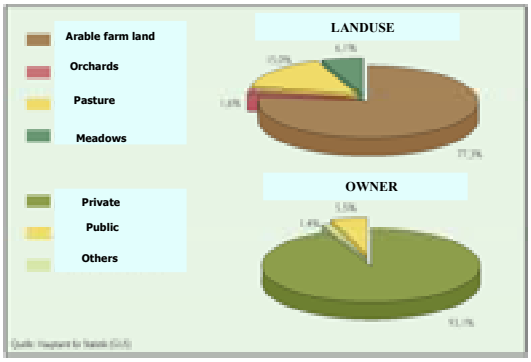
Introduction (4)

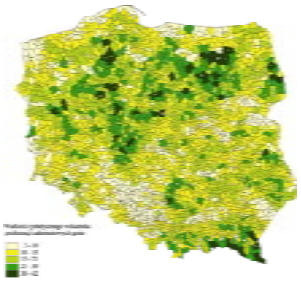
Landuse and characteristics of Polish agriculture



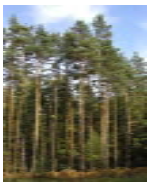
Quality of agricultural soils

Introduction (5)

Forest cover changes in Poland:
Year 1820: area 38%;
Year 1945: area 20.8%;
Year 1970: area 27%;
Year 2004: area 28.6% (8.94 mln ha)

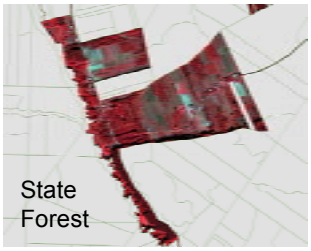


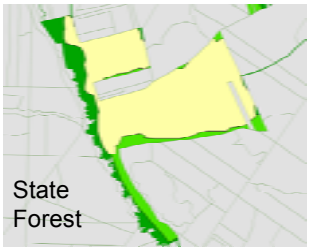
- National Plan on the Augmentation of Forest Cover in Poland
- An increament is planned up to **30%** in the year 2030 till **33%** in 2050.




CORINE Land Cover 2000

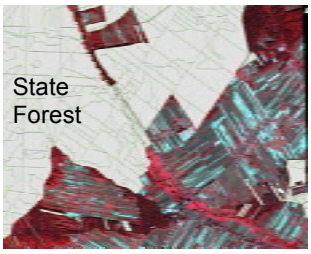
Poland

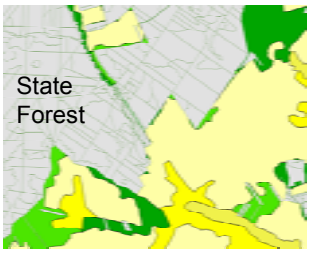




Forest cover:

CORINE = 29,76%
GUS (PL) = 28,4%
Difference = 1,3%
~ 4.064 km^2





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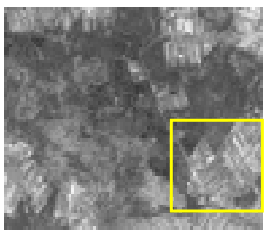
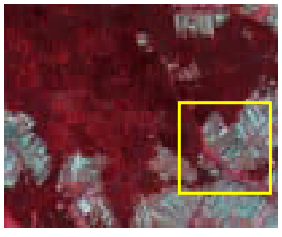
Test area and VHR Data

- South Poland
- Swietokrzyskie Voivodship
- Staszow municipality (Powiat)
- Mostki cadastre map - raster
- QuickBird data
  MS + PAN 15.09.2003



QB PAN



QB 432_PAN

QB 321_PAN

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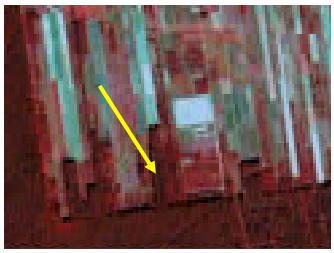
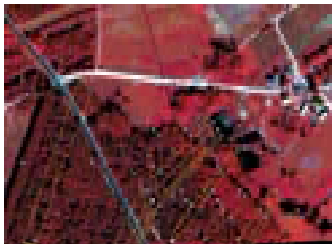
Problems

Cadastre maps are not up to date



Cadastre maps are inaccurate



Orthophoto 1:13.000

QuickBird 432_PAN

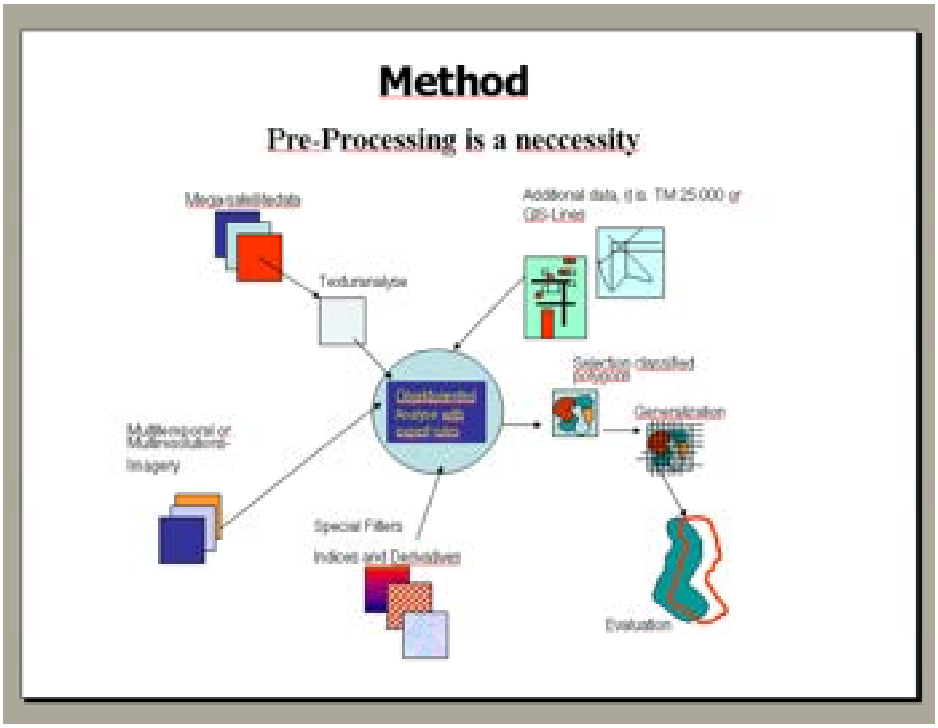
Succession (1)

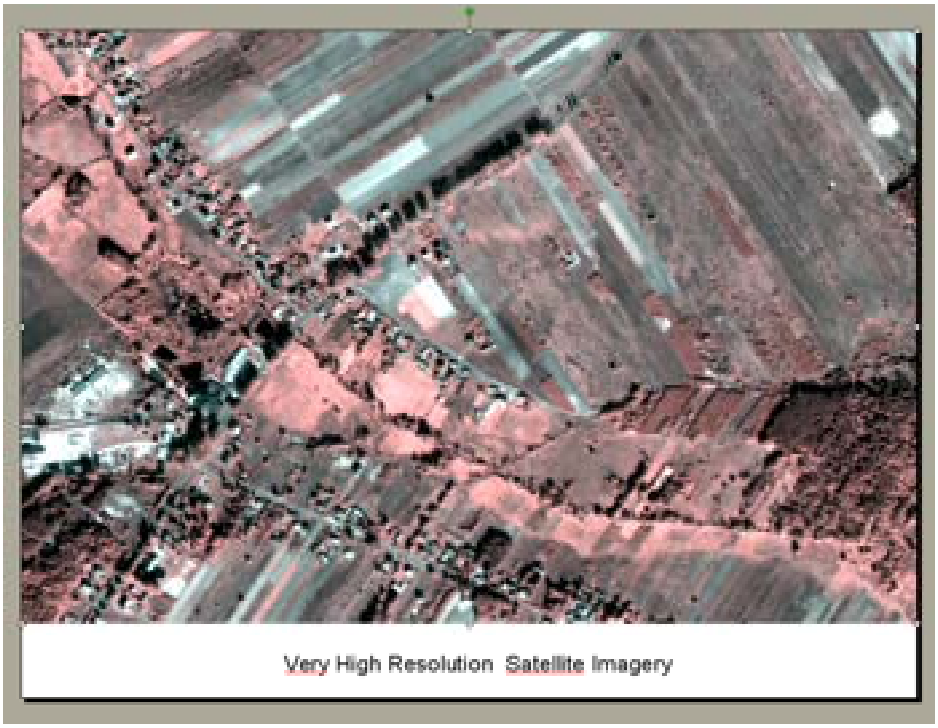
Succession (2)

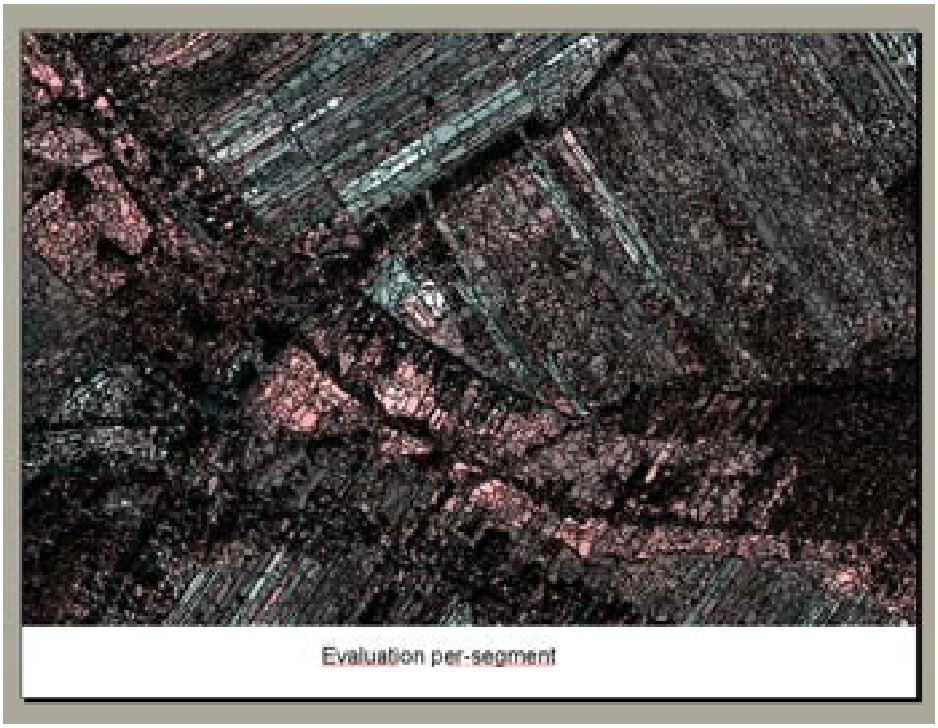




Succession (3)

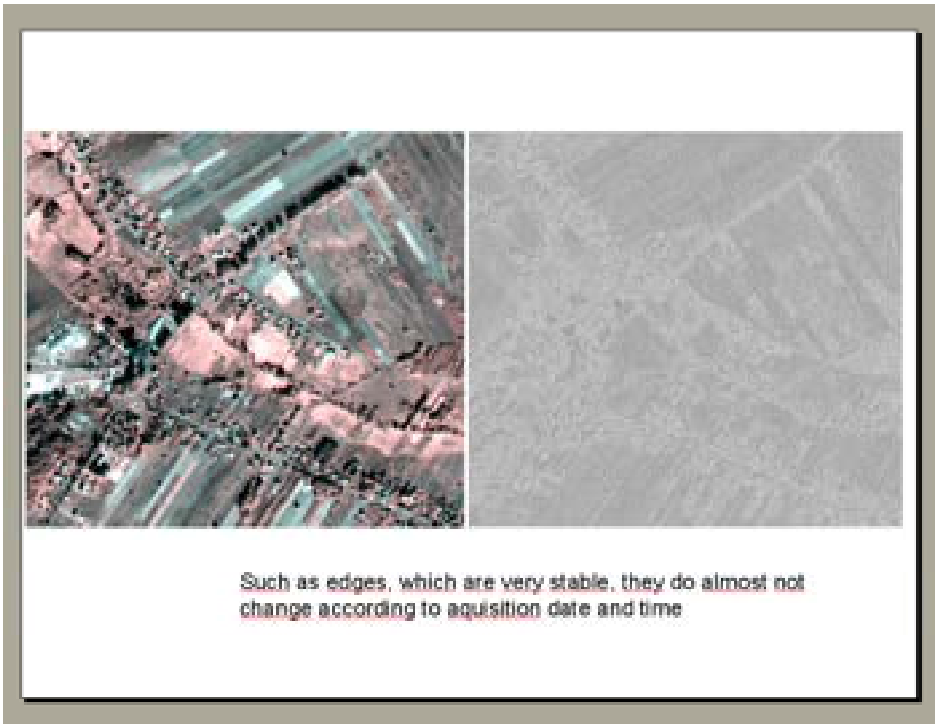


Method
Pre-Processing is a neccessity
Mega-satellitedata
Additional data, (i.e. TM 25.000 gr
GIS-Lines)
Textureanalyse
Selection classified
Generalization
Multitemporal or
Multiresolutions
Imagery
Special Filters
Indices and Derivatives
Evaluation

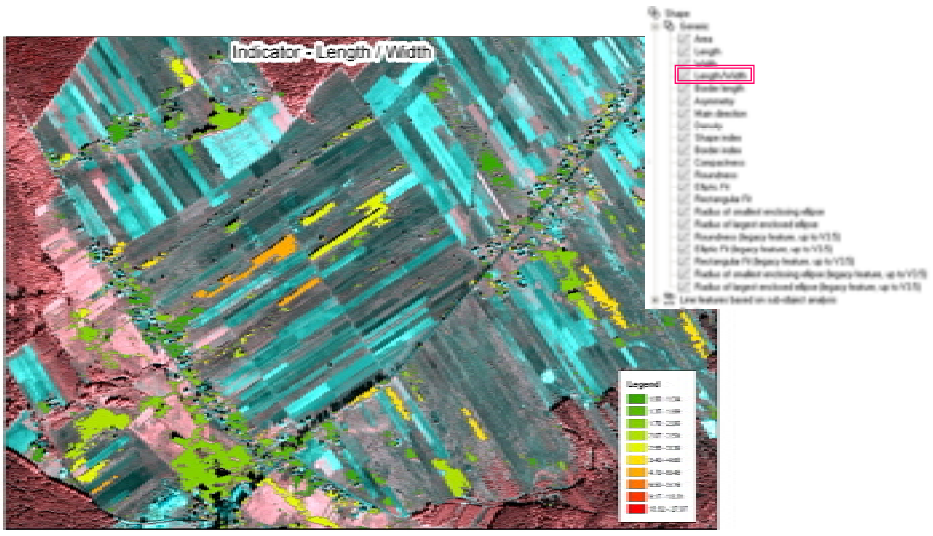

Very High Resolution Satellite Imagery

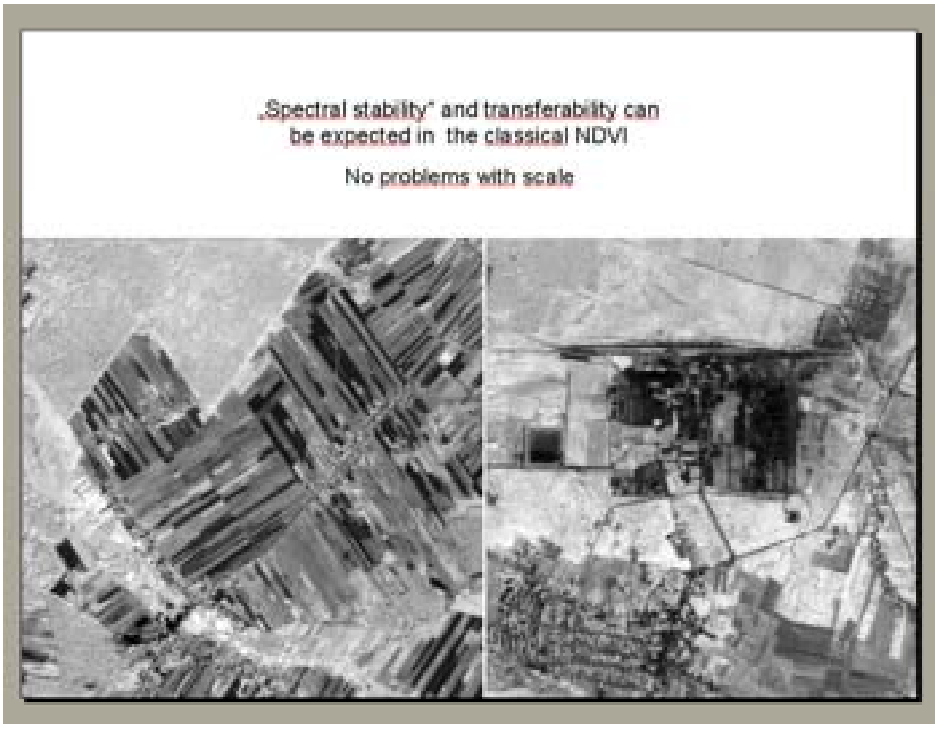

Evaluation per-segment

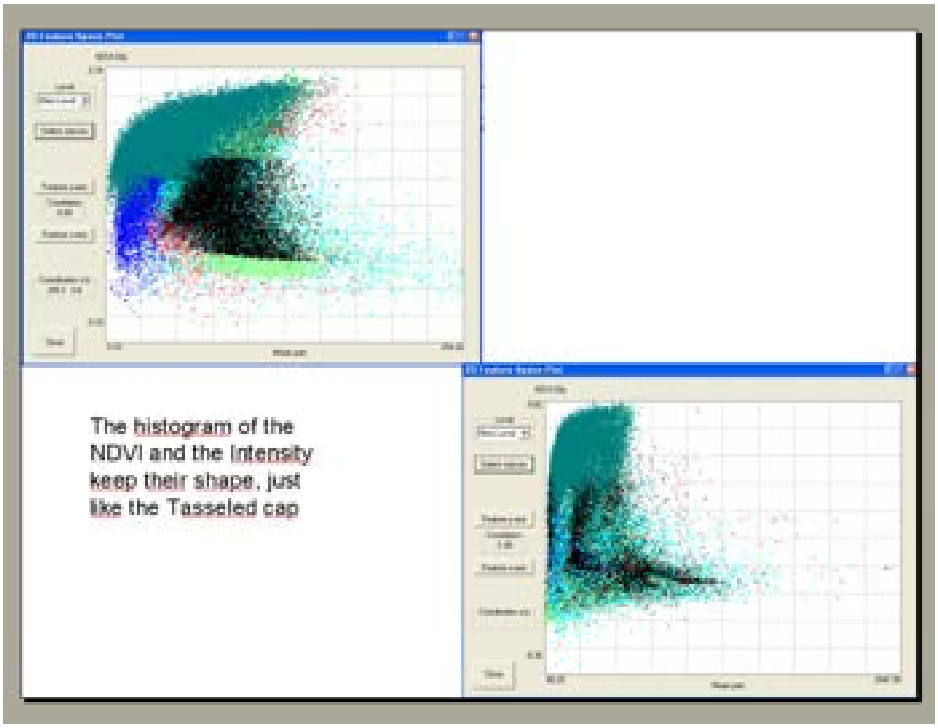

Not only using mean-spectral-values

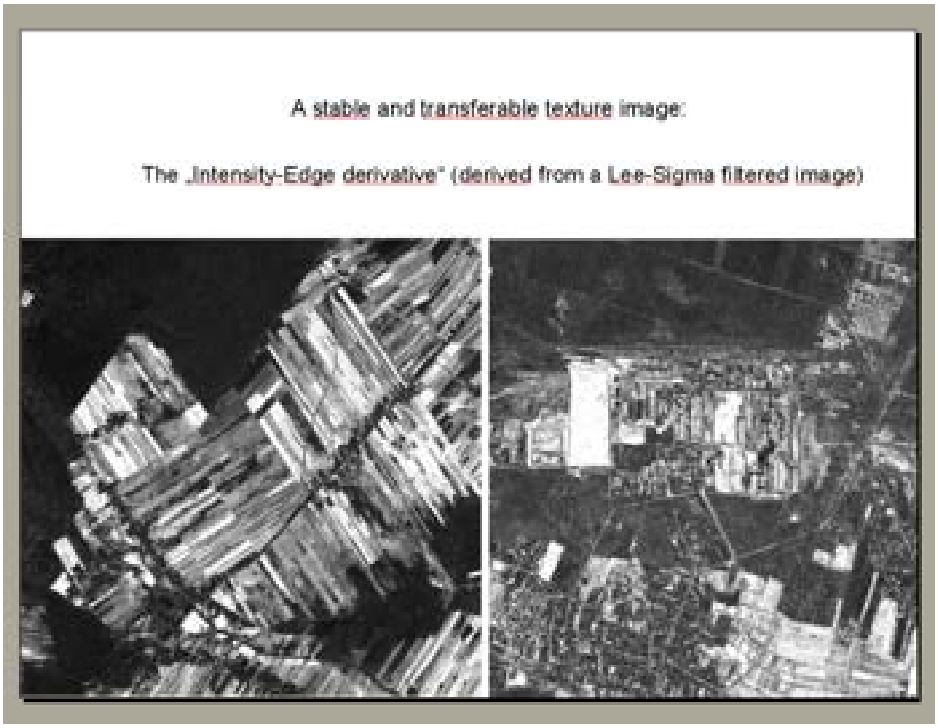

But also Variance and many others

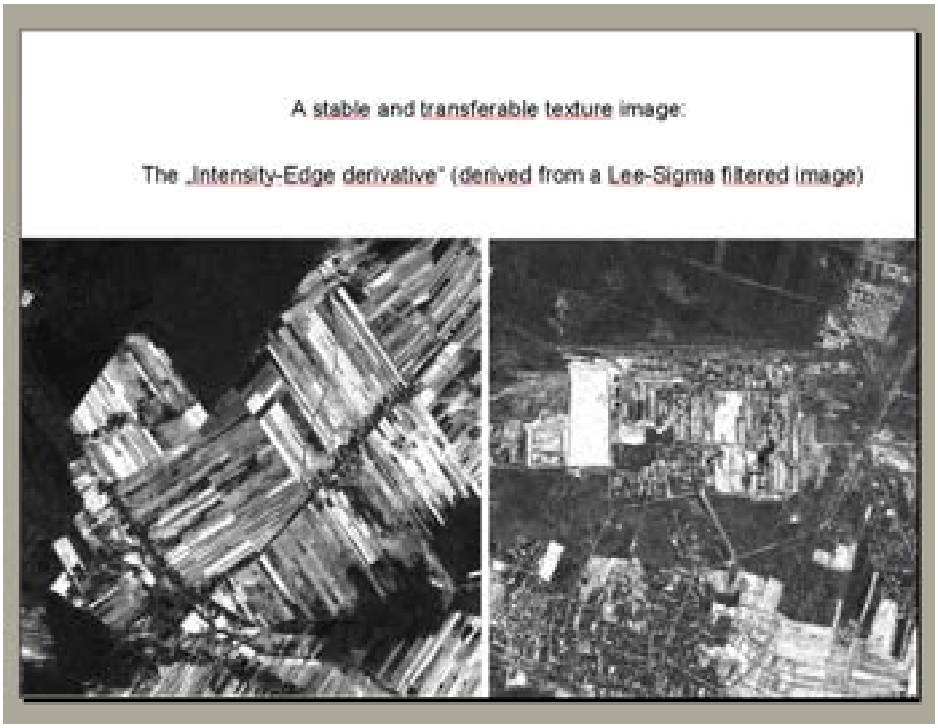

Such as edges, which are very stable, they do almost not change according to aquisition date and time

