Use of Remote Sensing Imagery for GeoTraceability in Agriculture

STEREO & VEGETATION Workshop
6 May 2004 - Brussels

CENTRE WALLON DE RECHERCHES AGRONOMIQUES

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WALLOON REGION

Presentation

➤ **Traceability concept**
  (Basic concepts and approach)

➤ **Traceability Context**
  - Legislation (EU-CAP, National…)
  - IACS/LPIS

➤ **GeoTraceability concept**

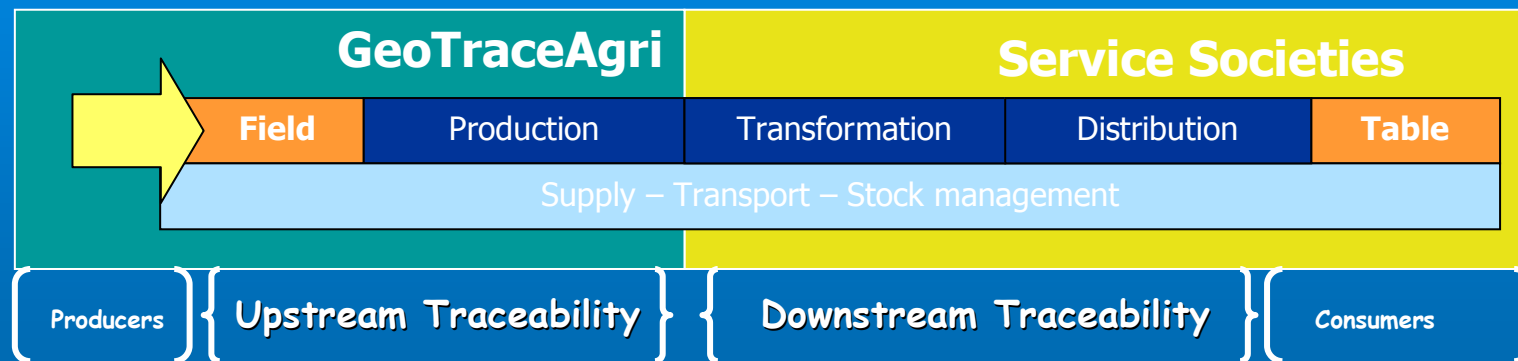➤ **Opportunities/Potentialities of RS**

Traceability concept
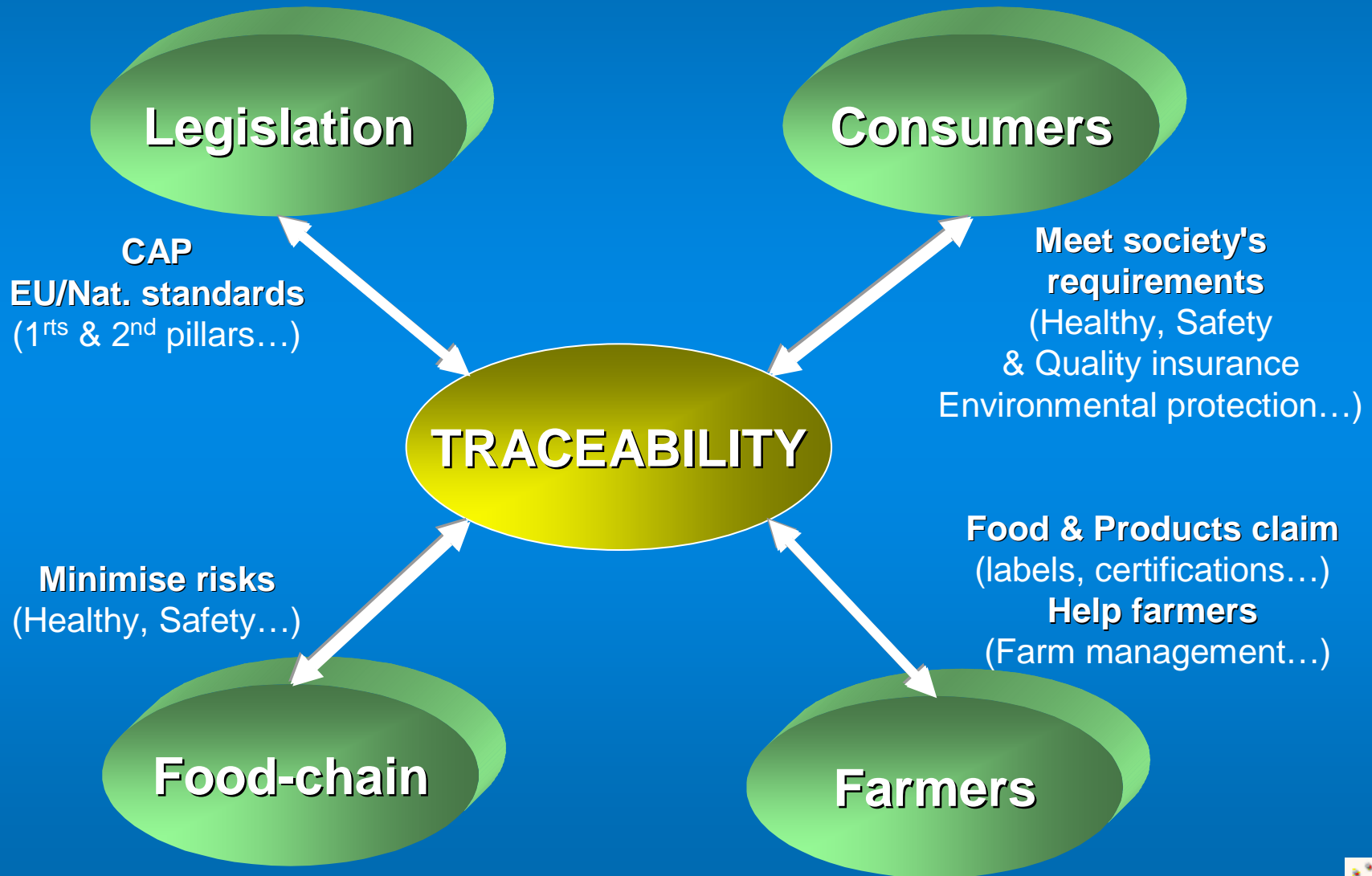
➤ <u>Traceability in agriculture</u>:

Ability to document, trace and follow a food or feed product through all stages of its life, from its creation (production) up to its consumption (distribution).

➤ <u>Tracing:</u>

Determining the « history » throughout the agri-food chain.

GeoTraceAgri			Service Societies		
	Field	Production	Transformation	Distribution	**Table**
	Supply – Transport – Stock management				

{ Producers } { **Upstream Traceability** } { **Downstream Traceability** } { Consumers }

GeoTraceability concept

Legislation

Consumers

CAP
EU/Nat. standards
(1^{rts} & 2nd pillars…)

Meet society's
requirements
(Healthy, Safety
& Quality insurance
Environmental protection…)

TRACEABILITY

Minimise risks
(Healthy, Safety…)

Food & Products claim
(labels, certifications…)
Help farmers
(Farm management…)

Food-chain

Farmers

Traceability context: CAP orientations

➢ <u>Actual CAP</u>

- Management and control of agricultural area based subsidies
- IACS concept

➢ <u>CAP Reform</u>

- Market orientation (consumer driven)
- Quality initiative & Food Safety
- Environment protection
- Rural development
- LPIS concept

Traceability scheme

Traceability context: LPIS

➢ Main purpose of the LPIS are to provide
- An unique parcel identification number
- A geographic location
- An area for any agricultural parcel

➢ In 2000: Reg 1593/00 make compulsory digital LPIS and GIS
- Digital maps
- Orthophotos

➢ Jan 2005: LPIS/GIS fully implemented

In practice, the LPIS provides a reference system at the parcel level, allowing the identification and the cross checks of all the parcels declared in a given campaign.

GeoTraceability concept

GeoTraceability because:

- Traceability at the parcel level (IACS/LPIS). Recording and monitoring all the field operations.

