB_Anum, check description of Technical codes (especially if codes ≠ standard ones)
- check parameters used (SITE table)
- Check / fill projection type and parameters and date of imagery used (ortho) in DB_QCRs

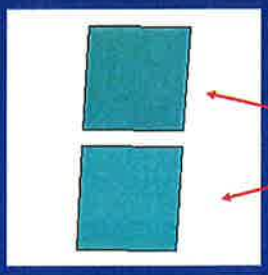
Future of QC 4

Ex. of SATCORR table (EE)

- **Correctly filled** -> used for checking location of VHR site
- **Pay attention to units**

SATCORR : Table

ProjSys	ProjZ	ProjEllipse	ProjDatumn	CentScale	Lat1st	Lat2nd	CentMerdian	LatOrigin	FalseEasting	FalseNorthing
Lambert-Est92	-	GRS80	Lambert-Est 92	1.00000	58.0000	59.2000	24.00	57.3103	500000	6375000
Lambert-Est92	-	GRS80	Lambert-Est 92	1.00000	58.0000	59.2000	24.00	57.3103	500000	6375000
Lambert-Est92	-	GRS80	Lambert-Est 92	1.00000	58.0000	59.2000	24.00	57.3103	500000	6375000



DD (57.3103°) or
DMS (57° 31' 03") ?