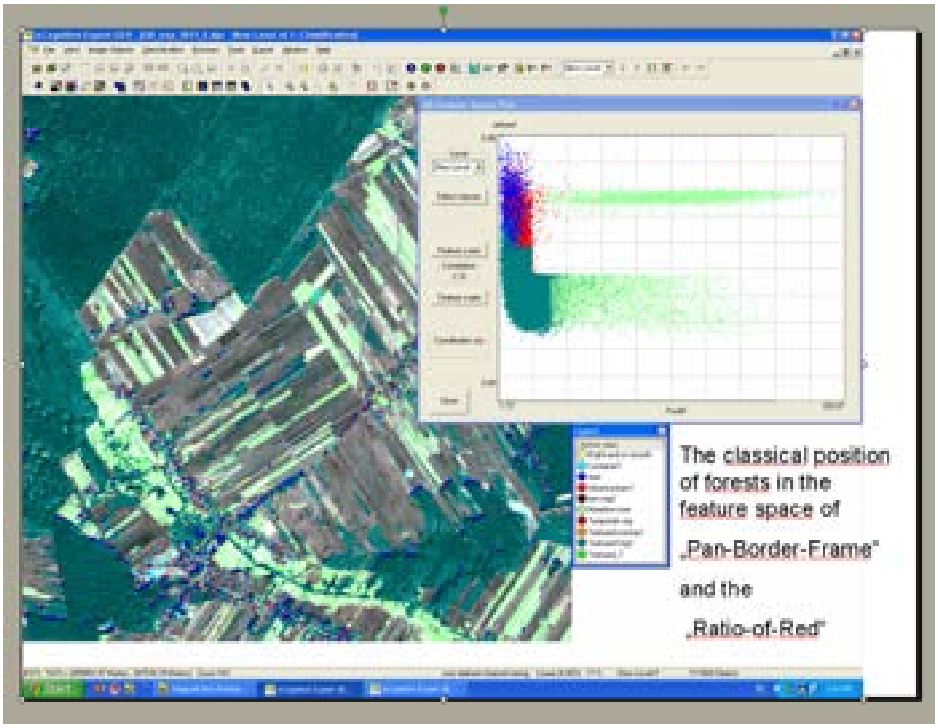

Indicator - Length / Width

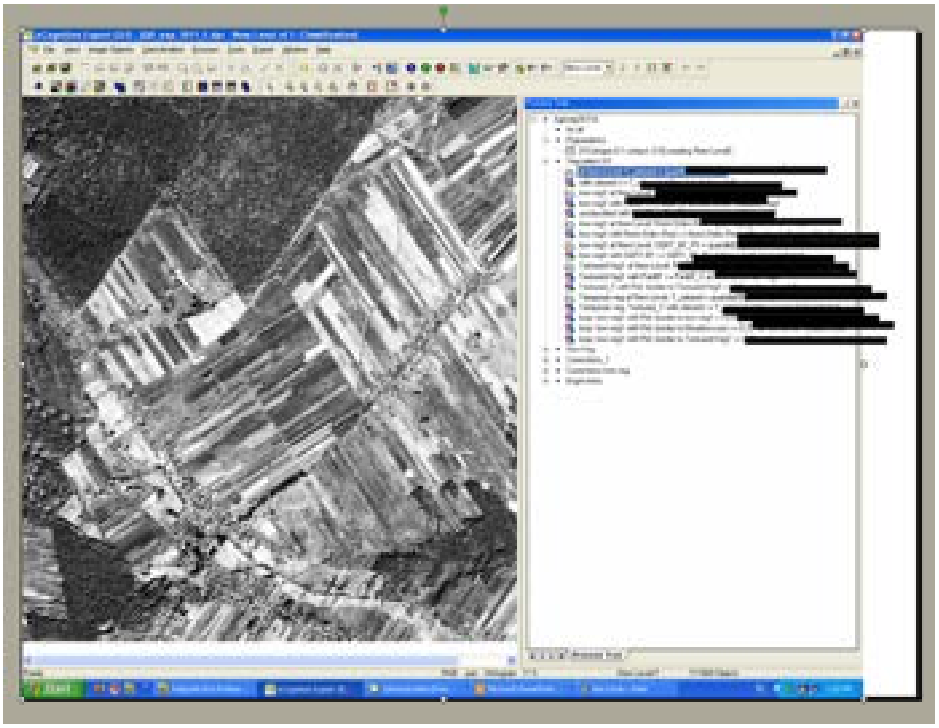

„Spectral stability" and transferability can
be expected in the classical NDVI
No problems with scale

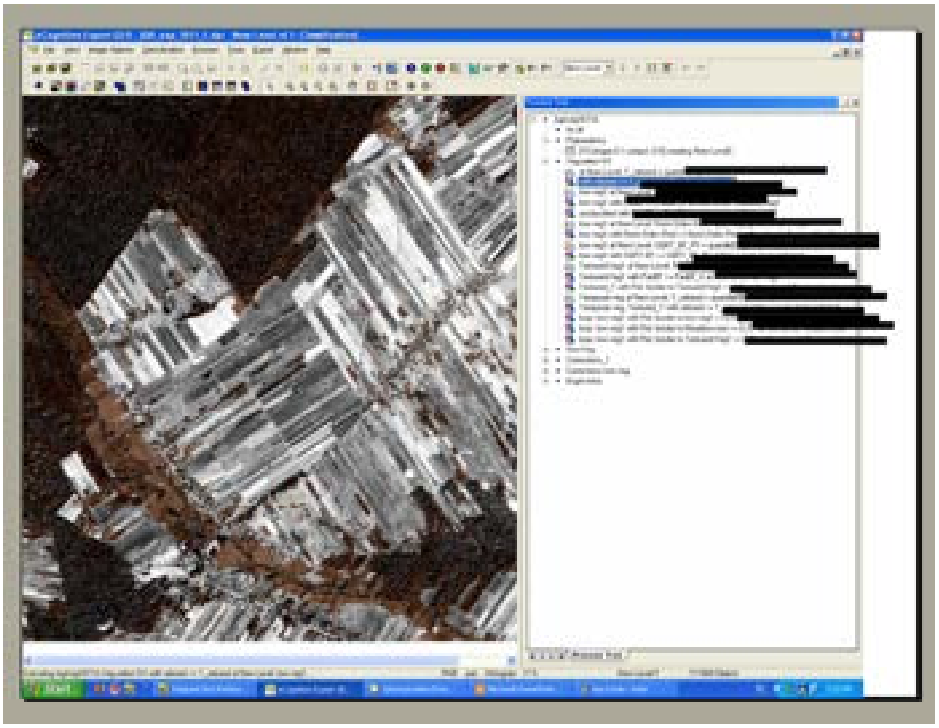

The histogram of the
NDVI and the Intensity
keep their shape, just
like the Tasseled cap

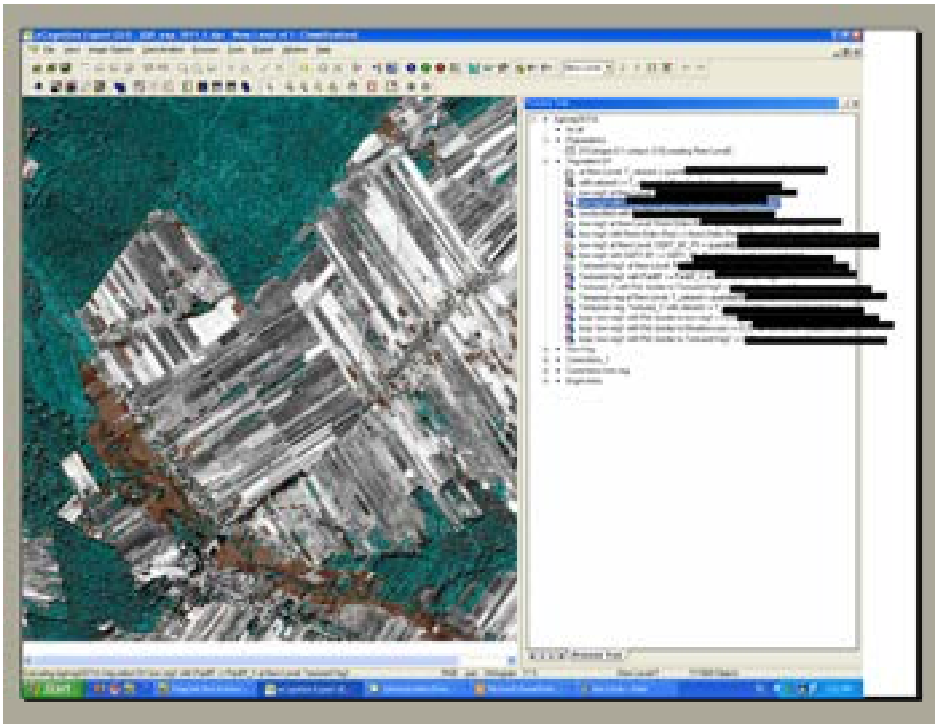

A stable and transferable texture image:
The „Intensity-Edge derivative" (derived from a Lee-Sigma filtered image)

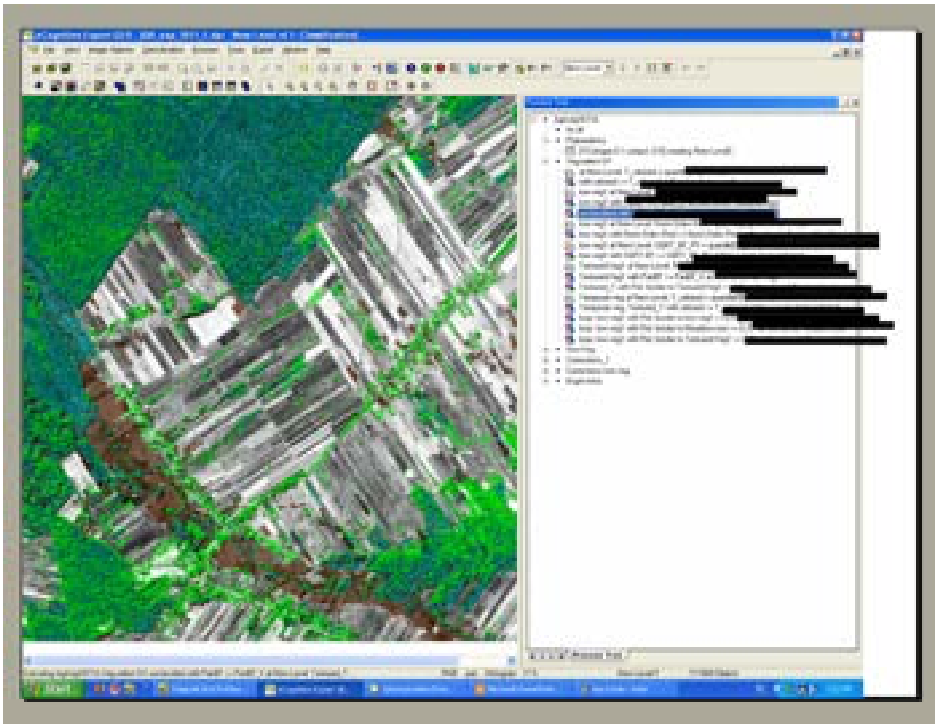

A stable and transferable texture image:
The „Intensity-Edge derivative" (derived from a Lee-Sigma filtered image)

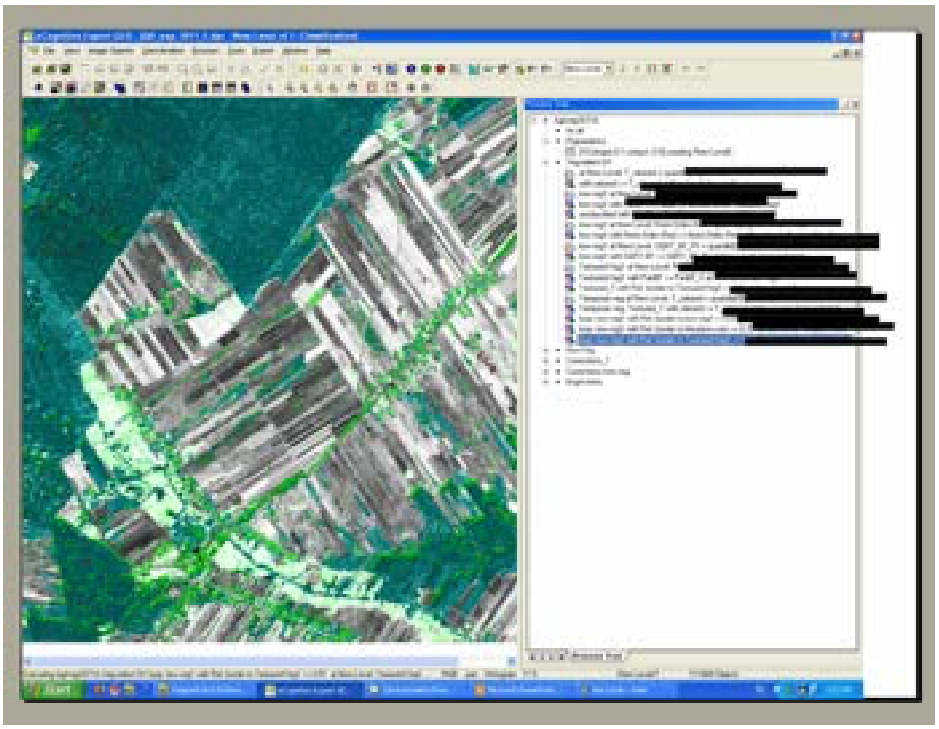

The classical position of forests in the feature space of
„Pan-Border-Frame"
and the
„Ratio-of-Red"

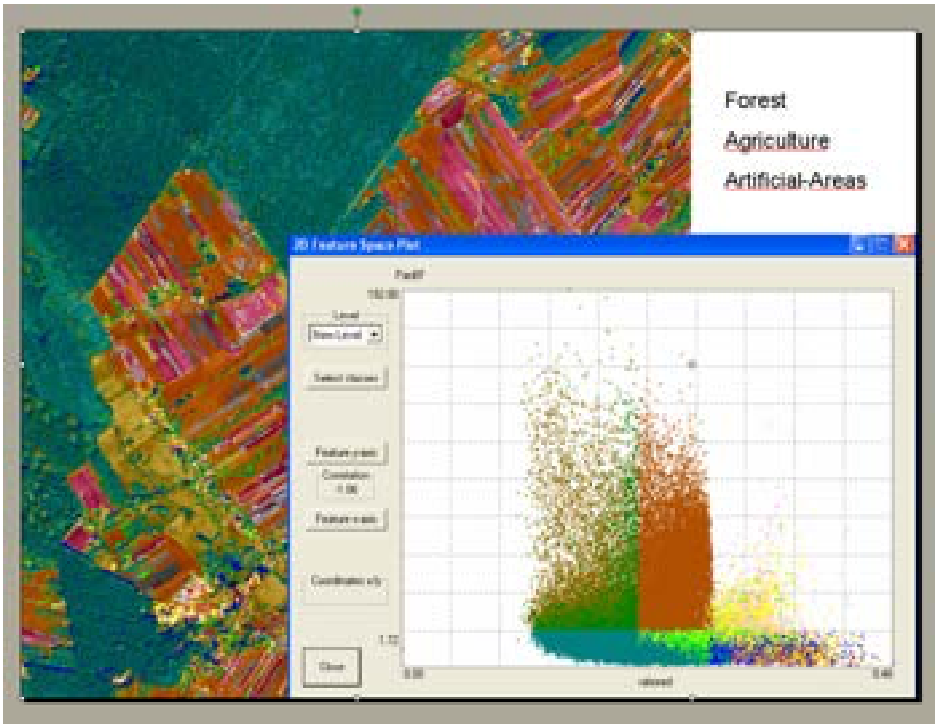


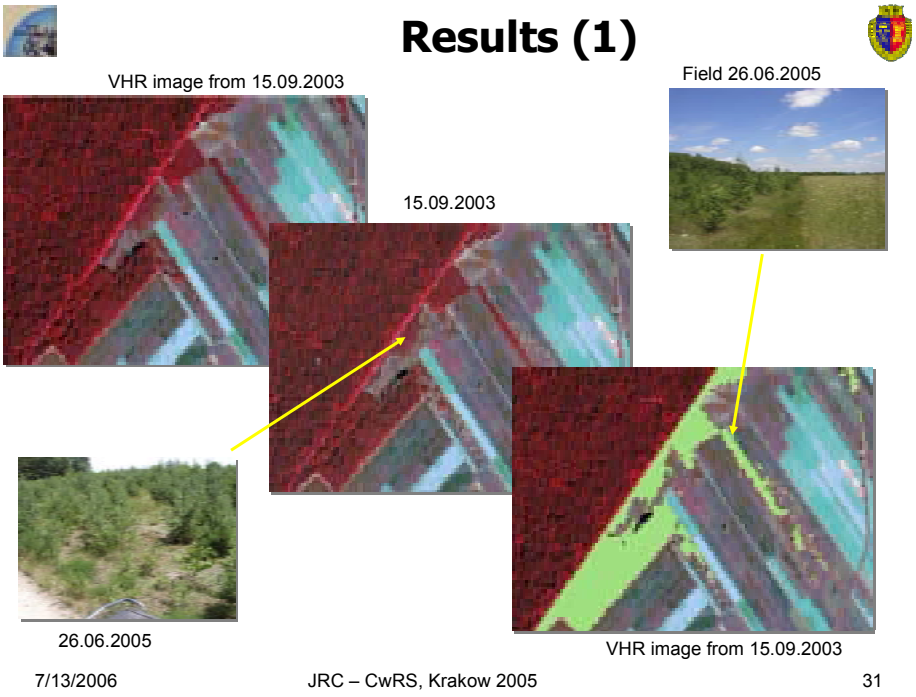


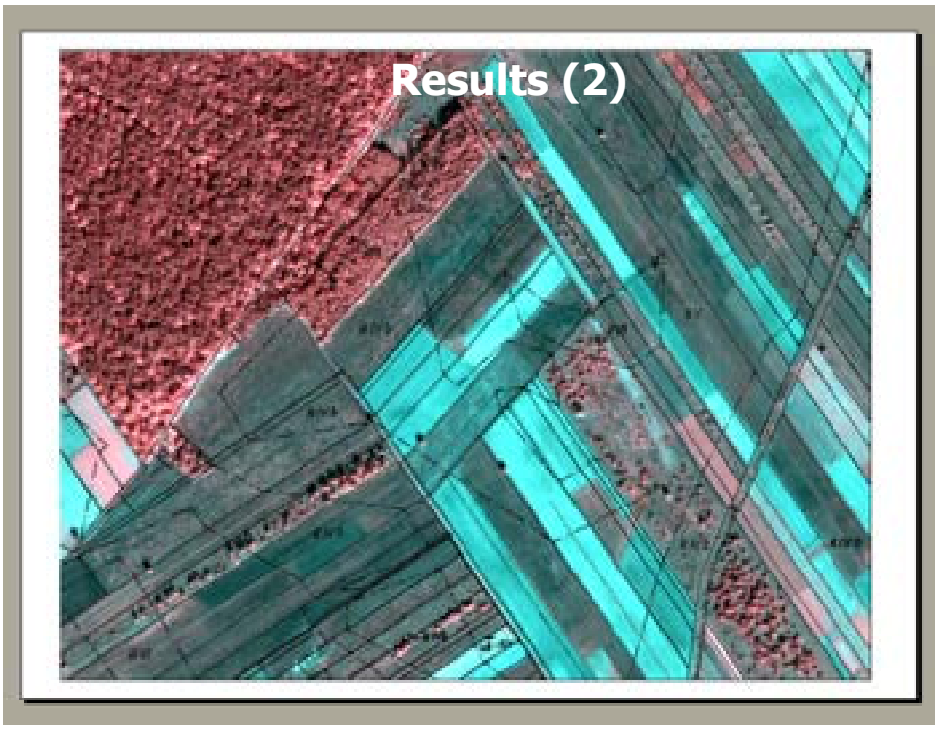




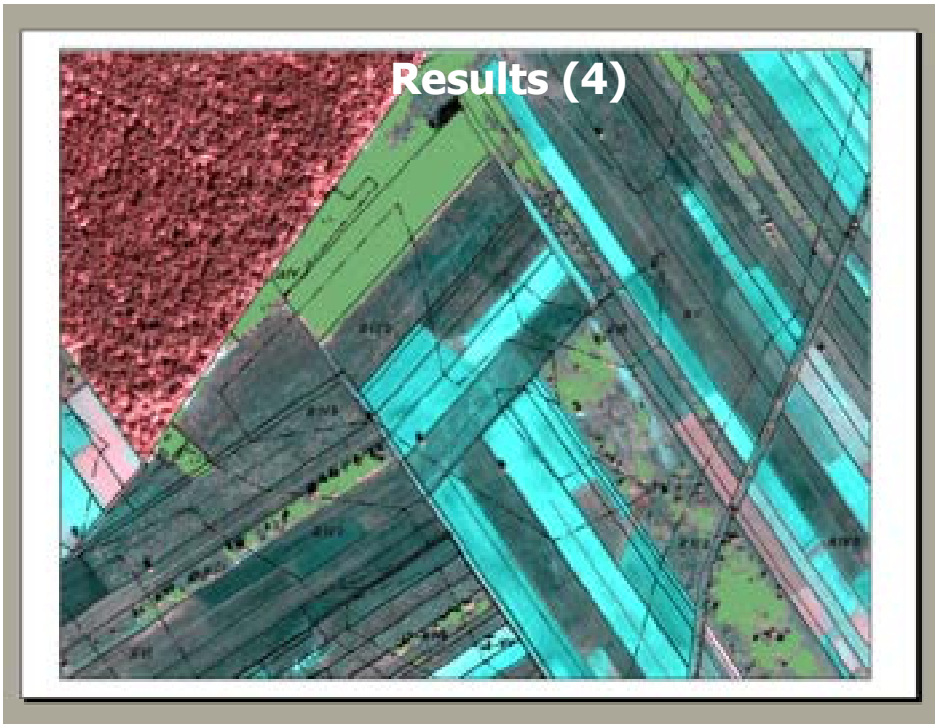



Forest
Agriculture
Artificial-Areas


Results (1)
VHR image from 15.09.2003
Field 26.06.2005
15.09.2003
26.06.2005
VHR image from 15.09.2003
7/13/2006
JRC – CwRS, Krakow 2005
31

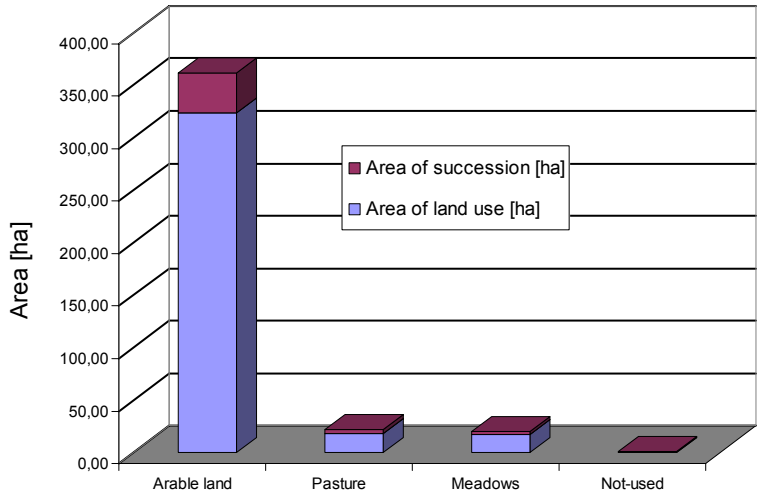

Results (2)


Results (3)