- Traceability entails the measurements of both, the environmental and climatic conditions occurring naturally, that may affect the food safety (risk, standards…).
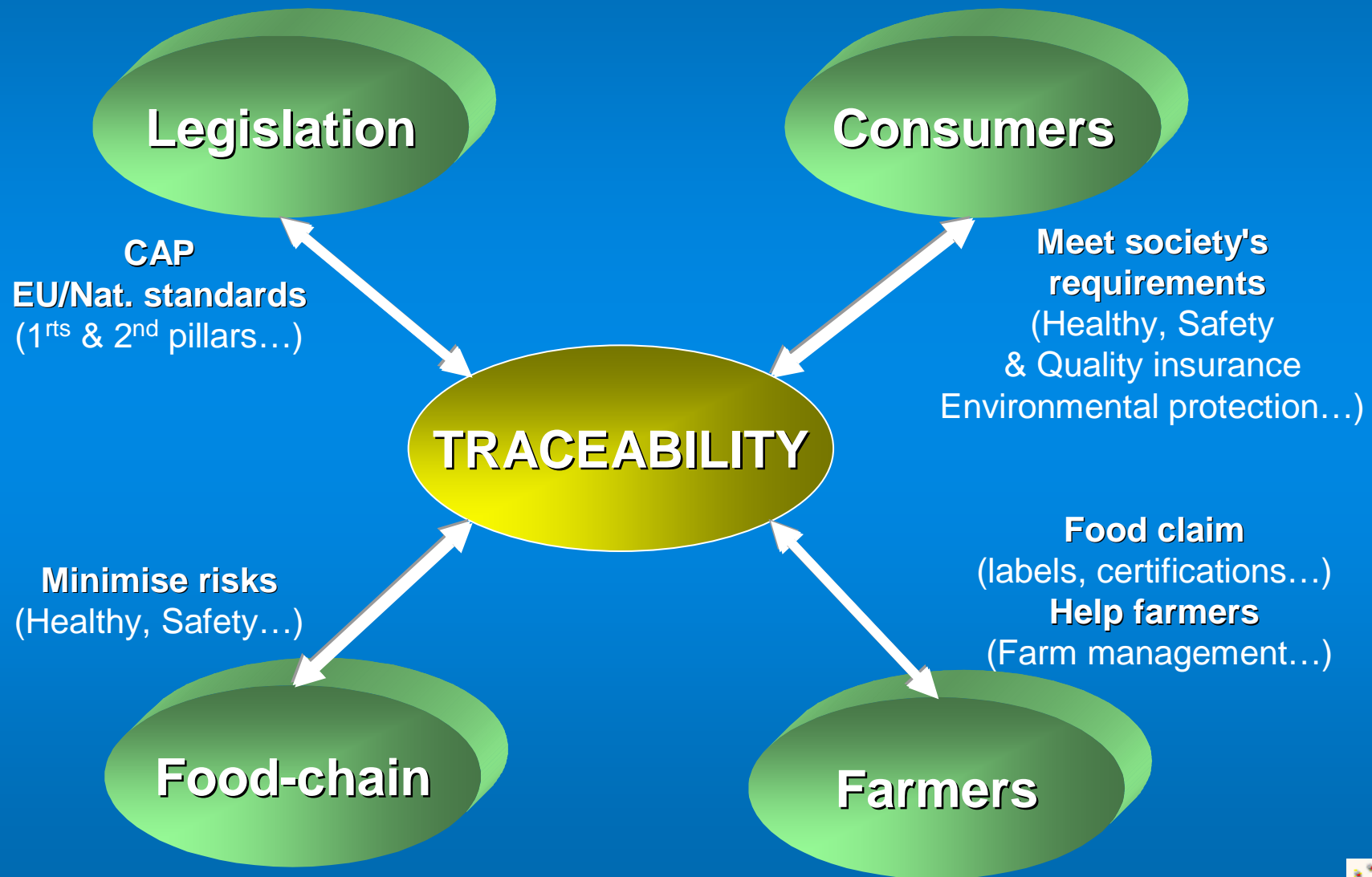
Potentialities of Remote-Sensing

Climate

Characteristics
⇒**Spectral RS potentialities**
   (Multi-spectral)

Crops

Pa...

Multi-Seasonal

Event
⇒**Temporal RS potentialities**
   (Multi-temporal)

Season

Decade

Event

Region

Soil

Environment
⇒**Spatial RS potentialities**
   (Multi-scale)

Potentialities of Remote-Sensing

➢ EO capacities have already been used intensively for monitoring agriculture (MARS-EU, B-CGMS, SAGRIWATEL…)

➢ To calculate Geo-indicators that complement the LPIS
- Fixed time interval
- Fixed periodes / dates
- Covering large territories
- For parcels and farm surroundings

GeoTraceability concept

Legislation

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TRACEABILITY

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(labels, certifications…)
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Food-chain

Farmers

Opportunities of Remote-Sensing (cont.)

