5th Conference on

Control with Remote Sensing of Area-based Subsidies

25-26 November 1999
Grand Hotel Bristol
Stresa, Italy

PROCEEDINGS

MARS Project - Monitoring Agriculture with Remote Sensing

ARIS Unit - Agriculture and Regional Informaton Systems Unit

http://mars.aris.sai.jrc.it/

Sai Space Applications Institute

I.S.P. 00.44

JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

5th Conference on

Control with Remote Sensing of Area-based Subsidies

25-26 November 1999
Grand Hotel Bristol
Stresa, Italy

PROCEEDINGS

About the cover page illustration:
On the edge: this 1999 image composite illustrates the complementarity of the two major remote sensing techniques used in the Controls programme. Ortho-imagery is increasingly used throughout the Union to check parcel size, while multi-temporal satellite image data serves to recognise the actual land use. The use of digital vector databases is crucial to systematically administer and control farmers' application for area based support measures. *(Satellite image © CNES 1998. Ortho-photo and vector data supplied by SIRS France as part of the quality control 1998 data.)*

MARS Project - Monitoring Agriculture with Remote Sensing

ARIS Unit - Agriculture and Regional Informaton Systems Unit

http://mars.aris.sai.jrc.it

Sai Space Applications Institute

S.P.I.00.44

Printed in Italy

JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

Foreword

On 25 and 26 November 1999, the MARS project of the Space Applications Institute hosted the "5th Conference on Control with Remote Sensing of Area-based Subsidies" in Stresa, on the western bank of the Lago Maggiore. The MARS project, supporting the DG AGRI and National Administrations involved in the Control programme, organised this conference to review results from the campaign just concluded and to examine technical challenges ahead. These proceedings give a printed record of that event.[1]

More than 130 participants attended the Conference: representatives from the Commission, from National and Regional Administrations (mainly Ministries of Agriculture), contractors from the various Member States and providers of satellite images. And for the first time, representatives from candidate Member States in Central and Eastern Europe and the Baltic States had been invited to the venue. Indeed, as the Commission is planning to extend its agricultural aid system into aspiring Member States, we could share our experience from using remote-sensing tools to check farmer's applications with their agricultural administrators and remote-sensing specialists in order to support their technical preparations for adhesion to the European Union.

In retrospect, since the co-financing of the Control programme ended in 1998, from 1999 onwards the Member States have had to incur the full cost of their contracts with their national partners (only the satellite images remain fully financed by the Commission). The fact that all Member States but Luxembourg decided to participate in the 1999 campaign testifies to how widely applicable - and cost-efficient - these remote-sensing checks are: a common methodology that is implemented, with certain national adaptations, throughout the European Union. Gauged by the number of satellite images ordered, processed and analysed every year, this activity remains the largest civilian application of remote sensing in Europe.

In prospect, looking at burgeoning techniques for the third millennium, the Conference featured a presentation on the technical characteristics of a new, very-high-resolution satellite (IKONOS), whose geometric resolution approaches that of aerial photos. The Commission, in order to test out the potential of using IKONOS images in the operational context, will provide the contractors of the 2000 Control campaign with such images on an experimental basis.

On another level, the Conference devoted a session to novel ideas for using Internet to distribute (and eventually retrieve) cartographic information and application forms to local offices and farmers, methods that are already being tested out in some Member States. In the not-so-distant future, the day that digital signatures have become safe and legally accepted, the administrative onus of disseminating and collecting farmers' applications could be drastically reduced.

These proceedings have been distilled directly from the digital presentations submitted by the speakers, and as such they do not purport to represent views endorsed or validated by the Commission. That is, the information provided and opinions expressed herein are the authors' alone and fall under their responsibility.

On behalf of the Control team of the MARS project, I want to thank everyone who contributed to making this Conference the summit of the 1999 campaign.

Tore Tollefsen

[1] The digital version of the proceedings, released shortly after the Conference, can be found on the MARS Web site: http://mars.aris.sai.jrc.it/control/meetings/stresa99.

Greetings from the candidate Member States

It was a special pleasure for all of us, representing the candidate Member States, to participate in the "5th Conference on Control with Remote Sensing of Area-based Subsidies". This was a joyful reunion with some colleagues, well known experts or representatives of the MARS program as well as with some other people, from the EU and Central and Eastern Europe. Although we have thoroughly watched the progress of MARS from 1989 and have been aware of the MARS CAP and operational subsidy control by remote sensing, this was the first occasion to attend the conference as invited observers.

Similarly to the present EU members, the countries in CEE have had their special history in remote sensing and subsidy control. Poland and Hungary were among the first countries to start application oriented R&D programmes in remote sensing at about 1980. Beyond the basic heterogeneity in objectives, resources and background in the region, the common feature was the low level of international co-operation opportunities. This dramatically improved in the 1990's.

Hungary launched a relatively ambitious RS national program as early as in 1980 with priorities to promote agricultural and environmental applications. In some CEE countries, remarkable R&D efforts were made. The entirely remote-sensing based national crop monitoring and production forecast system operation (CROPMON: from 1997 – to date) was preceded by a 300 man per year vast investment.

In 1995-96 we developed the concept of a multipurpose agricultural parcel based information system at national level in Hungary. From this origin a program was developed for the IACS and remote sensing based subsidy control soon (1997). The operational CROPMON's infrastructure and expertise, the very good co-operation between the Ministry of Agriculture and Regional Development and the Remote Sensing Centre, FÖMI, proved to be a good basis. This paved the way for the initiation of harmonised programs for the development of the land registration and administration system (PARCELLA), the area based subsidy control and the IACS at the same time.

Special pilot projects have been accomplished from 1998 for the accurate vineyard survey by historical growing region and for the control of area based national subsidy and partial loss compensation programs (waterlog) on remarkable areas in Hungary (1999). We have worked hard to synthesise and study the EU regulations of subsidy control and the application of remote sensing in this so that we could help the Hungarian legislation's convergence. We studied the system of the control in 8 Member States and the overall performance of the program at the EU level. FÖMI designed (1999) a remote sensing based control system that will operate in Hungary. This is based on the cadaster, but there are efforts to gradually shift to the land parcel approach. We started an ortho-photo program to support this goal.

Despite these preparations here in Hungary and similarly in other candidate countries, there were many topics at the Conference that excited us and also gave impetus to our further programs and co-operation with the MARS project. Having had application experiences with IRS PAN data we also have expectations to IKONOS images. FÖMI and the land offices operate a dedicated network for cadaster GIS data transmission so that the efficient Internet transmission technology of cartographic data was also in our interest. It was primarily the standardisation topics, efforts (e.g. measurement tolerances, the quality control system) that gave us a lot new information. It was good to feel the same fresh air and fertilising as during our co-operation with the MARS program in the early and mid nineties. The proven and distilled knowledge and experience that have been accumulated in the EU Control program, inspires and helps us in the gradual development of our national program and also provides us with a capability to help the national systems regulation's harmony by the time of the accession.

The candidate countries were pleased to respond to the kind invitation of the MARS, SAI organisers to provide a cross section of their related programs and results through posters.

On behalf of the candidate countries' experts, I sincerely greet the conference, appreciate the Control Program's achievements and also state that we are ready for the co-operation and an active contribution to the program.

Gábor Csornai
Hungary

Programme

Thursday, 25 November 1999

Session 1: Summary of 1999 campaign

Welcome and introduction	O. Léo
Summary tables and review of the 1999 campaign	T. Tollefsen
Methodologies, problems and improvements	O. Léo
Acquisition and delivery of satellite data in 1999	G. Peroni
Quality control in 1999	J. Masson

Session 2: Technical issues of 1999 campaign

Introduction	O. Léo
Complementary use of ortho-images in LPIS	G. Lemoine
First RS Control campaign using the new LPIS: advantages, problems	L. Tournas, Eratosthenes (GR)
Use of Remote Sensing for Control of the Livestock Extensification Subsidy	D. Reddington, DAF & B. McHugh, The Icon Group (IE)
Inventory of ineligible areas in Italy	F. Steidl, CCIA (IT)

Session 3: Images and image processing

Introduction	G. Peroni
The IKONOS system and its potential applications to area-based subsidies	N. Spiropoulos, SIE (GR)
The Radarsat imagery option for RS Control	E. Smith, Icon (IE)
Automatic classification in RS Control	M. Wooding, RSAC (UK)

Poster session, software demonstrations & cocktails

Friday, 26 November 1999

Session 4: Agro- Environmental Measures

Introduction	P. Åstrand, JRC
Checking AEMs in France with remote sensing	E. De Laroche, CNASEA (FR)
Checking implementation of AEMs with remote sensing in Sweden	Å. Svensson, SJV (SE)
Control in Austria: modified approach, adapted to Austrian requirements	G. Mansberger, Geospace (AT)

Session 5: Special topics

Introduction	T. Tollefsen, JRC
Pilot study of technical tolerances in Greece	M. Matsouki, Fasma (GR)
Quality control of field visits using CASI scanner	U. Minelli, P. Ragni, Aquater (IT)
Technical aspects of Landsat 7 and Direct Video Broadcasting	R. Biasutti, L. Rossi, Eurimage (IT)

Session 6: Ideas for Electronic Transmission of declaration data

Introduction	G. Lemoine, JRC
Using Internet to distribute LPIS data and application forms in Denmark	K. Nybye, B. Pedersen, Min. (DK)
Web services and GIS applications for farm register	G. Valenza, CSIA (IT)
Integrated control via the Internet	R. Kidd, JRC
Serving large image data-sets	J. Cutler, GISL (UK)

Conclusions

Session 1:

Summary of 1999 campaign

Welcome and introduction	O. Léo
Summary tables and review of the 1999 campaign	T. Tollefsen
Methodologies, problems and improvements	O. Léo
Acquisition and delivery of satellite data in 1999	G. Peroni
Quality control in 1999	J. Masson

5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999

Slide n°1

5eme Conférence «Contrôles par Télédétection»

Stresa, 25- 26 novembre 1999

Introduction

- Contexte et objectif de la conférence
- Le Programme
- Les participants
- Informations Pratiques

Sai *Agriculture and Regional Information Systems Unit*

JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999

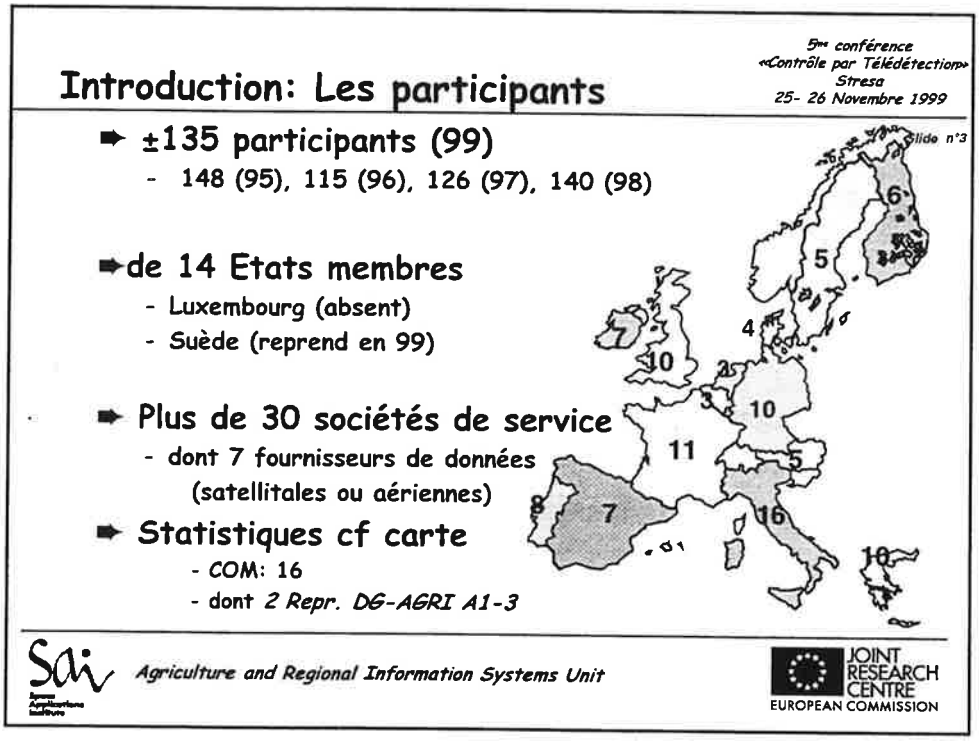
Contexte et objectif de la conférence

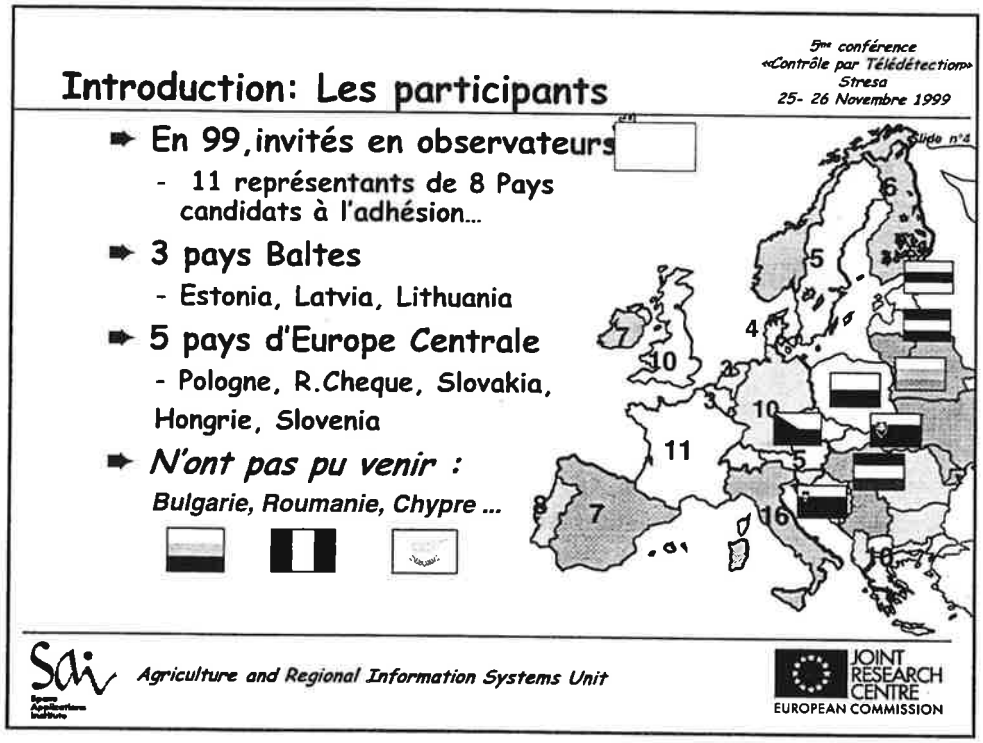
Slide n°2

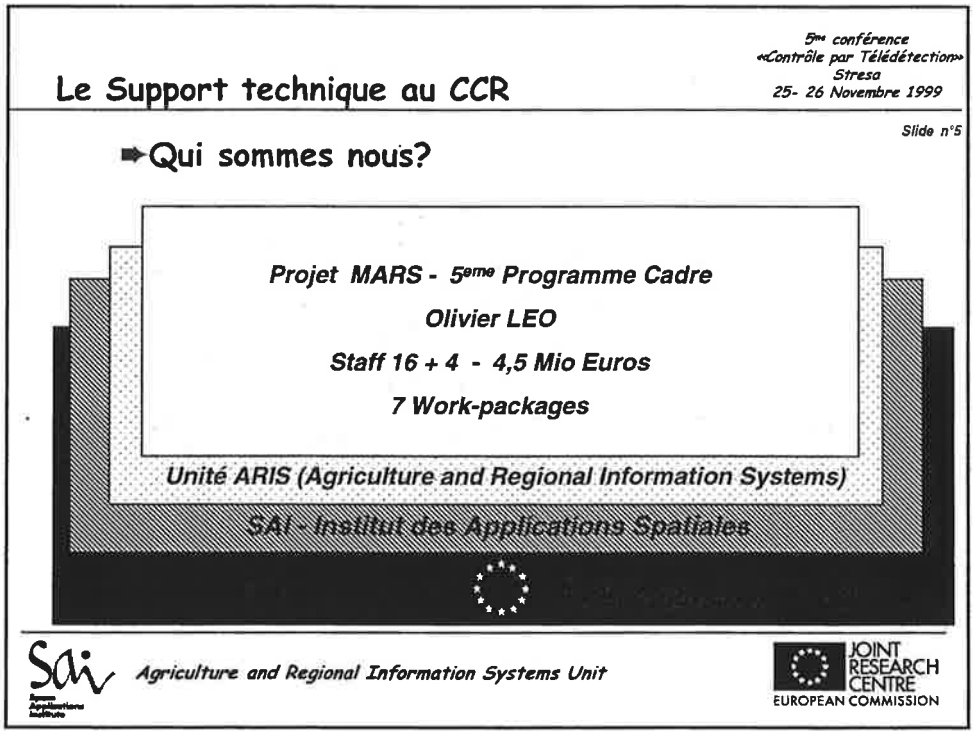
- **1999... la 5eme conférence**
  - la septième année des contrôles par télédétection
- **1999... une année clef:**
  - 1ere année sans cofinancement
    - 10-15% des coûts des sites TLD
    - 0% des sites avec photographies aériennes...
  - regroupement du support technique au CCR
    - mise en place d 'une équipe technique de 5 personnes
    - au sein du projet MARS
    - Nouveau 5eme programme cadre du CCR (1999-2002)
    - Nouvelles relations de travail avec la DG VI A1-3.

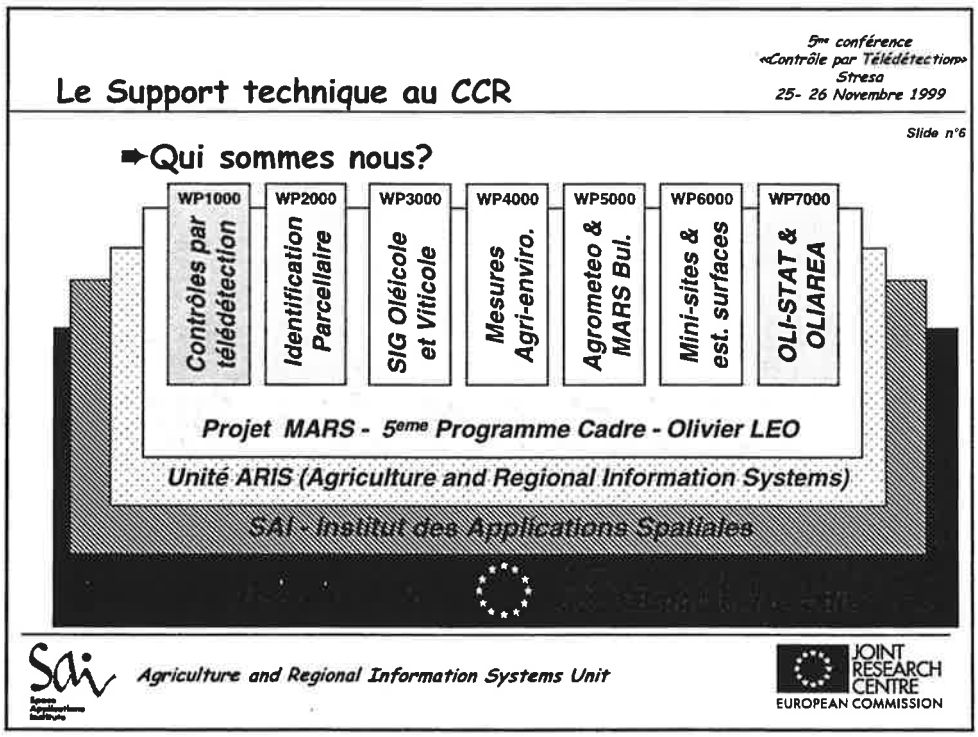
Sai *Agriculture and Regional Information Systems Unit*

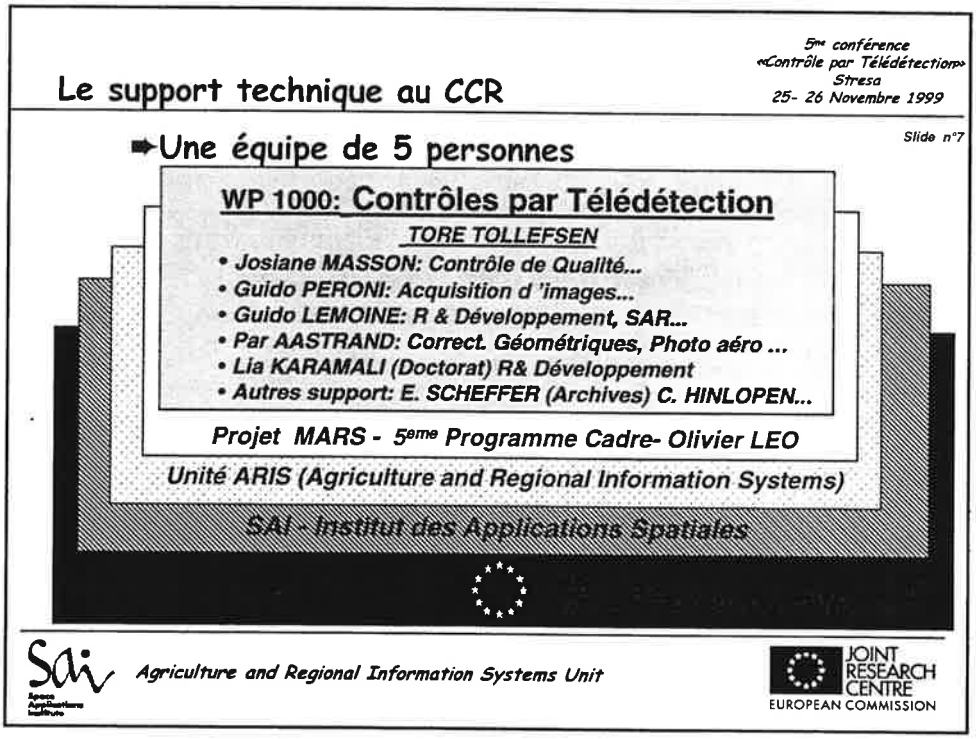
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

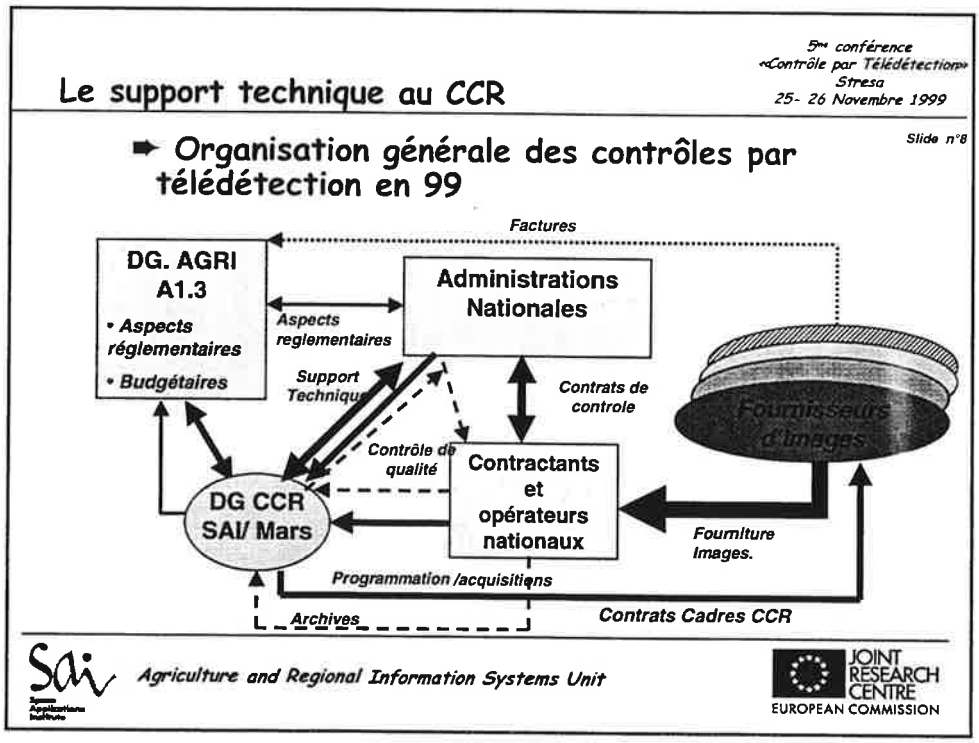

5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Introduction: Les participants
±135 participants (99)
- 148 (95), 115 (96), 126 (97), 140 (98)
de 14 Etats membres
- Luxembourg (absent)
- Suède (reprend en 99)
Plus de 30 sociétés de service
- dont 7 fournisseurs de données (satellitales ou aériennes)
Statistiques cf carte
- COM: 16
- dont 2 Repr. DG-AGRI A1-3
Slide n°3
Agriculture and Regional Information Systems Unit
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION


5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Introduction: Les participants
En 99, invités en observateurs
- 11 représentants de 8 Pays candidats à l'adhésion...
3 pays Baltes
- Estonia, Latvia, Lithuania
5 pays d'Europe Centrale
- Pologne, R.Cheque, Slovakia, Hongrie, Slovenia
N'ont pas pu venir :
Bulgarie, Roumanie, Chypre ...
Slide n°4
Agriculture and Regional Information Systems Unit
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION


5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Le Support technique au CCR
Slide n°5
➡Qui sommes nous?
Projet MARS - 5eme Programme Cadre
Olivier LEO
Staff 16 + 4 - 4,5 Mio Euros
7 Work-packages
Unité ARIS (Agriculture and Regional Information Systems)
SAI - Institut des Applications Spatiales
Agriculture and Regional Information Systems Unit
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION


5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Le Support technique au CCR
Slide n°6
➡Qui sommes nous?
WP1000
Contrôles par télédétection
WP2000
Identification Parcellaire
WP3000
SIG Oléicole et Viticole
WP4000
Mesures Agri-enviro.
WP5000
Agrometeo & MARS Bul.
WP6000
Mini-sites & est. surfaces
WP7000
OLI-STAT & OLIAREA
Projet MARS - 5eme Programme Cadre - Olivier LEO
Unité ARIS (Agriculture and Regional Information Systems)
SAI - Institut des Applications Spatiales
Agriculture and Regional Information Systems Unit
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION


5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Le support technique au CCR
Slide n°7
Une équipe de 5 personnes
WP 1000: Contrôles par Télédétection
TORE TOLLEFSEN
• Josiane MASSON: Contrôle de Qualité...
• Guido PERONI: Acquisition d 'images...
• Guido LEMOINE: R & Développement, SAR...
• Par AASTRAND: Correct. Géométriques, Photo aéro ...
• Lia KARAMALI (Doctorat) R& Développement
• Autres support: E. SCHEFFER (Archives) C. HINLOPEN...
Projet MARS - 5eme Programme Cadre- Olivier LEO
Unité ARIS (Agriculture and Regional Information Systems)
SAI - Institut des Applications Spatiales
Agriculture and Regional Information Systems Unit
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION


5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Le support technique au CCR
Slide n°8
Organisation générale des contrôles par télédétection en 99
Factures
DG. AGRI A1.3
• Aspects réglementaires
• Budgétaires
Aspects reglementaires
Administrations Nationales
Support Technique
Contrats de controle
Fournisseurs d'images
Contrôle de qualité
DG CCR SAI/ Mars
Contractants et opérateurs nationaux
Fourniture Images.
Programmation /acquisitions
Archives
Contrats Cadres CCR
Agriculture and Regional Information Systems Unit
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Le support technique au CCR

Slide n°9

- **Les objectifs du support technique**
  - Veiller à la bonne mise en oeuvre des techniques et au respect des réglementations
  - Maintenir un niveau Européen:
    - Homogénéité des approches et méthodes
    - Cahier des charges et recommandations techniques Communes
    - Echanges, transparence, cohérence...
  - Améliorations et développement de nouvelles approches...
- **Les modalités du support technique**
  - Visites techniques et rapports...
  - Contrôles de qualité
  - Conférences, séminaires, Eurocourses (Adm.seules)
  - Accueil au CCR d 'experts nationaux détachés?

Sai Agriculture and Regional Information Systems Unit

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Introduction: Le programme

Slide n°10

- **Conférence: 6 sessions, avec:**
  - Une session de bilan de la Campagne 99
  - Une Revue des différents aspects techniques
  - Une session 4:

    Contrôles de mesures Agrienvironementales
  - Deux thèmes importantes pour le futur:

    L'arrivée des satellites de très haute résolution.... IKONOS 2

    L'utilisation croissante des techniques Internet (session 6)

Sai Agriculture and Regional Information Systems Unit

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Introduction: Le programme

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Slide n°11

- 22 présentations...
- Session Poster... env. 20
- 4 démonstrations logiciels / applications

- Proceedings en Février-Mars 2000

SVP Fournir dès que possible à

Corinne HINLOPEN (secrétariat conf.)

- une Copie papiers de votre présentation (interprètes)
- Copie digitale pour la publication

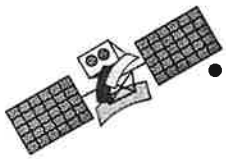
Sai Agriculture and Regional Information Systems Unit

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Introduction: Informations Pratiques

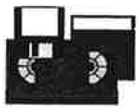
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Slide n°12



- Retour des Données satellite

Pour les archives du CCR



Voir Emilie SCHEFFER

Sai Agriculture and Regional Information Systems Unit

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Introduction: Informations Pratiques

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Slide n°13

- Problèmes logistiques? Remboursements?
  Voir le Secrétariat de la Conférence:
  Ulrike WINTER, Dorit SCHLITTENHART
- Remboursement (Administrations nationales, représentants des Pays candidats et certains conférenciers)
  - Formulaires + Photocopies des billets
  - et Carte accès à bord.
- Voyages et navettes aéroport...
- Notifier les demande de changement avant ce soir!!!
- Vérifier aussi vos coordonnées
  (liste de participants)

Sai Agriculture and Regional Information Systems Unit

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Introduction: Informations Pratiques

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Slide n°14

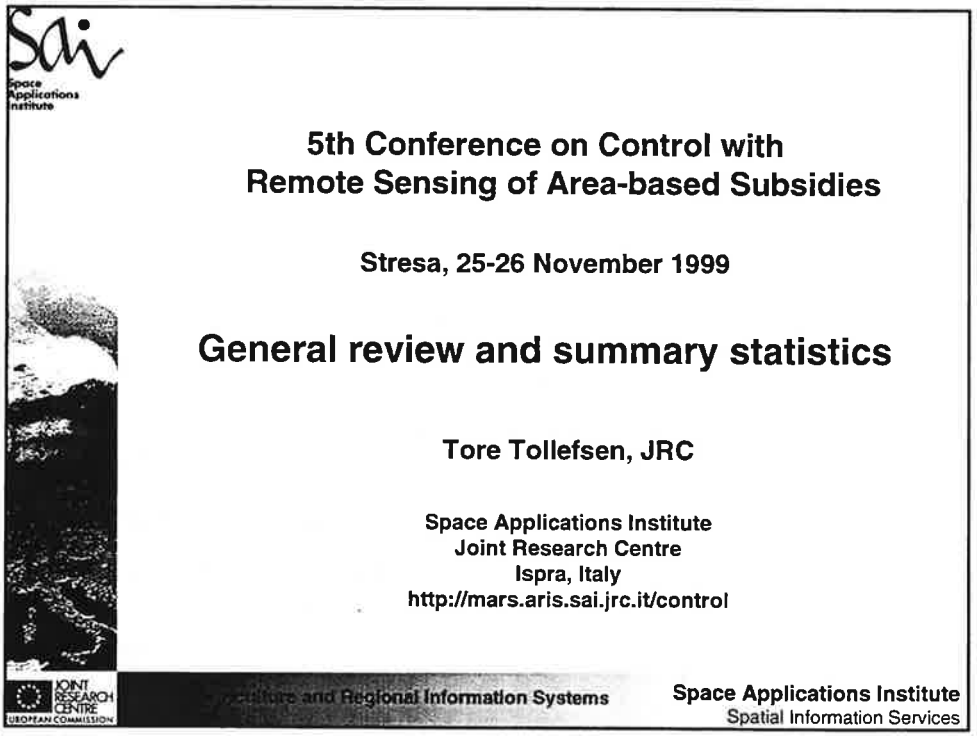
- Interprétation
  - 5 Langues parlées: ENG, FR, D, ESP, IT
  - 3 Langues écoutées: ENG, FR, D.

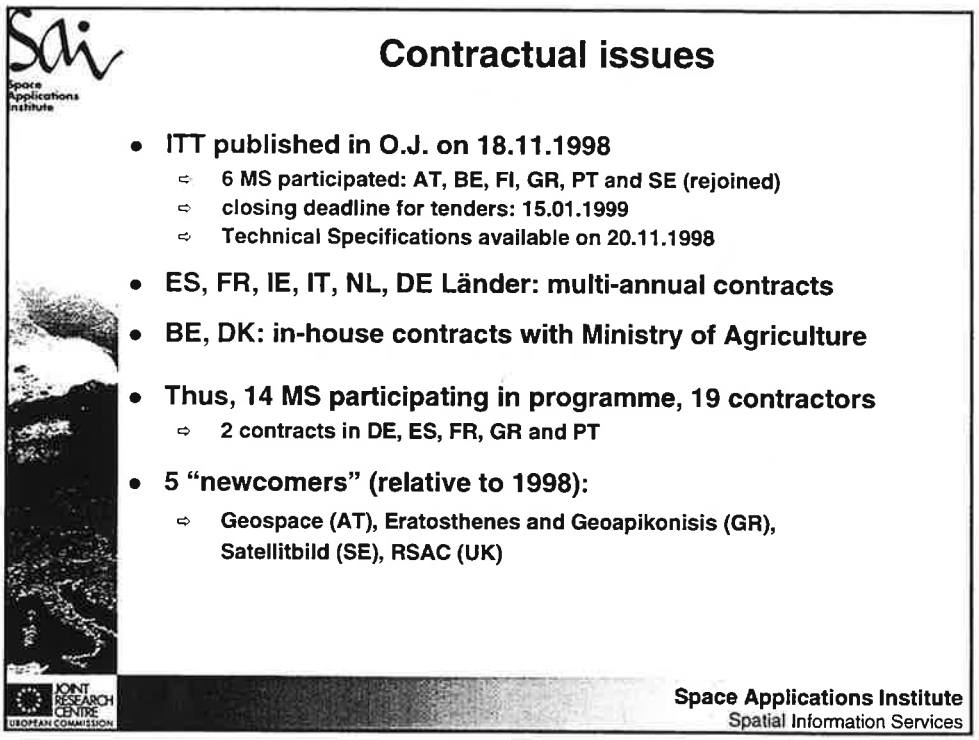
- Respectons les Horaires...
- Présentations et pauses Café

- *SVP, pas de téléphones cellulaires!*

Sai Agriculture and Regional Information Systems Unit

JOINT RESEARCH CENTRE EUROPEAN COMMISSION


Sai
Space Applications Institute
5th Conference on Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November 1999
General review and summary statistics
Tore Tollefsen, JRC
Space Applications Institute
Joint Research Centre
Ispra, Italy
http://mars.aris.sai.jrc.it/control
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services


Sai
Space Applications Institute
Contractual issues
ITT published in O.J. on 18.11.1998
6 MS participated: AT, BE, FI, GR, PT and SE (rejoined)
closing deadline for tenders: 15.01.1999
Technical Specifications available on 20.11.1998
ES, FR, IE, IT, NL, DE Länder: multi-annual contracts
BE, DK: in-house contracts with Ministry of Agriculture
Thus, 14 MS participating in programme, 19 contractors
2 contracts in DE, ES, FR, GR and PT
5 "newcomers" (relative to 1998):
Geospace (AT), Eratosthenes and Geoapikonisis (GR), Satellitbild (SE), RSAC (UK)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

Meetings and Commission visits

- **Kick-off meeting with all Administrations (April)**
  - ⇨ status of preparations for this campaign
- **Commission interim and technical visits to 7 MS, 8 contractors (June-July)**
  - ⇨ Geospace (AT)
  - ⇨ Eratosthenes and Geoapikonisis (GR)
  - ⇨ CCIA (IT)
  - ⇨ Geometral and Terracarta (PT)
  - ⇨ Satellitbild (SE)
  - ⇨ RSAC (UK)
  - ⇨ JRC-ONIC-AT Administration tri-lateral meeting in Lille (Sep.)
- **Commission participated in DE final meeting, Dresden (Oct.)**
  - ⇨ end-of-campaign meeting with BML and all Länder
- **IACS Expert Group meeting, Brussels (Nov.)**
  - ⇨ preparations for 2000 campaign
  - ⇨ ITT and Technical Specifications
- **5th Conference on Control with Remote Sensing (Nov.)**

Space Applications Institute
Spatial Information Services

Methodology

- **Technical Specifications**
  - ⇨ still two options for applying technical tolerances: at crop group or parcel level
- **Recommendations**
  - ⇨ Part 1: Site selection, image acquisition and delivery (April)
    - ❑ revised guidelines for site selection
    - ❑ technical information on satellite images, prices
  - ⇨ Part 2: Pre-processing of data and CAPI (April)
    - ❑ new chapter on geometric corrections and their quality checks
  - ⇨ Part 3: Technical tolerances and categorisation rules (April)
    - ❑ revised section on parcel area ceiling based upon LPIS area
    - ❑ technical tolerances at group or parcel level
  - ⇨ Part 4: Quality control (July)
    - ❑ re-definition of parcel tables, data delivery formats
    - ❑ enhanced quality control of geometric corrections of imagery

Space Applications Institute
Spatial Information Services

JRC Control team activities

- **Supervision and technical co-ordination**
  - launched common ITT on behalf of MS
  - co-ordinated Technical Specifications and Recommendations
  - launched new ITT for supply of satellite remote sensing data
- **Technical support to MS and follow-up of contractors**
  - made technical (interim) visits to contractors
  - created Web site for documents (http://mars.aris.sai.jrc.it/control)
  - launched RS Control Newsletter, with five issues so far
- **Site selection and image acquisition**
  - co-ordinated selection 100 sites with MS and image providers
  - ordered and distributed more than 700 satellite scenes to 18 contractors
- **Quality control**
  - continue external quality control of contractors' work
  - signed new contract with Hunting TS for 1999-2001 campaigns
- **Research and new methods**
  - evaluation of new sensors for possible inclusion in programme

Space Applications Institute
Spatial Information Services

Evolution of costs per campaign

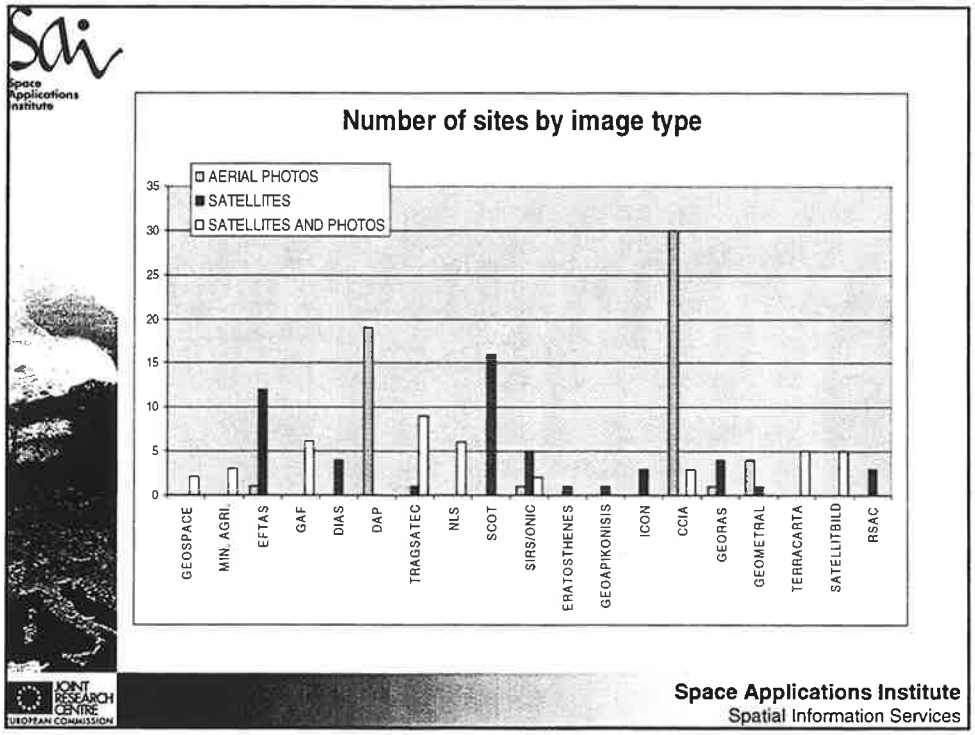
Costs of satellite images, analysis and quality control (in KEURO)

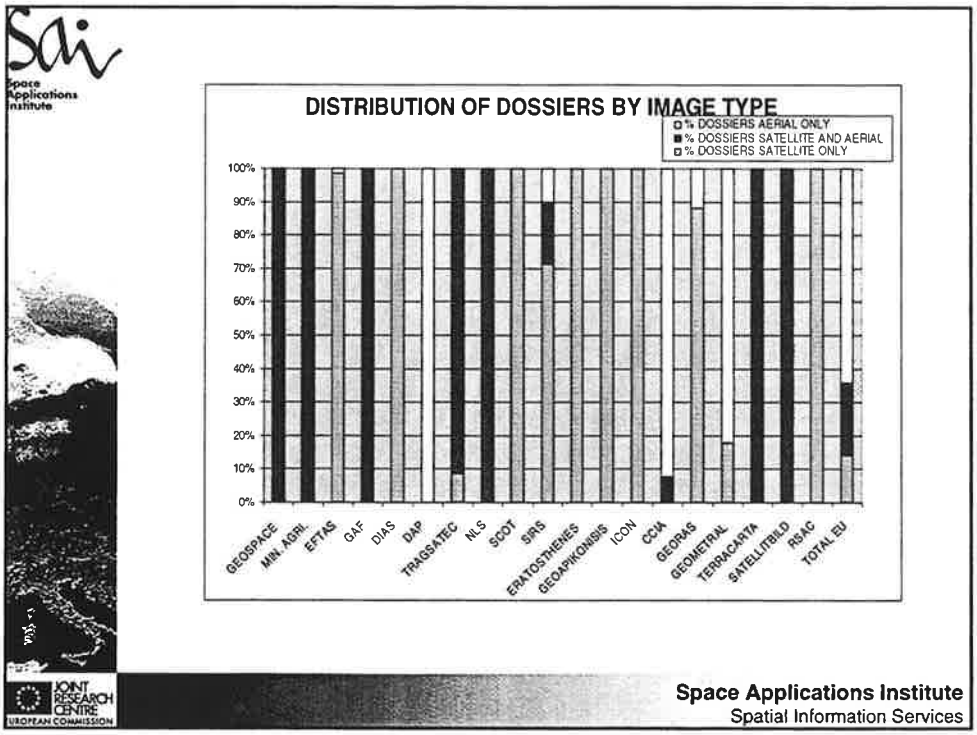
	1995	1996	1997	1998	1999
No. satellite sites	86	90	78	104	113
Satellite images*	1300	1410	1255	1540	1738
Control with RS**	9925	11585	10385	12500	0
Quality control	100	300	300	300	193
Total	**11325**	**13295**	**11940**	**14340**	**1931**

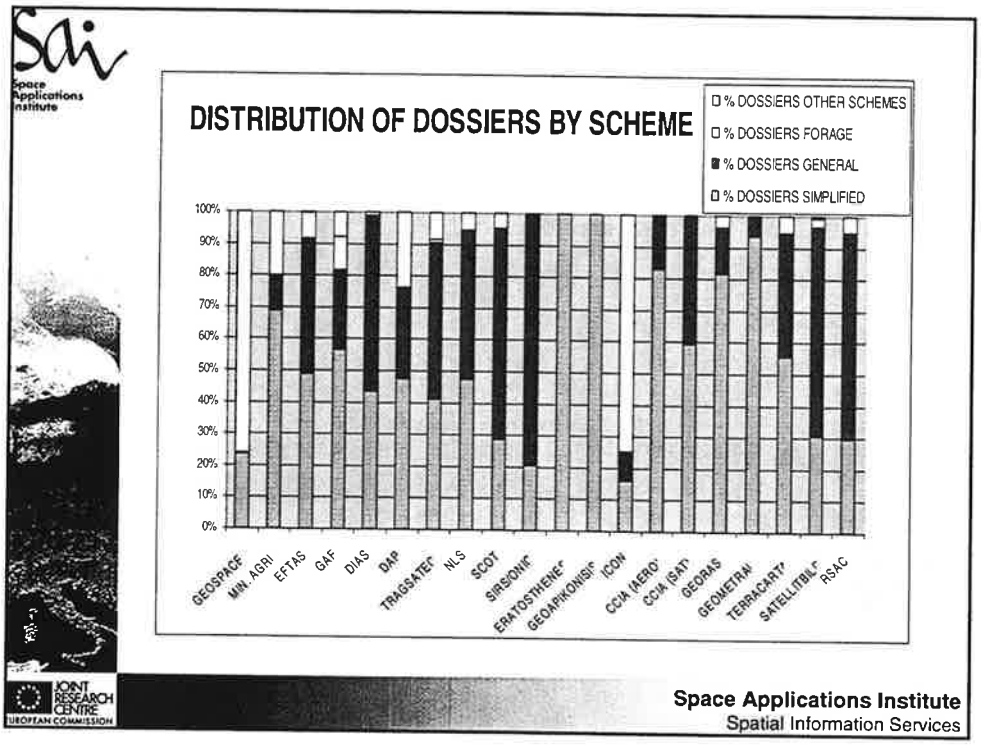
* Satellite image funding: 100% by Commission

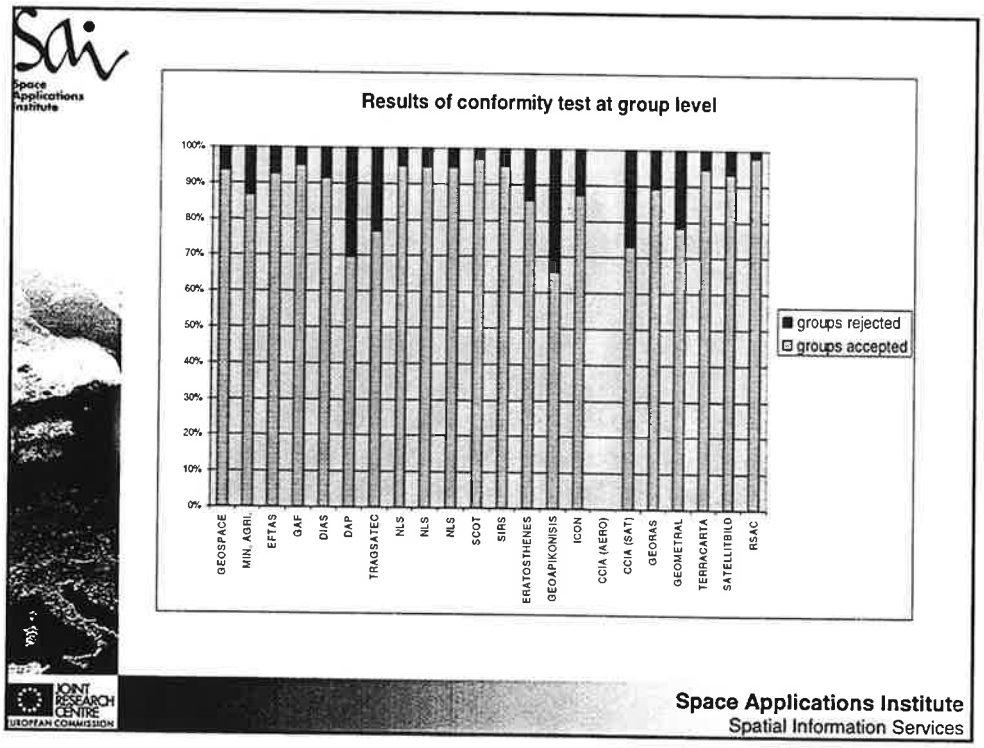
** Activity funding: 1995-1998: 50% by Commission, 50% by MS; from 1999 onwards: 100% by MS

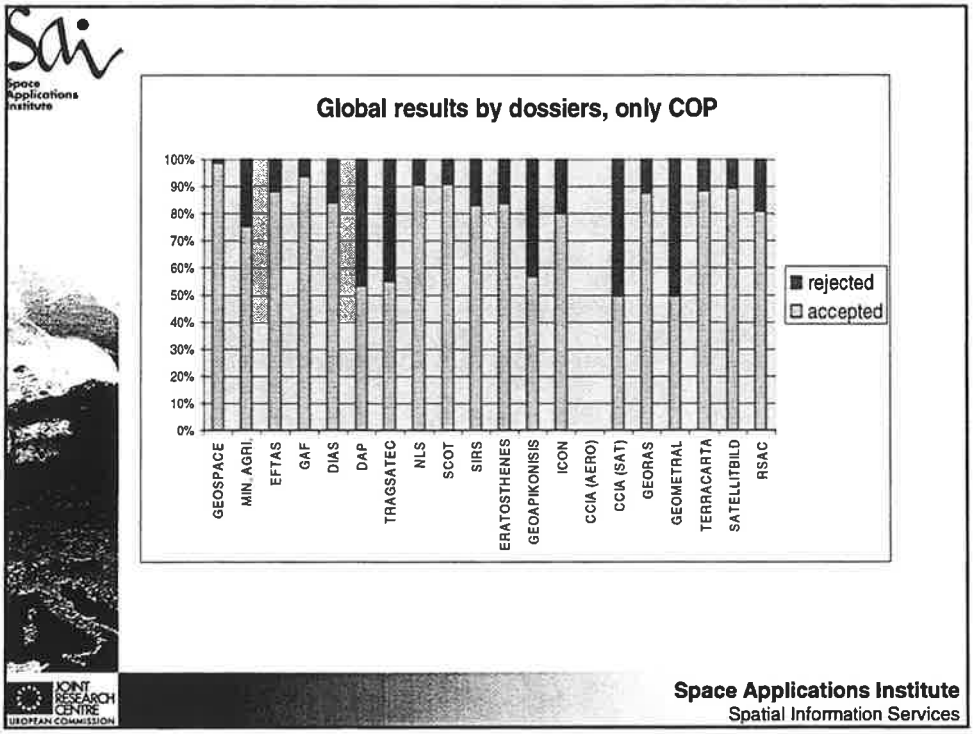
Space Applications Institute
Spatial Information Services

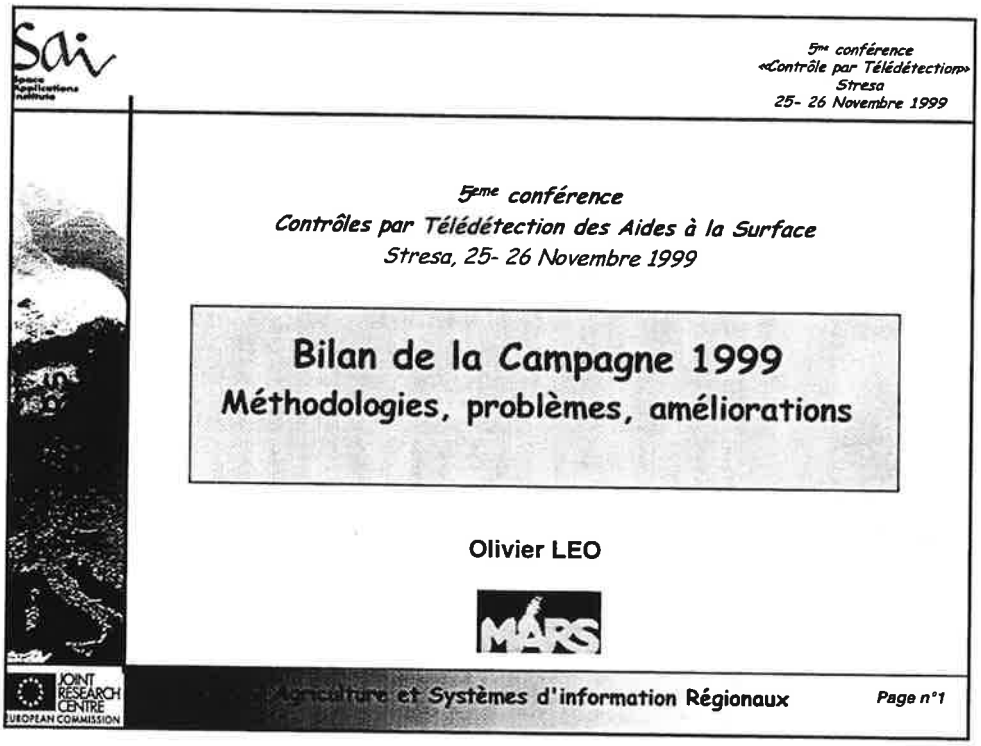

Space Applications Institute
Number of sites by image type
AERIAL PHOTOS
SATELLITES
SATELLITES AND PHOTOS
35
30
25
20
15
10
5
0
GEOSPACE
MIN. AGRI.
EFTAS
GAF
DIAS
DAP
TRAGSATEC
NLS
SCOT
SIRS/IONIC
ERATOSTHENES
GEOAPIKONISIS
ICON
CCIA
GEORAS
GEOMETRAL
TERRACARTA
SATELLITBILD
RSAC
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

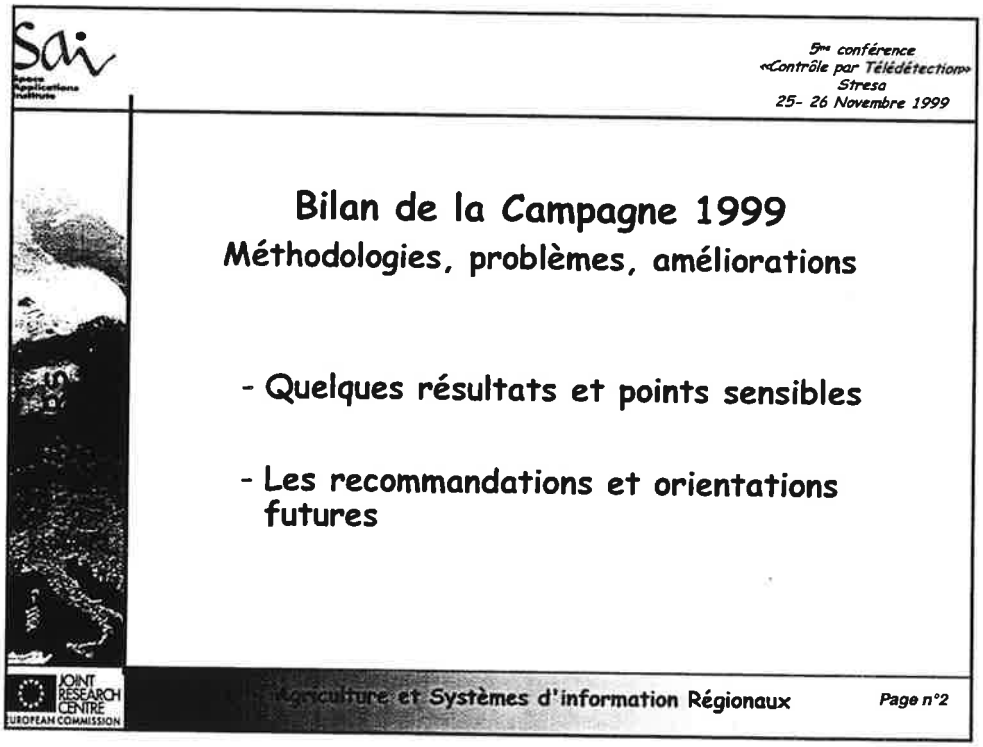

Space Applications Institute
DISTRIBUTION OF DOSSIERS BY IMAGE TYPE
% DOSSIERS AERIAL ONLY
% DOSSIERS SATELLITE AND AERIAL
% DOSSIERS SATELLITE ONLY
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
GEOSPACE
MIN. AGRI.
EFTAS
GAF
DIAS
DAP
TRAGSATEC
NLS
SCOT
SIRS
ERATOSTHENES
GEOAPIKONISIS
ICON
CCIA
GEORAS
GEOMETRAL
TERRACARTA
SATELLITBILD
RSAC
TOTAL EU
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

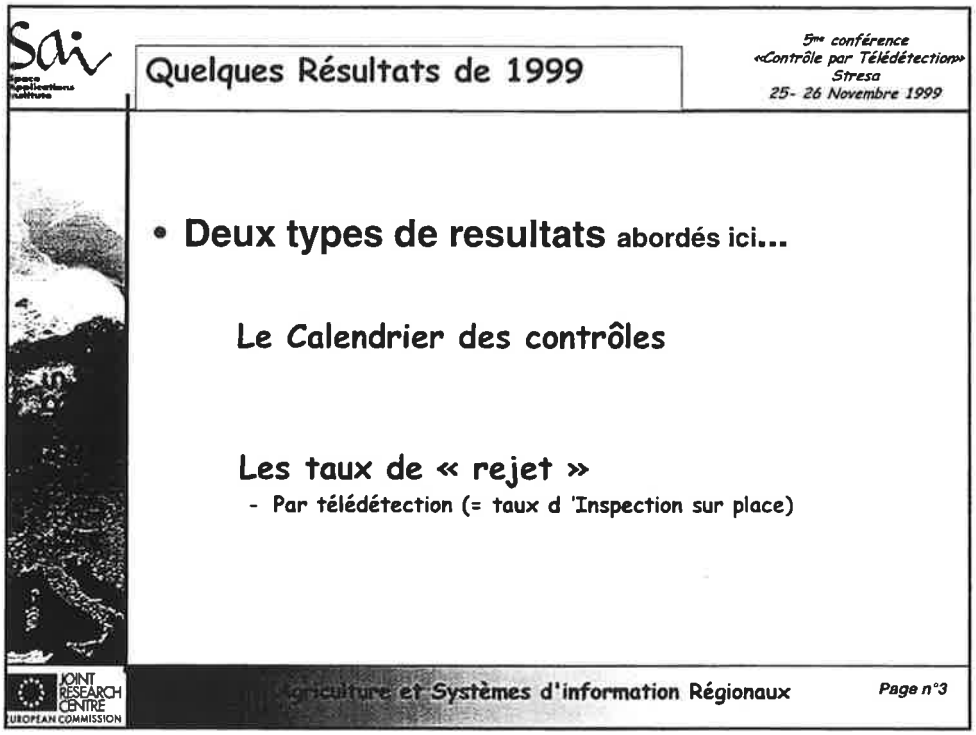

Sai
Space Applications Institute
DISTRIBUTION OF DOSSIERS BY SCHEME
% DOSSIERS OTHER SCHEMES
% DOSSIERS FORAGE
% DOSSIERS GENERAL
% DOSSIERS SIMPLIFIED
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
GEOSPACE
MIN. AGRI
EFTAS
GAF
DIAS
DAP
TRAGSATEC
NLS
SCOT
SIRS/ONIC
ERATOSTHENES
GEOAPIKONISIS
ICON
CCIA (AERO)
CCIA (SAT)
GEORAS
GEOMETRAL
TERRACARTA
SATELLITBILD
RSAC
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

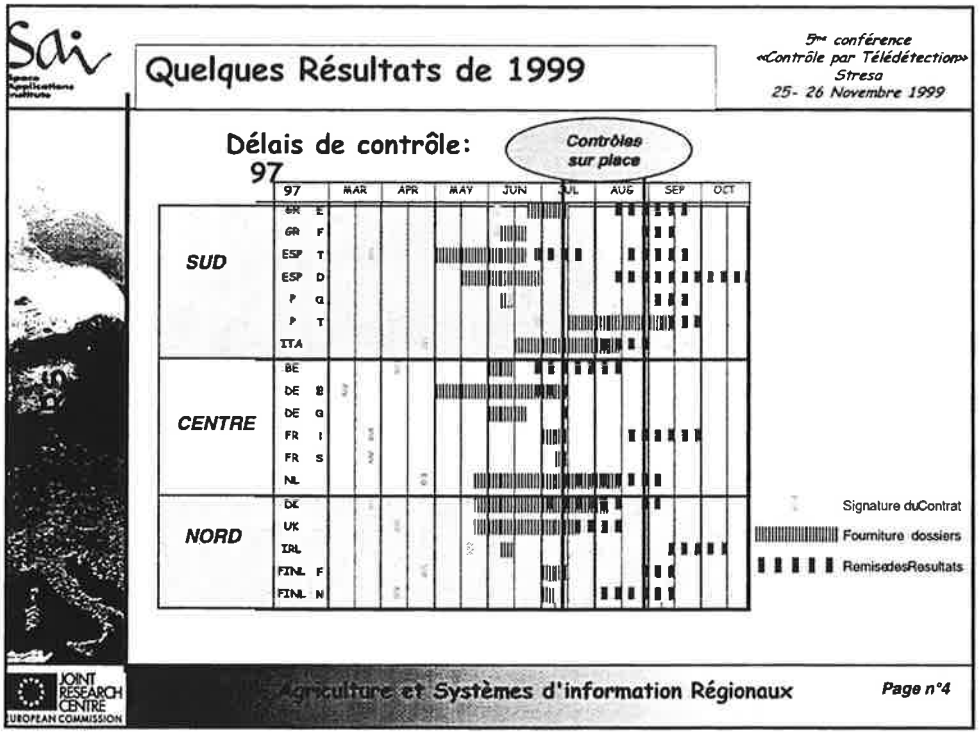

Sai
Space Applications Institute
Results of conformity test at group level
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
groups rejected
groups accepted
GEOSPACE
MIN. AGRI.
EFTAS
GAF
DIAS
DAP
TRAGSATEC
NLS
NLS
NLS
SCOT
SIRS
ERATOSTHENES
GEOAPIKONISIS
ICON
CCIA (AERO)
CCIA (SAT)
GEORAS
GEOMETRAL
TERRACARTA
SATELLITBILD
RSAC
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

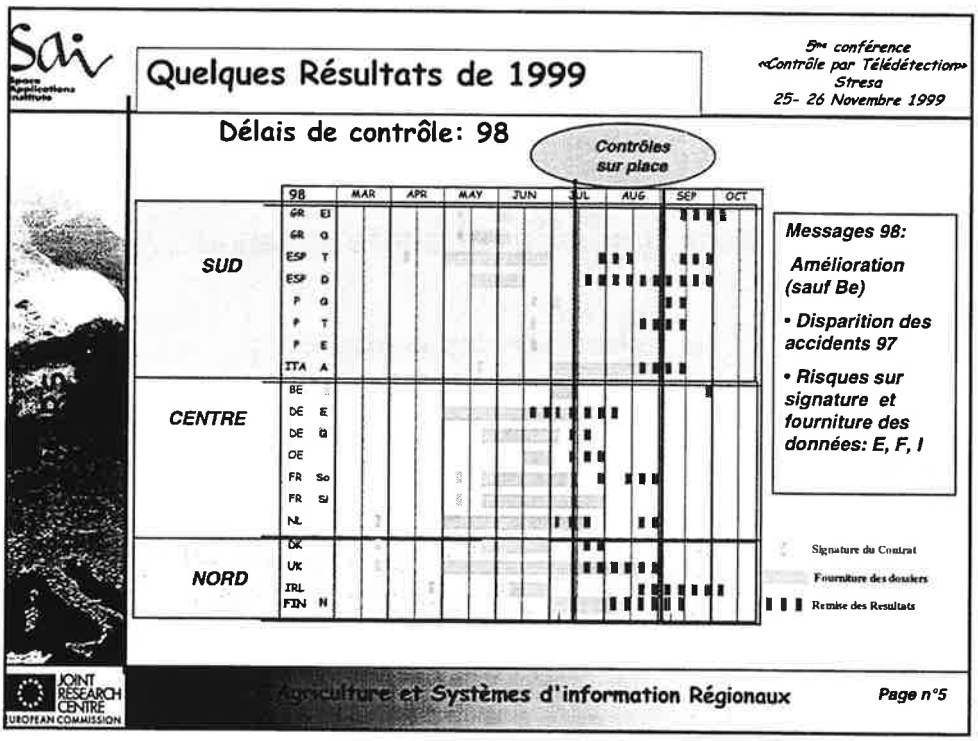

Sai
Space Applications Institute
Global results by dossiers, only COP
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
rejected
accepted
GEOSPACE
MIN. AGRI.
EFTAS
GAF
DIAS
DAP
TRAGSATEC
NLS
SCOT
SIRS
ERATOSTHENES
GEOAPIKONISIS
ICON
CCIA (AERO)
CCIA (SAT)
GEORAS
GEOMETRAL
TERRACARTA
SATELLITBILD
RSAC
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

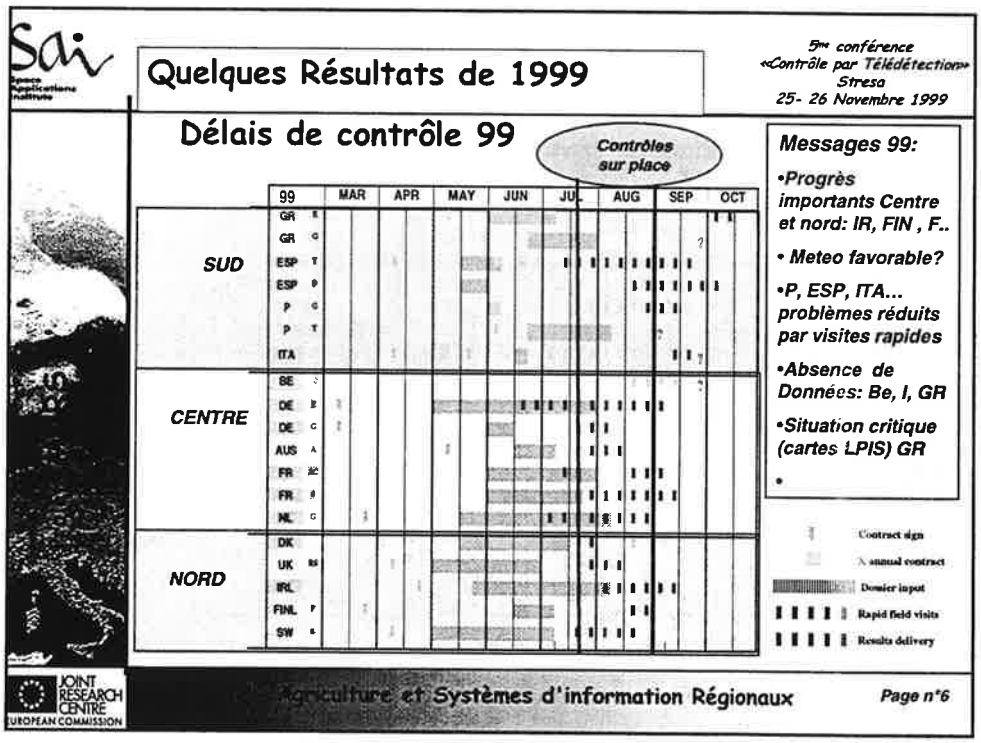

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
5ème conférence
Contrôles par Télédétection des Aides à la Surface
Stresa, 25- 26 Novembre 1999
Bilan de la Campagne 1999
Méthodologies, problèmes, améliorations
Olivier LEO
MARS
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°1


5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Bilan de la Campagne 1999
Méthodologies, problèmes, améliorations
- Quelques résultats et points sensibles
- Les recommandations et orientations futures
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°2


Sai
Quelques Résultats de 1999
5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
• Deux types de resultats abordés ici...
Le Calendrier des contrôles
Les taux de « rejet »
- Par télédétection (= taux d 'Inspection sur place)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
griculture et Systèmes d'information Régionaux
Page n°3


Sai
Quelques Résultats de 1999
5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
Délais de contrôle:
97
Contrôles sur place
97
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
SUD
CENTRE
NORD
Signature duContrat
Fourniture dossiers
RemisedesResultats
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°4


Sai
Quelques Résultats de 1999
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Délais de contrôle: 98
Contrôles sur place
98 MAR APR MAY JUN JUL AUG SEP OCT
SUD
CENTRE
NORD
Messages 98:
Amélioration (sauf Be)
• Disparition des accidents 97
• Risques sur signature et fourniture des données: E, F, I
Signature du Contrat
Fourniture des dossiers
Remise des Resultats
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°5


Sai
Quelques Résultats de 1999
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Délais de contrôle 99
Contrôles sur place
99 MAR APR MAY JUN JUL AUG SEP OCT
SUD
CENTRE
NORD
Messages 99:
•Progrès importants Centre et nord: IR, FIN , F..
• Meteo favorable?
•P, ESP, ITA... problèmes réduits par visites rapides
•Absence de Données: Be, I, GR
•Situation critique (cartes LPIS) GR
Dossier input
Rapid field visits
Results delivery
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°6

Quelques Résultats de 1999

5me conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

- **La maîtrise du calendrier de contrôle**

  Demeure un impératif

  - Des gains importants depuis quelques années dans l'organisation des contrôles:
    - Fourniture des données
    - Disponibilité de cartes digitales
    - Préparation des Administrations nationales/régionales
    - Contrats pluriannuels (11/19 en 99)...
  - Dans les choix méthodologiques:
    - Contrôles en deux phases
    - Visites rapides

  Ne doit pas se faire au détriment de la qualité / consistance du contrôle….

  - Cf Date Satellite / Cult. été

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Agriculture et Systèmes d'information Régionaux

Page n°7

Quelques Résultats de 1999

5me conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

- **Les taux de « rejets»** (moyennes app. si x contract.)

% Dossiers

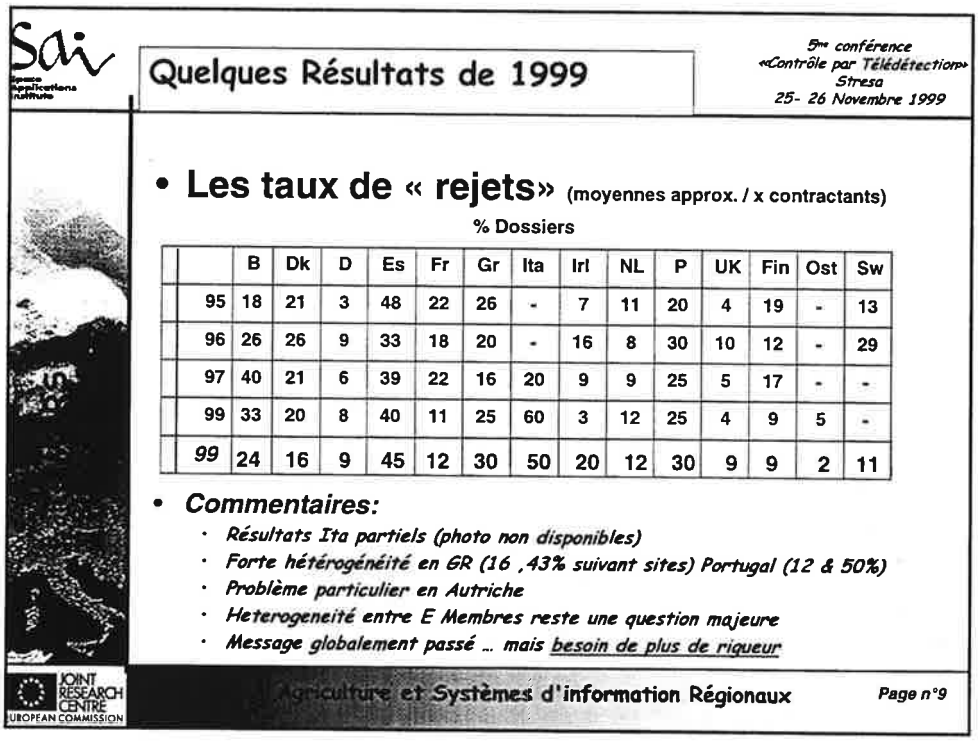
	B	Dk	D	Es	Fr	Gr	Ita	Irl	NL	P	UK	Fin	Ost	Sw
95	18	21	3	48	22	26	-	7	11	20	4	19	-	13
96	26	26	9	33	18	20	-	16	8	30	10	12	-	29
97	40	21	6	39	22	16	20	9	9	25	5	17	-	-
99	33	20	8	40	11	25	60	3	12	25	4	9	5	-
99?														