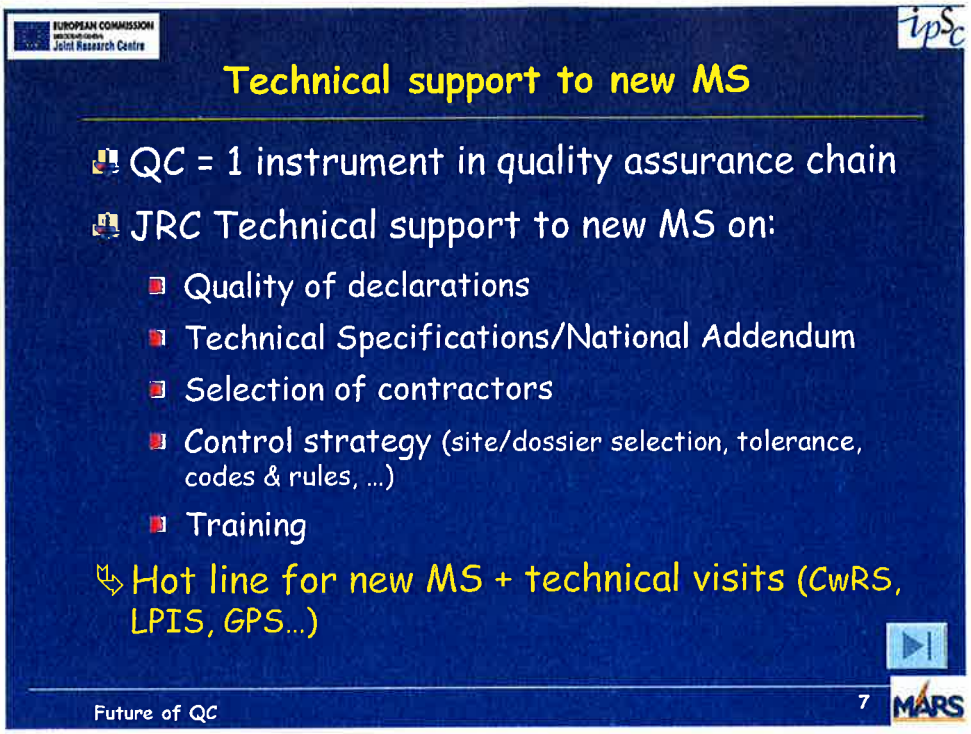
Should be DD

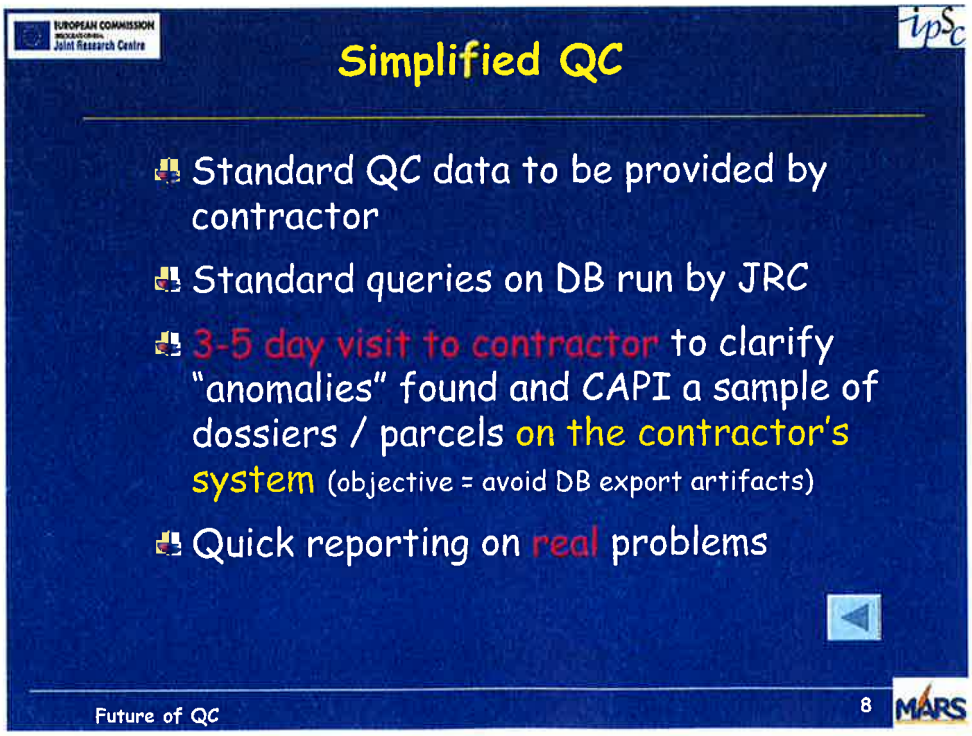
Future of QC 5

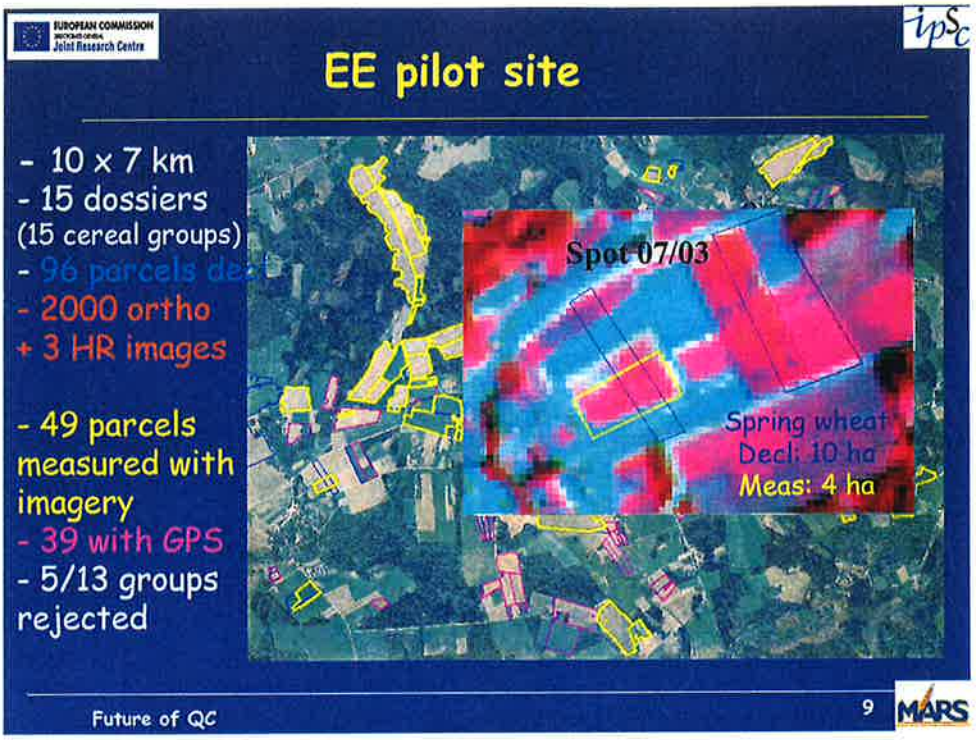
Evolution of QC for 2003 & 2004 campaigns