> ## Control of declarations in the traceability process:

- Reduce *in situ* control process
- Contribute to cross-checks

✓ Check of agricultural land-use declaration

✓ Check of parcel acreage declaration

Overlay IACS with geo-corrected SPOT-XS or IKONOS images
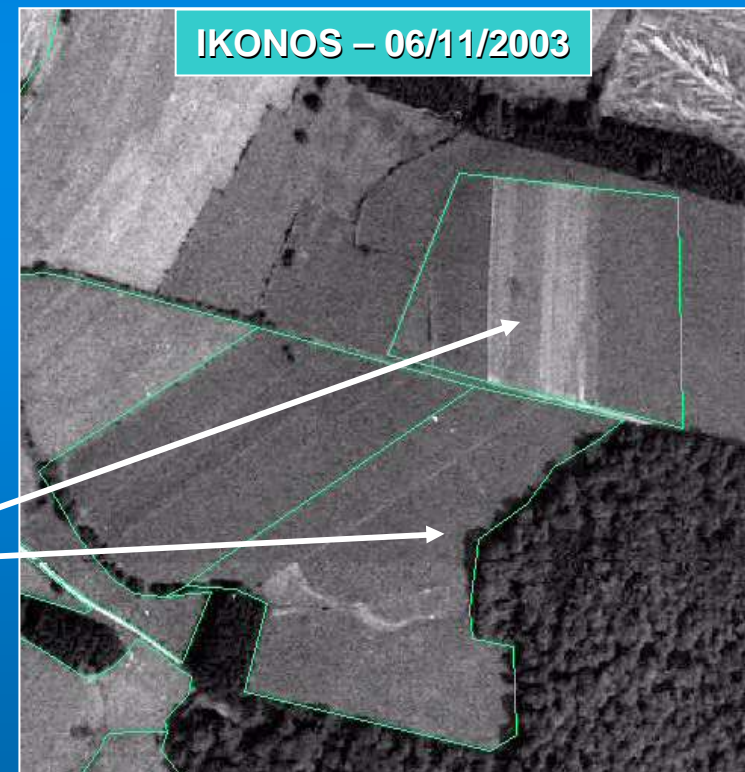
IKONOS – 06/11/2003

Opportunities of Remote-Sensing (cont.)

➢ **Control of declarations in the traceability process:**

- Reduce *in situ* control process
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✓ Check of agricultural land-use declaration.

✓ Check of parcel acreage declaration

✓ Control specific EU/Nat. standards for:
  - **certifications, labels…**

Buffer zones

IKONOS – 06/11/2003

Opportunities of Remote-Sensing (cont.)

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- Reduce *in situ* control process
- Contribute to cross-checks

✓ Check of agricultural land-use declaration.

✓ Check of parcel acreage declaration

✓ Control specific EU/Nat. standards for:
- **certifications, labels…**
- **environnemental protection (AEMs)**

Hyperspectral – 06/2003

Not yet pastured

Just pastured

**One IACS parcel but
Lower part = normal practice
Upper part = late cutting (AEM)**
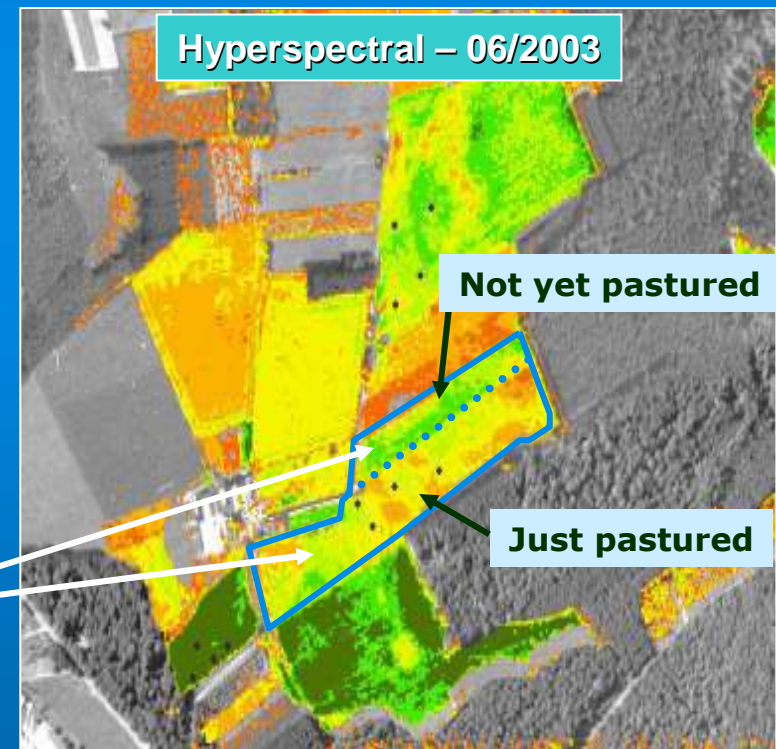
Opportunities of Remote-Sensing (cont.)