Results (4)

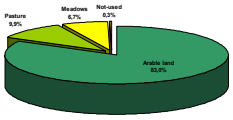
Results (6)

Structure of the test site in Staszow



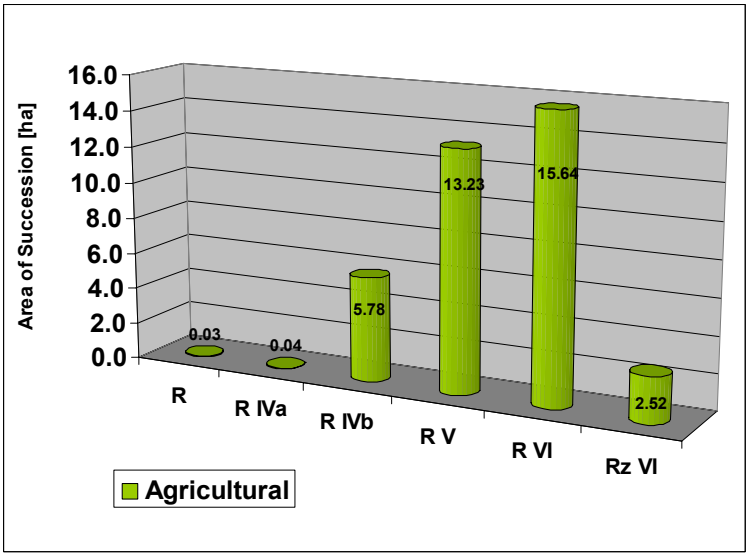
Results (7)

Land use	Area of land use [ha]	Area of succession [ha]	Precentage of succession	Distribution of succession [%]
Arable land	360,84	37,24	10,3%	83,0%
Pasture	22,06	4,46	20,2%	9,9%
Meadows	20,13	3,03	15,0%	6,7%
Not-used	0,32	0,14	43,9%	0,3%
SUM	**403,35**	**44,87**	**11,1%**	



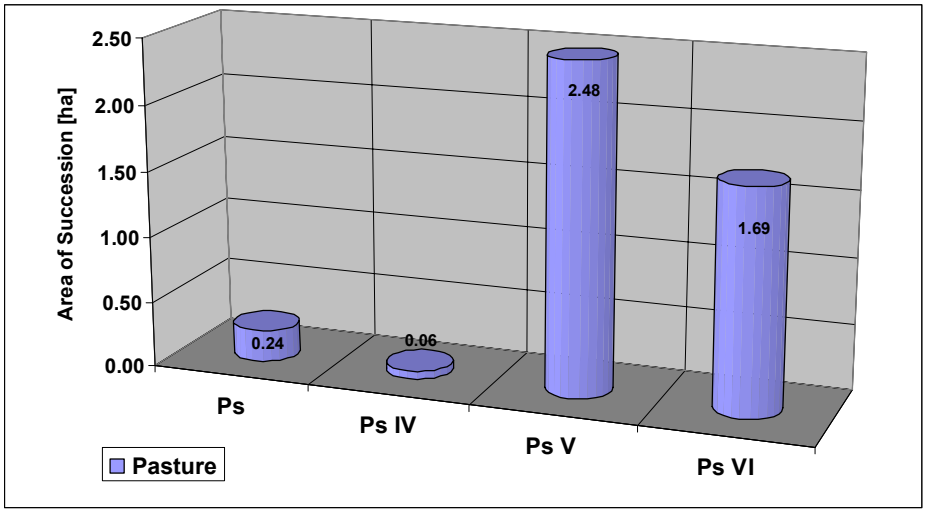
Results (8)

Succession on arable land



Results (9)

Succession on Pastures



EU subsidies

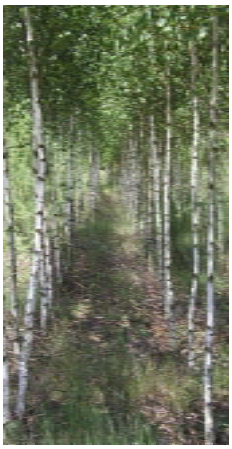
Payment of equivalents for afforestations on previous agricultural land

Valid only when development plan is available

- **Subsidies for afforestation and game protection (from 1.000 up till 1.500 € /ha/year);**
- **Maintainance for 5 first years (from 100 to 250 € /ha/year);**
- **Afforestation bonus as compensation for putting the arable land on „non-active“ (up to 300 € /ha/year)**

July 2005:
- 4.245 applications registered
- 17.375 ha of afforestations

after http://www.arimr.gov.pl



Conclusions

- The integration of VHR satellite data processing with other GI techniques is unavoidable in the construction of the AICS/ LPIS/ Cadaster;
- Object oriented classification of VHR satellite image allows full-automatic work-flow;
- An image classification method that replaces „Training & Test Areas" with an „Histogramm-Sampling" technique, shows preadvantages in stable and transferable classification protocols;
- Modernization of cadastre (GIS; geometry and attributes) is necessary and techincal possible.

Ungoing experiments

Polyline simplification

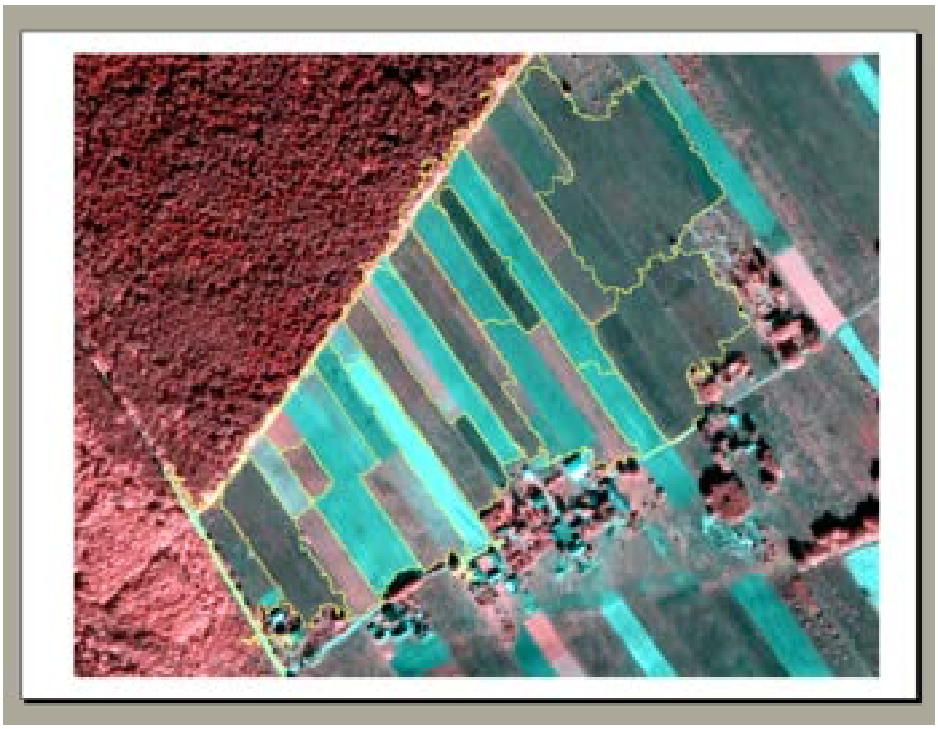
To simplify polylines, which were made in classification process, two combined methods were used:

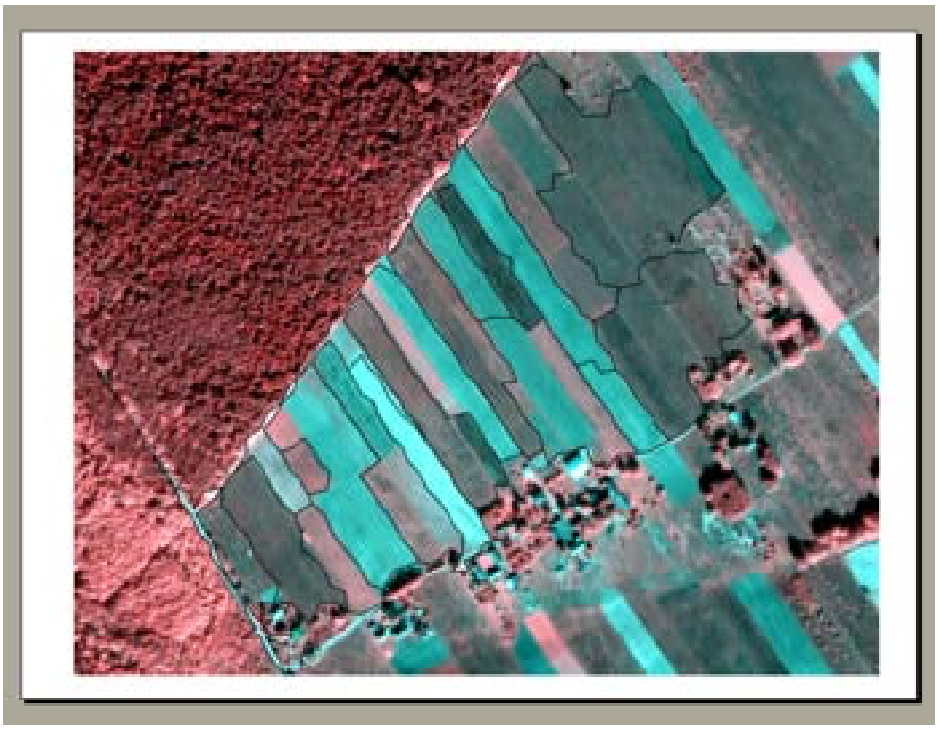
- for the purpose of polyline vertices reduction input polylines were simplified using cartographic line generalization method – the **Chrobak** method. It is the objective quantitative method, which uses the elementary triangle properties to reduce polyline vertices number.
- obtained polylines were simplified further on – the vertices with **sinuosity values** more then 1.1 were removed.

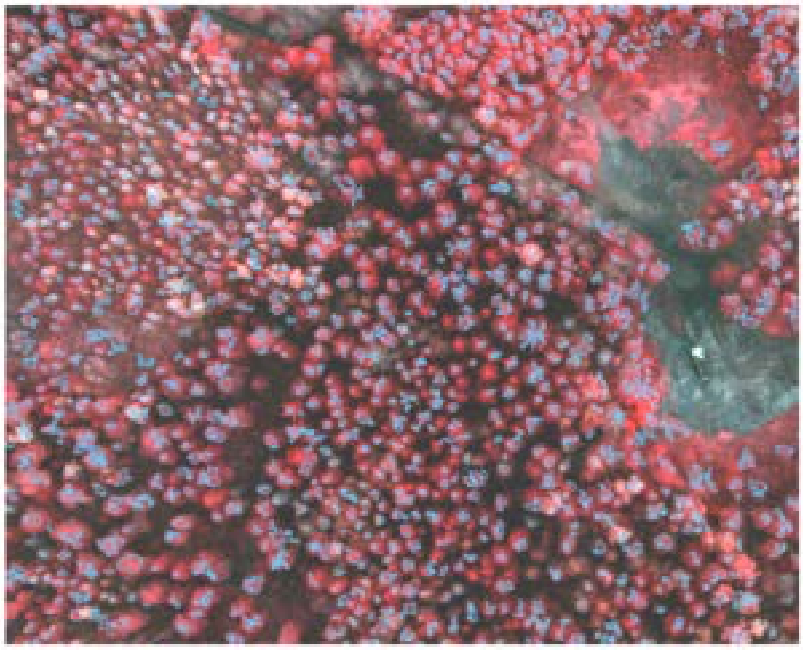
References:

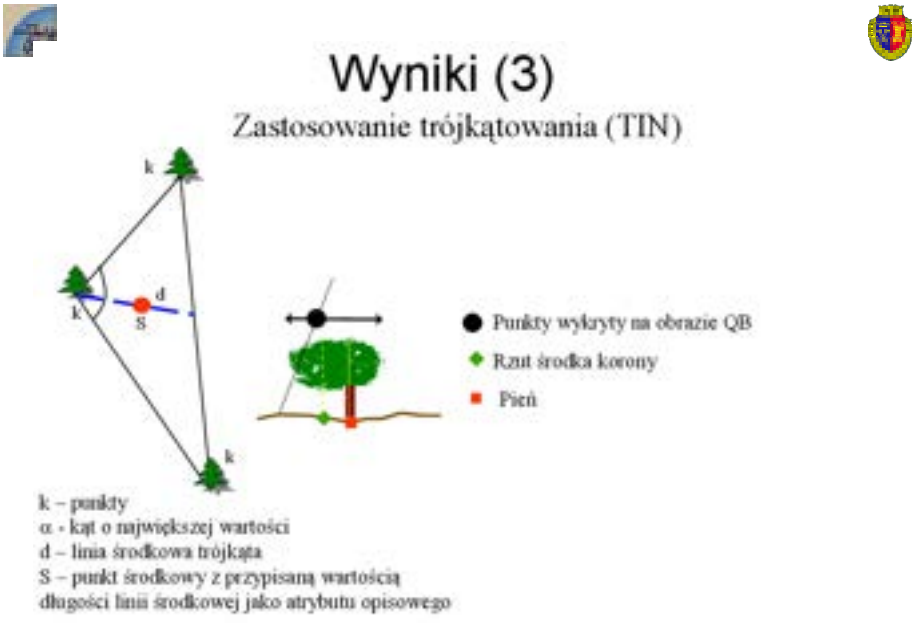
1. Chrobak, T.: *An investigation of* **elementary** *triangle usefulness for computer cartographic generalization*. Kraków, UWND AGH 1999
2. Dutton, G.: *Scale, Sinuosity, and Point Selection in Digital Line Generalization*. **Cartography and Geographic Information Science**, Vol. 26, No 1, 1999

Made by:
Marta Żukowska, Department of Geodesy and Cartography, Faculty of Mining Surveying and Environmental Engineering, AGH, Kraków








Wyniki (3)
Zastosowanie trójkątowania (TIN)
k
d
S
k
k
Punkty wykryty na obrazie QB
Rzut środka korony
Pień
k – punkty
α - kąt o największej wartości
d – linia środkowa trójkąta
S – punkt środkowy z przypisaną wartością
długości linii środkowej jako atrybutu opisowego

Acknowledgement

Thanks to:

**Forest Research Institute, Warsaw and
Polish State Forest Holding**

Presentation 5 – GEOPORTAL.GOV.PL The GIS tool for on-line update of the LPIS in Poland

Ryszard Preuss, Janusz Dygaszewicz,
Head Office of Geodesy and Cartography, PL

Abstract

The Land Parcel Information System in Poland is being created taking into account an assumption that source data originate from the real estate cadastre system. At present, data bases of this system are scattered throughout above 490 locations because they are run on the district level and in few cases on the communal level. These bases are run on the basis of software of a different quality and produced by different software developers. The present status of the real estate cadastre as well as courses of actions undertaken in order to achieve targeted digital form of data, its standardization and integration on the central level aimed at direct data exchange with other central public registers will be presented in the following report. The results achieved up to now in this scope and the results achieved in this scope in the frameworks of the Phare programs co-financed from the E.U. sources will be presented. There will also be presented a program of actions for 2005-2007 leading to full integration of data on the central level in the Integrating Electronic Platform (IPE) through creation of replica source data bases administered by districts, creation of IT tools to share these data with institutional entities and interested citizens. This solution named geoportal.gov.pl will enable to serve on-line geodetic-cartographic data of different types and levels of detail as: cadastral data, principal maps, topographic bases, NMT, orthophotomaps etc. Cadastral data will constitute one of first types of geodetic data shared in this service to be available just in 2007. An application, which will maintain data sharing for institutional entities such as Agency for Restructuring and Modernisation of Agriculture (ARMA), will generate data in form and thematic scope adjusted to requirements of such recipient – in this case for the LPIS system. Hence, conditions for a system update of the LPIS data base using cadastral data will have been created by the end of 2007 and in 2008 it will have been possible to share on-line data via an intranet network of GEOPORTAL.

Keywords: Integrated Electronic Platform, IACS, State Integrated Cadastral System, LPIS, cadastral data, actualization, data feeding, GEOPORTAL, INSPIRE, GIS, Land and Building Register, Land and Mortgage Register, Taxation, mass appraisal ,WAN, Intranet, Internet, online data exchange

GEOPORTAL.GOV.PL
The GIS tool for on-line actualization of the LPIS in Poland

Kraków, 23-25 November 2005

Ryszard Preuss
Janusz Dygaszewicz

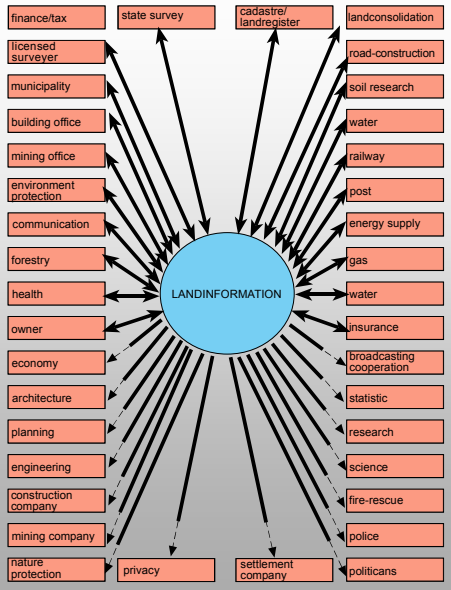
Why cadastral data - Advantages of Cadastral Systems

- Legal guarantee of rights
- Efficient service for customers
- Complete covering of all area of competence
- Comprehensive, reliable, and secure system
- Computerized system, digital data
- System serves also other functions (GIS basis etc.)
- Integration of different systems
- Organizational link between Land Register and Cadastre
- Legal basis and service
- Clear structure
  - decentralized structure
  - centralized administration (some different solutions in Poland)

•Local demands, flexibility to market, integration of private sector, cost-oriented system, connection to economy, aspects of profession

Demand for land information

Land information is involved in 80% of Administration activity



Agriculture – LPIS

Trends in Cadastral Systems

- Customer orientation
- Improvement of data quality (completeness)
- Improvement of data quality (up-to-dateness)
- Improvement of data quality (accuracy)
- Improvement of data quality (standardization)
- Effectiveness of cadastre
- Aspect of multipurpose cadastre
- Economic aspects of cadastre

Innovation

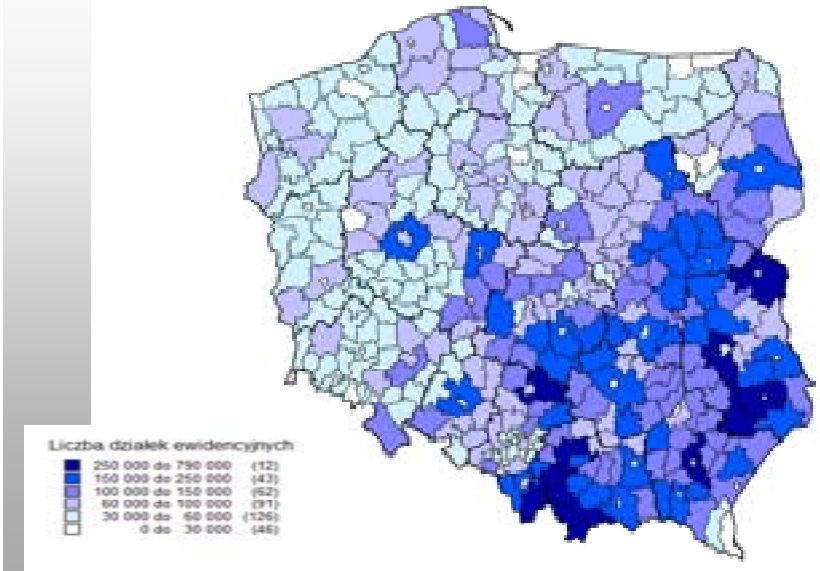
Cycles of Innovation

Hardware	2-5 years (overestimated)
Software	5-19 years (overestimated)
Manpower	10-20 years (disregarded)
Data	**> 20** years (underestimated, most important)

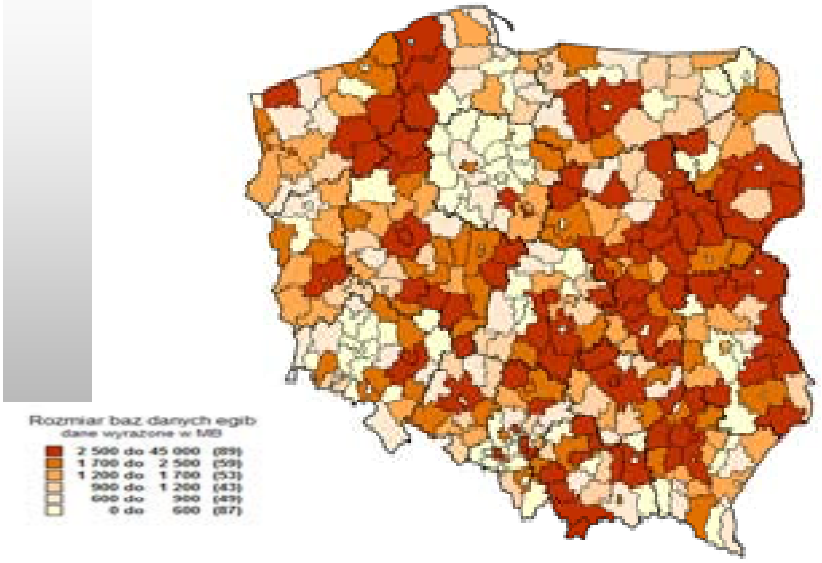
Relations of Costs

Hardware – Software – **Data** = 10 – 10 - **80**

Layout of real-estate parcels – 33 M



Layout of capacity of the Land and Buildings Register databases; MB



Capacity of the Land and Buildings Register

All together in Poland

831 316 MB (~ 1 TB)

and growing every day

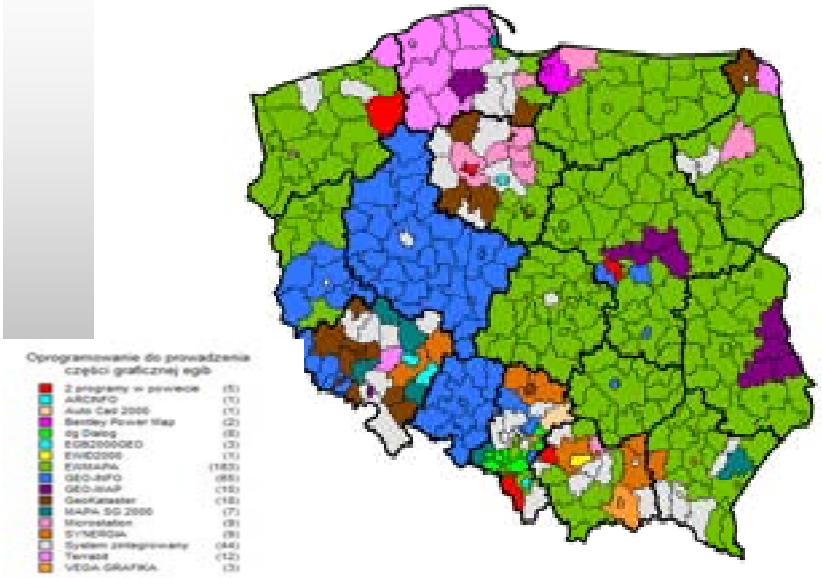
But different:

IT standard,

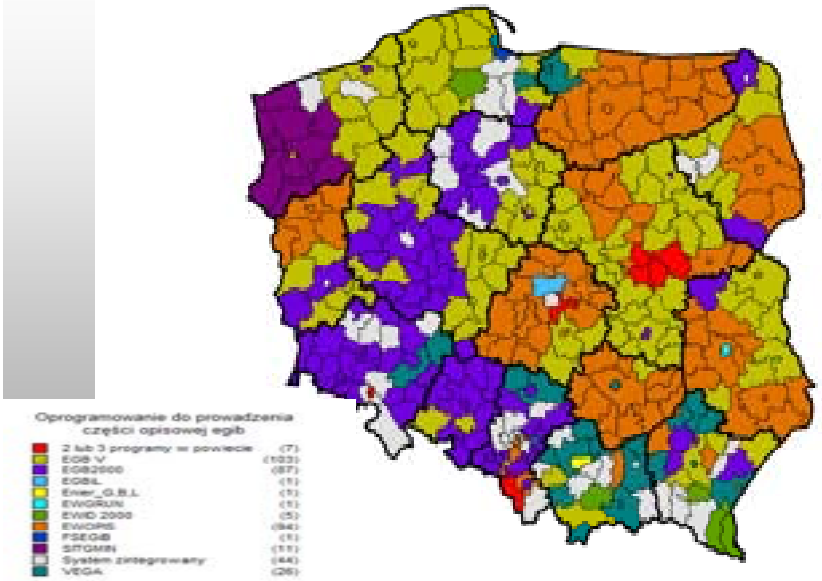
capacity

data quality

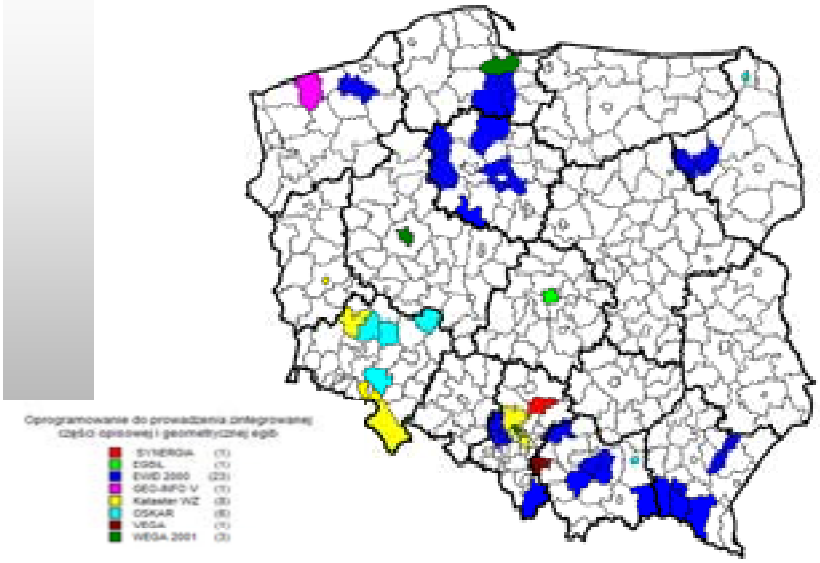
Software supporting geometric part of the Land and Buildings Register in powiats



Software supporting the text part of the Land and Buildings Register in powiats



Software supporting integrated (text and geometry) Land and Buildings Register in powiats



Phare 2000 Project (PL 0003.01)

in the 2003

"Construction of the Integrated Cadastral System (ZSK)"

"Integrating Electronic Platform
(access to Land and Buildings Register and
Exchange of Digital Data for the Integrated Cadastral System)
and
IT System Assisting Real Estate Mass Valuation",

has been constructed within the frame of the Phare 2000 Project

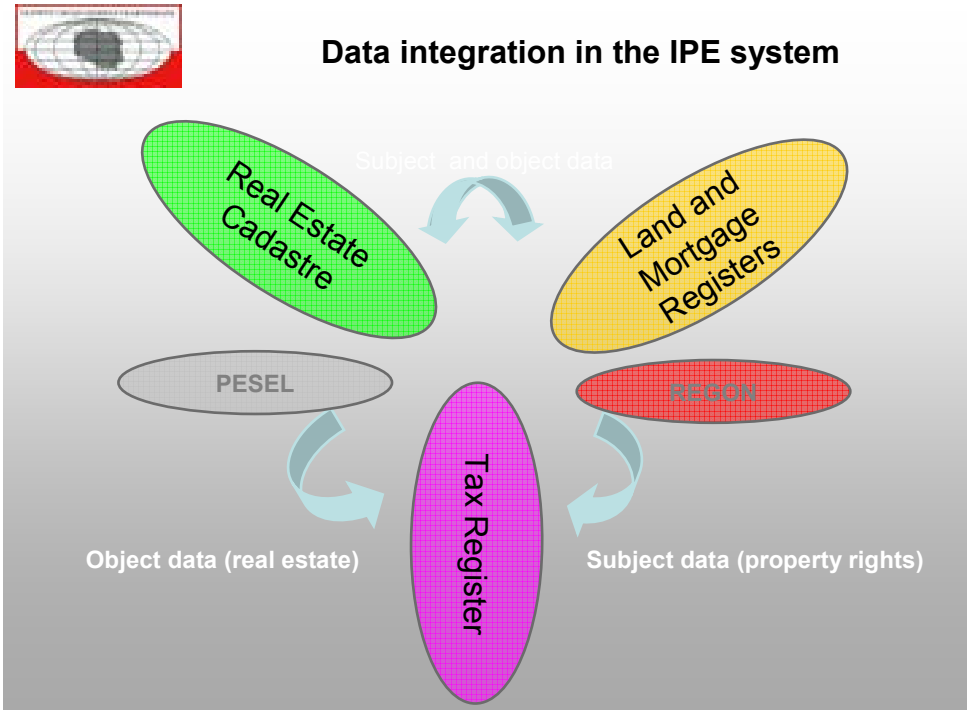
Organisations implementing the Project

- **Head Office of Geodesy and Cartography**
  in twinning cooperation with the Government of Saxony
  Implementation of component I
- **Ministry of Justice**
  in twinning cooperation with the Government of Saxony
  Project coordination and implementation of component II
- **Ministry of Finance**
  in twinning cooperation with French Ministry of Finance
- ***Implementation of component III***

Integrated Cadastral System

Basic data sets obligatory for use within the Integrated Cadastral System

- **Land and buildings register**
  (real estate cadastre)
- **Land and mortgage registers**
- **Tax register**


Data integration in the IPE system
Subject and object data
Real Estate Cadastre
Land and Mortgage Registers
PESEL
REGON
Tax Register
Object data (real estate)
Subject data (property rights)

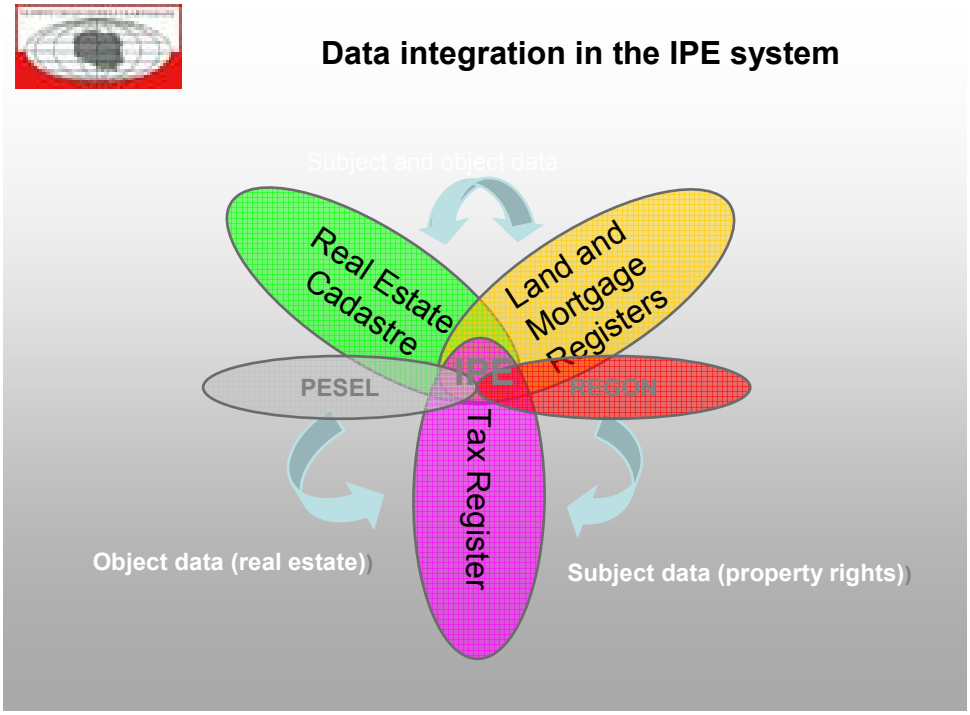
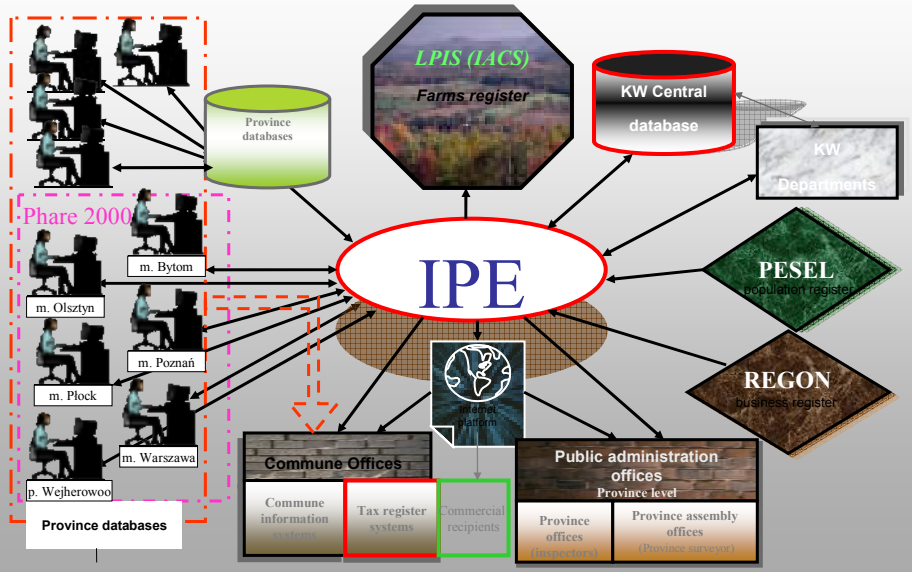

Data integration in the IPE system
Subject and object data
Real Estate Cadastre
Land and Mortgage Registers
IPE
PESEL
REGON
Tax Register
Object data (real estate)
Subject data (property rights)

Diagram showing how ZSK data resources are connected



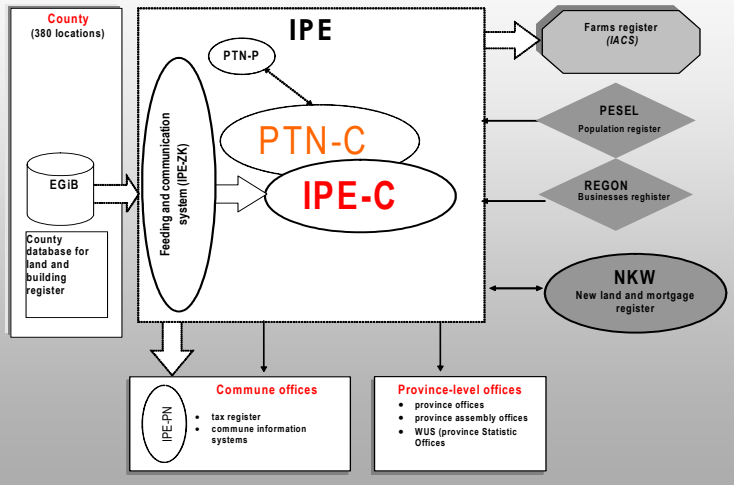
The parts of the IPE-PTN system

The IPE-PTN system comprises two principal component parts:

– IPE – Integrująca Platforma Elektroniczna (Integrating Electronic Platform)

– PTN – Powszechna Taksacja Nieruchomości (Real Estate Mass Appraisal)

Physical architecture of the IPE system



Implementing the purposes of the Phare 2000 Project

The purposes defined in the Phare 2000 project fiche (6 pilot locations) and specified explicitly in the terms of reference for the order

were implemented

before the end of 2003

Directions and stages of expansion of the IPE-PTN system

Expanding the system's scope of functioning

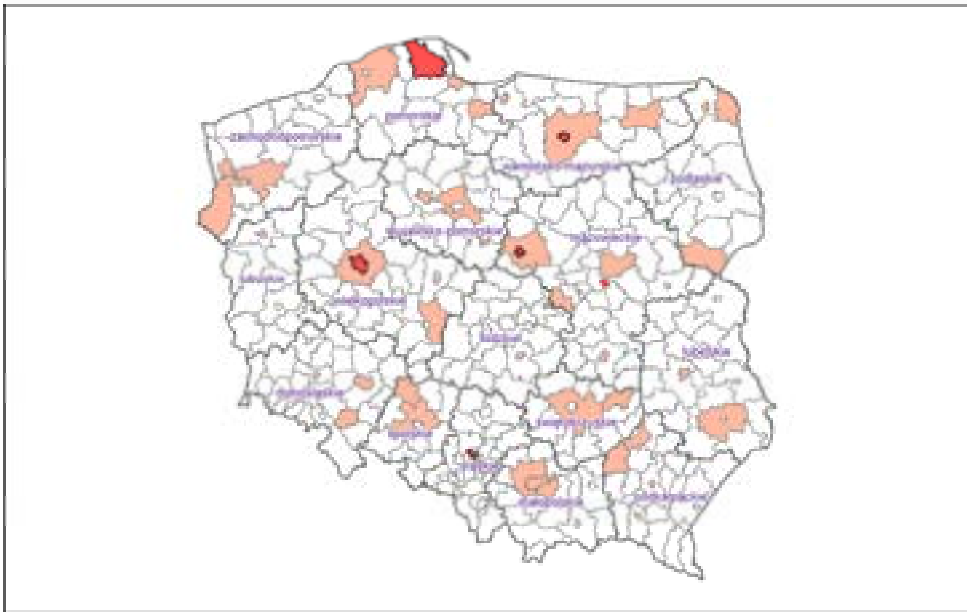
- Phare 2000 – 6 pilot counties in 2003 - finished
- Phare 2001 – 43 counties in 2004 – 2005 – finished -
  and after this:
  collected cadastral data are ready to feed the LPIS database (The first feeding from IPE has been done successfully at the beginning of this year)

next:

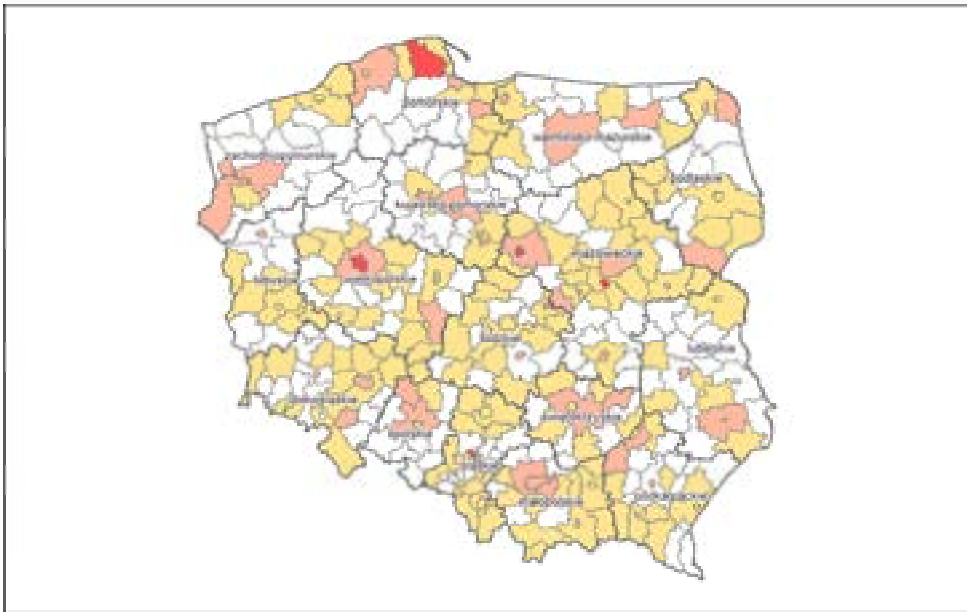
- Phare 2003 –183 counties in 2005 – 2006 under preparation
- **GEOPORTAL.GOV.PL** – will cover the last 165 counties in 2006 – 2007 – have started since July 2005

Phare 2000 - Phase I – 6 pilot locations

Phare 2001 - Phase II 49 counties

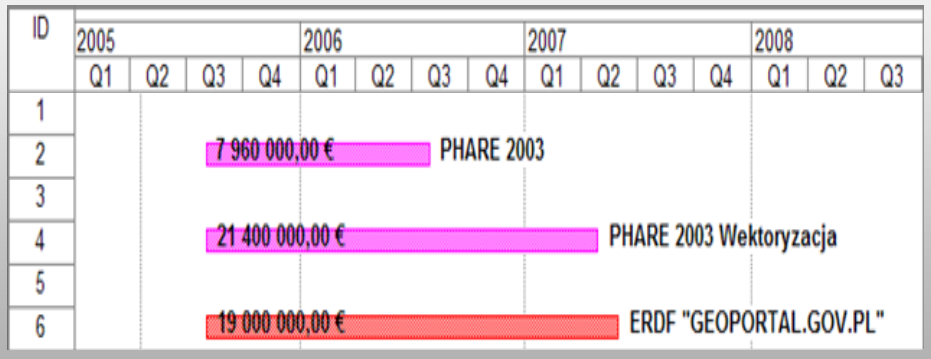


Phare 2003 - Phase III – 231 locations

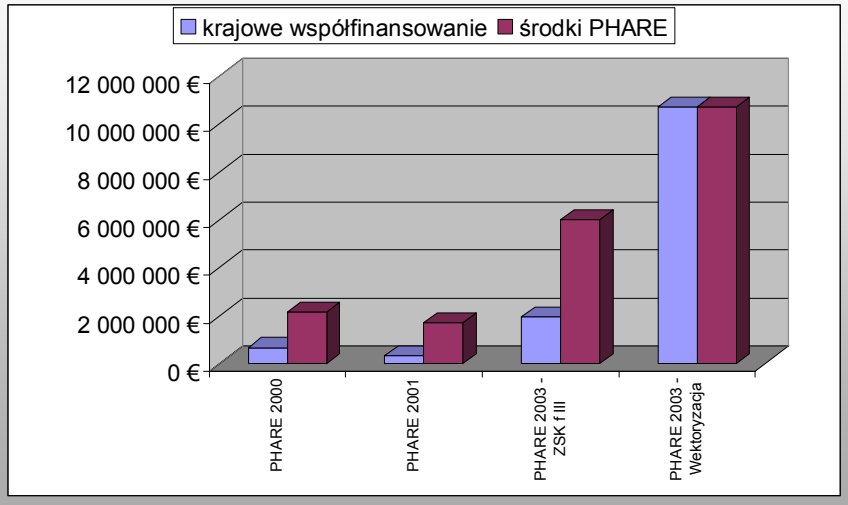


The ERDF Project – GEOPOTRAL.GOV.PL remaining 165 counties

GUGiK activity in 2005 - 2007



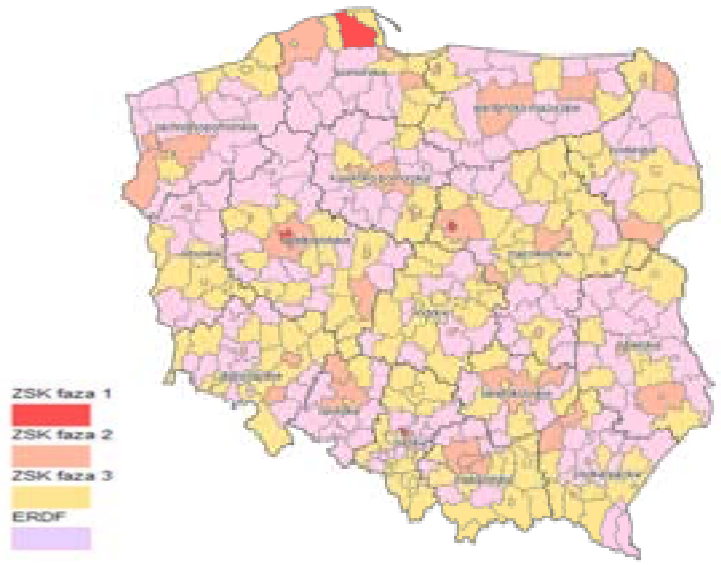
The Phare and PL financial resources allocated to the integrated cadastral system in Poland



The EU and PL financial resources allocated to the integrated cadastral system in Poland

	PHARE 2000	PHARE 2001	PHARE 2003 - ICS Phase III	PHARE 2003 Vectorization	Geoportal ERDF Structural Found
PL co-financing	668 698 €	316 054 €	1 960 000 €	10 700 000 €	5 000 000 €
EU financing	2 158 382 €	1 710 000 €	6 000 000 €	10 700 000 €	14 000 000 €

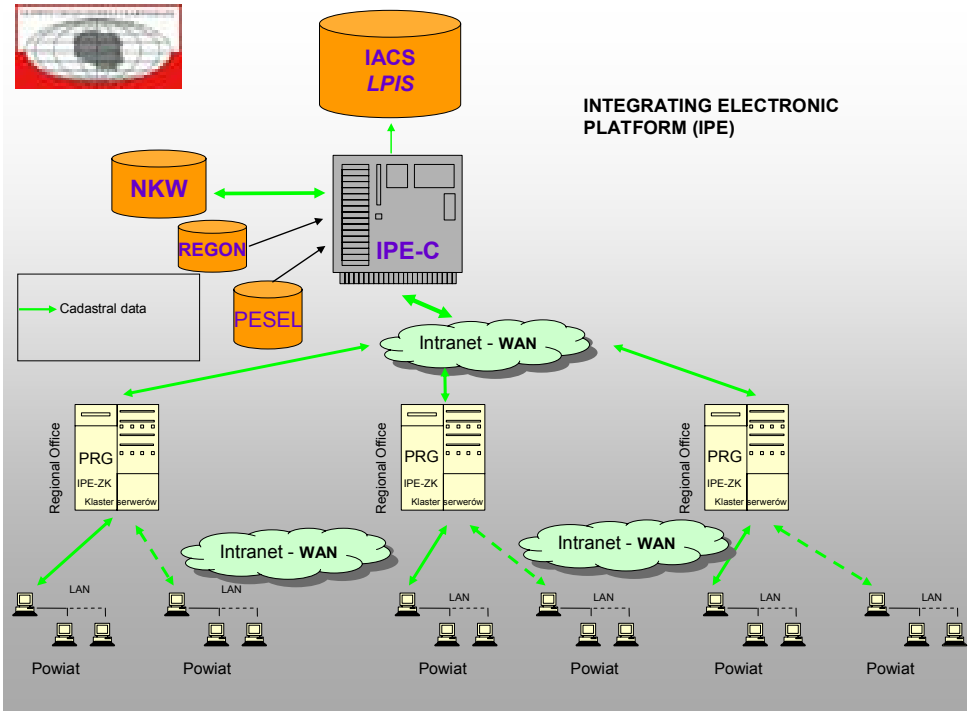
Planned situation at the end of 2007 year

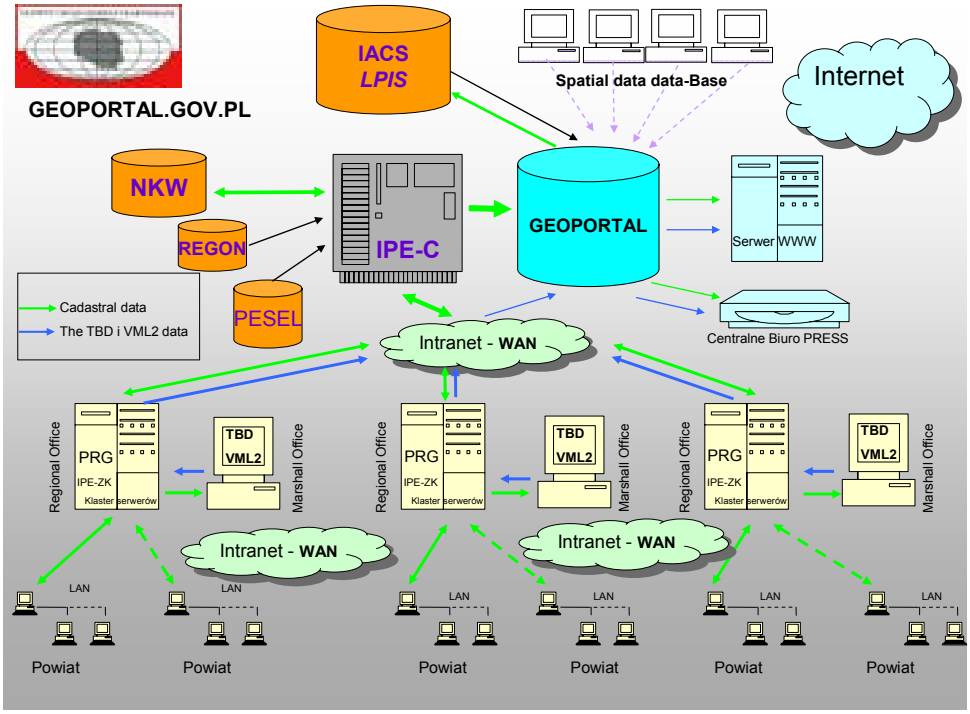


By 2007 the IPE-PTN system will have become a fully operational national Polish system with ability to automatic supply of cadastral integrated data to the LPIS

Functionality of the IPE system

- **Creation and maintenance of replica of the Land and Buildings Register data** and visualization of these data in form of maps, extracts of cadastral map and land register, tables and summaries
- **Export of data to the LPIS (IACS) system** and property tax register
- **Notifications handling** (*a decree is under preparation*)
  - On changes in the L&BR base
  - On changes in the Land and Mortgage Register (L&MR) base
- **Queries handling**
  - To the L&BR base
  - To the L&MR base
  - To PESEL/REGON
- Reports
- System management





According to the INSPIRE directive

"geo portal" means an internet site, or equivalent, providing access to the services referred to

in *Article 11*…

- discovery services…
- view services…
- download services…
- transformation services…
- services allowing spatial data services to be invoked.