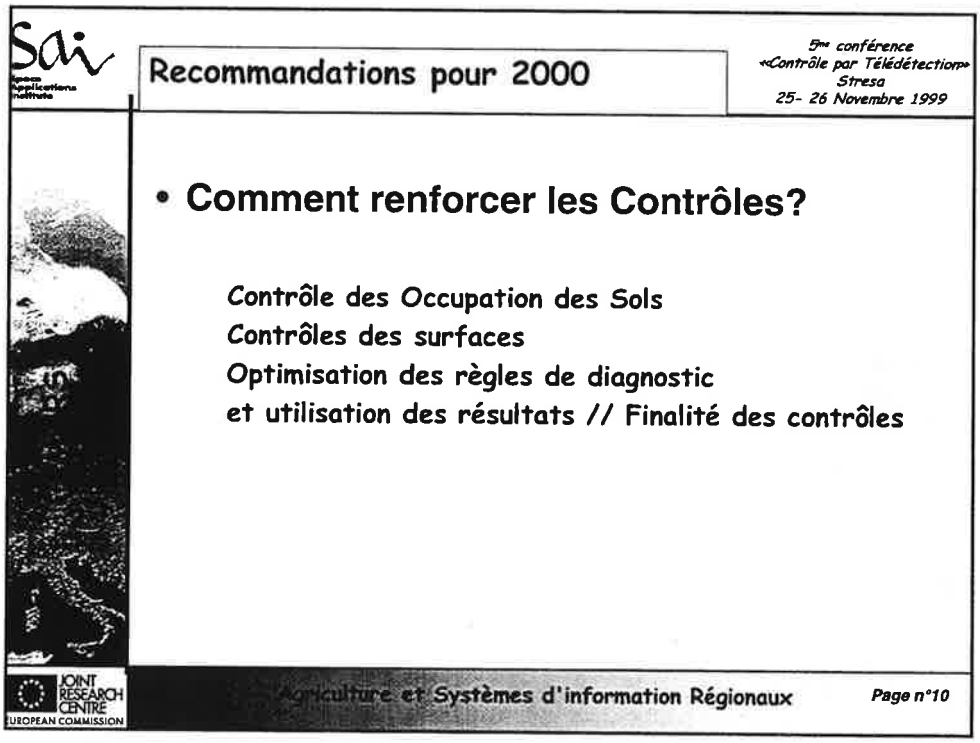
- ***Messages de 1998:***
  - *Attention aux taux trop faibles (Risques d'omissions !!!)*
  - *Problèmes logistiques des taux trop élevés ou irréguliers*
  - *Hétérogénéité entre ETATS membres ?*

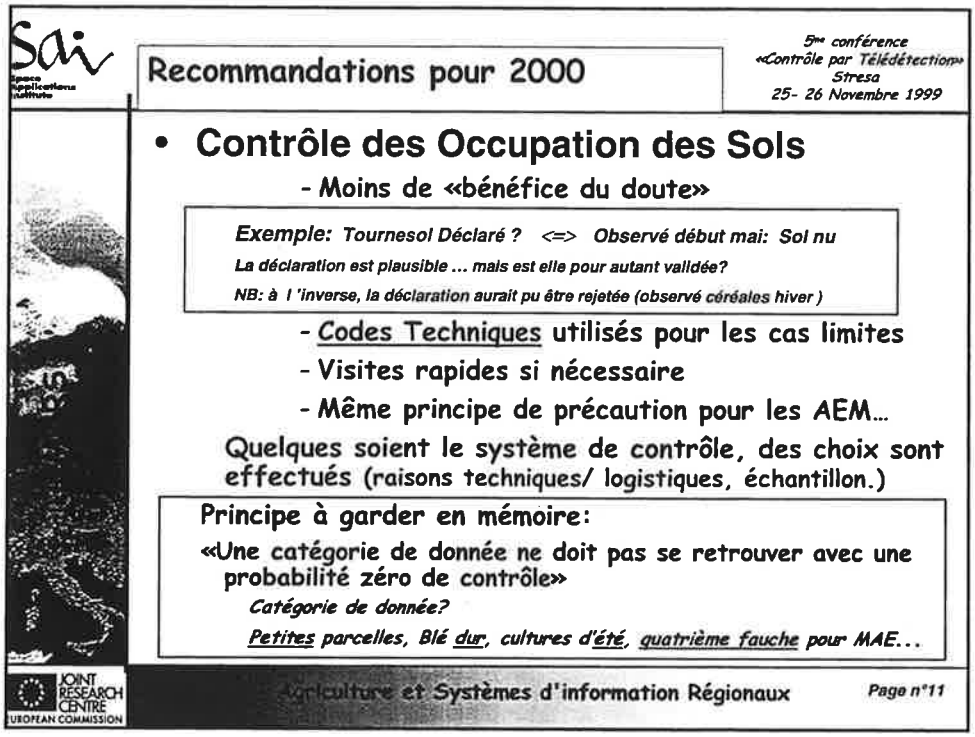
JOINT RESEARCH CENTRE EUROPEAN COMMISSION

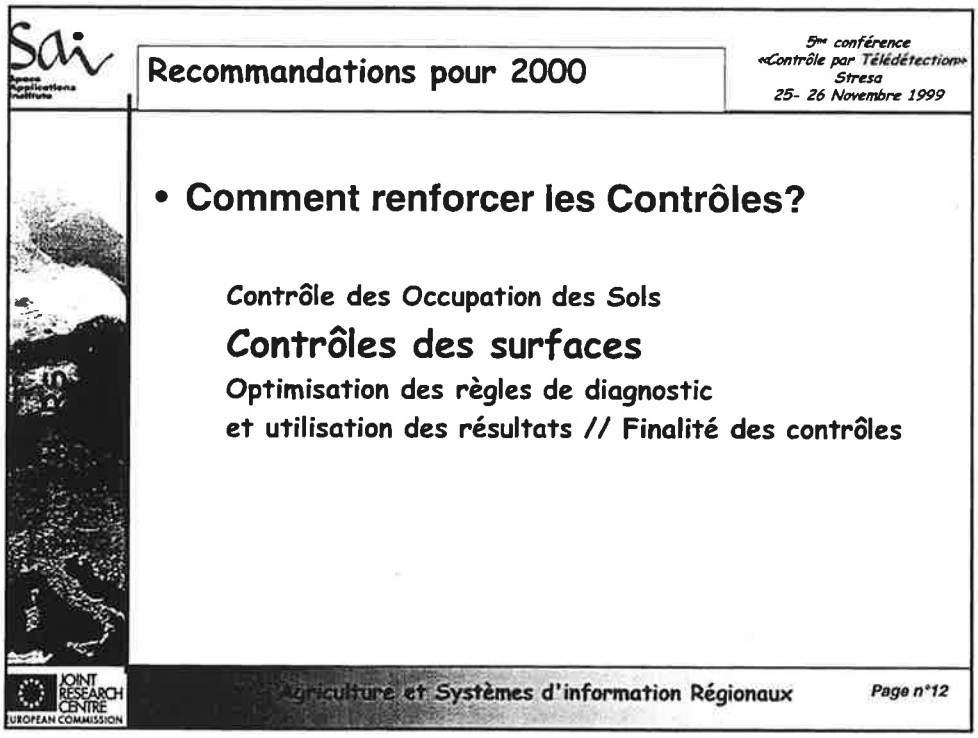
Agriculture et Systèmes d'information Régionaux

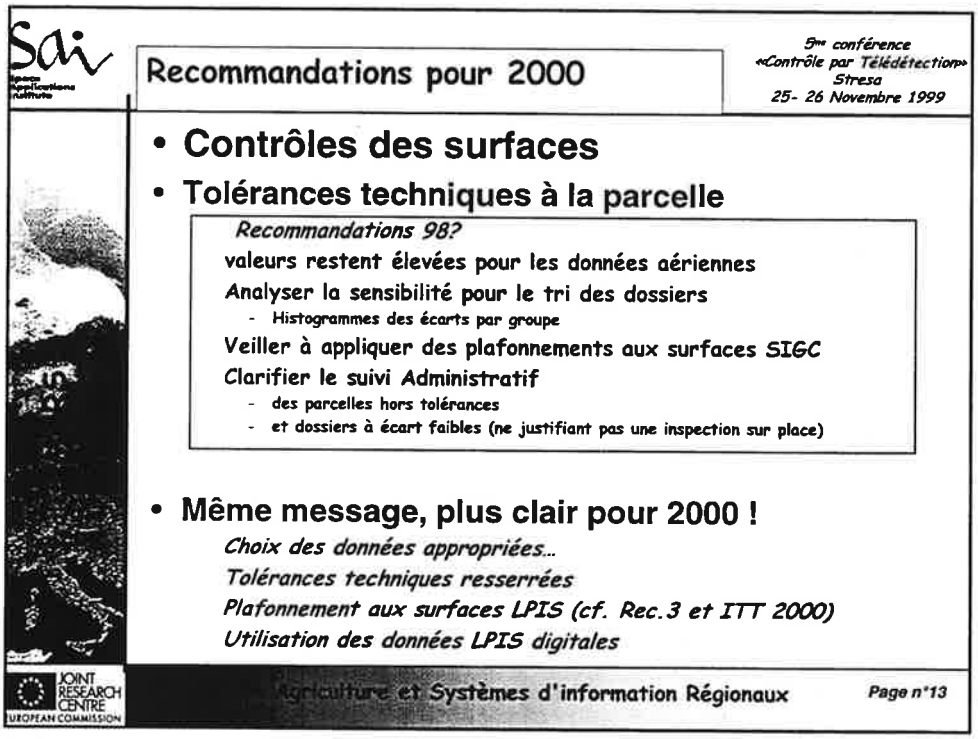
Page n°8

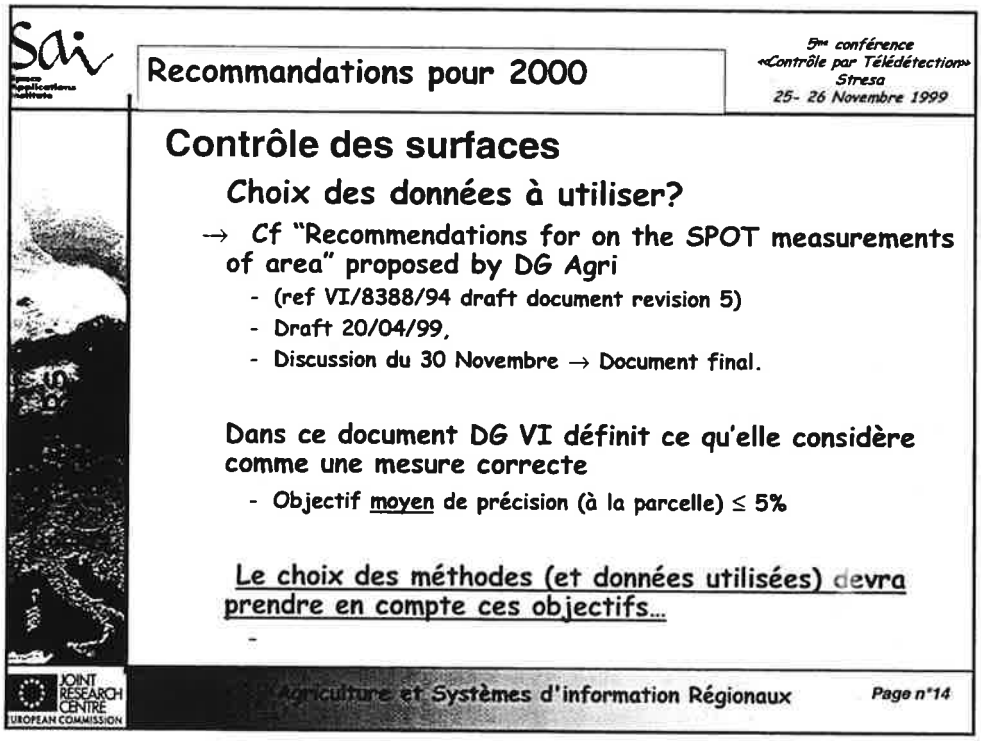

Sai
Quelques Résultats de 1999
5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
• Les taux de « rejets» (moyennes approx. / x contractants)
% Dossiers
B Dk D Es Fr Gr Ita Irl NL P UK Fin Ost Sw
95 18 21 3 48 22 26 - 7 11 20 4 19 - 13
96 26 26 9 33 18 20 - 16 8 30 10 12 - 29
97 40 21 6 39 22 16 20 9 9 25 5 17 - -
99 33 20 8 40 11 25 60 3 12 25 4 9 5 -
99 24 16 9 45 12 30 50 20 12 30 9 9 2 11
• Commentaires:
· Résultats Ita partiels (photo non disponibles)
· Forte hétérogénéité en GR (16 ,43% suivant sites) Portugal (12 & 50%)
· Problème particulier en Autriche
· Heterogeneité entre E Membres reste une question majeure
· Message globalement passé .. mais besoin de plus de riqueur
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°9


Sai
Recommandations pour 2000
5ème conférence
«Contrôle par Télédétection»
Stresa
25- 26 Novembre 1999
• Comment renforcer les Contrôles?
Contrôle des Occupation des Sols
Contrôles des surfaces
Optimisation des règles de diagnostic
et utilisation des résultats // Finalité des contrôles
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°10


Sai
Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
• Contrôle des Occupation des Sols
- Moins de «bénéfice du doute»
Exemple: Tournesol Déclaré ? <=> Observé début mai: Sol nu
La déclaration est plausible ... mais est elle pour autant validée?
NB: à l 'inverse, la déclaration aurait pu être rejetée (observé céréales hiver)
- Codes Techniques utilisés pour les cas limites
- Visites rapides si nécessaire
- Même principe de précaution pour les AEM...
Quelques soient le système de contrôle, des choix sont effectués (raisons techniques/ logistiques, échantillon.)
Principe à garder en mémoire:
«Une catégorie de donnée ne doit pas se retrouver avec une probabilité zéro de contrôle»
Catégorie de donnée?
Petites parcelles, Blé dur, cultures d'été, quatrième fauche pour MAE...
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°11


Sai
Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
• Comment renforcer les Contrôles?
Contrôle des Occupation des Sols
Contrôles des surfaces
Optimisation des règles de diagnostic
et utilisation des résultats // Finalité des contrôles
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°12


Sai
Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
• Contrôles des surfaces
• Tolérances techniques à la parcelle
Recommandations 98?
valeurs restent élevées pour les données aériennes
Analyser la sensibilité pour le tri des dossiers
- Histogrammes des écarts par groupe
Veiller à appliquer des plafonnements aux surfaces SIGC
Clarifier le suivi Administratif
- des parcelles hors tolérances
- et dossiers à écart faibles (ne justifiant pas une inspection sur place)
• Même message, plus clair pour 2000 !
Choix des données appropriées..
Tolérances techniques resserrées
Plafonnement aux surfaces LPIS (cf. Rec.3 et ITT 2000)
Utilisation des données LPIS digitales
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°13


Sai
Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Contrôle des surfaces
Choix des données à utiliser?
→ Cf "Recommendations for on the SPOT measurements of area" proposed by DG Agri
- (ref VI/8388/94 draft document revision 5)
- Draft 20/04/99,
- Discussion du 30 Novembre → Document final.
Dans ce document DG VI définit ce qu'elle considère comme une mesure correcte
- Objectif moyen de précision (à la parcelle) ≤ 5%
Le choix des méthodes (et données utilisées) devra prendre en compte ces objectifs...
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°14

Recommandations pour 2000

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Contrôle des surfaces

En pratique, les spécifications du nouvel ITT (2000) ont pu être discutées avec la DG VI:

→ **Tolérances techniques appliquées à la parcelle**
- Déja 11 EM sur 14 en 1998
- Pour 2000, DK passe à la parcelle... UK et P ?

→ **Tolérance au groupe temporairement acceptable si accompagnée d 'un Plafonnement strict aux surfaces du LPIS.**

Recommandations pour 2000

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

→ Valeurs proposées (ITT 2000)

Table 2. **Technical tolerance parameters proposed for the parcels**

Code	Conditions	Tolerance (width)
L1	Aerial photography (or very high resolution satellites)	+/- 1.5 metres
L2	Recent archive aerial photo combined with satellite images	+/- 3 metres
L3	Other PAN satellite images	+/- 5 metres

- **L1 (Photo-aérienne) resserrée de 2m à 1,5 m (soit 1,5 pixel)**
- **L3 (Images SPOT) resserrée de 6m à 5 m (soit 0,5 pixel)**
- **Abandon catégorie IRS PAN, 4m soit 0.75 pixel**
  - **pas une différence significative avec SPOT PAN (Qualité radiométrique et conditions meteo)**
  - **pas d'acquisition assurée (100% SPOT pan en 99!)**
- **Création catégorie intermédiaire L2=3m, pour combinaison SAT PAN /orthophoto archives**

JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux

Recommandations pour 2000

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Choix des méthodes?

Analyse du CCR sur données de CQC 98 / Guido Lemoine

Main characteristics of the sites

Sites (Country)	Total area ha	Number of agricultural parcels	Mean parcel size (ha)
CHIN (E)	2897.1	2163	1.34
HASS (B)	8631.1	5074	1.70
MAAS (NL)	7365.3	3688	2.00
LOND (UK)	20264.3	3225	6.28
PADO (I)	7669	16317	0.47

Résultats: (purement indicatifs)

Estimation du % de parcelles et du % de surface correspondantes mesurés

pour des objectifs de précision < 5, 10, 15%

Buffers de 2 et 6m (spécifications 99)

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Agriculture et Systèmes d'information Régionaux

Page n°17

Recommandations pour 2000

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Choix des méthodes? Analyse CCR sur CQC 98

Site LOND, United Kingdom

Buffer (m)	Target of Relative accuracy	Parcels Number	Parcels %	Area Ha	Area %
2m Orthophotos	Better than 5%	1835	56.9	17954.2	88.6
	Better than 10%	2732	84.7	19940.1	98.4
	Better than 15%	2973	92.2	20163.0	99.5
6m SPOT P	Better than 5%	29	0.9	1134.8	5.6
	Better than 10%	948	29.4	13111.0	64.7
	Better than 15%	1835	56.9	17954.2	88.6

Site MAAS, Netherlands

Buffer (m)	Relative accuracy	Parcels Number	Parcels %	Area Ha	Area %
2m Orthophotos	Better than 5%	618	16.8	3164.6	42.9
	Better than 10%	2616	70.9	6731.3	91.3
	Better than 15%	3360	91.1	7242.4	98.3
6m SPOT P	Better than 5%	2	0.1	70.7	1.0
	Better than 10%	86	2.3	864.7	11.7
	Better than 15%	618	16.8	3164.6	42.9

Résultats:

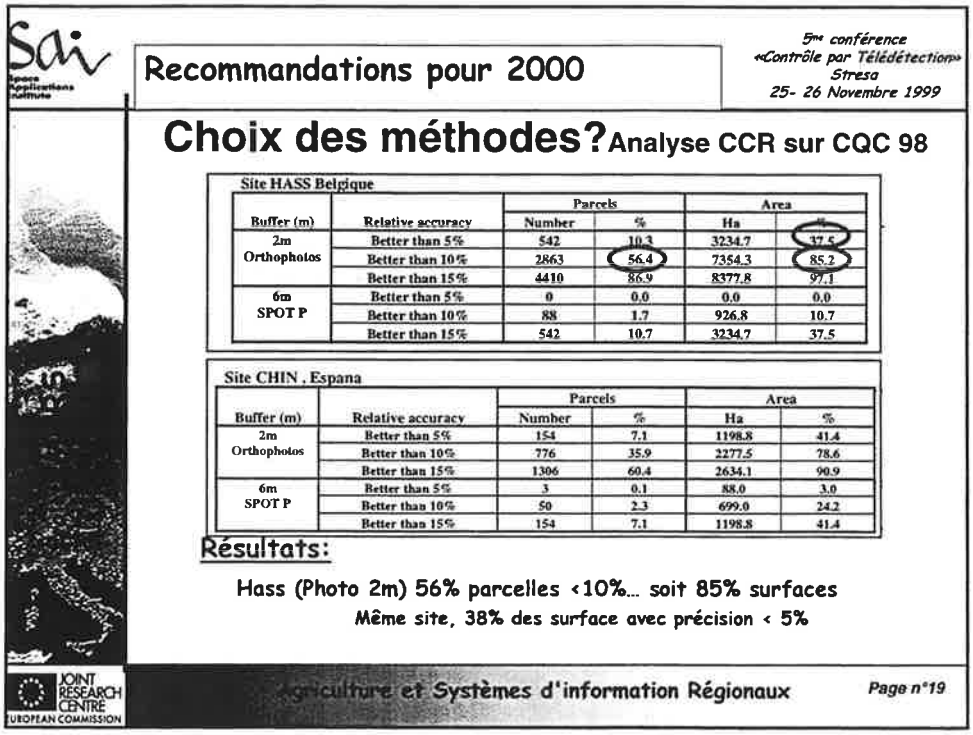
Lon +SPOT: 65% des surfaces< 10%... mais 6% seul. < 5%

Mas: Avec SPOT 11% des surf.<10%... mais 98 % avec photos (2m)

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

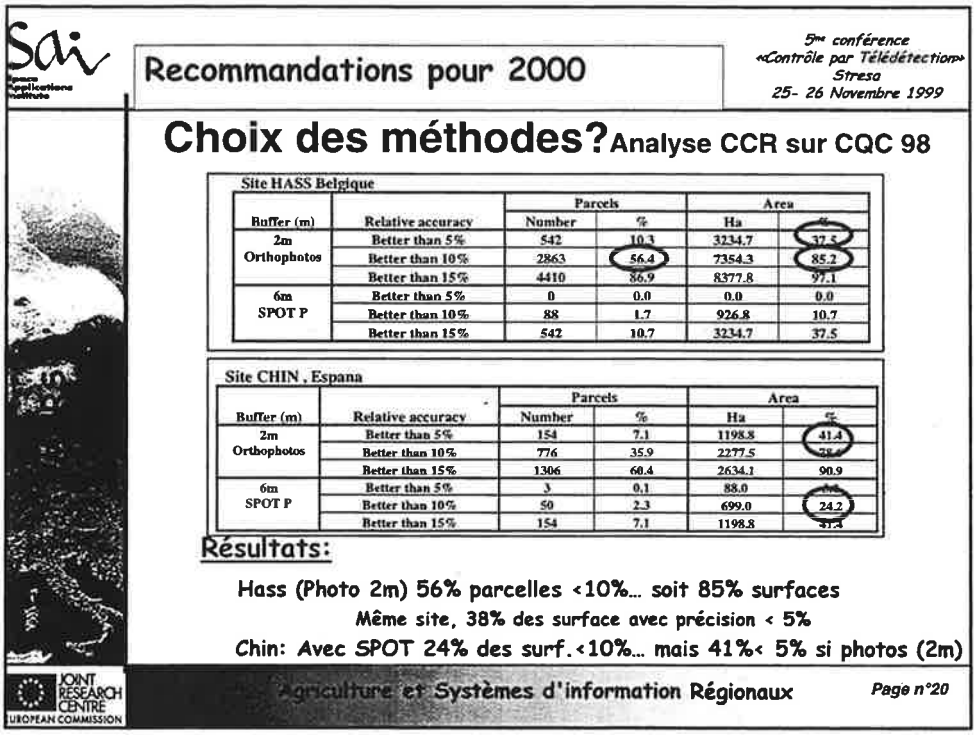
Agriculture et Systèmes d'information Régionaux

Page n°18



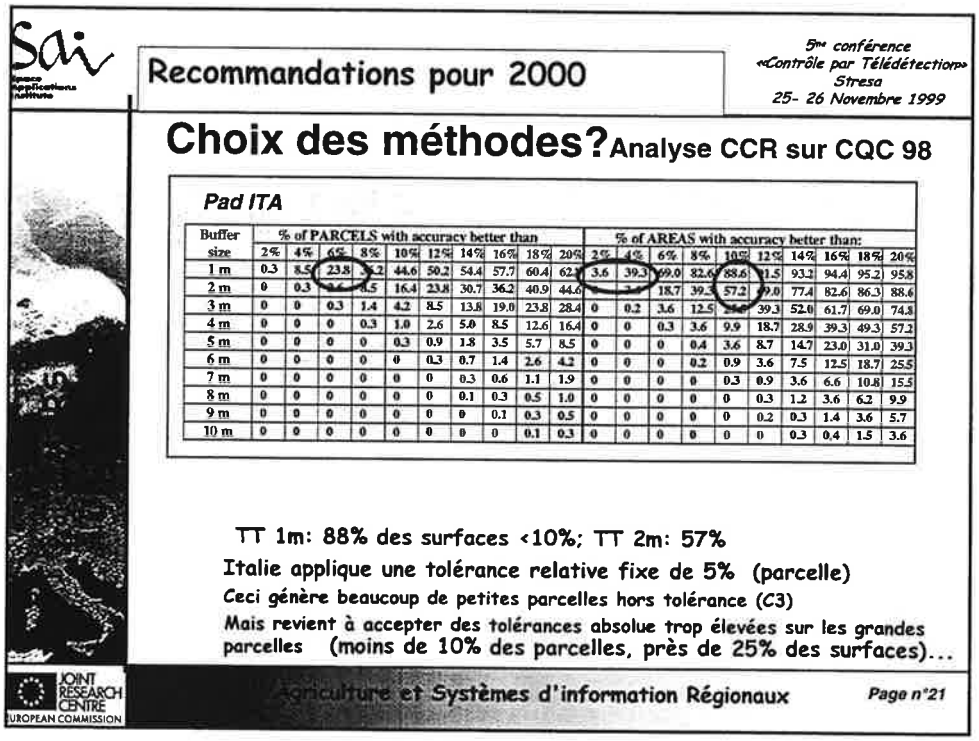
Site HASS Belgique		Parcels		Area	
Buffer (m)	Relative accuracy	Number	%	Ha	%
2m Orthophotos	Better than 5%	542	10.3	3234.7	37.5
	Better than 10%	2863	56.4	7354.3	85.2
	Better than 15%	4410	86.9	8377.8	97.1
6m SPOT P	Better than 5%	0	0.0	0.0	0.0
	Better than 10%	88	1.7	926.8	10.7
	Better than 15%	542	10.7	3234.7	37.5

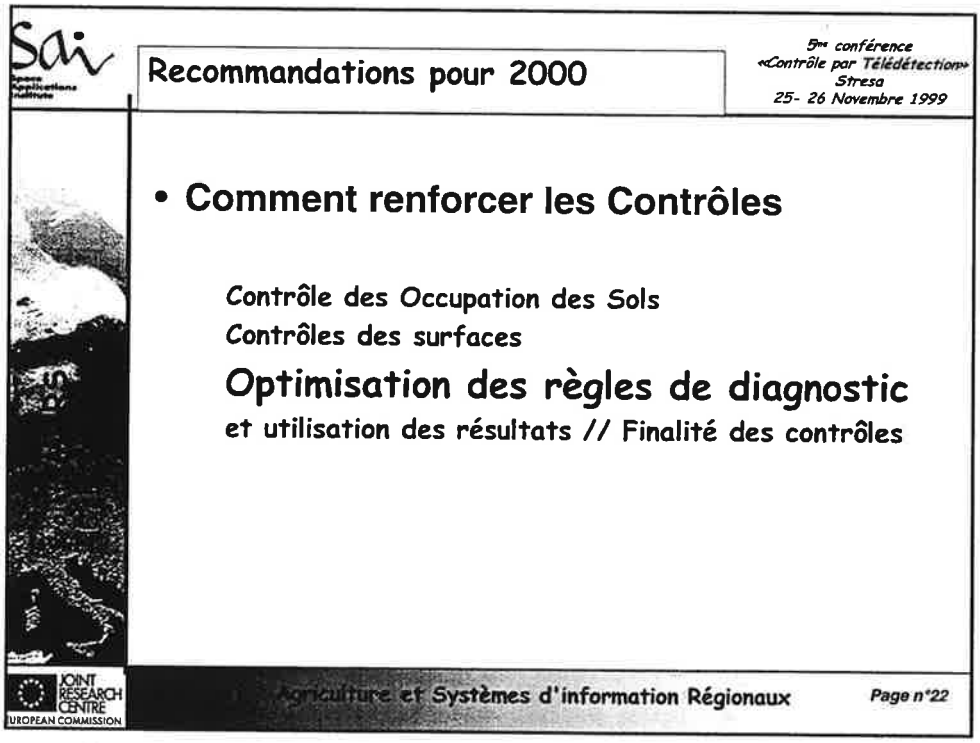
Site CHIN . Espana		Parcels		Area	
Buffer (m)	Relative accuracy	Number	%	Ha	%
2m Orthophotos	Better than 5%	154	7.1	1198.8	41.4
	Better than 10%	776	35.9	2277.5	78.6
	Better than 15%	1306	60.4	2634.1	90.9
6m SPOT P	Better than 5%	3	0.1	88.0	3.0
	Better than 10%	50	2.3	699.0	24.2
	Better than 15%	154	7.1	1198.8	41.4

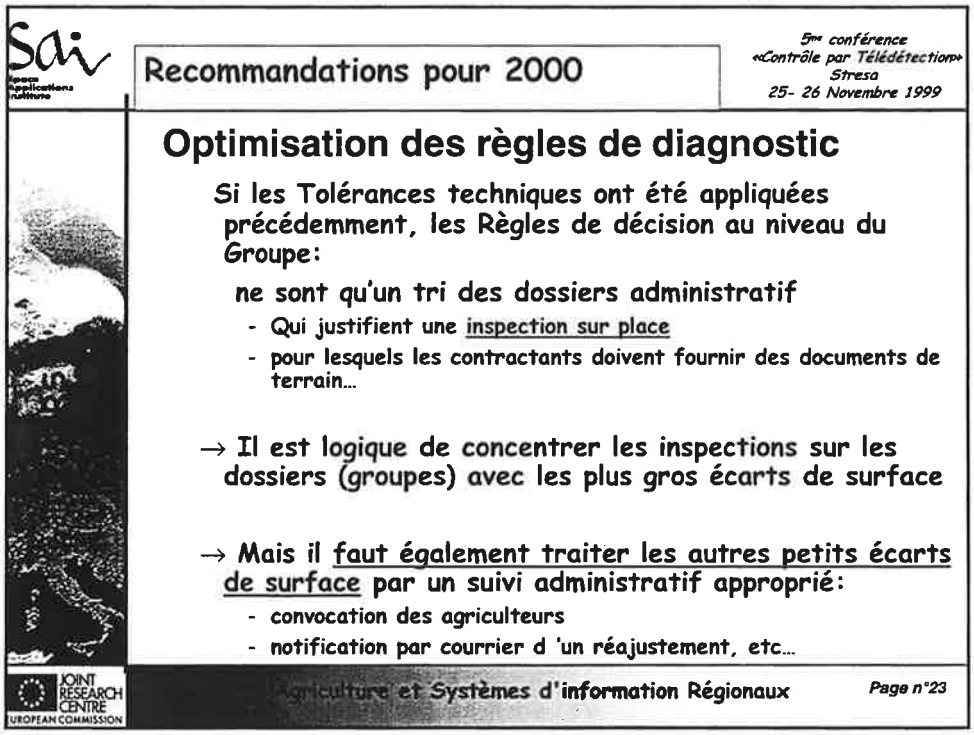


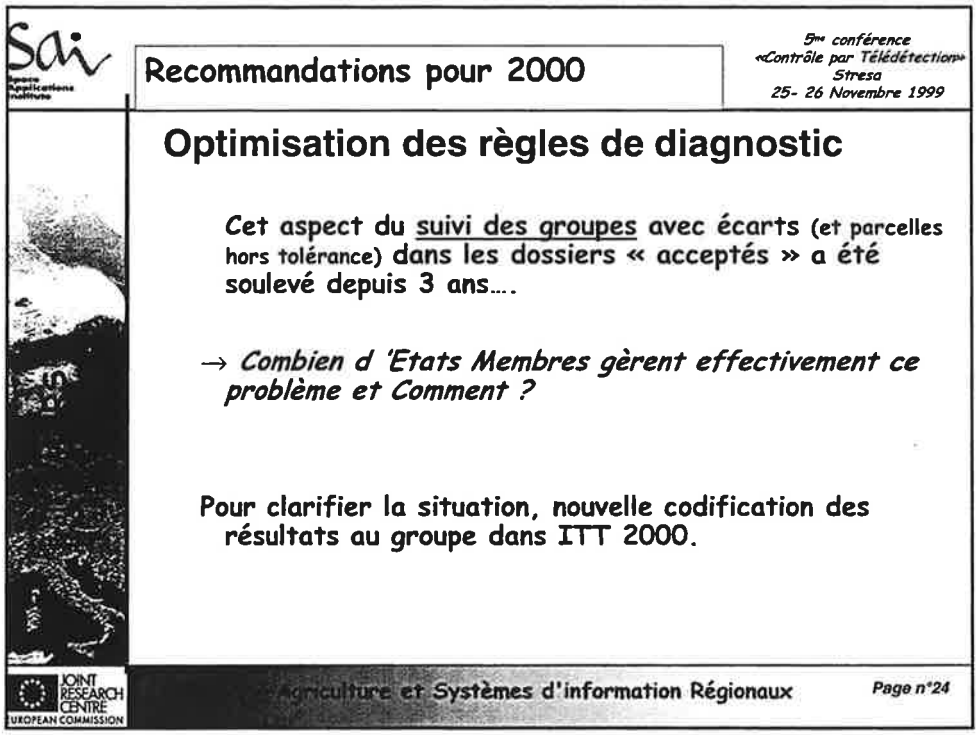
Site HASS Belgique		Parcels		Area	
Buffer (m)	Relative accuracy	Number	%	Ha	%
2m Orthophotos	Better than 5%	542	10.3	3234.7	37.5
	Better than 10%	2863	56.4	7354.3	85.2
	Better than 15%	4410	86.9	8377.8	97.1
6m SPOT P	Better than 5%	0	0.0	0.0	0.0
	Better than 10%	88	1.7	926.8	10.7
	Better than 15%	542	10.7	3234.7	37.5

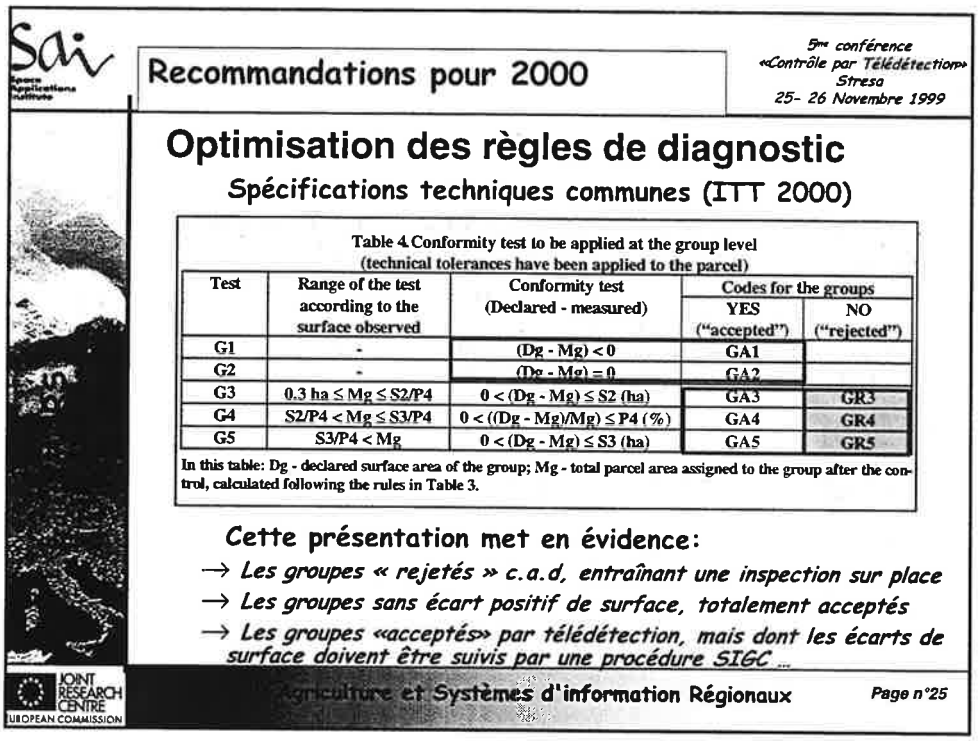
Site CHIN . Espana		Parcels		Area	
Buffer (m)	Relative accuracy	Number	%	Ha	%
2m Orthophotos	Better than 5%	154	7.1	1198.8	41.4
	Better than 10%	776	35.9	2277.5	[illegible]
	Better than 15%	1306	60.4	2634.1	90.9
6m SPOT P	Better than 5%	3	0.1	88.0	[illegible]
	Better than 10%	50	2.3	699.0	24.2
	Better than 15%	154	7.1	1198.8	41.4

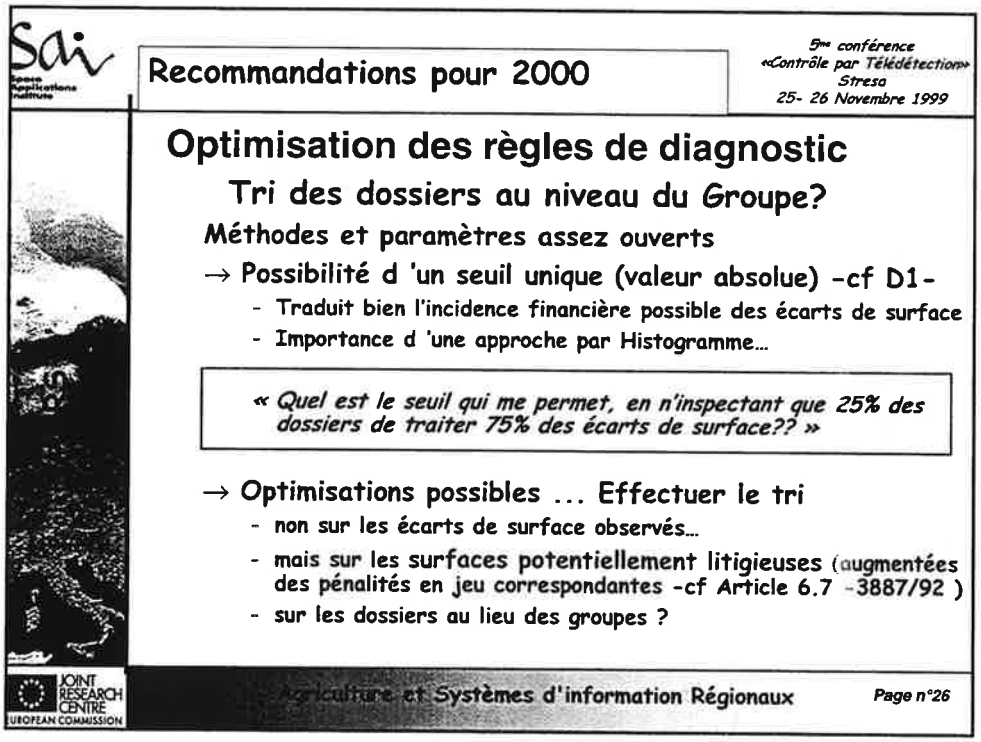

Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Choix des méthodes? Analyse CCR sur CQC 98
Pad ITA
Buffer size | % of PARCELS with accuracy better than: 2% 4% 6% 8% 10% 12% 14% 16% 18% 20% | % of AREAS with accuracy better than: 2% 4% 6% 8% 10% 12% 14% 16% 18% 20%
1 m 0.3 8.5 23.8 44.6 50.2 54.4 57.7 60.4 62.6 3.6 39.3 69.0 82.6 88.6 91.5 93.2 94.4 95.2 95.8
2 m 0 0.3 1.4 8.5 16.4 23.8 30.7 36.2 40.9 44.6 0 3.6 18.7 39.5 57.2 69.0 77.4 82.6 86.3 88.6
3 m 0 0 0.3 1.4 4.2 8.5 13.8 19.0 23.8 28.4 0 0.2 3.6 12.5 28.6 39.3 52.0 61.7 69.0 74.8
4 m 0 0 0 0.3 1.0 2.6 5.0 8.5 12.6 16.4 0 0 0.3 3.6 9.9 18.7 28.9 39.3 49.3 57.2
5 m 0 0 0 0 0.3 0.9 1.8 3.5 5.7 8.5 0 0 0 0.4 3.6 8.7 14.7 23.0 31.0 39.3
6 m 0 0 0 0 0 0.3 0.7 1.4 2.6 4.2 0 0 0 0.2 0.9 3.6 7.5 12.5 18.7 25.5
7 m 0 0 0 0 0 0 0.3 0.6 1.1 1.9 0 0 0 0 0.3 0.9 3.6 6.6 10.8 15.5
8 m 0 0 0 0 0 0 0.1 0.3 0.5 1.0 0 0 0 0 0 0.3 1.2 3.6 6.2 9.9
9 m 0 0 0 0 0 0 0 0.1 0.3 0.5 0 0 0 0 0 0.2 0.3 1.4 3.6 5.7
10 m 0 0 0 0 0 0 0 0 0.1 0.3 0 0 0 0 0 0 0.3 0.4 1.5 3.6
TT 1m: 88% des surfaces <10%; TT 2m: 57%
Italie applique une tolérance relative fixe de 5% (parcelle)
Ceci génère beaucoup de petites parcelles hors tolérance (C3)
Mais revient à accepter des tolérances absolue trop élevées sur les grandes parcelles (moins de 10% des parcelles, près de 25% des surfaces)...
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°21

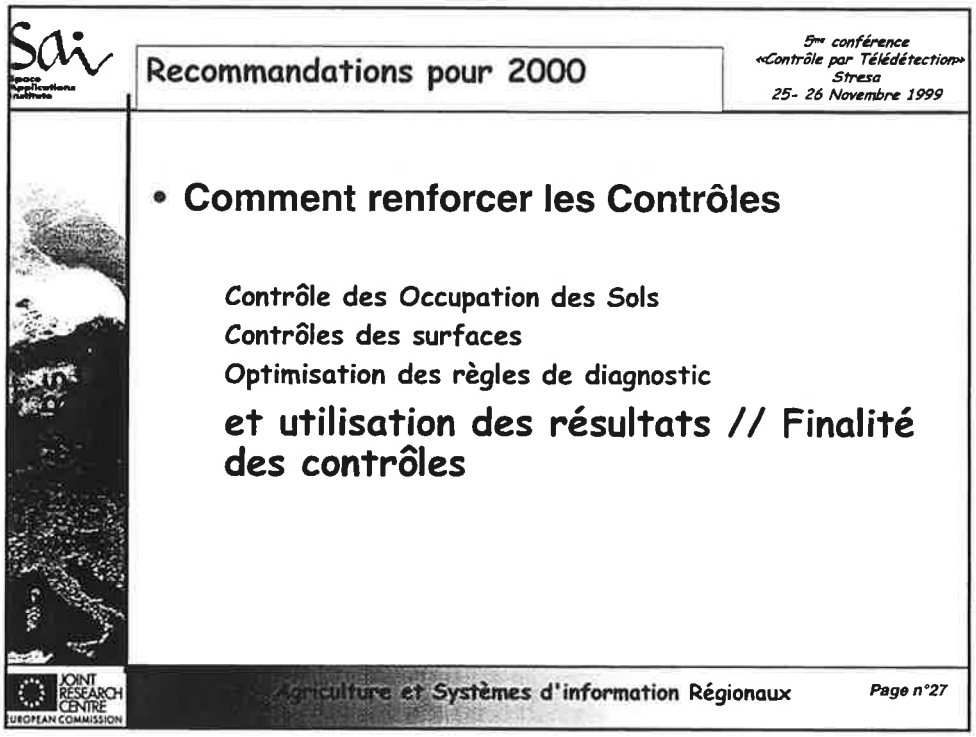

Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
• Comment renforcer les Contrôles
Contrôle des Occupation des Sols
Contrôles des surfaces
Optimisation des règles de diagnostic
et utilisation des résultats // Finalité des contrôles
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°22

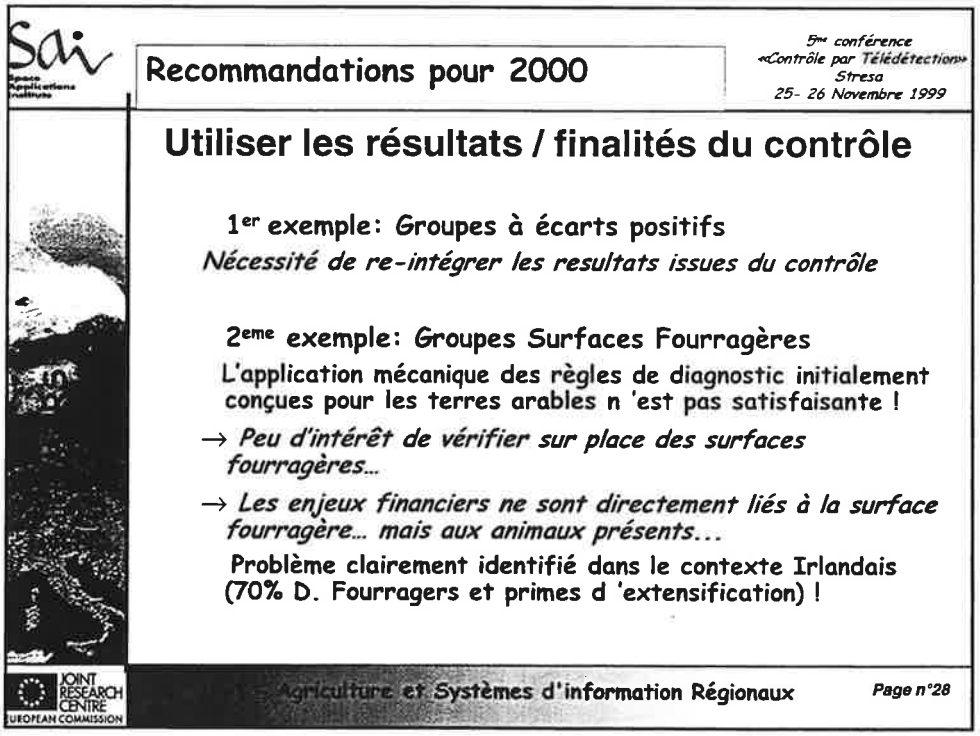

Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Optimisation des règles de diagnostic
Si les Tolérances techniques ont été appliquées précédemment, les Règles de décision au niveau du Groupe:
ne sont qu'un tri des dossiers administratif
- Qui justifient une inspection sur place
- pour lesquels les contractants doivent fournir des documents de terrain...
→ Il est logique de concentrer les inspections sur les dossiers (groupes) avec les plus gros écarts de surface
→ Mais il faut également traiter les autres petits écarts de surface par un suivi administratif approprié:
- convocation des agriculteurs
- notification par courrier d 'un réajustement, etc...
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°23


Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Optimisation des règles de diagnostic
Cet aspect du suivi des groupes avec écarts (et parcelles hors tolérance) dans les dossiers « acceptés » a été soulevé depuis 3 ans....
→ Combien d 'Etats Membres gèrent effectivement ce problème et Comment ?
Pour clarifier la situation, nouvelle codification des résultats au groupe dans ITT 2000.
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°24


Sai
Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Optimisation des règles de diagnostic
Spécifications techniques communes (ITT 2000)
Table 4. Conformity test to be applied at the group level (technical tolerances have been applied to the parcel)
Test | Range of the test according to the surface observed | Conformity test (Declared - measured) | Codes for the groups YES ("accepted") | NO ("rejected")
G1 | - | (Dg - Mg) < 0 | GA1 |
G2 | - | (Dg - Mg) = 0 | GA2 |
G3 | 0.3 ha ≤ Mg ≤ S2/P4 | 0 < (Dg - Mg) ≤ S2 (ha) | GA3 | GR3
G4 | S2/P4 < Mg ≤ S3/P4 | 0 < ((Dg - Mg)/Mg) ≤ P4 (%) | GA4 | GR4
G5 | S3/P4 < Mg | 0 < (Dg - Mg) ≤ S3 (ha) | GA5 | GR5
In this table: Dg - declared surface area of the group; Mg - total parcel area assigned to the group after the control, calculated following the rules in Table 3.
Cette présentation met en évidence:
→ Les groupes « rejetés » c.a.d, entraînant une inspection sur place
→ Les groupes sans écart positif de surface, totalement acceptés
→ Les groupes «acceptés» par télédétection, mais dont les écarts de surface doivent être suivis par une procédure SIGC ...
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°25


Sai
Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Optimisation des règles de diagnostic
Tri des dossiers au niveau du Groupe?
Méthodes et paramètres assez ouverts
→ Possibilité d 'un seuil unique (valeur absolue) -cf D1-
- Traduit bien l'incidence financière possible des écarts de surface
- Importance d 'une approche par Histogramme...
« Quel est le seuil qui me permet, en n'inspectant que 25% des dossiers de traiter 75% des écarts de surface?? »
→ Optimisations possibles ... Effectuer le tri
- non sur les écarts de surface observés...
- mais sur les surfaces potentiellement litigieuses (augmentées des pénalités en jeu correspondantes -cf Article 6.7 -3887/92)
- sur les dossiers au lieu des groupes ?
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°26


Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
• Comment renforcer les Contrôles
Contrôle des Occupation des Sols
Contrôles des surfaces
Optimisation des règles de diagnostic
et utilisation des résultats // Finalité des contrôles
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°27


Recommandations pour 2000
5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999
Utiliser les résultats / finalités du contrôle
1er exemple: Groupes à écarts positifs
Nécessité de re-intégrer les resultats issues du contrôle
2eme exemple: Groupes Surfaces Fourragères
L'application mécanique des règles de diagnostic initialement conçues pour les terres arables n 'est pas satisfaisante !
→ Peu d'intérêt de vérifier sur place des surfaces fourragères...
→ Les enjeux financiers ne sont directement liés à la surface fourragère... mais aux animaux présents...
Problème clairement identifié dans le contexte Irlandais (70% D. Fourragers et primes d 'extensification) !
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture et Systèmes d'information Régionaux
Page n°28

Sai

Recommandations pour 2000

5ème conférence «Contrôle par Télédétection» Stresa 25- 26 Novembre 1999

Utiliser les résultats / finalités du contrôle

Surfaces Fourragères?

Prime d 'extensification liées à des seuils de densités (vache allaitantes, bovins mâles)

- Un écart de surface important peu n'avoir aucune conséquence...
- Un écart faible peu avoir des conséquences.

Nécessité de prendre en compte les deux éléments !

Surface réajustée/ effectif du troupeau ...

Proposition Spécifications Techniques (ITT-2000)

cf § 5.42 et 6.3.4: Cas particulier des surfaces fourragères.

→ Envisager de conserver tous les écarts de surface positif

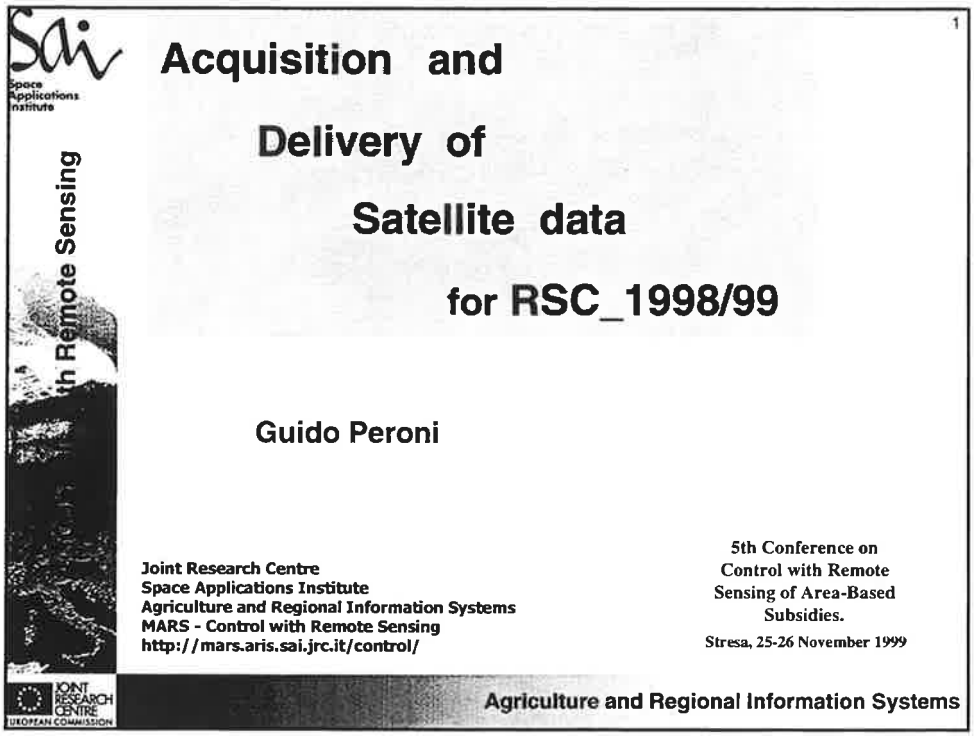
→ Effectuer un tri ultérieur, en fonction des déclarations sur les animaux : Calcul des variations de densité en jeu

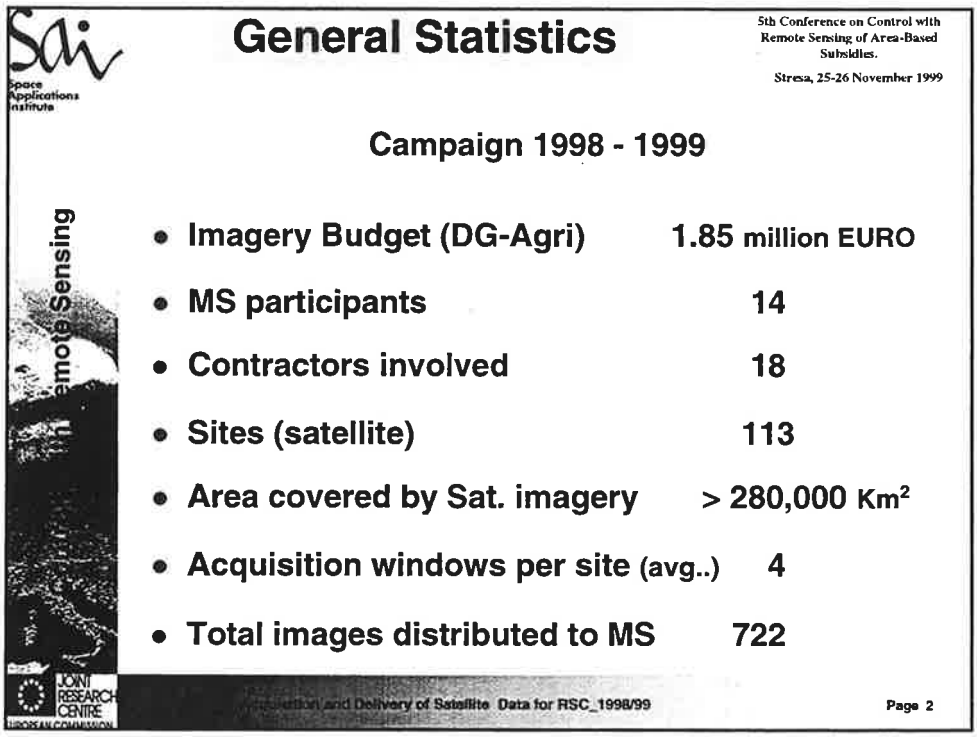
Administrations? Contractants?

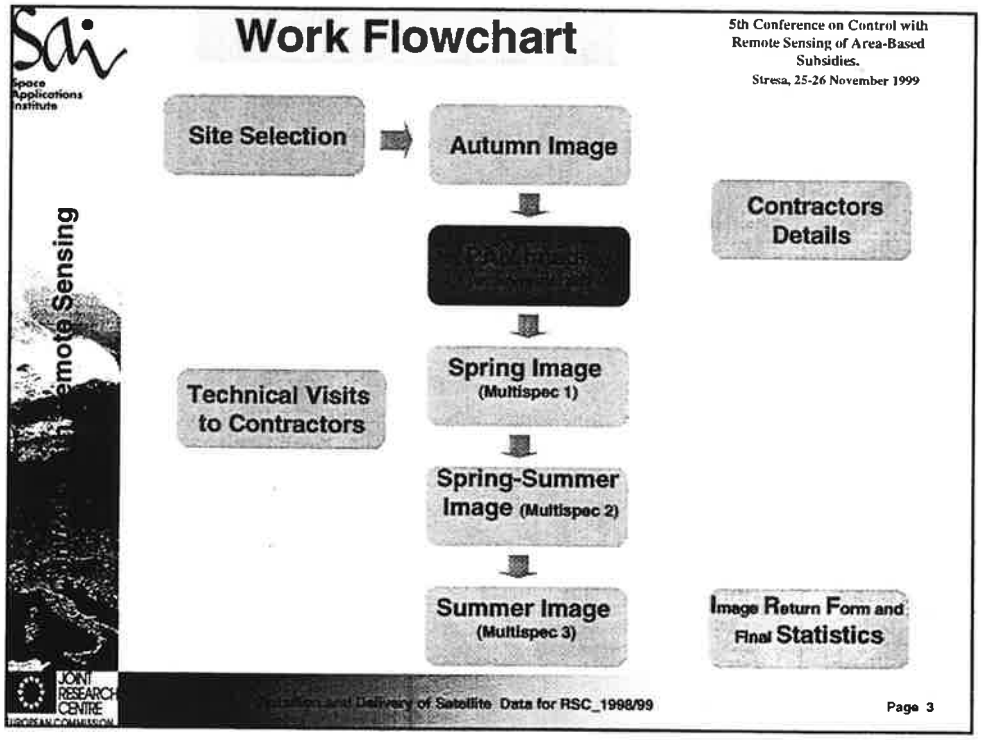
JOINT RESEARCH CENTRE EUROPEAN COMMISSION

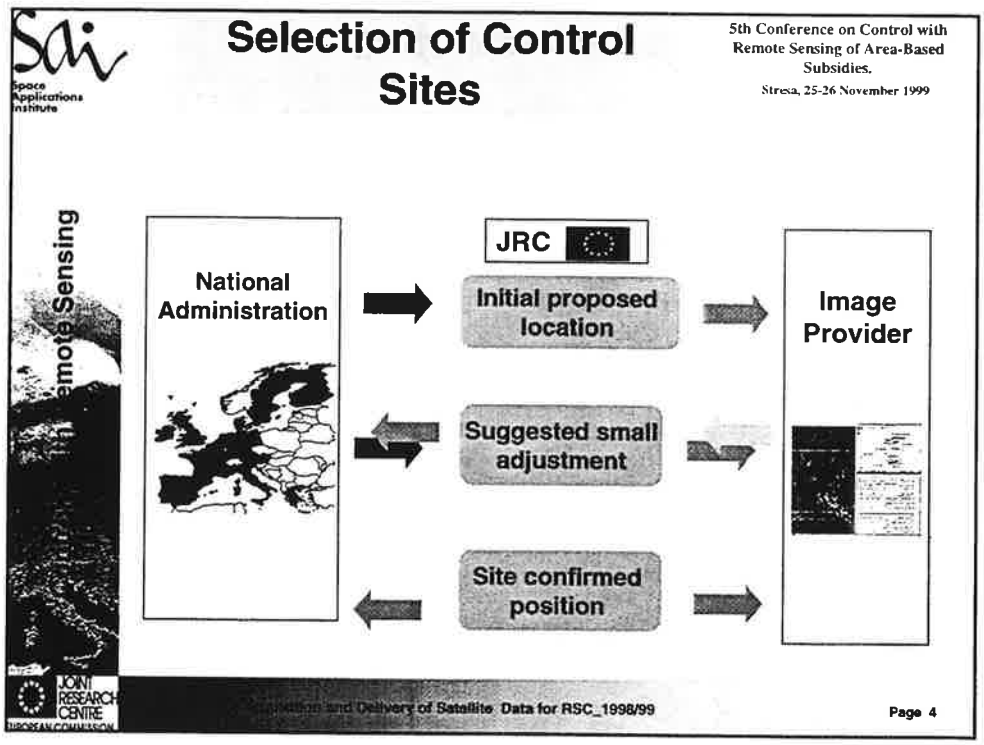
Agriculture et Systèmes d'information Régionaux

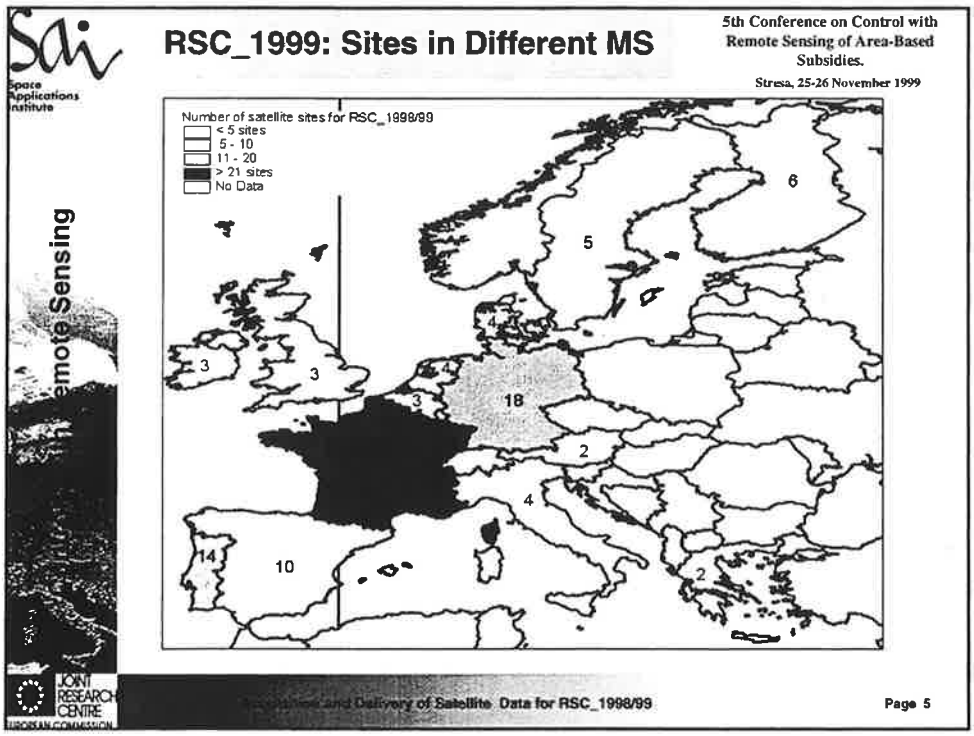
Page n°29

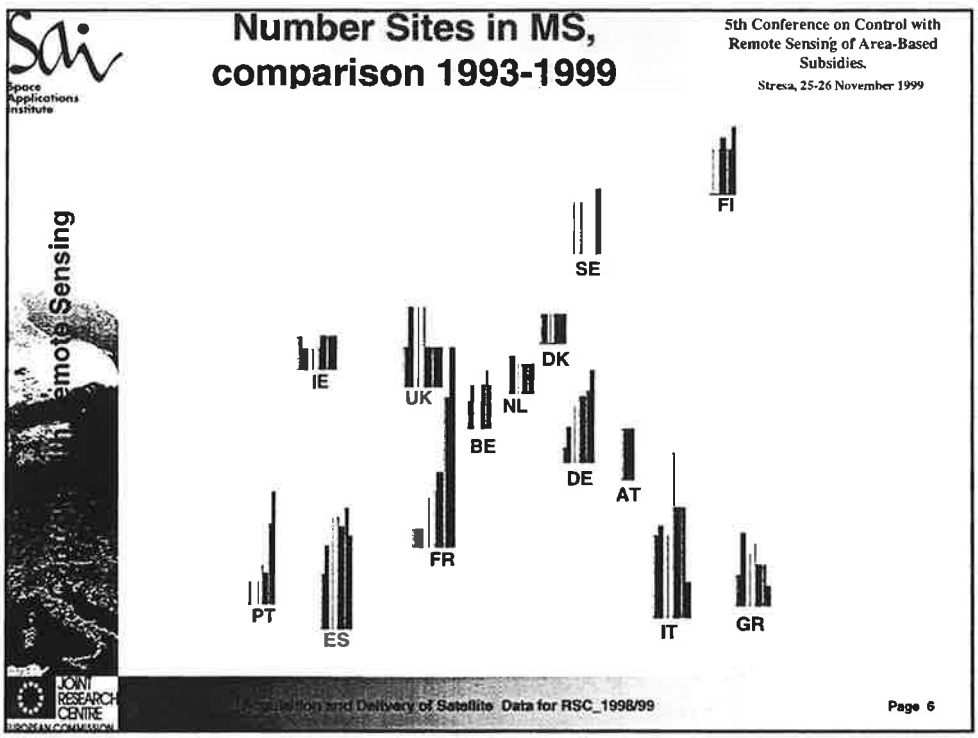

1
Space Applications Institute
Acquisition and
Delivery of
Satellite data
for RSC_1998/99
Guido Peroni
Joint Research Centre
Space Applications Institute
Agriculture and Regional Information Systems
MARS - Control with Remote Sensing
http://mars.aris.sai.jrc.it/control/
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems

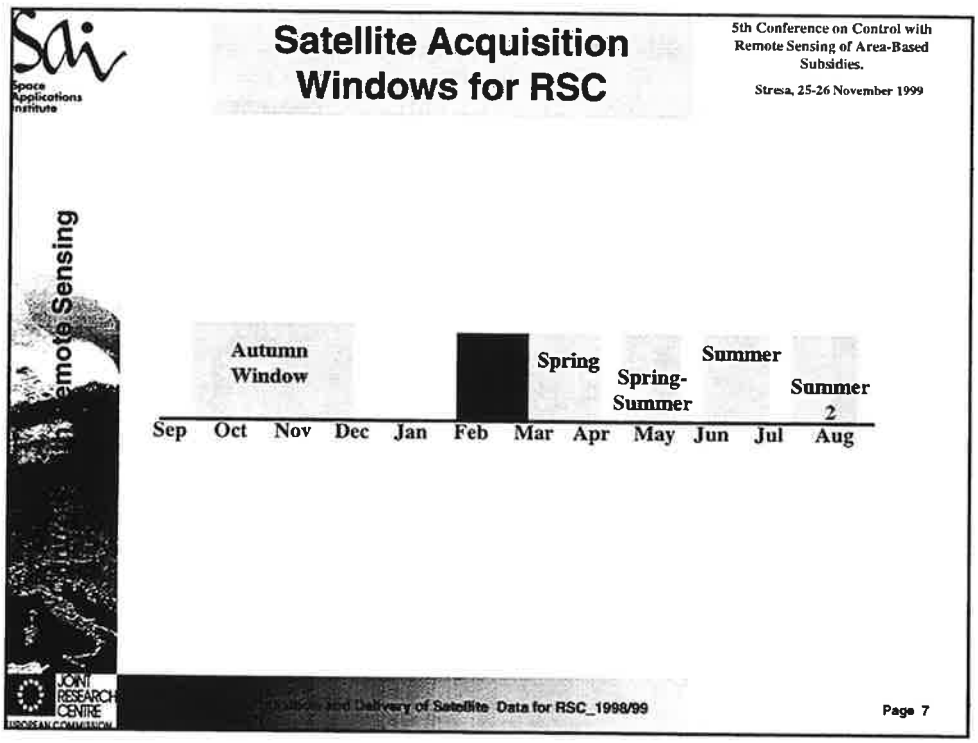

Space Applications Institute
General Statistics
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Campaign 1998 - 1999
Imagery Budget (DG-Agri) 1.85 million EURO
MS participants 14
Contractors involved 18
Sites (satellite) 113
Area covered by Sat. imagery > 280,000 Km²
Acquisition windows per site (avg..) 4
Total images distributed to MS 722
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 2

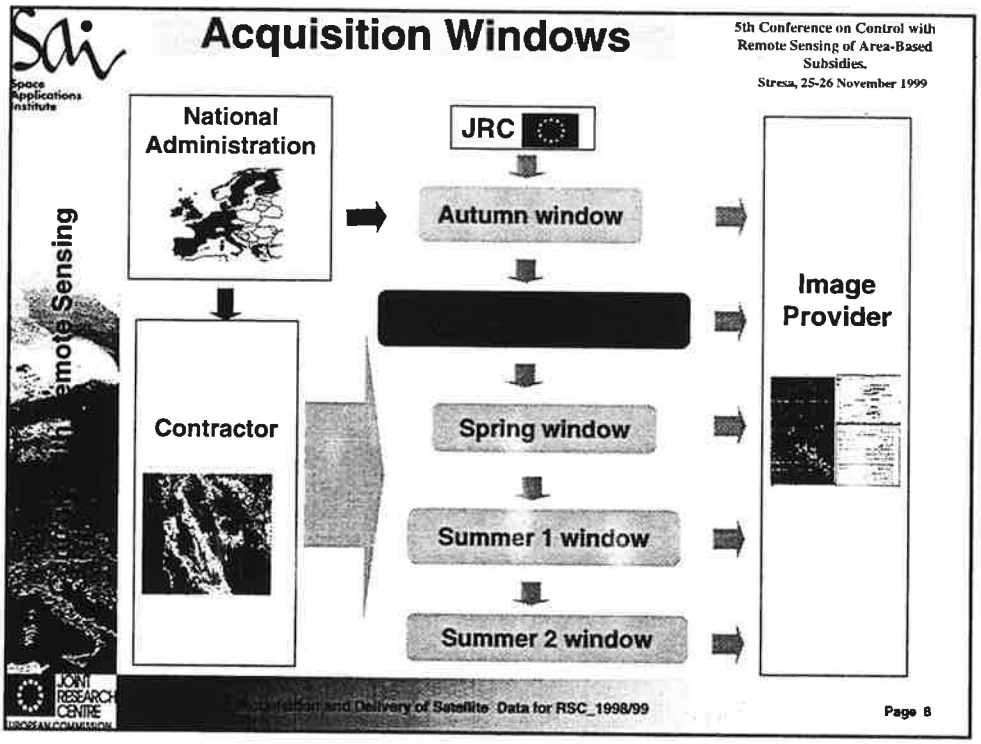

Work Flowchart
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Site Selection
Autumn Image
Contractors Details
Spring Image (Multispec 1)
Technical Visits to Contractors
Spring-Summer Image (Multispec 2)
Summer Image (Multispec 3)
Image Return Form and Final Statistics
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 3

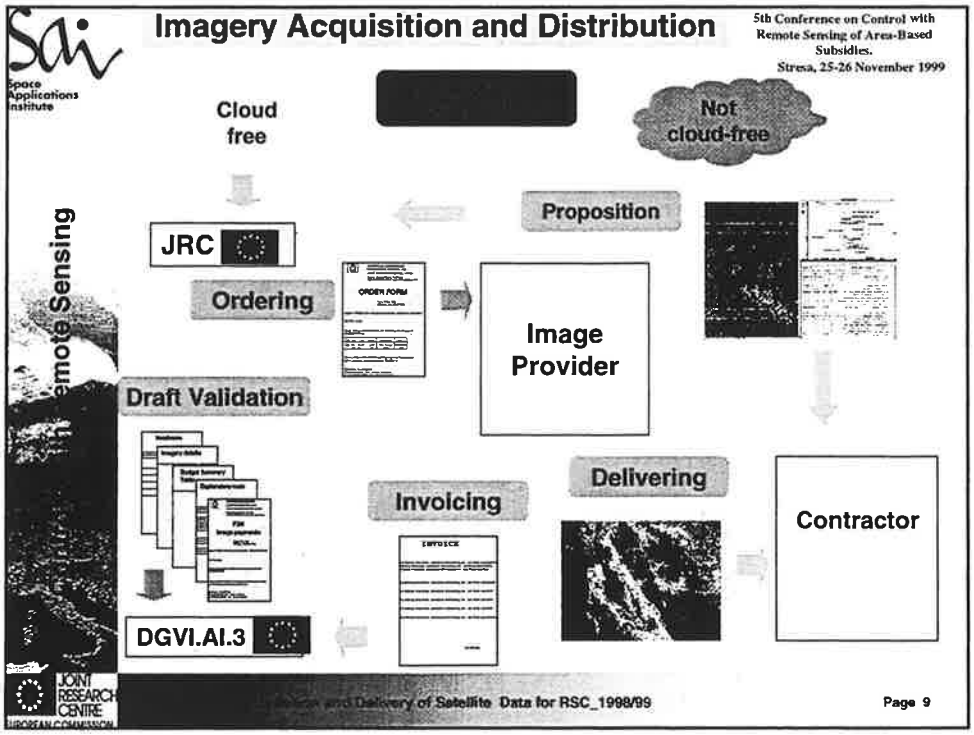

Selection of Control Sites
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
National Administration
JRC
Initial proposed location
Image Provider
Suggested small adjustment
Site confirmed position
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 4

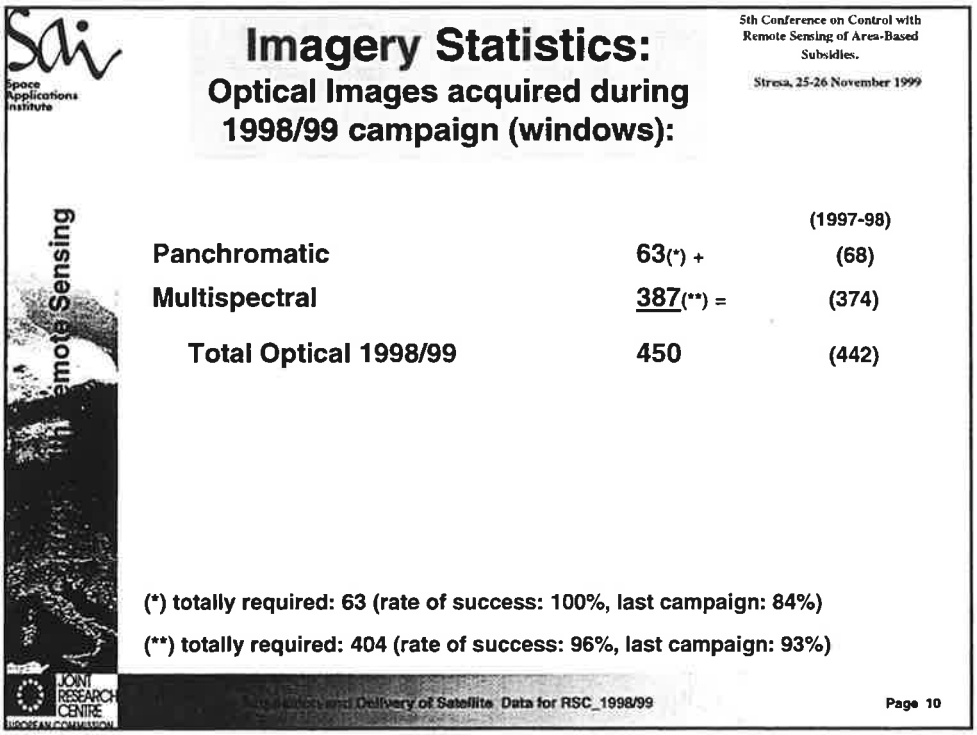

RSC_1999: Sites in Different MS
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Number of satellite sites for RSC_1998/99
< 5 sites
5 - 10
11 - 20
> 21 sites
No Data
Space Applications Institute
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 5

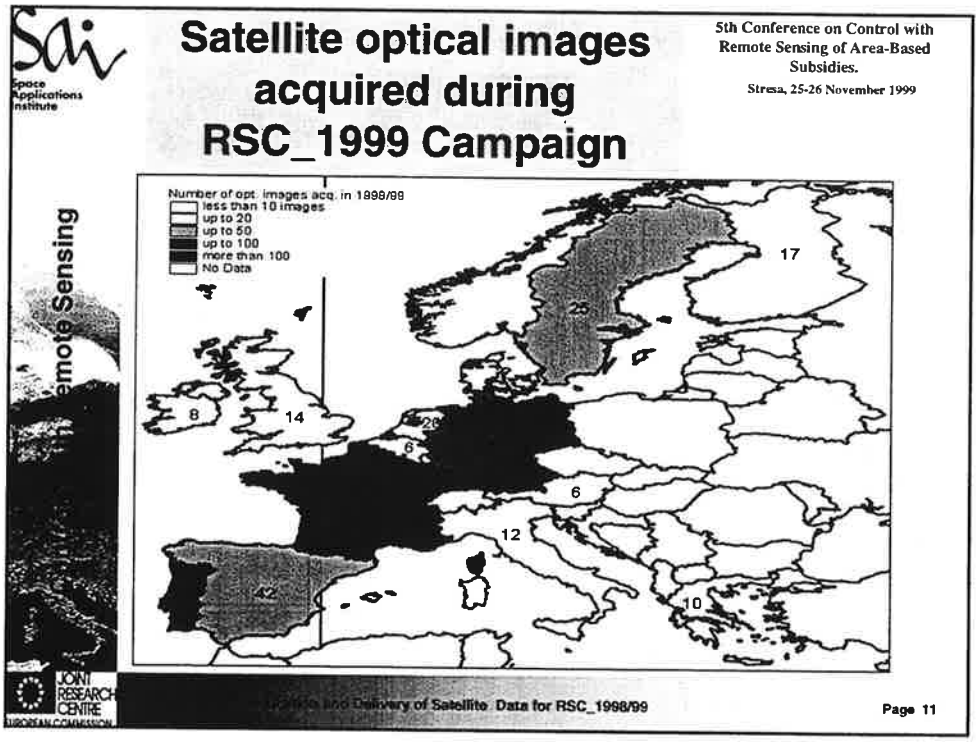

Number Sites in MS, comparison 1993-1999
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
FI
SE
IE
UK
DK
NL
BE
DE
AT
FR
PT
ES
IT
GR
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 6