> ## Historical information for GeoTraceability process:

- New declared parcel
- New EU/Nat. legislation/standards

✓ No declarative information available, so if new information is needed we can expect to find it in archive imagery.

✓ Land-Cover / Land-Use change e.g. Forest ↔ Crops

SPOT time series

Begin A

End

Begin

Mid July 2000

UL_g

OSTC
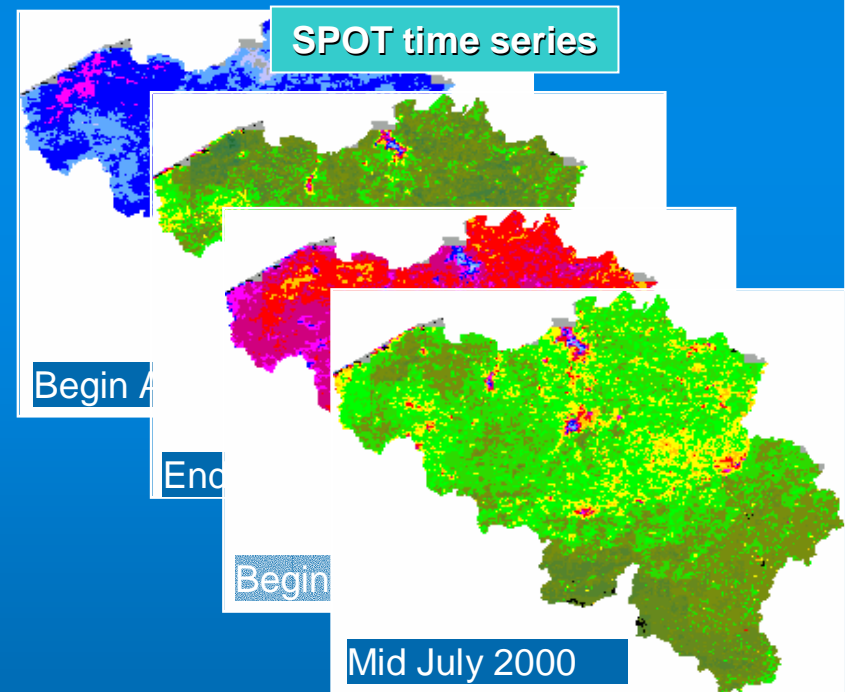
Opportunities of Remote-Sensing (cont.)

> ## GeoTraceability for food & products promotion :
>
> - Characterisation of the environment of the parcel
> - Surrounding parcels