Directive INSPIRE *Art. 3…*

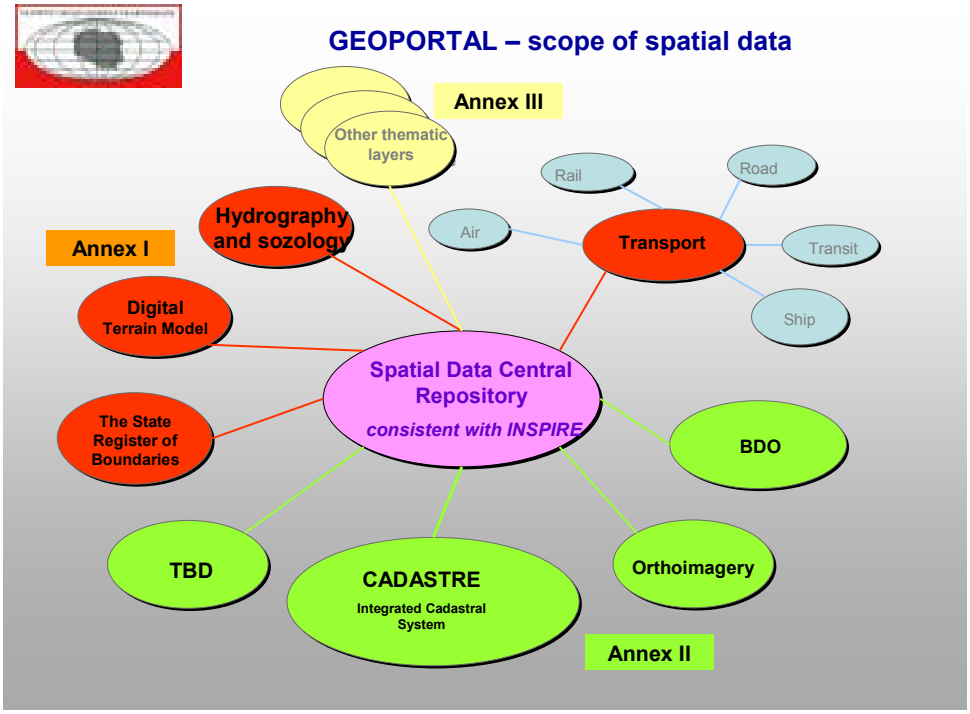
- "infrastructure for spatial information" means metadata, spatial data sets and spatial data services; network services and technologies; agreements on sharing, access and use; and coordination and monitoring mechanisms, processes and procedures, established, operated or made available in accordance with this Directive;

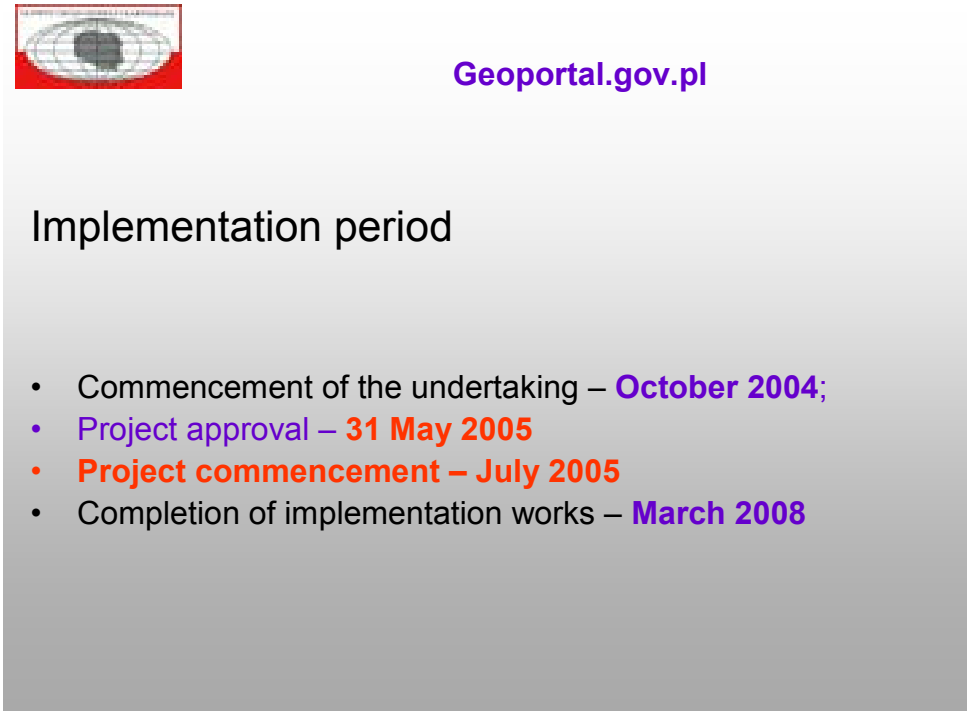
Project GEOPORTAL.GOV.PL

Data servicing

Products of the system in accordance with Annexes I and II to the INSPIRE directive:

- **Cadastral data** gained from the IPE.
- **Digital terrain models** – for 1st and 2nd level of NMT (WODGiK, CODGiK).
- **Thematic maps: hydrographic, sozologic** (WODGiK, CODGiK).
- **Topographic raster maps** (WODGiK, CODGiK).
- **Data on a course of boundaries and area of the State administrative division units** (WODGiK, CODGiK).
- **Vector map in scale 1:25,000** (WODGiK, CODGiK).
- **Topographic Database (TBD)** (WODGiK, CODGiK).
- **Geographic Database (BDO)**
- **VML2**
- **Aerial photographs and high-resolution satellite images**
- **Digital ortophotomaps**
- **Gazetteer** (WODGiK, CODGiK)


GEOPORTAL – scope of spatial data
Annex III
Other thematic layers
Rail
Road
Air
Transport
Transit
Ship
Hydrography and sozology
Annex I
Digital Terrain Model
Spatial Data Central Repository
consistent with INSPIRE
The State Register of Boundaries
BDO
TBD
CADASTRE
Integrated Cadastral System
Orthoimagery
Annex II


Geoportal.gov.pl
Implementation period
• Commencement of the undertaking – October 2004;
• Project approval – 31 May 2005
• Project commencement – July 2005
• Completion of implementation works – March 2008

In 2008 the GEOPORTAL system will become a fully operational national Polish system with ability to exchange on-line cadastral integrated data with the LPIS system

Project GEOPORTAL.GOV.PL

Budget:

zł 79 M (~ € 19 M)

And in the near future….

Welcome to the:

www.geoportal.gov.pl

Contact:

Janusz Dygaszewicz
e-mail: janusz.dygaszewicz@gugik.gov.pl

Ryszard Preuss
e-mail: ryszard.preuss@gugik.gov.pl

Dziękuję za uwagę!
Thank you for your attention!

Kraków, 23-25 November 2005

Ryszard Preuss
Vicepresident of Head Office of Geodesy and Cartography
Janusz Dygaszewicz
Director of the National Geodetic and Cartographic Resources
Computerisation and Development Department in GUGiK.
A Member of the Informatisation Council
of the Minister of Science and Informatisation

Presentation 6 – Use of radar images for checking parcel coverage during the winter

Joanna Pluto-Kossakowska
MARS PAC JRC IPSC, Agrifish Unit

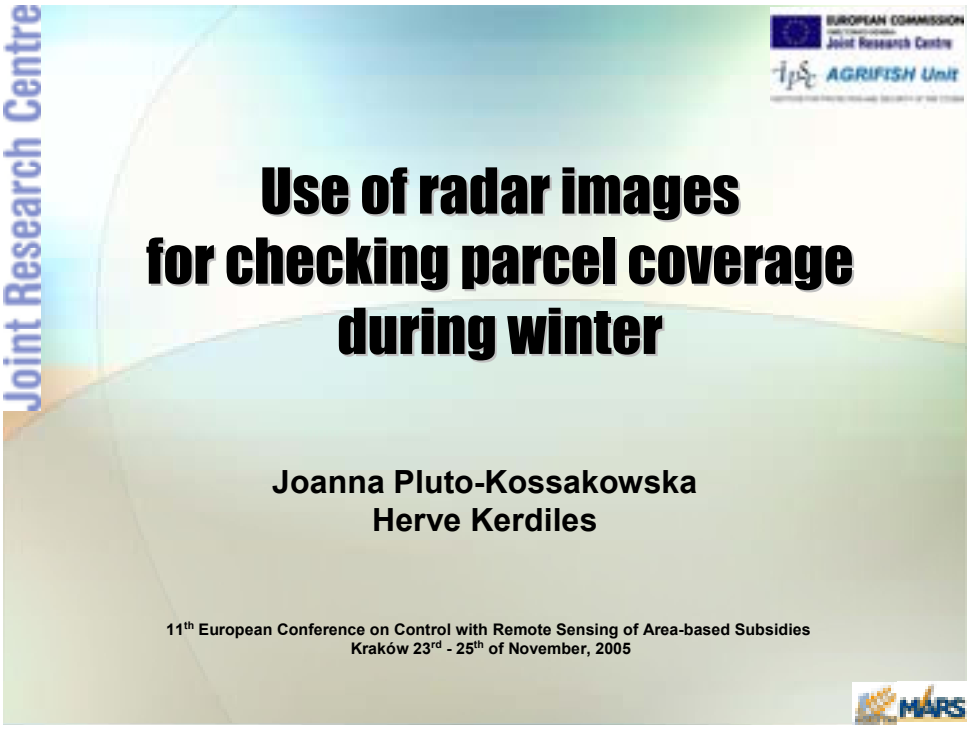
Abstract

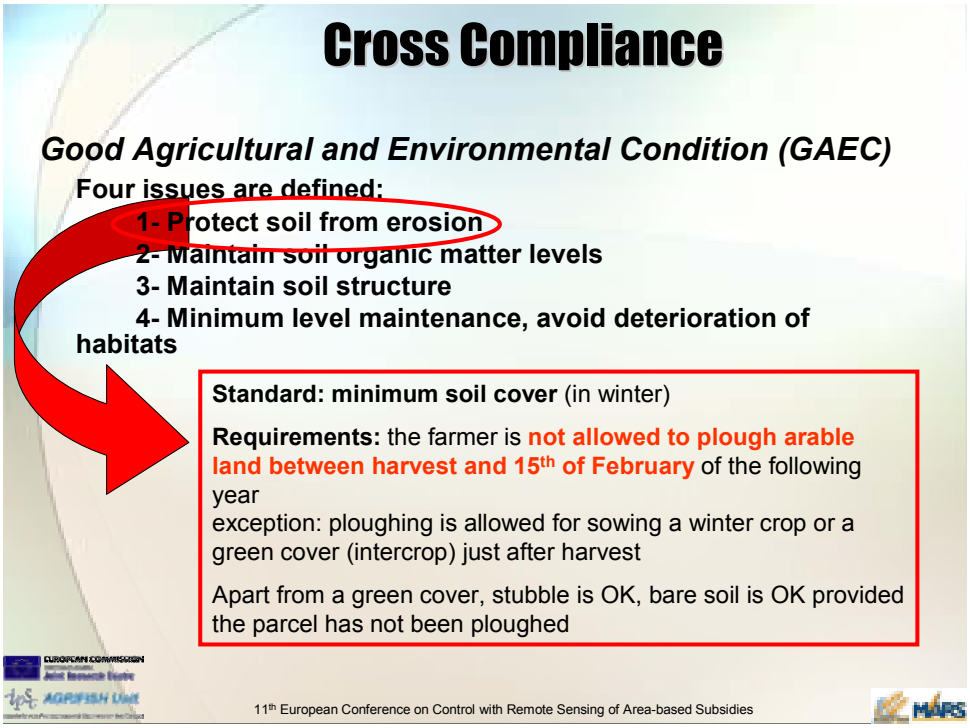
The purpose of the study was to assess the use of radar imagery for detecting bare soil parcels in the frame of the control of the Good Agricultural and Environmental Conditions (GAEC) in Wallonie (BE). In order to protect the soil from erosion, all parcels with a slope above 10% should have green coverage between 30th of November and 15th of February. In order to check whether these parcels were in bare soil or not, high resolution optical images were requested between 1/12/2004 and 31/01/2005 by the Walloon authorities. However, since acquiring cloud free optical images is difficult and risky in winter over Belgium, it is worth assessing whether SAR data, which can be acquired in all weather conditions, can be valuable alternative to optical data.
This on-going study is being carried out over four Walloon 2005 control sites using:

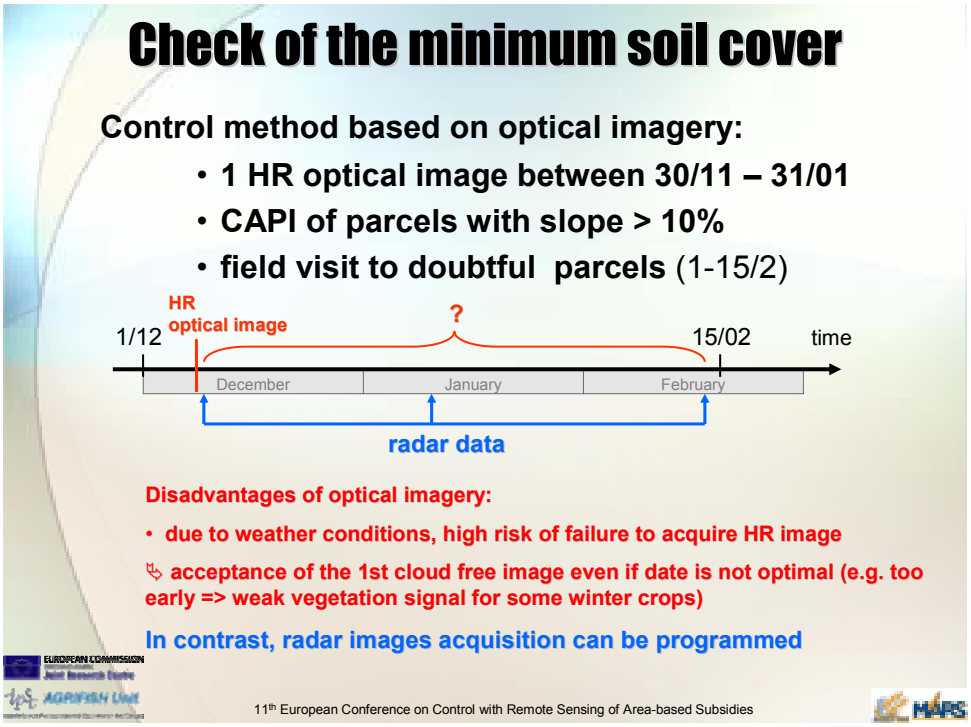
- the vector data of the 976 parcels concerned by the interdiction,
- the set of optical HR images of the Walloon contractor,
- the series of ASAR and ERS data acquired on a monthly frequency from November to February,
- the set of parcels visited in the field following the risk analysis carried out by the Belgian authorities.

While the optical images were photo-interpreted to determine whether the parcel was bare or not, the SAR images were classified using two types of classification: per pixel and per parcel method. The preliminary results of these classifications based on time-series radar data will be presented.

Key words: control with remote sensing of GAEC, radar image, classification


Joint Research Centre
EUROPEAN COMMISSION
Joint Research Centre
AGRIFISH Unit
Use of radar images
for checking parcel coverage
during winter
Joanna Pluto-Kossakowska
Herve Kerdiles
11th European Conference on Control with Remote Sensing of Area-based Subsidies
Kraków 23rd - 25th of November, 2005
MARS


Cross Compliance
Good Agricultural and Environmental Condition (GAEC)
Four issues are defined:
1- Protect soil from erosion
2- Maintain soil organic matter levels
3- Maintain soil structure
4- Minimum level maintenance, avoid deterioration of habitats
Standard: minimum soil cover (in winter)
Requirements: the farmer is not allowed to plough arable land between harvest and 15th of February of the following year
exception: ploughing is allowed for sowing a winter crop or a green cover (intercrop) just after harvest
Apart from a green cover, stubble is OK, bare soil is OK provided the parcel has not been ploughed
EUROPEAN COMMISSION
Joint Research Centre
AGRIFISH Unit
11th European Conference on Control with Remote Sensing of Area-based Subsidies
MARS


Check of the minimum soil cover
Control method based on optical imagery:
• 1 HR optical image between 30/11 – 31/01
• CAPI of parcels with slope > 10%
• field visit to doubtful parcels (1-15/2)
HR optical image
?
1/12
15/02
time
December
January
February
radar data
Disadvantages of optical imagery:
• due to weather conditions, high risk of failure to acquire HR image
acceptance of the 1st cloud free image even if date is not optimal (e.g. too early => weak vegetation signal for some winter crops)
In contrast, radar images acquisition can be programmed
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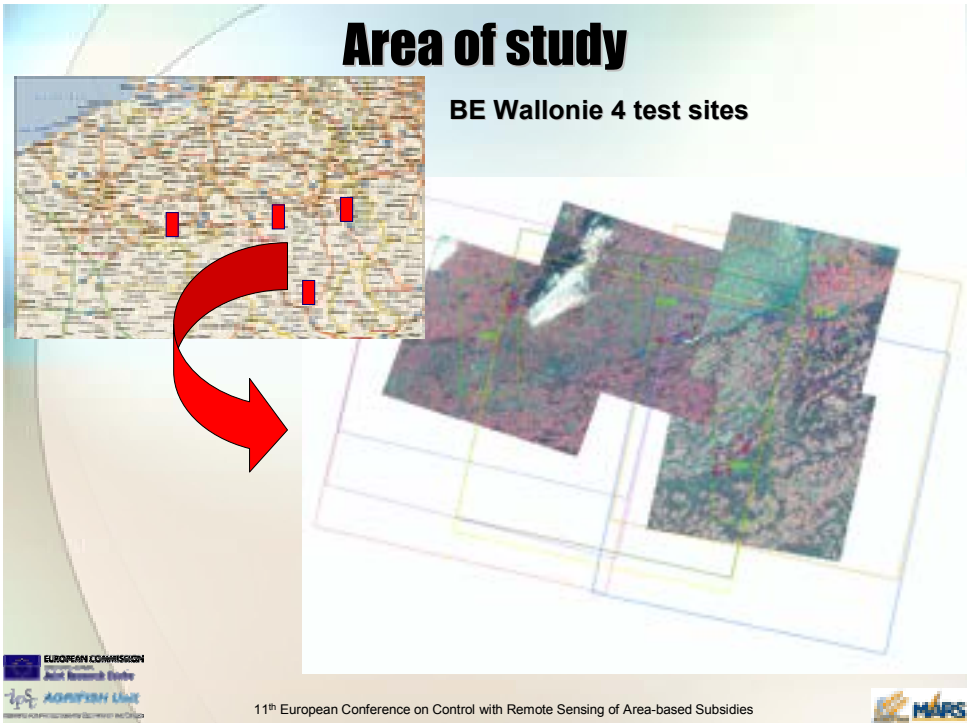
Area of study
BE Wallonie 4 test sites
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Set of data

- 4 MS SPOT4 images (3 bands without SWIR)
- Vectors of parcels with slope > 10%: 1000 parcels from campaign 2004
- 8 radar images with resolution 25x25m
- Air ortho-photomaps (resolution 2x2m) from 06/2002-03/2003
- Digital Elevation Model 20x20m
- 74 parcels checked in field in January/February 2005 following the selection of potentially non compliant parcels by BE Admin (threshold on NDVI + selection to reach 1% of dossiers)

Test sites	SPOT 4	Radar images						
		19/11/2004	5/12/2004	8/12/2004	24/12/2004	9/01/2005	12/01/2005	16/02/2005
SOIG	3/12/2004	+/-	-	+	+/-	+	+	+
FERN	3/12/2005	+	+/-	+/-	+/-	+/-	+/-	+/-
HERV	13/01/2005	-	+/-	-	-	+	-	-
NASS	30/11/2004	+	+	-	+	+	-	-

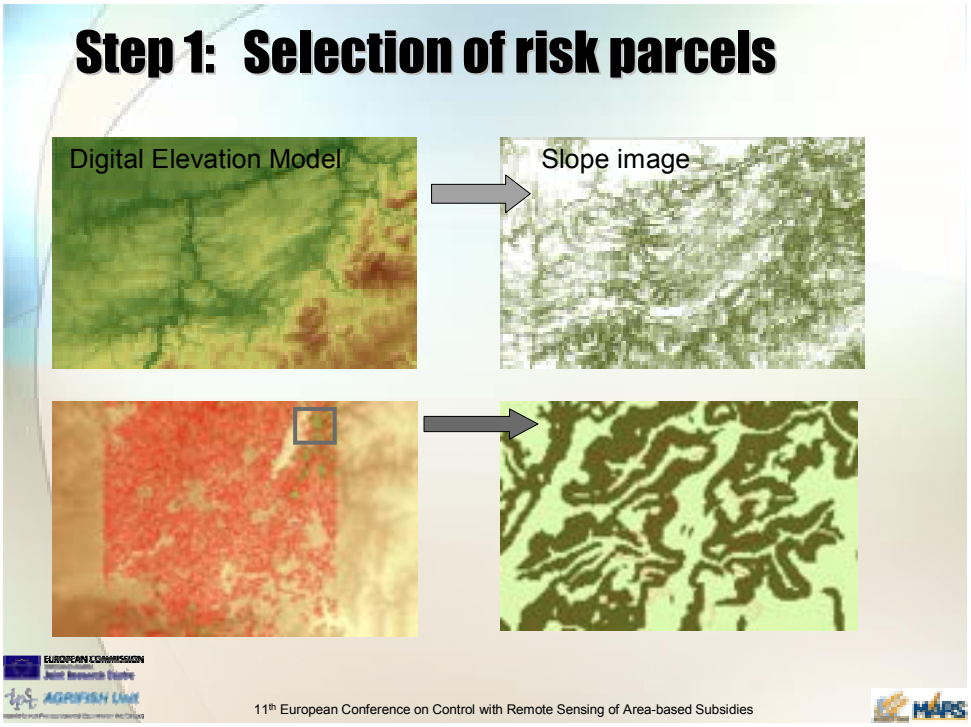
Schema of investigation methodology

Step 1: Selection of risk parcels (BE Admin)
- Calculation of slope layer from DEM
- Calculation of aspect layer for image interpretation (JRC)