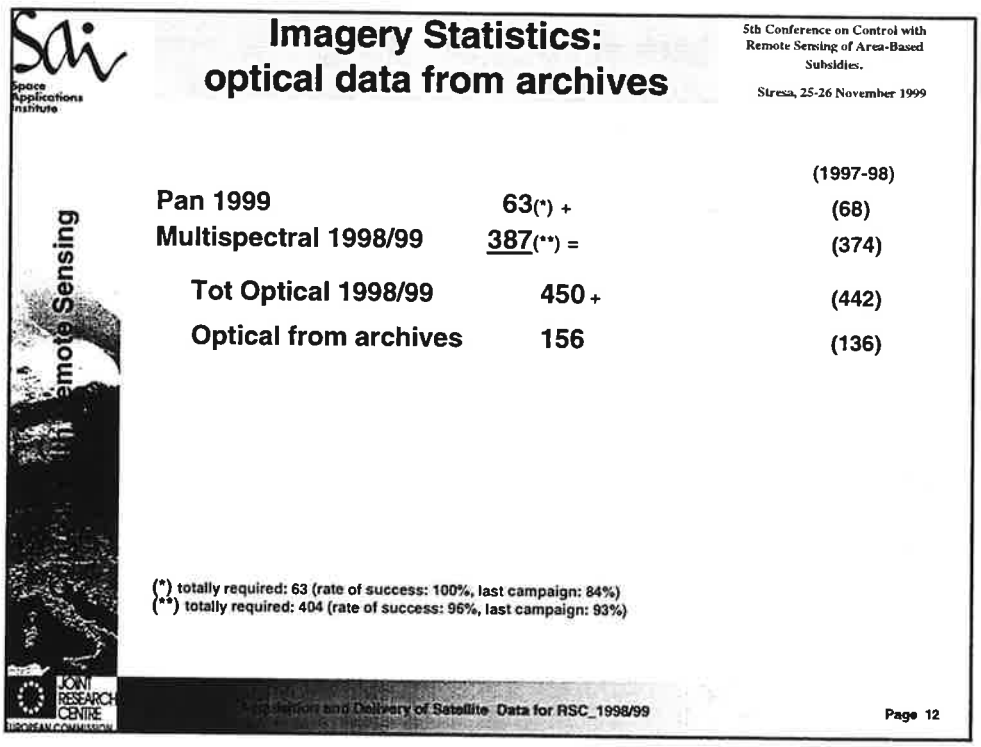

Satellite Acquisition Windows for RSC
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
Autumn Window
Spring
Spring-Summer
Summer
Summer 2
Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 7

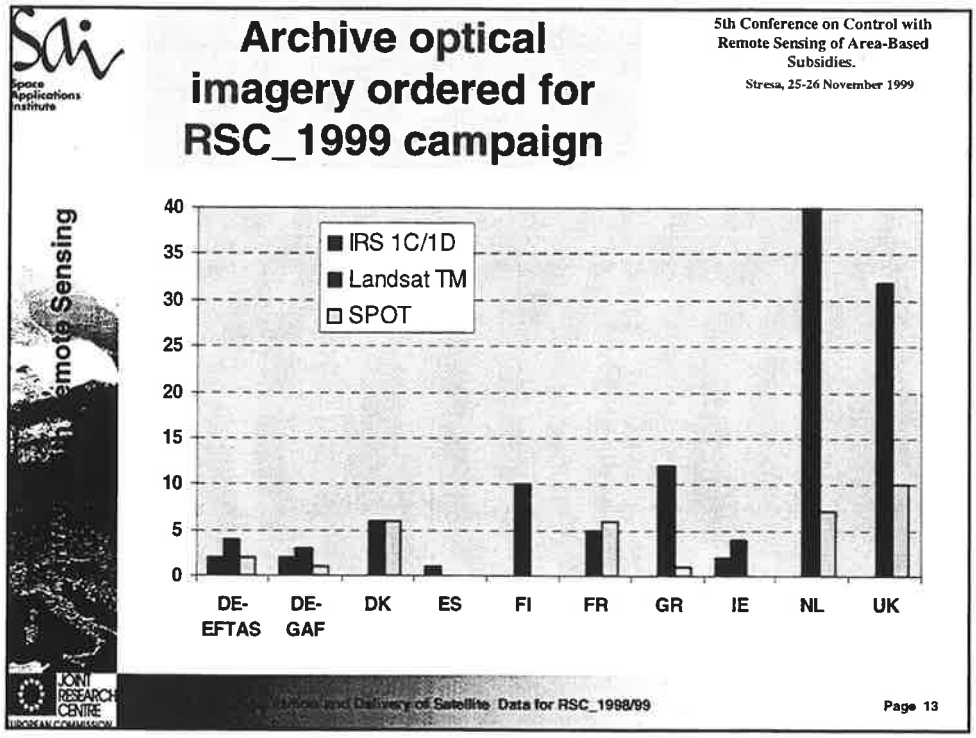

Acquisition Windows
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
National Administration
JRC
Autumn window
Spring window
Summer 1 window
Summer 2 window
Contractor
Image Provider
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 8

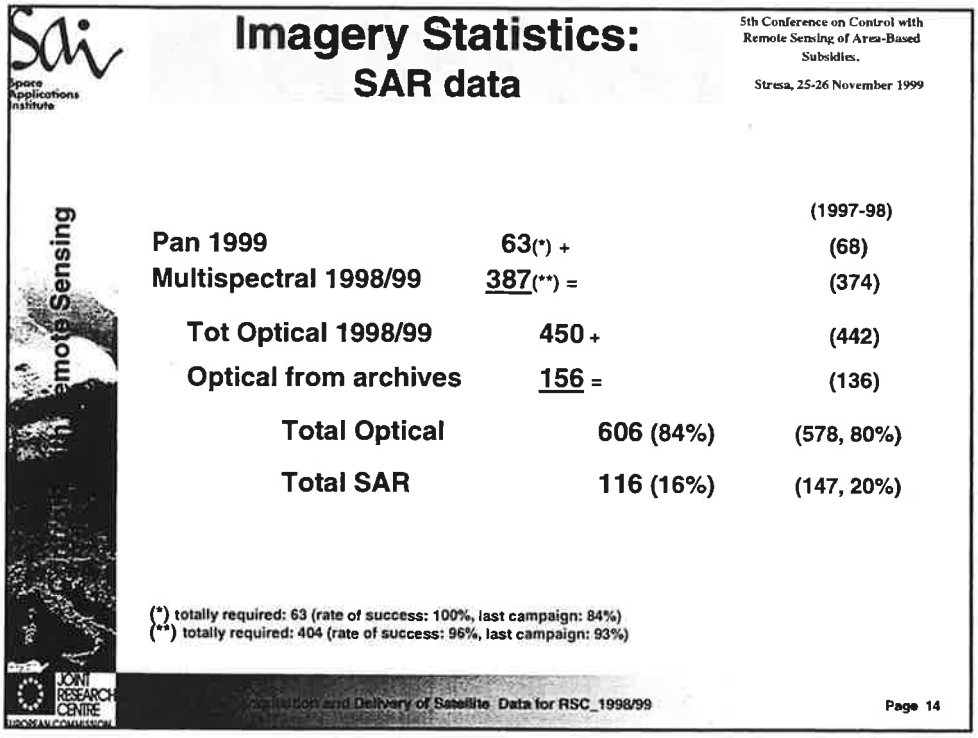

Imagery Acquisition and Distribution
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Cloud free
Not cloud-free
Proposition
JRC
Ordering
Image Provider
Draft Validation
Delivering
Invoicing
Contractor
DGVI.AI.3
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 9

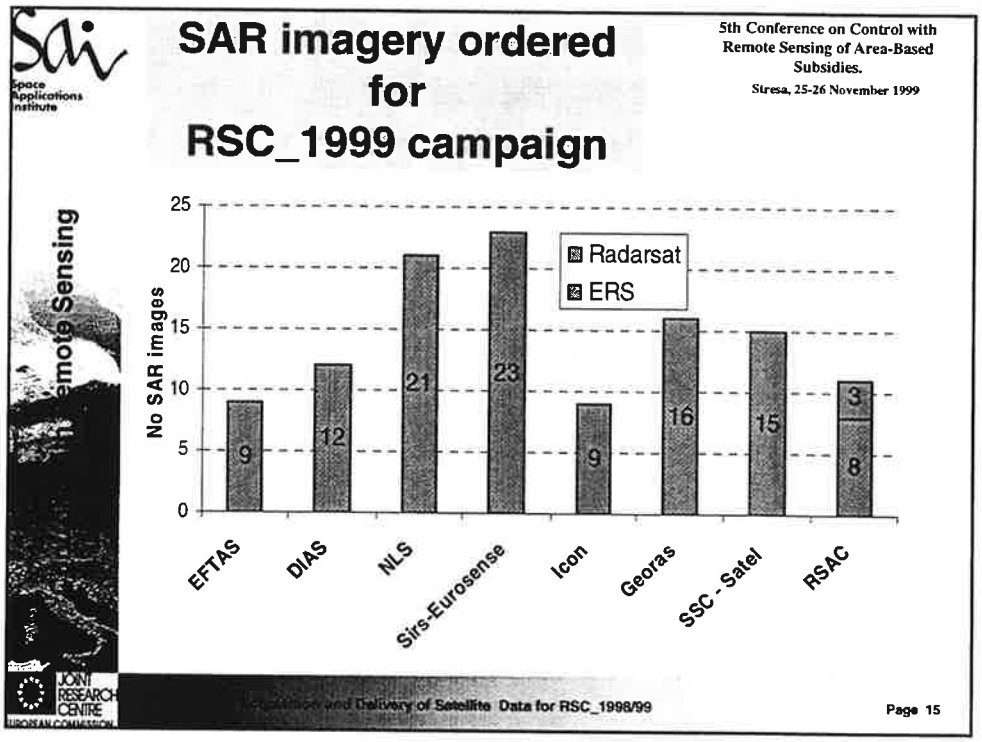

Imagery Statistics:
Optical Images acquired during 1998/99 campaign (windows):
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
(1997-98)
Panchromatic 63(*) + (68)
Multispectral 387(**) = (374)
Total Optical 1998/99 450 (442)
(*) totally required: 63 (rate of success: 100%, last campaign: 84%)
(**) totally required: 404 (rate of success: 96%, last campaign: 93%)
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 10

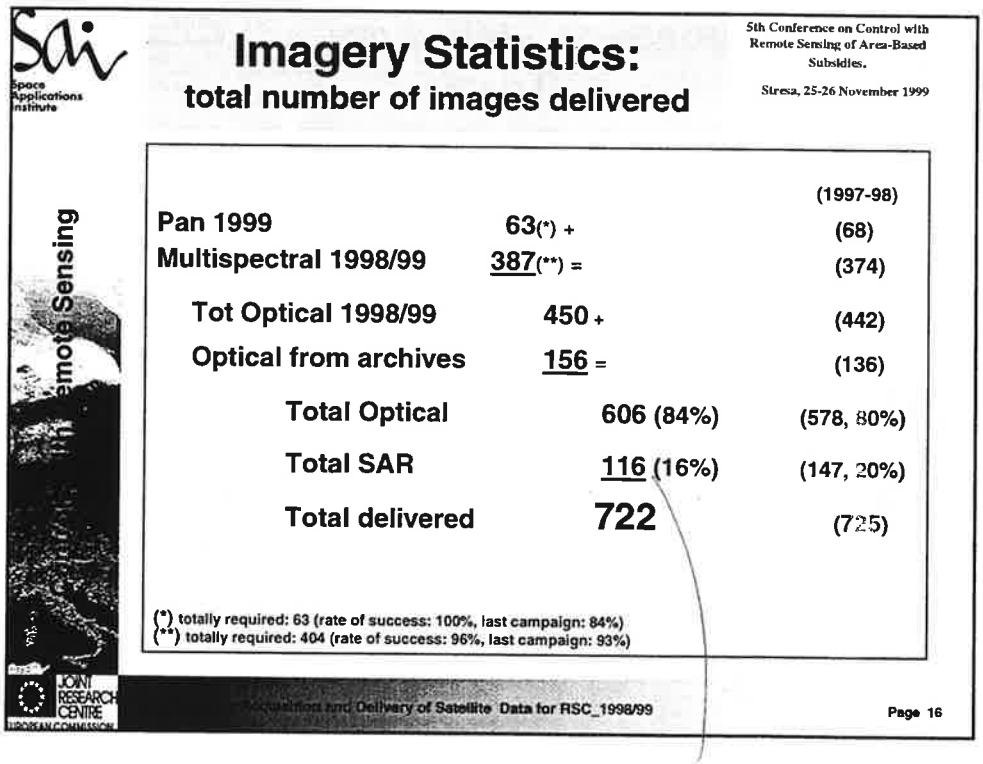

Satellite optical images acquired during RSC_1999 Campaign
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
Number of opt. images acq. in 1998/99
less than 10 images
up to 20
up to 50
up to 100
more than 100
No Data
17
25
8
14
26
6
6
12
42
10
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 11

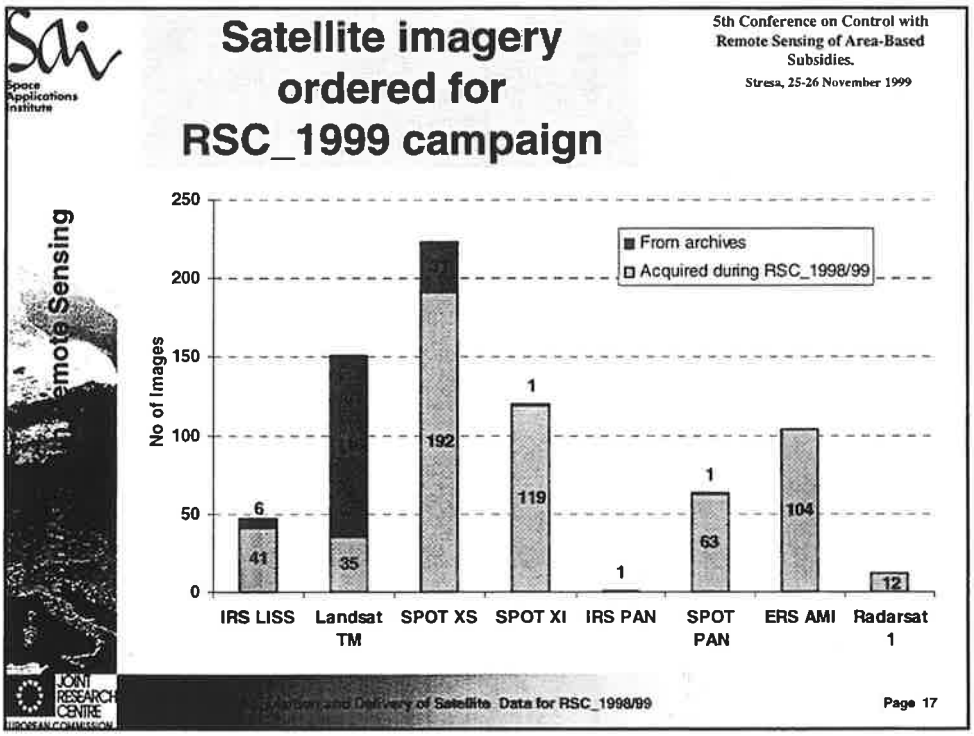

Imagery Statistics: optical data from archives
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
(1997-98)
Pan 1999 63(*) + (68)
Multispectral 1998/99 387(**) = (374)
Tot Optical 1998/99 450 + (442)
Optical from archives 156 (136)
(*) totally required: 63 (rate of success: 100%, last campaign: 84%)
(**) totally required: 404 (rate of success: 96%, last campaign: 93%)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 12

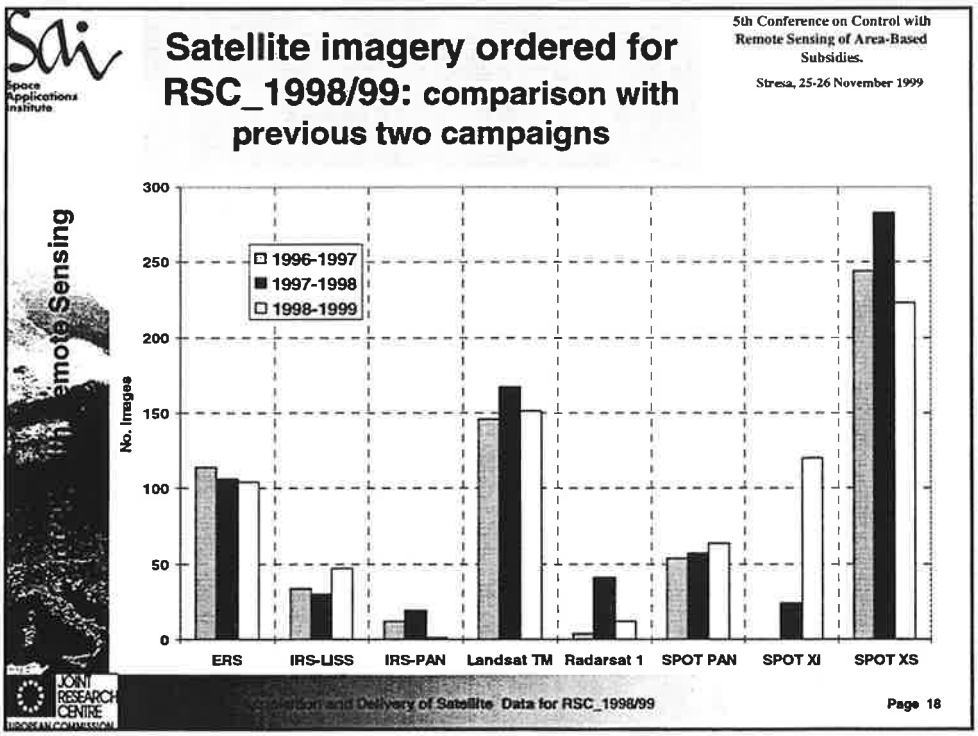

Archive optical imagery ordered for RSC_1999 campaign
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
IRS 1C/1D
Landsat TM
SPOT
40
35
30
25
20
15
10
5
0
DE-EFTAS
DE-GAF
DK
ES
FI
FR
GR
IE
NL
UK
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Acquisition and Delivery of Satellite Data for RSC_1998/99
Page 13

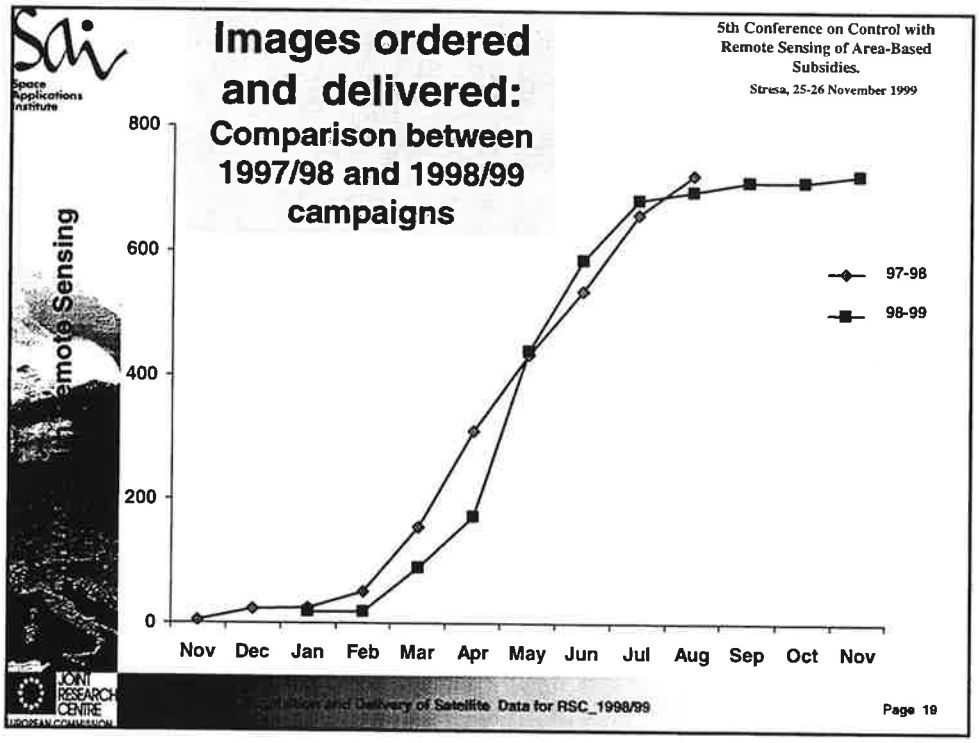

Imagery Statistics:
SAR data
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
(1997-98)
Pan 1999 63(*) + (68)
Multispectral 1998/99 387(**) = (374)
Tot Optical 1998/99 450 + (442)
Optical from archives 156 = (136)
Total Optical 606 (84%) (578, 80%)
Total SAR 116 (16%) (147, 20%)
(*) totally required: 63 (rate of success: 100%, last campaign: 84%)
(**) totally required: 404 (rate of success: 96%, last campaign: 93%)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Acquisition and Delivery of Satellite Data for RSC_1998/99
Page 14

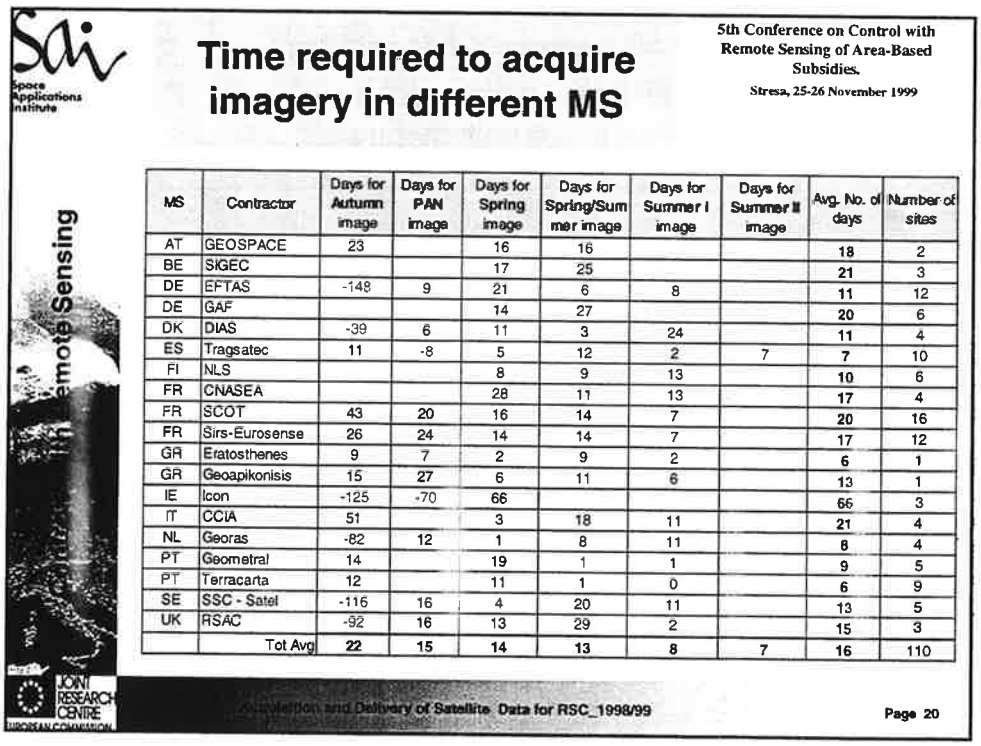

SAI
Space Applications Institute
SAR imagery ordered for RSC_1999 campaign
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Remote Sensing
No SAR images
25
20
15
10
5
0
Radarsat
ERS
9
12
21
23
9
16
15
3
8
EFTAS
DIAS
NLS
Sirs-Eurosense
Icon
Georas
SSC - Satel
RSAC
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Acquisition and Delivery of Satellite Data for RSC_1998/99
Page 15


SAI
Space Applications Institute
Imagery Statistics:
total number of images delivered
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Remote Sensing
(1997-98)
Pan 1999 63(*) + (68)
Multispectral 1998/99 387(**) = (374)
Tot Optical 1998/99 450 + (442)
Optical from archives 156 = (136)
Total Optical 606 (84%) (578, 80%)
Total SAR 116 (16%) (147, 20%)
Total delivered 722 (725)
(*) totally required: 63 (rate of success: 100%, last campaign: 84%)
(**) totally required: 404 (rate of success: 96%, last campaign: 93%)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Acquisition and Delivery of Satellite Data for RSC_1998/99
Page 16


Satellite imagery ordered for RSC_1999 campaign
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
From archives
Acquired during RSC_1998/99
No of Images
250
200
150
100
50
0
6
41
35
192
1
119
1
1
63
104
12
IRS LISS
Landsat TM
SPOT XS
SPOT XI
IRS PAN
SPOT PAN
ERS AMI
Radarsat 1
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 17


Satellite imagery ordered for RSC_1998/99: comparison with previous two campaigns
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
1996-1997
1997-1998
1998-1999
No. Images
300
250
200
150
100
50
0
ERS
IRS-LISS
IRS-PAN
Landsat TM
Radarsat 1
SPOT PAN
SPOT XI
SPOT XS
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Page 18



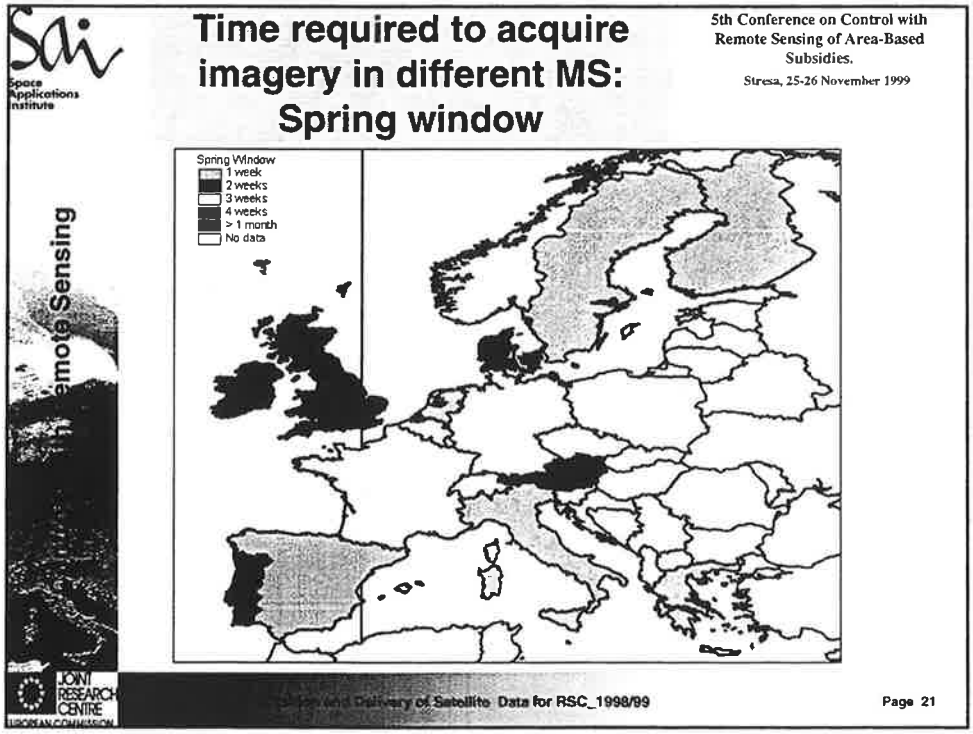


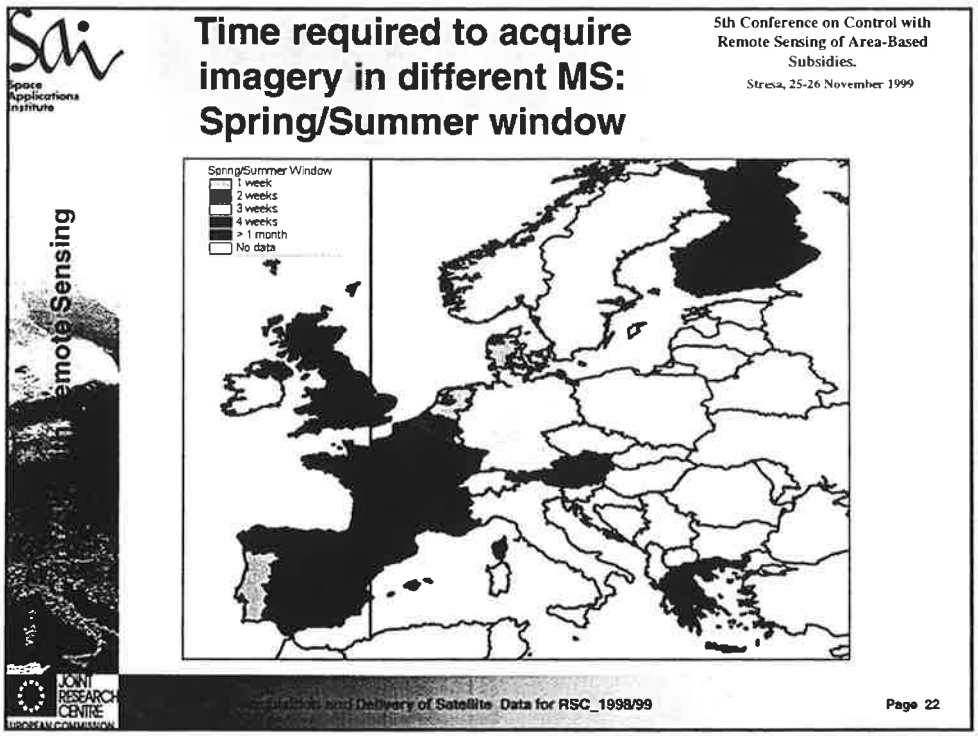
Time required to acquire imagery in different MS

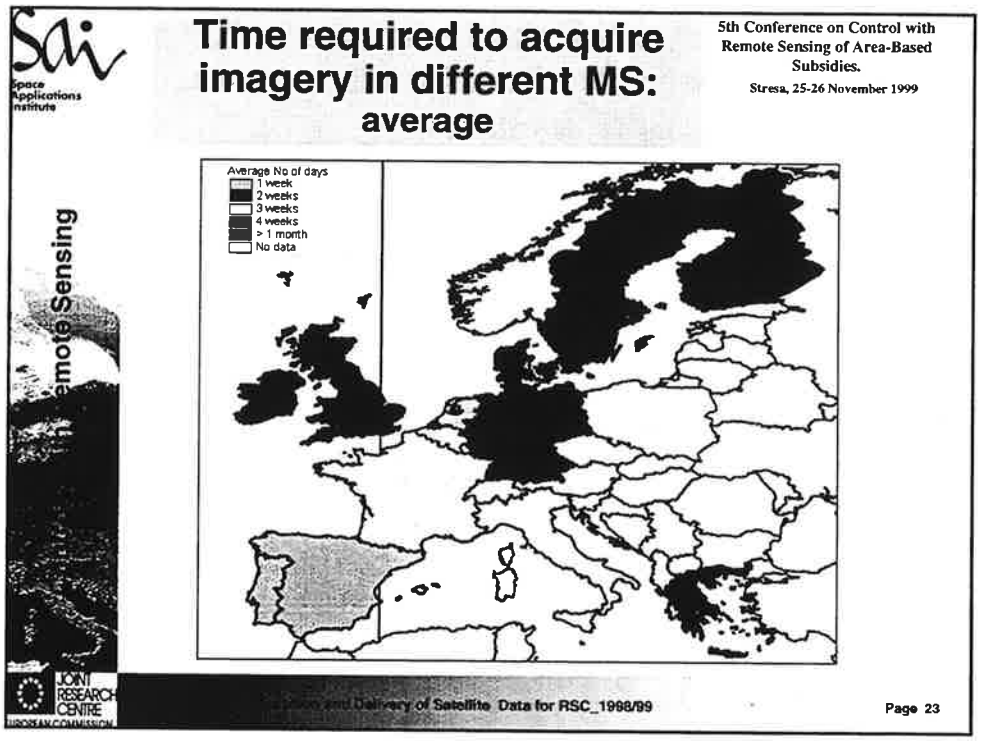
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999

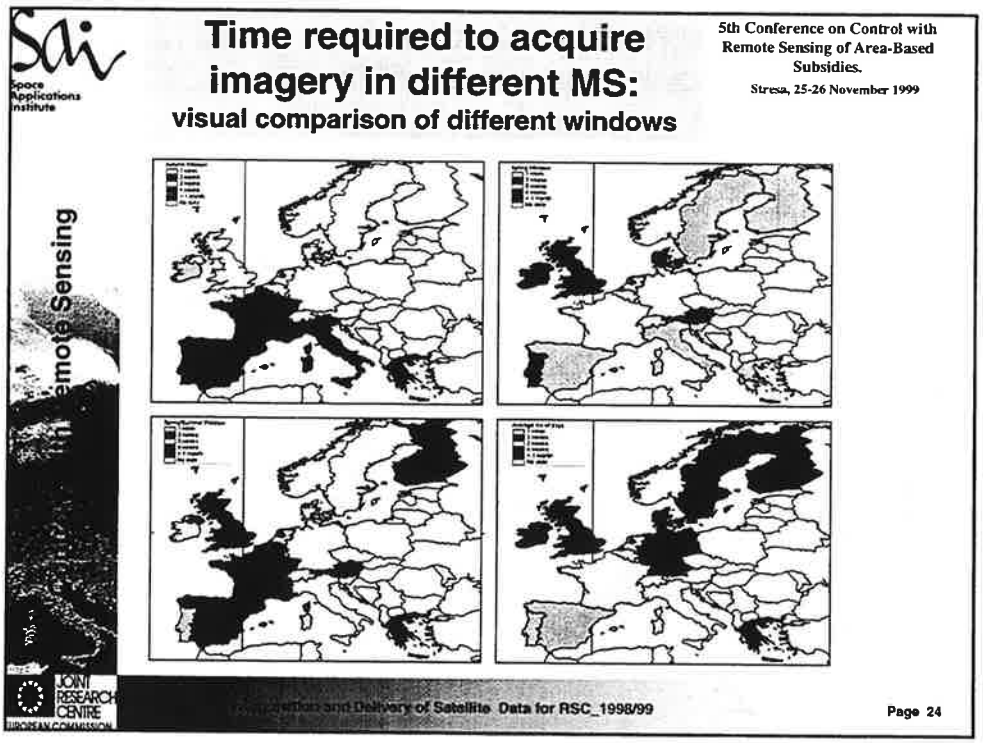
MS	Contractor	Days for Autumn image	Days for PAN image	Days for Spring image	Days for Spring/Summer image	Days for Summer I image	Days for Summer II image	Avg. No. of days	Number of sites
AT	GEOSPACE	23		16	16			18	2
BE	SIGEC			17	25			21	3
DE	EFTAS	-148	9	21	6	8		11	12
DE	GAF			14	27			20	6
DK	DIAS	-39	6	11	3	24		11	4
ES	Tragsatec	11	-8	5	12	2	7	7	10
FI	NLS			8	9	13		10	6
FR	CNASEA			28	11	13		17	4
FR	SCOT	43	20	16	14	7		20	16
FR	Sirs-Eurosense	26	24	14	14	7		17	12
GR	Eratosthenes	9	7	2	9	2		6	1
GR	Geoapikonisis	15	27	6	11	6		13	1
IE	Icon	-125	-70	66				66	3
IT	CCIA	51		3	18	11		21	4
NL	Georas	-82	12	1	8	11		8	4
PT	Geometral	14		19	1	1		9	5
PT	Terracarta	12		11	1	0		6	9
SE	SSC - Satel	-116	16	4	20	11		13	5
UK	RSAC	-92	16	13	29	2		15	3
	Tot Avg	22	15	14	13	8	7	16	110

Page 20


Time required to acquire imagery in different MS: Spring window
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Spring Window
1 week
2 weeks
3 weeks
4 weeks
> 1 month
No data
Space Applications Institute
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Data for RSC_1998/99
Page 21

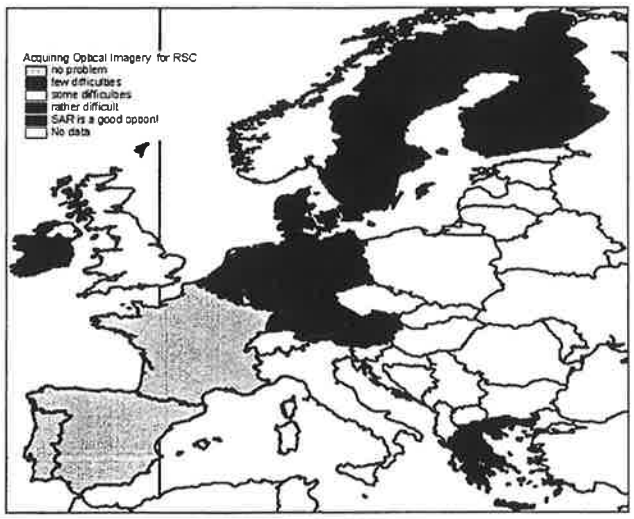

Time required to acquire imagery in different MS: Spring/Summer window
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Spring/Summer Window
1 week
2 weeks
3 weeks
4 weeks
> 1 month
No data
Space Applications Institute
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Data for RSC_1998/99
Page 22


Time required to acquire imagery in different MS:
average
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
Average No of days
1 week
2 weeks
3 weeks
4 weeks
> 1 month
No data
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 23


Time required to acquire imagery in different MS:
visual comparison of different windows
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
Space Applications Institute
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Delivery of Satellite Data for RSC_1998/99
Page 24

Difficulties in acquiring optical imagery during RSC_1998/99

5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999



Space Applications Institute
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

Acquisition and Delivery of Satellite Data for RSC_1998/99

Page 25

Problems encountered during the campaign

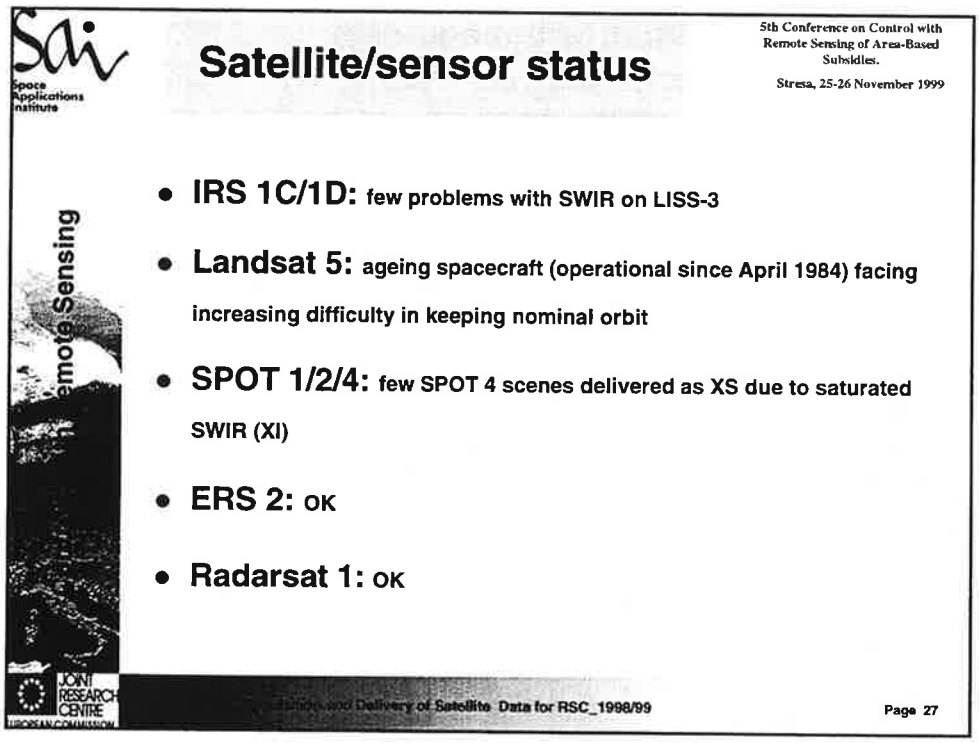
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999

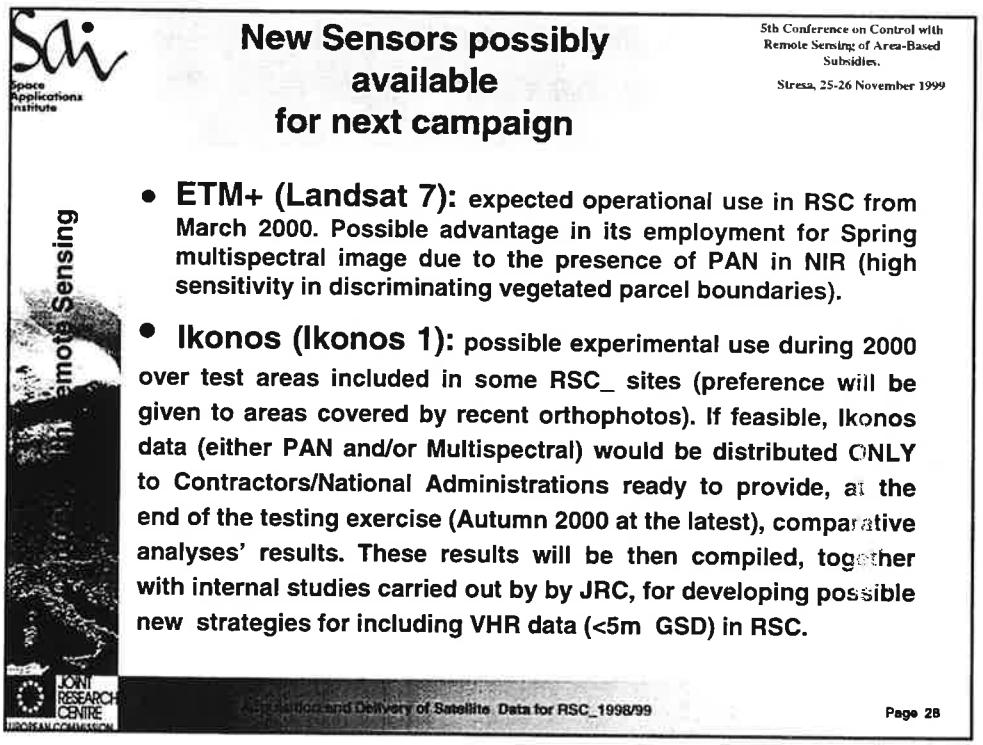
- Two weeks of interruption in Image Ordering (March/April 1999)
- Archive TM data rejected by ESA QC after order
- Sites not conformed to standard shape (PT and IT)
- Some delays in image delivery
- Haze affecting few cloud-free scenes

Space Applications Institute
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

Acquisition and Delivery of Satellite Data for RSC_1998/99

Page 26


Space Applications Institute
Satellite/sensor status
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
IRS 1C/1D: few problems with SWIR on LISS-3
Landsat 5: ageing spacecraft (operational since April 1984) facing increasing difficulty in keeping nominal orbit
SPOT 1/2/4: few SPOT 4 scenes delivered as XS due to saturated SWIR (XI)
ERS 2: OK
Radarsat 1: OK
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Acquisition and Delivery of Satellite Data for RSC_1998/99
Page 27


Space Applications Institute
New Sensors possibly available for next campaign
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
ETM+ (Landsat 7): expected operational use in RSC from March 2000. Possible advantage in its employment for Spring multispectral image due to the presence of PAN in NIR (high sensitivity in discriminating vegetated parcel boundaries).
Ikonos (Ikonos 1): possible experimental use during 2000 over test areas included in some RSC_ sites (preference will be given to areas covered by recent orthophotos). If feasible, Ikonos data (either PAN and/or Multispectral) would be distributed ONLY to Contractors/National Administrations ready to provide, at the end of the testing exercise (Autumn 2000 at the latest), comparative analyses' results. These results will be then compiled, together with internal studies carried out by by JRC, for developing possible new strategies for including VHR data (<5m GSD) in RSC.
Remote Sensing
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Acquisition and Delivery of Satellite Data for RSC_1998/99
Page 28

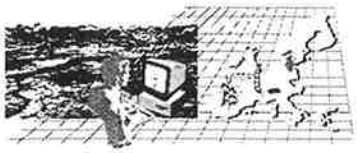
1

5th Conference on Control with Remote Sensing of Area-based Subsidies

Stresa, 25-26 November 1999

Session 1: 1999 Quality Control

by Josiane Masson, JRC



Space Applications Institute
Directorate General Joint Research Centre
European Commission
21020 Ispra (VA), Italy
http://www.sai.jrc.it

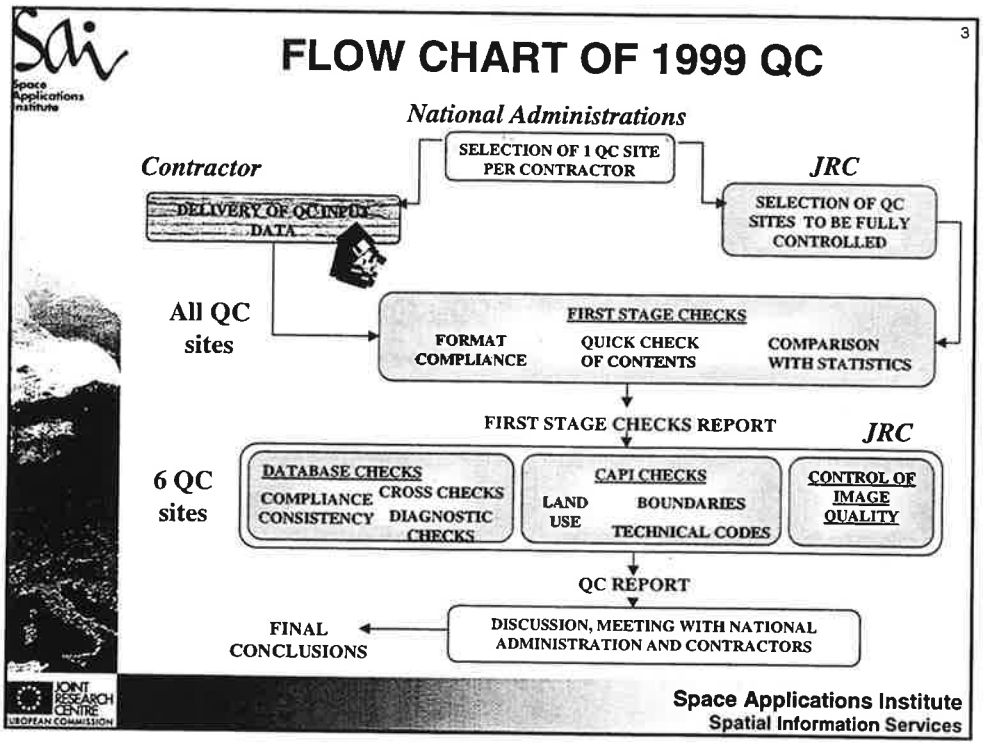
Space Applications Institute
Spatial Information Services

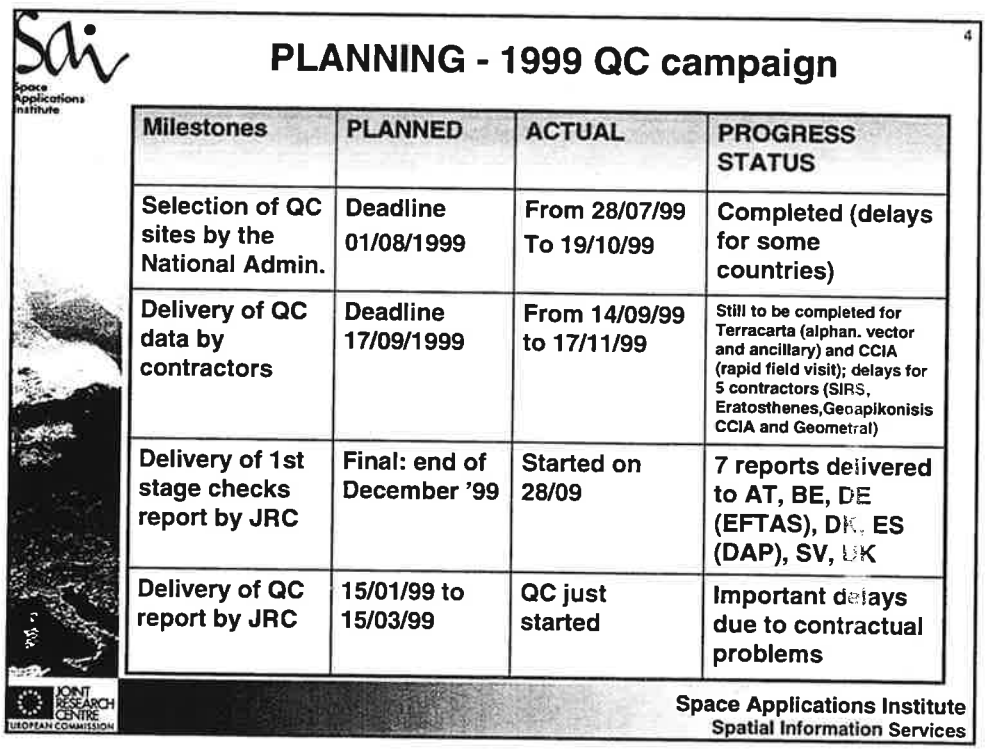
2

SIGNIFICANT CHANGES FOR 1999 QC

- **Development of a new QC software based on PC Windows NT platform and desktop DBMS+GIS by the JRC with external assistance**
  - Technical Specifications completed on the basis of the analysis of the previous campaigns and improvement requirements
  - Database Checks tool: development in progress in ACCESS (delays)
  - CAPI tool : some problem with external contract, will be designed by HTS on Arcview for 1999 campaign
- **ITT for technical support for the QC processing: HTS contractor for 3 years campaigns (1999-2001). Some delays in the signature of the contract (mid-November)**
- **Significant amendments of Recommendations Part 4 to better take account of the various types of dossiers within EU:**
  - Major changes in the structure of parcel tables
  - Provision of a Template ACCESS database with pre-defined tables in order to simplify the integration of input data.
- **Significant changes in the methodology**
  - More detailed checks of diagnostic: recalculation of diagnostic at parcel, group and dossier level; extrapolation of corrections on final diagnostic
  - First stage checks for all contractors: minimum control of all QC sites, early report delivered, corrections in order to avoid artefacts as far as possible
  - Additional QC of images (control of the quality of geometry)

Space Applications Institute
Spatial Information Services


3
FLOW CHART OF 1999 QC
National Administrations
Contractor
SELECTION OF 1 QC SITE PER CONTRACTOR
JRC
DELIVERY OF QC INPUT DATA
SELECTION OF QC SITES TO BE FULLY CONTROLLED
All QC sites
FIRST STAGE CHECKS
FORMAT COMPLIANCE
QUICK CHECK OF CONTENTS
COMPARISON WITH STATISTICS
FIRST STAGE CHECKS REPORT
JRC
6 QC sites
DATABASE CHECKS
COMPLIANCE CROSS CHECKS
CONSISTENCY DIAGNOSTIC CHECKS
CAPI CHECKS
LAND USE
BOUNDARIES
TECHNICAL CODES
CONTROL OF IMAGE QUALITY
QC REPORT
FINAL CONCLUSIONS
DISCUSSION, MEETING WITH NATIONAL ADMINISTRATION AND CONTRACTORS
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services


4
PLANNING - 1999 QC campaign
Milestones
PLANNED
ACTUAL
PROGRESS STATUS
Selection of QC sites by the National Admin.
Deadline 01/08/1999
From 28/07/99 To 19/10/99
Completed (delays for some countries)
Delivery of QC data by contractors
Deadline 17/09/1999
From 14/09/99 to 17/11/99
Still to be completed for Terracarta (alphan. vector and ancillary) and CCIA (rapid field visit); delays for 5 contractors (SIRS, Eratosthenes,Geoapikonisis CCIA and Geometral)
Delivery of 1st stage checks report by JRC
Final: end of December '99
Started on 28/09
7 reports delivered to AT, BE, DE (EFTAS), DK, ES (DAP), SV, UK
Delivery of QC report by JRC
15/01/99 to 15/03/99
QC just started
Important delays due to contractual problems
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

5

SELECTION OF QC SITES

- National Administrations selected a total of 19 QC sites:

No	Country	Contractor	QC site
1	AT Austria	Geospace	
2	BE Belgium	Min. Agri.	STEE
3	DE Germany	EFTAS	LUIS
4	DE Germany	GAF	PALZ
5	DK Denmark	DIAS	SLAG
6	ES Spain	DAP	SEVILLA1
7	ES Spain	TRAGSATEC	DAMI
8	FI Finland	NLS	FORS
9	FR France	SCOT	SULP

Space Applications Institute
Spatial Information Services

6

SELECTION OF QC SITES - 2

No	Country	Contractor	QC site
10	FR France	SIRS	DARG
11	GR Greece	Eratosthenes	LATK
12	GR Greece	Geoapikonisis	PEDI
13	IE Ireland	Icon	DUNS
14	IT Italy	CCIA	LODI
15	NL The Netherlands	Georas	ZONE 3
16	PT Portugal	Geometral	TRAS os MONTES
17	PT Portugal	Terracarta	BEJA (images AL3,AL4,AL8 & AL9)
18	SE Sweden	SSC Satellitbild	MISG
19	UK United Kingdom	RSAC	DORS

Space Applications Institute
Spatial Information Services

7

CRITERIA FOR THE SELECTION OF QC SITES BY THE JRC

- 6 QC SITES WERE SELECTED TO BE FULLY CONTROLLED
- NO MORE SITES THIS YEAR BECAUSE:
  - TRANSITION YEAR: NEW CONTRACT FOR TECHNICAL SUPPORT (BUT RISKS ARE LIMITED WITH THE SAME CONTRACTOR), REDEVELOPMENT OF QC SOFTWARE
  - SIGNIFICANT PROPORTION OF COUNTRIES WITH MULTI-YEARS CONTRACTORS
  - DELAYS FOR CONTRACTUAL REASONS
  - LIMITED RESOURCES

.... BUT COULD BE INCREASED AGAIN NEXT YEAR

PRIORITY ORDER GIVEN TO:

- NEW CONTRACTORS
- PROBLEMS FOUND IN 1998 QC : 1999 WILL FOCUS ON THOSE ISSUES

Space Applications Institute
Spatial Information Services

8

QC SITES SELECTED FOR FULL QC

No	Country	Contractor	Selected for database and CAPI checks	Selected for QC of images
1	DE	EFTAS	X	
2	AT	GEOSPACE	X	X
3	SV	SSC SAT.	X	X
4	UK	RSAC	X	X
5	SP	DAP	X	X
6	GR	GEOAPIKONISIS	X	X
(7)	SP	TRAGSATEC		X

Space Applications Institute
Spatial Information Services

9

RATE OF QUALITY CONTROL

- **IN 1999 A TOTAL OF 148 SITES WERE CONTROLLED BY REMOTE SENSING WITHIN UE**
  - ⇨ **19 SITES WILL PASS THE FIRST STAGE CHECKS = 13 %**
  - ⇨ **6 QC SITES WILL BE FULLY CONTROLLED = 4 %**
- **IN 1999 A TOTAL OF 248700 DOSSIERS WERE CONTROLLED BY REMOTE SENSING WITHIN UE**
  - ⇨ **23,387 DOSSIERS WILL PASS THE FIRST STAGE CHECKS = 9%**
  - ⇨ **5,600 DOSSIERS WILL BE FULLY CONTROLLED = 2%**
- **THE RATE OF QC VARIES VERY MUCH FROM ONE COUNTRY TO THE OTHER: 1% to 100%**

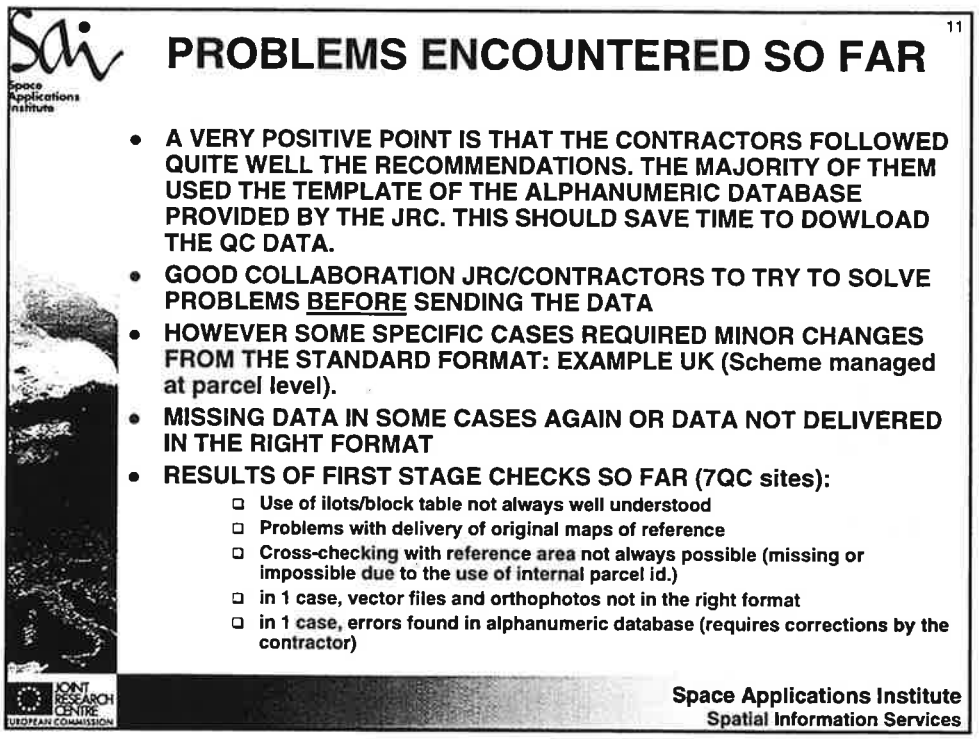
Space Applications Institute
Spatial Information Services

10

Proportion of dossiers checked per contractor in 1999

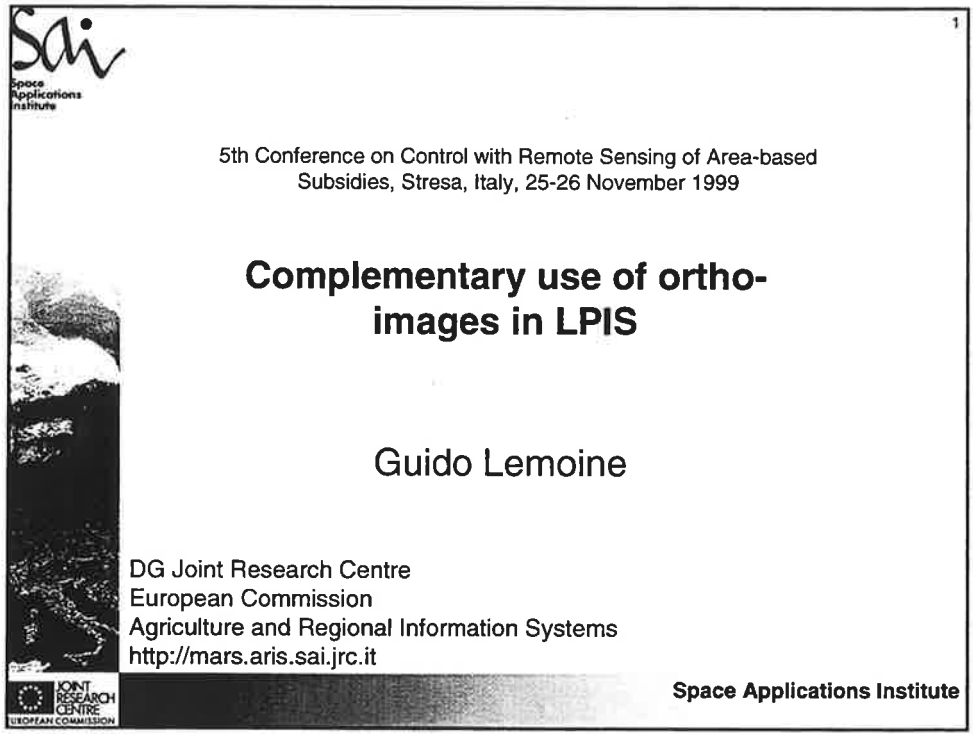
COUNTRY	CONTRACTOR	TOTAL NBR DOSSIERS PROCESSED BY THE CONTRACTOR	NBR DOSSIERS IN THE QC SITE	% DOSSIERS QUALITY CONTROLLED
BE	MIN AGRI	1991	641	32%
DE	EFTAS	6689	389	6%
DE	GAF	6626	806	12%
DK	DIAS	2436	736	30%
ESP	DAP	4154	438	11%
ESP	TRAGSATEC	19910	2585	13%
FINL	NLS	3696	2232	60%
FR	SCOT	7152	402	6%
FR	SIRS EUROSENSE	3089	402	13%
GR	ERATOSTHENES	2447	2447	100%
GR	GEOAPIKONISIS	2448	2448	100%
IRL	ICON	4687	1484	32%
ITA	CCIA	159744	1256	1%
NL	GEORAS	3114	882	28%
O	GEOSPACE	1539	1238	80%
P	TERRACARTA	6588	1883	29%
P	GEOMETRAL	8539	2031	24%
SV	SSC - SATEL	2652	684	26%
UK	RSAC	1200	403	34%
ALL QC SITES/	**TOTAL EU**	**248701**	**23387**	**9%**
6 QC SITES/	**TOTAL EU**	**248701**	**5600**	**2%**

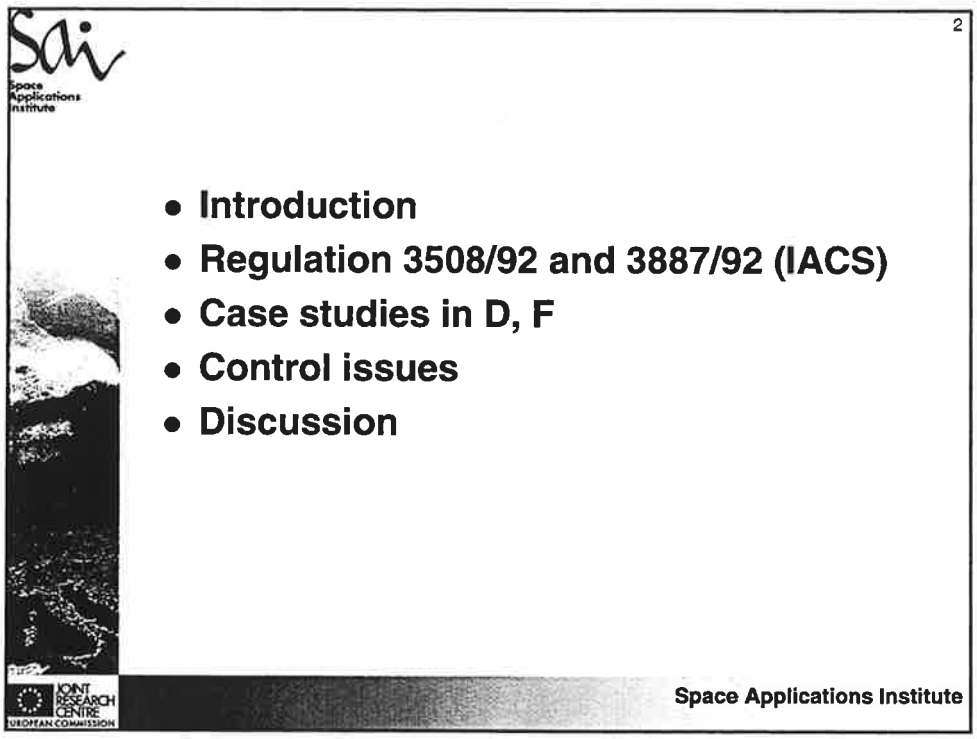
Space Applications Institute
Spatial Information Services

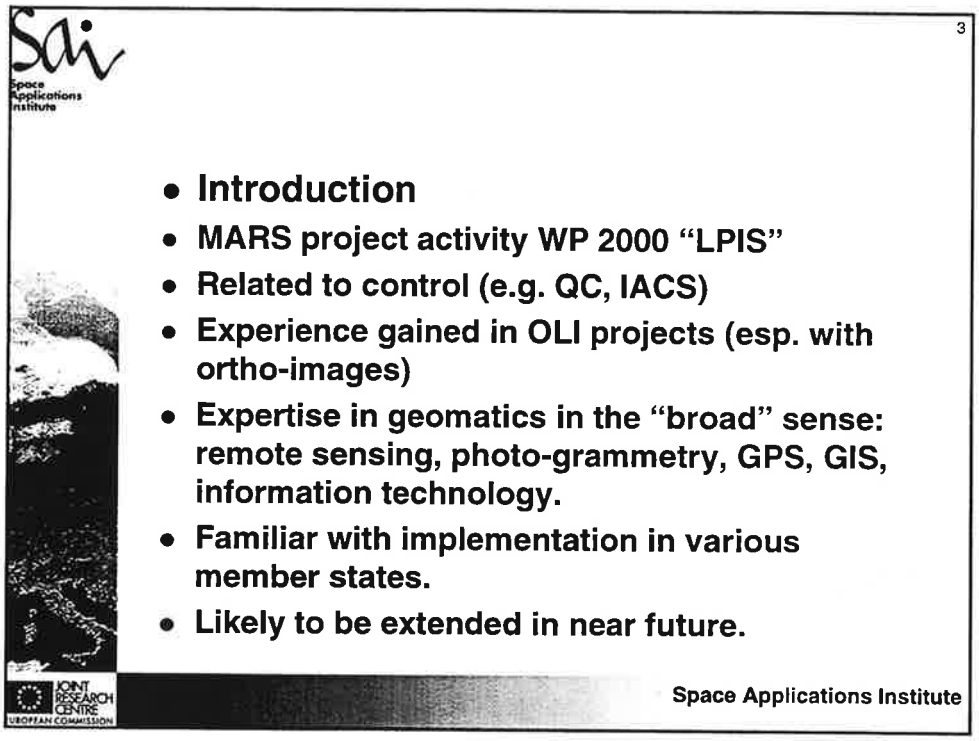

11
PROBLEMS ENCOUNTERED SO FAR
Space Applications Institute
A VERY POSITIVE POINT IS THAT THE CONTRACTORS FOLLOWED QUITE WELL THE RECOMMENDATIONS. THE MAJORITY OF THEM USED THE TEMPLATE OF THE ALPHANUMERIC DATABASE PROVIDED BY THE JRC. THIS SHOULD SAVE TIME TO DOWLOAD THE QC DATA.
GOOD COLLABORATION JRC/CONTRACTORS TO TRY TO SOLVE PROBLEMS BEFORE SENDING THE DATA
HOWEVER SOME SPECIFIC CASES REQUIRED MINOR CHANGES FROM THE STANDARD FORMAT: EXAMPLE UK (Scheme managed at parcel level).
MISSING DATA IN SOME CASES AGAIN OR DATA NOT DELIVERED IN THE RIGHT FORMAT
RESULTS OF FIRST STAGE CHECKS SO FAR (7QC sites):
Use of ilots/block table not always well understood
Problems with delivery of original maps of reference
Cross-checking with reference area not always possible (missing or impossible due to the use of internal parcel id.)
in 1 case, vector files and orthophotos not in the right format
in 1 case, errors found in alphanumeric database (requires corrections by the contractor)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute
Spatial Information Services

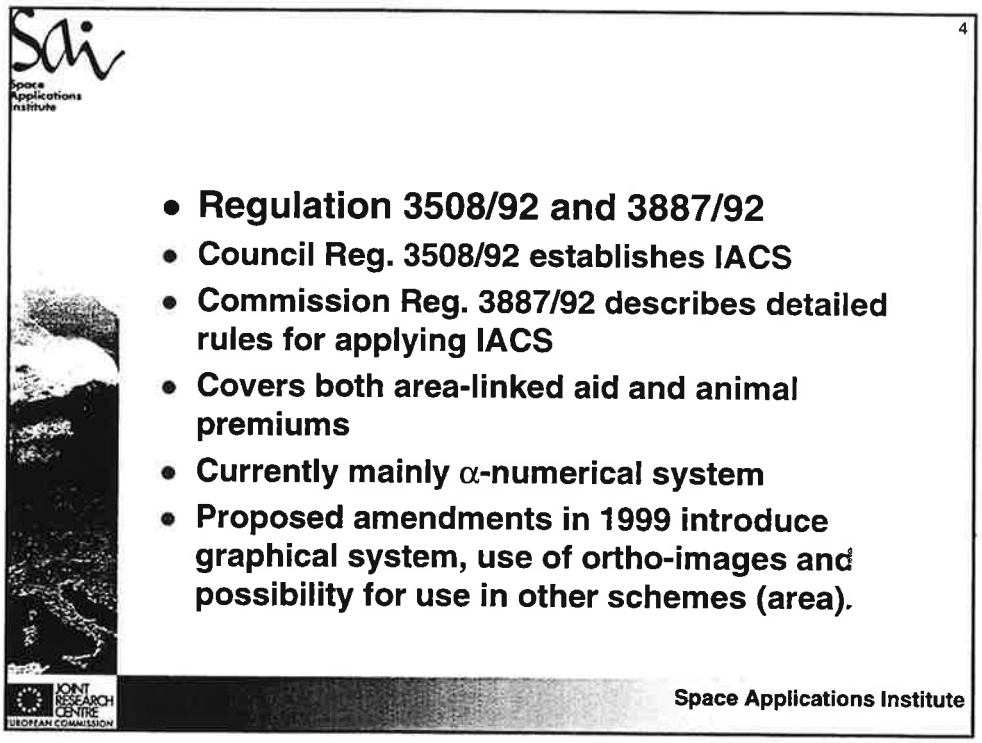
Session 2:

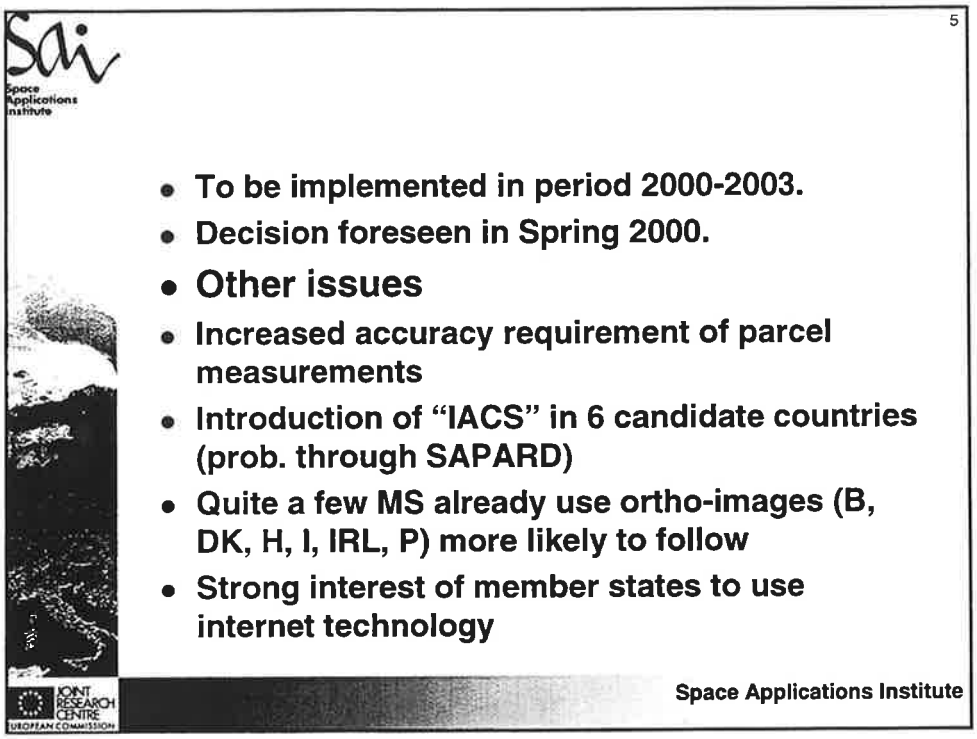
Technical issues of 1999 campaign

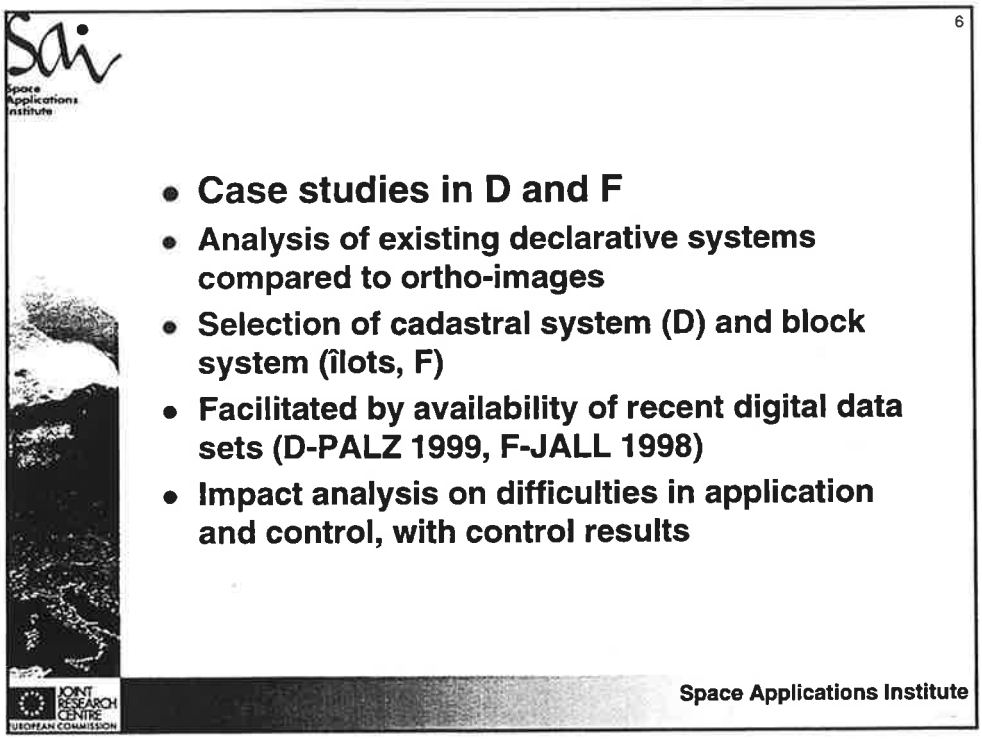

1
Space Applications Institute
5th Conference on Control with Remote Sensing of Area-based Subsidies, Stresa, Italy, 25-26 November 1999
Complementary use of ortho-images in LPIS
Guido Lemoine
DG Joint Research Centre
European Commission
Agriculture and Regional Information Systems
http://mars.aris.sai.jrc.it
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

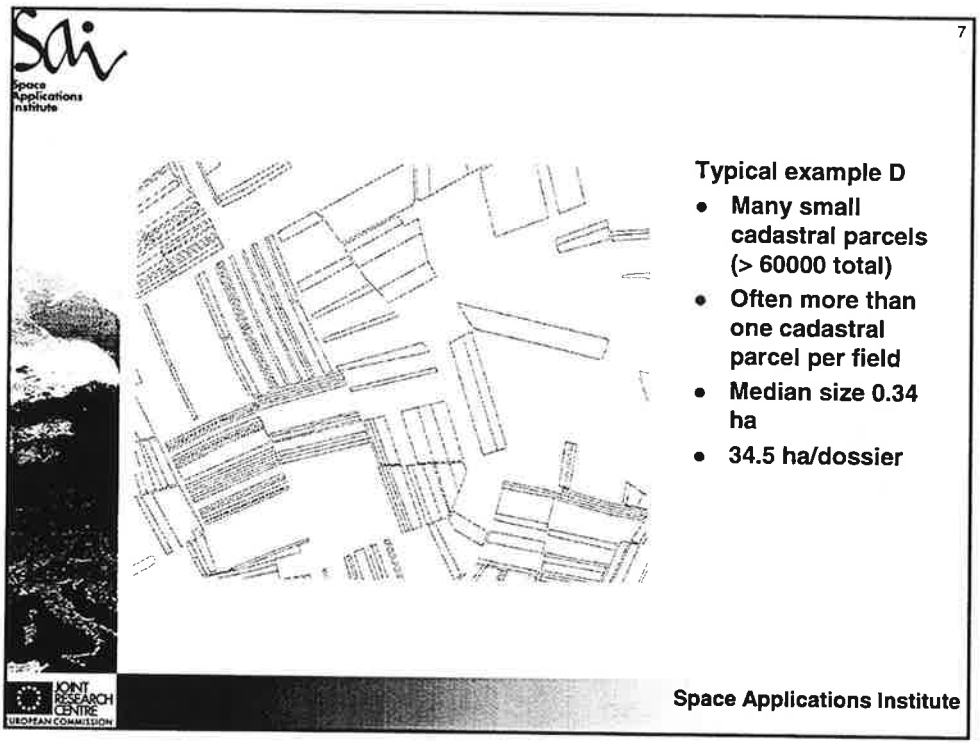

2
Space Applications Institute
• Introduction
• Regulation 3508/92 and 3887/92 (IACS)
• Case studies in D, F
• Control issues
• Discussion
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

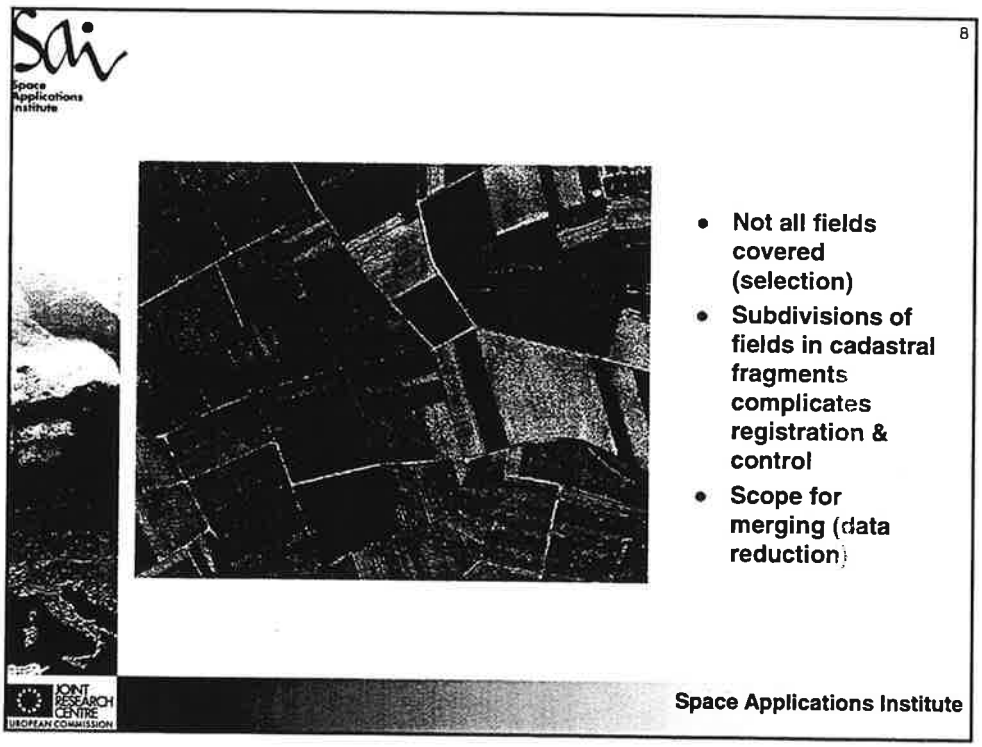

3
Sai
Space Applications Institute
• Introduction
• MARS project activity WP 2000 "LPIS"
• Related to control (e.g. QC, IACS)
• Experience gained in OLI projects (esp. with ortho-images)
• Expertise in geomatics in the "broad" sense: remote sensing, photo-grammetry, GPS, GIS, information technology.
• Familiar with implementation in various member states.
• Likely to be extended in near future.
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


4
Sai
Space Applications Institute
• Regulation 3508/92 and 3887/92
• Council Reg. 3508/92 establishes IACS
• Commission Reg. 3887/92 describes detailed rules for applying IACS
• Covers both area-linked aid and animal premiums
• Currently mainly α-numerical system
• Proposed amendments in 1999 introduce graphical system, use of ortho-images and possibility for use in other schemes (area).
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


5
Space Applications Institute
To be implemented in period 2000-2003.
Decision foreseen in Spring 2000.
Other issues
Increased accuracy requirement of parcel measurements
Introduction of "IACS" in 6 candidate countries (prob. through SAPARD)
Quite a few MS already use ortho-images (B, DK, H, I, IRL, P) more likely to follow
Strong interest of member states to use internet technology
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


6
Space Applications Institute
Case studies in D and F
Analysis of existing declarative systems compared to ortho-images
Selection of cadastral system (D) and block system (îlots, F)
Facilitated by availability of recent digital data sets (D-PALZ 1999, F-JALL 1998)
Impact analysis on difficulties in application and control, with control results
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


Sai
Space Applications Institute
7
Typical example D
• Many small cadastral parcels (> 60000 total)
• Often more than one cadastral parcel per field
• Median size 0.34 ha
• 34.5 ha/dossier
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


Sai
Space Applications Institute
8
• Not all fields covered (selection)
• Subdivisions of fields in cadastral fragments complicates registration & control
• Scope for merging (data reduction)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

9

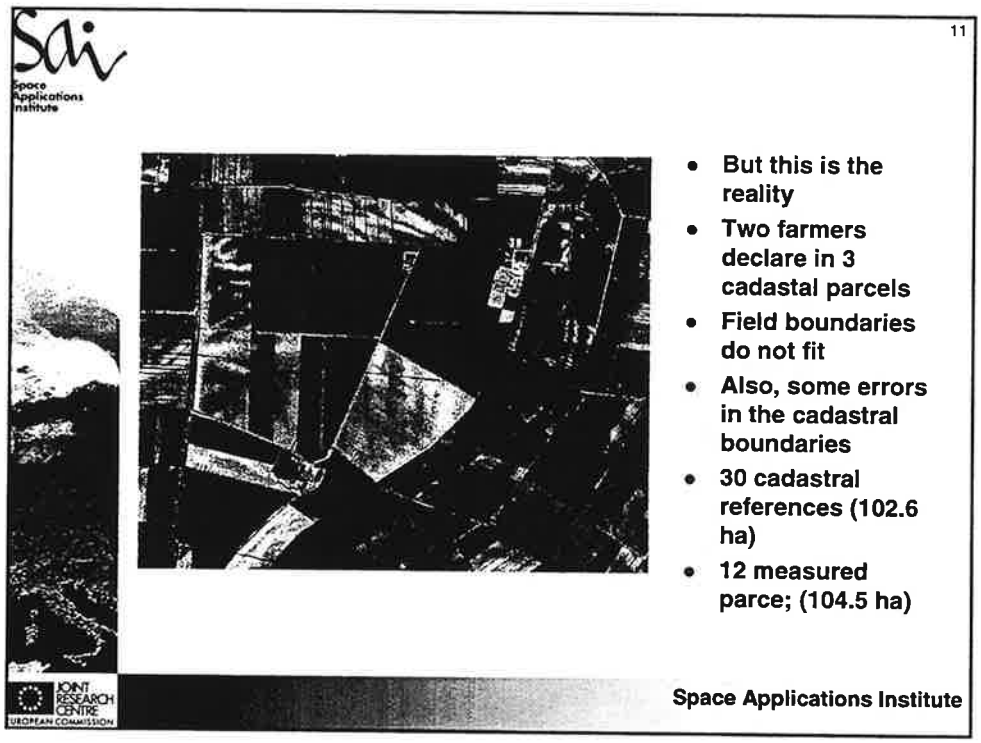
- Combine adjacent cadastral parcels, from same dossier, with same crop
- Written in JAVA!
- For this sample: 1594 parcels are merged into 856.
- For MmvP: 374→181
- For whole of PALZ: reduction of 25-30% (estimate)
- Significant workload reduction!