✓ Characterisation of parcels environment as part of the certification

Generic indicators

✓ Spatial analysis and diagnosis of the parcel according to surrounding parcels

Proximity indicators
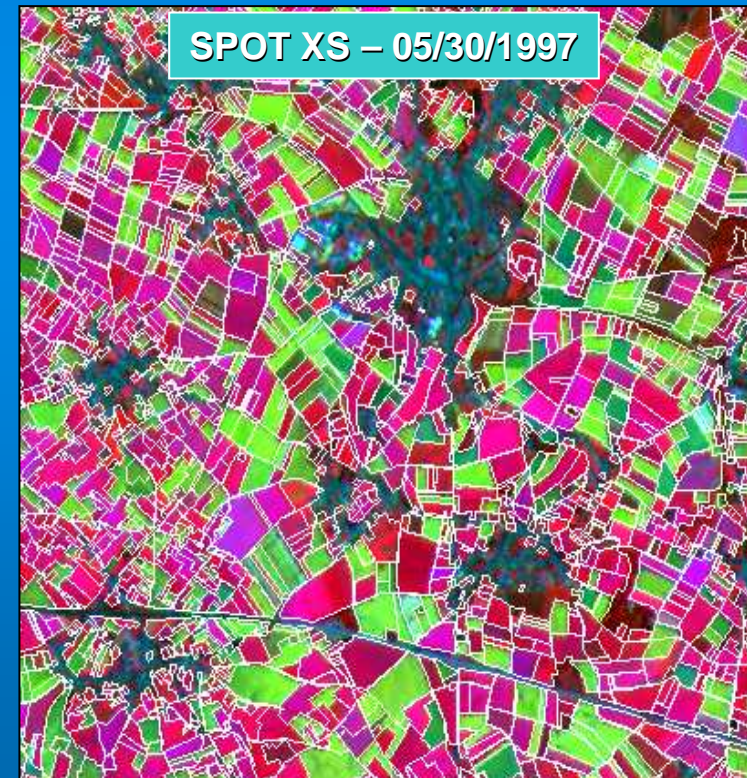
SPOT XS – 05/30/1997

Opportunities of Remote-Sensing (cont.)

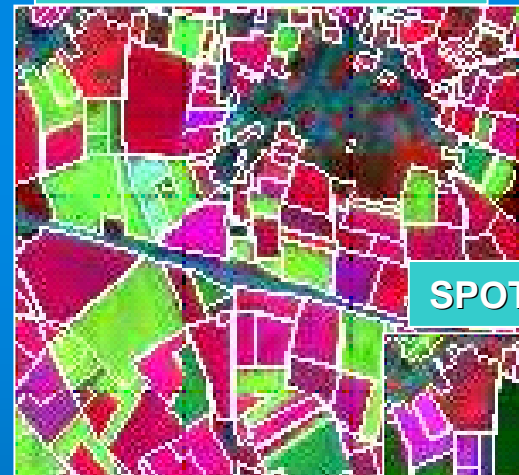> ## GeoTraceability for food & products promotion :
>
> - ### Agri-Environmental Measures
> - ### Farm-management

✓ Indicators related to agricultural and agri-environemental practices during the season:

  - fertilisation,

CASI-SWIR spectroradiometers

Site A

Site B

Site C

Agri-environmental indicators

Opportunities of Remote-Sensing (cont.)
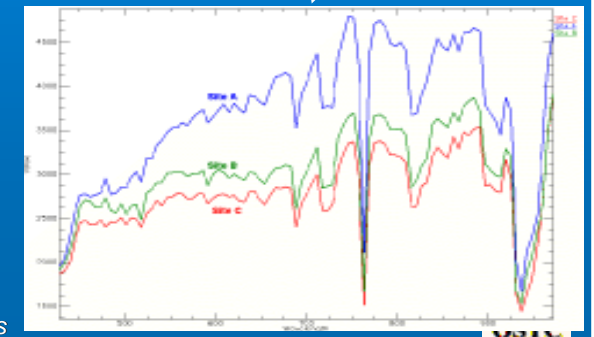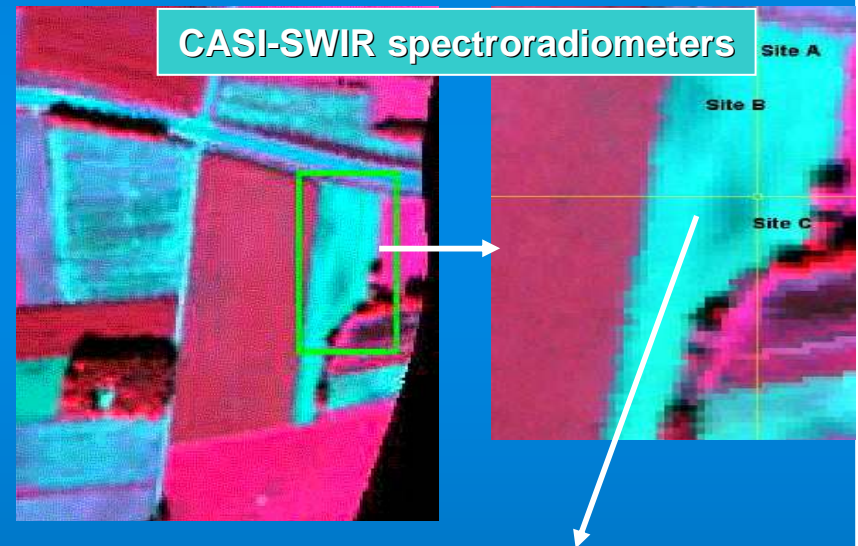
➢ <u>GeoTraceability for food & products promotion :</u>