Step 2: Computer Aided Photo-Interpretation (CAPI) of optical images to identify bare soil parcels
- Fusion SPOT4 images with air orthophotos
- NDVI

Step 3: Processing of radar images
- Pre-processing (despeckling, geocoding)
- Photointerpretation
- Classification

Step 4: Comparison results
- Accuracy assessment of classification results
- Check radar photointerpretation with RFV


Step 1: Selection of risk parcels
Digital Elevation Model
Slope image
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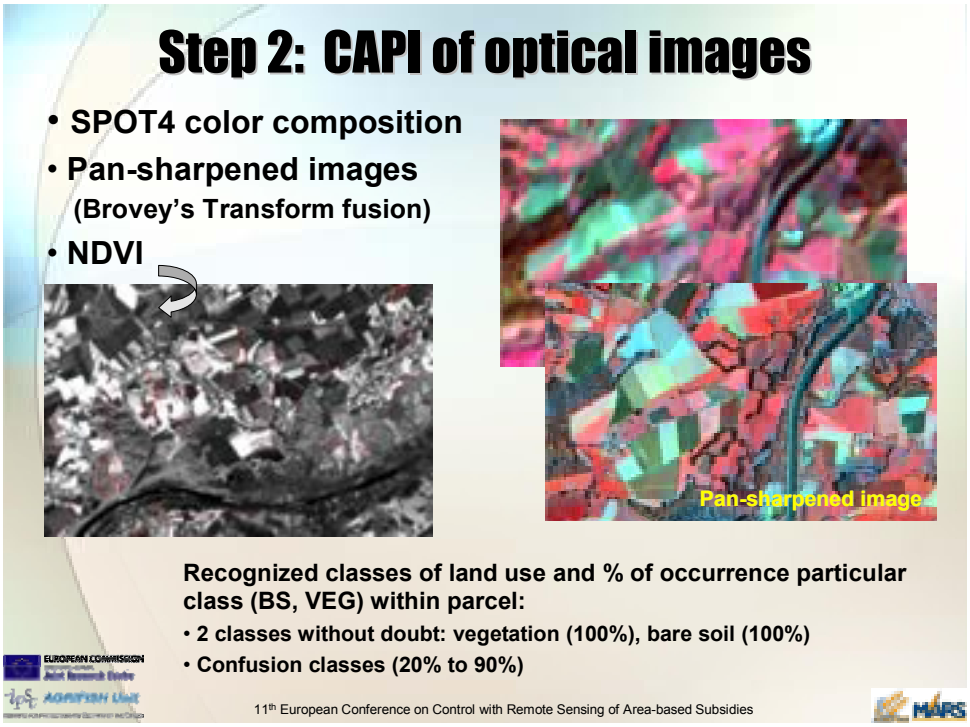
Step 2: CAPI of optical images
• SPOT4 color composition
• Pan-sharpened images
(Brovey's Transform fusion)
• NDVI
Pan-sharpened image
Recognized classes of land use and % of occurrence particular class (BS, VEG) within parcel:
• 2 classes without doubt: vegetation (100%), bare soil (100%)
• Confusion classes (20% to 90%)
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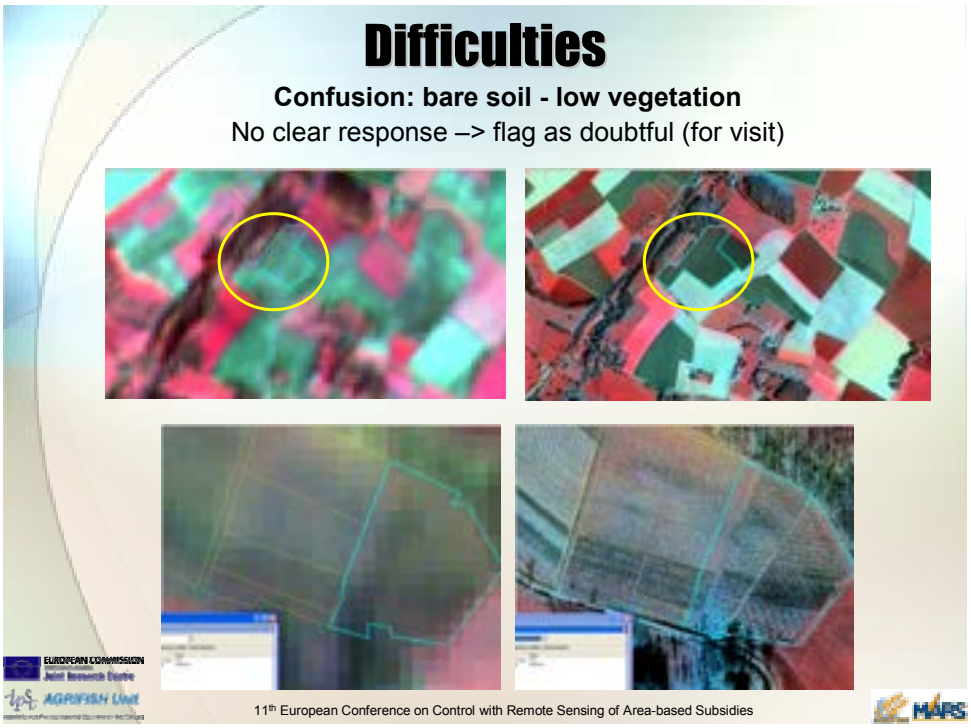
Difficulties
Confusion: bare soil - low vegetation
No clear response –> flag as doubtful (for visit)
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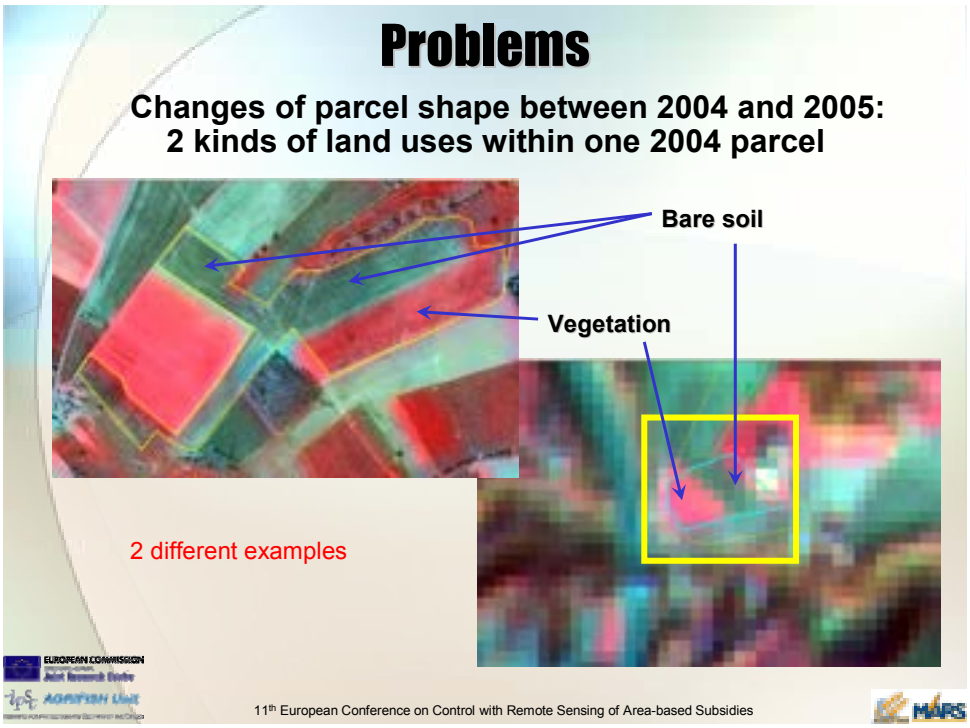
Problems
Changes of parcel shape between 2004 and 2005:
2 kinds of land uses within one 2004 parcel
Bare soil
Vegetation
2 different examples
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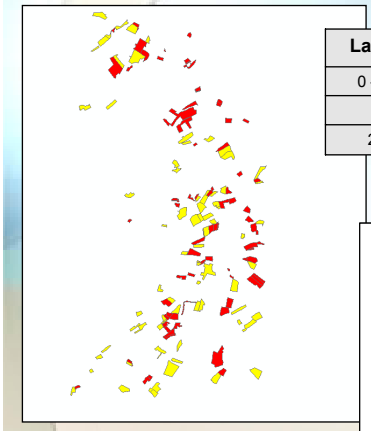
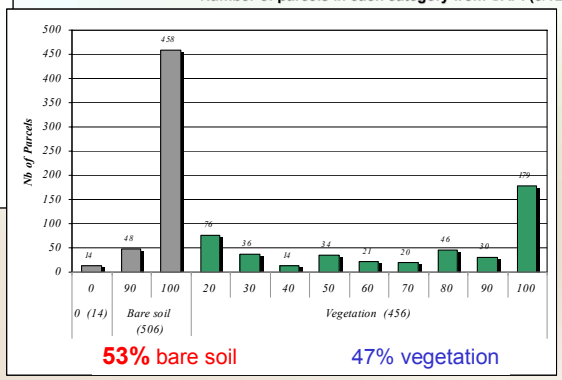
Results of CAPI of optical image



Land use class	Percents of occurrence
0 – not identified	0 – if not identified
1 – bare soil	from 20 to 100% quantity of pixels occurred in polygon (approx.)
2 - vegetation	

506 / 976 parcels considered as bare soil or doubtful

Number of parcels in each category from CAPI (3/12/2004)



53% bare soil 47% vegetation

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Step 3: Processing of radar images

- Processing of radar images
  - Pre-processing (by SARMAP)
    - Despeckling (Gamma MAP, Time Series Filtering)
    - Geocoding
  - Calculation of backscatter coefficient (σ_0) values
  - Creation of time series color compositions
- Classifications (for 1 test site)
  - Photo-interpretation key – training samples
  - Supervised classification per pixel
  - Unsupervised classification per parcel

Satellite	Date	Mode	Polarization	Angle	
ERS 1/2	19 November 2004	SLC	V/V	Unique 23^0	Descending
	24 December 2004				
ENVISAT 1	05 December 2004	IMS		IS2 (19^0 –27^0)	
	08 December 2004				
	09 January 2005				
	12 January 2005				
	13 February 2005				
	16 February 2005				

2 Multitemporal compositions:

8/12/2004
12/01/2005
16/02/2005

5/12/2004
9/01/2005
13/02/2005

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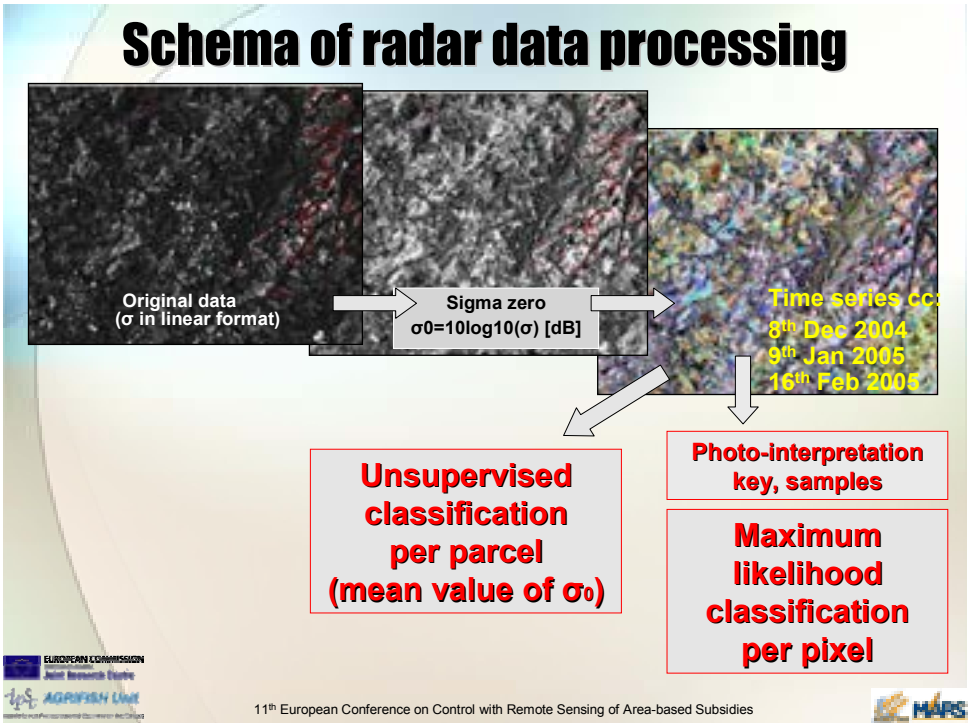
Schema of radar data processing
Original data
(σ in linear format)
Sigma zero
σ0=10log10(σ) [dB]
Time series cc
8th Dec 2004
9th Jan 2005
16th Feb 2005
Unsupervised classification per parcel (mean value of σ0)
Photo-interpretation key, samples
Maximum likelihood classification per pixel
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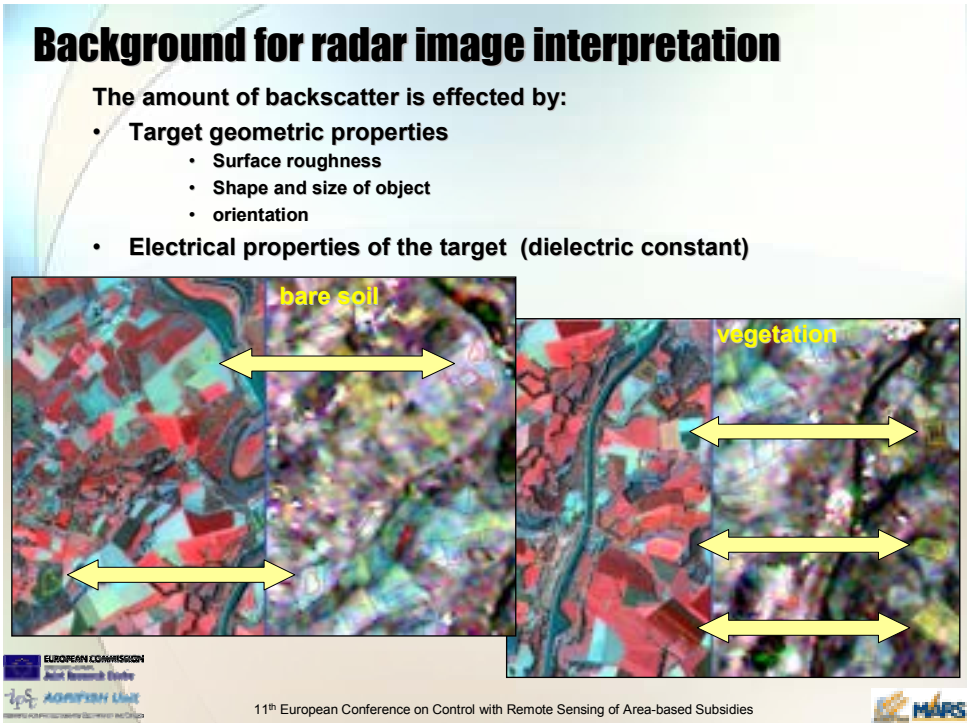
Background for radar image interpretation
The amount of backscatter is effected by:
Target geometric properties
Surface roughness
Shape and size of object
orientation
Electrical properties of the target (dielectric constant)
bare soil
vegetation
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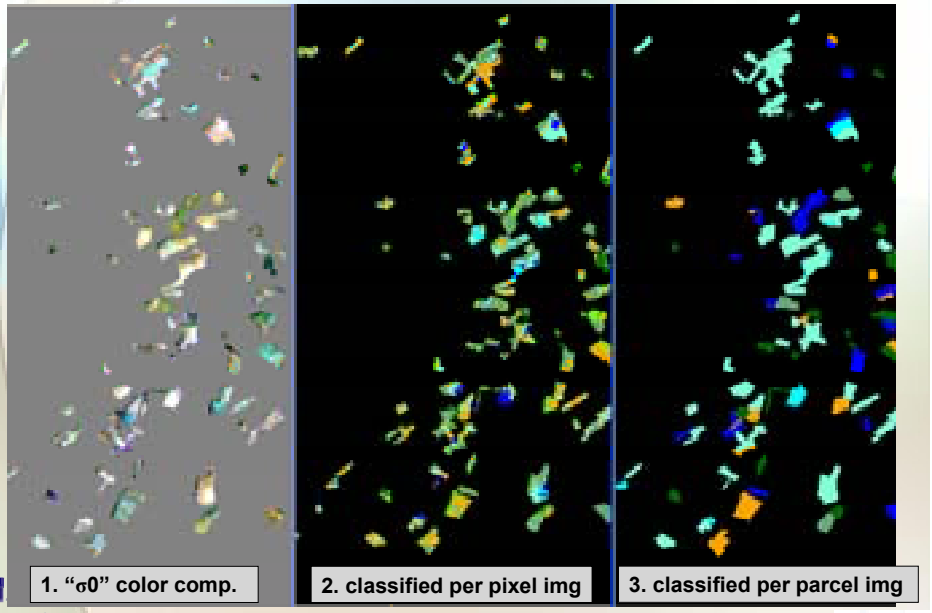
SAR images classification results



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Step 4: Accuracy assessment

Number of parcels		PER PIXEL CLASSIFICATION			Cartographic index
		Vegetation	Bare soil	grand total	
Class photo	bare soil	87	29	116	**25%**
	vegetation	88	14	102	**86%**
	grand total	175	43	218	omega=54%
user's accuracy		50%	67%		kappa=0.16

Low agreement due to different time frame

Number of parcels		PER PARCEL CLASSIFICATION			Cartographic index
		Vegetation	Bare soil	Grand Total	
Class photo	Vegetation	**70**	32	102	**69%**
	Bare soil	54	**62**	116	**53%**
	Grand total	124	94	218	K=0.22
user's accuracy		56%	66%		Ω=61%

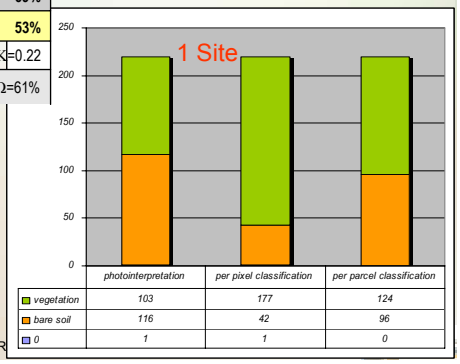
"Ground truth" (Field visit)

74 parcels selected from risk analysis:

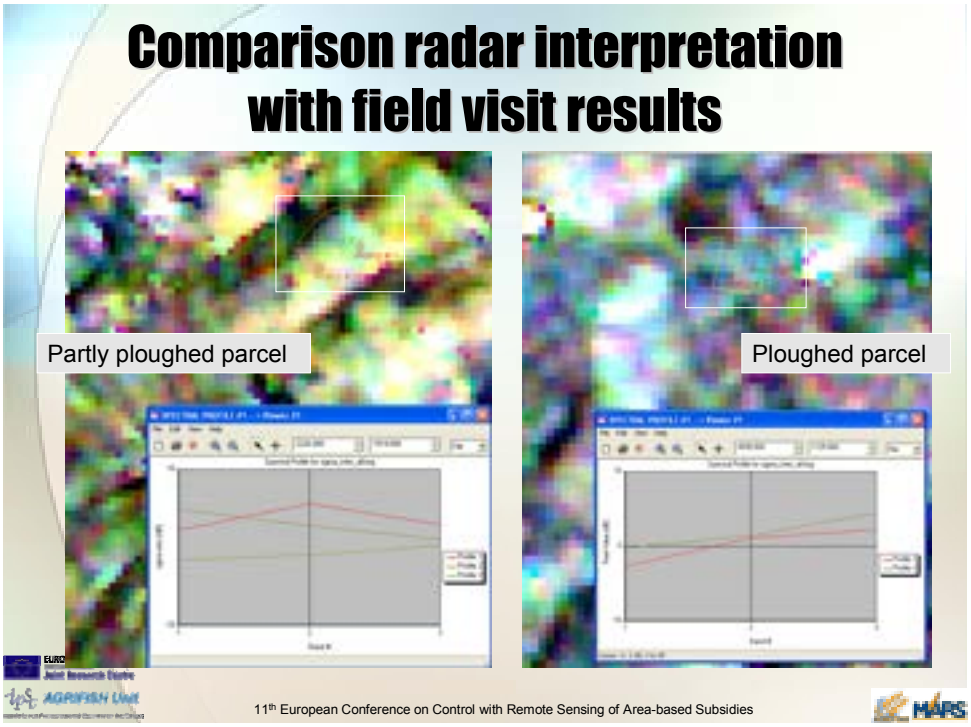
Only 10 parcels non compliant

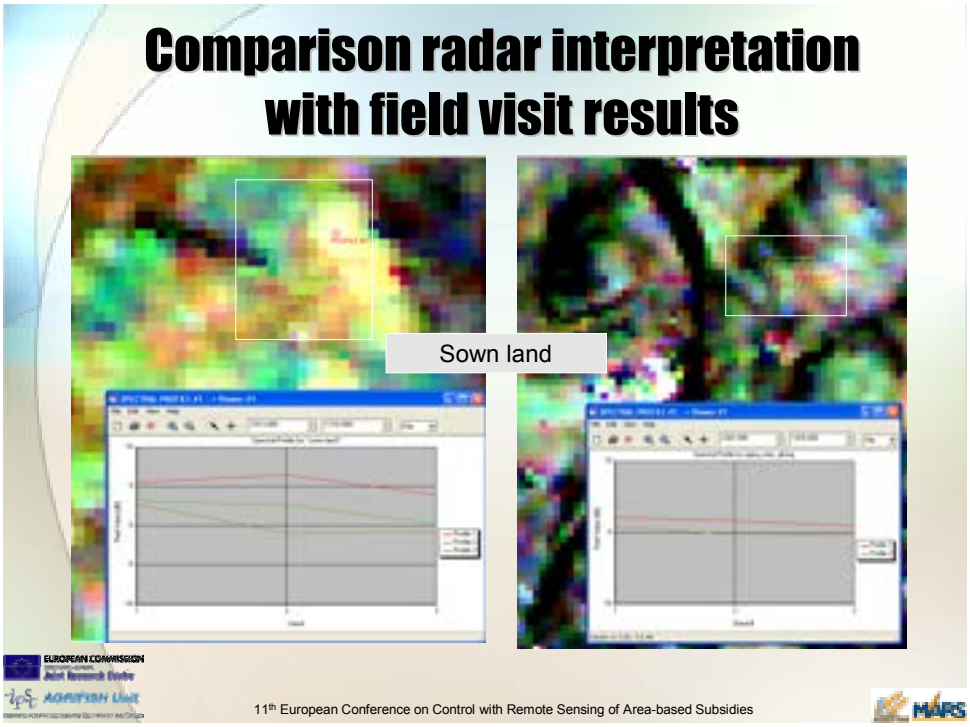
59 sown or with vegetation
5 parcels with slope <10%

?