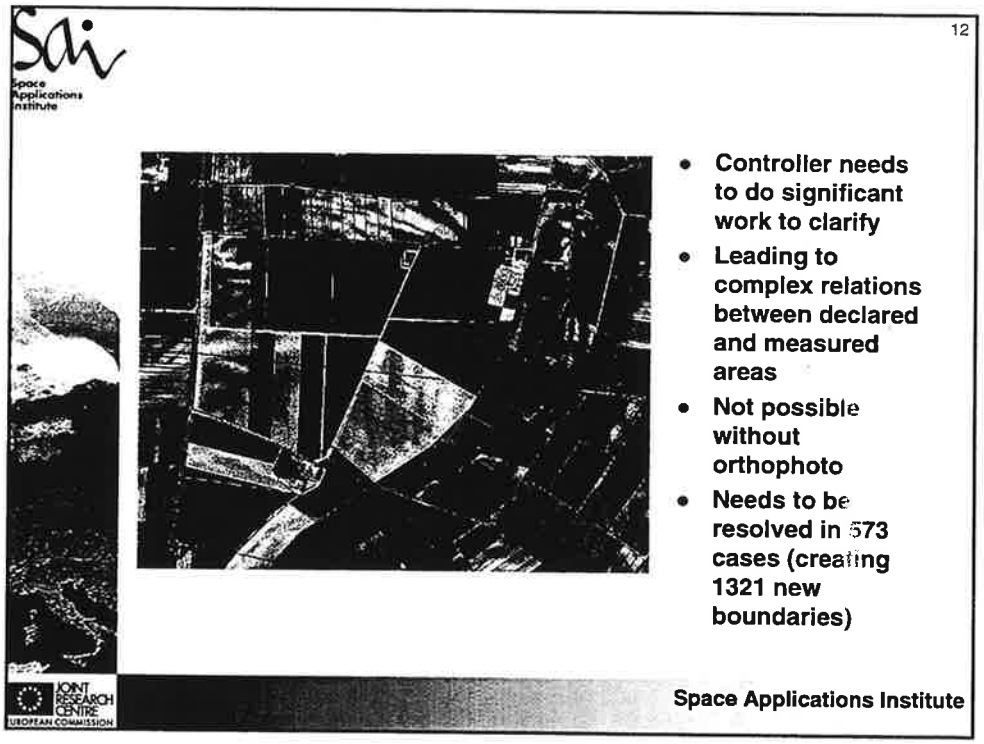
Space Applications Institute

10

- Difficult case
- Multiple field, in more than 1 dossier, in several cadastral parcels
- Sometimes crossing cadastral boudaries
- Farmer has this cadastral information on a map

Space Applications Institute


Sai
Space Applications Institute
11
• But this is the reality
• Two farmers declare in 3 cadastal parcels
• Field boundaries do not fit
• Also, some errors in the cadastral boundaries
• 30 cadastral references (102.6 ha)
• 12 measured parce; (104.5 ha)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


Sai
Space Applications Institute
12
• Controller needs to do significant work to clarify
• Leading to complex relations between declared and measured areas
• Not possible without orthophoto
• Needs to be resolved in 573 cases (creating 1321 new boundaries)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

13

Space Applications Institute

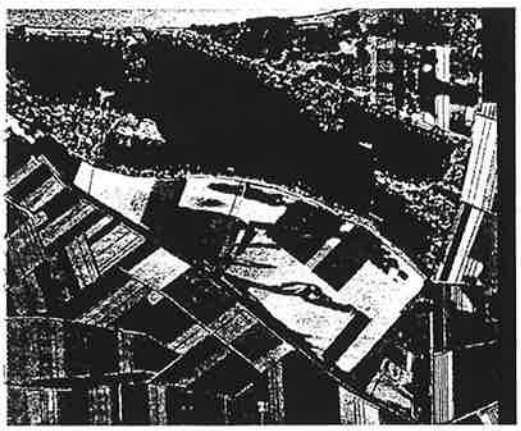
- How up to date is the cadastral map?
- Farmer has this cadastral information on a map

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

14

Space Applications Institute



- But this is the real situation
- Does not look like a very recent change in land use
- In 66.6 ha cadastral parcel, 27.9 ha is declared in 8 dossiers
- Controller has identified 8 ha.
- Other 20 ha is present, but difficult to localise

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

15

Space Applications Institute

- Curious case
- Farmer on edge of cadastral map?
- 1 dossier misses out on 1.4 ha WWH
- Not widespread problem.

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

16

Space Applications Institute

Typical example F

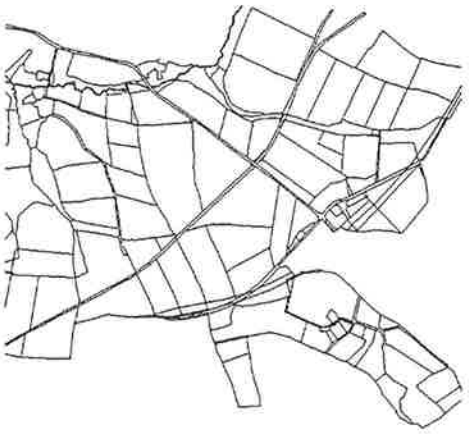
- More than one cadastral parcel per field ⇒ ilots
- cadastral boundaries not coinciding with field boundaries
- cadastral boundaries often out of date!
- Ilot boundaries sometimes difficult to establish

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

17

Space Applications Institute



Cadastre update

- Farmer must declare on the basis of these cadastral boundaries

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

18

Space Applications Institute

- But this is the reality
- Cadastral map seems outdated (i.e. road)
- Problem: how to declare appropriate parcel and ilot surface?
- Ample scope for combination of redundant cadastral parcel information.

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

19

Space Applications Institute

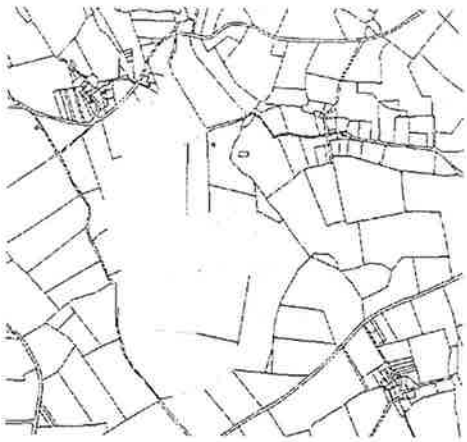
- Declaration could have been made on the basis of ortho-image alone.
- Instead of a complex combination of (parts of) 23 parcels, farmer needs only outline 10.
- All parcel limits unambiguous in this case
- Reduced workload, straightforward control

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

20

Space Applications Institute



- Farmer has this cadastral information on a map
- No specific information on field internals

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

21

Space Applications Institute

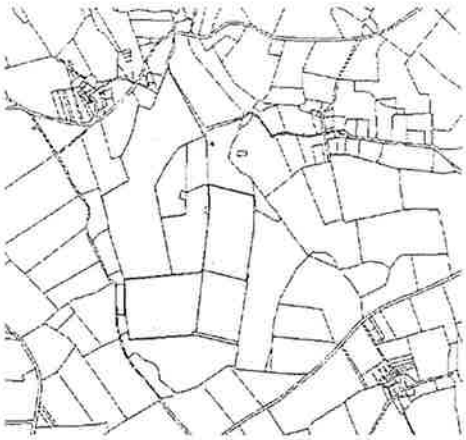
- Farmer behaves prudently
- Ilot only contains cadastral parcels which are completely within his holding
- Does not include parcels which are only partly used

JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute

22

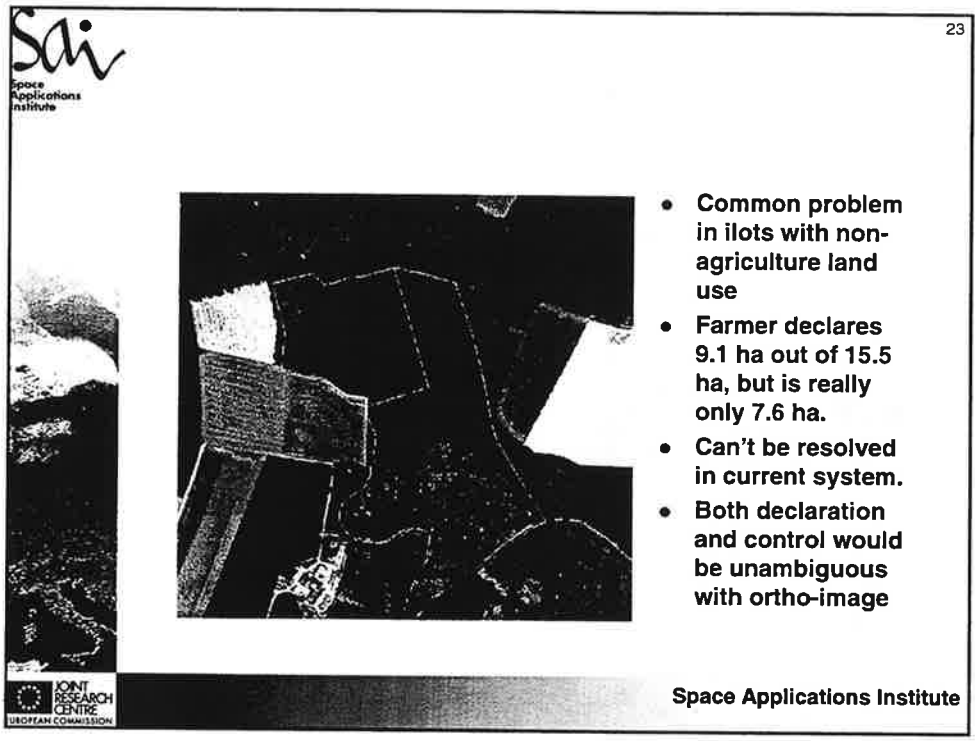
Space Applications Institute

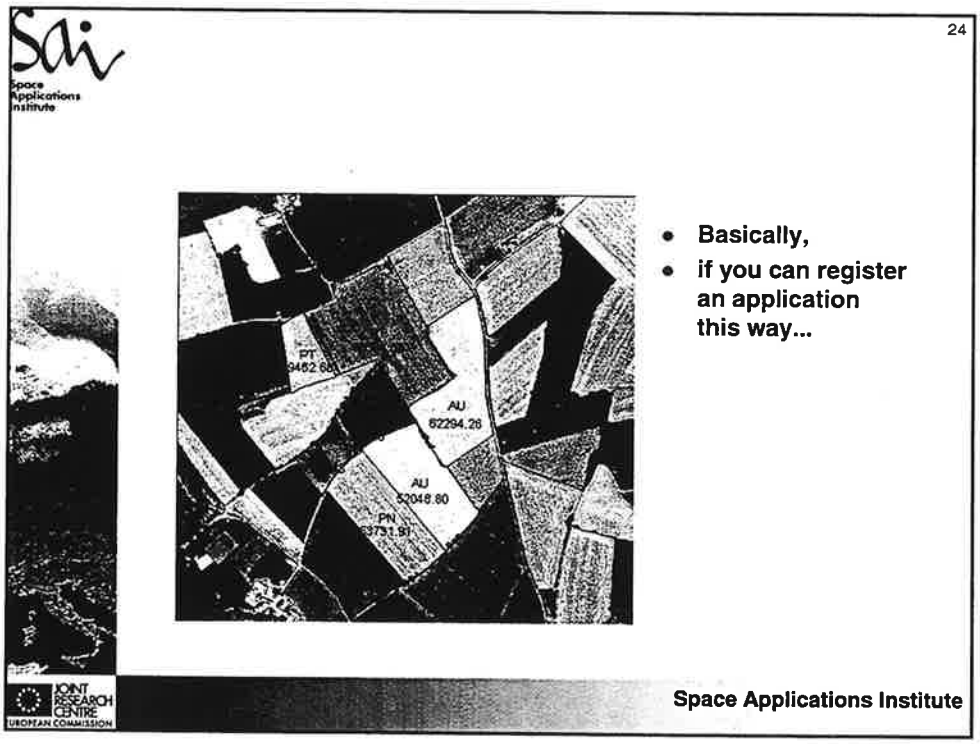


- Farmer under-declares, missing 3.8 ha (of 25.2 ha!).
- Due to difficulty in using incomplete cadastral data
- Would have been straigthforward on the basis of ortho-images.
- Farmer has financial loss due to inaccurate cadastral data

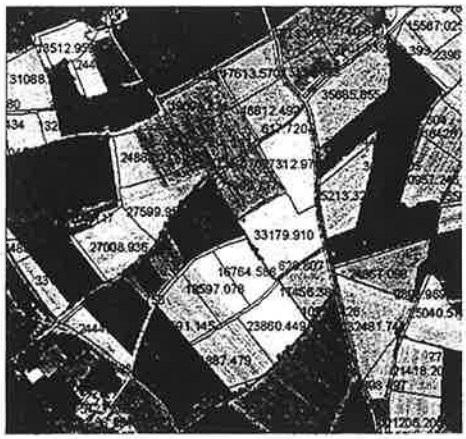
JOINT RESEARCH CENTRE EUROPEAN COMMISSION

Space Applications Institute


Sai
Space Applications Institute
23
• Common problem in ilots with non-agriculture land use
• Farmer declares 9.1 ha out of 15.5 ha, but is really only 7.6 ha.
• Can't be resolved in current system.
• Both declaration and control would be unambiguous with ortho-image
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


Sai
Space Applications Institute
24
• Basically,
• if you can register an application this way...
PT
AU
62294.26
AU
52048.80
PN
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

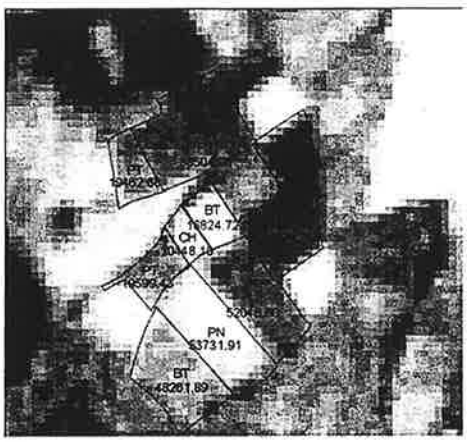
25



- Why would you do it this way?
- Use of ortho-images improves quality of declaration and control
- Will significantly reduce amount of administrative records to be managed
- Is simple to update over the years (assuming 20% "soft" boundary change)

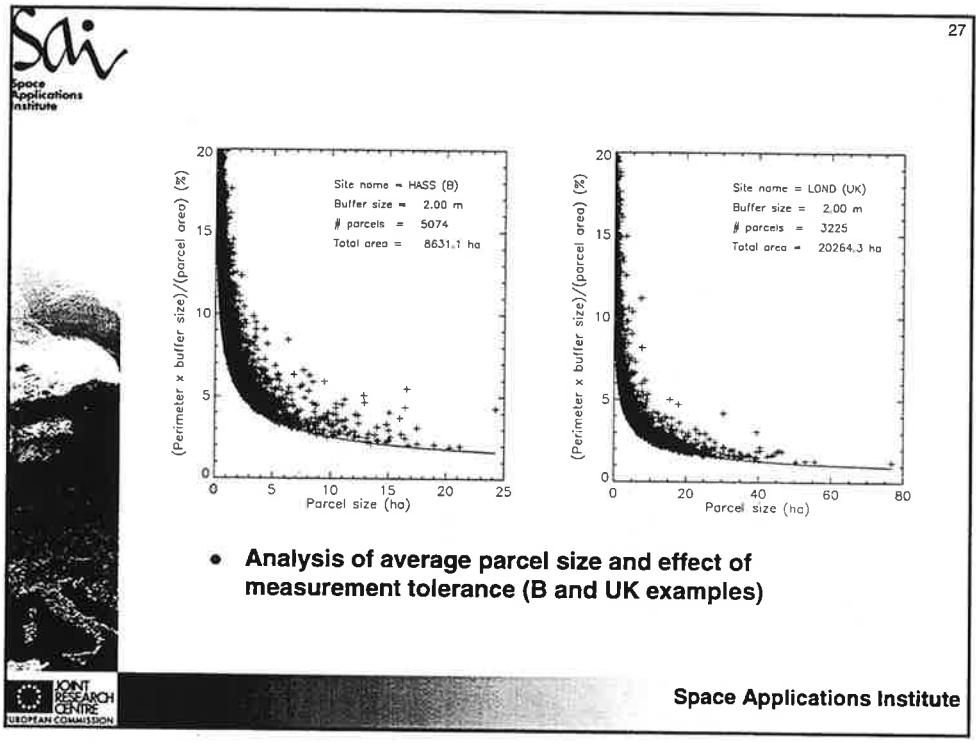
Space Applications Institute

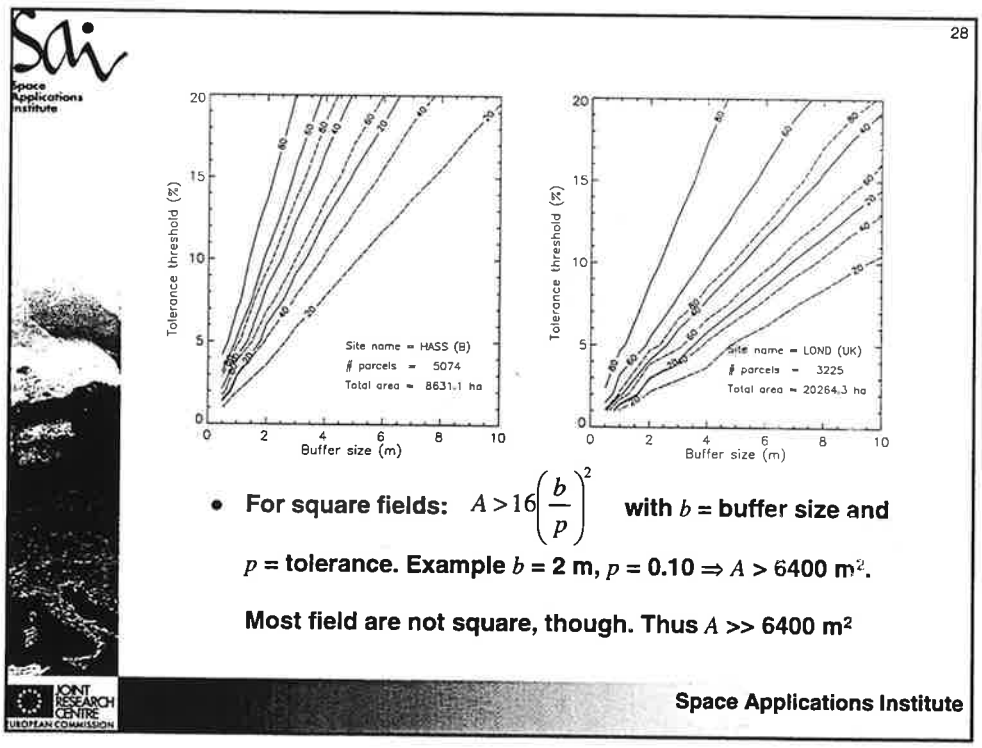
26



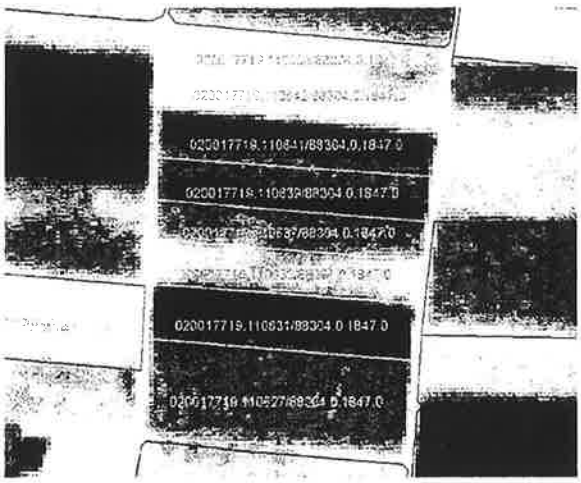
- And improves possibility to use coarser resolution remote sensing for control of crop type

Space Applications Institute


27
Space Applications Institute
(Perimeter x buffer size)/(parcel area) (%)
Site name = HASS (B)
Buffer size = 2.00 m
parcels = 5074
Total area = 8631.1 ha
Parcel size (ha)
Site name = LOND (UK)
Buffer size = 2.00 m
parcels = 3225
Total area = 20264.3 ha
Parcel size (ha)
• Analysis of average parcel size and effect of measurement tolerance (B and UK examples)
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Space Applications Institute


28
Space Applications Institute
Tolerance threshold (%)
Site name = HASS (B)
parcels = 5074
Total area = 8631.1 ha
Buffer size (m)
Site name = LOND (UK)
parcels = 3225
Total area = 20264.3 ha
Buffer size (m)
• For square fields: $A > 16\left(\frac{b}{p}\right)^2$ with b = buffer size and
p = tolerance. Example b = 2 m, p = 0.10 ⇒ A > 6400 m².
Most field are not square, though. Thus A >> 6400 m²
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Space Applications Institute

29



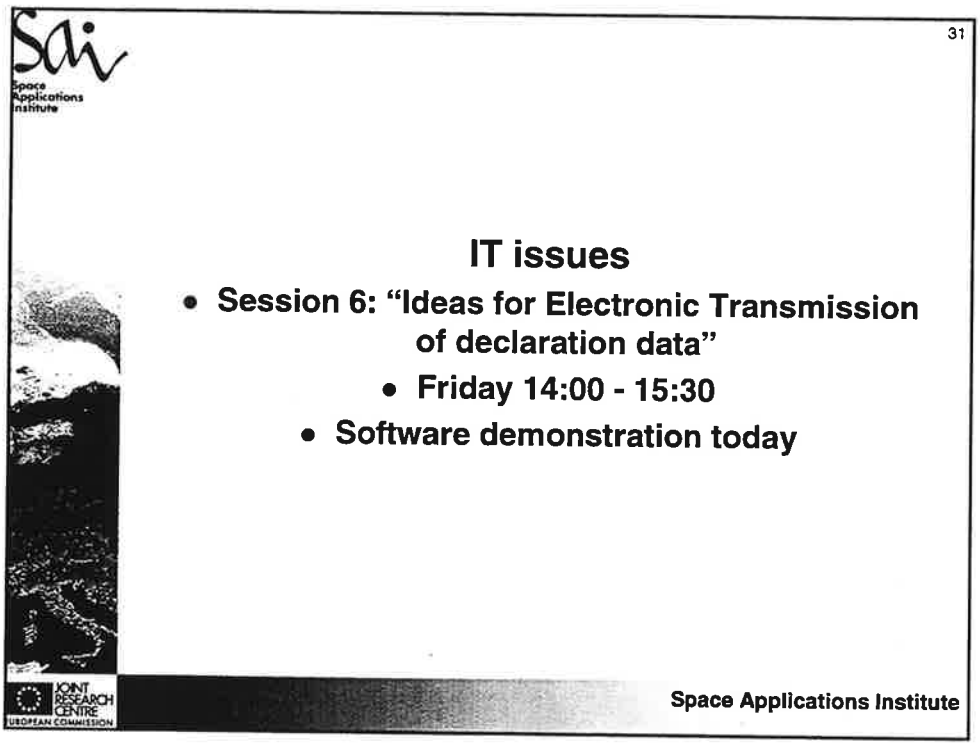
- This is certainly not very precise...

Space Applications Institute

30

- Discussion
- Cadastral data of general good quality
- Still, a number of problems are easily highlighted. Estimated 5-10% of parcels affected in PALZ, 10-20% in JALL.
- Multiple cadastral parcels, ilots, partial inclusion of parcels, introduces high level of complexity, leading to problems in registration and control (LAON experience)
- Ortho-images resolve most of these problems and are indispensable in control
- Tolerance requirements leave little room for discussion.

Space Applications Institute


31
Space Applications Institute
IT issues
• Session 6: "Ideas for Electronic Transmission of declaration data"
• Friday 14:00 - 15:30
• Software demonstration today
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

5th Conference on
Control with Remote Sensing of Area-Based Subsidies
Grand Hotel Bristol, Stresa, Italy
25-26 November 1999

Session 2: Technical issues of the 1999 campaign

First RS Control campaign using the new LPIS: advantages, problems

L. Tournas
ERATOSTHENES Ltd.
Athens, Greece
e-mail: ltournas@eranet.gr

ERATOSTHENES Ltd, 49 Kallidromiou Str, 10681 ATHENS, GREECE

Introduction

- During recent years, Greece has been required to conform to the obligations laid down in the EC regulations for the establishment and operation of an Integrated Administration and Control System (IACS).
- A new Land Parcel Identification System (LPIS) based on orthophotomaps and îlots was completed in 1998.
- The use of the new LPIS system was mandatory in the '99 Remote Sensing Control.
- The new system is solving a lot of problems caused by the lack of cartographic reference, but it also introduces new type of errors.

Preexisting situation

- Scales larger than 1:10.000 are considered sufficient for providing the minimum accuracy requirements of the IACS.
- Of the various maps found in Greece, only the following maps of the Directorate of Topographic Surveying of the MoA contain useful information for the IACS:
  - Consolidation plans
  - State Distributions of land
  - Cadastral maps
  - Grazing land

Preexisting situation

- The existing cartographic material of the MoA is not sufficient because:
  - it covers about 60% of the total cultivated area
  - it is outdated
  - there is overlap between the various map series
  - refers to a local (not national) geodetic reference system
  - unique parcel identification codes could not be easily established for the whole country

Implementation of the LPIS

- The Greek MoA decided in 1995 to implement a new Land Parcel Identification System.
- The new LPIS is an intermediate reference system based on orthophotos and îlots.
- The available data from the LPIS include:
  - print outs of the orthophotos at scale 1:5.000
  - corresponding îlot transparencies at scale 1:5.000
  - digital orthophotos at 1x1 m resolution
  - Digital Terrain Models in ASCII files
  - îlot boundaries in digital form
  - data base files with related information (area, predominant land use, boundary features etc.)

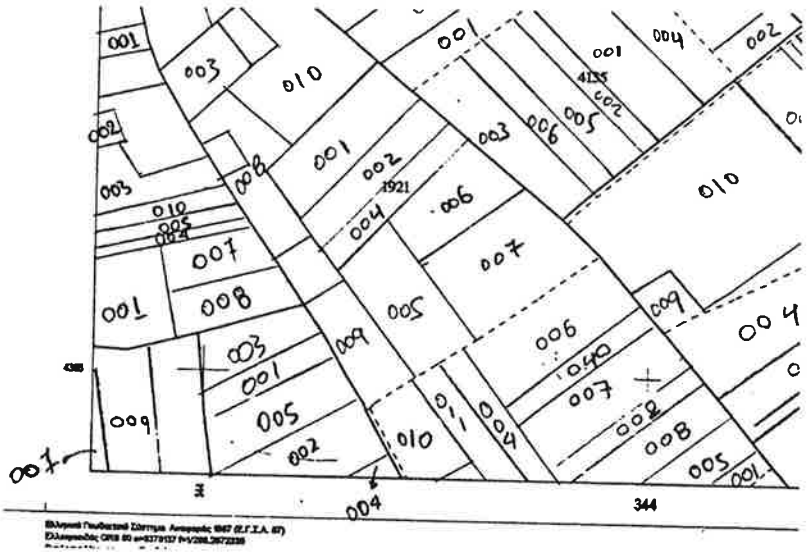
Main advantages

- Cartographic reference for all declared parcels.
- Available data may be used in various phases of the RS Control:
  - Ground Control Points (GCPs) identification
  - ortho-rectification of satellite images
  - ground data collection
  - dossier data entry
  - digitization of the parcels
  - photo-interpretation
  - production of field documents
  - quality controls
  - ....

First use

- The use of the new LPIS was generalized in 1999.
- The documents used include two map series at scale 1:5.000:
  - a hardcopy output of the orthophoto
  - a transparency with îlot limits and identification codes
- The identification of the parcels on the orthophotos is carried out by the farmers, with the assistance of the Administration.
- Parcel boundaries are sketched on the îlot's transparency.
- Unique identification codes are assigned to the parcels.
- Existing cartographic material is used as a supplementary tool for plot location.

Example of a cartographic reference document



ERATOSTHENES' contract

- ERATOSTENES has been participating in the 1999 RS Control by processing 2450 dossiers in one control zone

Prefecture	No of Communes	submitted dossiers	selected dossiers	1:5.000 maps
LARISSA				
TRIKALA				
KARDITSA				
total	**28**	**6850**	**2450**	**136**

- Dossiers were submitted directly to the local DoA in one Prefecture. In the other two, sub-contractors were used.

Use of LPIS data

- The use of the LPIS data in various phases of the work is summarized in the following table:

	Phase of the work	Ortho	DTM	Îlots	Alph. data
1	GCP collection				
2	Ortho-rectification				
3	QC of rectified satellite images				
4	Ground data collection				
5	Dossier data entry				
6	Parcel digitization				
7	Parcel boundaries verification				
8	Parcel location				
9	Photo interpretation				
10	Field documents				
11	Administration checks				

	Phase of the work	Ortho	DTM	Îlots	Alph. data
1	GCP collection				
2	Ortho-rectification				
3	QC of rectified satellite images				
4	Ground data collection				

- Digital orthophotos were used for GCPs collection.
- Before LPIS, GCPs were taken from existing 1:5.000 scale maps of the HMGS.
- DTM was used in ortho-rectification of the satellite images.
- Digital orthophotos and îlot boundaries were used for the quality control of the geometrically corrected satellite images.
- Digital orthophotos were used to facilitate the location of sampling roots in ground data collection.

	Phase of the work	Ortho	DTM	Îlots	Alph. data
5	Dossier data entry				
6	Parcel digitization				
7	Parcel boundaries verification				

- Alphanumeric data of the dossiers were computerised by ERATOSTHENES.
- The digitising of the plots was performed with semi-automatic raster line following.
- îlot limits were used as guide-lines for the digitisation
- About 33000 plots, which correspond to all declared parcels on the selected Communes were digitised.
- Digital orthophotos weren't used during parcel digitisation.
- Parcel boundary check was performed after parcel location and before automatic classification and photo-interpretation.

	Phase of the work	Ortho	DTM	Îlots	Alph. data
8	Parcel location				

- The most frequent type of errors found in cartographic reference codes are summarised in the following table:

a/a	Description	No of cases
1		277
2		15
3		4
4		60
5		124
6		15
7		29
8		172
9		46
10		12
11		57
12		42
13		-

	Phase of the work	Ortho	DTM	Îlots	Alph. data
8	Parcel location				

- Errors in cartographic reference codes may appear in the following phases of the work:
  - collection of the dossier (1,2,3,4,5,6,7,8,9,10,13)
  - dossier data entry (1,2)
  - digitisation of parcel boundaries (9,12)
- Errors introduced during dossier data entry and map digitisation are corrected by the contractor.
- Errors introduced during dossier collection should be corrected by the Administration.

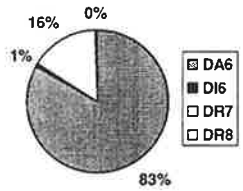
	Phase of the work	Ortho	DTM	Îlots	Alph. data
8	Parcel location				

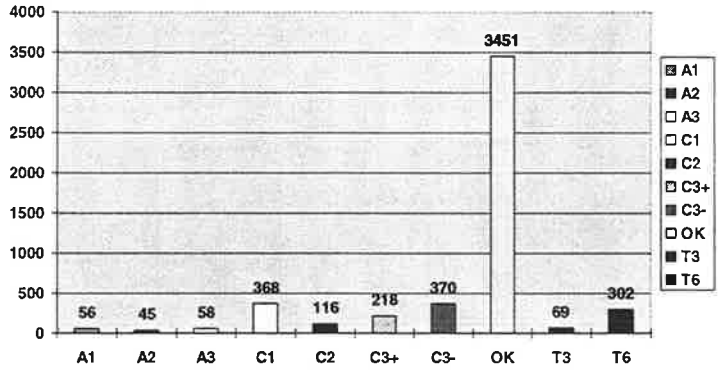
- Some errors can be semi-automatically detected if all declared parcels on the selected Communes are available in digital form.
- A specific application was developed for this purpose (C, AML).
- Possible cartographic reference codes may be proposed taking in to account some predefined criteria.
- A parcel may be proposed if:
  - one of the previously mentioned errors is automatically detected
  - the proposed identification code exists in the database of the digitised plots
  - the calculated area agrees with the declared area, and
  - the parcel is not declared by another farmer

	Phase of the work	Ortho	DTM	Îlots	Alph. data
9	Photo interpretation				
10	Field documents				
11	Administration checks				

- Digital orthophotos weren't used during photo-interpretation.
- Digital orthophotos were used as a background in the field inspection documents, overlaid by the parcel boundaries.
- Concerning the administration checks, the plausibility of the total area declared in the reference ilots was checked.
- The results could not be considered reliable because there was a lack of cartographic reference in the majority of parcels declared as not subsidised.

Final Results





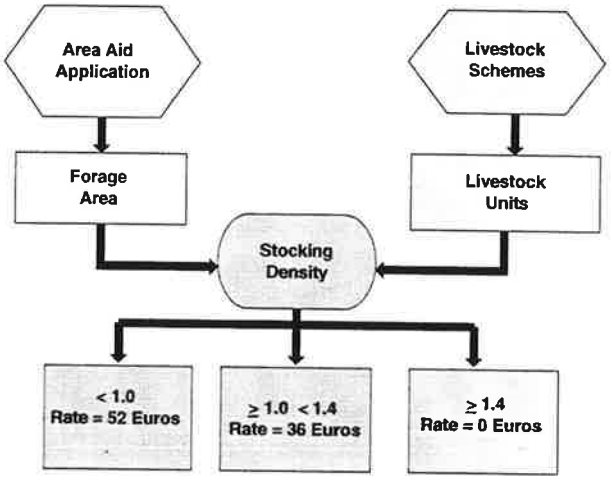
Conclusion

Taking into account the experience acquired in the first year of application, attention in the coming years should be concentrated on the education of those responsible for the identification of the parcels on the orthophotos. Both surveyors working in local DoA and sub-contractors selected by the MoA should be better informed. In addition,

- preliminary area checks should be performed during dossier data collection, and
- intensive quality controls must be applied to the sub-contractors that undertake the collection of the dossiers.

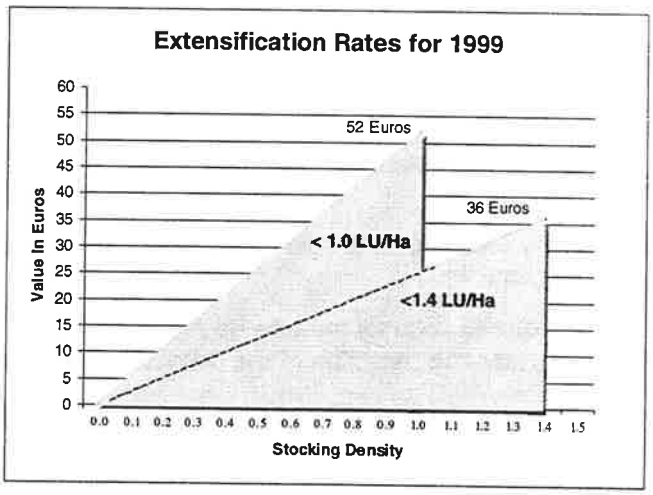
The ICON Group

Extensification Scheme Overview



The ICON

Relationship between Stocking Density & Extensification Premium



The ICON Group

Remote Sensing Control of Forage Groups in Ireland

- Forage applications are dealt with in the same way as Arable Applications
- After applying the technical tolerances, the Forage Groups requiring inspection are identified by the decision rules at group level.
- Payment is made on the number of Livestock Units.
- A claim that is rejected in area by Remote Sensing Control may still be within the Stocking Density Tolerance

The ICON Group

Example Forage Group

- For example Forage Group "A" has a Declared area of 130.4 Ha and a Measured area of 124.8 Ha.
  This claim will be rejected at the Group level test
- Livestock units are 160 for that claim
- The Declared Stocking Density (160 / 130.4) = 1.23
  (<1.4 = the rate of 36 Euros per Livestock Unit)
- Extensification Payment (160 * 36) = 5,760 Euros
- The Retained Stocking Density (160 / 124.8) = 1.28
  (<1.4 = the rate of 36 Euros per Livestock Unit)
- Extensification Payment (160 * 36) = 5,760 Euros

The ICON Group

Analysis of Potential Effect on Remote Sensing– Ireland 1999

Table 1.0

Dossiers	Herds	%
Dossiers controlled by remote sensing	4687	
Forage area declarations	4496	100%
Application for premium / Suckler Cows or Beef Cattle	3735	83%

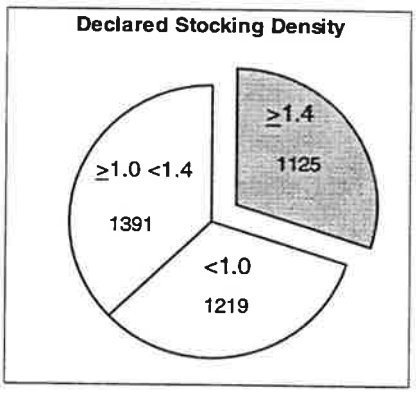
Table 1.1

Forage Groups (With an application for livestock premium)	Herds	%
Total number of forage groups	3735	100%
Without area discrepancy (area retained ≥ declared area)	2585	69%
With area discrepancy (retained < declared)	1150	31%
Rejected group (after application of diagnostic rules from 99)	618	17%

The ICON Group

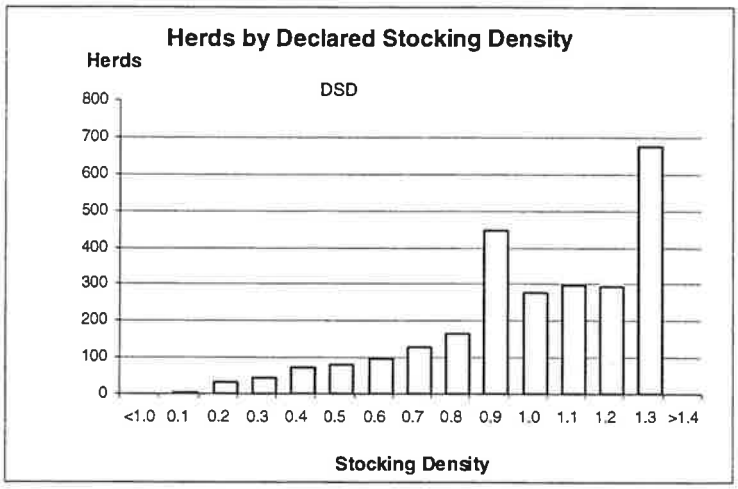
Analysis of DSD of Remote Sensing

Stocking Density	Herds	%
<1.0	1219	33%
≥1.0 <1.4	1391	37%
≥1.4	1125	30%
Total	3735	100%



The ICON Group

DSD by Herd



The ICON Group

RSD Decision Rules

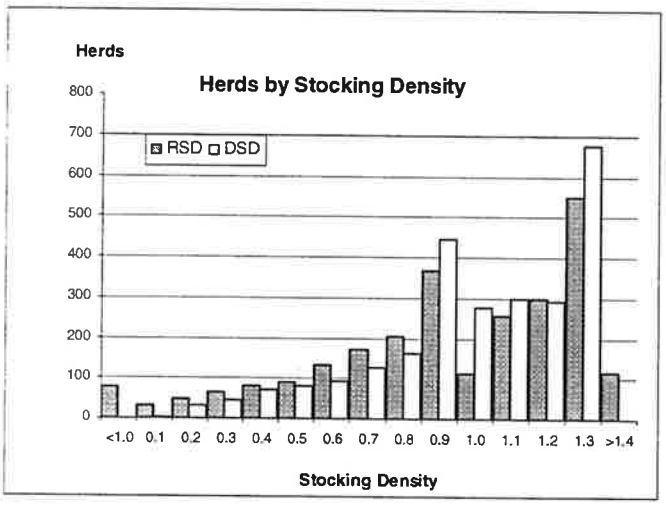
In the case of an "under-declaration" in the declared area (the measured area is greater than the declared area.)
The declared area is used.

Table 2.0

Test			Conclusion
RSD < 1.4	and	DSD≥1.4	Does not quality for scheme
RSD < 1.0	and	DSD < 1.0	Rate = 52 Euros
RSD < 1.0	and	DSD ≥ 1.0 <1.4	Rate = 36 Euros
RSD ≥ 1.0 <1.4	and	DSD ≥ 1.0 <1.4	Rate = 36 Euros
RSD = 0			Rate = 0
RSD ≥ 1.4			Rate = 0

The ICON Group

RSD & DSD by Herd



The ICON Group

Results analysis

DSD & RSD: Cross Checks between Herds / Area / Value

Table 3.0

Stocking Density	Herds		Area Ha		Value in Euros		
	Declared	Retained	Declared	Retained	Declared	Retained	Difference
<1.0	1,219	1,138	40,432	38,954	1,432,911	1,359,991	-72,920
≥ 1.0 <1.4	1,391	1,245	51,095	49,291	2,263,527	2,053,105	-210,422
Total	2,610	2,383	91,527	88,245	3,696,439	3,413,096	-283,342

DSD & RSD: Movement in Stocking Density / Area / Value

Table 3.1

Stocking Density	Herds		Area		Value in Euros		
	Declared	Retained	Declared	Retained	Declared	Retained	Difference
= 0	-77	77	1,649	455	47,924	0	-47,924
≥1.4	-117	117	4,521	3,328	212,398	0	-212,398
<1.0 to >1 <1.4	-33	33	1,587	1,308	74,815	51,795	-23,020
Total	-227	227	7,757	5,092	335,137	51,795	-283,342

The ICON Group

Results analysis of Remote Sensing Rejects

DSD & RSD: Cross Checks between Herds / Area / Value

Table 4.0

Stocking Density	Herds		Area Ha		Value in Euros		
	Declared	Retained	Declared	Retained	Declared	Retained	Difference
<1.0	197	120	7,394	5,969	247,724	176,355	71,369
≥ 1.0 <1.4	236	104	8,360	6,646	367,078	185,334	181,744
Total	433	224	15,754	12,616	614,802	361,689	253,113

DSD & RSD: Movement in Stocking Density / Area / Value

Table 4.1

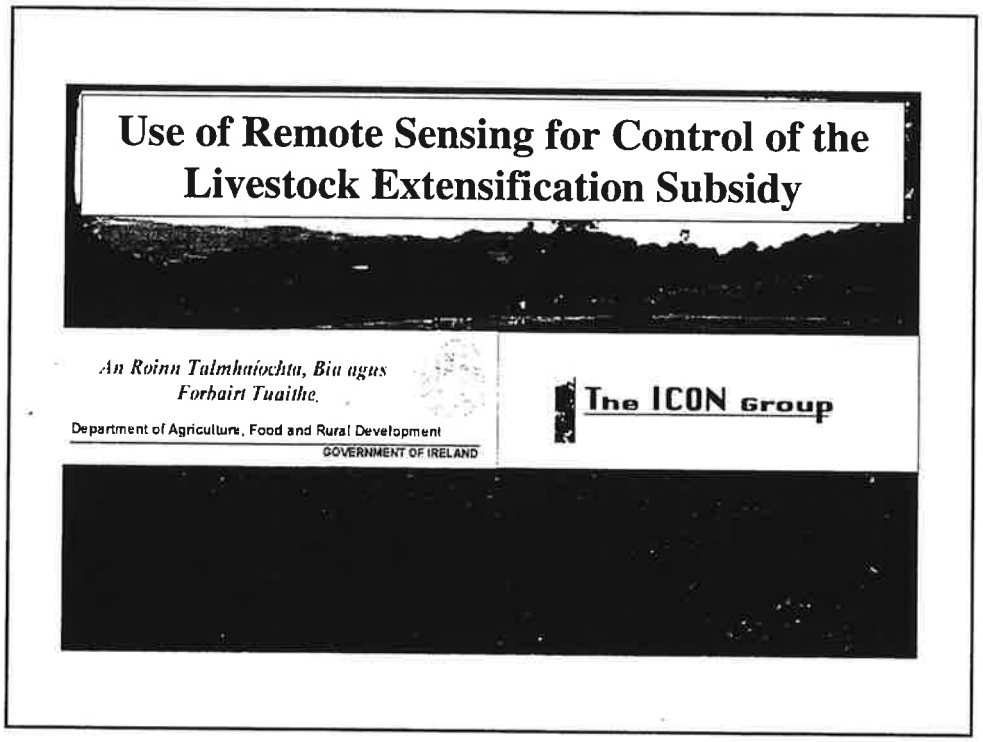
Stocking Density	Herds		Area		Value in Euros		
	Declared	Retained	Declared	Retained	Declared	Retained	Difference
= 0	-76	76	1,194	0	47,688	0	-47,688
≥1.4	-103	103	3,948	2,764	183,720	0	-183,720
<1.0 to >1 <1.4	-30	30	1,504	1,227	70,544	48,838	-21,706
Total	-209	209	6,646	3,991	301,951	48,838	-253,113

The ICON Group

Conclusion

- This study has shown that by using the Retained area from the Remote Sensing Control it has the potential effect of reducing Extensification Payments by over 280,000 Euros
- But it also shows that there is a need to optimise the methodology for identifying the Forage groups for inspection

Forage Groups Rejected		**Herds**	**%**
Total	=	618	100%
Effect on Extensification payment	=	209	34%
No effect on Extensification payment	=	409	66%



Arable and Livestock Payments in Ireland

In Ireland, approximately 80% of the agricultural land is used for livestock production.

Therefore, Forage Area-related payments make up a much higher portion of the total EAGGF payments than Arable Area payments.

Arable Crops:	IR£ 94.5M (€ 120.0M)
Livestock Payments:	IR£740.0M (€ 939.6M)
Total Direct Payments 1998:	IR£834.5M (€1,059.6M)

For 1998, IR£78.0M (€99.0M) was paid in respect of the Extensification subsidy in Ireland.

What is the Extensification Subsidy?

- An additional payment which is issued to some farmers who have received direct payments under the Special Beef Premium Scheme and the Suckler Cow Premium Scheme
- Designed to encourage livestock farmers to farm extensively

How Does a Farmer Qualify for the Extensification Payment?

- The stocking density of livestock on the farm must be <1.4 Livestock Units (L.U.) per hectare of forage land (land available for raising livestock)
- Higher rate of payment where the stocking density is <1.0 L.U. per hectare

1999 Payment Rates

Stocking Density	Payment per Male Animal*	Payment per Cow
<1.0	**49.41 IR£38.90**	**54.76 IR£43.13**
>=1.0 and <1.4	**34.21 IR£26.94**	**37.91 IR£29.86**
>=1.4	**0.00 IR£0.00**	**0.00 IR£0.00**

* Rate of payment for male animal reduced due to overshoot of national beef quota

To Calculate Stocking Density

Sum of:

- (the number of cows entered for the Suckler Cow Premium; plus
- the number of male animals entered for the Special Beef Premium Scheme; plus
- the number of ewes and ewe hoggets entered for the Ewe Premium Scheme; plus
- Number of dairy cows needed to produce any milk quota held by the farmer at 1 April of the year in question*;)

..divided by total Forage Area.

*In Ireland, this figure was arrived at by dividing the milk quota gallons by a national average figure of 897 gallons (1 gallon = 4.546 litres)

How is a Livestock Unit Calculated?

Type of Animal	**Livestock Unit Value**
Male bovine up to 24 months of age:	0.60 LU
Male bovine over 24 months of age:	1.00 LU
Suckler Cow:	1.00 LU
Dairy Cow:	1.00 LU
Ewe/Ewe hogget:	0.15 LU

Method of Analysis (1)

The forage area measured by remote sensing can be used to determine if the stocking density may be changed from <1.0 to >=1.0, resulting in a reduced payment, or from <1.0 to >=1.4, or <1.4 to >=1.4, resulting in zero extensification payment.

For each application controlled by remote sensing, and containing a forage area declaration, use:

1. From Remote Sensing data:
   - •Declared Forage Area (Dg)
   - •Measured Forage Area (Mg)
2. From Administration data:
   - •Total Number of Livestock Units
   - •Declared Stocking Density

Method of Analysis (2)

3. Interrogate the database and refer to the control unit for field inspection (or rapid field visit) all dossiers which satisfy any of the conditions below:

Declared Stocking Density	Measured Stocking Density
<1.0	>=1.0 and <1.4
<1.0	>=1.4
>=1.0 and <1.4	>1.4

Problem - Different Application Period

Area Declarations must be submitted by 15 May

BUT

Applications for Special Beef Premium can be submitted up to end of December

∴ Must wait until early in the following year before livestock application data is recorded

As the normal control by remote sensing is carried out during the summer and early autumn;

Should Remote Sensing Contractor or Administration analyse the data?

Agenda 2000 - Changes to Extensification Rules

- New Payment Rates
- Producer must indicate annually if he/she wishes to be considered for extensification premium if eligible;
- In counting animals for stocking density purposes, account must be taken of all bovine animals over 6 months of age, not just those animals entered for the various premia;
- Actual Number of dairy cows must be counted, instead of using milk quota
- areas under cereal, oilseed and protein crops **whether or not** declared for arable aid must be excluded from the forage area. In addition **at least 50%** of the area to be taken as forage area must be grazing land.

This will require an additional level of analysis.

Payment Rates 2000 and 2001

Stocking Density	Payment per Animal
<1.6	**66.00 IR£51.98**
>=1.6 and <=2.0	**33.00 IR£25.99**
>=2.0	**0.00 IR£0.00**

Agenda 2000 - Method of Analysis (1)

For each application controlled by remote sensing, and containing a forage area declaration, use:

1. From Remote Sensing data:

•Declared Forage Area (excluding any areas of cereal, oilseed or protein crops declared as forage) (Dg2)

•Measured Forage Area (Mg)

•Measured Forage Area (excluding any areas where the declared use is grass but the observed use is a cereal, oilseed or protein crop) (Mg2)

2. From Administration data:

•Total Number of Livestock Units

•Declared Stocking Density

Agenda 2000 - Method of Analysis (2)

3. The dossiers must be categorised as follows:

Where (Mg2/Mg) X 100 <50% (i.e. 50% of observed forage area must be grazing land), reject group immediately; refer dossier to Administration control unit;

Where (Mg2/Mg) X 100 >= 50%, continue analysis

Agenda 2000 - Method of Analysis (3)

4. Where Mg2<Dg2, find new stocking density figure:

NSD2 = TLU ÷ Mg2

NSD2 = New Stocking Density

TLU = Total Livestock Units (from Administration data)

Mg2 = Measured Forage Area (from Remote Sensing) excluding areas where land use is a cereal, protein or oilseed crop

Method of Analysis 2000 and 2001 (4)

5. For those dossiers where (Mg2/Mg) X 100 <50%, interrogate the database and refer to the control unit for field inspection (or rapid field visit) all dossiers which satisfy any of the conditions below:

Declared Stocking Density	NSD2
<1.6	>=1.6 and <=2.0
<1.6	>2.0
>=1.6 and <=2.0	>2.0

ITALIA 1999 - CONTRÔLES PAR TELEDETECTION

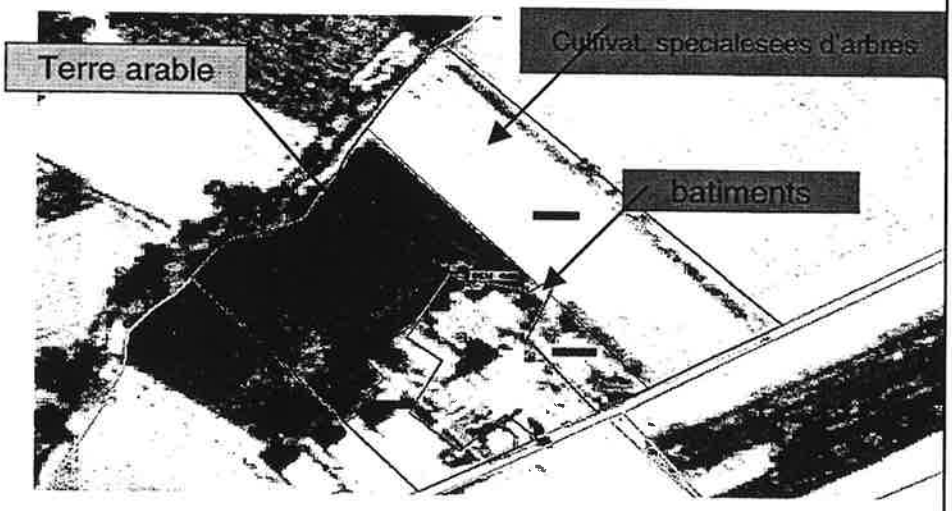
Stresa - Conférence du 25 et 26 novembre 1999

RECENSEMENT DES SUPERFICIES NON ELIGIBLES

Orateur: Federico Steidl (CCIA)

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

QU'EST CE QUE C'EST LA SUPERFICIES NON ELIGIBLE ?



ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

OBJECTIFS DU RECENSEMENT DES SUPERFICIES NON ELIGIBLES:

- **AMELIORER LE CONTROLE OBJECTIF DES DEMANDES AVEC COUTS LIMITES (VALIDITE REELLE DE L'AIDE DEMANDEE)**
- **EFFETS DISSUASIFS POUR LES FRAUDES**
- **POSSIBILITE DE FOURNIR LES INFORMATIONS PHOTO+CARTES CADASTRALES POUR LES EXPLOITANTS:**
  - **AMELIORER LA CONNAISSANCE DU TERRITOIRE PAR L'EXPLOITANT**
  - **FACILITER LA REDACTION DE LA DEMANDE**
  - **AMELIORER LE CONTROLE ADMINISTRATIF (moins d'erreurs dans les demandes)**

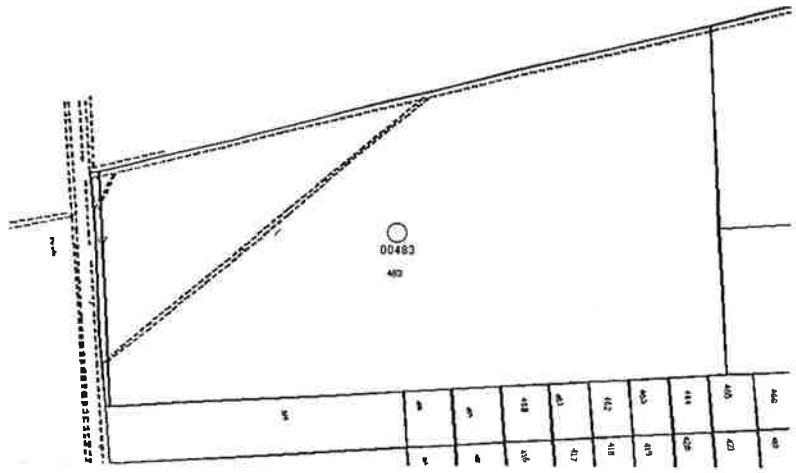
ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

LES DECLARATIONS DES PRODUCTEURS PAC TERRES ARABLES PRENNENT EN COMPTE:

- **DONNEES CADASTRALES**
  - **PROVINCE**
  - **COMMUNE**
  - **N° CARTE CADASTRALE**
  - **N° PARCELLE (15 PARCELLES CADASTRAL EN MOYENNE PAR DEMANDE)**
- **DONNEES CULTURES**
  - **SUPERFICIES DE CHACUNE DES CULTURES**
  - **TYPE DE CULTURE**

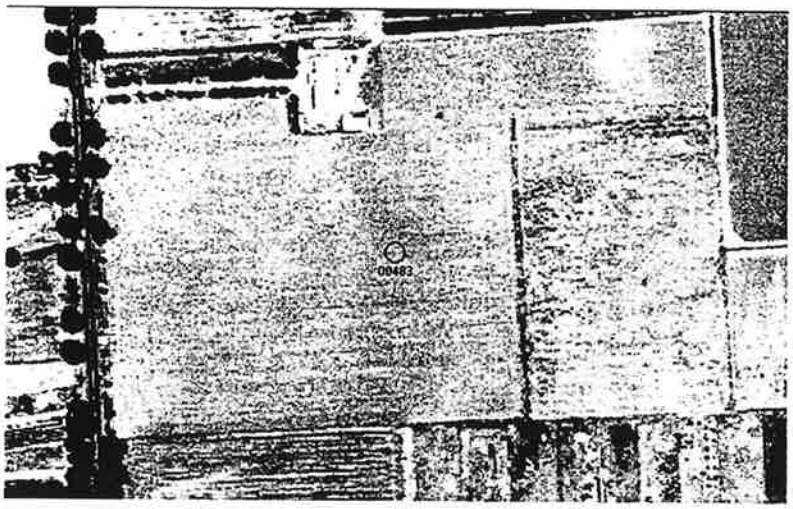
ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

DONNEES CADASTRALES (CARTE CADASTRALE + DONNEES ALPHANUMERIQUES)



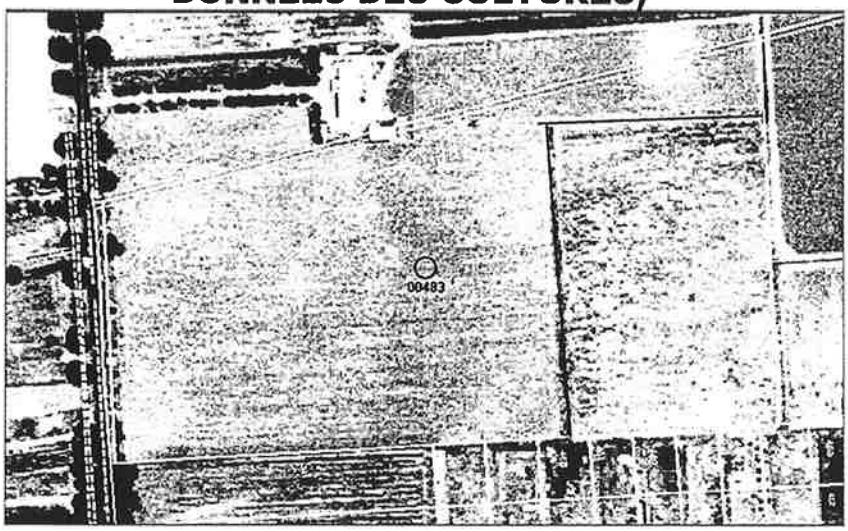
ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

DONNEES CULTURES (SUPERFICIE DE CHACUNE DES CULTURES PAR PARCELLE)



ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

DEMANDE (DONNES CADASTRALES + DONNEES DES CULTURES)

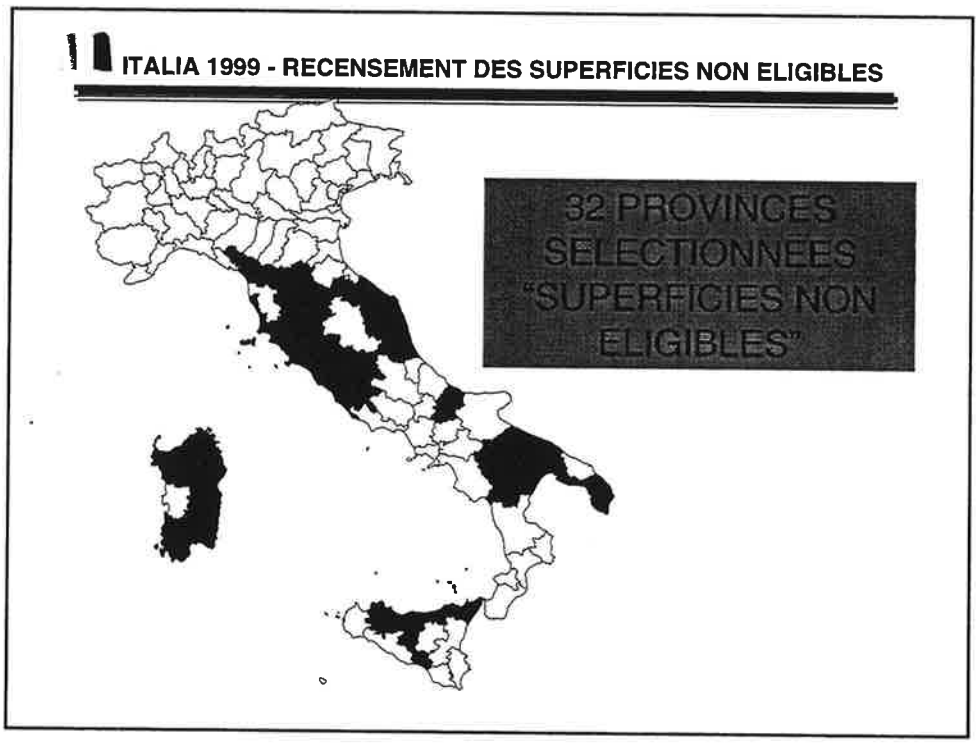


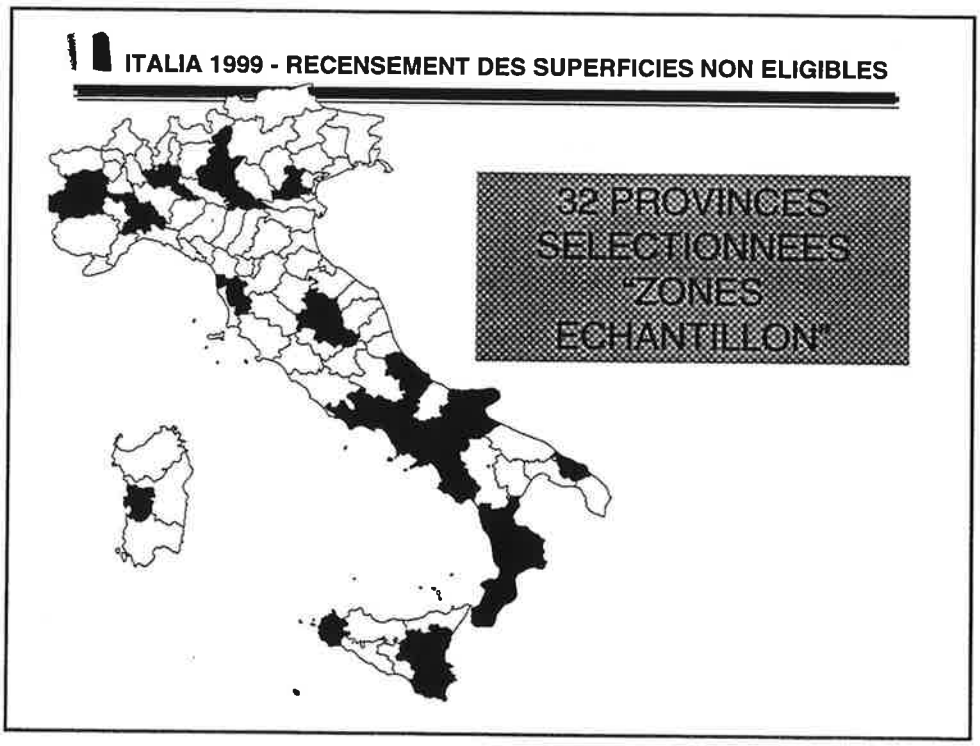
ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

TOTAL DES DEMANDES PAC CONCERNEES PAR LES CONTROLES

TOTAL DES DEMANDES PAC TERRES ARABLES 1999: 655.868

- **DEMANDES ECHANTILLONNEES: 172.236 (26%)**
  - **12.390 EXPLOTATIONS METHODOLOGIE SATELLITE-AERIEN**
  - **147.354 EXPLOTATIONS METHODOLOGIE AERIENNE**
  - **12.492 EXPLOTATIONS METHODOLOGIE "CLASSIQUES" SUR PLACE**
- **DEMANDES NON ECHANTILLONNEES 483.632**
  - **CONTROLES ADMINISTRATIFS (100%)**
  - **CONTROLES SUPERFICIES NON ELIGIBLES (ENVIRON 220.000 DEMANDES)**


ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
32 PROVINCES SELECTIONNEES "SUPERFICIES NON ELIGIBLES"


ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
32 PROVINCES SELECTIONNEES "ZONES ECHANTILLON"

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

32 PROVINCES "ZONES NON ELIGIBLES"

PROVINCE	N° CARTES	PARCELLES DECLAREES
AGRIGENTO	2.162	50.347
CAGLIARI	2.943	109.608
LECCE	2.487	40.877
MACERATA	2.257	90.183
PESARO	2.717	87.822
TARANTO	1.497	21.278
ANCONA	1.809	95.926
ASCOLI PICENO	1.804	83.622
SASSARI	1.877	15.695
CAMPOBASSO	2.785	165.491
CALTANISSETTA	1.593	59.394
MESSINA	340	1.969
NUORO	1.839	17.627
PALERMO	1.820	84.519
AREZZO	2.123	49.206
BARI	2.328	68.594
FIRENZE	1.900	30.465
GROSSETO	2.559	53.212
Macerata	2.676	85.605
LIVORNO	541	11.461
LUCCA	414	13.854
MATERA	1.672	68.267
MASSA-CARRARA	155	1.019
PISTOIA	324	5.371
POTENZA	4.225	142.613
PRATO	125	2.202
RIETI	1.144	12.002
ROMA	1.821	24.371
SIENA	3.139	56.913
TERAMO	1.411	61.381
TERNI	1.559	33.948
VITERBO	1.961	45.711
totale	58.007	1.690.553