- Agri-Environmental Measures
- Farm-management

✓ Indicators related to agricultural and agri-environemental practices during the season:
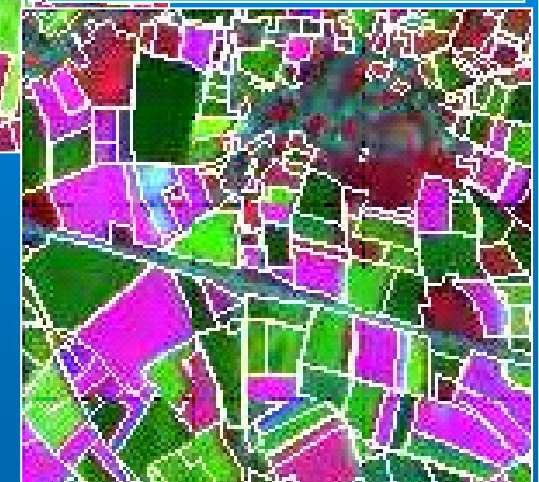
- fertilisation,
- length of the growing period,
- biomass and yield
- …

Agri-environmental indicators

SPOT-XS, 30 May 1997

SPOT-XS, 6 August 1997

Opportunities of Remote-Sensing (cont.)

➢ **GeoTraceability for food safety promotion:**

- Diseases
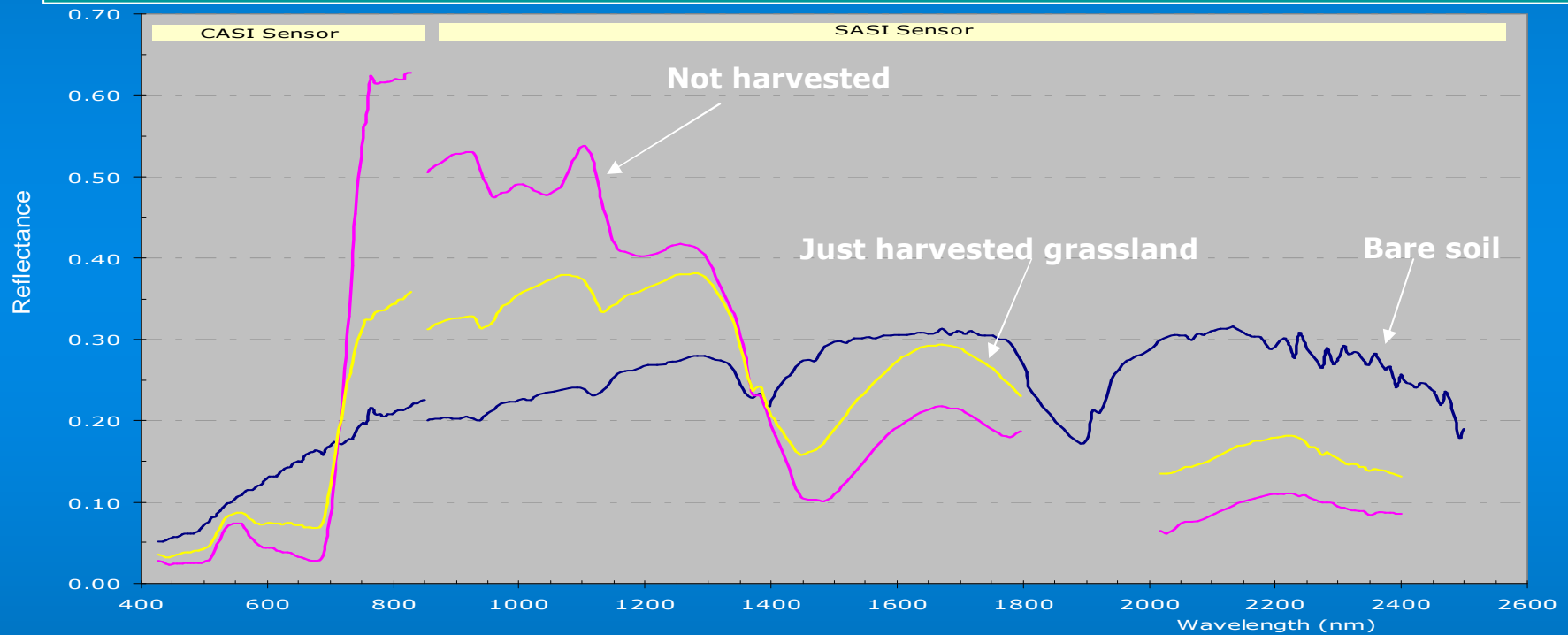- Contamination risks

CASI-SWIR spectroradiometers

Lacks / Heterogeneity inside the field

Unharmed crop parcel

Opportunities of Remote-Sensing (cont.)

> ## GeoTraceability for food quality promotion:

To summarize

The support of remote sensing in geotraceability can be summarised as follow:

• To complement and reinforce the diagnosis at parcel & farm level.

• To better focus field inspections related to traceability

• To better support the update process of LPIS