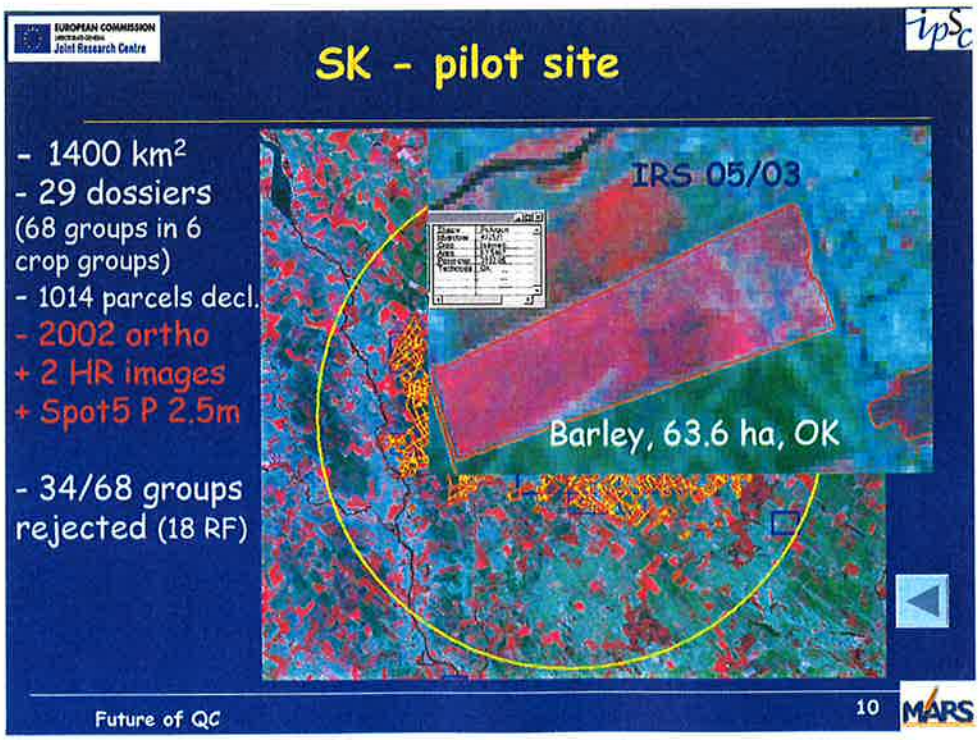
- Up to now, QC made by JRC in support to 13-14 MS
- As from 2004, need to **focus on 10 new MS**
- Change in JRC strategy:
  - **Simplified QC** to speed up results
  - **Time to transfer QC to "old" MS ?**
    - some QC already performed by some MS (e.g. PT, FR, UK)
  - Delivery of QC data still requested for examination of particular issues
  - Support to MS through **training** -> any request ?

Future of QC 6


Technical support to new MS
QC = 1 instrument in quality assurance chain
JRC Technical support to new MS on:
Quality of declarations
Technical Specifications/National Addendum
Selection of contractors
Control strategy (site/dossier selection, tolerance, codes & rules, ...)
Training
Hot line for new MS + technical visits (CwRS, LPIS, GPS...)
Future of QC
7


Simplified QC
Standard QC data to be provided by contractor
Standard queries on DB run by JRC
3-5 day visit to contractor to clarify "anomalies" found and CAPI a sample of dossiers / parcels on the contractor's system (objective = avoid DB export artifacts)
Quick reporting on real problems
Future of QC
8


EUROPEAN COMMISSION
Joint Research Centre
EE pilot site
- 10 x 7 km
- 15 dossiers
(15 cereal groups)
- 96 parcels de
- 2000 ortho
+ 3 HR images
- 49 parcels measured with imagery
- 39 with GPS
- 5/13 groups rejected
Spot 07/03
Spring wheat
Decl: 10 ha
Meas: 4 ha
Future of QC
9
MARS


EUROPEAN COMMISSION
Joint Research Centre
SK - pilot site
- 1400 km²
- 29 dossiers
(68 groups in 6 crop groups)
- 1014 parcels decl.
- 2002 ortho
+ 2 HR images
+ Spot5 P 2.5m
- 34/68 groups rejected (18 RF)
IRS 05/03
Barley, 63.6 ha, OK
Future of QC
10
MARS

Mission of JRC

The mission of JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference center of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

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