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

32 PROVINCES "ZONES ECHANTILLON"

PROVINCE	N° CARTES	PARCELLES DECLAREES
BRESCIA	3.417	93.472
TORINO	6.853	309.506
CASERTA	1.743	18.450
RAGUSA	1.382	36.840
LATINA	1.603	23.470
SIRACUSA	1.481	34.652
AVELLINO	2.025	45.720
TRAPANI	1.513	25.932
FROSINONE	2.279	42.859
ENNA	2.387	97.361
CATANIA	2.107	58.177
BENEVENTO	1.892	44.212
PERUGIA	5.541	182.676
CATANZARO	1.715	18.202
SALERNO	2.286	32.483
MANTOVA	2.937	64.489
CHIETI	2.113	91.120
CROTONE	859	12.948
PISA	2.176	54.544
REGGIO CALABRIA	1.525	12.574
PADOVA	2.901	95.593
PESCARA	1.121	58.245
COSENZA	3.119	29.817
BRINDISI	1.316	12.212
ORISTANO	2.078	41.959
ALESSANDRIA	3.822	198.793
FOGGIA	4.110	192.774
NAPOLI	345	2.128
ISERNIA	1.837	32.552
VIBO VALENTIA	1.136	24.334
LODI	1.027	18.909
MILANO	3.185	46.894
	73.831	2.053.897

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

VOLUMES TRAITES

- **64 PROVINCES**
- **120.000 CARTES CADASTRALES**
- **3,7 MILLIONS DE PARCELLES CADASTRALES DECLAREES PAR DEMANDES PAC TERRES ARABLES 1999**
- **1,8 MILLIONS DE PARCELLES DIGITALISEES**

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

METHODOLOGIE

- **UTILISATION DU GIS (DISPONIBLE SUR TOUT LE TERRITOIRE NATIONAL)**
- **PHOTOS AERIENNES LES PLUS RECENTES**
- **DIGITALISATION DES PARCELLES CADASTRALES DECLAREES (DANS LES PROVINCES AVEC CARTOGRAPHIE NON NUMERIQUE)**
- **PHOTOINTERPRETATION SUR PC (VIDEO)**

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

CALENDRIER DES ACTIVITES

ACTIVITES	lug-99	ago-99	set-99	ott-99	nov-99	dic-99
SELECTION DES PROVINCES	■					
BANQUE DE DONNEES DES PARCELLES A CONTROLER	■					
PREDISPOSITION "COUPLE" PHOTO + CARTE		■	■	■		
DIGITALISATION DES PARCELLES CADASTRALES		■	■	■	■	
PHOTOINTERPRETATION			■	■	■	■
PRESENTATION DES RESULTATS					■	■
MISE A JOUR DE LA BANQUE DE DONNEES ADMINISTRATION						■

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

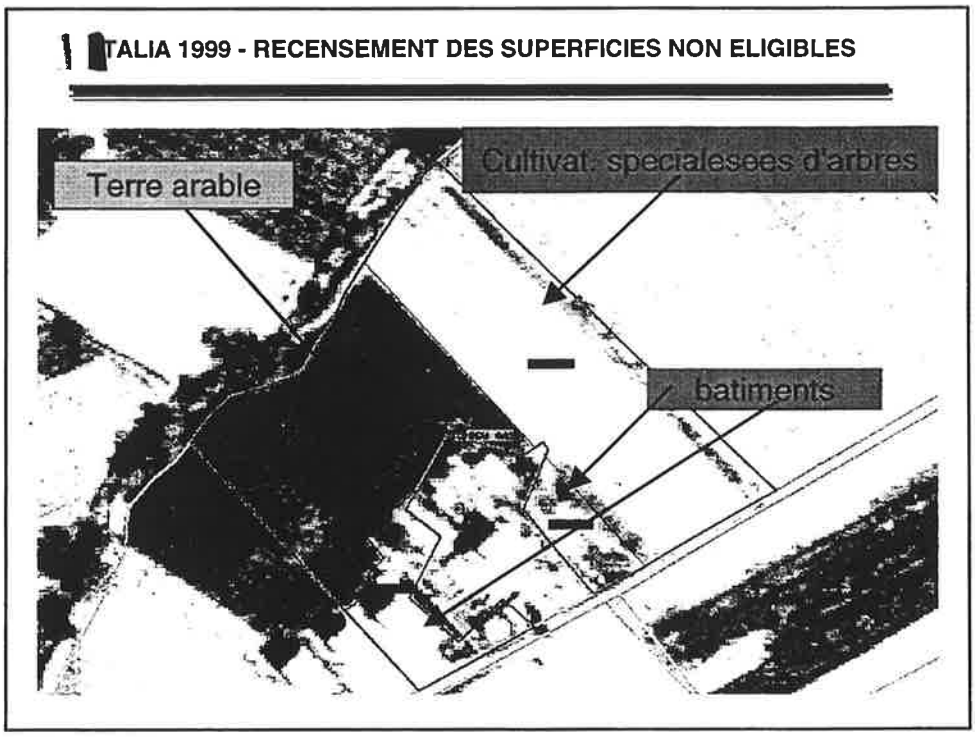
CLASSEMENTS DES CULTURES

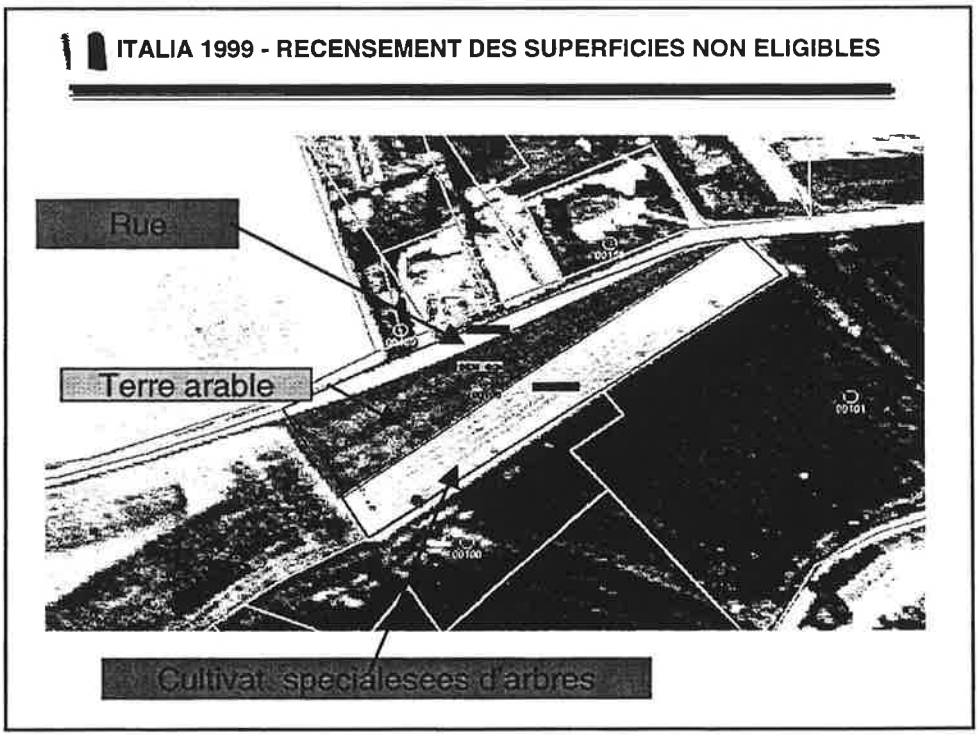
- **SUPERFICIES NON ELIGIBLES**
- **SUPERFICIES POTENTIELLEMENT ELIGIBLES**

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

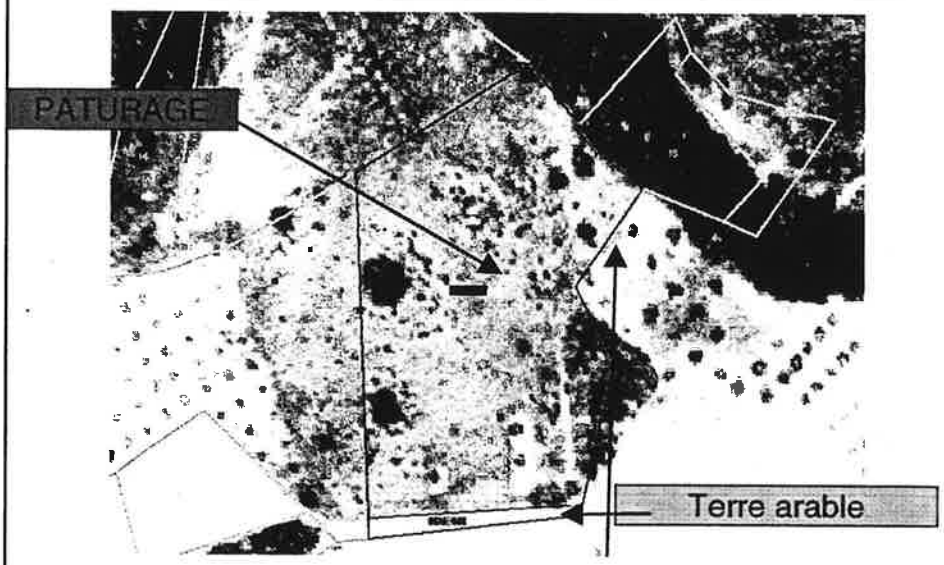
SUPERFICIES NON ELIGIBLES

- CONSTRUCTION (BATIMENTS, RUES, CARRIERES, SERRES, JARDINS, ETC.)
- BOIS (SUPERFICIES AVEC COUVERTURE VEGETALE NATURELLE - ARBRES)
- ZONES DE JACHERE (ZONES NON CULTIVABLES, ZONES ROCHEUSES, CALANQUES, ETC.)
- PATURAGES AVEC ARBUSTES (TERRAINS NON CONCERNES PAR ROTATION DES CULTURES, TERRAINS DESTINES EN PERMANENCE À LA PRODUCTION D'HERBACEES OU D'ARBUSTES NATURELS)
- CULTIVATIONS SPECIALISEES D'ARBRES (CULTIVATIONS D'ARBRES NON ASSOCIES A TERRES ARABLES)
  - CULTIVATIONS ESPACEES REGULIEREMENT: DISTANCE ENTRE LES RANGEES < A' 5 METRES OU DISTANCE ENTRE LES FEUILLAGES < A' 3 METRES
  - CULTIVATIONS ESPACEES IRREGULIEREMENT: DENSITE > A' 400 PLANTES/HECTARE OU DISTANCE ENTRE LES FEUILLAGES < A 3 METRES


ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
Terre arable
Cultivat. specialesees d'arbres
batiments


ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
Rue
Terre arable
Cultivat. specialesees d'arbres

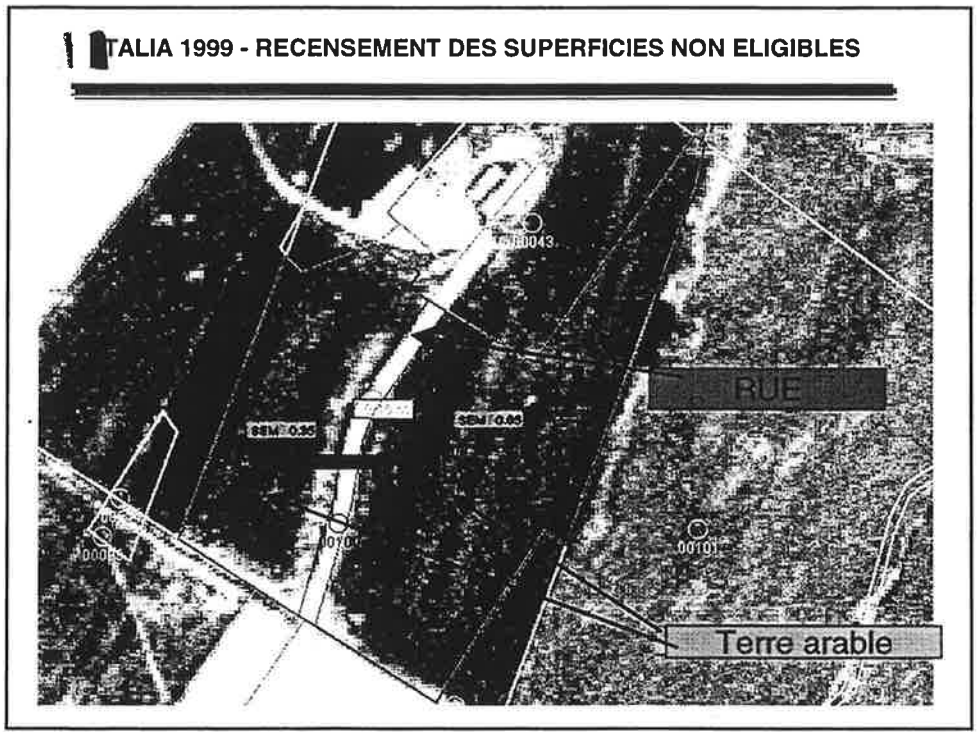
ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES



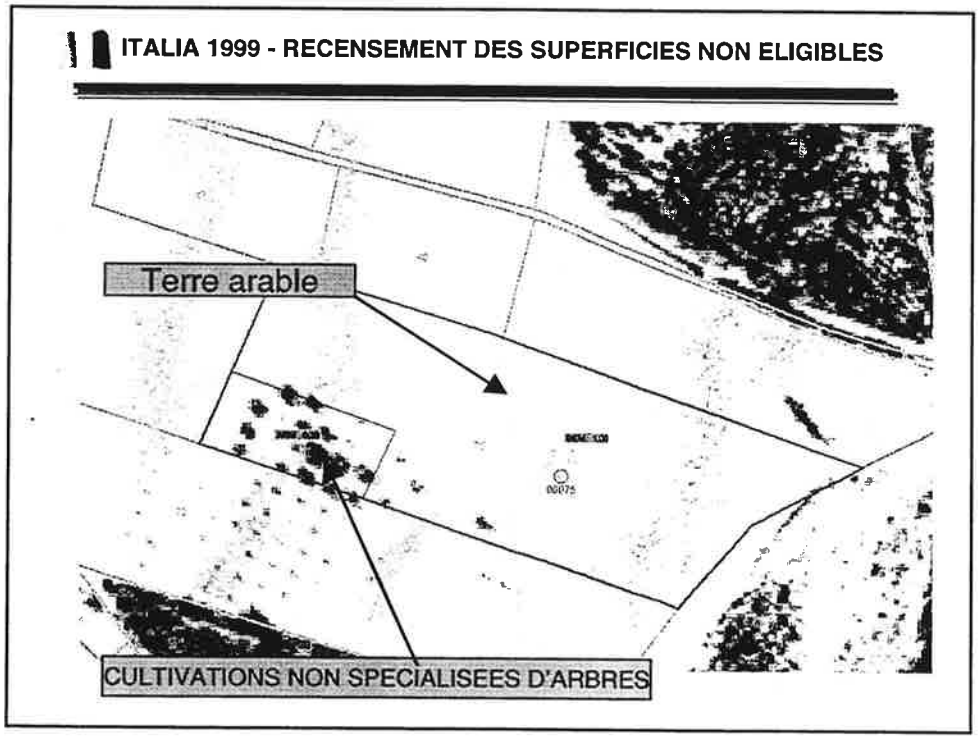
ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES

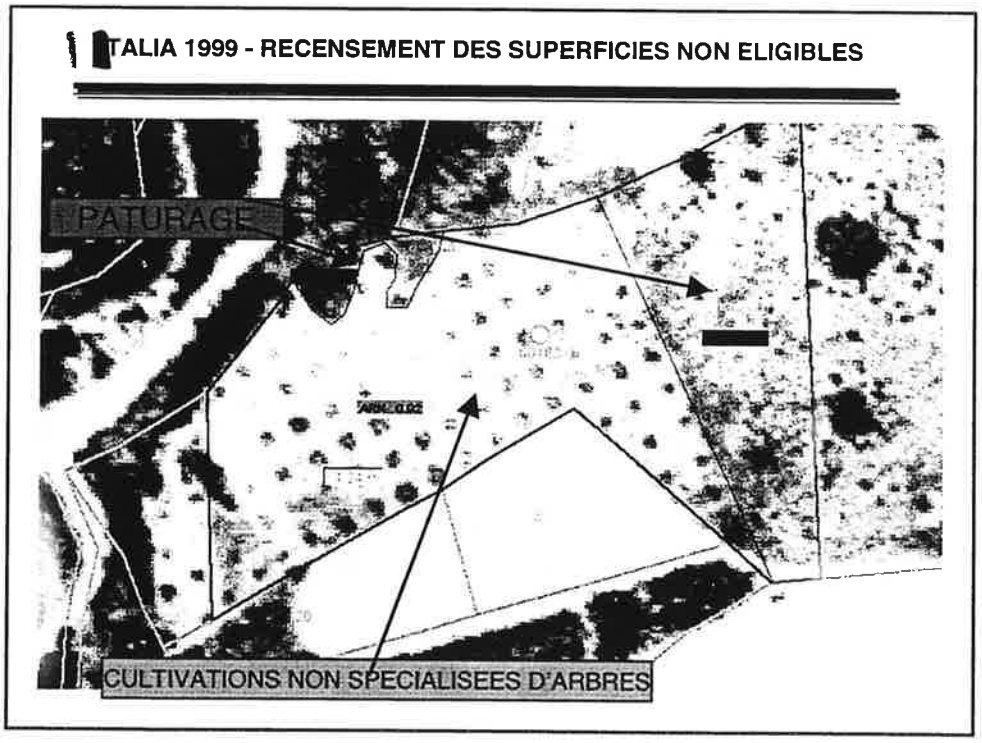
ZONES POTENTIELLES ELIGIBLES

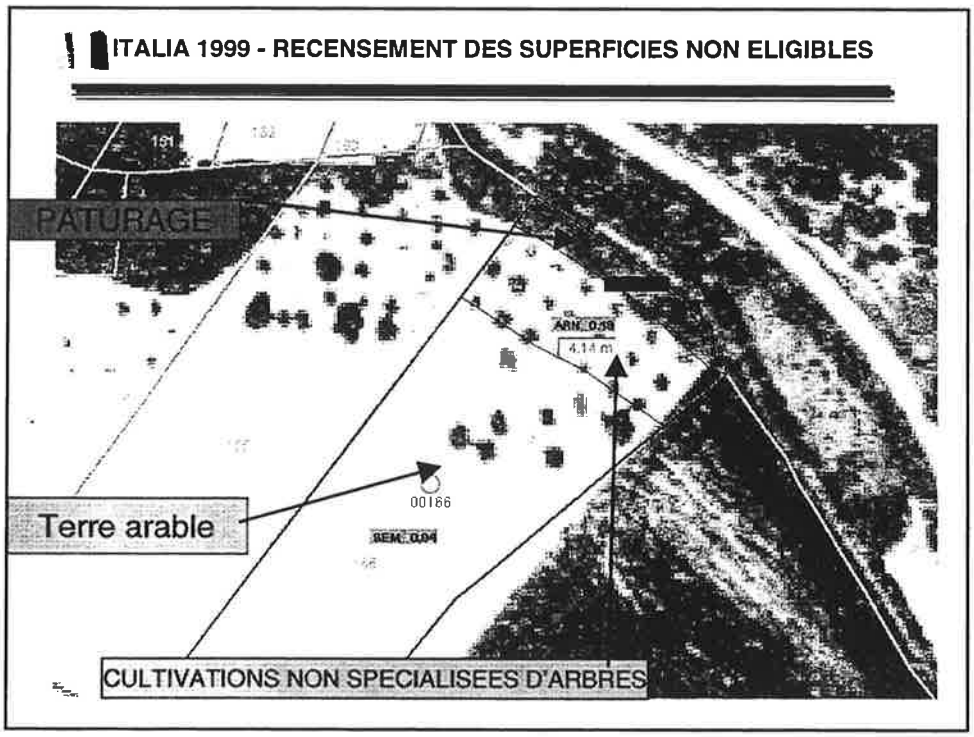
- **TERRE ARABLE: ZONE AVEC SIGNES DE CULTIVABILITE (CULTIVATIONS EN COURS OU USAGE D'ENGINS MECANISES)**
- **TERRE ARABLE EVENTUELLE: ZONE QUI NE PEUT FIGURER DANS LA CLASSE CI-DESSUS, MAIS SANS ELEMENT DE NON CULTIVABILITE**
- **CULTIVATIONS NON SPECIALISEES D'ARBRES (CULTIVATIONS D'ARBRES ASSOCIES A TERRES ARABLES)**
  - **CULTURES ESPACEES REGULIEREMENT: DISTANCE ENTRE LES RANGEES > A' 5 METRES OU DISTANCE ENTRE LES FEUILLAGES > A' 3 METRES**
  - **CULTURES ESPACEES IRREGULIEREMENT: DENSITE COMPRISE ENTRE 100 ET 400 PLANTES HECTARE OU DISTANCE ENTRE LES FEUILLAGES > A' 3 METRES**

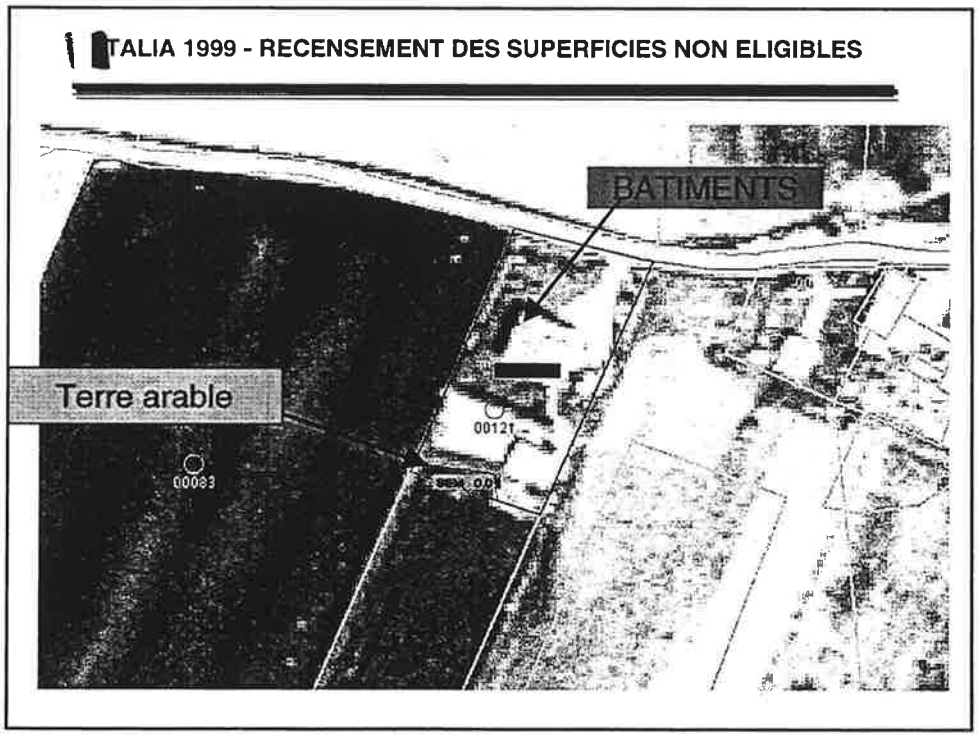

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
RUE
Terre arable

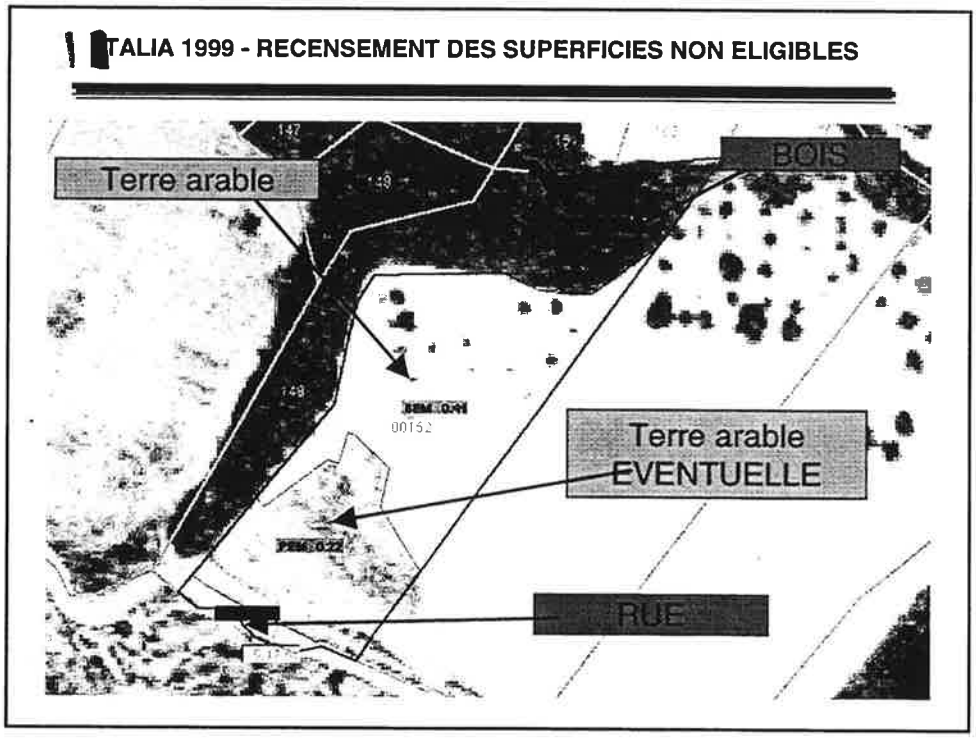

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
Terre arable
RUE


ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
Terre arable
CULTIVATIONS NON SPECIALISEES D'ARBRES


TALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
PATURAGE
CULTIVATIONS NON SPECIALISEES D'ARBRES


ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
PATURAGE
Terre arable
CULTIVATIONS NON SPECIALISEES D'ARBRES

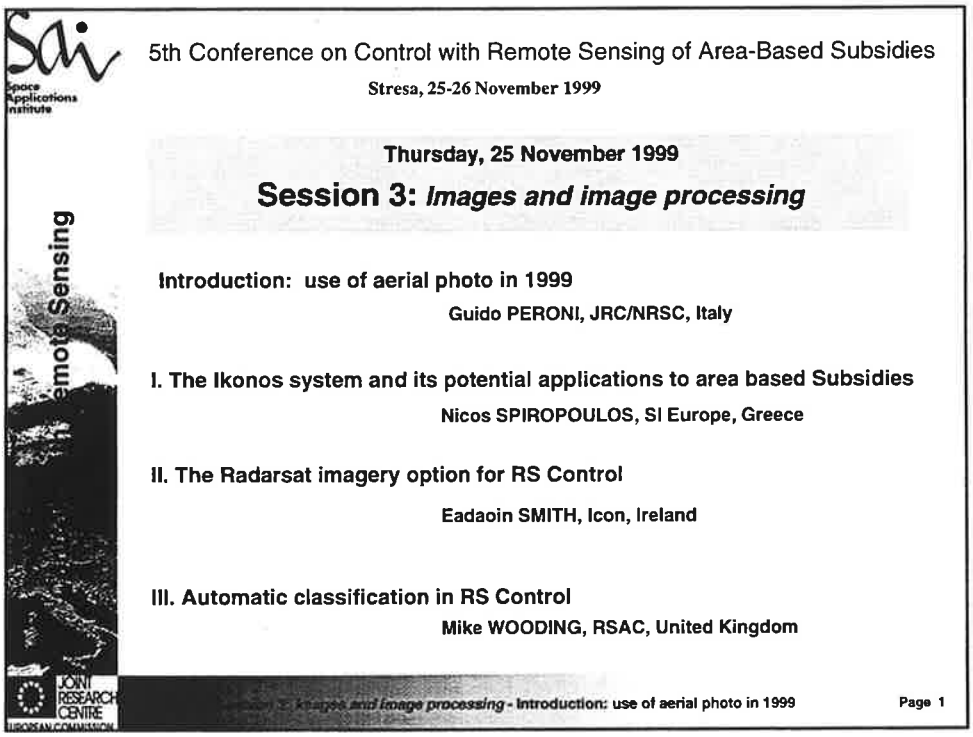

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
BATIMENTS
Terre arable

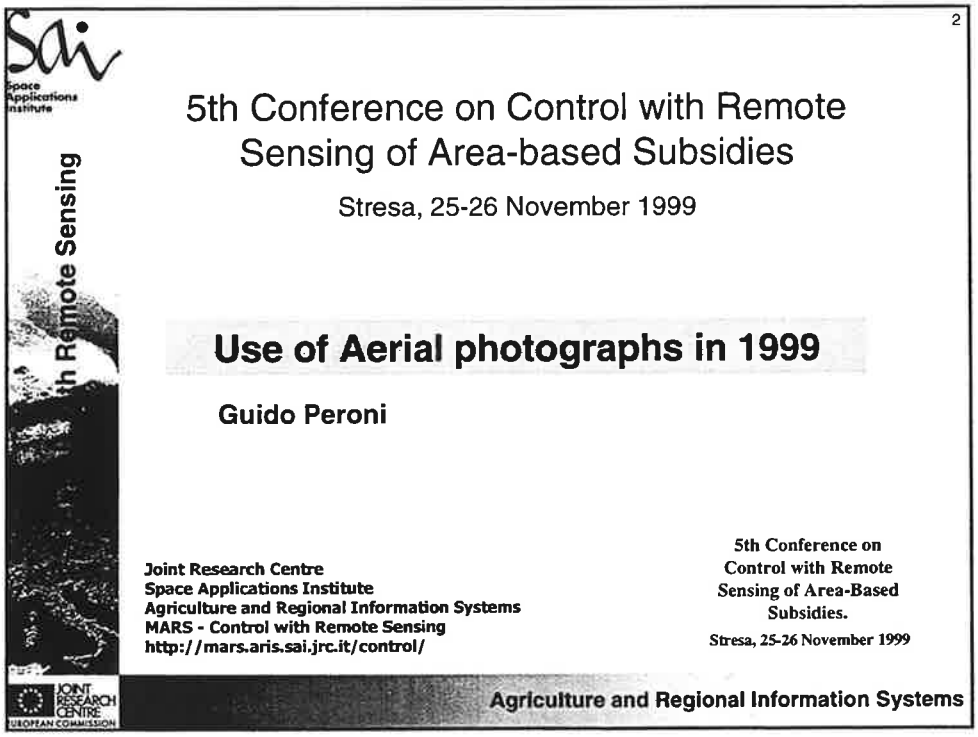

ITALIA 1999 - RECENSEMENT DES SUPERFICIES NON ELIGIBLES
Terre arable
BOIS
Terre arable
EVENTUELLE
RUE

Session 3:

Images and image processing

Introduction	G. Peroni
The IKONOS system and its potential applications to area-based subsidies	N. Spiropoulos, SIE (GR)
The Radarsat imagery option for RS Control	E. Smith, Icon (IE)
Automatic classification in RS Control	M. Wooding, RSAC (UK)


Space Applications Institute
5th Conference on Control with Remote Sensing of Area-Based Subsidies
Stresa, 25-26 November 1999
Thursday, 25 November 1999
Session 3: Images and image processing
Introduction: use of aerial photo in 1999
Guido PERONI, JRC/NRSC, Italy
I. The Ikonos system and its potential applications to area based Subsidies
Nicos SPIROPOULOS, SI Europe, Greece
II. The Radarsat imagery option for RS Control
Eadaoin SMITH, Icon, Ireland
III. Automatic classification in RS Control
Mike WOODING, RSAC, United Kingdom
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Images and image processing - Introduction: use of aerial photo in 1999
Page 1


2
Space Applications Institute
5th Conference on Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November 1999
Use of Aerial photographs in 1999
Guido Peroni
Joint Research Centre
Space Applications Institute
Agriculture and Regional Information Systems
MARS - Control with Remote Sensing
http://mars.aris.sai.jrc.it/control/
5th Conference on Control with Remote Sensing of Area-Based Subsidies.
Stresa, 25-26 November 1999
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems

USE OF AERIAL PHOTO IN 1999: summary table

MS	CONTRACTOR	Photo from LPIS	Photo from archive	Photo for RSC	Scale	Emulsion	Acq. Date
AT	GEOSPACE	-	-	2 sites	?	?	June 1999
DE	EFTAS	-	-	1 site (240 km2)	1/36000	IRC Kodak 2443	May + July 1999 (2 dates)
DE	GAF	-	-	2 sites (3800 km2)	1/36 - 1/40000	IRC Kodak II	May-June 1999
ES	DAP	-	-	250 km2 * 19	1/38000	Pan Aviophot	May 1999
FI	NLS			6 sites (14000 km2)	1/55000	IRC Kodak 2443	June 1999
FR	SIRS	No	-	2 sites 1900 km2	1/35000	Colour K x1412	May+July 1999 (2 dates per site)
IT	CCIA	+		85000 km2	1:40,000	PAN (X2412)	Apr-Jun 1999
NL	GEORAS	-	-	1 site	1:40,000	PAN (Agfa 50)	May 1999
PT	GEOMETRAL	+	-	4 sites	1:43,000	PAN (Agfa 50)	Jun-Aug 1999 (for 1 site: 2 dates)
PT	TERRACARTA	+	-	+	1:33,000	PAN	June 1999
BE	MIN. AGRI.	+	-	-			1995
DK	DIAS	+	-	No			
GR	ERATOSTHENES	+	-				
GR	GEOAPIKONISIS	+	-				
IE	ICON	+	-	-	*1:40,000*	*PAN*	*Summer 1995*
SE	SSC SATELLITBILD	-	+	3 sites 300 km2	1:36000 and 1:60000	PAN DOUBLE X, AERO LX	1993 and 1998

Space Applications Institute — Remote Sensing — JOINT RESEARCH CENTRE — EUROPEAN COMMISSION

...images and image processing - Introduction: use of aerial photo in 1999 Page 3

USE OF AERIAL PHOTO IN 1999: main points

- **16 contractors in 13 MS used aerial photos for RSC_1999:**
  - ⇨ 10 contractors acquired aerial photo in 1999: DE (2), ES, FI, FR, IT, NL, PT(2).
  - ⇨ 5 contractors used photos from LPIS: BE (1995), DK, GR (2), IE (1995)
  - ⇨ 1 contractor used archive photos (not LPIS): SE (1993-98)
- **2 flights (May and June-July) in DE (2),FR, IT, and PT (1)**
- **85,000 Km2 covered in IT; 14,000 in FI**
- **1:40,000 scale, 1 metre pixel size**
- **4 contractors (DE, FI, and FR) used colour films**
  - ⇨ **CIR in DE and FI**

Space Applications Institute — Remote Sensing — JOINT RESEARCH CENTRE — EUROPEAN COMMISSION

...images and image processing - Introduction: use of aerial photo in 1999 Page 4

SPACE IMAGING EUROPE

Mission Planning & Scheduling
From Product Order to Imagery Collection

Nicos V. Spiropoulos

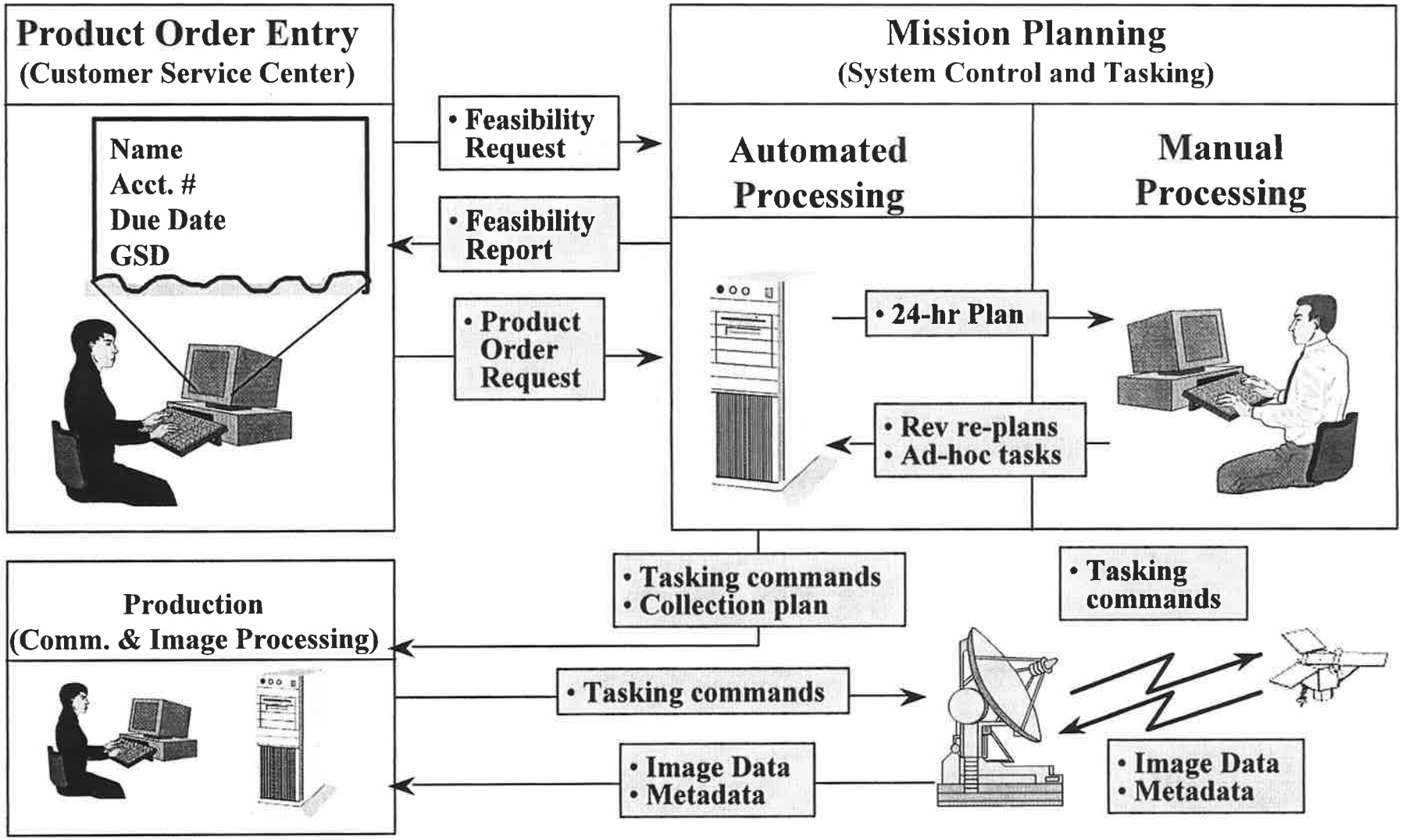
(original background removed by MARS for smaller file size)

Mission Planning & Scheduling Functions

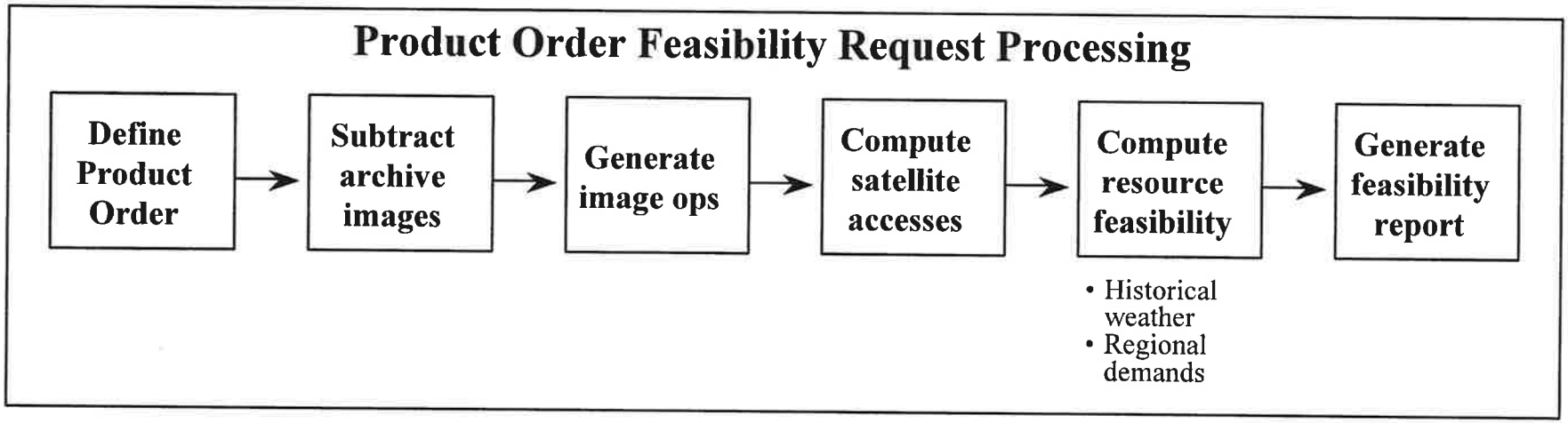
- **Planning is Resource Allocation**
  - Feasibility Requests processing
  - Automated product order to image operation conversion
  - Interactive image operation modification

- **Scheduling is Image Operation Selection**
  - Dynamic Program Scheduling
  - Detailed constraints checking
  - 24-hr Plan generation
  - Tasking plan generation
  - Satellite command generation

Overview
Product Order to Image Processing



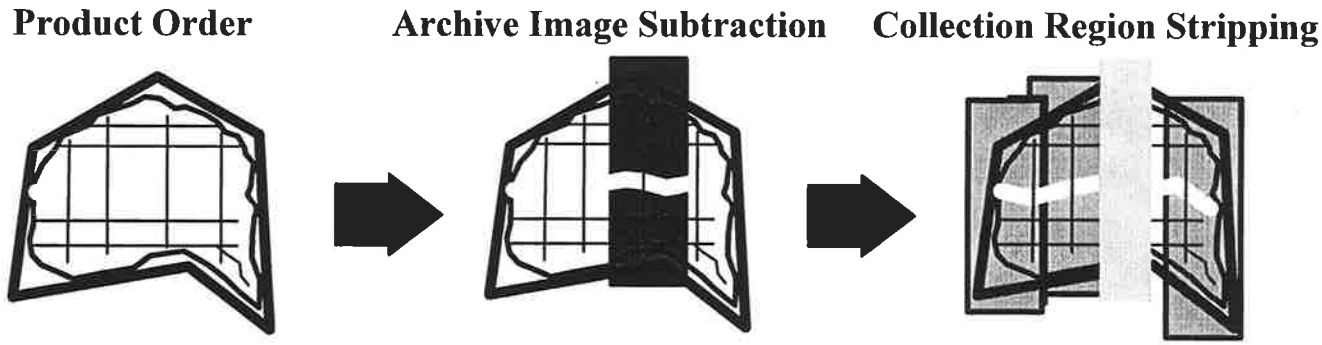
Product Order Entry



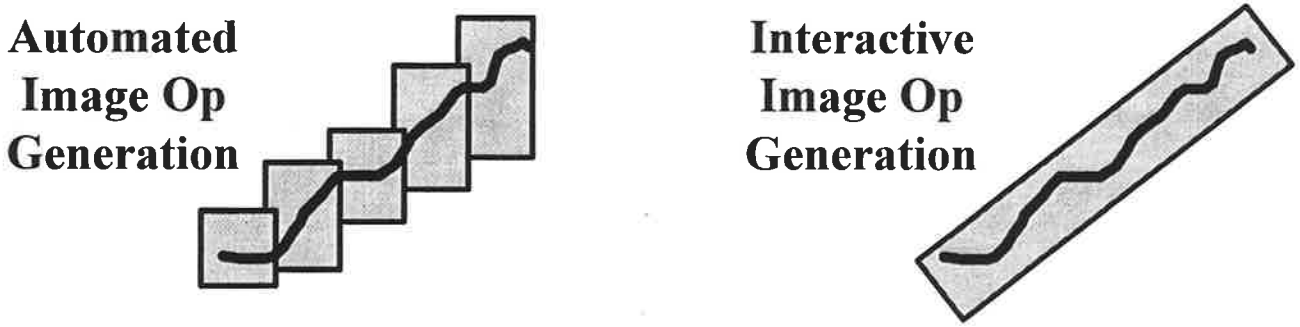
- All product orders enter system through the CSC
  - CSR works with customer to define requirements
  - CSR requests feasibility report from SCT
  - CSR enters product order
- Product order contains required collection parameters
  - Geometric requirements: GSD, sun elevation, obliquity
  - Production requirements: monoscopic / stereoscopic, archive data
  - Temporal requirements: due date, seasonal constraints

Planning
Image Operation Generation

- **Image Ops generated automatically for product orders**
  - **Archived images subtracted from area to produce collection region**
  - **Image ops generated for North - South strips**



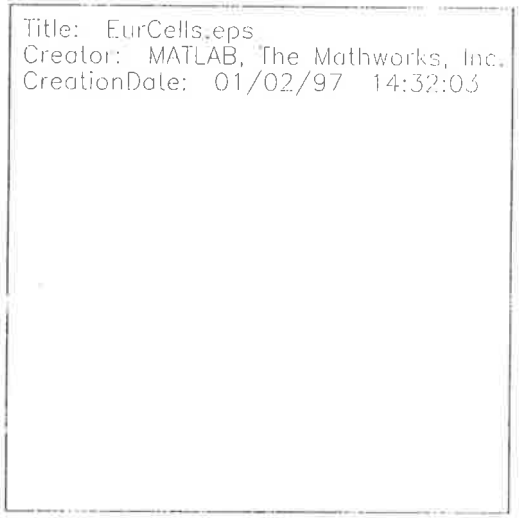
- **Interactive tools provided for manual image op generation**
  - **Optimize collections for odd-shaped areas: rivers, coasts, etc.**



Planning
Resource Allocation Grid

- Resource is satellite imaging time
- Planning allocates imaging time for product order collection
- Geographical distribution of image operations establishes the demand for imaging resources
- Satellite imaging resources allocated based on predicted cloud free visibility and global / regional conflicting
- Resources allocated using grid cells
- Customer satisfaction achieved by priority-based collection
- Resource utilization used to request contacts for 30-Day Plan

Europe Example

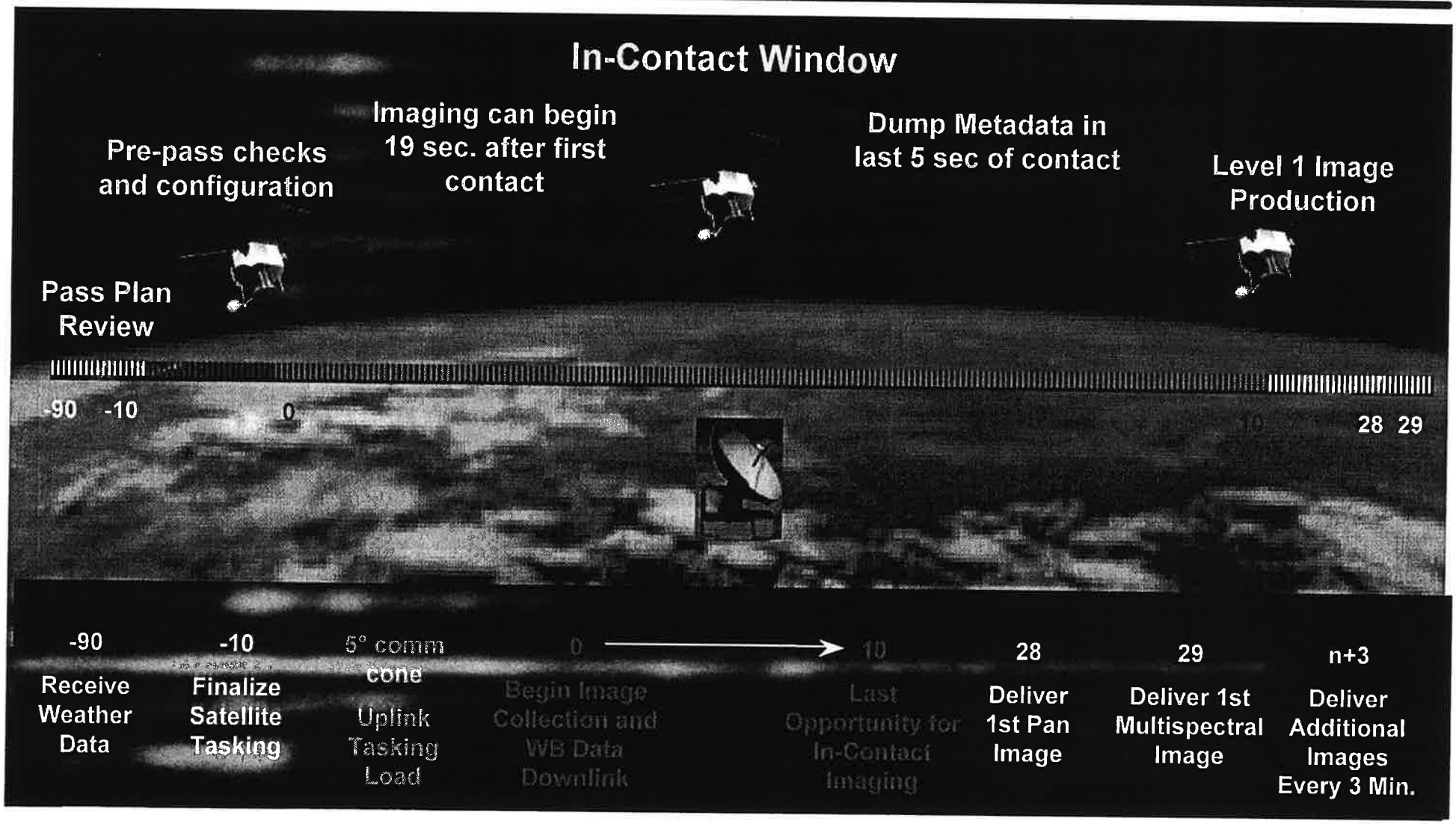


- Equal area resource cells defined by Sectional Aeronatical Chart regions
- Associated with each grid cell:
  - Available imaging time
  - Required imaging time by priority
  - Historical weather
  - Average slew estimates as a function of candidate image density

Scheduling
Operator Functions

- **Operator runs scheduler to produce 24-hr plan**
  - **Covers each contact window in period**
  - **Produces optimal plan given current data**
    - Incorporates latest weather data
- **Operator reviews plan and modifies if needed**
  - **Manual intervention for high-priority tasks**
- **Operator re-runs scheduler for updated weather or changing collection priorities**
- **Scheduler produces tasking commands and collection plan**
  - **Collection plan sent to CIP automatically**
  - **Collection can be modified typically 1 hour prior to contact**
  - **Ad-hoc tasking can be sent up to 10 minutes prior to contact**
- **Operator sends tasking commands during satellite contact**
  - **Satellite collects and downlinks data**

Timeliness
Operations Pass



Planning & Scheduling Summary

- **Mission Planning allocates time to meet imaging demands**
  - **Performs feasibility assessment for new orders**
  - **Converts product orders to image operations**
    - Allows for manual intervention for odd-shaped regions
  - **Provides resource requirements for contact window requests**
- **Scheduling selects image operations for optimal time usage**
  - **Generates 24-hr Plan**
    - Uses dynamic programming for optimal solution
    - Allows for manual intervention for high-priority orders
  - **Performs detailed constraints checking for safe operation**
  - **Generates tasking commands and collection plan**
    - Assures accurate implementation of plan

Collection Capabilities

Nicos V. Spiropoulos

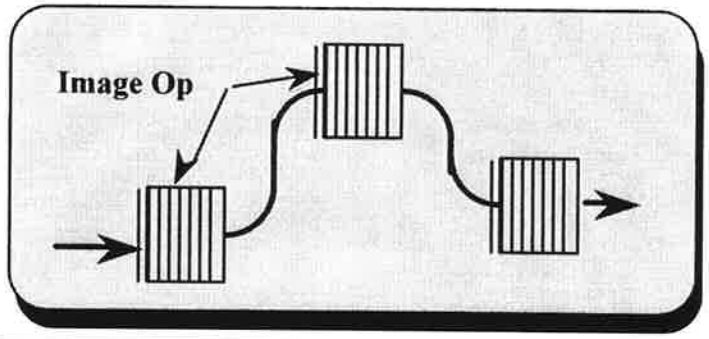
Topics

- Collection scenarios
- Collection access
- Collection yields

Collection Scenarios

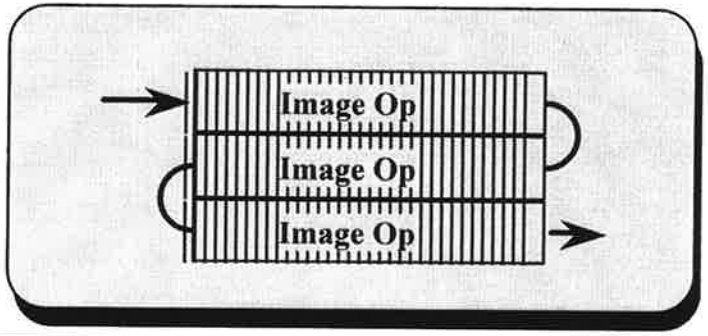
Point targets

- **Smallest area to be collected is 11.3 km. x 11.3 km. at nadir**
- **Least efficient due slew times**



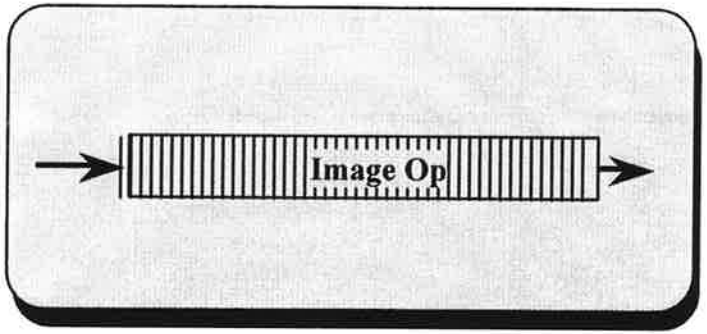
Area targets

- **More efficient due to longer scans**
- **Limited by acceleration capability**

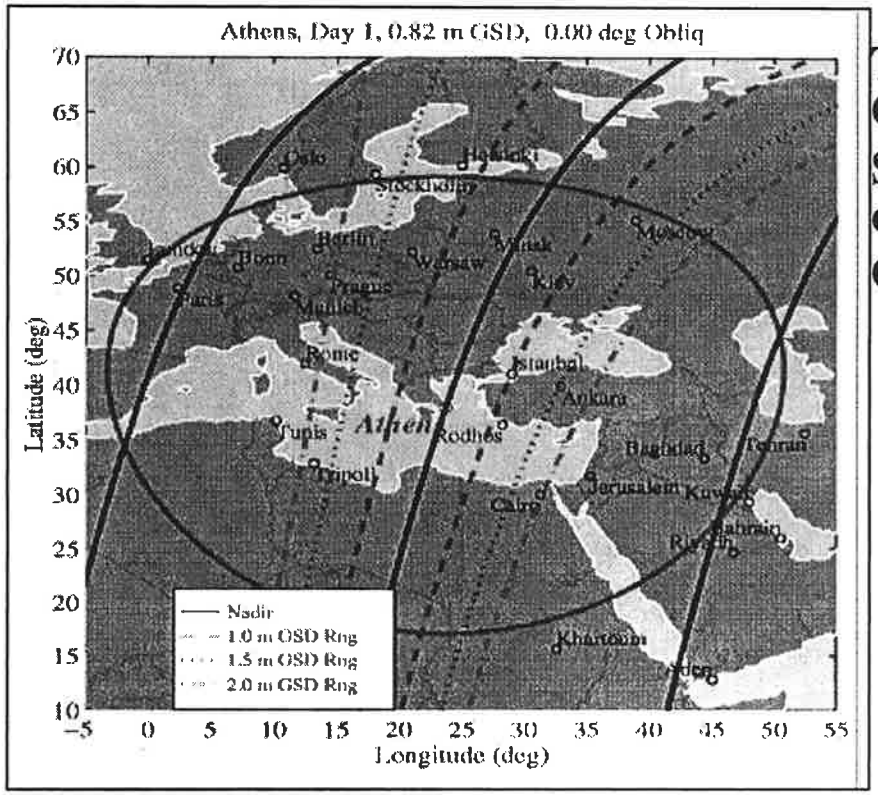


Continuous strips

- **Single image operation**
- **Low acceleration impact**



Collection Access
Cross-track Viewing Capability



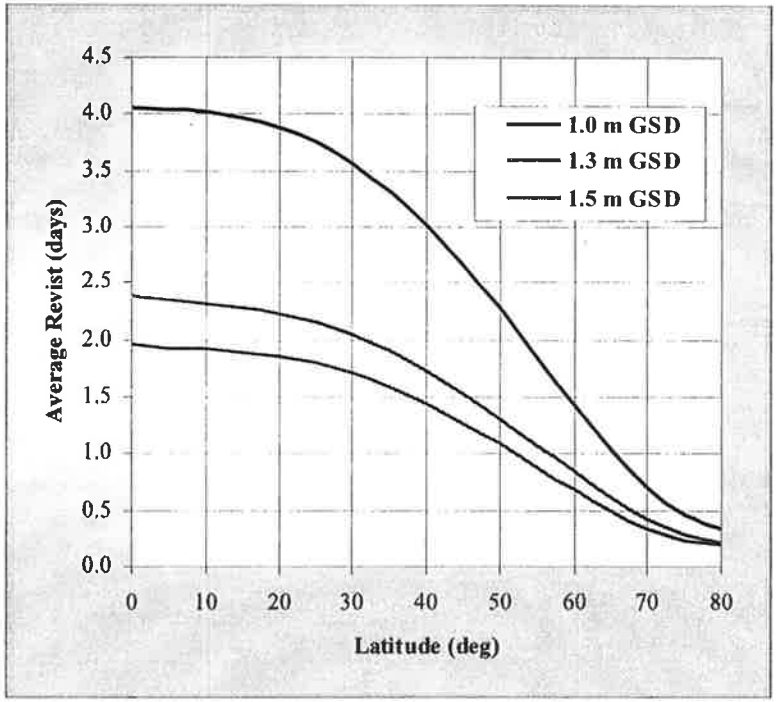
GSD (m)	Obliquity (deg)	Cross-track (km)
1.0	26	350
1.5	44	700
2.0	51	930

Typical access to 45 deg. obliquity (1.56 m GSD)

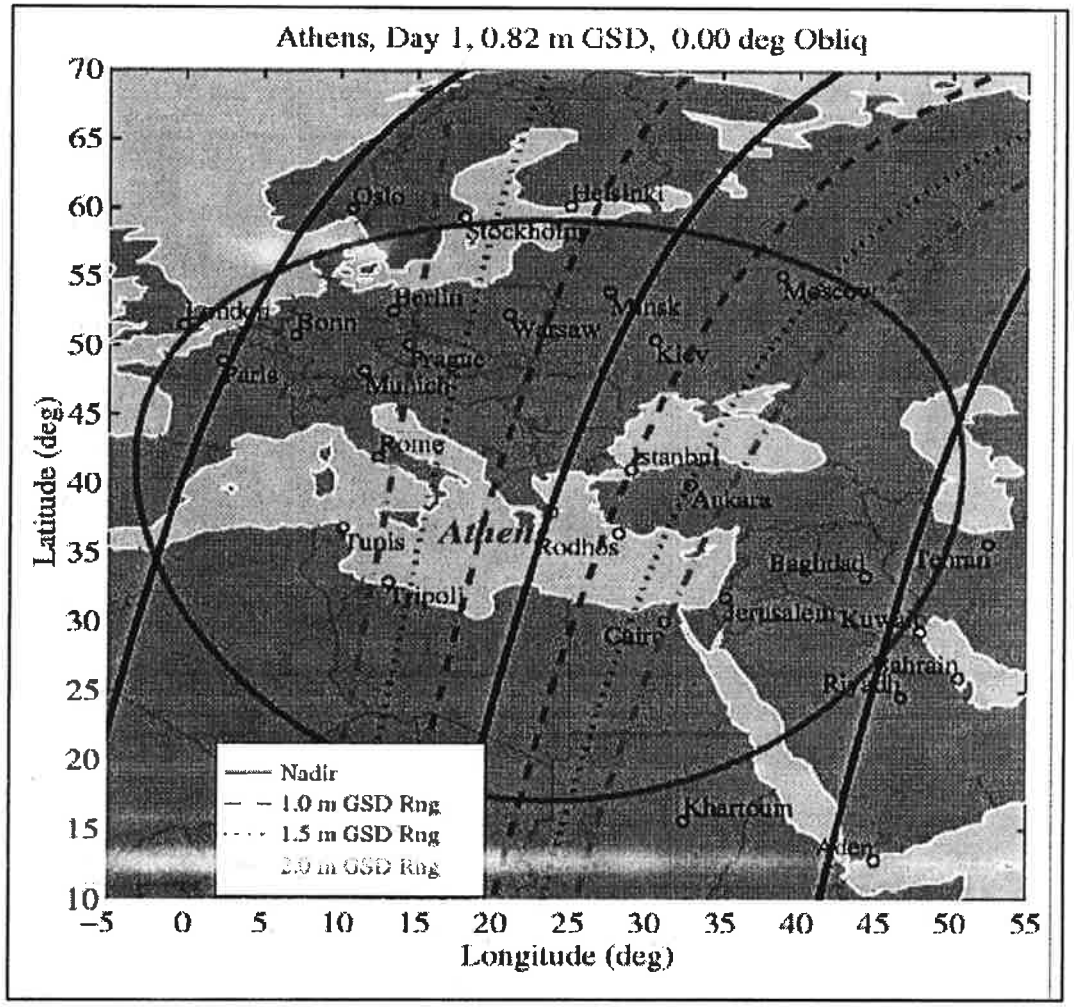
Some limitations on access to 51 degree obliquity (2.0 m GSD)

Cross-track viewing improves revisit times

Average Revisit Time vs. Latitude



Collection Access
Daily Example: Day 1

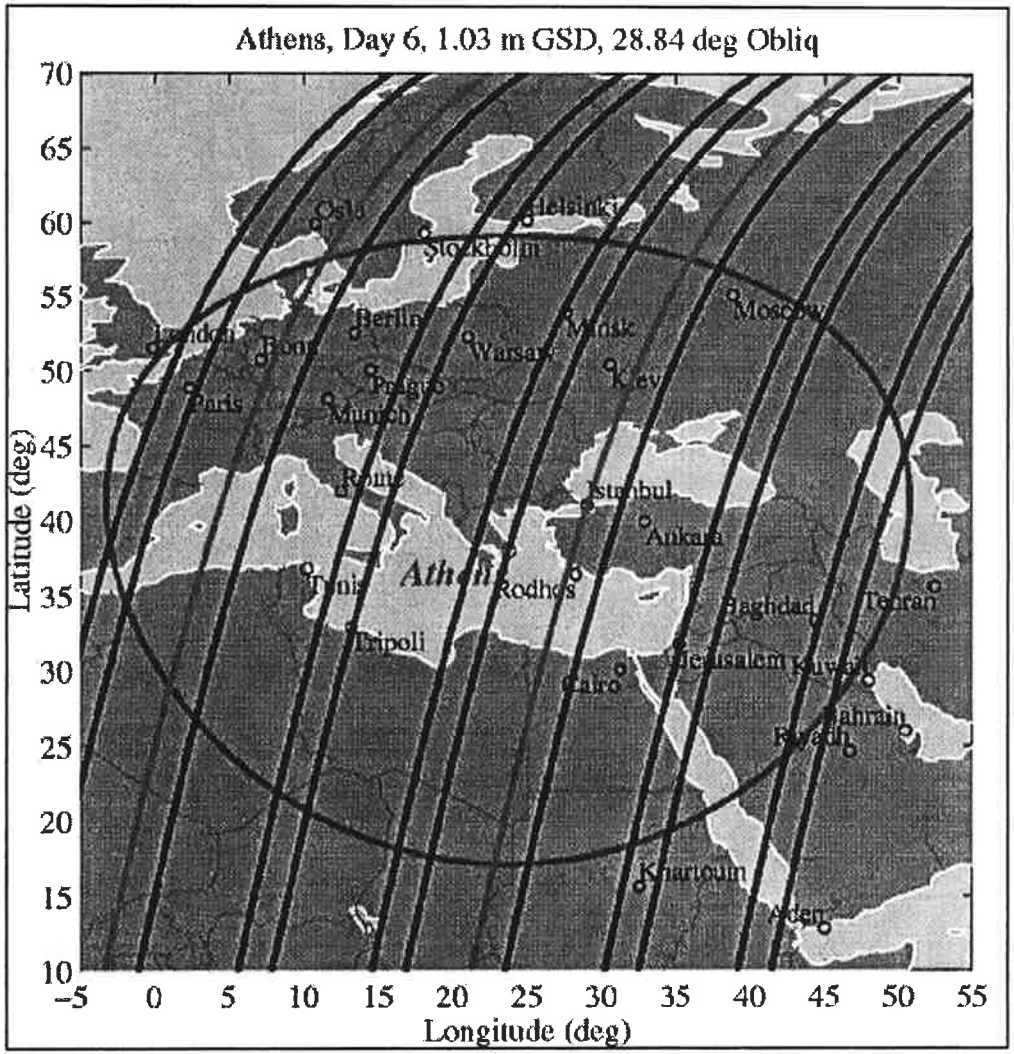


Day 1: Satellite passes directly over ground station

Access Parameters
(to image ground station)

Day	GSD (m)	Obliq (deg)
1	0.82	0
2	2.17	52.6
3	1.59	45.6
4	0.91	20.3
5	2.93	57.1
6	1.16	34. 9
7	1.19	35. 9
8	2.86	56. 9
9	0.90	18.9
10	1.63	46.3
11	2.12	52.2

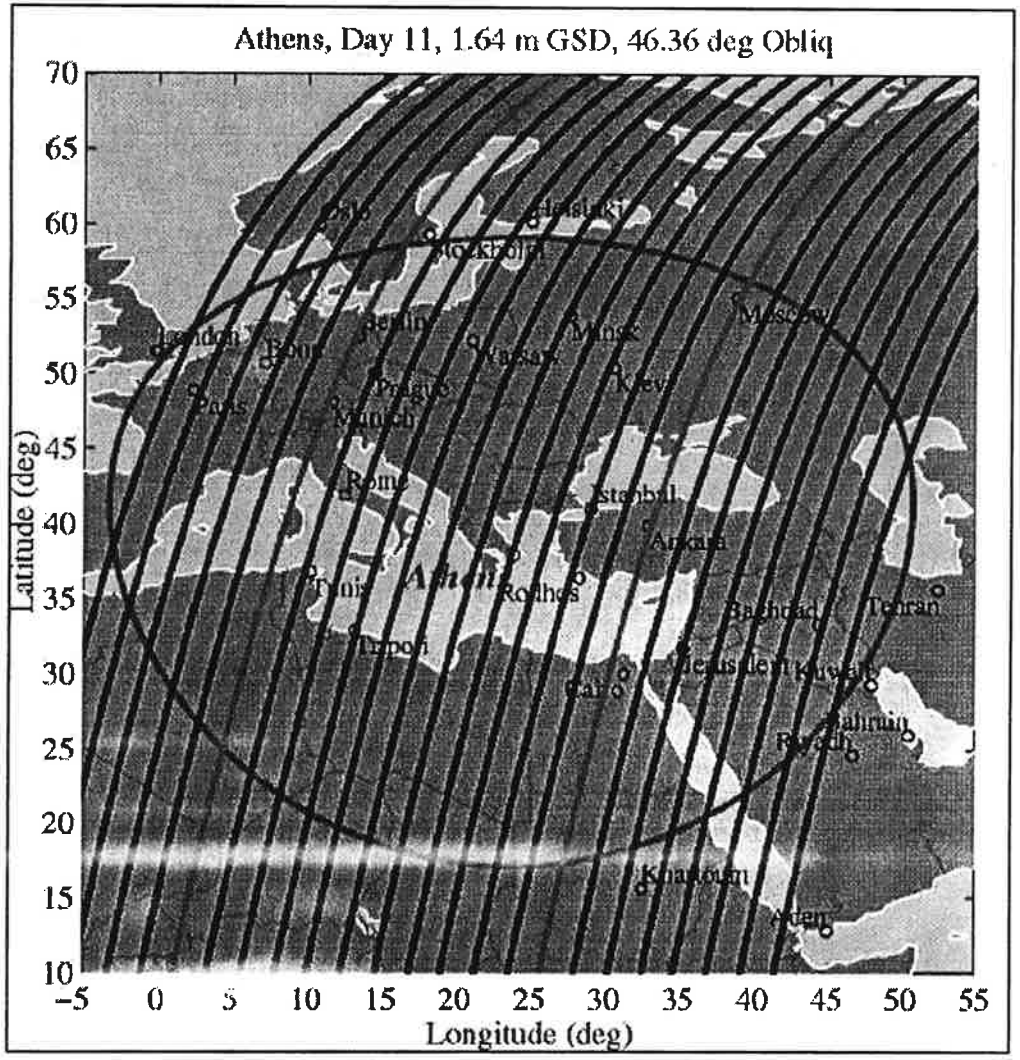
Collection Access
Daily Example: Day 6



Access Parameters
(to image ground station)

Day	GSD (m)	Obliq (deg)
1	0.82	0
2	2.17	52.6
3	1.59	45.6
4	0.91	20.3
5	2.93	57.1
6	1.16	34. 9
7	1.19	35. 9
8	2.86	56. 9
9	0.90	18.9
10	1.63	46.3
11	2.12	52.2

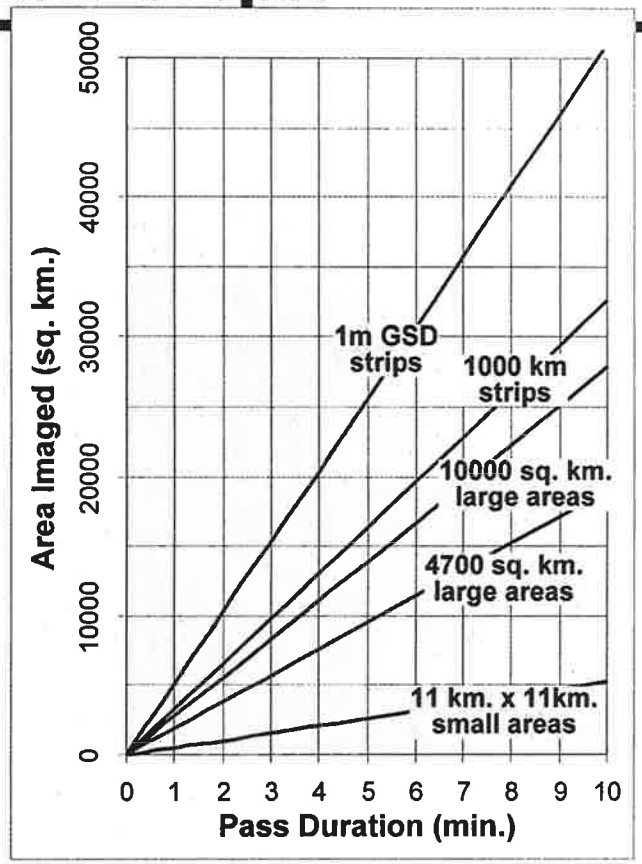
Collection Access
Daily Example: Day 11

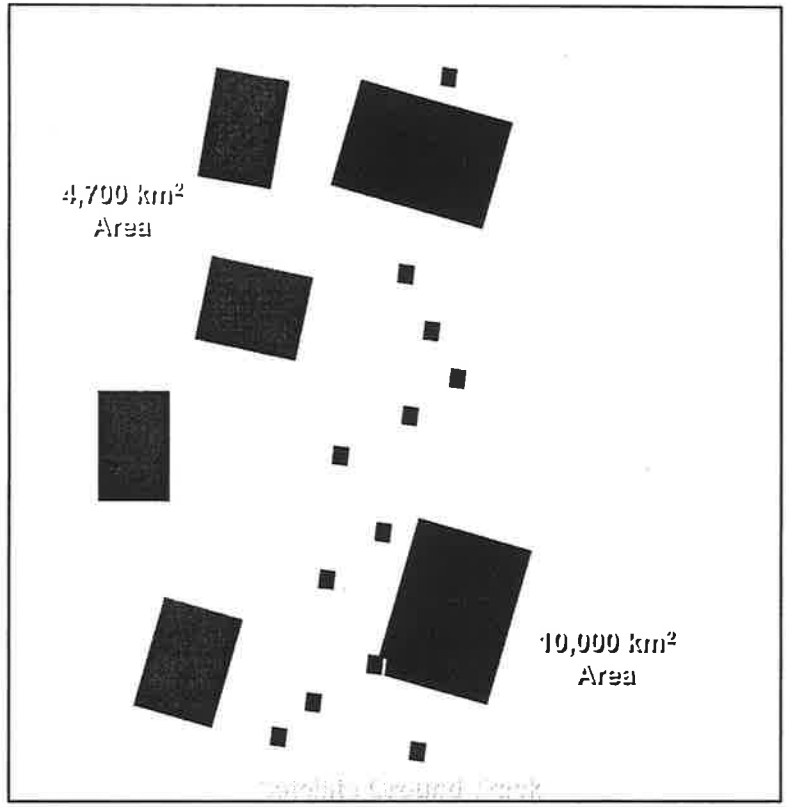


Access Parameters
(to image ground station)

Day	GSD (m)	Obliq (deg)
1	0.82	0
2	2.17	52.6
3	1.59	45.6
4	0.91	20.3
5	2.93	57.1
6	1.16	34. 9
7	1.19	35. 9
8	2.86	56. 9
9	0.90	18.9
10	1.63	46.3
11	2.12	52.2

Collection Yields
Monoscopic





Idealized Monthly Collection: Square Kilometers

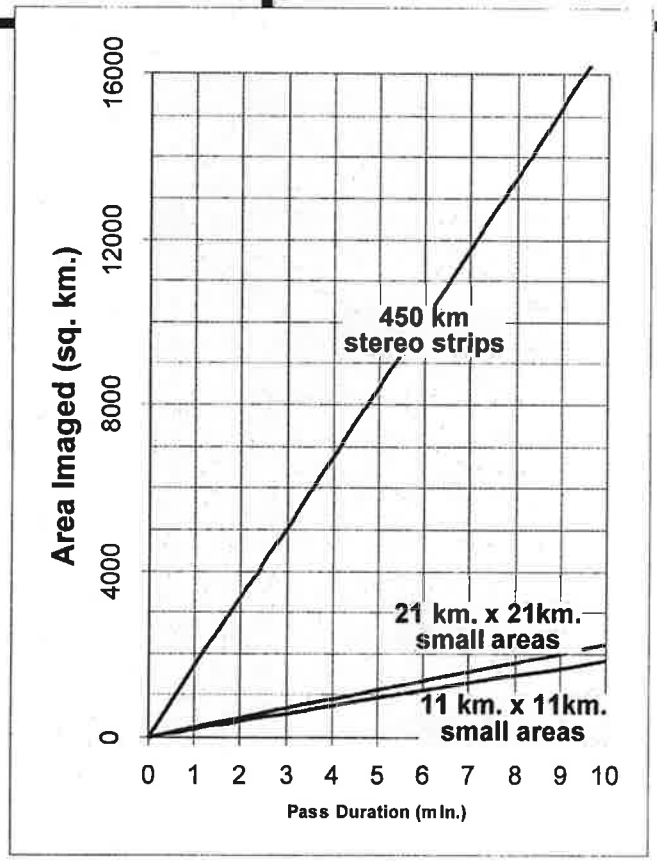
Subscrip	Collection Mode				
	Small Area	Large Area	Large Area	Strip	Strip
(Min./Mth)	(11 X 11)	(4700 km^2)	(10000 km^2	(0.85m GSD)	(1.0m GSD)
20	10,470	38,110	55,810	65,290	102,230
75	39,260	142,910	209,300	244,850	383,350
150	78,530	285,810	418,600	489,700	766,710
300	157,060	571,620	837,210	979,410	1,533,410

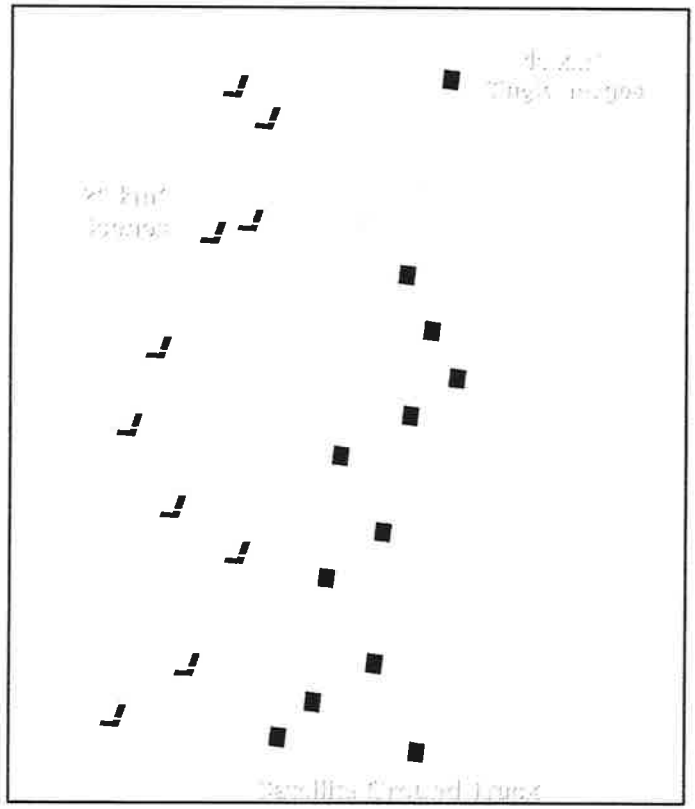
Idealized Annual Collection: Scenes

Subscrip	Collection Mode				
	Small Area	Large Area	Large Area	Strip	Strip
(Min./Mth)	(11 X 11)	(4700 km^2)	(10000 km^2	(0.85m GSD)	(1.0m GSD)
20	1,040	3,780	5,530	6,480	10,140
75	3,890	14,170	20,760	24,280	38,020
150	7,790	28,340	41,510	48,570	76,040
300	15,580	56,690	83,030	97,130	152,070

Note: Area collection rates shown here represent operation entirely in the specified mode. Actual collection scenarios will be a combination of the modes suggested here and will have different resulting area collection rates.