• To complement the analysis of the impact of agricultural production on the surrounding of the parcel & farm
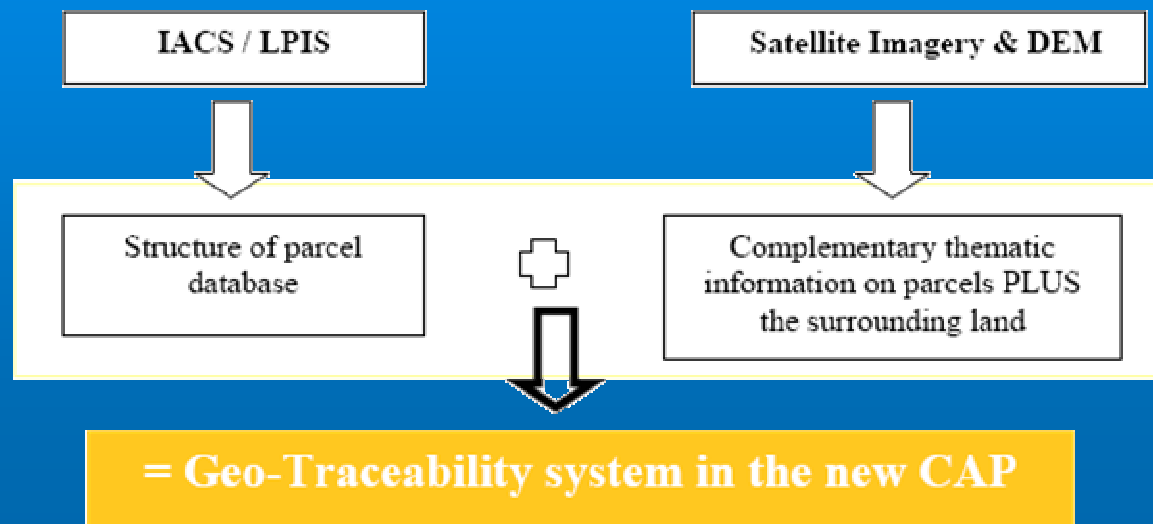
Conclusion

- IACS/LPIS = reference database system for traceability
    - Provides exhaustive information on parcels for all agricultural parcels in Europe.
    - Gives information on the parcel practices

- Remote-Sensing is a complementary tool
    - Capture non declarative and periodic information.
    - On large territories.
    - Give information on practices carried out on surrounding parcels.
    - To provide and to facilitate the calculation of complementary GeoTraceability indicators.

- **GeoTraceAgri project (FP5-IST)**

CRA-W (Belgique), FUL-ULg (Belgique), CDER Informatique (France), CCI Gers (France), CIRAD (France), U-Laval (Canada)

- **GTIS-CAP (FP6-SSP)**

CRA-W (Belgique), FUL-ULg (Belgique), CIGEST (Belgique), SPOT (France), CCI Gers (France), ACTA (France),CDER Informatique (France)