11th European Conference on Control with R


Comparison radar interpretation with field visit results
Partly ploughed parcel
Ploughed parcel
11th European Conference on Control with Remote Sensing of Area-based Subsidies


Comparison radar interpretation with field visit results
Sown land
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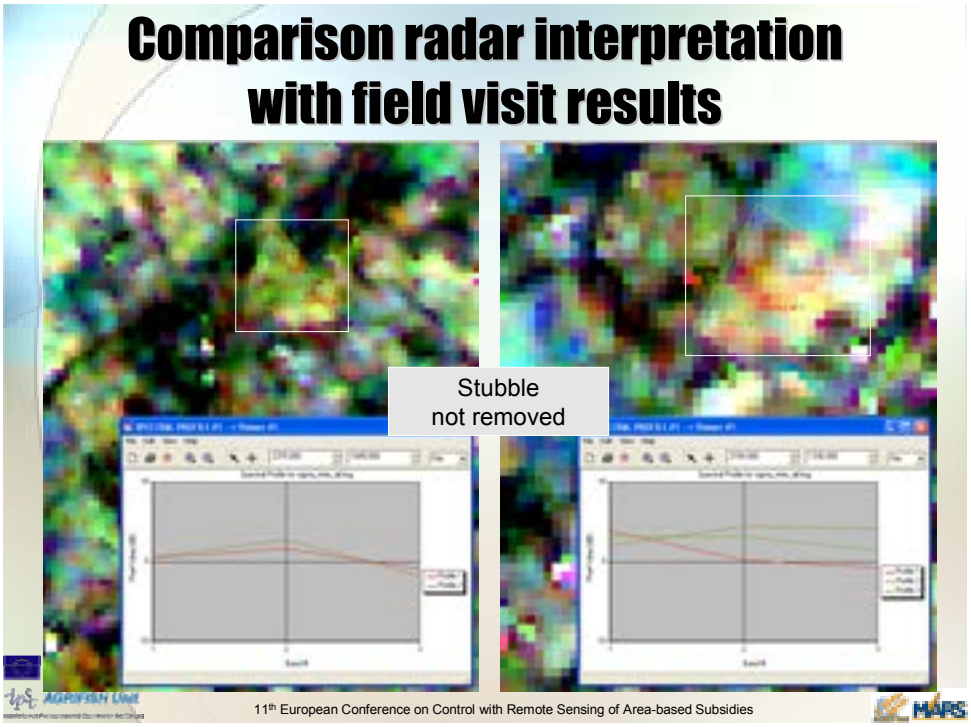
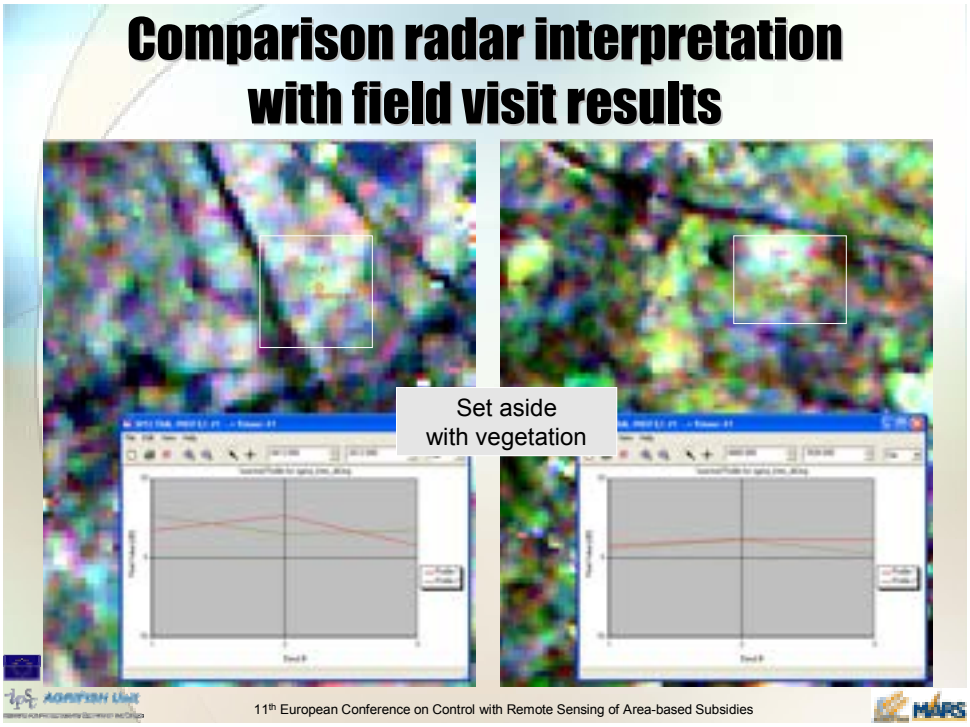

Comparison radar interpretation with field visit results
Stubble not removed
11th European Conference on Control with Remote Sensing of Area-based Subsidies


Comparison radar interpretation with field visit results
Set aside with vegetation
11th European Conference on Control with Remote Sensing of Area-based Subsidies

Remarks from classification and interpretation of radar images

- **A linear / flat signature** (without any changes during winter period) **indicates no changes on parcel** (in land cover mean).
  - **If color is bright then bare soil** (sown land)
  - **If color is dark then set aside** (with vegetation)
- **A variable signature indicates changes of the parcel cover during winter**
  - **If color is bluish then ploughed area** (response signal decrease)
  - **If color is yellowish then stubble on parcel** (response signal increase)

Comparison of radar image interpretation with field visit

74 parcels selected from risk analysis:

Ground truth	Radar interpretation
9 Ploughted parcel	7 Bare soil / 2 Vegetation
35 Sown land	31 Bare soil / 4 Vegetation
17 Stubble on parcel	3 Bare soil / 14 Vegetation
1 Set aside	1 Vegetation
5 not ploughted land	1 Bare soil / 4 Vegetation

User's accuracy:
Bare soil 86%
Vegetation 83%

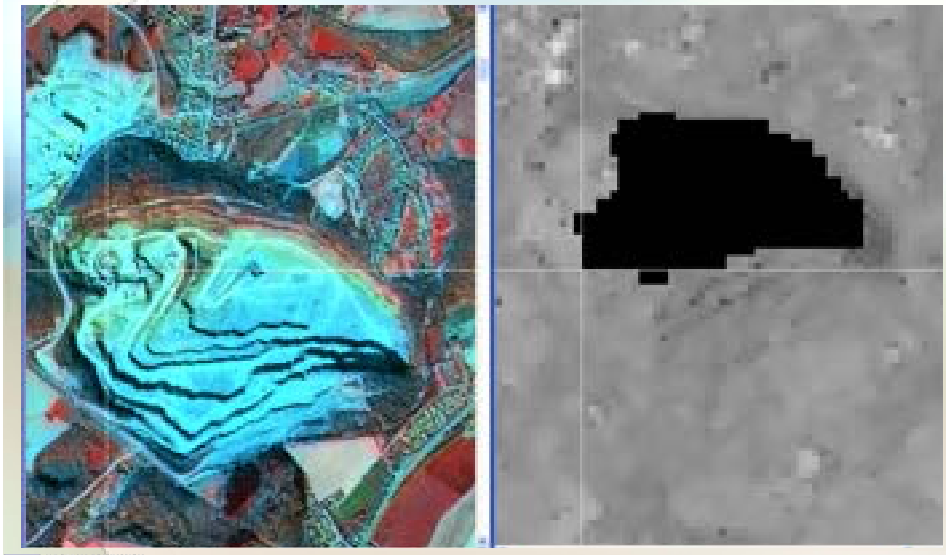
Conclusions

- **Optical images useful for control of minimum soil cover, but highly uncertain acquisition in winter**
- **Non optimal date may lead to poor identification of potentially non compliant parcels** (useless field visits)
  - 1000 parcels at risk,
  - 1 optical HR image => 500 parcels doubtful
  - Risk analysis (to check 1% dossiers) => 74 parcels visited: 10 non compliant
- **Risk analysis not very efficient due to early date and confusion low vegetation – bare soil**
- **Verification approach based on 1% sample not fully deterrent to promote GAEC**

Conclusions

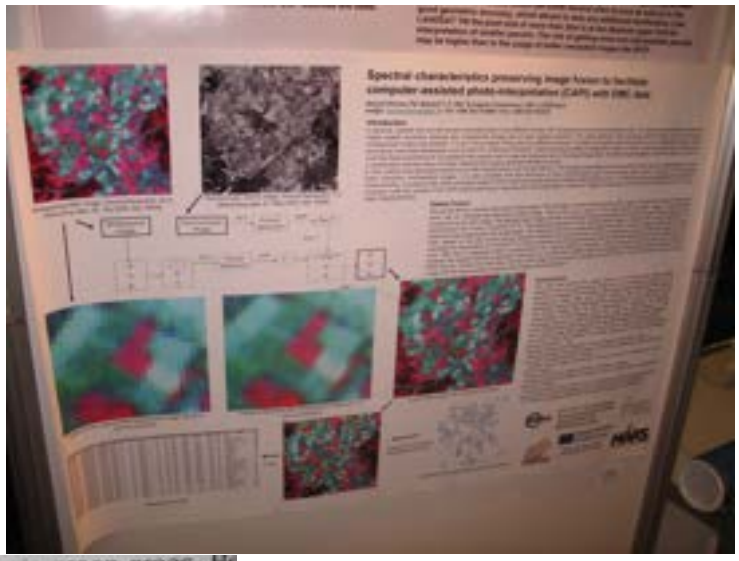
- **Interest of testing radar data to identify potentially ploughed parcels since acquisition dates are programmed over the whole window** (interest of time variation of parcel response)
  - **Agreement between:**
    radar – optical image (December) 58%
    radar – field visit (January/February) 86%
- **SAR useful for discrimination between sown parcel, ploughed parcel, stubble and set aside**
- **Control Strategy could be based on SAR data (since acquisition dates are guaranteed) with Optical images as complementary data**

Open mine(d) area



Parallel Session T6 – Posters contributions, software demonstrations

Posters (Abstracts)



1 – AWiFS sensor of IRS-P6

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The IRS-P6 Resourcesat-1 was successfully launched into sun synchronous orbit on October 17,
2003 and has a mission lifetime of five years. It ensures the data continuity of the IRS-1C and
IRS-1D. IRS-P6 data are acquired by a world wide network of groundstations in India, USA, China and Germany. A solid state recorder on bord the IRS-P6 even makes a global coverage possible.

The IRS-P6 has three improved multispectral cameras to provide an up to date remote sensing data service for mapping, acreage estimation, forestry and disaster management.

The Advanced Wide Field Sensor (AWiFS) offers new unprecedented monitoring applications.

The unique combination of swath, enhanced radiometric, improved spatial and timely resolution makes it suitable for applications even on a regional scale for environmental, agricultural and forestal monitoring besides large-area vegetation survey.

- 60 m spatial resolution
- 10 bit radiometric resolution
- 4 spectral bands in the VIS, NIR and SWIR
- 740 km swath width
- · 5 days repetition rate

Keywords:
- Three improved multispectral cameras
- Global coverage through solid state recorder
- AWiFS with enhanced radiometric and spatial resolution
- AWiFS suitable for unprecedented monitoring applications on a regional scale

2. Remote Sensing Control of subsidized areas 2005 in Cyprus

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The Cyprus Agricultural Payment Organization has focused the Remote Sensing Controls of the year 2005 in two test sites (LARN and NICO) through analyzing 1932 dossiers.

Existing cadastral data were used for geo referencing of the declared parcels. The digitized cadastral maps and dossier data were provided to the contractor.

Satellite data that were processed (overall 9 scenes) were mainly SPOT (4 AND 5) acquisitions, including also one VHR acquisition per site. Due to the relatively small parcel size (average size 0,47ha) SPOT 5 data are more appropriate for the controls. The cadastral data are outdated and present geometry problems. In this frame a specific workflow was adopted and implemented (COAP application) to locate, delineate and categorize appropriately the actual agricultural parcels.

Land use control was realized with Computer assisted photo interpretation (CAPI) on the basis of the outcome of ground data collection, which was realized end of May 2005 for a sample of transects. Doubtful cases were subject of a RFV.

RFV were also organized and realized by the COAP personnel to assess the compliance with the GAEC criterion related to the soil structure (plough when soil humidity conditions are appropriate) and involved the whole of the arable parcels. The findings of this activity were incorporated in the database.

The categorization process resulted in a relatively large number of rejected dossiers. This relates rather to the status of the update of the cadastral maps and the declarative process than to fraud.

3. The LioDotNet WEB Application

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LioDotNet is a WEB based informatics application to manage request, validation, ordering and invoicing of satellite images.

There is an automatic Email exchange to synchronize the actions between different actors; contractors, image providers and the Joint Research Centre (JRC).

This system allows, in an easy way, a permanent control of the image acquisition status during the campaign.

After publishing an acquisition request, the provider can upload images controlled and accepted by the contractors and the Joint Research Centre (JRC).

The web application is based on a portal (DotNetNuke) using the Microsoft dot net framework and the data repository is a Microsoft SQL database.

Keywords: WEB based, DotNetNuke, SQL database

4. Validation of GPS methods for measurement of land parcel areas

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The presentation gives detailed information about the work carried out in April – May 2005 concerning validation of GPS methods and equipment for measurement of land parcel areas. The work was commissioned by JRC (Joint Research Centre) in Ispra, Italy. The venture involved a great number of GPS equipment, operators and field measurements. There were two main experiments performed on two objects where 36 different land parcels (of total area 80-100 ha) were established in the field. The parcels were selected according to size, shape, border and replication. Three models of GPS receivers were used by 20 operators allocated to 4 teams. Altogether 3672 GPS measurements were made and total distance walked by the operators of all teams exceeded 2250 km. Collected measurements were compared to reference values precisely determined using Total Station Leica TC605. The extensive statistical analyses were made. The results of analyses are given as well as conclusions concerning the use of GPS receivers in control campaigns for IACS subsidies.

5. SagaCap - Bulgaria

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With the change of EU CAP-regulations (Common Agricultural Policy) and the accession of several new EU countries, timing is ideal for the creation and development of a generic agricultural control service (based on remote sensing). Besides the control of area and land use (crop/payment group), as incorporated in the IACS, also several new measures of the cross-compliance have to be controlled, e.g. good agricultural and environmental conditions (GAECs). SagaCap wants to generalize and adapt EUROSENSE's well-developed agricultural control workflow to these new challenges.

The overall goal is to demonstrate the possibilities of the construction of a reliable agricultural control service with remote sensing as generic as possible, so it can operate in different geographical areas, taking in account different agri-environmental conditions, according to different national interpretations and legislations and with different types of input-data.

Keywords: Bulgaria, Control with Remote Sensing,Cross-compliance, GAEC

6. Land use discrimination of agricultural parcels using spring VHR satellite image data

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The traditional methodology of control with remote sensing which is used in some of EU countries assumes the availability of multitemporal set of satellite (basically) images with adequate spatial resolution. The efficiency of such approach is usually on acceptable level. In Poland the simplified control method based on one orthorectified VHR satellite image (version of rapid field visits) is applied alternatively to the widely used classic field inspection. In this context it is interesting to know in which conditions and how far such one date image can be considered as a acceptable source of information about land use and crops in spectrally and spatially complex agricultural terrain.

The poster presents the results of research and investigation concerning the usability of spring VHR remote sensing images (IKONOS and QuickBird) for agricultural parcels interpretation. Two different test sites were chosen taking into consideration the different land use structure, different crop types and different parcel's size. The land use visual interpretation was performed on screen. Each test site was investigated independently three times by different visual interpreter. For all investigated crop / land use type the omission and commission errors were calculated and analysed. The factors influencing the final image interpretation accuracy are identified and discussed. The role of texture in crop / land use identification is considered as well.

Keywords: crop identification, VHR remote sensing images, land use / land cover, visual interpretation.

7. The use of DMC data as a substitute for missing common optical data. A comparison of accuracy and spectral capabilities

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In 2005 EFTAS has been assigned to do the controls by remote sensing within the IACS in Germany for eighteen sites. Traditionally some of the administrations ordered a separated check of the summer crops using an optical image acquired in July. Due to the bad weather conditions it wasn't possible to collect regular optical data in three of those sites. Therefore JRC asked EFTAS to test DMC data instead to do both the checks of the summer crops and a feasibility test of the data for possible future use in RSC within the IACS.

The DMC data provides 32m resolution image data in 3 LANDSAT equivalent spectral bands covering NIR, visible Red and visible Green. What makes this dataset such a specific one is its very wide swath width allowing large areas to be imaged in one pass: The images acquired for EFTAS have got dimensions of about 404km x 460km covering almost 13 sites.

EFTAS got two datasets, an already ortho-corrected one using a rigorous model that corrected for the elements of the geometric distortion of images, such as earth shape, earth rotation, spacecraft orbit, spacecraft attitude etc. and one only corrected radiometrically.

EFTAS had been able to use a subset for one site only due to heavy cloud coverage on the rest of the two images. Therefore a subset from both datasets has been made. The ortho-corrected image of 28-07-2005 has been checked for its geometric accuracy and has been used successfully for CAPI of the summer crops. Additionally the "raw"-image has been geometrically corrected

using ERDAS Imagine's *Projective Transform algorithm.* The accuracy of both images have been compared. Moreover DMC data has been compared with other optical datasets, commonly used for RSC in IACS like SPOT and LANDSAT TM, especially regarding geometric and radiometric resolution and capabilities. Results are, that DMC data in spite of its low geometric resolution is fully compatible to other comparable sensors, usually used for CAPI like LANDSAT TM. The geometric accuracy of the ortho-rectified product supplied by the provider has been approved by independent checkpoints to be within the tolerances given by the Common Tech. Specs.

In general, satellite and aircraft sensors recorded data in two different modes, the multispectral and the panchromatic mode. The panchromatic mode provides the higher spatial resolution whereas the multispectral images are of lower spatial resolution. . The ratios between high resolution panchromatic and low resolution multispectral modes vary between 1:2 and 1:8 (or higher if they are from different sensors). To obtain the higher spatial resolution in the multispectral image some techniques have been developed, such as IHS, PC or Brovey Transform. These techniques create multispectral images of higher spatial resolution but usually at the cost that these transforms do not preserve the original color or spectral characteristics of the input image data. Therefore these datasets cannot be used in a CAPI or a classification because they no longer represent the original spectral reflectance values.

A new method was developed based on an IHS transformation and Fourier filtering. This method guarantees the preservation of the spectral characteristics of the lower resolution multispectral images. It is also possible with this technique to fuse multi-temporal and multi-sensoral data without changes in the spectral characteristics.A subset of the ortho-corrected image of 28-07-2005 was fused with this method called Ehlers Fusion. A CAPI was then proceeded on this subset to compare it with the results of the CAPI without the fusion.

Keywords: summer crops, optical datasets, DMC, swath width, geometric accuracy radiometric capabilities, IACS, CAPI, Data fusion, pansharpening, color preservation, multi-sensor fusion

8. Control with Remote Sensing in the Czech Republic in 2005

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In 2006 Control with Remote Sensing in Czech Republic has been used in a full extent to control agricultural area-based subsidies. 80 % of all applicants selected for On-the-Spot were controlled by Remote Sensing. Schemes such as SAPS including control of GAECs, agroenvironmental measures, LFA and UGFPs were a subject of CwRS.

In 2005 there were four sites selected on basis of Risk analysis and were controlled on HR and VHR data (Quickbird and Ikonos).

The poster shows basis data about site selection, site definitions and satellite data used, also the list of GAECs defined in 2005 and so on. Furthermore you can see examples of GIS analysis that can be effective to do from GAEC control point of view and also some examples of GAEC non-compliance this year.

Keywords: Remote Sensing, GAECs, GIS

9. Control of Area Based Subsidies in Hungary in 2005

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The poster gives an overview on the development and the current status of the Hungarian remote sensing control program.

2000 was the first year when the Institute of Geodesy, Cartography and Remote Sensing (FÖMI) carried out a program for the control of area based subsidies with remote sensing, under the supervision of the Ministry of Agriculture and Rural Development (MARD). The program continued within the national framework until 2003. In the first years, only 9 counties (out of the 19) were controlled, but in 2002 the program was extended to touch all of the counties. Since 2004, FÖMI Remote Sensing Centre has been carrying out the CwRS program under a delegation contract with the Agricultural and Rural Development Agency (ARDA).

2005 was the second year when the subsidies and their controls were carried out fully on the basis of the EU regulations. It included a sophisticated risk analysis, different payment groups, control of the Good Agricultural and Environmental Conditions, and the control documents. In 2005, the total number of applications submitted was around 207 500, out of which 11000 were controlled with remote sensing. 76 % of the control sample has been checked by remote sensing because of its effectiveness and because of the large volume of the controls. There were 9 sites, all covered by VHR data (IKONOS and QuickBird). All the standard VHR and HR data have been financed by the European Commission. The 46 000 declared agricultural parcels of the control sample covered more than 200 000 hectares, touching about 8400 physical blocks. In 2005, three standards of the GAEC are in force, all of them have been controlled by remote sensing for the selected dossiers. The results of control have been submitted to ARDA.

The claim data has been stored and handled in GIS since the beginning of the national control program. The first step of the geographical data input is the digitization of the parcel drawings from the block maps, which constitute the standard part of the claim dossiers. More than 700 000 individual block maps have been delivered for the farmers in 2005. The software for the Computer-Aided Photo-Interpretation (CAPI) was developed "in-house", by FÖMI, and it is annually being adjusted to regulations of subsidy schemes.

Keywords: CAPI, VHR, SAPS, top-up, GAEC control

10. Processing of VHR data from Quickbird for the purpose of the LPIS in Bulgaria

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The poster shows the results of the work conducted in the frame of Pilot Project, supported by MARS-PAC at JRC in the region of Assenovgrad, Bulgaria. The main aims of the project are to complete results obtained during Pilot Study for CwRS of Area-based Subsidies for Isperih (financed by JRC) in a different context (smaller agriculture, mountains areas) and to support the definition of the overall strategy for LPIS in Bulgaria. Another important point is the preparation of the technical recommendations for the block CAPI.

Archive VHR satellite imagery from Quickbird is used. Precise Ground Control Points and Check Points are collected using DGPS. Different landmarks and feature are tested for the proper positioning of the GCPs. Three types of DEMs are tested for the process of orthorectification – the freely available SRTM; the national DEM from the 1:50 000 topomaps and the Ref3D of SPOT, available already for the whole country.

Keywords: LPIS, orthophotorectification, DEM, VHR, parcel measurement, data integration

Improvement of the Rapid Field Visits for the CwRS through Voice Technology

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The poster presents a current research of another pilot project, supported by the Ministry of Agriculture and Forestry (in the frame of FP6 SAFIR). The project combines voice and graphic user interface within a compact mobile GIS/GPS enabled system, which could facilitate and speed up the work of the field inspectors for data collection and validation of the results from the CwRS. The test voice-activated portable GIS/GPS system is based on ArcGIS and VQL technology and allows verbal dialog with the field user, guiding him and allowing easy ways for alphanumerical data collection and vector data creation/update. The first field tests have been done in the agriculture areas of Sofia and Vraca, Bulgaria.