Collection Yields
Stereoscopic





Idealized Monthly Collection: Square Kilometers

Subscrip. (Min./Mth)	Collection Mode: Small Area (11 km x 11 km)	Small Area (21 km x 21 km)	Strip (450 km.)
20	3,630	4,410	33,680
75	13,610	16,540	126,310
150	27,230	33,080	252,610
300	54,450	66,150	505,220

Idealized Annual Collection: Scenes

Subscrip. (Min./Mth)	Collection Mode: Small Area (11 km x 11 km)	Small Area (21 km x 21 km)	Strip (450 km.)
20	360	440	3,340
75	1,350	1,640	12,530
150	2,700	3,280	25,050
300	5,400	6,560	50,100

Note: Area collection rates shown here represent operation entirely in the specified mode. Actual collection scenarios will be a combination of the modes suggested here and will have different resulting area collection rates.

Collection Yields
Example Annual Collection

- **Area collection rates can vary from several hundred square kilometers per minute to over 5000 square kilometers per minute**
- **An average rate would be 3000 sq. km. per minute**
- **A ROC with a 300 minute per month subscription could collect data approximately 10 minutes per day**
- **Over 90,000 scenes (11 km. x 11 km.) could be collected per year**
- **Over 50,000 scenes would be cloud free with a cloud cover factor of 60%**

Description	Value	Units
Collection rate	3000	km^2/min
Time per day	10	minutes
Area per day	30000	km^2
Scenes per day	247.93	images
Scenes per year	90496	images
Cloud cover	60	percent
Yield	54298	images

Summary

- **Agile satellite allows for different collection modes**
  - **Continuous strips are most efficient**
  - **Small area targets are least efficient**
- **Frequent revisit provides choice of collection opportunities**
- **High collection yields attained by choice of collection mode**
  - **Timely use of weather data increases yields**

The Radarsat Option

'99 Irish Experience

The ICON Group

Éadaoin Smith
Stresa 24-25 November '99

The ICON Group

Background

- Ireland's Latitude ranges from 51° to 55.4°N
- weather conditions tend to be cloudy and sunny days are often hazy
- as a small island it experiences the effects of the sea/ocean inland as well as along the coast
- **Summary -** geographically not conducive to the acquisition of cloud-free imagery

The ICON Group

Example - '98

- One cloud-free SPOT XS image for each of the 3 zones was acquired on 18/19 May
- In early-mid August, the following were captured:

Laoi:	SPOT XS - 20% cloud/haze
	SPOT XS - 50% cloud/haze
Ross:	SPOT XS - 40% cloud
Done:	no useable image

- Parcels that were bare/stubble & indistinguishable in May were just harvested in August so the RADAR data proved vital as a back-up dataset

The ICON Group

Optical -vs- RADAR

- Used Radarsat data for one of the 98 zones and found its radiometric and spatial resolution more than satisfactory
- Optical option - High probability that we would have to process the ERS SAR data automatically provided as well as a minimum of 2 multi-spectral images per zone
- RADAR option - RADARSAT data provided automatically - our preferred SAR source - and a maximum of 2 multi-spectral images per zone

The ICON Group

Ordering RADARSAT

- A comprehensive list of images was available as early as mid-March with no difficulty in choosing optimum dates
- Scene co-ordinates were available at time of imagery order showing coverage of the zones
- Therefore dossiers within the zone but outside scene coverage could be flagged early on in the campaign and not processed unnecessarily

The ICON Group

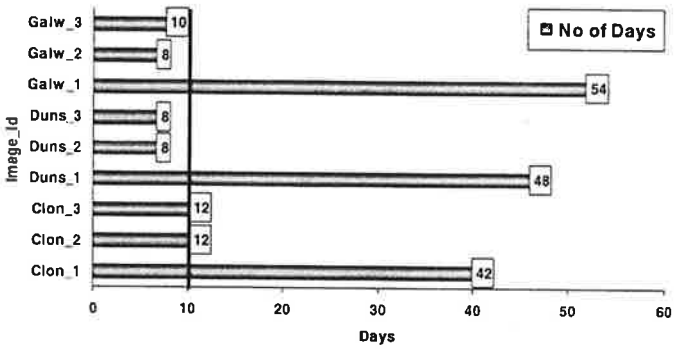
Delivery of Data

- Delivery Periods: 10 working days if ordered before 21st June or 5 working days if ordered after 21st June
- All important delivery dates are pre-determined early on in the campaign allowing a more definite timetable and project plan to be constructed
- Our Radarsat image dates were:

	Image 1	Image 2	Image 3
Galw	02-Apr	20-May	13-Jun
Duns	09-Apr	27-May	20-Jun
Clon	15-Apr	02-Jun	26-Jun

The ICON Group

Delivery Delays



The ICON Group

Processing

- Chose Fine Mode with slant to ground range conversion already applied
- Noise/speckle reduction filter applied to the intensity values
- Geo-rectification of imagery taking GCPs from 1m orthophotos
- Produced a RGB false colour composite for interpretation

SW algs ?

The ICON Group

Multi-spectral Imagery

- One cloud-free SPOT XS/XI summer image was acquired per zone as follows:

  Clon: 25 June <10% cc
  Galw: 08 July 10-15% cc
  Duns: 12 July <3% cc

- One cloud-free '98 Autumn image per zone
- All imagery datasets were available from the beginning of land use determination

The ICON Group

Interpretation

- The multi-temporal Radarsat, SPOT XS image and Autumn images were all available to the operators on-screen
- vector overlay of parcels with application data in tabular form to be updated with observed crop
- Imagery was used as follows:

	Master	Auxiliary
Arable	Radarsat	SPOT XS
Forage	SPOT XS	Radarsat
Autumn image showed land use in 1998		

The ICON Group

Crop Groups

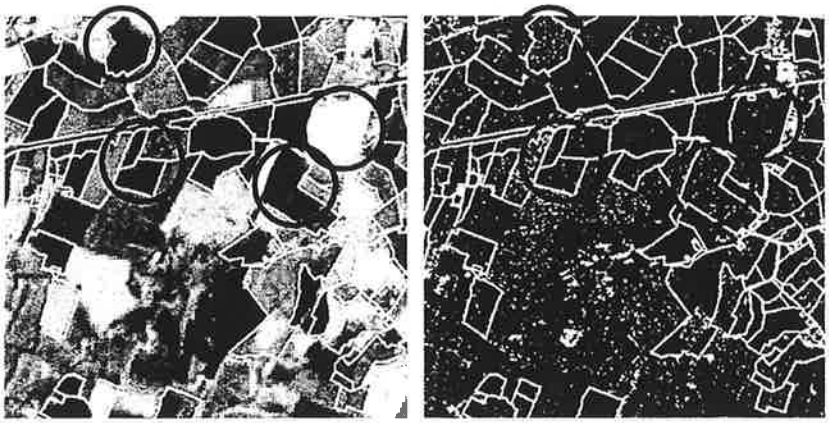
- Radarsat - ability to distinguish between crop groups, particularly cereal/non-cereal
- SPOT - used as confirmation of crop type
- In Ireland, most cases of non-cereal are forage, forestry, potatoes, beets or bog

The ICON Group

Sample 1

The ICON Group

Sample 2



The ICON Group

Summary

- Backscatter values may vary for similar crops but there are rarely more than 3 'colour groups' per crop
- Very low rate of parcels where interpretation was impossible using all imagery available - i.e. only 33 'T1's out of 32839 parcels

Minority Crops	
Beans	consistent, needed verification on SPOT
Linseed	not clear, needed verification on SPOT
Maize	excellent in cases, dependent on age & plastic cover
Oilseed	most distinct, appearing cyan-blue
Peas	not enough to make assessment

The ICON Group

Conclusion
The Radarsat Option

- Provides reliable, weather-independent, high quality data, allowing the Project to run to a stricter timetable and plan
- It is not an expensive dataset to use
- Easy to use
- Highly recommended

RSAC

Automatic Classification in Remote Sensing Control

Mike Wooding and Andrew Batts
Remote Sensing Applications Consultants, Alton, UK

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

RSAC

Automatic Classification in Remote Sensing Control

- **Identification of discrepancies in declared crop types is an important part of the control work.**
- **Crop types are determined using a combination of CAPI and automatic classification.**
- **Two different ways in which automatic classification can be used:**
  1. Used as a guide to help the interpreter during CAPI
  2. Automatically deciding on crop type.
- **Potential for time savings and improved accuracy if able to automatically decide on the crop type rather than subjecting every parcel to CAPI.**

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

RSAC

Automatic Classification Techniques

- **Supervised or unsupervised.**
- **Pixel-based or parcel-based.**
- **Automatic classification for remote sensing control is different from traditional use for land use mapping.**
- **Seen as a means of verifying large number of fields with well defined crop types so that CAPI can be focused on difficult crop discrimination problems, not as a means of giving a definitive result for every agricultural field within the area of interest.**
- **For those parcels classified using automatic classification accuracy levels need to be very close to 100%, not the 90% - 95% accuracy commonly achieved for other land cover or crop mapping purposes.**

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

RSAC

Decisions for Supervised Classification

- **Which Crop Classes?**
  Difficult directly to use declared crop classes
  e.g. only 'oilseed' or 'wheat' declared, but winter and spring crops have very different spectral characteristics
- **Contents of Classification Training Set?**
  Do we include just those with normal or average conditions, or those covering the full range of conditions that are present?
  Using ground data collection it may be difficult to sample a full range of conditions, and to include large numbers of the rarer crop types (unrealistic to drive around the whole of a zone visiting isolated fields near roads).
- **Which Images and Bands?**
  To achieve an optimum result need to carefully consider which images/bands are included, and the possibility of applying different weightings

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

RSAC

A Conventional Pixel-based Approach

- If adopt a conventional pixel based approach use mean signatures for each of the different classes and assign each pixel to one of these classes.
- Rules applied for allocating a class to parcels based on the proportions of differently classified pixels within the parcel. e.g. technical specifications state a threshold set at 70% of pixels being in the same class.
- Classification accuracy assessment based on the use of a separate independent data sample.
- Difficult to include SAR data because of image speckle problem (even if data are heavily filtered).

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

RSAC

The CROPINS Parcel-based Approach

- Extraction of parcel statistics for all fields (i.e. mean reflectance/backscatter from all available images/bands).
- Involves testing similarity between individual fields rather than the use of mean signatures for each class.
- Selection of optimum image date/band combination based on classification accuracy assessment results achieved by taking each field in turn from the training set and testing against the rest of the training set (i.e. independent sample).
- Each individual field taken in turn and similarity measured against those in the training set.
- Automatic classification result only accepted when there is a high level of similarity (e.g. 4 out of the best 5 matches are the same crop type) and this is the same as the declared crop type.

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

Classification Training Set

- Need to have training set which include typical crops but does not include all unusual crop conditions.
- Preferred approach to use 'CAPI by crop' to produce classification training set with approximately 10 fields per crop class (i.e. based on our understanding of crop signatures and the knowledge that the majority of declared crop types are correct).
- Classification training set for 1999 based primarily on ground data collection fields.
- Main role for ground data collection is to examine range of crop conditions helpful for CAPI .

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

Assessment of Classification Results

- 'CAPI by crop' used to check automatic classification results and examine all fields which have remained unclassified.
- Reason why fields are not classified normally obvious: unusual crop conditions or inclusion of small parts of other crops (i.e. field boundary problems)
- Crop type classification errors are rare because the declared crop has to be wrong and yet there is a high spectral similarity with the declared crop type
- Good sensitivity to field boundary discrepancies, but CROPINS operations include overall visual checking of all field boundaries during 'CAPI by farm'.

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

Assessment of the Technique

- A very conservative approach designed to automatically verify the declared crop type of large number of the commonly occurring crops (e.g. cereals, oilseed, grass, natural regeneration).
- Classification results for fields not classified automatically is also available to the interpreter when using CAPI to assign crop types.
- Advantages seen in a method which avoids generating mean signature for crop types.
- Some practical limitations related to the need for a multi-stage operation unless all fields are digitised prior to generating parcel statistics.

5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

Issues related to the EC Technical Recommendations

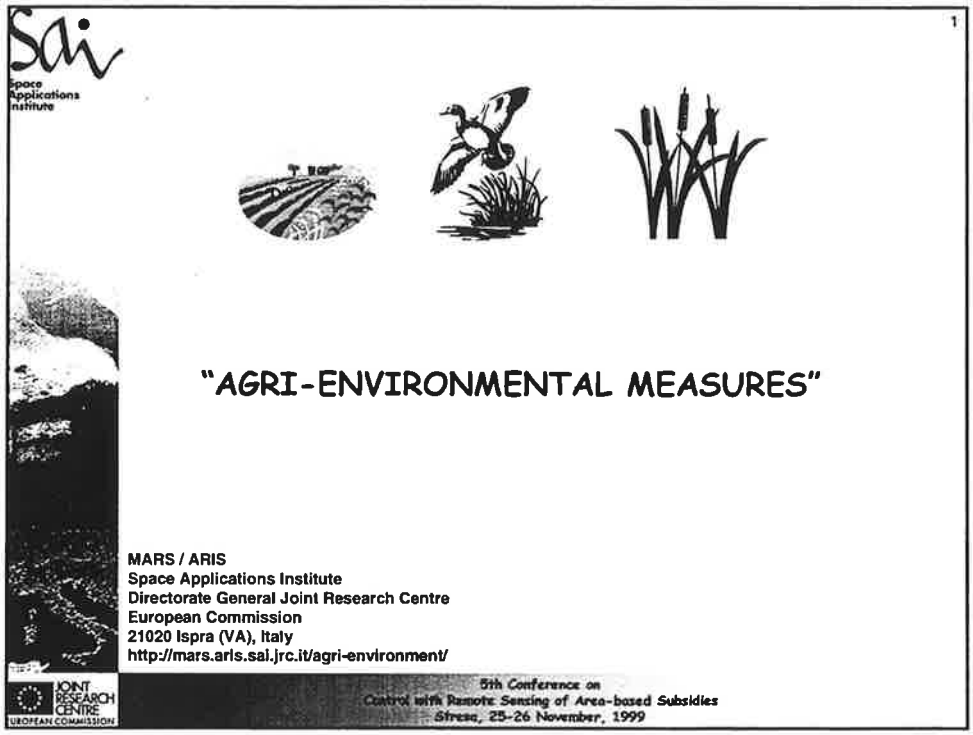
- The EC Technical Specifications (and associated recommendations) provide little information on automatic classification techniques, but seem to imply use of a pixel based approach.
- No distinction made between 'ground data fields' and 'classification training set', and it seems to be assumed that they are synonymous (this could introduce serious bias, especially when used to produce mean signatures).
- Any precise statements concerning acceptable classification accuracy are meaningless without more detail concerning classes and the fields included in a classification training set.
- While no reason why a pixel based approach cannot be used to produce results comparable to those presented....still waiting to see a convincing presentation on how many of the issues raised in this presentation are handled.

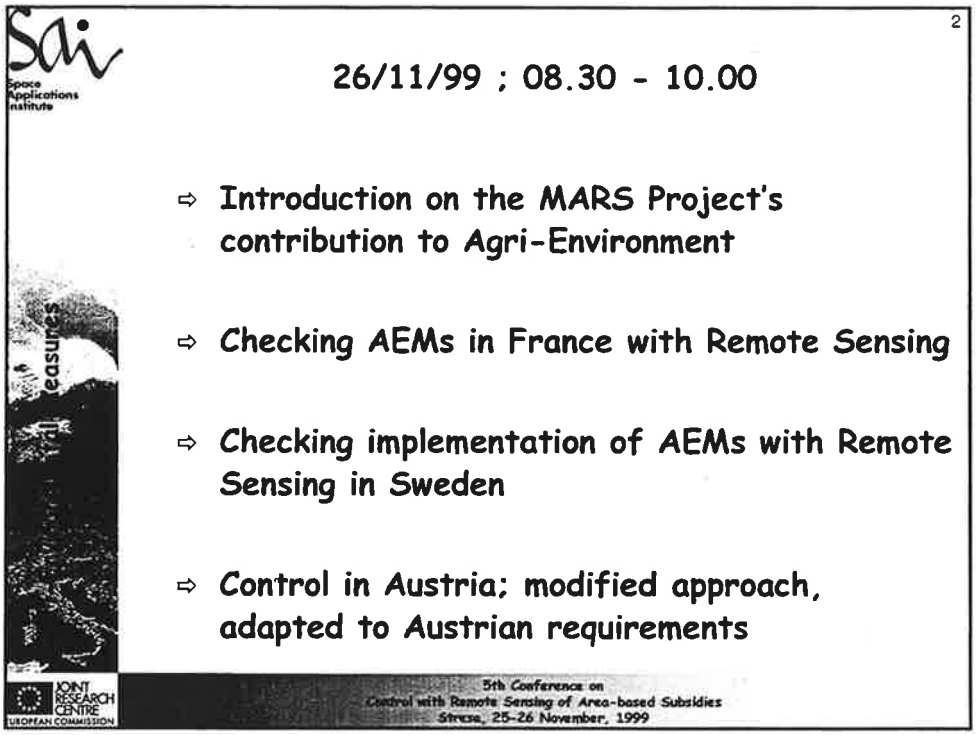
5th Conference on Control with Remote Sensing of Area-based Subsidies, 25-26 Nov 1999

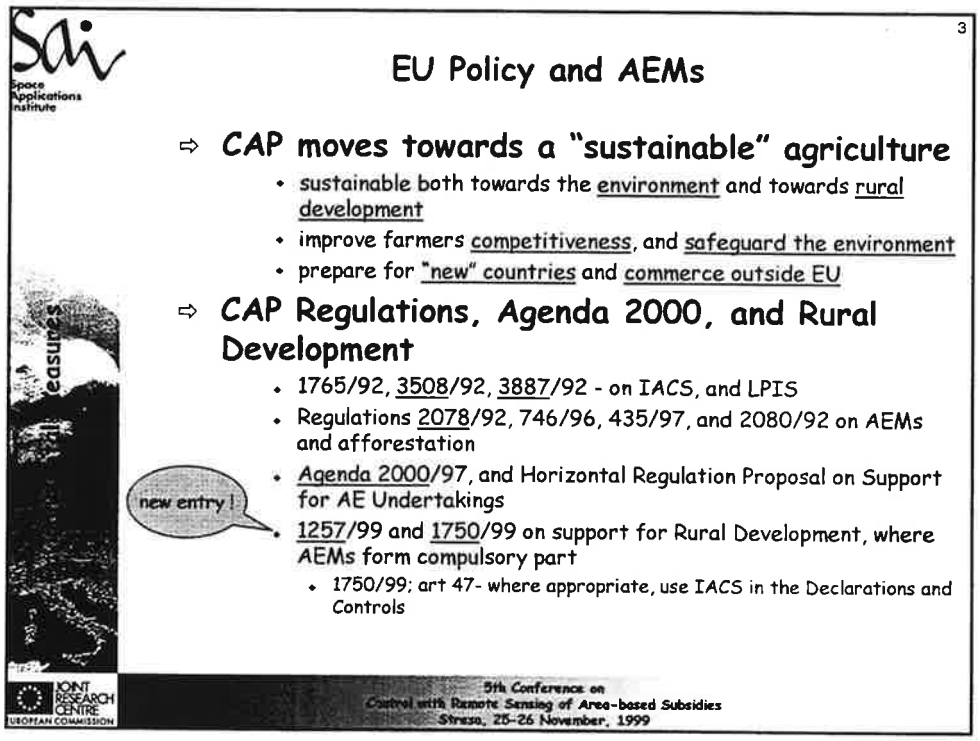
Session 4:

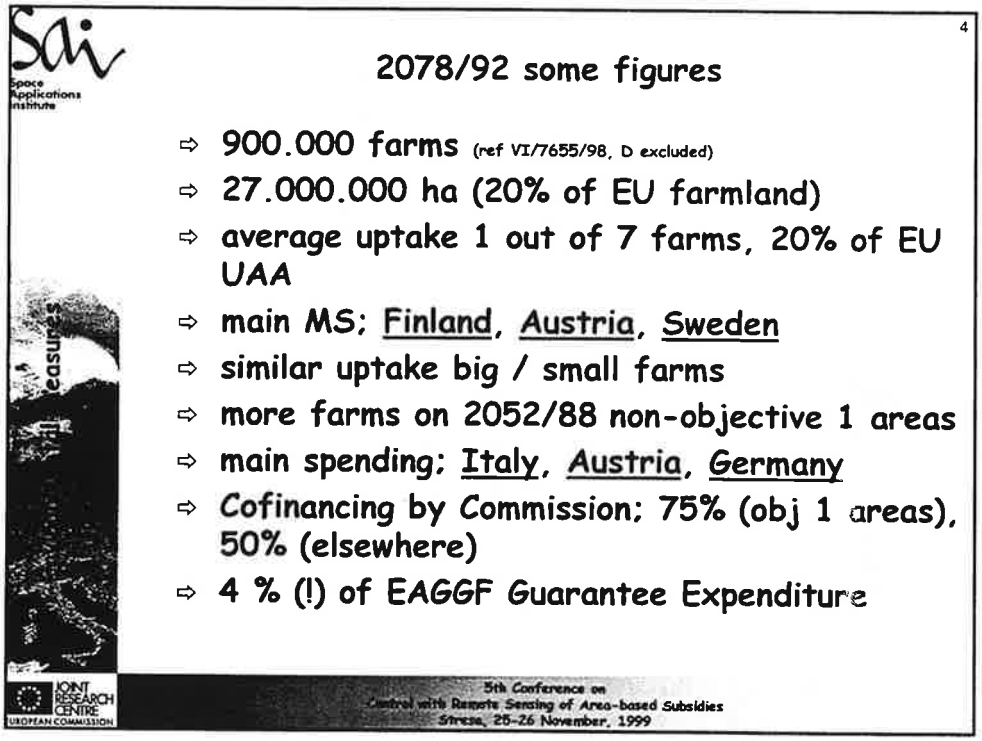
Agro- Environmental Measures

Introduction	P. Åstrand, JRC
Checking AEMs in France with remote sensing	E. De Laroche, CNASEA (FR)
Checking implementation of AEMs with remote sensing in Sweden	Å. Svensson, SJV (SE)
Control in Austria: modified approach, adapted to Austrian requirements	G. Mansberger, Geospace (AT)


1
Space Applications Institute
"AGRI-ENVIRONMENTAL MEASURES"
MARS / ARIS
Space Applications Institute
Directorate General Joint Research Centre
European Commission
21020 Ispra (VA), Italy
http://mars.aris.sai.jrc.it/agri-environment/
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


2
Space Applications Institute
26/11/99 ; 08.30 - 10.00
⇨ Introduction on the MARS Project's contribution to Agri-Environment
⇨ Checking AEMs in France with Remote Sensing
⇨ Checking implementation of AEMs with Remote Sensing in Sweden
⇨ Control in Austria; modified approach, adapted to Austrian requirements
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


3
EU Policy and AEMs
⇨ CAP moves towards a "sustainable" agriculture
• sustainable both towards the environment and towards rural development
• improve farmers competitiveness, and safeguard the environment
• prepare for "new" countries and commerce outside EU
⇨ CAP Regulations, Agenda 2000, and Rural Development
• 1765/92, 3508/92, 3887/92 - on IACS, and LPIS
• Regulations 2078/92, 746/96, 435/97, and 2080/92 on AEMs and afforestation
• Agenda 2000/97, and Horizontal Regulation Proposal on Support for AE Undertakings
new entry !
• 1257/99 and 1750/99 on support for Rural Development, where AEMs form compulsory part
• 1750/99; art 47- where appropriate, use IACS in the Declarations and Controls
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


4
2078/92 some figures
⇨ 900.000 farms (ref VI/7655/98, D excluded)
⇨ 27.000.000 ha (20% of EU farmland)
⇨ average uptake 1 out of 7 farms, 20% of EU UAA
⇨ main MS; Finland, Austria, Sweden
⇨ similar uptake big / small farms
⇨ more farms on 2052/88 non-objective 1 areas
⇨ main spending; Italy, Austria, Germany
⇨ Cofinancing by Commission; 75% (obj 1 areas), 50% (elsewhere)
⇨ 4 % (!) of EAGGF Guarantee Expenditure
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999

5

AEMs classification

- ⇨ **environmentally-beneficial productive farming**
  - input reduction
  - organic farming
  - extensification of livestock
  - conversion of arable land to grassland and rotation measures
  - under-sowing, cover crops, field margins, buffer strips, crop edges, beetle banks, strips for erosion and fire prevention etc.
  - areas of special bio-diversity/nature interest
  - maintenance of existing sustainable and extensive systems
  - farmed landscape : farming practice (heather burning, hay cutting dates etc.)
- ⇨ **non-productive land management**
  - set aside
  - upkeep of abandoned land and woodland
  - maintenance of the countryside and landscape features (walls, hedges, ponds, etc.)
  - public access
- ⇨ **socio-economic measures and impacts**
  - training, farm incomes, employment, societal attitudes

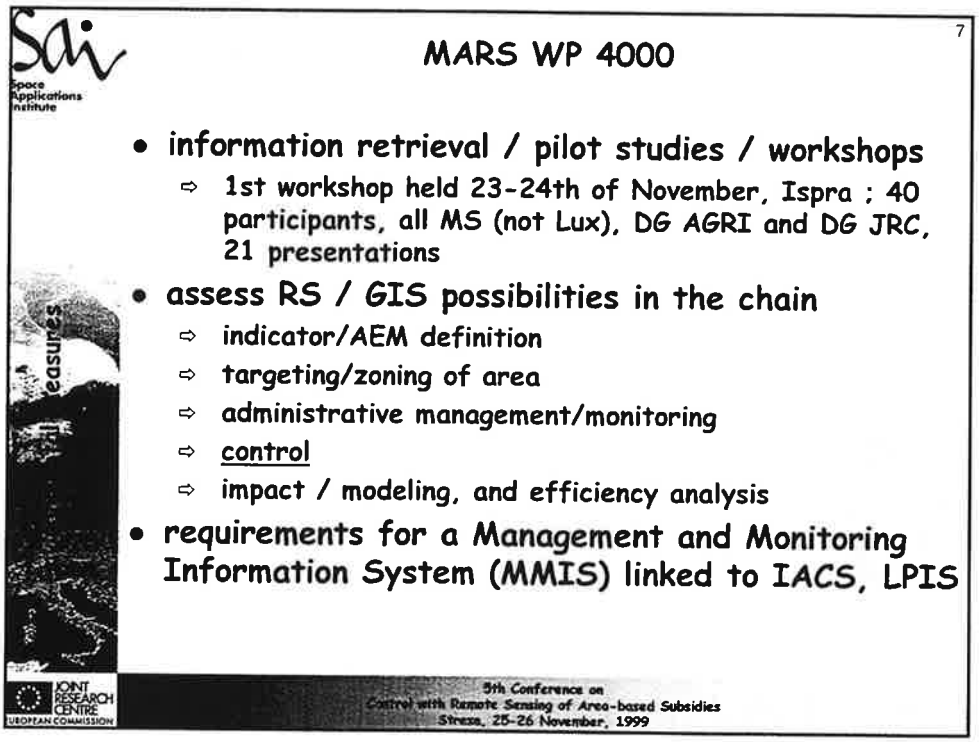
5th Conference on Control with Remote Sensing of Area-based Subsidies Stresa, 25-26 November, 1999

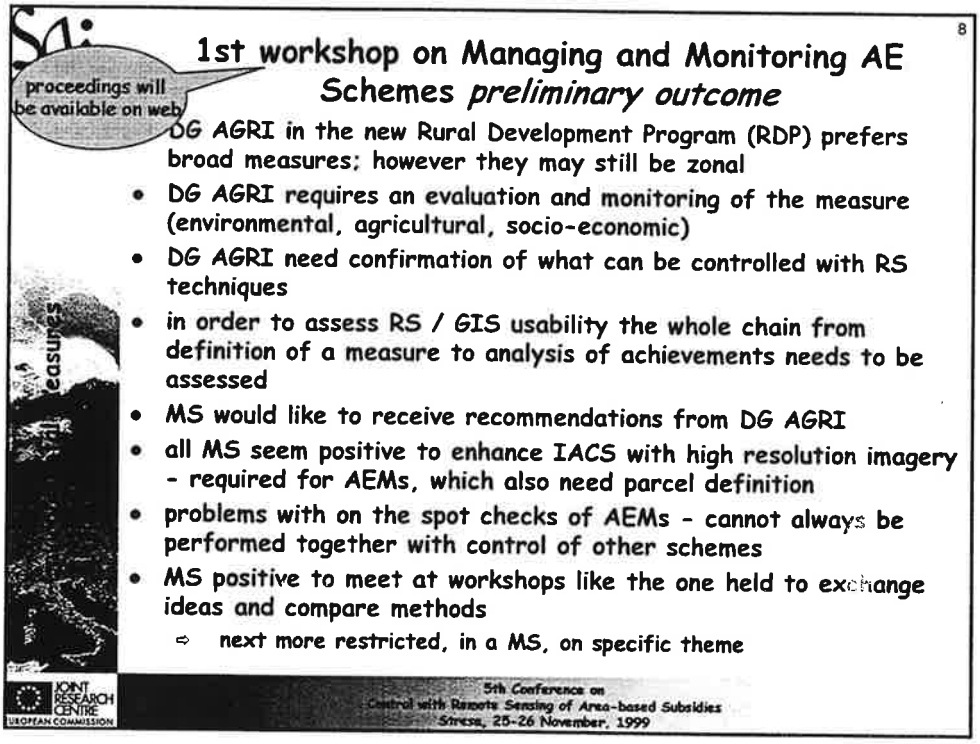
6

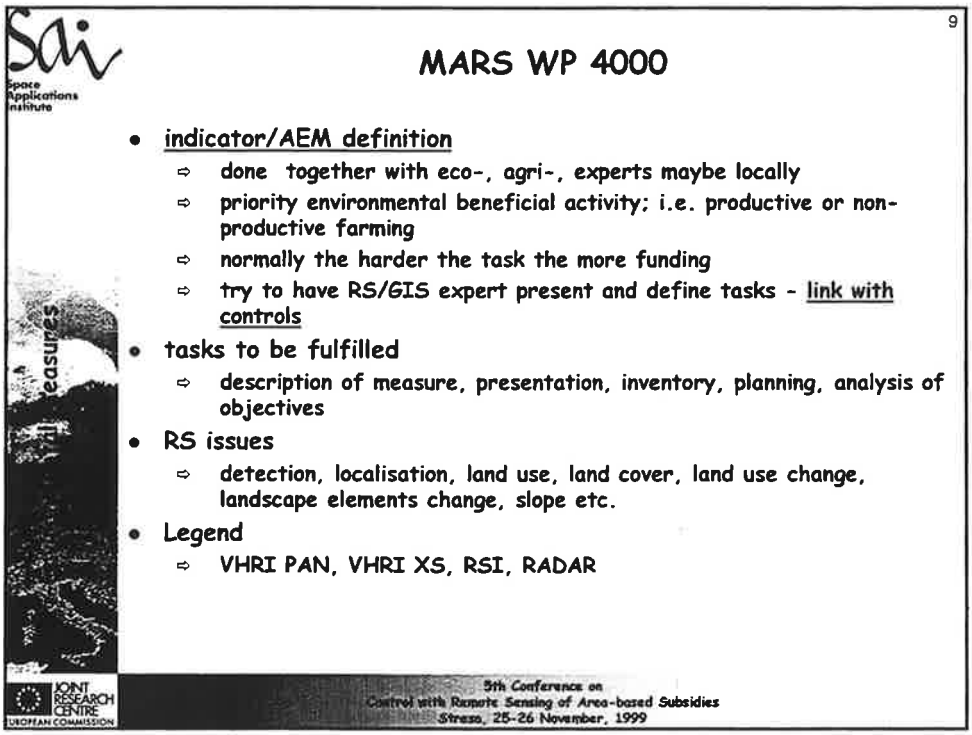
the MARS Project's contribution to Agri-Environment

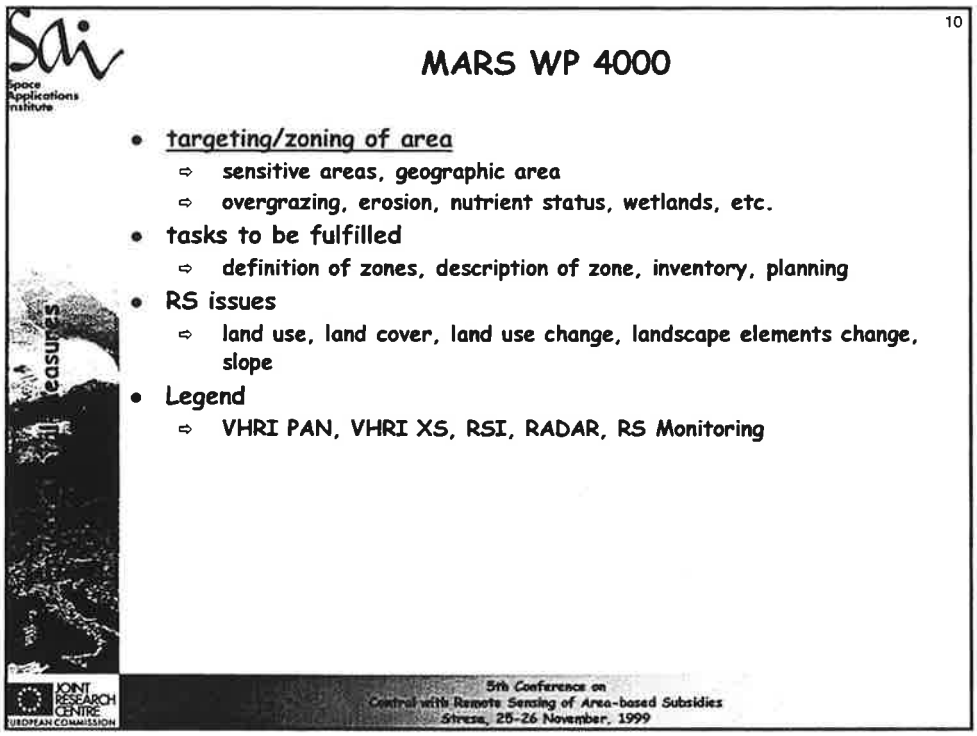
Activity	*Sub activities*
Fight against fraud	1. Control with Remote sensing
	2. IACS & Land Parcel Identification Systems
	3. Olive and Vineyard - Registers
	4. Management of Agri-environmental regulations ; WP 4000
Yield and Crop monitoring	5. Agro-meteorological monitoring (MARS bulletin)
	6. R&D on area / rapid estimate (national, European)
Ad hoc specific surveys	7. OLISTAT, OLIAREA, OLIYIELD and others
New sensors and applications	8. Support to EU space activities
	9. Tech. watch / *precision farming*

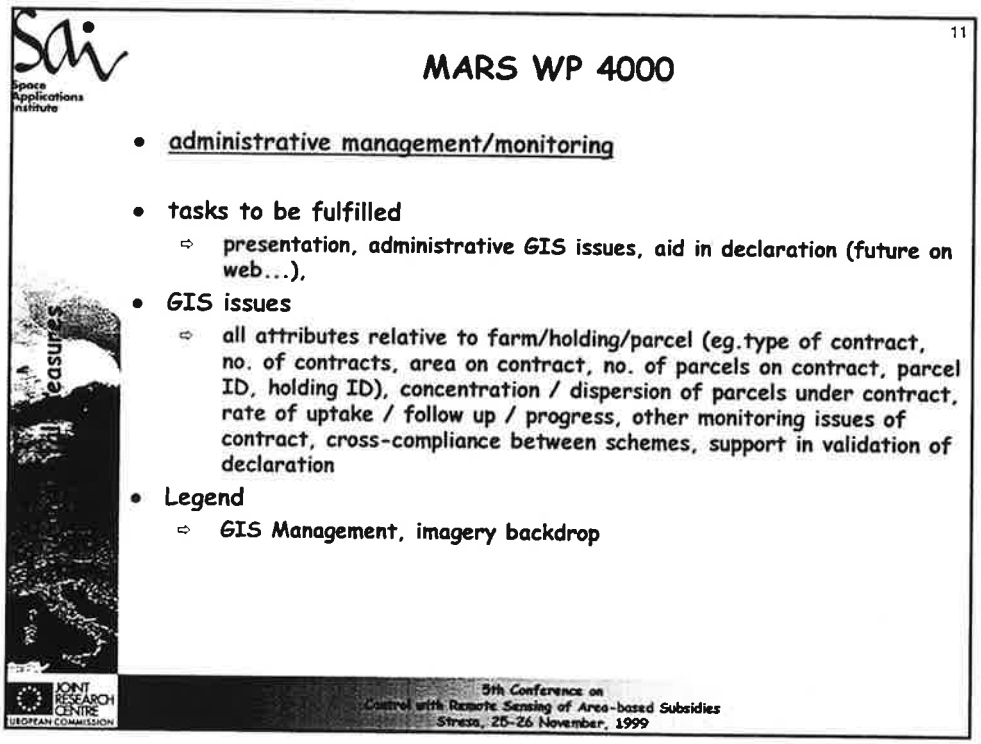
5th Conference on Control with Remote Sensing of Area-based Subsidies Stresa, 25-26 November, 1999

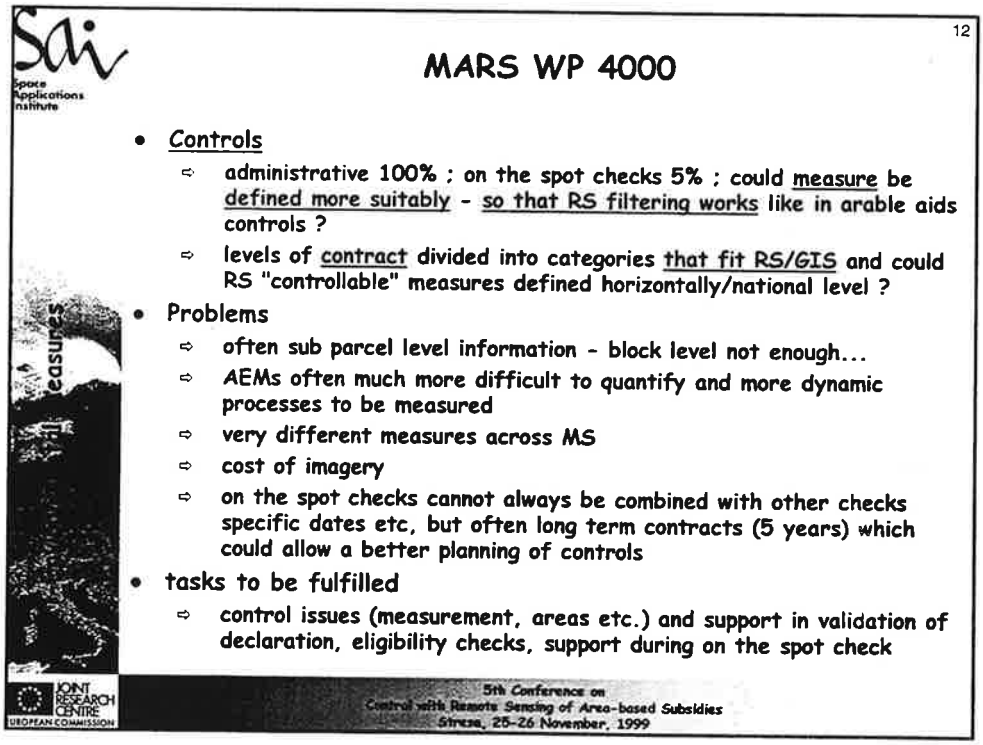

Space Applications Institute
7
MARS WP 4000
• information retrieval / pilot studies / workshops
⇨ 1st workshop held 23-24th of November, Ispra ; 40 participants, all MS (not Lux), DG AGRI and DG JRC, 21 presentations
• assess RS / GIS possibilities in the chain
⇨ indicator/AEM definition
⇨ targeting/zoning of area
⇨ administrative management/monitoring
⇨ control
⇨ impact / modeling, and efficiency analysis
• requirements for a Management and Monitoring Information System (MMIS) linked to IACS, LPIS
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999

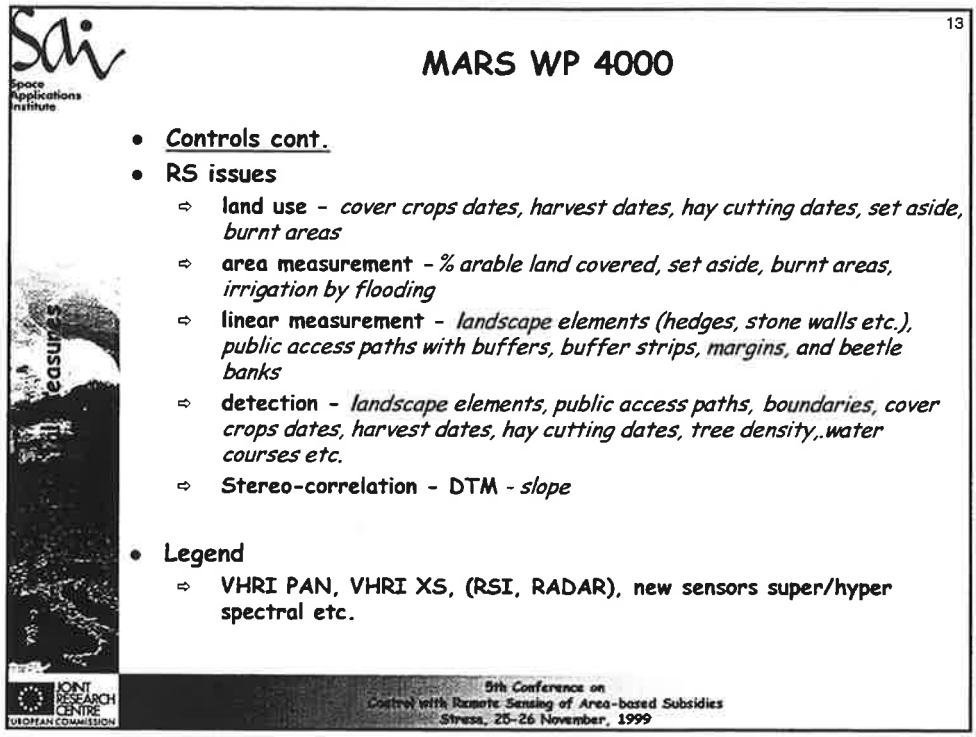

8
1st workshop on Managing and Monitoring AE Schemes *preliminary outcome*
proceedings will be available on web
DG AGRI in the new Rural Development Program (RDP) prefers broad measures; however they may still be zonal
• DG AGRI requires an evaluation and monitoring of the measure (environmental, agricultural, socio-economic)
• DG AGRI need confirmation of what can be controlled with RS techniques
• in order to assess RS / GIS usability the whole chain from definition of a measure to analysis of achievements needs to be assessed
• MS would like to receive recommendations from DG AGRI
• all MS seem positive to enhance IACS with high resolution imagery - required for AEMs, which also need parcel definition
• problems with on the spot checks of AEMs - cannot always be performed together with control of other schemes
• MS positive to meet at workshops like the one held to exchange ideas and compare methods
⇨ next more restricted, in a MS, on specific theme
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999

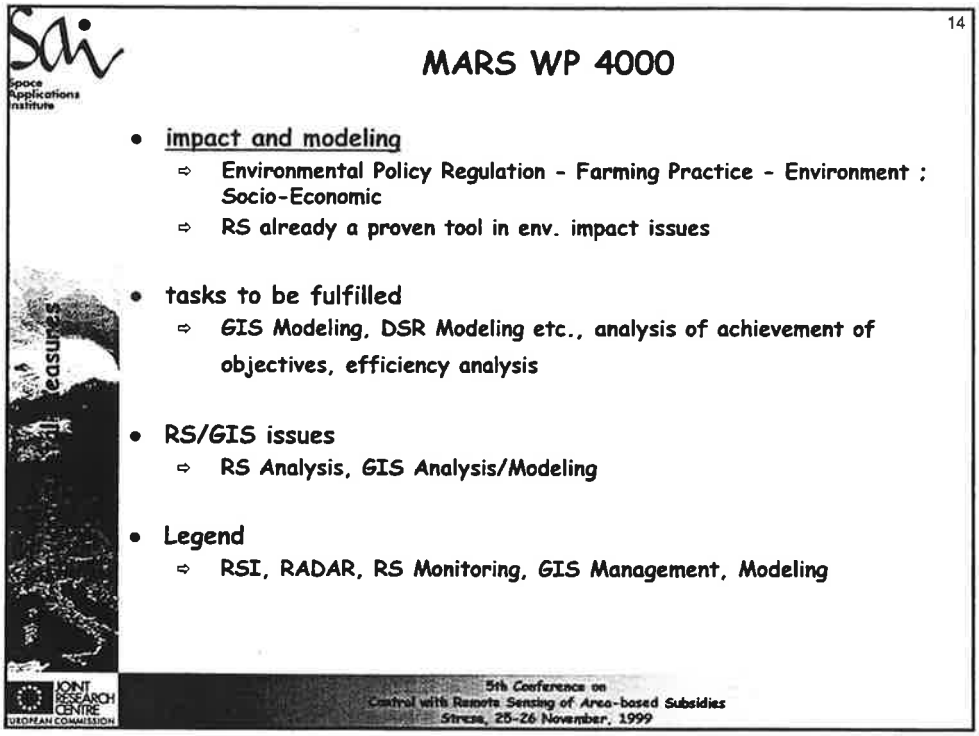

9
MARS WP 4000
Space Applications Institute
indicator/AEM definition
⇨ done together with eco-, agri-, experts maybe locally
⇨ priority environmental beneficial activity; i.e. productive or non-productive farming
⇨ normally the harder the task the more funding
⇨ try to have RS/GIS expert present and define tasks - link with controls
tasks to be fulfilled
⇨ description of measure, presentation, inventory, planning, analysis of objectives
RS issues
⇨ detection, localisation, land use, land cover, land use change, landscape elements change, slope etc.
Legend
⇨ VHRI PAN, VHRI XS, RSI, RADAR
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999

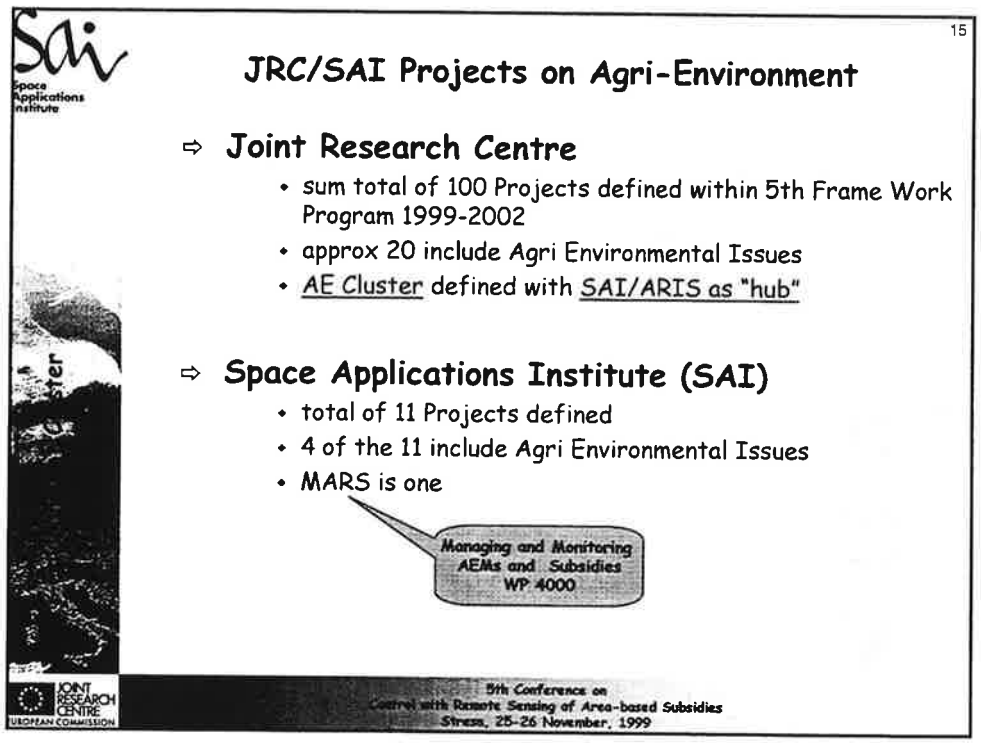

10
MARS WP 4000
Space Applications Institute
targeting/zoning of area
⇨ sensitive areas, geographic area
⇨ overgrazing, erosion, nutrient status, wetlands, etc.
tasks to be fulfilled
⇨ definition of zones, description of zone, inventory, planning
RS issues
⇨ land use, land cover, land use change, landscape elements change, slope
Legend
⇨ VHRI PAN, VHRI XS, RSI, RADAR, RS Monitoring
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999

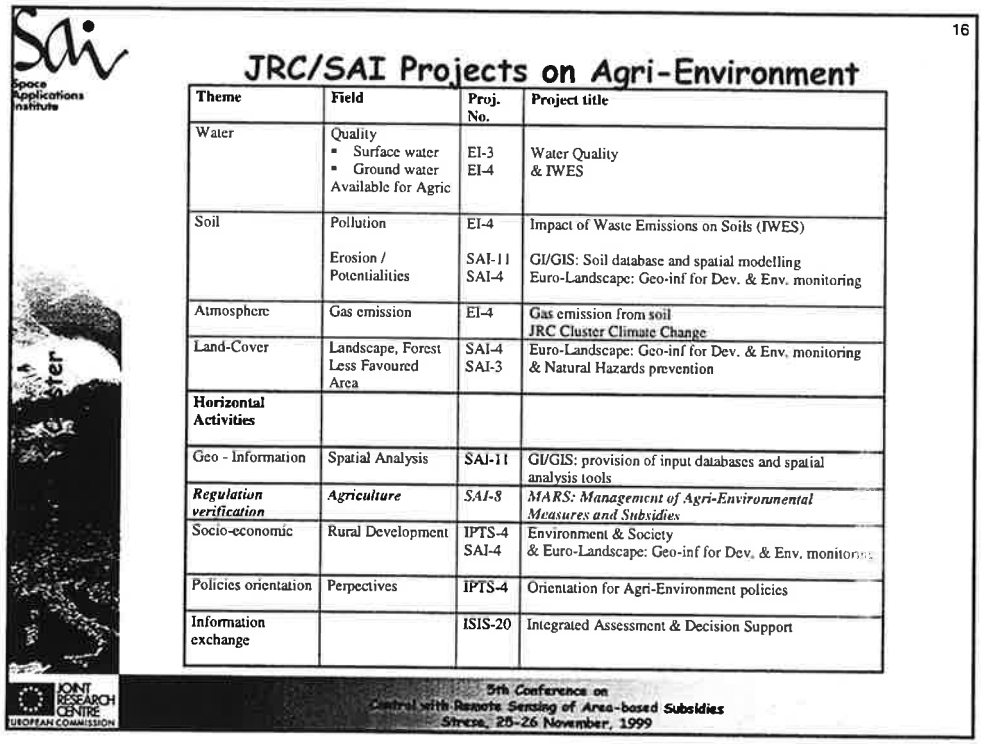

11
MARS WP 4000
Space Applications Institute
administrative management/monitoring
tasks to be fulfilled
presentation, administrative GIS issues, aid in declaration (future on web...),
GIS issues
all attributes relative to farm/holding/parcel (eg.type of contract, no. of contracts, area on contract, no. of parcels on contract, parcel ID, holding ID), concentration / dispersion of parcels under contract, rate of uptake / follow up / progress, other monitoring issues of contract, cross-compliance between schemes, support in validation of declaration
Legend
GIS Management, imagery backdrop
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


12
MARS WP 4000
Space Applications Institute
Controls
administrative 100% ; on the spot checks 5% ; could measure be defined more suitably - so that RS filtering works like in arable aids controls ?
levels of contract divided into categories that fit RS/GIS and could RS "controllable" measures defined horizontally/national level ?
Problems
often sub parcel level information - block level not enough...
AEMs often much more difficult to quantify and more dynamic processes to be measured
very different measures across MS
cost of imagery
on the spot checks cannot always be combined with other checks specific dates etc, but often long term contracts (5 years) which could allow a better planning of controls
tasks to be fulfilled
control issues (measurement, areas etc.) and support in validation of declaration, eligibility checks, support during on the spot check
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


13
MARS WP 4000
Space Applications Institute
Controls cont.
RS issues
land use - cover crops dates, harvest dates, hay cutting dates, set aside, burnt areas
area measurement - % arable land covered, set aside, burnt areas, irrigation by flooding
linear measurement - landscape elements (hedges, stone walls etc.), public access paths with buffers, buffer strips, margins, and beetle banks
detection - landscape elements, public access paths, boundaries, cover crops dates, harvest dates, hay cutting dates, tree density,.water courses etc.
Stereo-correlation - DTM - slope
Legend
VHRI PAN, VHRI XS, (RSI, RADAR), new sensors super/hyper spectral etc.
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


14
MARS WP 4000
Space Applications Institute
impact and modeling
Environmental Policy Regulation - Farming Practice - Environment : Socio-Economic
RS already a proven tool in env. impact issues
tasks to be fulfilled
GIS Modeling, DSR Modeling etc., analysis of achievement of objectives, efficiency analysis
RS/GIS issues
RS Analysis, GIS Analysis/Modeling
Legend
RSI, RADAR, RS Monitoring, GIS Management, Modeling
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
5th Conference on
Control with Remote Sensing of Area-based Subsidies
Stresa, 25-26 November, 1999


15
JRC/SAI Projects on Agri-Environment
Joint Research Centre
sum total of 100 Projects defined within 5th Frame Work Program 1999-2002
approx 20 include Agri Environmental Issues
AE Cluster defined with SAI/ARIS as "hub"
Space Applications Institute (SAI)
total of 11 Projects defined
4 of the 11 include Agri Environmental Issues
MARS is one
Managing and Monitoring AEMs and Subsidies WP 4000
5th Conference on
Stresa, 25-26 November, 1999


16
JRC/SAI Projects on Agri-Environment
Theme | Field | Proj. No. | Project title
Water | Quality ▪ Surface water ▪ Ground water Available for Agric | EI-3 EI-4 | Water Quality & IWES
Soil | Pollution | EI-4 | Impact of Waste Emissions on Soils (IWES)
Erosion / Potentialities | SAI-11 SAI-4 | GI/GIS: Soil database and spatial modelling Euro-Landscape: Geo-inf for Dev. & Env. monitoring
Atmosphere | Gas emission | EI-4 | Gas emission from soil JRC Cluster Climate Change
Land-Cover | Landscape, Forest Less Favoured Area | SAI-4 SAI-3 | Euro-Landscape: Geo-inf for Dev. & Env. monitoring & Natural Hazards prevention
Horizontal Activities
Geo - Information | Spatial Analysis | SAI-11 | GI/GIS: provision of input databases and spatial analysis tools
Regulation verification | Agriculture | SAI-8 | MARS: Management of Agri-Environmental Measures and Subsidies
Socio-economic | Rural Development | IPTS-4 SAI-4 | Environment & Society & Euro-Landscape: Geo-inf for Dev. & Env. monitoring
Policies orientation | Perpectives | IPTS-4 | Orientation for Agri-Environment policies
Information exchange | ISIS-20 | Integrated Assessment & Decision Support
5th Conference on
Stresa, 25-26 November, 1999

CONTRÔLE DES MAE PAR TÉLÉDÉTECTION

Une méthode de contrôle complémentaire du contrôle classique

16/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 1

PLAN DE LA PRÉSENTATION

- 1 - Le dispositif des mesures agri-environnementales (MAE) en France (règlement 2078/92)
- 2 - Le contrôle par télédétection des MAE :
  - objectif et contexte
  - méthodologie et organisation du projet
- 3 - Résultats et Perspectives : l 'utilisation de la télédétection pour le suivi et l 'évaluation des MAE

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 2

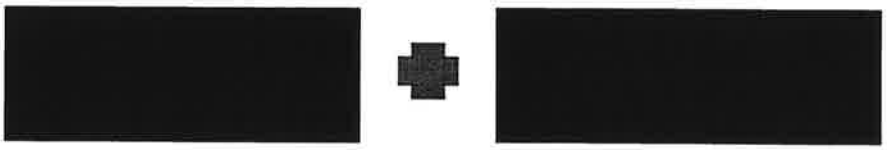
Les MAE en France : Objectifs environnementaux du 2078/92

- Protection des eaux
- Extensification
- Conversion à l'agriculture biologique

- Protection des biotopes
- Lutte contre les incendies de forêt
- lutte contre la déprise
- Protection des races menacées

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 3

Les MAE en France : le Dispositif National



- 73 000 contractants
- 4,2 millions d'ha primés
- 1,07 milliard de F. payés (1998)

- 52 000 contrats (1998)
- 670 000 ha contractualisés
- 557 millions de F. payés (1998)

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 4

Les MAE en France : les Programmes Régionaux

- Opérations zonales → 7 cahiers des charges "type"
- Opérations locales → Chaque cahier des charges est élaboré au cas par cas
- Dispositif de formation

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 5

Les MAE en France : un exemple

- L 'opération locale « Foin de Crau » (13)

	Contraintes directement contrôlables	Contrat 1
A	Procéder à l'irrigation au calan par submersion des parcelles tous les 10 jours de mars à octobre	X
B	Entretien du réseau d'irrigation	X
C	Entretien manuel des haies	X
D	Absence de remise en culture	X
E	Ne pas retourner les prairies	X
F	Maintenir 3 coupes de foin par an (dont une pourra être remplacée par un pâturage en place)	X
G	Pâturage du dernier regain	X
	Contraintes indirectement contrôlables	
	Absence d'engrais azoté	X

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 6

Contrôle par télédétection : Objectif et Contexte

- Augmenter l'efficacité des contrôles en adaptant aux MAE le système de contrôle par télédétection des Aides Compensatoires Surface
  - projet expérimental et opérationnel
- Projet confié au CNASEA par le Ministère de l'Agriculture (1998)

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 7

Contrôle par télédétection : Les acteurs du projet

- Maître d'ouvrage : Ministère français de l'Agriculture et de la Pêche
- Maître d'œuvre : CNASEA
  - Siège :
    - Chef de projet (BOP)
    - Gestionnaire MAE (SARDE)
  - Délégations régionales :
    - Contrôleurs de terrain
- Partenaires extérieurs :
  - Organismes publics (ONIC, DDAF, ...)
  - Sociétés de services

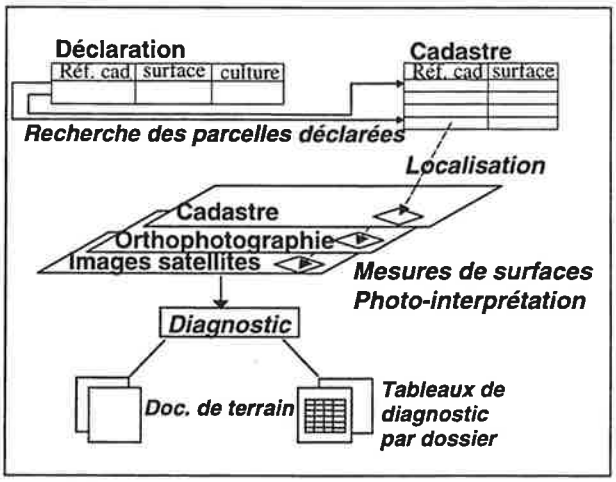
24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 8

Contrôle par télédétection : Les contraintes du projet

- Réglementaires
  - MAE :
    - Protéger et entretenir l 'espace rural : des engagements spécifiques à chaque opération
    - Contrôle en délégation régionale (DR)
  - Contrôle par télédétection :
    - cahier des charges de la Commission Européenne
- Techniques :
  - Limites de la télédétection (mesures de surfaces, contrôle de l 'entretien, etc.)
- Budget et délais

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 9

Contrôle par télédétection : Principes



DIAGNOSTIC :

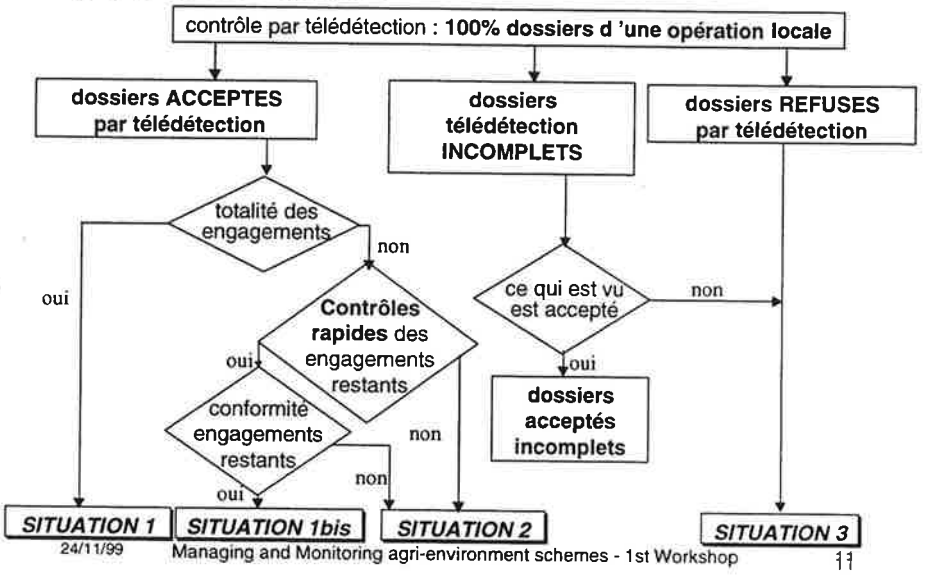
à la parcelle :
- surface (tolérance)
- niveau d 'engagement

au niveau d 'engagement

au dossier
- accepté
- refusé
- incomplet

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 10

Contrôle par télédétection : la Procédure



24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 11

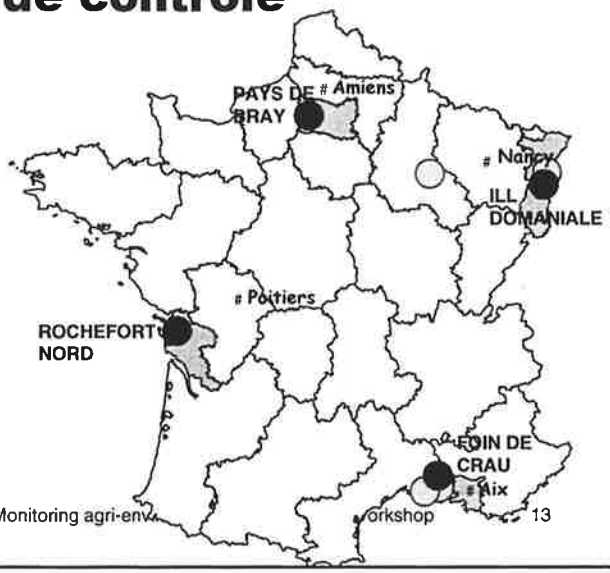
Contrôle par télédétection : Les données et l 'outil

- Les données
  - dossiers de déclaration informatisés
  - cadastre numérique
  - orthophotographies / images satellitales
- Le logiciel de contrôle par télédétection VIGIE

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 12

Contrôle par télédétection : Les sites de contrôle

- 1998
- 1999



24/11/99 Managing and Monitoring agri-env... orkshop 13

Contrôle par télédétection : Organisation en DR

SIRS-Eurosense

Siège du CNASEA
Assistance méthodologique et technique

1 poste de travail par DR

- cohérence cadastre + PIAO
- diagnostic

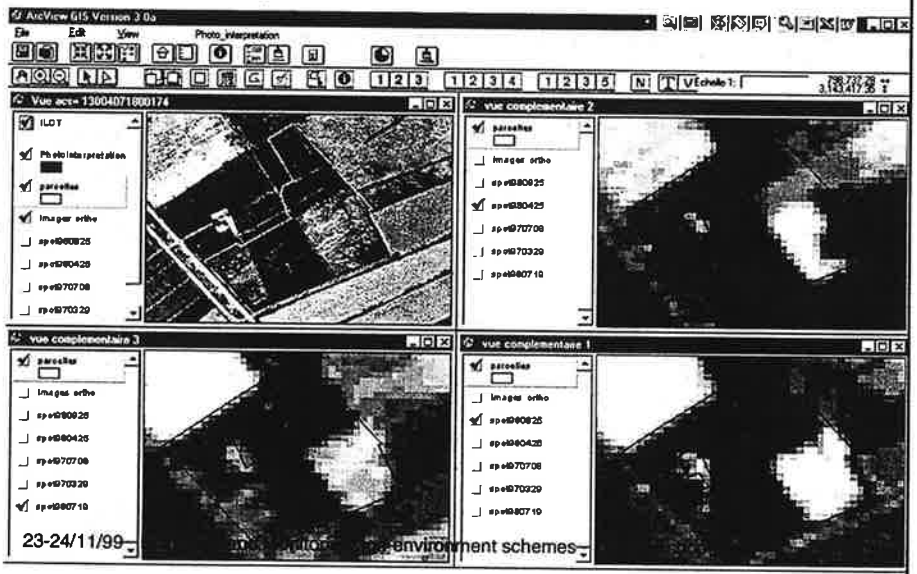
REFUSE — ACCEPTE

CONTROLE DE TERRAIN

- Poste de travail :
- PC :
  - 64Mo RAM
  - 4Go disque
  - écran 17 ''
- Logiciels :
  - licence ArcView 3.1
  - licence Vigie
- Imprimante A4 couleur

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 14

Contrôle par télédétection : L 'exemple de « Foin de Crau »



Résultats et perspectives : Résultats de l 'opération 1998

- Chiffres :

	ACCEPTE	REFUSE	TOTAL
CONTROLE PAR TELEDETECTION	426 (91%)	42 (9%)	**468**
CONTROLES DE TERRAIN	12	42	54
CONFORME	12	6	18
NON CONFORME		**36**	36

- Peu de fraudes volontaires
- Mise en évidence des limites de certains cahiers des charges et du montage de certains dossiers ⇒ effet correctif

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 16

Résultats et perspectives : Conclusions générales

- Vérification de la conformité des surfaces et de l 'occupation du sol
- Contrôle des engagements qualitatifs dépendant en partie des dates d 'images
- Recours aux contrôleurs de terrain indispensable pour la photo-interprétation
- Contrôles rapides : une méthode peu réaliste

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 17

Résultats et perspectives : Propositions pour la campagne 2000

- Objectifs identiques
- Méthodologie / Procédure :
  - mise en place de guides de photo-interprétation par site
  - procédure de contrôles rapides à revoir
- Organisation :
  - Données : données existantes ou produites spécifiquement pour le contrôle par télédétection
  - Calendrier spécifique :
    - contrôle par télédétection : année N
    - contrôles de terrain : année N + 1

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 18

Résultats et perspectives : Quelle utilisation de la télédétection ?

- Le diagnostic de territoire
- L 'instruction et le suivi des dossiers sur base graphique
  - le logiciel ADAGEO
- L 'évaluation des mesures

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 19

fin

24/11/99 Managing and Monitoring agri-environment schemes - 1st Workshop 20

JORDBRUKS VERKET

Is it possible to control Agri-environmental schemes with Remote sensing?