Keywords: RFV, on-the-spot checks, CwRS, parcel data update, VQL, Voice Engine

11. Improvement and application of ArcPad based functionality for the rapid field control of farmer applications

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The popularization of small and cheap GPS receivers and PDA-s (handheld computers) called also palmtops has opened new possibilities in developing of mobile mapping sector which can be also considered as an interesting part of widely seen GIS.

Technical possibilities of such devices, quite good positional accuracy, ability to work with different data types (raster, vector), and relatively low price allow to consider them as a quite efficient solutions and practical tools usable also for the control activity in the frame of IACS.

The reasonable and successful use of that solution for the IACS control purpose in practice requires its adaptation to the desired functionalities important in control methodology.

The poster presents some experiences and achievements in practical development and adaptation of modern mobile mapping technology for the purpose of rapid field visits based on control method called 'foto'. As an example of the software the ArcPad application, as mobile extension of ArcGIS platform is explored. Designed functionality of the device dedicated to the field

control supported by ortho images significantly improves the control procedure and make it more automated.

Keywords: IACS, controls with remote sensing, rapid field visits, ArcPad, customization

12. QuickBird data for GAEC evaluation: an additional tool for environmental safeguards

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Under the new policy addressed by GAEC (Good Agricultural Environmental Conditions) detection and monitoring need better, more integrated technological tools, aimed at:

- Agro-environmental parameter detection
- Non compliance detection and measurement within parcels
- Evaluation of damage
- Monitoring and eventual field visit support

VHR QuickBird data, with its higher intrinsic resolution (both geometric and radiometric) allows a larger scale for these analyses, making possible a complete land parcel inspection (up to 1:1,000 scale). Examples of this capability, especially for land erosion and soil loss, are shown.

Keywords: …..VHR, GAEC, QuickBird, erosion, landslides

13. The Importance of updated Background Themes

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Since 1992 the Danish Institute of Agricultural Sciences (DIAS) has performed parts of the control of the area-based subsidies by remote sensing. The present system (CABS) was used for the first time in 1996. The Danish CABS makes extensive use of the Danish LPIS (the Block Map). The reason for this is that by definition all agricultural land in Denmark ought to be represented in the Block Map. Therefore it is not possible to digitize a field that is declared outside the block boundaries. This makes the Danish CABS very vulnerable in cases, where the Block Map is not updated.

In general all area-based subsidies in Denmark have to be linked to the Block Map.
Consequently, it is of extremely importance that the Block Map is as updated as possible.

The Block Map is updated annually but because of numerous and extensive changes in the landscape, not all these are reflected in the Block Map rapidly enough. Several sources contribute with information regarding changes of the block boundaries on various forms. Despite this it is shown every year that the Block Map is still not completely updated.

Keywords: LPIS, Block Map, Update

14. Control of Cross-Compliance Issues with Remote Sensing?

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The European Union's common agricultural policy (CAP) was changed in 2003. As part of this reform a control of cross compliance of the applications for subsidy was introduced concerning at least 1% of all the applications for area-based subsidy. The European Union has found that remote sensing could be an efficient tool to perform part of the control of the cross compliance issues.

The task in the remote sensing controls is basically to verify the areas and crops that the applying farmers are declaring. The area controls require that the fields be digitised in a GIS system. The cross compliance issues are defined in different ways; mainly as some environmental requirements that have to be met in specific geographic areas. This means that the GIS system has to take into account these geographic limits in order to find out which requirements to measure for which parcels.

To control cross compliance issues with remote sensing in Denmark will therefore require that all basic data is defined in same GIS system and that satellite imagery in the given areas is available in due time. Thus far there has been no remote sensing control of cross compliance issues in Denmark mainly due to lack of data integration.

Keywords: remote sensing, GIS, cross compliance, agriculture, subsidies

15. Information Technologies in Control of Weed Seed Bank

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Weed control could be more effective and require less herbicide, if farmers could afford to estimate the composition, density, distribution and dynamics of weed seed banks (the weed seed reserve in the soil) in real time in a field, since weed seeds are more vulnerable to treatment. Study of weed seed demography has been largely abandoned because of the lack of fast on-line methods for extracting seeds from soil and because of time-consuming evaluation procedure for weed seed banks.

The goal is to estimate a technique for extracting seeds from the soil in real time in a field and to estimate the weed seed bank dynamics, based on Information Technologies (IT). It will enable to prepare weed maps, which could be used as an instrument to farmers for planning the most appropriate weed management options, would reduce herbicide application and its residues in food, water and soil.

Methodology:

- Developing efficient sampling plans for estimating the spatial distribution of weed seed banks by collecting multiple soil cores and locating them by Differential Global Positioning System (DGPS);
- Constructing on-line weed seed identification/classification procedure based on image processing and pattern recognition techniques;

The proposed interdisciplinary approach will enable estimation of weed seed distributions in a field in real time.

Keywords: weed control, seed morphology, seed identification/classification, soil samples GPS

16. Use of remote sensing and GIS techniques in drought monitoring and early warning for Romania

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Romania is one of the countries most affected by drought and there are areas that become affected by desertification. The frequency of droughty years has increased almost continuously in Romania, from 33% (1942-1953) to 80 % (1982-1990). In 2000 due to severe drought in Romania the cereal crop yield was significantly reduced, well beyond the decline already evident in the past decade. In 2003 the agricultural production was affected and Romania shut down its sole nuclear reactor at Cernavoda on the Danube River.

The paper presents an operational system based on remotely sensed and ground data integrated in a GIS environment, constituting an on-line application.

In this study the Normalized Difference Vegetation Index (NDVI) a product from SPOT Vegetation satellites images, for the period 1998-2005 was used.

The NDVI is a geometrically and atmospherically corrected decadal product, with spatial resolution 1 km have been used for the vegetation condition index computation.

In conclusion, the vegetation index times series analysis allowed drought detection and evolution study for 2000 and 2003 years. The differences in drought impact on different types of crops were also estimated. This method will permit the drought monitoring and early warning.

Keywords: drought, remote sensing, GIS, monitoring, early warning system

17. An independent Geometric Quality control of a digital Airborne photogrammetric camera ULTRACAM-D

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In the European Union, information systems for managing the Common Agricultural Policy (CAP) payments to farmers are often based upon digital ortho-image coverage. Since the mid 1990's, great emphasis has been placed upon creating nationwide coverage for all 25 EU member states. Most of these countries have now been flown for – among other reasons – the CAP subsidy management requirements, resulting in digital ortho-images with pixel sizes of 0.5m – 1m, often in colour. Many countries have now developed frequent up-date programmes, usually on a 3 to 5 year cycle.

One of the tasks of the European Commission Joint Research Centre (JRC) is to benchmark new techniques or methods which could be used for improving the digital ortho-image production process, and provide guidance for quality assurance of deliverables to EU Member States. One such improvement is the use of a digital airborne sensor instead of the classic analogue photogrammetric film cameras.

Keywords: digital airborne camera, rmse, geometric quality

18. The use of DMC data as a substitute for missing common optical data. A comparison of accuracy and spectral capabilities

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In 2005 EFTAS has been assigned to do the controls by remote sensing within the IACS in Germany for eighteen sites. Traditionally some of the administrations ordered a separated check of the summer crops using an optical image acquired in July. Due to the bad weather conditions it wasn't possible to collect regular optical data in three of those sites. Therefore JRC asked EFTAS to test DMC data instead to do both the checks of the summer crops and a feasibility test of the data for possible future use in RSC within the IACS.

The DMC data provides 32m resolution image data in 3 LANDSAT equivalent spectral bands covering NIR, visible Red and visible Green. What makes this dataset such a specific one is its very wide swath width allowing large areas to be imaged in one pass: The images acquired for EFTAS have got dimensions of about 404km x 460km covering almost 13 sites.

EFTAS got two datasets, an already ortho-corrected one using a rigorous model that corrected for the elements of the geometric distortion of images, such as earth shape, earth rotation, spacecraft orbit, spacecraft attitude etc. and one only corrected radiometrically.

EFTAS had been able to use a subset for one site only due to heavy cloud coverage on the rest of the two images. Therefore a subset from both datasets has been made. The ortho-corrected image of 28-07-2005 has been checked for its geometric accuracy and has been used successfully for CAPI of the summer crops. Additionally the "raw"-image has been geometrically corrected using ERDAS Imagine's *Projective Transform algorithm.* The accuracy of both images have been compared. Moreover DMC data has been compared with other optical datasets, commonly used for RSC in IACS like SPOT and LANDSAT TM, especially regarding geometric and radiometric resolution and capabilities. Results are, that DMC data in spite of its low geometric resolution is fully compatible to other comparable sensors, usually used for CAPI like LANDSAT TM. The geometric accuracy of the ortho-rectified product supplied by the provider has been approved by independent checkpoints to be within the tolerances given by the Common Tech. Specs.

Keywords: summer crops, optical datasets, DMC, swath width, geometric accuracy radiometric capabilities, IACS, CAPI

19. Control with Remote Sensing of area-based subsidies in Slovak Republic

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Since 2003 the Soil Science and Conservation Research Institute (SSCRI) has carried out a program for the control of area based subsidies with remote sensing for the Agricultural Paying Agency (APA) in Slovak republic. Since 2004, SSCRI - via its Department of Remote Sensing and Informatics - carries out the CwRS program as a delegated duty, according to the APA-SSCRI delegation contract.

Slovak administration decided to have three control sites for the 2005 campaign of remote sensing control of area-based subsidies, two defined by square 20x20km and one by rectangle 20x25km. Two sites were covered by IKONOS images and one site by Quickbird images.

The CAPI has been adjusted to the annual conditions of the regulations of subsidy schemes. More than 40 000 graphical annexes were printed and delivered to the farmers where they indicated the agricultural parcels they cultivate. The parcel boundaries have been digitized and controlled on VHR and HR images.

In 2005 campaign the total number of dossiers was 13 797, the number of dossiers controlled with remote sensing is 773 (5,6 % of all dossiers). The total area controlled was 43 747 hectares, with 2424 reference parcels. There were 5129 agricultural parcels to control, on average 7 parcels/farmer and 60 hectare/dossier.

Keywords: CwRS, VHR images, subsidies

20. Improvement of the LPIS for GIS IACS in application of time and cost saving approaches drawing on offline and online information technologies - experiences in the field of aid application, LPIS updating, administrative control and On-The-Spot Checks

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The guiding principles for the CAP, market and rural development policies, are expected to result in strong economic performance which must go hand in hand with the sustainable use of natural resources[1]. CAP reforms represent major steps forward to improve the competitiveness and sustainable development of farming activity. The inclusion of environment, food safety, animal health and welfare standards in cross-compliance[2] increases the environmental sustainability of farming. The realisation of cross-compliance requires efficient exchanges of information between administration and farmers resulting in a high capacity demand. Since 2002 responsible administrations in Germany have been focused on the development of efficient approaches drawing on offline GIS technologies to keep costs in line. Based on recommendations of EU[3] intermediary offline solutions have been applied to make detailed maps and GIS functionalities available for farmers to be used in aid- application, LPIS-verification - updating process as well as in the geo-data acquisition for landscape elements. Significantly, a cost reduction compared to analogous approaches occurred due to higher data safety and quality, decreasing correction needs, homogenous instruments and data sets for administration and for farmers. Since 2003 results of LPIS verification procedures and aid application campaigns in the German Laender

[1] Council Decision on Community strategic guidelines for Rural Development, COM(2005), Brussels, 5.7.2005
[2] Council Regulation (EC) No 1782/2003 of 29 September 2003
[3] EU- Discussion paper, O. Leo and G. Lemoine 2001 ‚LPIS in the frame of regulation (EC) 1593/2000', ISPRA 10 July 2001

Brandenburg, Saxony and Berlin were shown in a high participation of farmers using digital GIS- driven offline approaches. The continued development of GIS – offline technology will be used to accelerate the implementation of the online – technology. Considering advantages of homogenous offline GIS-based technologies for administration and farmers a transfer of knowledge and experiences within the EU PHARE Twinning project PL2003/IB/AG/04 reinforces the development of LPIS drawing on GIS in Poland.

Keywords: CAP reform, GIS IACS, LPIS, offline and online IT, cross-compliance, aid application, administrative control, on-the-spot checks

21. Development of eCognition protocols for automatic segmentation of VHR imagery and updating of the LPIS – the case studies on agricultural dynamics in South Poland

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The visual interpretation of increasing amount of VHR satellite imagery require a large numbers of experts as well as enough time for analysis. In this case the automatisation of the image classification process is extremely important.

From Data, to Information and from Information to Knowledge, expert systems are required to enable this process-flow. Although the flow of Data towards Information, IACS/LPIS is based for an important part on information from farmers, the direct link from satellite image data to GIS information can profit very well from intelligent image understanding methods that are now available.

Presented paper, demonstrates the state of the art methods (eCognition ver. 5) and procedures of updating GIS layers (cadastre) with data gathered automatically from VHR satellite image.

Some Facts

In 2002, the area of abandoned land was 2.3 mln ha (17.6% of arable land in Poland).

In 2004, the total area of arable land in Poland equaled 16.327 mln ha (52% of the country) and the area of abandoned land was reduced to 1.3 mln ha (9.9% of arable land in Poland).

The total number of farms in Poland was 1.85 mln ha in 2004, with a mean area of 7.5 ha per farm.

The percentage of total succession in the test area was 11.1 % and the class of arable land (abandoned) contributed to 83 % of the total succession.

Generalization

To simplify polylines, which were made in the classification process, two combined methods were used:

1. A line generalization method (after Chrobak). It is the objective quantitative method, which uses elementary triangle properties to reduce the number of polyline vertices.

2. Obtained polylines were further simplified by removing the vertices with sinuosity values greater then 1.1.

Keywords: automatic image analysis, classification protocols, GIS spatial analysis, forest succession

22. Evaluation of potential suitability of SRTM C-band data ver. II for the orthorectification of VHR satellite imagery used in CwRS

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The widespread availability of good quality digital elevation data opens the door to systematic and improved automation of orthoimage production. It is getting especially important for VHR satellite images which are considered as valuable source of data in many mapping oriented applications. The VHR orthorectified images are also used for IACS control activity in the frame of the Common Agricultural Policy. In that context the needs for DTM quality defined by best practice of the orthorectification process usually require an accuracy of 5m RMSE in Z.

In practice, the available good quality national DTM can be of course one solution but it might be interesting also to consider other equivalent possibilities taking into account both technical and economic aspects. The "open source" SRTM C-band (3 arc second, approx. 90m grid size) version II data, released to the general public via the internet seems to be such alternative although the data requires careful processing. The official general specifications are somewhat lower than the 5m RMSEZ, but given the usually limited relief in agricultural areas, an investigation into the quality of these dataset was considered an important task.

This poster presents the results of the tests carried out by WUT to determine the quality and potential suitability of the Shuttle Radar Topographic Mission product (version II). Three test areas (approx 10,000km2 each) were chosen over Poland, one in the North of Poland, second in the centre and third in the South. Test sites represents different terrain and landscape characteristic, moreover those representation of various classes gave good overview of vertical accuracy of radar data. National data elevation model (25 m grid size) and independent control poines ware used for vertical accuracy determination.

The results show that the SRTM ver. II data for the tiles tested performed better than its standard specification, and is suitable for rectification of most VHR imagery in the context of IACS without further processing (improvement), besides projection and datum transformations.

Keywords: SRTM, DEM, elevation, vertical accuracy

23. DeCOVER – the German Joint Project to Develop a Tested Methodology for a Consistent National Land Cover Data Base

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The need for consistent and up-to-date land cover information becomes more and more important with respect to recent international and European developments (e.g. Kyoto protocol, Water Framework Directive, Cross Compliance, IACS, GAECs). The existing German land cover data sets are insufficient to meet these requirements. Currently used data such as provided by the European CORINE Land Cover scheme as well as the German Automated Cartographic Information System (ATKIS) and the National Biotope and Land Use Type Mapping Scheme (BNTK) lack the required accuracy, national consistency and timeliness. Established competencies by ongoing European developments within the Global Monitoring for Environment and Security program (GMES) and the LUCAS and CORINE mapping schemes need to be bundled into a national initiative. The German DeCOVER Project aims therefore to develop a tested methodology for an improved German land cover database (DeCOVER) to:

- facilitate interoperability between existing data sets (ATKIS, BNTK, CORINE)
- employ a classification based on user requirements to meet the upcoming requirements from EC policies and directives (e.g. Thematic Soil Strategy)
- provide flexible updates of BNTK data and CORINE at the DeCOVER level
- identify target areas to update ATKIS data, GAECs and CC elements
- reduce mapping efforts for change detection
- link DeCOVER to international and national Geodata Infrastructure developments (INSPIRE, GDI-DE) and existing GMES Service Elements.

DeCOVER will be based upon a detailed user requirement analysis. Data interoperability will be developed employing ontologies and semantics. Sensor-independent change detection methodologies will use radar and optical satellite data. The developed services will be demonstrated using latest satellite technology (RapidEye and TerraSAR-X).

Keywords: German land cover data base, BNTK, CORINE, ATKIS, GAECs, CC, WFD, GMES, data interoperability, change detection, latest satellite technology, Radar-optical data integration.

Software demonstrations (Abstracts)

1. The LioDotNet WEB Application

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LioDotNet is a WEB based informatics application to manage request, validation, ordering and invoicing of satellite images.

There is an automatic Email exchange to synchronize the actions between different actors; contractors, image providers and the Joint Research Centre (JRC).

This system allows, in an easy way, a permanent control of the image acquisition status during the campaign.

After publishing an acquisition request, the provider can upload images controlled and accepted by the contractors and the Joint Research Centre (JRC).

The web application is based on a portal (DotNetNuke) using the Microsoft dot net framework and the data repository is a Microsoft SQL database.

Keywords: WEB based, DotNetNuke, SQL database

2. Development of eCognition protocols for automatic segmentation of VHR imagery and updating of the LPIS – the case studies on agricultural dynamics in South Poland

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The visual interpretation of increasing amount of VHR satellite imagery require a large numbers of experts as well as enough time for analysis. In this case the automatisation of the image classification process is extremely important.

From Data, to Information and from Information to Knowledge, expert systems are required to enable this process-flow. Although the flow of Data towards Information, IACS/LPIS is based for an important part on information from farmers, the direct link from satellite image data to GIS information can profit extremely from intelligent image understanding methods that are now available.

Presented paper, demonstrate the state of the art methods (eCognition ver. 5) and procedures of updating GIS layers (cadastre) with data gathered automatically from VHR satellite image.

Case study 1: shows automatic procedures for the quantitative analysis of the dynamic of natural succession (detect 69,28 ha of young forest; 16,2% of the test site) on abandoned agricultural parcels, a problem encountered in small scale farming in South Poland.
Case study 2: shows the experiments of borderline detection in agricultural parcels to arrive at 'Field-block' level. This study shows state of the art as well as the strategy how to solve the important missing links in automatic mapping of parcels and field-blocks.
Case study 3: shows patch analysis and indicator development for agricultural landscape

Keywords: automatic image analysis, classification protocols, GIS spatial analysis, forest succession, landscape indicators

3. MONITOR – an integrated EO monitoring service

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Monitor is an ESA supported project for development and demonstration of a monitoring service based upon an integrated value chain. The basic idea of the service is to enable a highly automatic image production and value adding chain using multi sensor and multi resolution datasets.

The service integrates components for:

- logistics of satellite programming;
- data acquisition and assessment of quick look data during a data reception campaign;
- image browsing, product ordering; and
- automated high-accuracy orthoimage production and delivery solutions

The service includes an automated workflow with a notification system used by the satellite operator as well as the value adder. The value adder is notified when new images has arrived and can make assessments of the image quality and coverage to determine if more acquisitions are needed for the value added product. Images are ordered through an order system and processed as orthos and delivered automatically to the value adder.

The project has demonstrated and evaluated a pilot service for monitoring new forest clear cuts indicating risk areas for power line damage. The full service chain will be functional in January 2006. This service concept could also be applied to the area-based subsidy control. A possible scenario for this is presented.

Keywords: Integrated value chain, monitoring, logistics, workflow, orthorectification, satellite programming.

4. Success of LPIS Software in Slovenia

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Cosylab developed an innovative software solution for establishment of LPIS in Slovenia. The software has been used for the last 7 months with great success by more than 1100 consultants across the country. Because the solution is optimized specifically for the problem of LPIS, we strongly believe that it is suitable for other transition countries and new ascension countries.

In our demonstration we will present different parts of the software and their most beneficial features, including:

1. The LPIS client application
   - High performance on conventional, low cost hardware (more than 300 concurrent users 10 hrs/day ~ 3000 man-hours/day)
   - High throughput (and scalability) on low-speed communication lines
   - Effortless installation using Java WebStart
   - Advanced custom-made tools for easier editing of LPIS data
2. LPIS Support Center and Administration Tool
   - Overview of the system parameters (lists of active users, DB communication, data throughput, CPU load of the application servers, access to application logs …)
   - Real-time inspection of user sessions (ability to see the mistakes that the user is making)
   - Conference editing – the support center expert can help the user solve difficult cases
3. LPIS web viewer for farm holders
   - Pure HTML for easy access, user-friendly navigation
   - Advanced tools, such as intersection of a markup with the cadastral parcels

Keywords: LPIS, distributed system, support center, Java, web viewer, low-cost, scalability

5. Mixing sources of geo-information for agricultural user community support

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Recent advancements in geoICT bring the integration of Earth Observation (EO), Global Navigation Satellite Systems (GNSS) and GIS within reach of every day use. Protocols and standards however are scarce. This is hampering the cross-organisational implementation. Collaboration between the Dutch payment agency, research institutes, industry and service providors has lead to a successful pilot for mixing sources.

Within the Galileo programme of EC and ESA research is initiated to promote the use of GNSS. The FieldFact project focuses on mixing sources of geo-information for agricultural user community support. This presentation focuses on a first critical analysis of the integration of GNSS with EO and GIS and provides an outlook to developments like geo-enabled farm management systems, updating LPIS with GPS and LBS for farm advice.

Keywords: Galileo, EO, agricultural user community, farm advice, LPIS update, LBS

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Abstract

The 11th yearly CwRS Conference on Controls with Remote Sensing of area-based subsidies was organized by the JRC (Institute for the Protection and Security of the Citizen, AGRIFISH Unit, MARS PAC) on 23-25 November 2006 in Kraków, Poland.
The Conference was organized in cooperation with the ARMA (Polish Paying Agency) and the Polish Ministry of Agriculture. It was held at the Sheraton Hotel, in Kraków. For the first time part of the conference was successfully organized with five parallel sessions plus poster session. The number of the participants registered to the event was 309, representing 36 countries (EU25, AC (BG, RO), CCs (HR, TR), and representatives from Albania (AL), Serbia Montenegro (SCR), Kosovo (KS), Macedonia (MK), and Switzerland, Israel, USA. Some registered participants (7%, mainly from PL) had to cancel their participation leading to a final number of 287 participants, which is a similar audience as last conference in Budapest.
A specific agreement with DG ELARG (TAIEX office) allowed the participation of above mentioned representatives from the CARDs countries. An important point was the involvement of the D1 Unit of DG AGRI who accepted to (co) chair 2 sessions. DG AGRI was in all present with 6 participants. JRC (Public Relations and IPSC AgriFish Unit) participated with 13 staff. The Conference in general gave input on the 2005 achievements, the new legislation, the problems and the solutions by the Member States, some approaches and considerations from the DG Agriculture, the technical progress, and the plans for 2006. Moreover, the EU, the MS Administrations, the Image Providers, and the contracting companies had a chance to meet each other and have discussions.
These proceedings are divided into two volumes (Volume 1 and Volume 2): the 1st one including all Plenary Sessions S1-S4, the 2nd one including all Parallel Technical Sessions (T1-T6).

The mission of the Joint Research Centre is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union policies. As a service of the European Commission, the JRC functions as a reference centre 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.