Yes and No

JORDBRUKS VERKET

- Requirements of the scheme
- Commissions point of view
- Statistics
- On-the-spot control

JORDBRUKS VERKET

Organic farming

Controlled* **11 403 ha**

Specification of Errors

• Size of the parcel	154 ha
• Crop	38 ha
• Double declaration	16 ha
• Not clearly distinguised	16 ha
• Fertilisers	5 ha
• Seed for planting not Ok	6 ha
• Pesticides	3 ha
• Others	7 ha

* Figures for the County Administrative Board of Västra Götaland

JORDBRUKS VERKET

Control with Remote Sensing '99

GEOSPACE
EFTAS

Presentation:

Control of Area-based Subsidies with Remote Sensing in Austria:

Modified Approach, adapted to Austrian Requirements

by

Gerald Mansberger
GEOSPACE GmbH, Salzburg

Control with Remote Sensing '99

GEOSPACE
EFTAS

Control with Remote Sensing in Austria

- **1999 Contract by GEOSPACE and Partner EFTAS**
- **Combined use of Aerial Photographs and Satellite Imagery**
- **Tolerances applied on parcel level**
- **Cadastral information for check of field limits**

Control with Remote Sensing '99

GEOSPACE
EFTAS

Used Data Sources

Satellite Data:

Control Site Salzburg			
Acquisition Date	06-Nov-1998	27-May-1999	05-July-1999
Satellite	SPOT 1	SPOT 1	SPOT 4
Sensor	XS	XS	XI

Control Site Vorarlberg			
Acquisition Date	07-Nov-1998	24-May-1999	25-June-1999
Satellite	SPOT 4	SPOT 2	SPOT 4
Sensor	XI	XS	XI

Aerial Photos: Subcontracted by Administration

Cadstral Information: Supplied by Administration in digital form

Applications: Supplied by Administration in digital form

Control with Remote Sensing '99

GEOSPACE
EFTAS

General Statistics:

Number of sites:	**2**
Number of application:	**1.539**
Simplified Scheme:	365
General Scheme:	4
Forage only	1170
Number of agricultural fields:	**18.022**
Declared Area (ha):	**20.998**

Control with Remote Sensing '99

GEOSPACE
EFTAS

Modified Approach necessary due to:

- **ÖPUL:** Analysis of specific crop required
- **Topography:** Definition of agricultural unit (parcel) influenced by topography
- **Agricultural Land Use:** Control Sites are mainly cultivated with grassland
- **Cadastral Information:** Agricultural management has changed Cadastral information has remained unchanged

Control with Remote Sensing '99

GEOSPACE
EFTAS

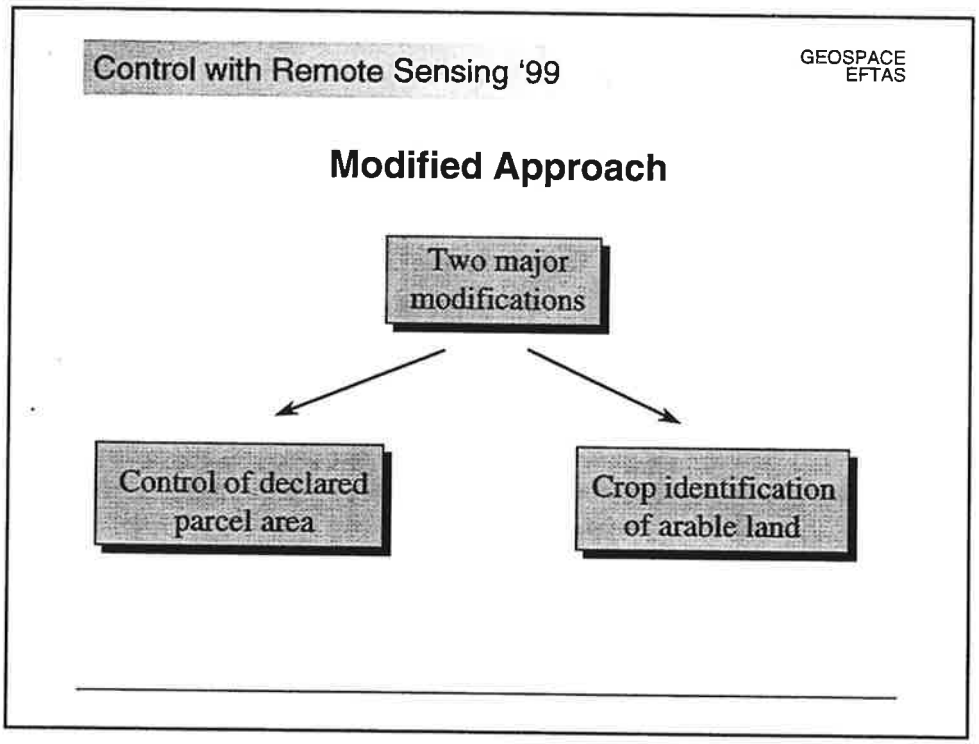
Schemes, controlled with Remote Sensing

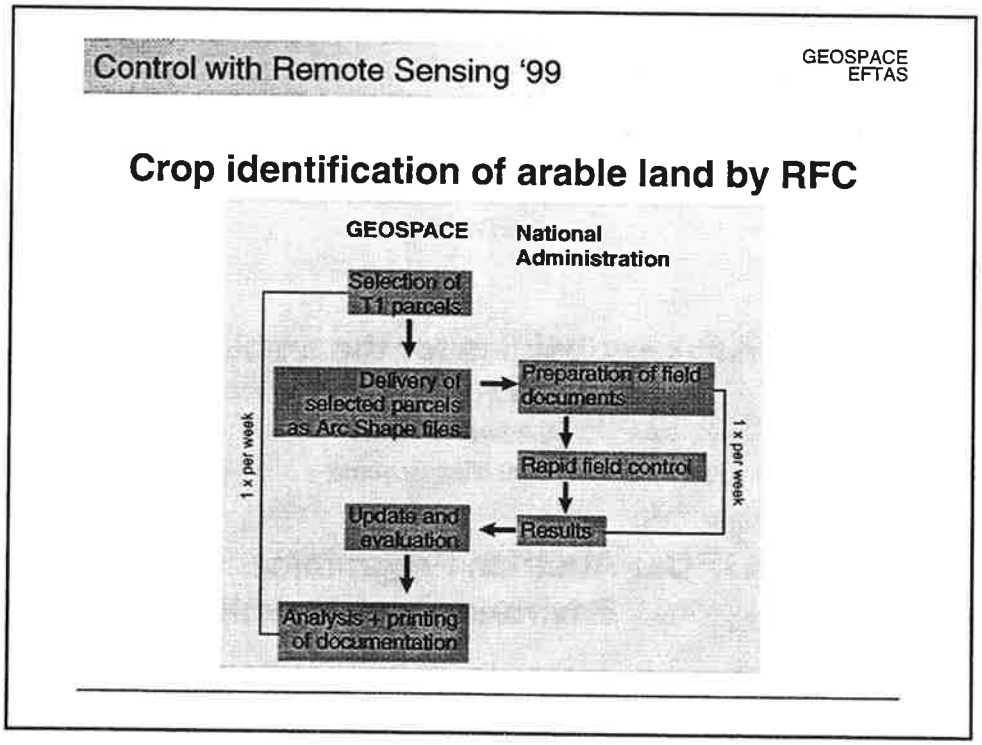
KPA - subsidies for the arable and forage areas

General Scheme

Simplified Scheme

ÖPUL- Austrian Programme for Environmental Agriculture

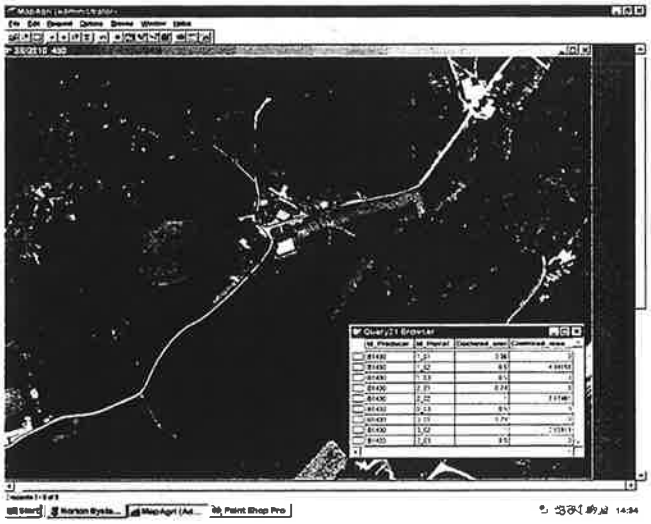

Control with Remote Sensing '99
GEOSPACE
EFTAS
Modified Approach
Two major modifications
Control of declared parcel area
Crop identification of arable land


Control with Remote Sensing '99
GEOSPACE
EFTAS
Crop identification of arable land by RFC
GEOSPACE
National Administration
Selection of 11 parcels
Delivery of selected parcels as Arc Shape files
Preparation of field documents
Rapid field control
Results
Update and evaluation
Analysis + printing of documentation
1 x per week
1 x per week

Control with Remote Sensing '99

GEOSPACE
EFTAS

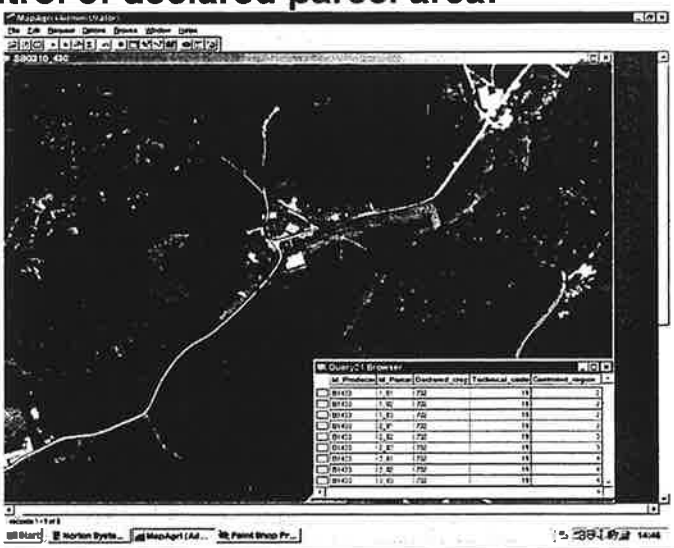
Control of declared parcel area:



Control with Remote Sensing '99

GEOSPACE
EFTAS

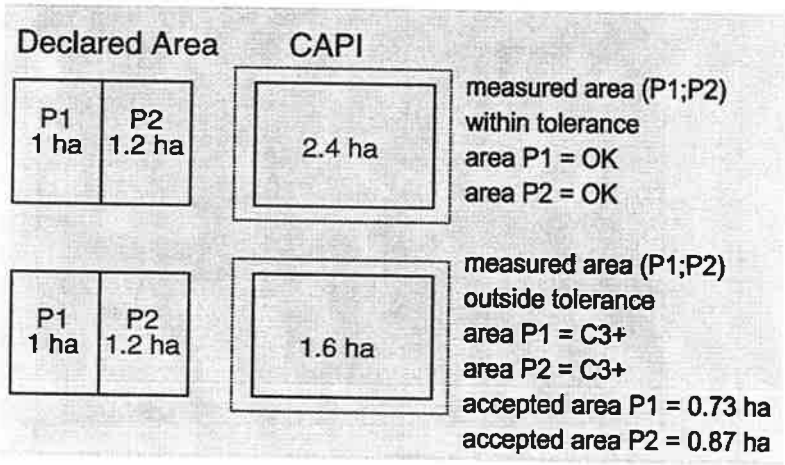
Control of declared parcel area:



Control with Remote Sensing '99

GEOSPACE
EFTAS

Control of Field Limits - Decision Rules



Control with Remote Sensing '99

GEOSPACE
EFTAS

Problems:

- Delayed start of CAPI due to development of new approach and decision rules for joined parcels
- Prolonged evaluation of crop due to RFC
- Extended set of technical codes
- Additional variable to indicate joined parcels

Control with Remote Sensing '99

GEOSPACE
EFTAS

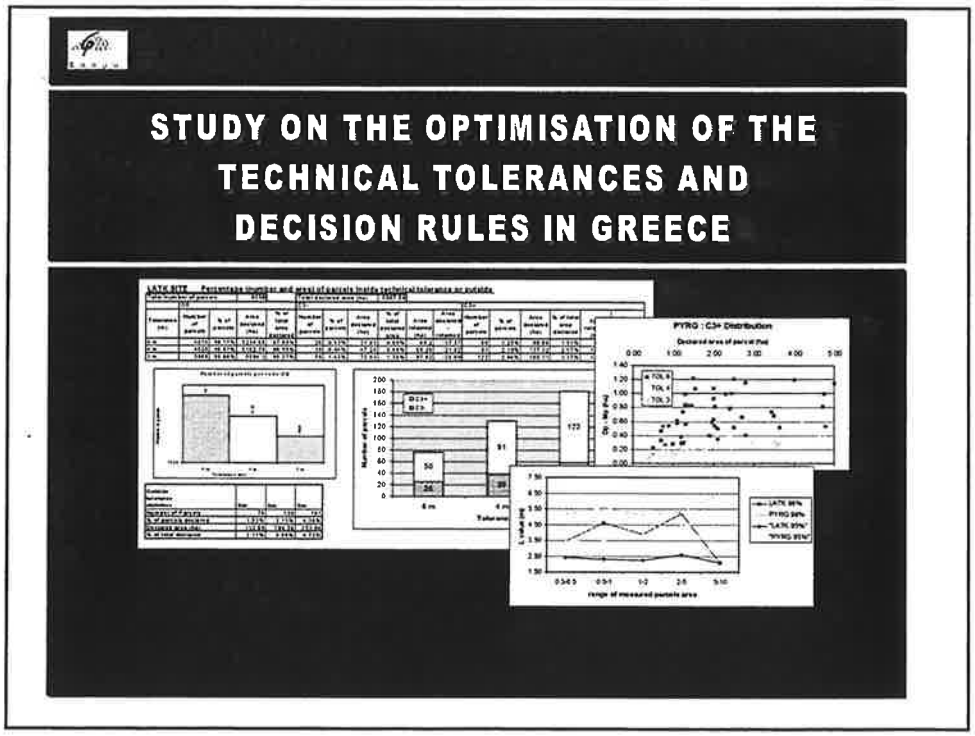
Improved Results

- **Crop type of all arable parcels evaluated**
- **No arable parcels with technical code T1**
- **Area of additional 3041 parcels (in total 18022) controlled**
- **3041 parcels less with technical code T5**

Session 5:

Special topics

Introduction	T. Tollefsen, JRC
Pilot study of technical tolerances in Greece	M. Matsouki, Fasma (GR)
Quality control of field visits using CASI scanner	U. Minelli, P. Ragni, Aquater (IT)
Technical aspects of Landsat 7 and Direct Video Broadcasting	R. Biasutti, L. Rossi, Eurimage (IT)



Objective & Context of the Study

The aim of the study is to aid the Greek Administration (MoA) :

- to optimise the technical tolerances & decision rules
- to take into consideration the implementation of a new Parcel Identification System based on Orthophotos

The context of the study is to simulate, from the archive databases of two control sites, the results generated by the modification of different parameters used in the decision rules.

Application of Technical Tolerances at the Parcel Level

⇨**1st Stage : Identifying parcel area discrepancies outside technical tolerances**

The tolerance is calculated using a width (L) applied to the perimeter of the parcel. ("buffer area" = L * perimeter)

The Selection of the optimum tolerance parameter (L) depends on:

- the parcel characteristics
- the quality of the reference material
- the measurement technique

⇨**2nd Stage : Sorting of the data for field visits**

The decision rules aim to concentrate field inspections on a reduced number of problematic data.

- Test at the Crop Group Level : Conformity Test
- Test at the Dossier Level : Completeness Test

Greek Land Parcel Identification System

⇨Old System : Available Consolidation maps of MoA

adv : - large scale (high accuracy) in most of the cases
disadv : - inhomogeneity in accuracy, currency & map quality
- reference system problems (in some cases)

⇨New System : Maps with block reference areas (ilots) based on orthophotos at scale 1:5000 derived from aerial photos 1:40000

adv : - homogeneity in scale, quality, reference system & coding system
- supplementary data (block area - use)
disadv : - less accurate then consolidation maps
overcome : - integration of the system with information provided from consolidation maps

Sample Sites

Both sites contain more than 200 dossiers and more than 1000 parcels each

Site Selection Criteria

- Representativeness of the sample ⟹
  - number of dossiers
  - size of parcels
  - type of scheme
- Different material for the digitisation of the parcels
- Different material for the Validation of the parcels
- Different accuracy of the geometric correction of the panchromatic image
- Elaborated by different companies

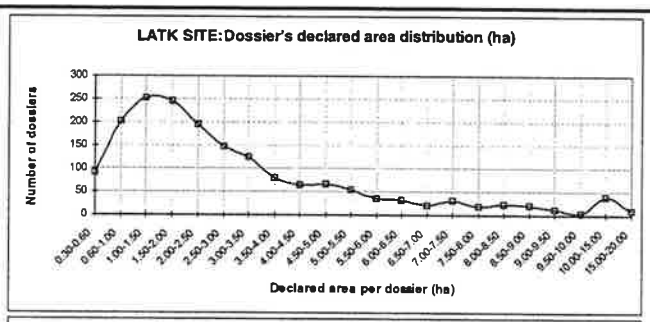
Description & Characteristics of the Sites

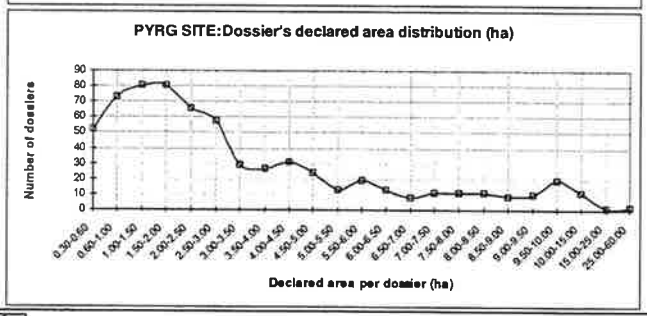
Summary table with the characteristics of the sites	LATK	PYRG	TOTAL

Important
Mean Values :

Note : both sites contain only simplified schemes

Description & Characteristics of the Sites





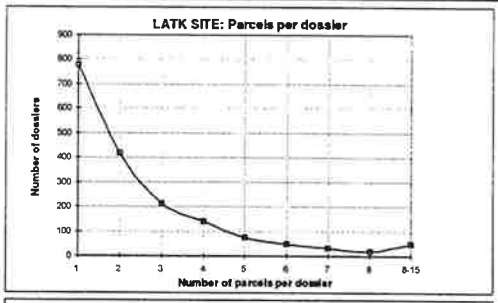
Dossier Statistics

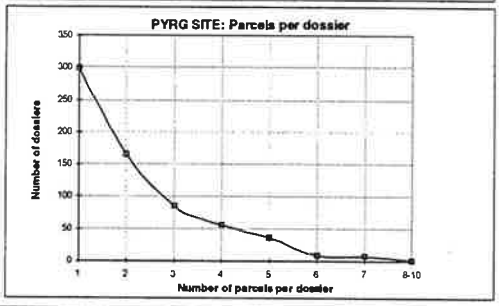
Notes :

- 60 % of dossiers contain declared area less than 3 ha

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Description & Characteristics of the Sites





Dossier Statistics

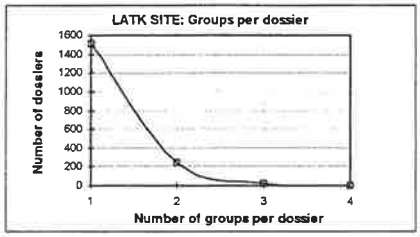
Notes :

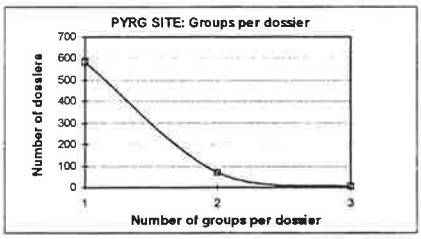
- 46 % of dossiers contain 1 parcel
- 25 % of dossiers contain 2 parcels
- 13 % of dossiers contain 3 parcels
- 16 % of dossiers contain > 3 parcels

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Description & Characteristics of the Sites

Dossier Statistics



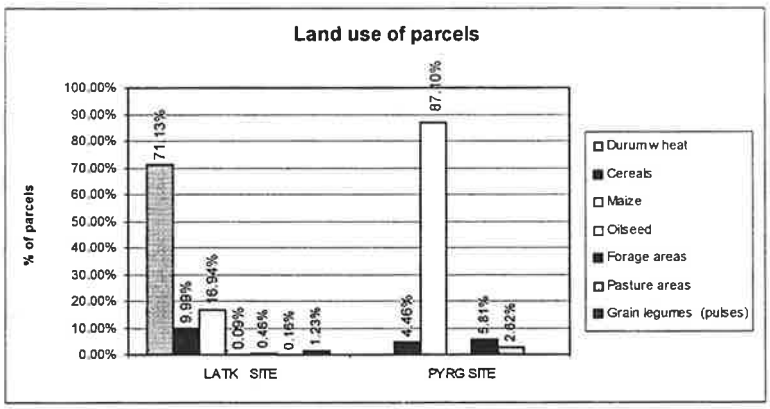


Notes :

- 87 % of dossiers contain 1 group
- 12 % of dossiers contain 2 groups
- 1 % of dossiers contain > 2 groups

Description & Characteristics of the Sites

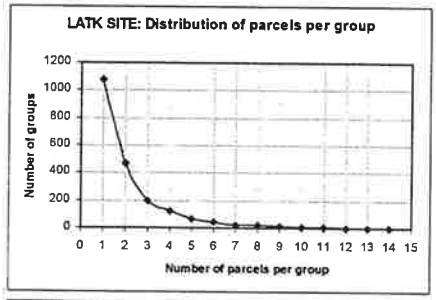
Group Statistics

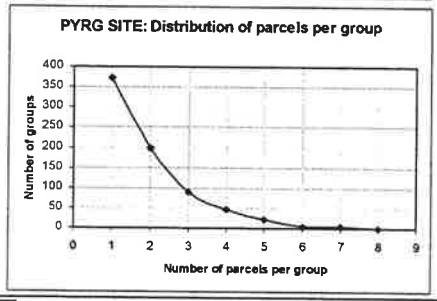


Principal crop groups : Durum wheat & Maize

Description & Characteristics of the Sites

Group Statistics



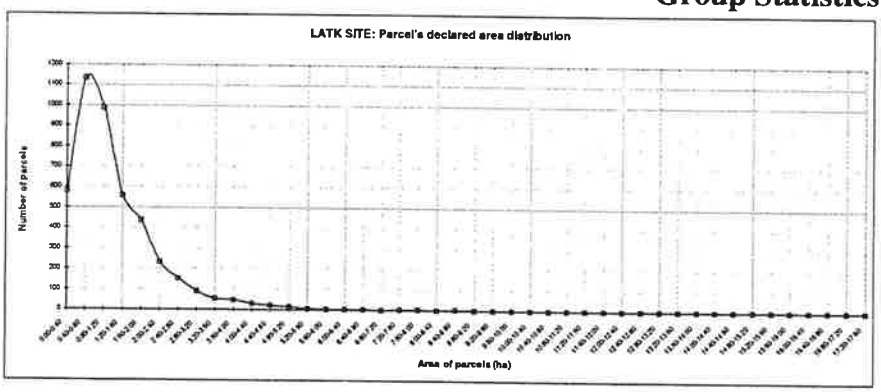


Notes :

- 51 % of groups contain 1 parcel
- 24 % of groups contain 2 parcels
- 10 % of groups contain 3 parcels
- 15 % of groups contain > 2 parcels

Description & Characteristics of the Sites

Group Statistics

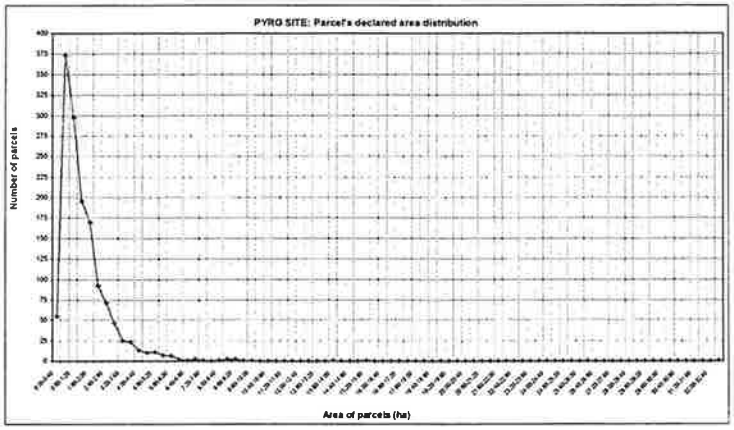


Notes : Declared area 0.3 - 0.8 ha ⇨ 40 %
Declared area 0.8 - 1.2 ha ⇨ 23 %
Declared area 1.2 - 1.6 ha ⇨ 12 %
Declared area 1.6 - 2.0 ha ⇨ 10 %
Declared area > 2.0 ha ⇨ 15 %

⇨ **Declared area < 2 ha ⇨ 85 %**

Description & Characteristics of the Sites

Group Statistics



Notes :
Declared area 0,3 - 0,8 ha ⇨ 30 %
Declared area 0,8 - 1,2 ha ⇨ 20 %
Declared area 1,2 - 1,6 ha ⇨ 13 %
Declared area 1,6 - 2,0 ha ⇨ 12 %
Declared area > 2,0 ha ⇨ 25 %

⇨ **Declared area < 2 ha ⇨ 75 %**

Technical Tolerance at the Parcel Level

Estimated precision of the area measurement - (Expected RMSE)

Principal causes of measurement errors

Digitisation from the consolidation maps or orthophotos

LATK Input material : Consolidation maps 1:2000 - 1:5000 (assumed accuracy 1:5000) ⇨ $RMSELatk = \pm\sqrt{1.5m^2 + 1.25m^2} = \pm 2.0m$

PYRG Input material : Orthophotos 1:5000 derived from a/f 1:40000 (assumed accuracy 1:10000) ⇨ $RMSEPyrg = \pm\sqrt{3m^2 + 1.25m^2} = \pm 3.25m$

Digitisation from the panchromatic images (Validation)

LATK Input material : SPOT-P (10m resolution) ⇨ $RMSELatk = \pm\sqrt{5m^2 + 2.5m^2} = \pm 5.6m$

PYRG Input material : IRS 1C (5m resolution) ⇨ $RMSEPyrg = \pm\sqrt{2.5m^2 + 1.25m^2} = \pm 2.79m$

Technical Tolerance at the Parcel Level

Cadastal maps for parcel determination	Panchromatic images	RMS from digitization on cadastal maps	RMS from digitization on the panchromatic im.	Maximum RMS

Topics :

- ➢Parcel identification material
- ➢Parcel validation material
- ➢Conclusion about maximum RMSE of each site

  LATK site ~ 66 m
  PYRG site ~ 64 m

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Quality of measurements of declarations before applying tolerances

Statistics before applying tolerances

Dp : Parcel's declared area
Mp : Parcel's measured area

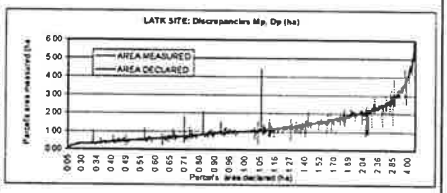
SITE	Area declared (ha)	Area measured (ha)	Area declared-measured (ha)	Area declared-measured (%)
LATK	5496.92	5477.15	19.77	0.36%
PYRG	2238.88	2206.68	32.20	1.44%
Totals	7735.80	7683.83	51.97	

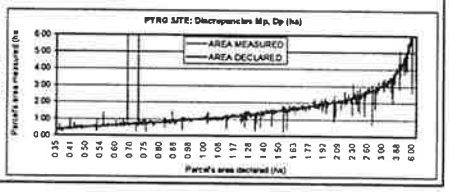
Dp<Mp

SITE	Area declared (ha)	Area measured (ha)	Area declared-measured (ha)	Area declared-measured (%)
LATK	2132.17	2212.85	-80.68	-3.78%
PYRG	927.96	991.51	-63.55	-6.85%
Totals	3060.13	3204.36	-144.23	

Dp>Mp

SITE	Area declared (ha)	Area measured (ha)	Area declared-measured (ha)	Area declared-measured (%)
LATK	2492.16	2391.71	100.45	4.03%
PYRG	1067.19	971.44	95.75	8.97%
Totals	3559.35	3363.15	196.20	





Over declared area : LATK ⇨ 4.03% - 3.78% = 0.25%
PYRG ⇨ 8.97% - 6.85% = 2.12%

Higher discrepancies of PYRG site, is probably due to less accurate determination of parcels boundaries at the stage of declaration (use of 1:5000 orthophotoes)

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

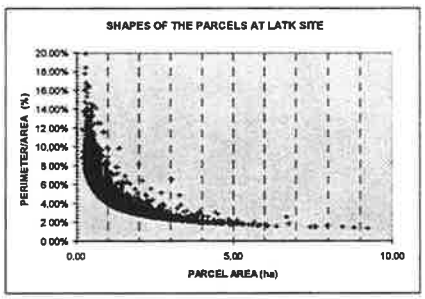
Estimation of the optimum L tolerance to be applied to the perimeter

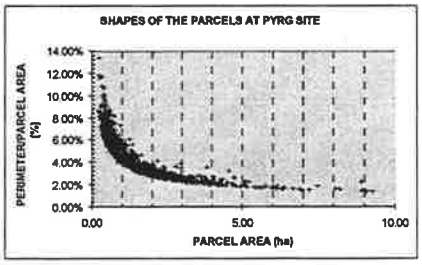
Considerations:
- Characteristics of the majority of the parcels
- Characteristics of the Parcel Identification System

Calculation Steps:
- Define the critical ranges of the parcels area, according to:
  - the influence of the perimeter (shape dependency) and
  - the classification of the sample
- Calculate the discrepancy between the declared and the measured area for every parcel. Then divide this discrepancy with the perimeter of the parcel & extract the necessary L value. L = (Mp - Dp) / perimeter
- Exclude the values which are greater from the twofold of the maximum estimated errors for each site (confidence level 95%)
- Calculate the mean L value and the standard deviation for the rest L values, asking the confidence level for the mean to be 95% and 98%

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Parcel characteristics





Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Calculation of L tolerance applied to the perimeter of the parcel from the discrepancies of the declared and measured area

LATK SITE

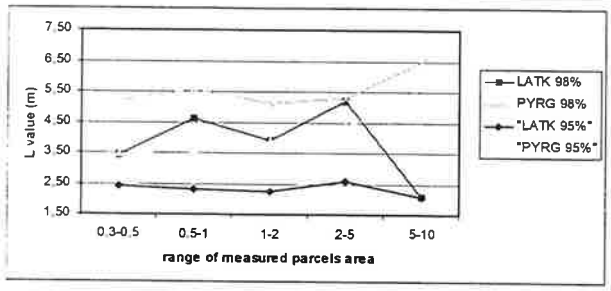
CALCULATION OF L value based on declared and measured area discrepancies

Parcel Area (ha)	0.3 to 0.5	0.5 to 1	1 to 2	2 to 5	5 to 10
Number of sample parcels	724	1356	1379	660	29
Num of parcels excluded	4	8	9	4	0
% of the sample excluded	0.55%	0.59%	0.65%	0.61%	0.00%
Minimum	0	0	0	0	0
Maximum	8.93945551	10.4262028	10.3646833	10.8467109	2.47319806
Sum	466.256843	1050.584962	1027.580865	532.003451	17.00318428
Number of parcels	720	1348	1370	656	29
L value (95%)	2.41	2.32	2.24	2.60	2.08
L value (98%)	3.44	4.63	3.92	5.21	2.08

PYRG SITE

CALCULATION OF L value based on declared and measured area discrepancies

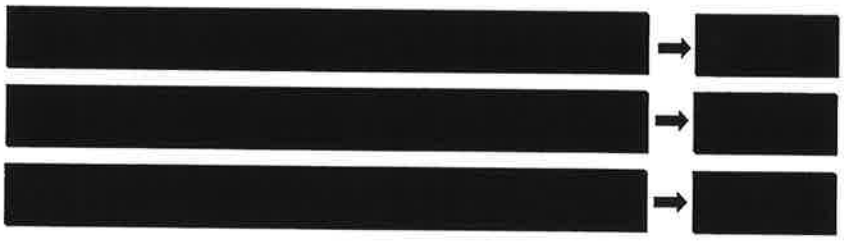
Parcel Area (ha)	0.3 to 0.5	0.5 to 1	1 to 2	2 to 5	5 to 10
Number of sample parcels	135	444	503	299	36
Num of parcels excluded	12	8	16	11	2
% of the sample excluded	8.89%	1.80%	3.18%	3.77%	13.89%
Minimum	0	0	0	0	0
Maximum	6.33312229	7.97391391	6.63207584	7.06752955	7.21071940
Sum	112.674176	485.520959	540.5974191	372.488777	46.43510992
Number of parcels	123	436	487	281	31
L value (95%)	3.45	3.60	3.92	4.42	5.04
L value (98%)	5.18	5.58	5.12	5.30	6.49



Suggested L values

Different L values should be applied to the boundaries according to the different source material precision

If this is applied, we propose the following values:

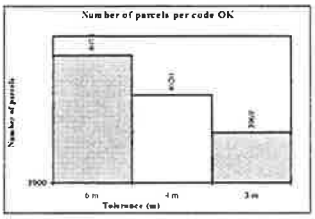


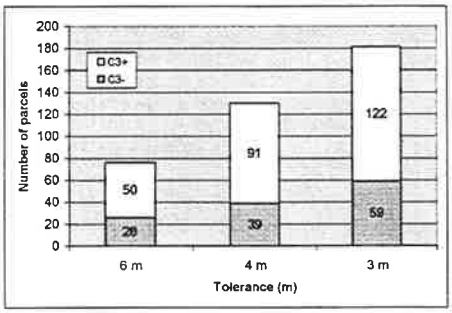
Alternatively (if we have no information about the source material precision)

Applying the L values of 6, 4, 3 m to the sites

LATK SITE Percentage (number and area) of parcels inside technical tolerance or outside

Total Number of parcels:		4150			Total declared area (ha):		5347.34									
	OK				C3-						C3+					
Tolerance (m)	Number of parcels	% of parcels	Area declared (ha)	% of total area declared	Number of parcels	% of parcels	Area declared (ha)	% of total declared area	Area retained (ha)	Area declared - retained	Number of parcels	% of parcels	Area declared (ha)	% of total area declared	Area retained (ha)	Area declared - retained
6 m	4074	98.17%	5234.65	97.89%	26	0.63%	31.83	0.60%	49.2	-17.37	50	1.20%	80.86	1.51%	54.77	26.09
4 m	4020	96.87%	5162.78	96.55%	39	0.94%	47.24	0.88%	68.26	-21.02	91	2.19%	137.32	2.57%	102.17	35.15
3 m	3969	95.64%	5094.3	95.27%	59	1.42%	72.93	1.36%	97.82	-24.89	122	2.94%	160.11	3.37%	139.72	40.39



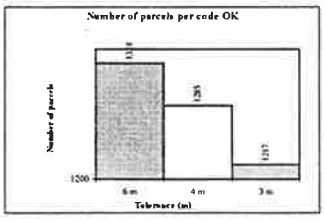


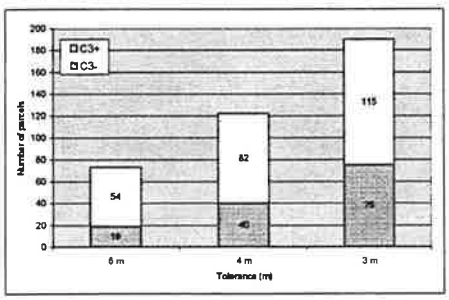
Outside tolerance statistics	6m	4m	3m
Number of Parcels	76	130	181
% of parcels declared	1.83%	3.13%	4.36%
Declared area (ha)	112.69	184.56	253.04
% of total declared	2.11%	3.45%	4.73%

Applying the L values of 6, 4, 3 m to the sites

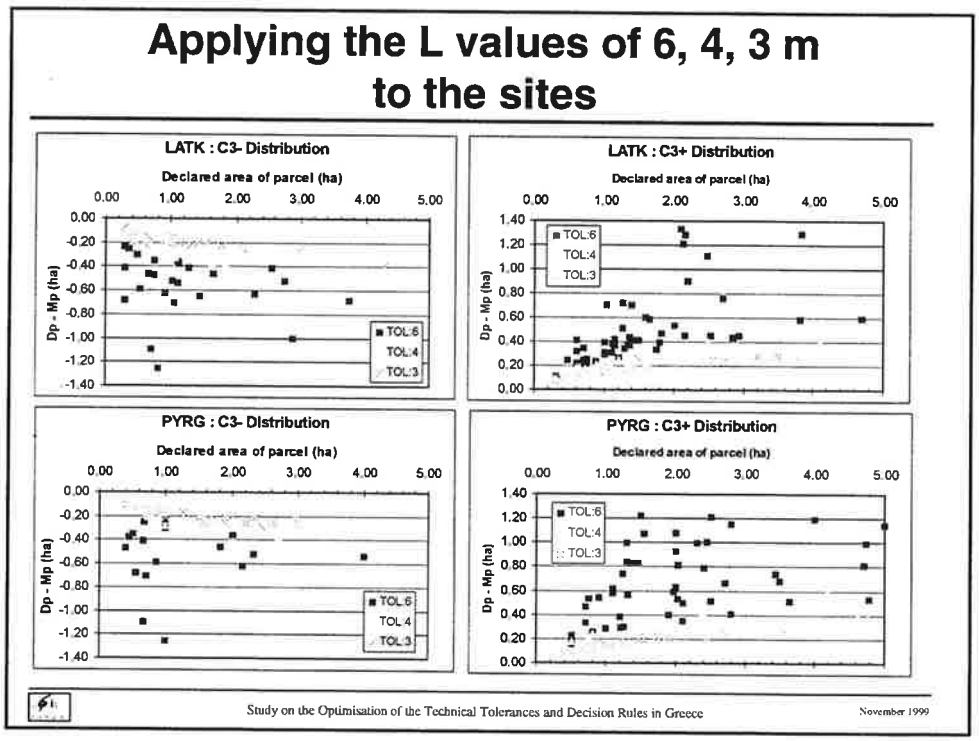
PYRG SITE Percentage (number and area) of parcels inside technical tolerance or outside

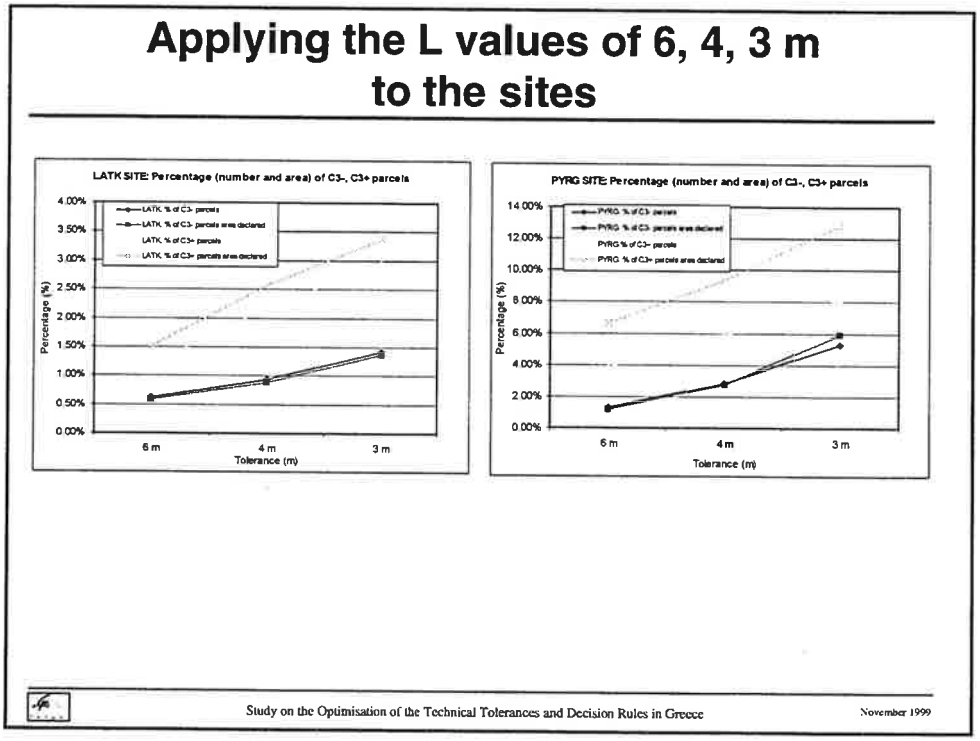
Total Number of parcels:		1407			Total declared area (ha):		2231.81									
	OK				C3-						C3+					
Tolerance (m)	Number of parcels	% of parcels	Area declared (ha)	% of total area declared	Number of parcels	% of parcels	Area declared (ha)	% of total declared area	Area retained (ha)	Area declared - retained	Number of parcels	% of parcels	Area declared (ha)	% of total area declared	Area retained (ha)	Area declared - retained
6 m	1334	94.81%	2056.51	92.15%	19	1.35%	26.95	1.21%	49.18	-22.23	54	3.84%	148.35	6.65%	89.73	58.62
4 m	1265	91.33%	1960.67	87.85%	40	2.84%	62.48	2.80%	90.38	-27.90	82	5.83%	208.66	9.35%	142.18	66.48
3 m	1217	86.50%	1813.31	81.25%	75	5.33%	131.82	5.91%	167.21	-35.39	115	8.17%	286.68	12.85%	213.11	73.57





Outside tolerance statistics	6m	4m	3m
Number of Parcels	73	122	190
% of parcels declared	5.19%	8.67%	13.50%
Declared area (ha)	175.30	271.14	418.5
% of total declared	7.85%	12.15%	18.75%


Applying the L values of 6, 4, 3 m to the sites
LATK : C3- Distribution
Declared area of parcel (ha)
Dp - Mp (ha)
TOL:6
TOL:4
TOL:3
LATK : C3+ Distribution
Declared area of parcel (ha)
Dp - Mp (ha)
TOL:6
TOL:4
TOL:3
PYRG : C3- Distribution
Declared area of parcel (ha)
Dp - Mp (ha)
TOL:6
TOL 4
TOL:3
PYRG : C3+ Distribution
Declared area of parcel (ha)
Dp - Mp (ha)
TOL:6
TOL:4
TOL:3
Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece
November 1999


Applying the L values of 6, 4, 3 m to the sites
LATK SITE: Percentage (number and area) of C3-, C3+ parcels
Percentage (%)
Tolerance (m)
6 m
4 m
3 m
PYRG SITE: Percentage (number and area) of C3-, C3+ parcels
Percentage (%)
Tolerance (m)
6 m
4 m
3 m
Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece
November 1999

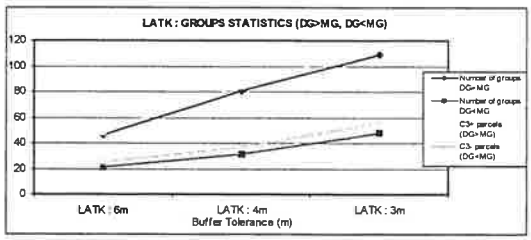
Statistics of the group level after applying buffer tolerance at the parcel level

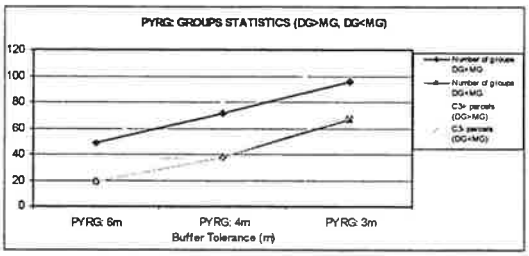
- The compensation of the discrepancies at the group level in Greece is insignificant because of the small number of groups per parcel

- The total overdeclared area at the group level is almost stable when applying different L values.

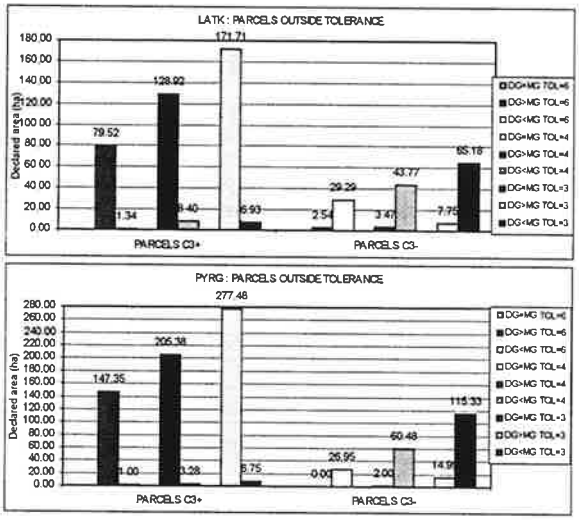
Buffer Tolerance (m)	LATK overdeclaration % of declared area		PYRG overdeclaration % of declared area	
	Dg>Mg+Dg<Mg	Dg>Mg	Dg>Mg+Dg<Mg	Dg>Mg
6m	0.16%	3.15%	2.61%	11.17%
4m	0.26%	5.39%	2.92%	15.82%
3m	0.28%	7.19%	3.17%	20.35%

Statistics of the group level after applying buffer tolerance at the parcel level

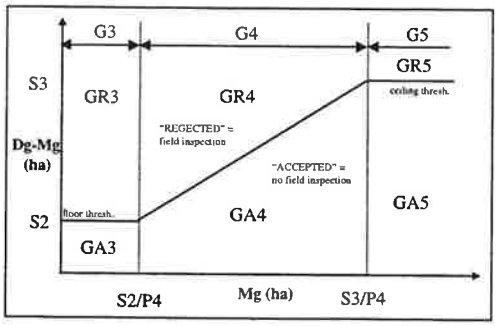




Statistics of the group level after applying buffer tolerance at the parcel



Conformity test at the group level



The conformity test aims to categorise the dossiers in two groups :

- "Accepted" dossiers, for which a field visit is compulsory &
- "Rejected" dossiers, for which a field visit is not considered compulsory

The test is based on the discrepancy at the group level (Dg-Mg) and it implies a threshold in percentage (relative), between 2 absolute thresholds (floor & ceiling).

The factors taken into account to estimate the optimum thresholds are:

- the cost-effectiveness of field inspections
- the special characteristics of the sites

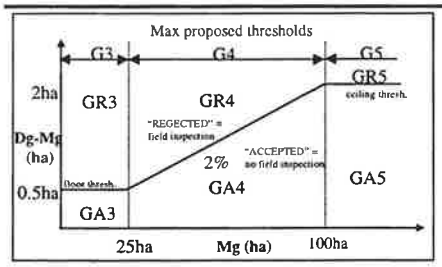
Factors taken into account to estimate the optimum thresholds at LATK & PYRG sites

Cost-effectiveness assumption ⇒ • inspection of 25% of the groups for the 75-80% of the disputed area

Main characteristics of the sites ⇒ • small size of parcels
75% of the parcels have area * 1.5ha

• small number of parcels per group
50% of the groups contain one parcel

Estimation of the optimum thresholds for the Conformity Test



Step 1

➢ Apply the Conformity Test to the sites, using the maximum thresholds proposed by EC

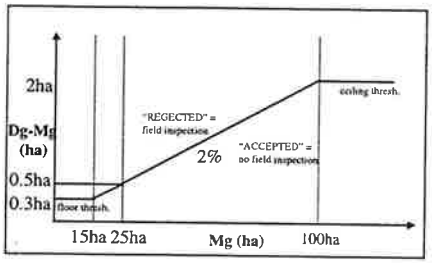
Results

➢ All of the groups had area less than 25 h.
Thus, the test was actually performed using an absolute ceiling threshold of 0.5ha

➢ Considering that the maximum parcel density is between 0.3ha and 1.6ha & the 50% of groups contain 1 parcel, we believe that the ceiling value of 0.5ha is high

➢ Therefore, (given that the percentage and the ceiling thresholds couldn't change) we decided to reduce the floor threshold at 0.3ha and observe the behavior of the data

Estimation of the optimum thresholds for the Conformity Test



Step 2

- Apply the Conformity Test to the sites, using floor threshold 0.3ha

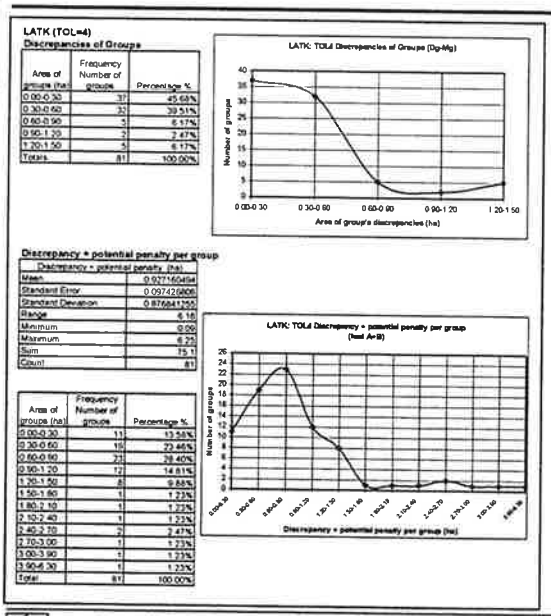
	Rejected Groups	Debatable Area
LATK (L=6)		
Floor thr: 0.5ha	52%	84%
Floor thr: 0.3ha	57%	87%
PYRG (L=4)		
Floor thr: 0.5ha	57%	60%
Floor thr: 0.3ha	60%	78%

Results

- The proportion of the rejected groups and debatable area is almost stable
- The additional groups that will be rejected by applying the lower floor threshold don't get over the 0.5%
- A greater reduction of the floor threshold will increase the field visits for small discrepancies, which is not cost-effective

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

An other approach



Introduce to the definition of debatable area the potential penalties that will derive from the dispute

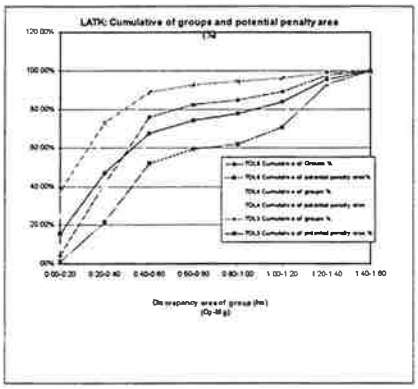
The aim is to estimate the threshold for the cost-effective assumption of 25% rejected groups for the 75-80% of the disputed area

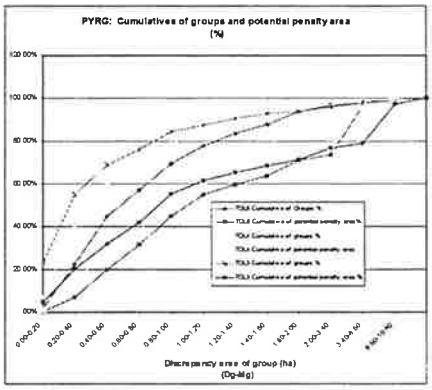
By examining the graphs for both sites, we concluded that the above proportion is retained well for the 0.5ha threshold

[redacted]

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Summary of discrepancy areas & potential penalties





Completeness test at the dossier level

Completeness test aims to separate those dossiers, for which various technical reasons did not allow a complete control.

Uncompleted dossiers are considered as non controlled and it is up to the Administration to decide to complete them with field inspections

A dossier will be classed as "complete" if the total area of "T Code" parcels in the processed groups is lower that two thresholds in %:
- P2 : for the total surface area of the dossier
- P3 : for each of the more important groups (durum wheat & Maize)

The factors taken into account to estimate the optimum thresholds are:
- ➢ the national context (parcel size, structure of farms)
- ➢ the Land Parcel Identification System &
- ➢ the field visit strategy of the Administration

Note : non controlled areas are flagged with a "T Code"

Completeness test at the dossier level

Site characteristics :
- only simplified schemes
  (only P2 threshold)
- LATK site ⇨ Old Parcel Identification System
  PYRG site ⇨ New Parcel Identification System

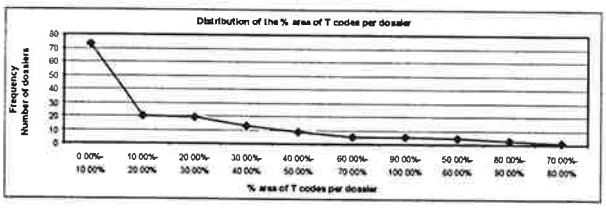
Tested P2 values :
- 40%, 50%, 60%, 70%

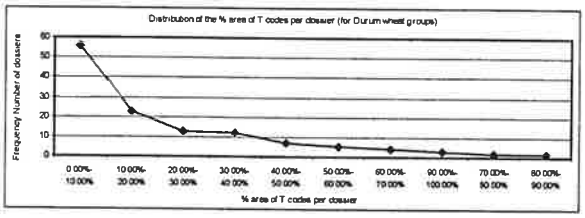
Results :
- The results for different P2 threshold values do not show any significant differences at the dossier level
- At PYRG site only 4 parcels were T Coded.
  This is due to the completeness of chartographic reference (new identification system) Therefore, we believe that when the new system will be completed for the whole country, T3 codes will be eliminated.

Proposed P2 value : [redacted]

Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Completeness test at the dossier level





Study on the Optimisation of the Technical Tolerances and Decision Rules in Greece — November 1999

Conclusions

Greek Land Parcel Identification System

⇨Old System : Available Consolidation maps of MoA

⇨New System : Maps with block reference areas (ilots) based on orthophotos at scale 1:5000 derived from aerial photos 1:40000

Main Site Characteristics (LATK - PYRG)

- Small parcel area
- Small group area
- Small dossier area
- Small number of parcels per group
- Only simplified schemes
- Main crop groups : durum wheat & maize

Conclusions

Technical Tolerance at Parcel Level

Principal causes of measurement errors ⇒
- Reference material accuracy
- Digitization error

Considerations ⇒
- Characteristics of the majority of the parcels
- Characteristics of the parcel Identification System

Proposed L value ⇒
- Different L values should be applied to each boundary according to the source material accuracy

Alternatively

- If we have no information for the source material accuracy, the tolerance should be extracted from the estimated RMS of the panchromatic image

Conclusions

Conformity Test

Factors taken into account ⇨
- Special characteristics of the sites
- Cost-effectiveness of field inspections

Proposed Threshold ⇨
- Due to the small size of parcels and the small number of parcels per group, the test was actually performed using an absolute ceiling threshold.
- By evaluating different threshold values we concluded that the maximum proposed threshold (0.5ha) is more efficient

Conclusions

Completeness Test

Factors taken into account ⇨
- The national context (parcel size - structure of farms)
- The Land Parcel Identification System in use
- The field visit strategy of the Administration

Proposed Threshold ⇨
- 50 % when the old identification system is still in use
- 40 % when the new identification system will be used for the whole country

5th Conference on Control with Remote Sensing of Area Based Subsidies
Stresa 25-26/11/1999

Quality control of field surveys using CASI

Paolo Ragni, Ugo Minelli

Aquater SpA

Remote Sensing and Land Information Unit

Objective

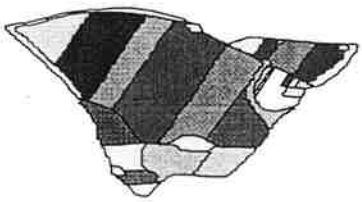
The scope of the project is to verify the economical feasibility of substituting or integrating the quality control of field surveys with the photointerpretation of CASI

(compact airborne spectrographic imager) images

Aquater's annual ...

- Consortium: ITA
- Project: AGRIT
- Area of interest: Italy
- Client: MiPAF

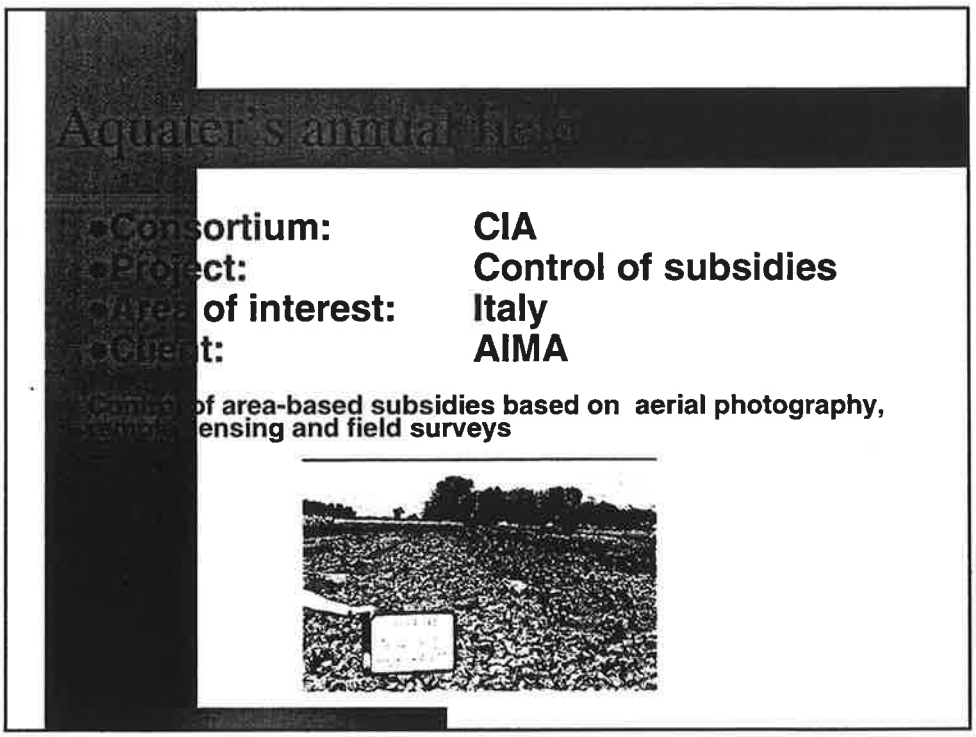
... production statistics at national and regional level ... area frame sampling and remote sensing

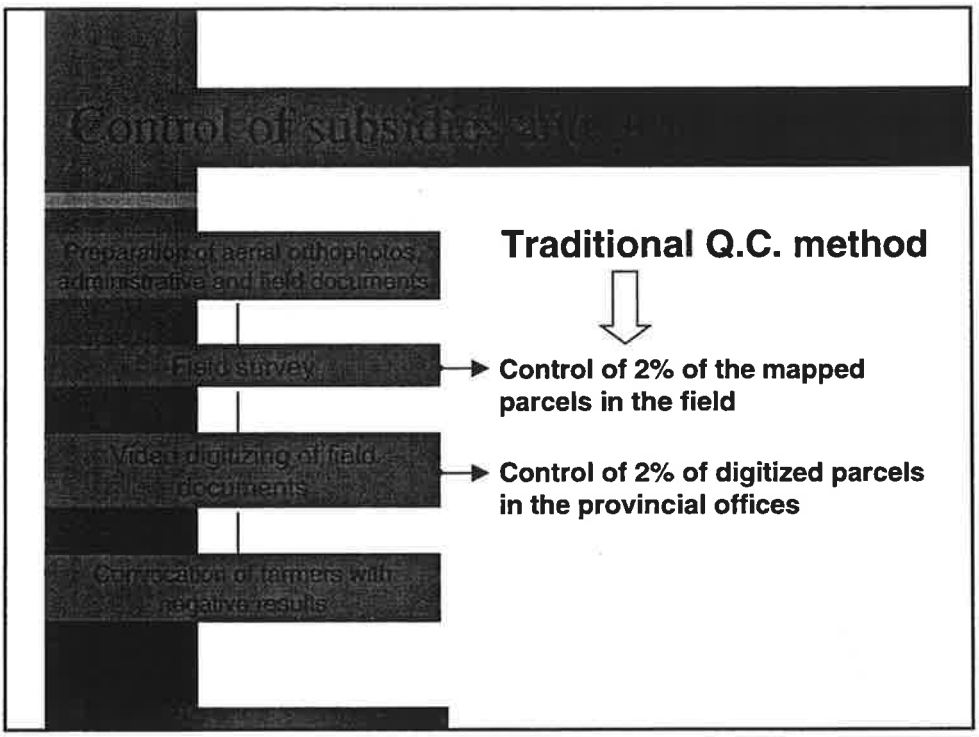


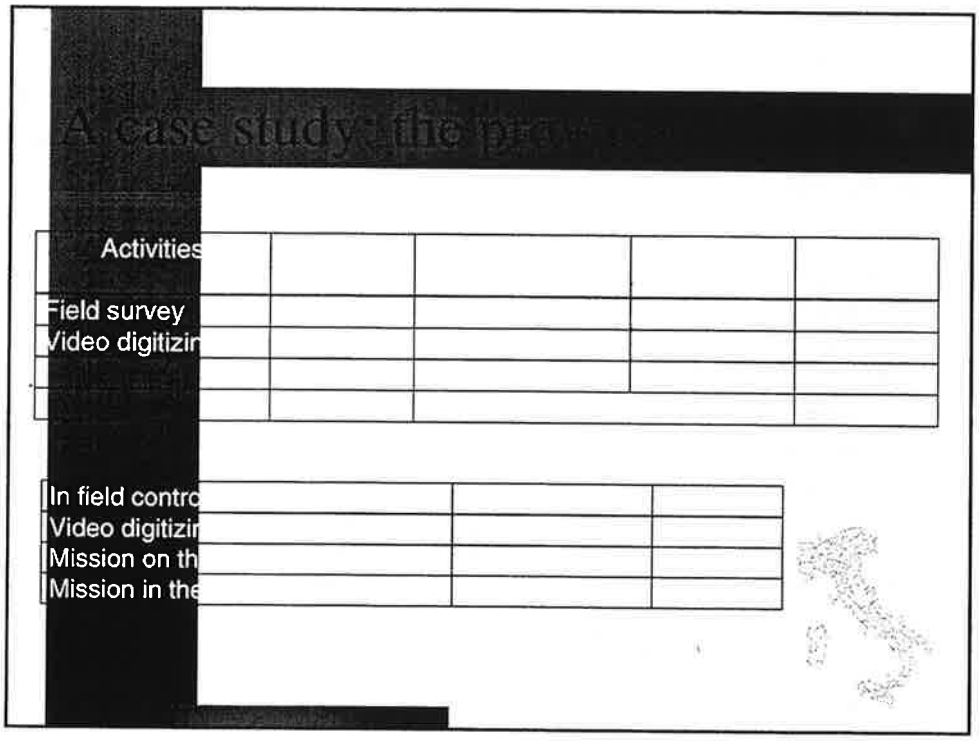
Aquater's annual ...

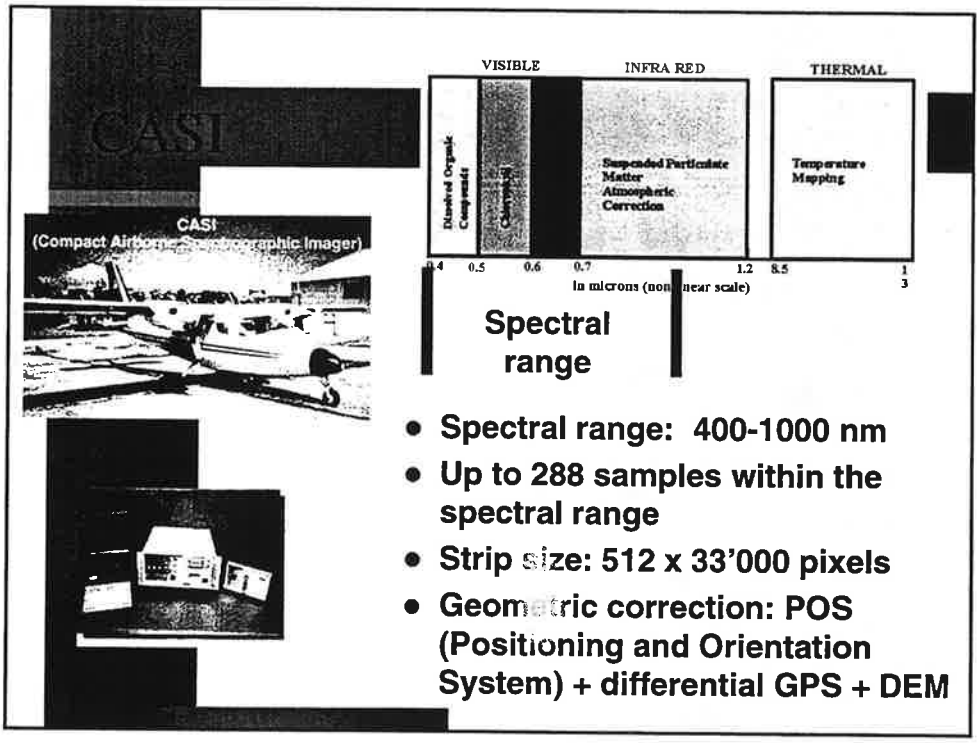
- Consortium: ITA
- Project: Mini-sites
- Area of interest: Italy and Benelux
- Client: DGVI, JRC

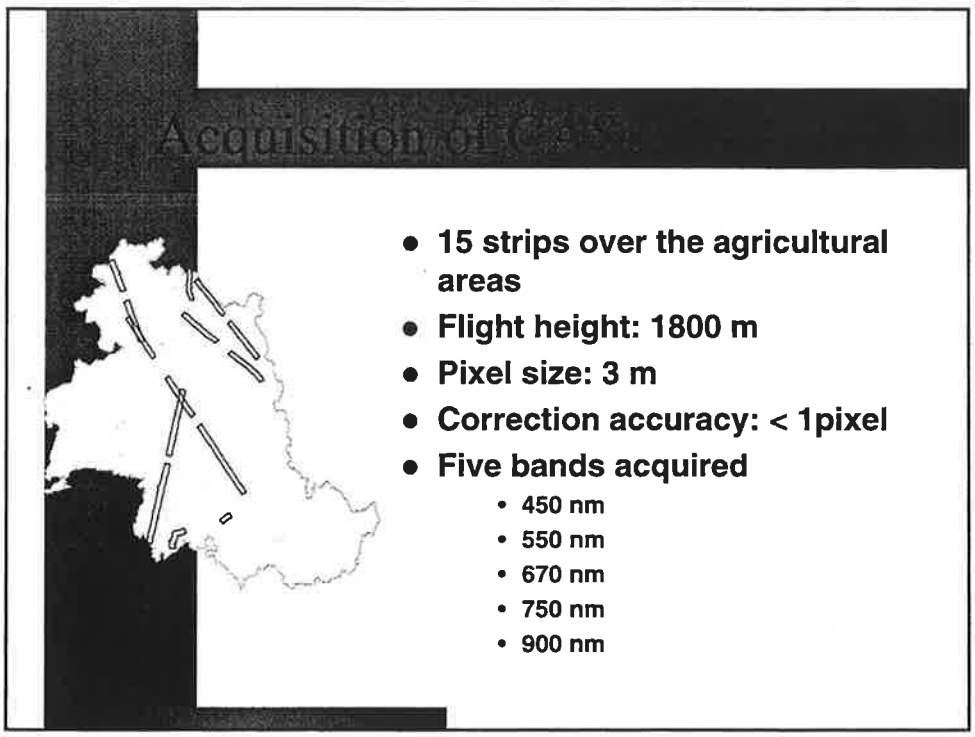
... study on rapid estimates of crop area changes from a ... sample of mini-sites

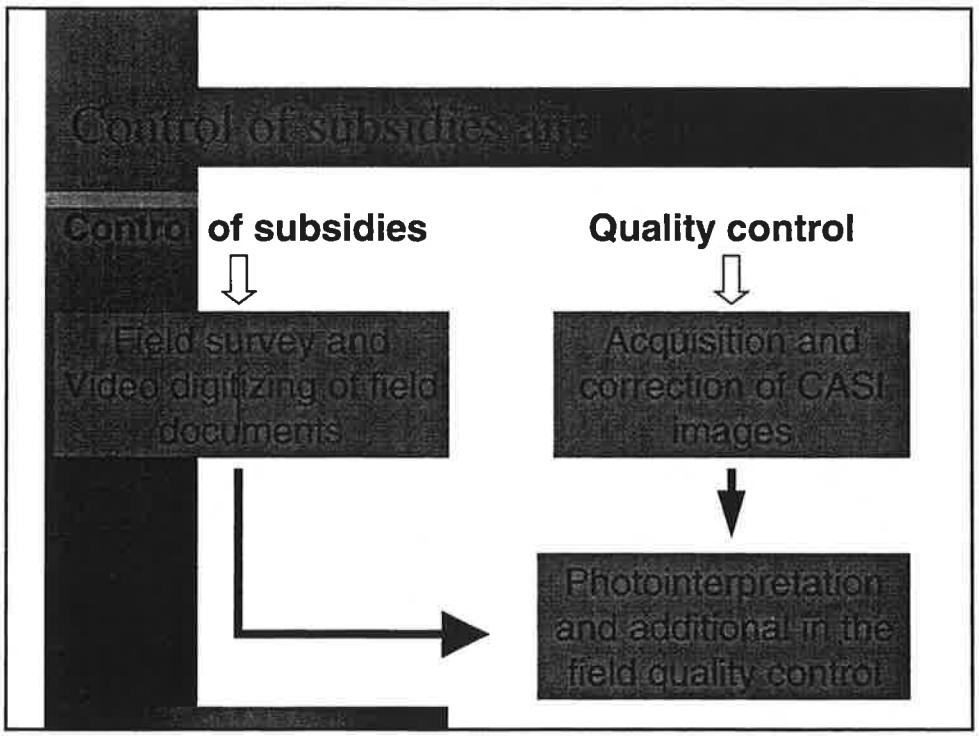

Aquater's annual
•Consortium: CIA
•Project: Control of subsidies
•Area of interest: Italy
•Client: AIMA
Control of area-based subsidies based on aerial photography, remote sensing and field surveys

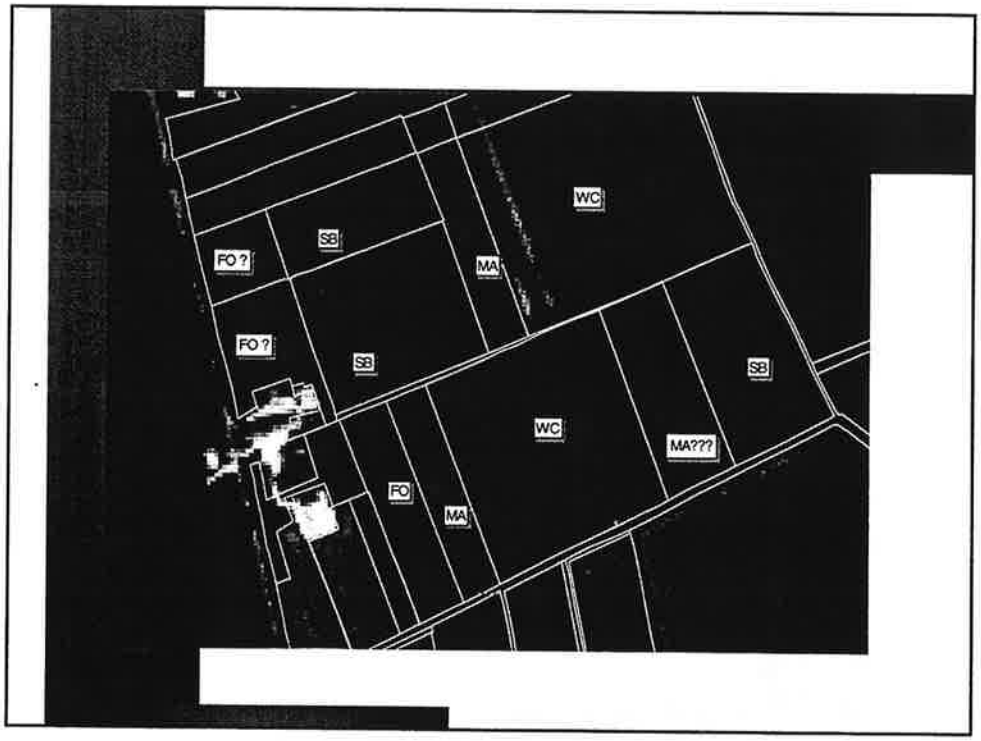

Control of subsidies
Preparation of aerial orthophotos, administrative and field documents
Field survey
Video digitizing of field documents
Communication of farmers with negative results
Traditional Q.C. method
Control of 2% of the mapped parcels in the field
Control of 2% of digitized parcels in the provincial offices

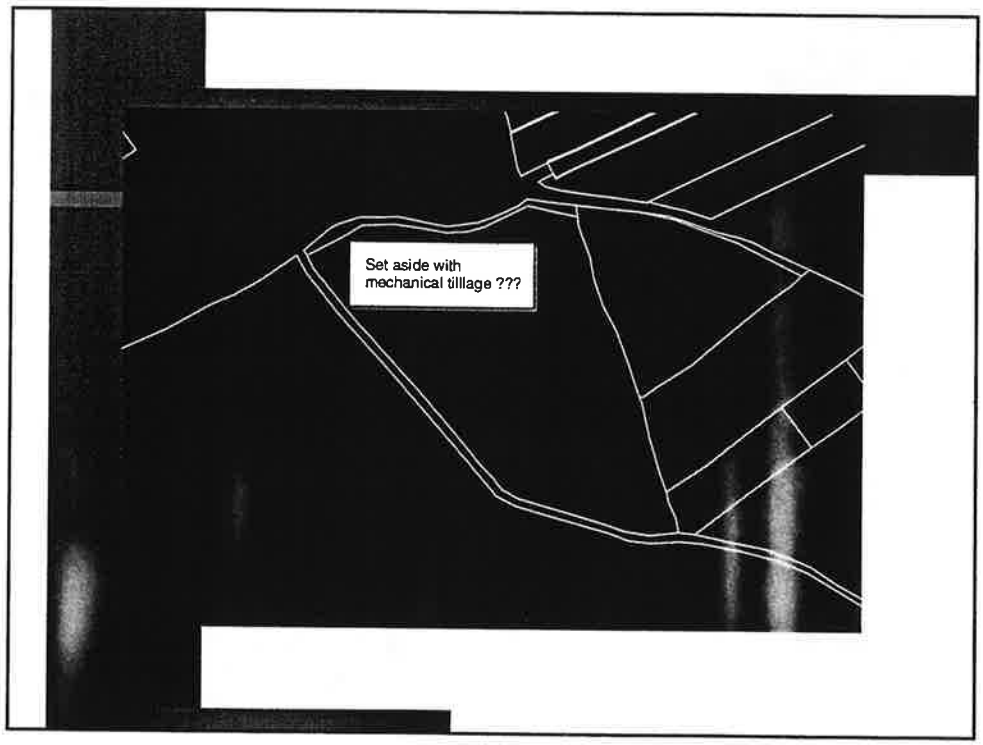

A case study: the pro
Activities
Field survey
Video digitizin
In field contro
Video digitizin
Mission on th
Mission in the

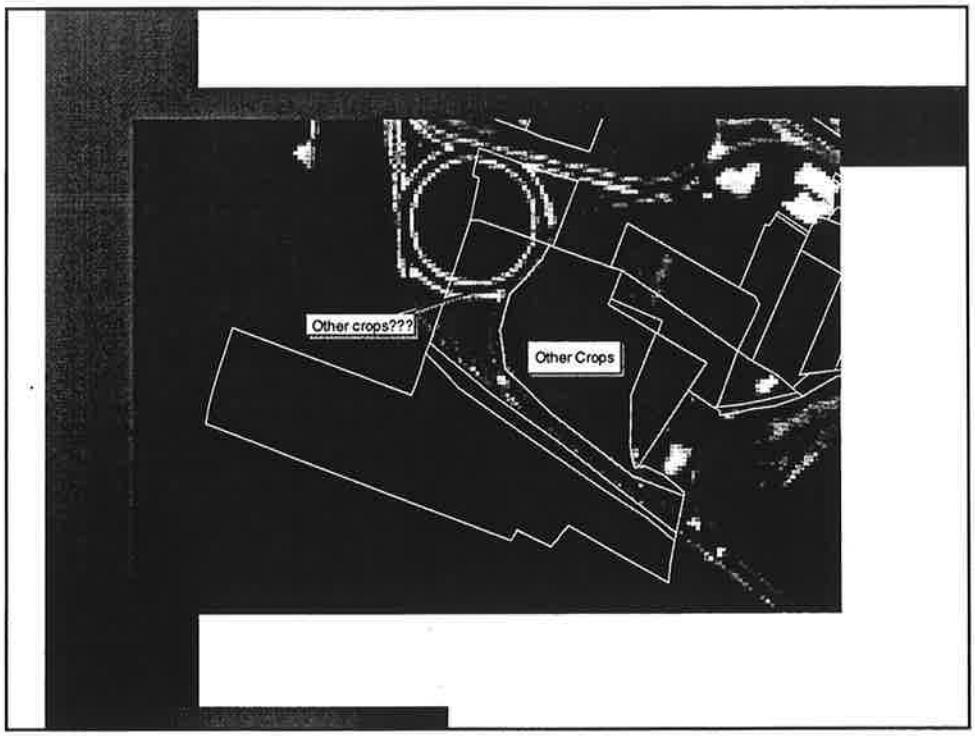

CASI
CASI
(Compact Airborne Spectrographic Imager)
VISIBLE
INFRA RED
THERMAL
Suspended Particulate Matter Atmospheric Correction
Temperature Mapping
0.4
0.5
0.6
0.7
1.2
8.5
1
3
In microns (non linear scale)
Spectral range
• Spectral range: 400-1000 nm
• Up to 288 samples within the spectral range
• Strip size: 512 x 33'000 pixels
• Geometric correction: POS (Positioning and Orientation System) + differential GPS + DEM

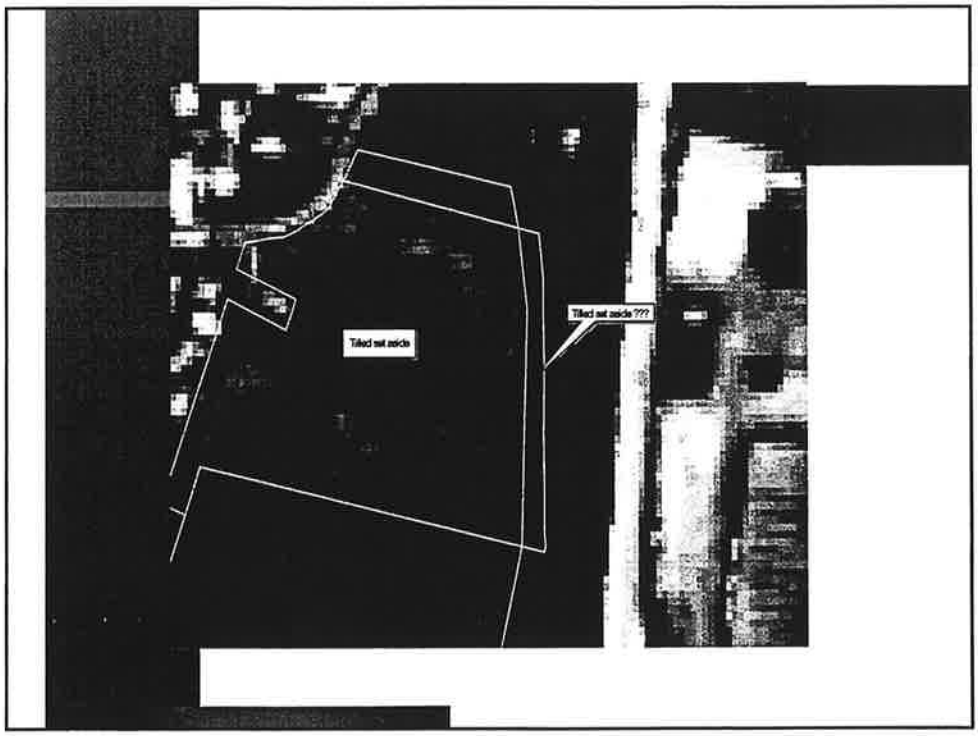

Acquisition of
15 strips over the agricultural areas
Flight height: 1800 m
Pixel size: 3 m
Correction accuracy: < 1pixel
Five bands acquired
450 nm
550 nm
670 nm
750 nm
900 nm

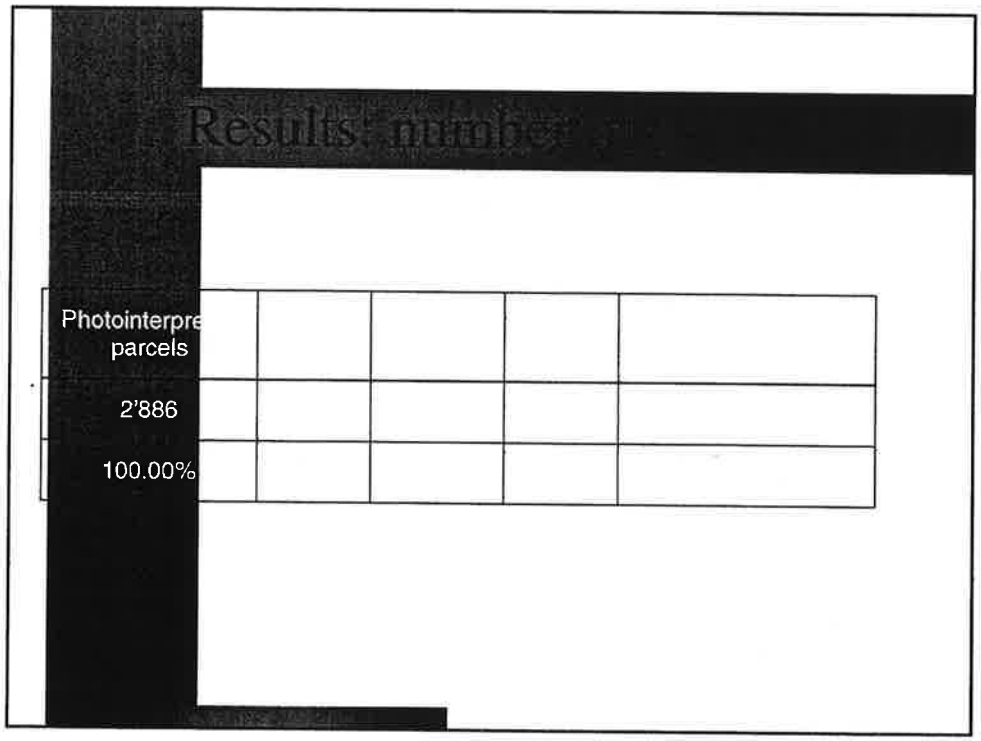

Control of subsidies and
Contro
of subsidies
Quality control
Field survey and video digitizing of field documents
Acquisition and correction of CASI images
Photointerpretation and additional in the field quality control

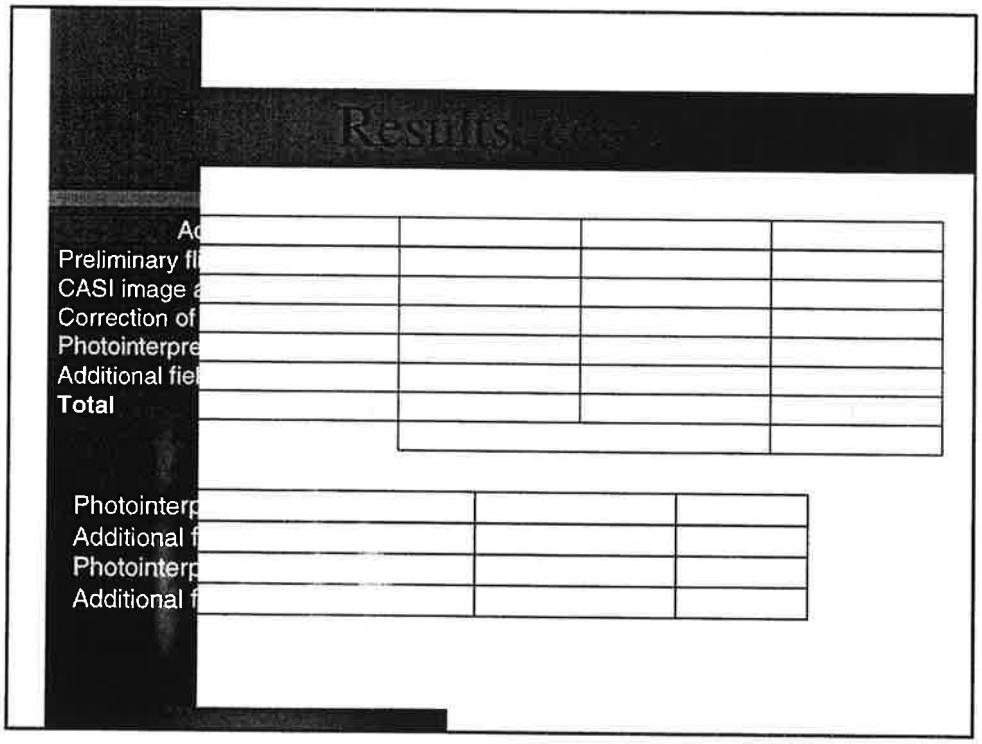

WC
SB
FO ?
MA
FO ?
SB
SB
WC
MA???
FO
MA

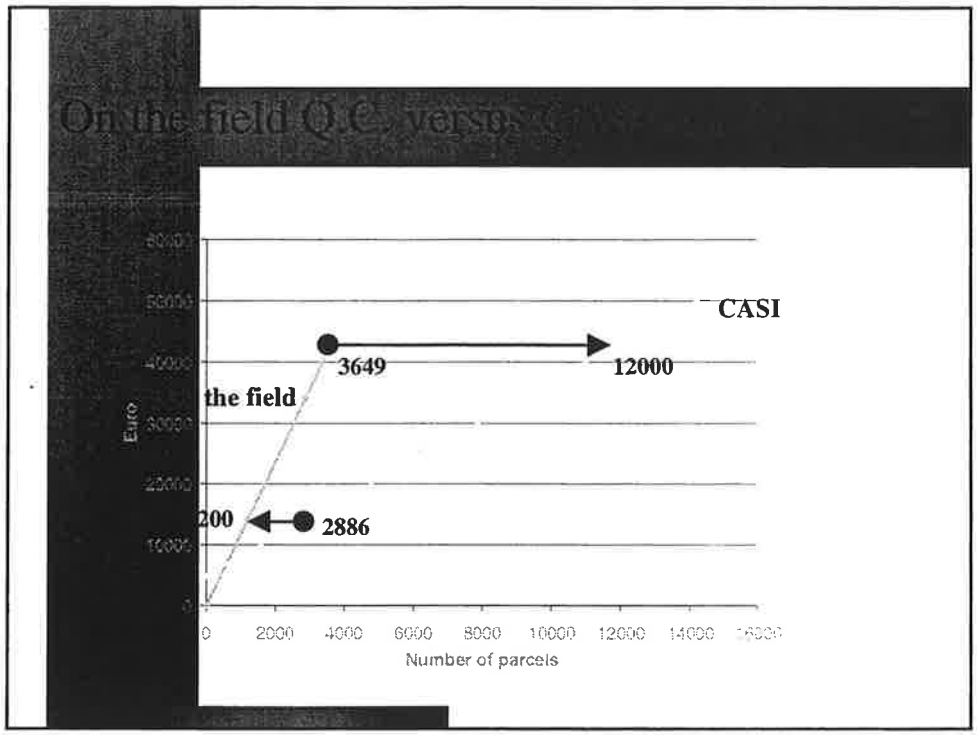

Set aside with
mechanical tilllage ???


Other crops???
Other Crops


Tilled set aside
Tilled set aside ???


Results: numbe
Photointerpre
parcels
2'886
100.00%


Results
Preliminary fl
CASI image a
Correction of
Photointerpre
Additional fie
Total
Photointerp
Additional f
Photointerp
Additional f


CASI
3649
12000
the field
2886
Number of parcels

www.eurimage.com

Technical aspects on the new Landsat 7 and DVB transmission

5th Conference on Control with Remote Sensing of Area-based Subsidies

Stresa 25-26 Nov 1999

Roberto Biasutti - Satellite Service Manager

Livio Rossi - Segment Development Manager

biasutti@eurimage.com rossi@eurimage.com

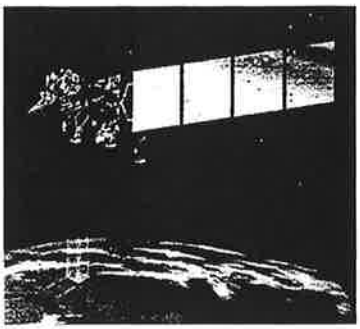
Overview

- **Landsat 7**
- **DVB transmission**

Landsat 7

- **Orbital Characteristics**

Orbit Type: Sun-synchronous
Altitude: 705 Km
Inclination: 98.2 deg
Orbit period: 98.9 min
Cycle: 16 days
Equatorial crossing: 10:00 am



Eurimage

Landsat 7 Payload

- **ETM+ (Enhanced Thematic Mapper) Instrument**
  - 6 Thematic bands
  - 1 Thermal band
  - 1 Panchromatic band

- **On-board recorder**

Type:	Solid state
Capacity:	378 Gbits (~100 scenes)
Downlink Frequency:	8.2 GHz (X-band)
Data volume:	450 Mbps (3 x 150)
Solid state recorder Playback:	300 Mbps

Eurimage

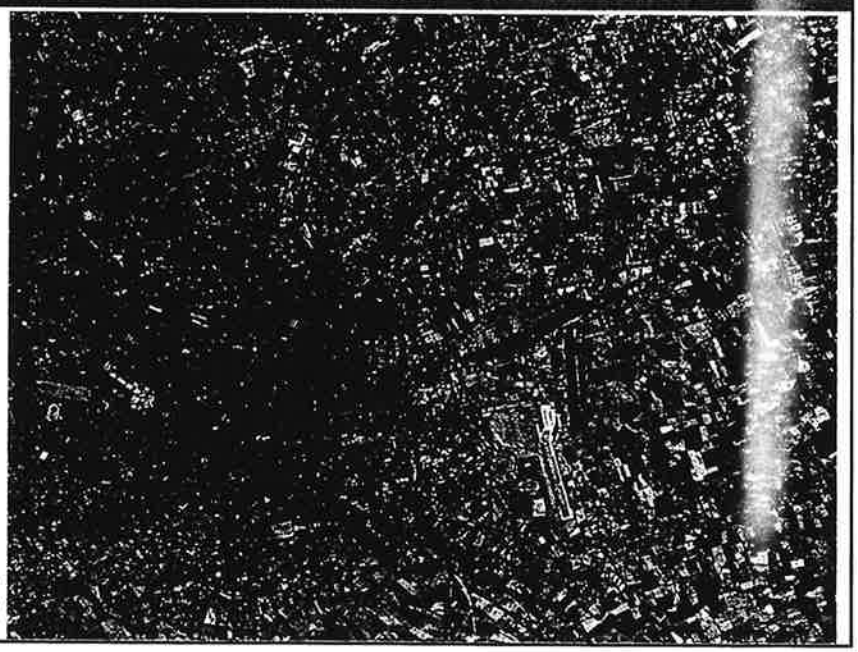
Landsat 7 Comparison with Landsat 5

Band	Bandwidth (μm)	L 7 Resolution (m)	L 5 Resolution (m)
PAN	0.520 - 0.900	15	-
1	0.450 - 0.515	30	30
2	0.525 - 0.605	30	30
3	0.630 - 0.690	30	30
4	0.775 - 0.900	30	30
5	1.550 - 1.750	30	30
6	10.40 - 12.50	60	120
7	2.090 - 2.350	30	30

* Solid state tape recorder (~210 images / day)

eurimage

Landsat 7 Pan



eurimage

Pan comparison

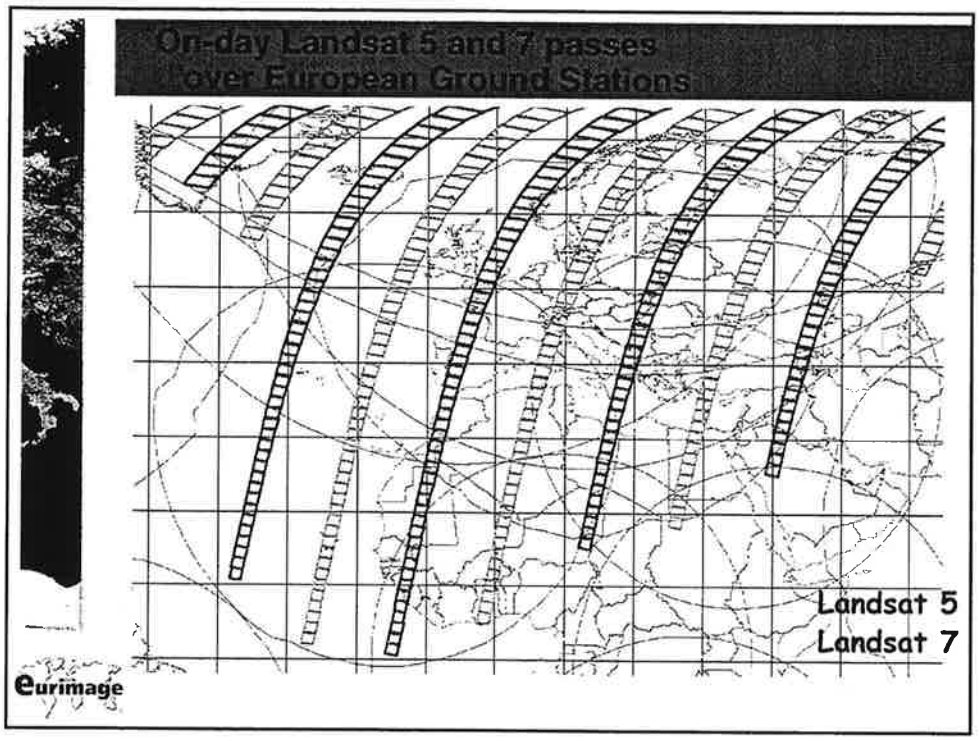
	L7	Spot	Irs
Bandwidth (μm)	0.52 - 0.90	0.51 - 0.73	0.50-0.75
Radiom. dynamic	8 bit	8 bit	6 bit
Ground Rez (m)	15 Fixed	10	6.0
Swath (km)	183	60	70
Frame (km)	172*183	60 *60	70*70
Across Track Angle	-	27°	26°
Loc. Accurcy (m)	200	500	N/A
Gain	High/Low	Single	Single
Revisit (Days)	16	~ 2	5
Data Size (MB)	143	36	210.2

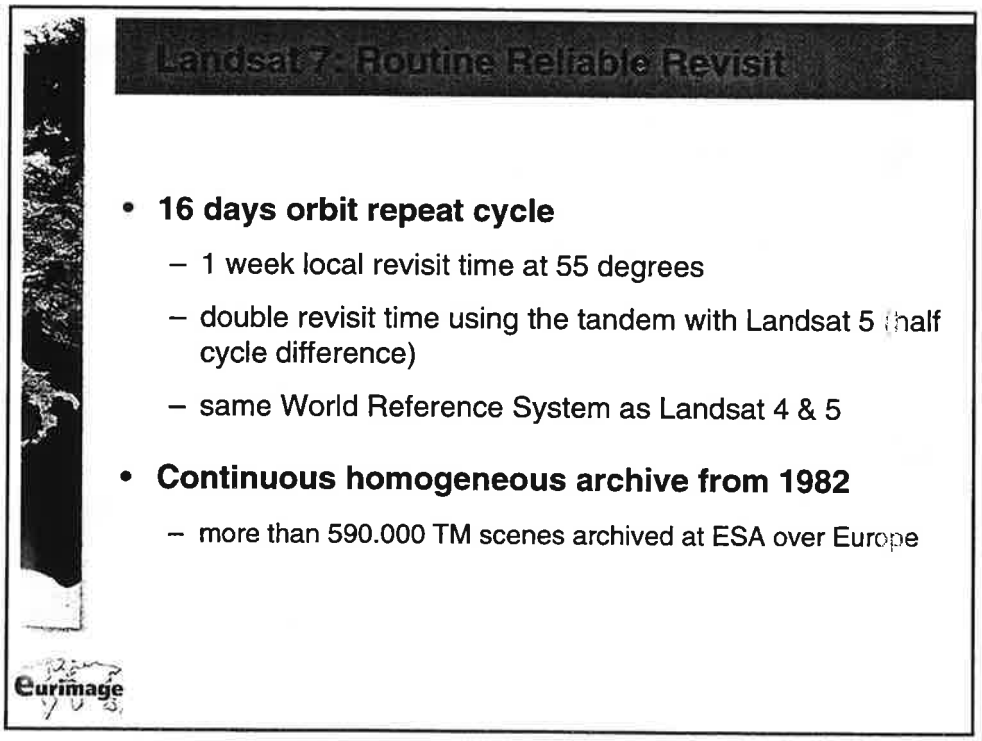
eurimage

Swath comparison

- **As example Germany is covered, in Panchromatic mode by:**
  - 31 Landsat 7 scenes
  - over 100 IRS scenes
  - over 120 Spot scenes

eurimage


One-day Landsat 5 and 7 passes
over European Ground Stations
Landsat 5
Landsat 7
eurimage


Landsat 7: Routine Reliable Revisit
• 16 days orbit repeat cycle
– 1 week local revisit time at 55 degrees
– double revisit time using the tandem with Landsat 5 (half cycle difference)
– same World Reference System as Landsat 4 & 5
• Continuous homogeneous archive from 1982
– more than 590.000 TM scenes archived at ESA over Europe
eurimage

Landsat 7: a Key Milestone

- The combination of a PAN (15 m), 6 Multispectral (30 m) and 1 Thermal (60 m) bands, with intrinsic native co-registration and absolute calibration overcomes many of the problems so far experienced by application users
- Landsat 7 will continue the Landsat legacy in medium resolution Earth Observation with the operational characteristics to enable consistent service

eurimage

Landsat 7: Panchromatic band

- Pan Band at 15 m resolution (the widest panchromatic frame of ever)
- Wide Pan Band extended towards near infrared (0.52-0.9 nm)
- Vegetation canopy identification
- Possibility of vegetation indexes (high reflectivity clusters)
- Better data fusion results with TM 432 bands (classic false colour)

eurimage

Landsat 7- Thermal band

- Unique Thermal Infrared band (10.4 - 12.5 nm) at 60 m resolution, with intrinsic native co-registration with Pan and 6 Multispectral bands
- Sea temperature and better land surface radiation budget
- Urban heat island and water heat stored
- Status monitoring of Alpine glaciers

eurimage

L7 Full Resolution Products

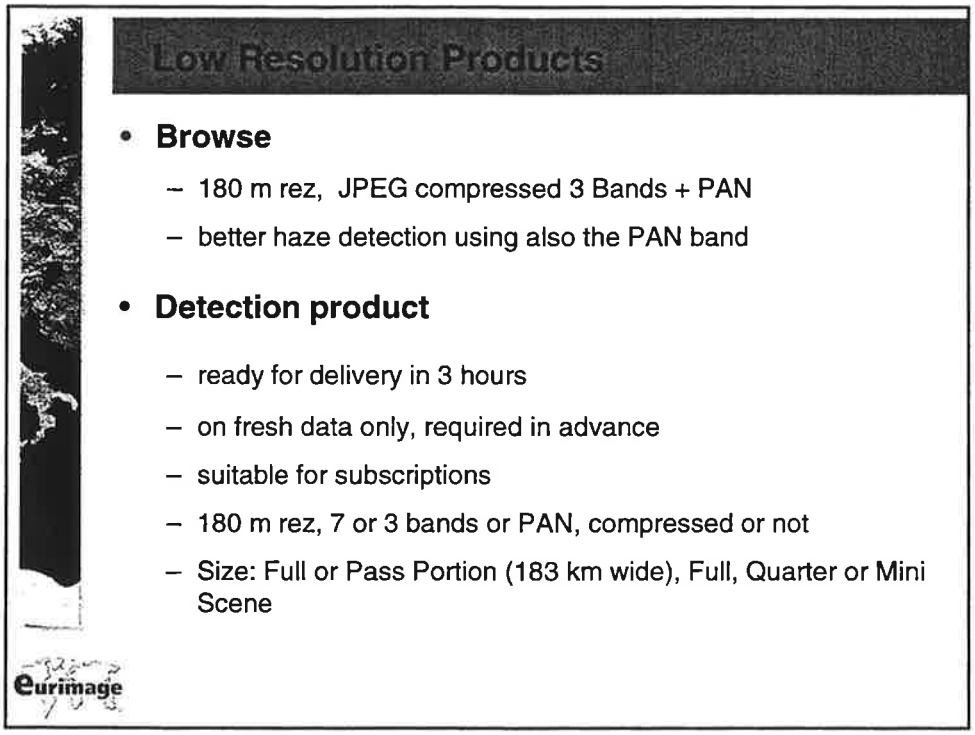
- **7 bands + PAN with sizes :**

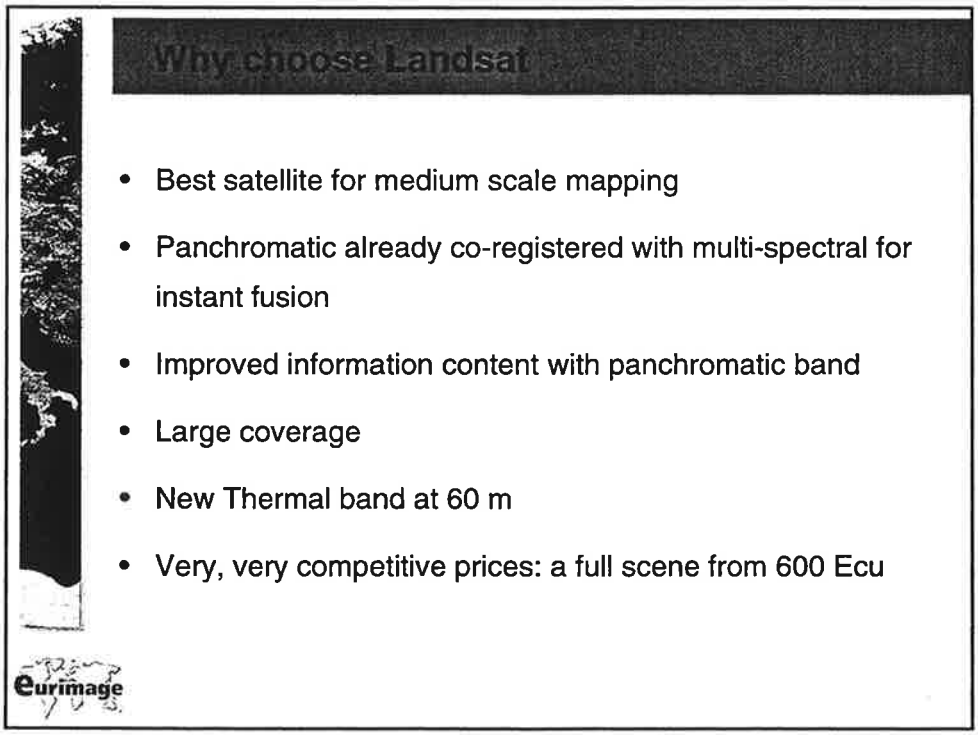
Full	(183 * 172 km)
Quarter	(94.5 * 88 km)
Mini	(54.6 * 54.6 km)
Micro	(25 * 25 km)

- **Public Relation**
  - ~ 1 Mpixel area (~ 4 Mpixel PAN)
  - 3 band or Pan product, system corrected compressed Jpeg
  - sizes :

183 * 172	km	180 m (pan 90 m)
94.5 * 88	km	90 m (pan 45 m)
54.6 * 54.6	km	60 m (pan 30 m)
25 * 25	km	30 m (pan 15 m)

eurimage


Low Resolution Products
• Browse
– 180 m rez, JPEG compressed 3 Bands + PAN
– better haze detection using also the PAN band
• Detection product
– ready for delivery in 3 hours
– on fresh data only, required in advance
– suitable for subscriptions
– 180 m rez, 7 or 3 bands or PAN, compressed or not
– Size: Full or Pass Portion (183 km wide), Full, Quarter or Mini Scene
eurimage

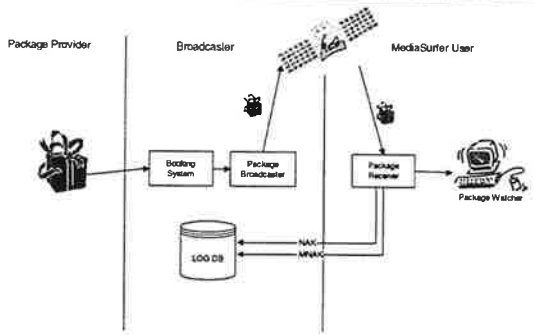

Why choose Landsat
• Best satellite for medium scale mapping
• Panchromatic already co-registered with multi-spectral for instant fusion
• Improved information content with panchromatic band
• Large coverage
• New Thermal band at 60 m
• Very, very competitive prices: a full scene from 600 Ecu
eurimage

User Fast Data Delivery

- For Particular Projects Landsat and ERS SAR full scenes had been successfully delivered via FTP
- Fast delivery data through our own software
- Under study BackWeb dissemination
- DVB Dissemination tests

eurimage

DVB Transmission



- Asynchronous delivery through UDP protocol
- Reserved or shared band
- Confirmed file delivery, with a return path

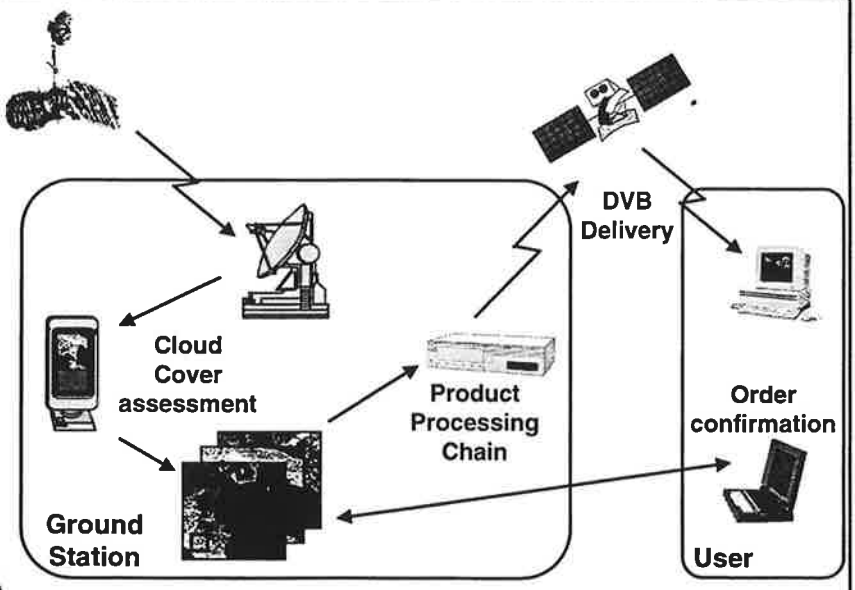
eurimage

DVB Transmission cont'd

- Successfully tested within Europe
- Easy system setup - completed in 2 hours
- Very low cost equipment needed: 1 standard PC, a commercial DVB card and a standard satellite television receiver antenna
- 100 Mbytes sent in 13' (pushed at 1 Mbit/s)
- Channel availability: up to 6 Mbit/s

eurimage

Future Near-Real-Time Projects: few hours cycle

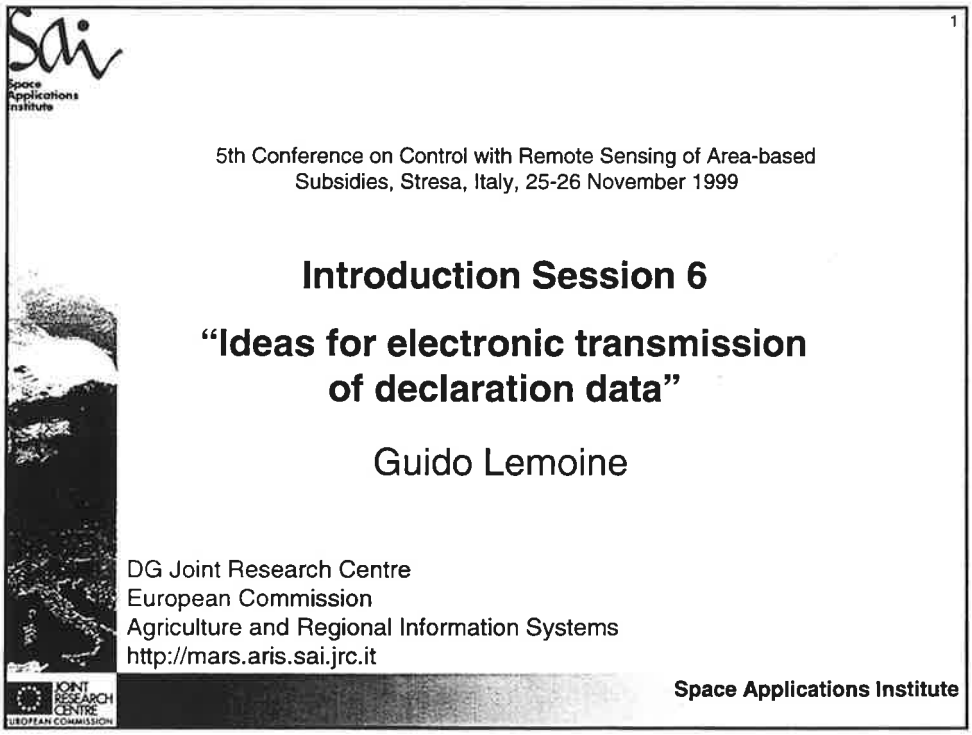


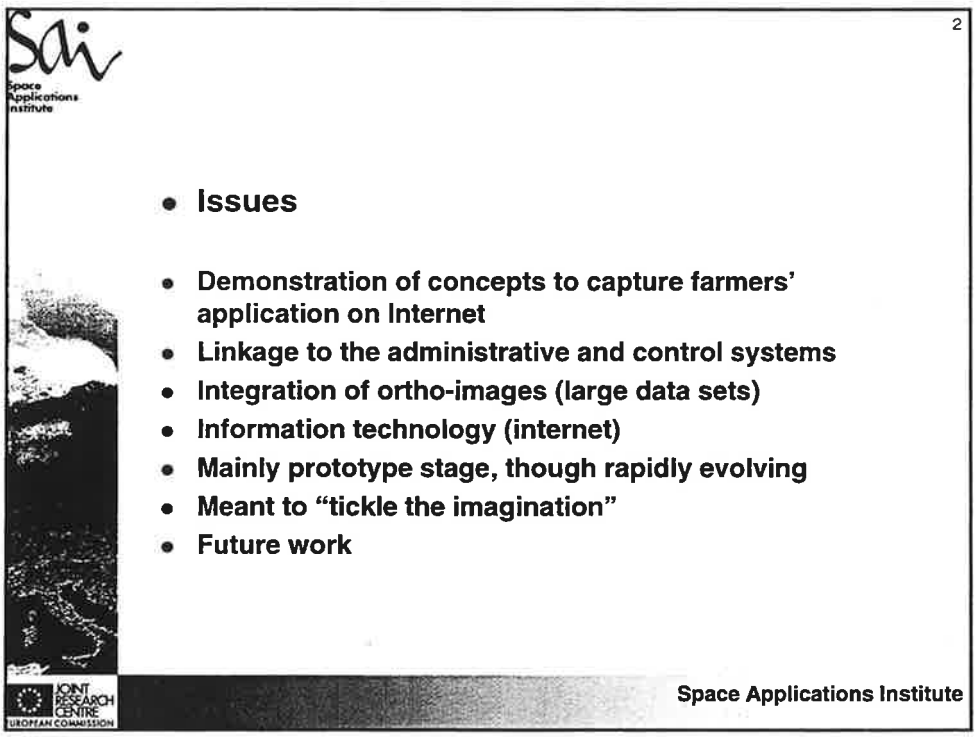
eurimage

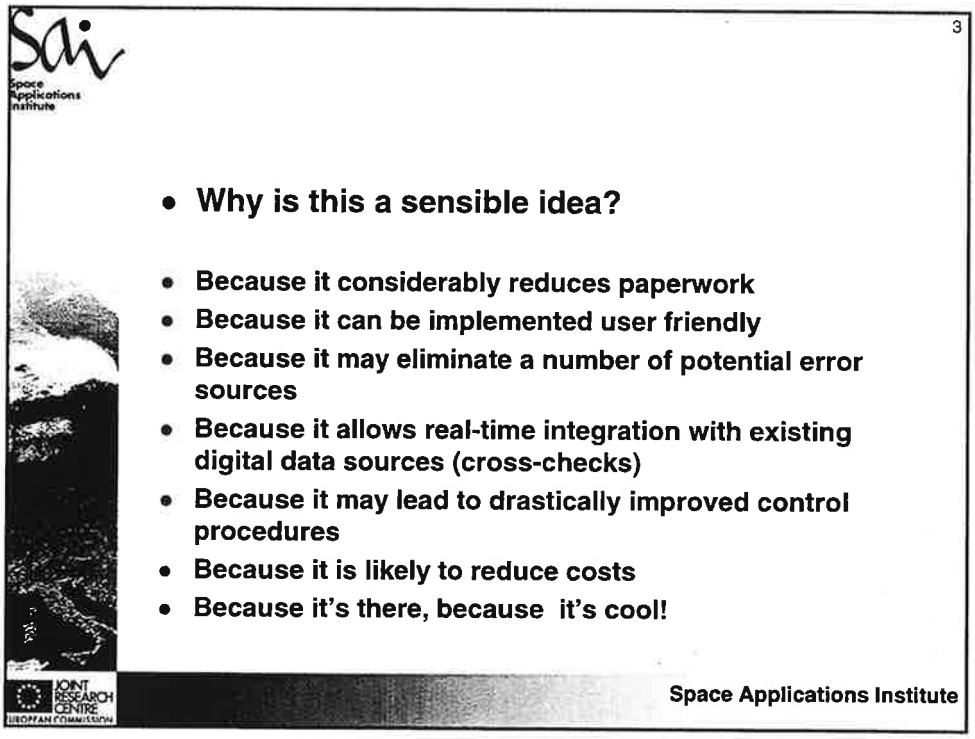
Session 6:

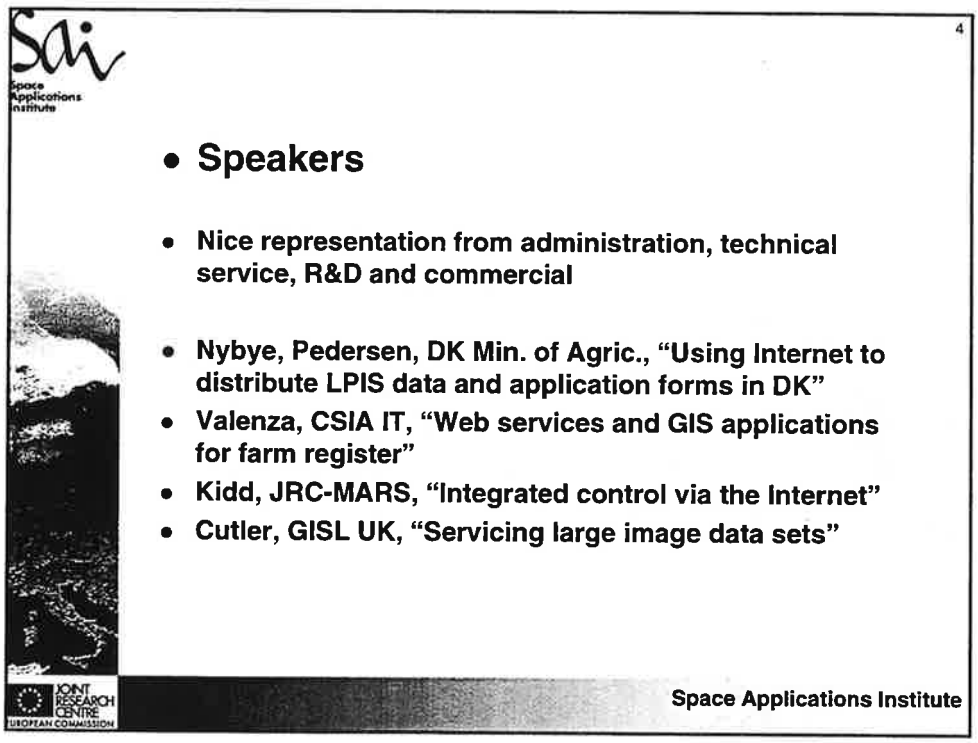
Ideas for Electronic Transmission of Declaration Data

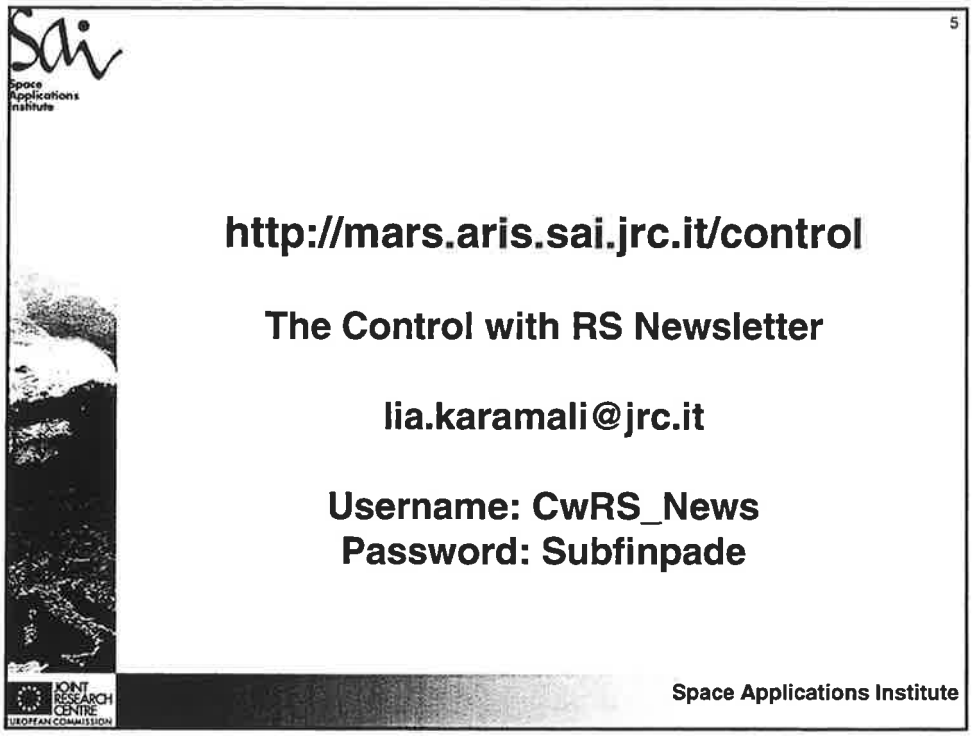
Introduction	G. Lemoine, JRC
Using Internet to distribute LPIS data and application forms in Denmark	K. Nybye, B. Pedersen, Min. (DK)
Web services and GIS applications for farm register	G. Valenza, CSIA (IT)
Integrated control via the Internet	R. Kidd, JRC
Serving large image data-sets	J. Cutler, GISL (UK)


1
Space Applications Institute
5th Conference on Control with Remote Sensing of Area-based Subsidies, Stresa, Italy, 25-26 November 1999
Introduction Session 6
"Ideas for electronic transmission of declaration data"
Guido Lemoine
DG Joint Research Centre
European Commission
Agriculture and Regional Information Systems
http://mars.aris.sai.jrc.it
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Space Applications Institute


2
Space Applications Institute
Issues
Demonstration of concepts to capture farmers' application on Internet
Linkage to the administrative and control systems
Integration of ortho-images (large data sets)
Information technology (internet)
Mainly prototype stage, though rapidly evolving
Meant to "tickle the imagination"
Future work
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Space Applications Institute


3
Space Applications Institute
• Why is this a sensible idea?
• Because it considerably reduces paperwork
• Because it can be implemented user friendly
• Because it may eliminate a number of potential error sources
• Because it allows real-time integration with existing digital data sources (cross-checks)
• Because it may lead to drastically improved control procedures
• Because it is likely to reduce costs
• Because it's there, because it's cool!
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


4
Space Applications Institute
• Speakers
• Nice representation from administration, technical service, R&D and commercial
• Nybye, Pedersen, DK Min. of Agric., "Using Internet to distribute LPIS data and application forms in DK"
• Valenza, CSIA IT, "Web services and GIS applications for farm register"
• Kidd, JRC-MARS, "Integrated control via the Internet"
• Cutler, GISL UK, "Servicing large image data sets"
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute


5
Sai
Space Applications Institute
http://mars.aris.sai.jrc.it/control
The Control with RS Newsletter
lia.karamali@jrc.it
Username: CwRS_News
Password: Subfinpade
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Space Applications Institute

Use of LPIS in the Remote Sensing controls

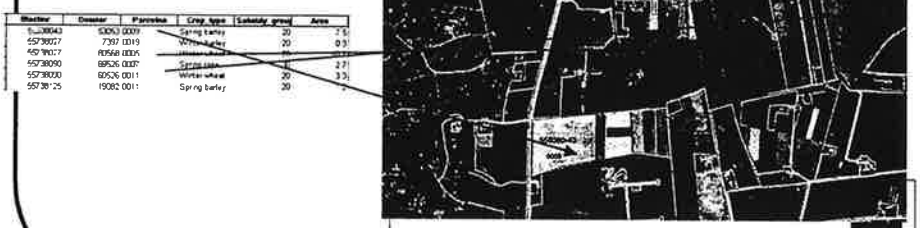
- History
- CABS
- Benefits/Problems with LPIS
- Future developments
- Other use of LPIS data

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

CABS - background data

- Tabular data

Ortho-photo maps



Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

CABS - background data

- Topographic maps
  - "Stable" digital features from 1995 or before: roads, fences, dikes, lakes, streams, railways and buildings
  - Inner field boundaries from 1995-1997 (prone to changes from year to year, but useful as guidelines)
  - Field block map revised every year - due to topographic changes
  - Future:
    - Digital field boundaries drawn by the farmers via the Internet

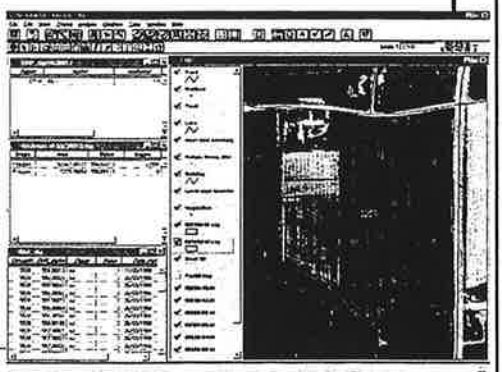
Digital ortho-photos

Satellite images

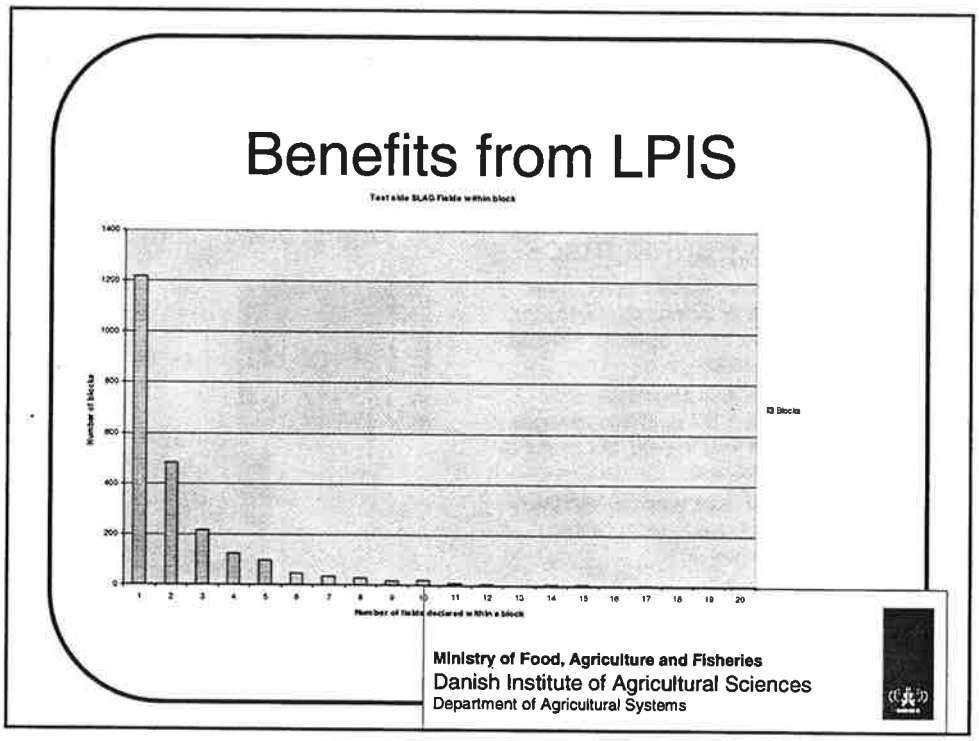
Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

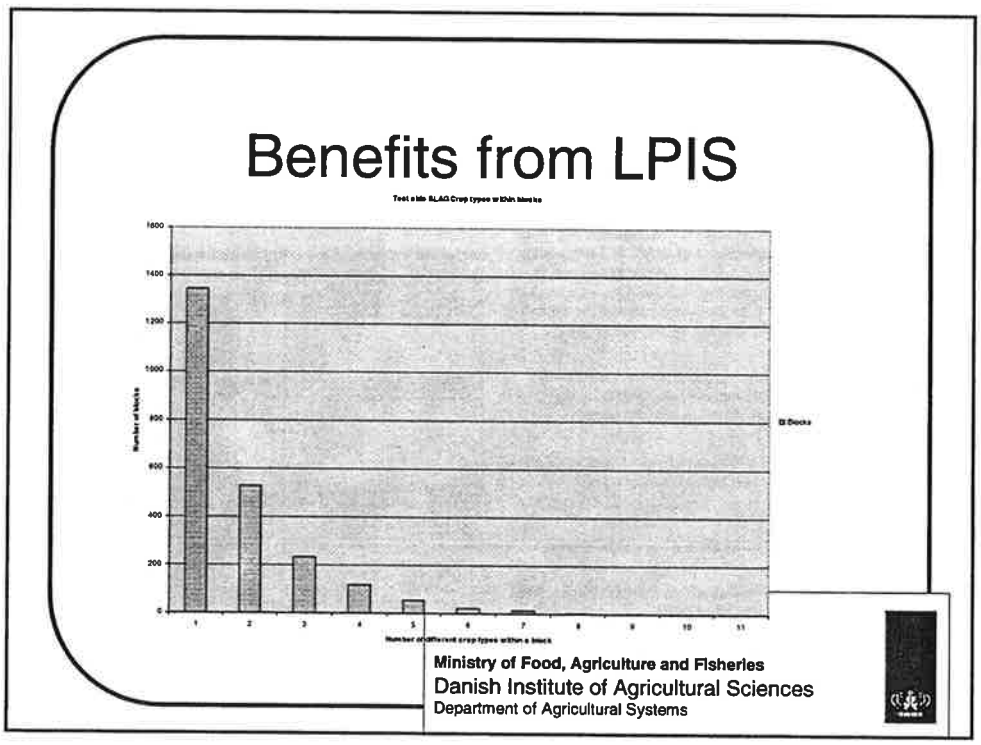
CABS - digitisation using LPIS

- The Field Block Map (LPIS) has found a wide range of applications at DIAS. In 1996 a tailor fitted software system, CABS, developed in house using ArcView/MS Access, was used for the first time for performing part of the control of area based subsidies by remote sensing.
- Today CABS is used for every aspect of the control: digitising, area verification, crop classification, reporting and mapping.
- The core of CABS is the Field Block Map (LPIS), guiding the flow of the subsidy control procedure.
- CABS is automated to a very high degree.
- CABS also makes use of the GLR/CHR (LPIS) register which stores yearly claims for subsidy from more than 60.000 farmers, information on husbandry and fertilisation etc.

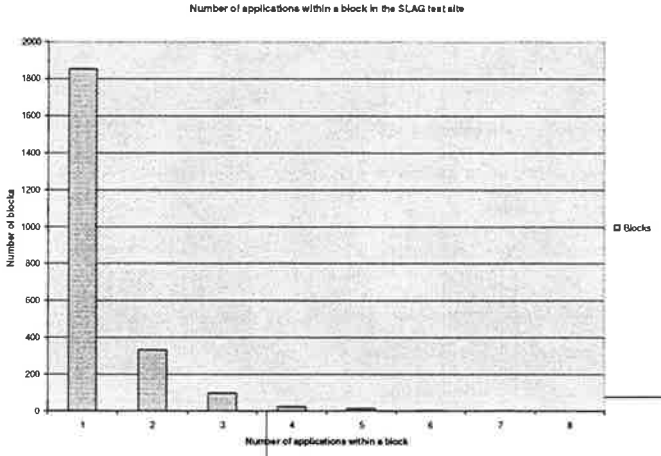


Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems


Benefits from LPIS
Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems


Benefits from LPIS
Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

Problems with LPIS?



Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

Future developments (automating the classification)

Crop type	All fields declared	T1	T2	T3	On-the-spot	Ort. Abs	Automatic found
Winter wheat	1741	340	212	180	132	54	15%
Spring barley	853	158	107	73	89	17	9%
Fallow with grass	726	171	102	58	34	24	8%
Grass in turn, not set aside	623	113	82	55	48	7	9%
Winter Barley	500	130	77	69	75	6	14%
Grass permanent	382	100	52	30		30	8%
Winter rape	334	72	47	39	60	11	12%
Rye	215	61	38	24	30	8	11%
Triticale	156	49	34	24	25	1	15%
Waste seed	130	21	13	4		4	3%
Peas	100	12	6	3	18	1/2	3%
Christmas trees	81	12	5	4		4	5%
Spring rape	68	14	11	8	14	6	12%
Mixed cereals	67	8	6	4		4	6%
Other	67	13	7	5		5	7%
Oat	62	14	9	6	7	1	10%
Seeds	58	14	9	9	8	1	16%
Spring barley	56	6	6	5		5	9%
Beets	43	1	1	1	6	1	2%
Linseed	36	19	12	9		9	25%
Spring wheat	27	2	3	2		2	7%
Maize	14	1				-	0%
Green fodder	14	1				-	0%
Potatoes	14	1				-	0%
Willow	9					-	0%
Cereals/Peas	8				4	4	0%
Winter barley	8					-	0%
Alfalfa	7				2	2	0%
Potatoes	7	3	3	3	2	1	43%
Winterwheat	5	1	1			-	0%
Game mixing	5					-	0%
Mixed Forest	4					-	0%
Rye	3					-	0%
Cabbage	2					-	0%
Oat	1					-	0%
Elephant grass	1					-	0%
Total	5931	1344	842	621	554	67	10%

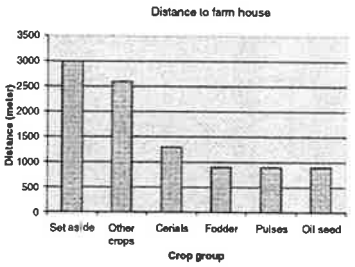
T1: All fields declared in a block belonging to the only declared crop type in the block
T2: -"- min. 90% applied for and max difference 0.4ha - Block > 4ha
T3: -"- min. 95% applied for and max difference 0.4ha - Blocks 4ha

- Today reference data for the classification is mostly found along the roads to avoid farmer involvement
- The table shows that if we (only) use the declared data, we get more reference data than using the "normal" procedure. And we also gets data from blocks long away from the roads without disturbing the farmers
- In the future we will use these farmer declared data for the dominating crops and concentrate the field work on the less dominating and less automatic found crops and we can use the data on a much earlier stage of the controls

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

Other use of the LPIS and subsidy data

- Research and Decision support
  - Changes in the behaviour of the farmers can be determined by comparing data from two or more years.
  - The digitised fields and declared crops can be compared with several topographic themes and surfaces (low areas, slopes, soil types, wet areas, protected area etc.) distances (buildings, roads, woods, lakes, streams etc.), natural resources
  - Comparison between the general agricultural register (GLR) and the central livestock register (CHR)
  - The block theme is used for many purposes at DIAS, with or without the crop information. All farmers know the block numbers of their fields and can use this as a positional reference. Decision support systems on the Internet will use this information in the near future for farmers to, via the Internet, report on their findings of potato late blight, aphids or other pests found on their fields.



Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences
Department of Agricultural Systems

Ministeriet for Fødevarer, Landbrug og Fiskeri
EU-direktoratet

History of application capture in Denmark

Data

- **1993** Application form
- **1994-95** Application form and T0 maps
- **1996-97** Electronic application programme on floppy disc. Electronic data capture, but paper form and field maps should be sent to EU-direktoratet.
- **1998** Download of application programme from central advisory service. Paper forms and field maps should be sent to EU-direktoratet. Manual data capture
- **1999** On-line application via Internet. Paper form and field maps should be sent to EU-direktoratet. Data capture directly from server. Project concerning digital signature, only field maps should be sent in to EU-direktoratet.
  Smart card constitutes proof of identity of applicant.
- **2000** On-line application via homepage on Internet. Paper form and field maps should be sent to EU-direktoratet.
- **Future** Electronic transmission of applications from applicant to administration, including "Field map" information.

Danish Market Management and Intervention Board
Kampmannsgade 3
DK-1780 Copenhagen V
Tel: + 45 33 92 70 00
Fax: + 45 33 92 69 48
E-post: eud@eud.dk

Ministeriet for Fødevarer, Landbrug og Fiskeri
EU-direktoratet

Maps

- **1993** Miscellaneous material, from free-hand drawings to Topographic (T0) maps
- **1994-95** T0 maps
- **1996** T0 maps with Blocks(LPIS), Pilot project orthophoto maps
- **1997-99** Orthophoto-maps 1,6 m precision from July 1995 flights including field blocks
- **2000** Orthophoto-maps 1,6 m from 1999 flight with field blocks. Pilot project: Field maps via Homepage link to ortophoto database, 0,4 m precision, 1999 flight.
- **Future** General access to ortophoto database via internet homepage link between the electronic application and the digital field maps

  Options for users: Easy access to extra field maps, zoom, digital drawing of field boundaries, measurements of fields, print of map segment, access to added informations concerning field blocks.
  Total electronic delivery of application

  Benefits for administration: Less to no field maps to plot, send, receive and store. By linking application and field block system (maps) less typing errors in the application.
  Saving money and becoming more efficient

Danish Market Management and Intervention Board
Kampmannsgade 3
DK-1780 Copenhagen V
Tel: + 45 33 92 70 00
Fax: + 45 33 92 69 48
E-post: eud@eud.dk

Ministeriet for Fødevarer, Landbrug og Fiskeri
EU-direktoratet

Building and updating of LPIS

- **Building**
  - Field blocks created based on digital informations from Topographic maps (T0) on "permanent boundaries".
  - Orthophoto flight 1995 used as supplement
  - more farmers possible in a fieldblock
  - max. 10 fields/field block

- **Updating**
  - Every year adjustments based on informations from applicants.
  - Partial systematical revision every year based on ortophoto's
  - New total ortophoto produced from 1999 flight

Use of LPIS data in the administration

- **Computerised cross check**
  - All field sizes from applications declared in a field block are put together and compared with size the field block
  - All applications with fields in a field block are flagged in case of overdeclaration

- **Error types**
  - Typing at the farmer
  - Typing at EUD
  - Misreading of block number

Danish Market Management and Intervention Board
Kampmannsgade 3
DK-1780 Copenhagen V
Tel: + 45 33 92 70 00
Fax: + 45 33 92 69 48
E-post: eud@eud.dk

Web services and GIS application for Farm Register

- **detail of layers held in AIMA's GIS**
- **live demos (we'll be connected to the net)**
- **things to come**

Detail of layers held in AIMA's GIS

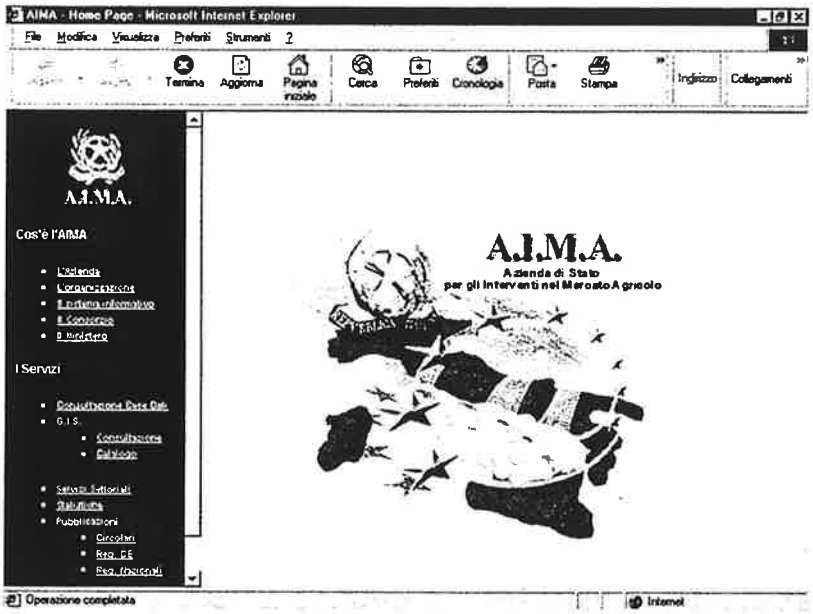
All layers are indexed via GIS:

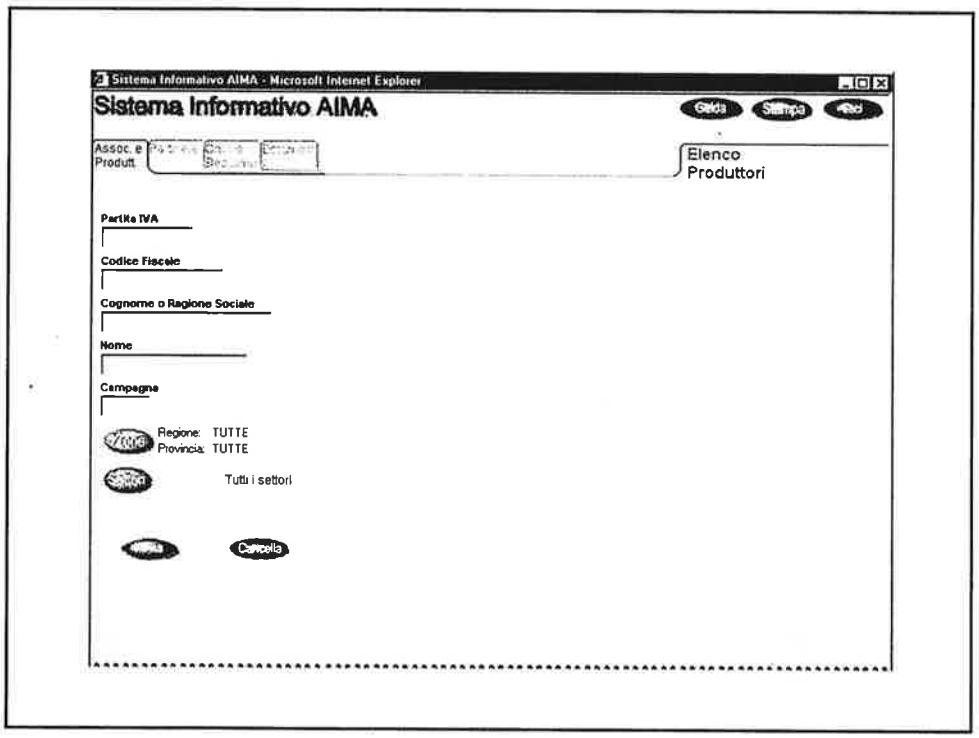
Aerial Photos (ortho corrected via DTM)
- **held on server via a multiresolution compression technique**
- **available in multi year layers, in order to allow time based analysis (this feature will be implemented soon)**
- **indexed via GIS**

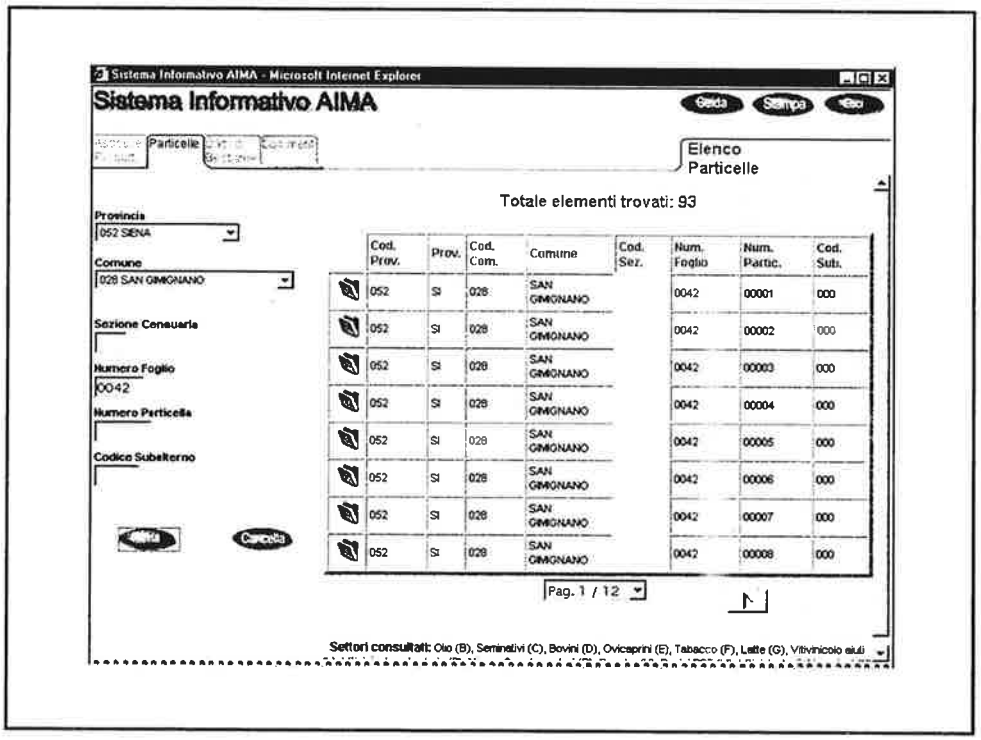
- **Cadastral data**
  - **used for indexing particles**
  - **updated on line**
- **Other more specific Layers**
  - **ineligible areas**
  - **olive plant dots**
  - **crop areas**
  - **vineyards**

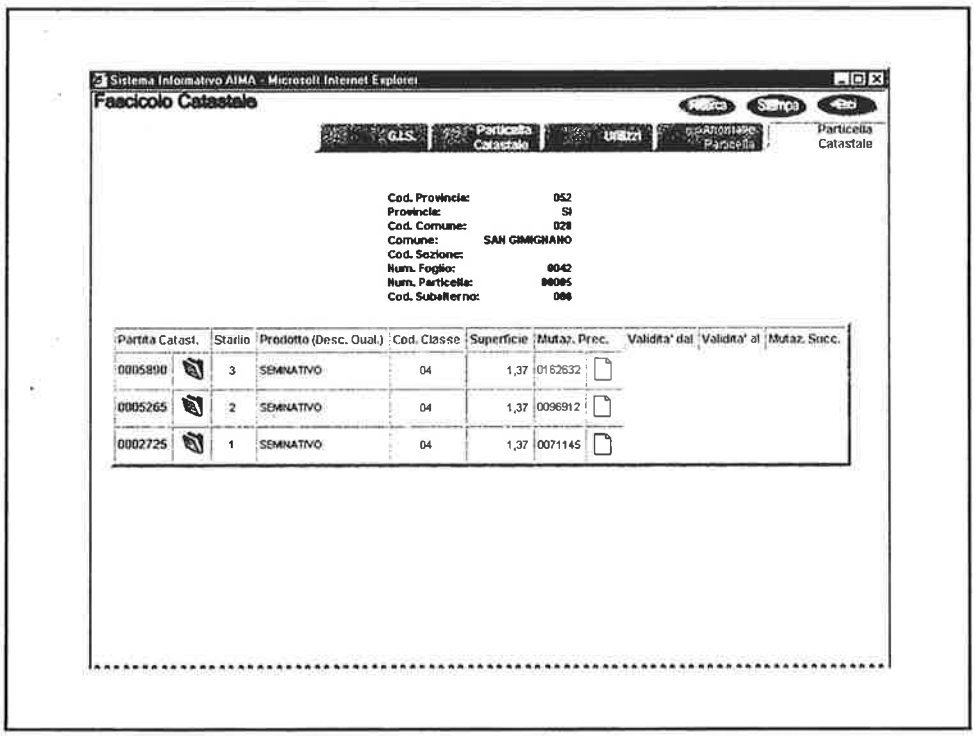
Live demos (we'll be connected to the net)

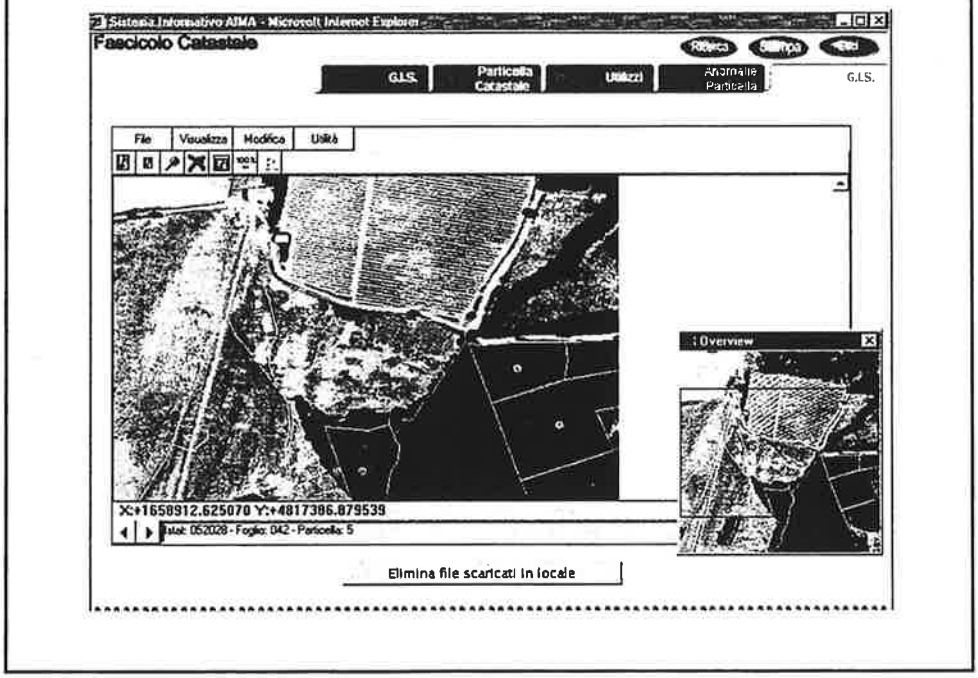
- **web based application using ActiveX technology, and local cache (Poggio Mirteto district)**
- **overview of prototipal AIMA's web Site (Farm Directory)**
- **navigation via browser (Siena district)**

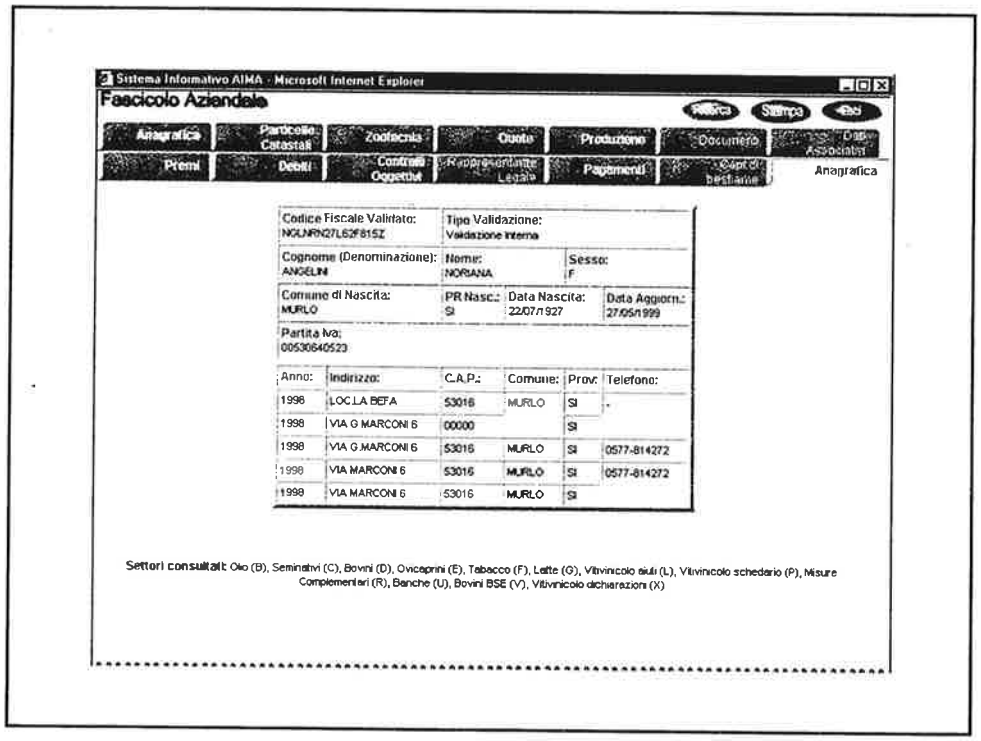


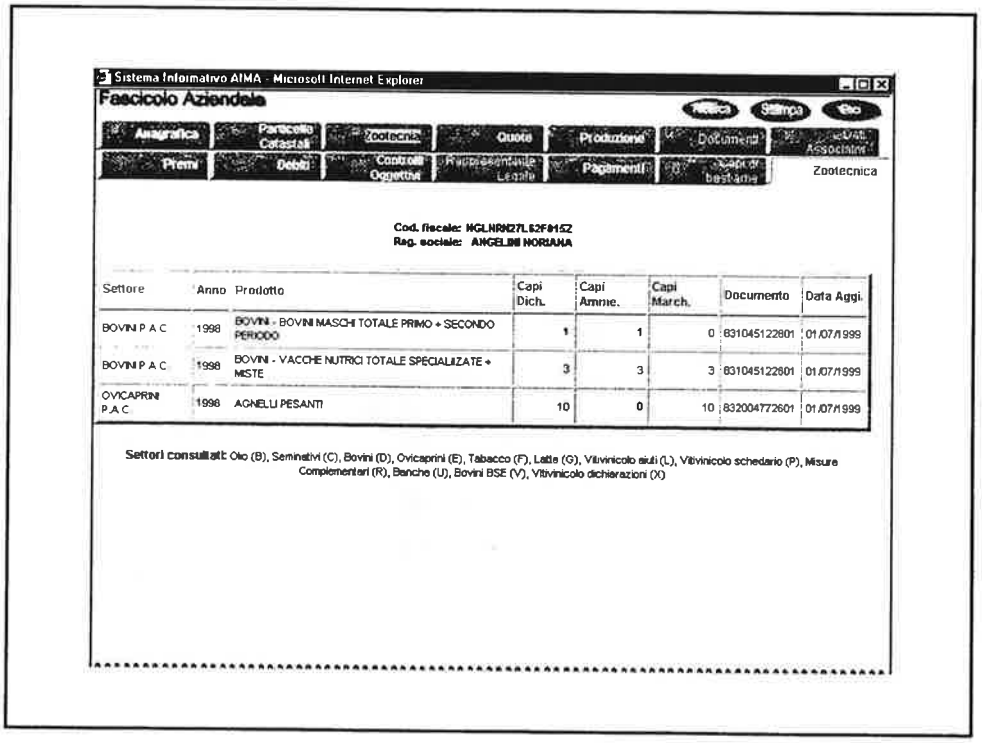

Sistema Informativo AIMA - Microsoft Internet Explorer
Sistema Informativo AIMA
Guida
Stampa
Esci
Assoc. e Produtt.
Elenco Produttori
Partita IVA
Codice Fiscale
Cognome o Ragione Sociale
Nome
Campagna
Regione: TUTTE
Provincia: TUTTE
Tutti i settori
Cancella

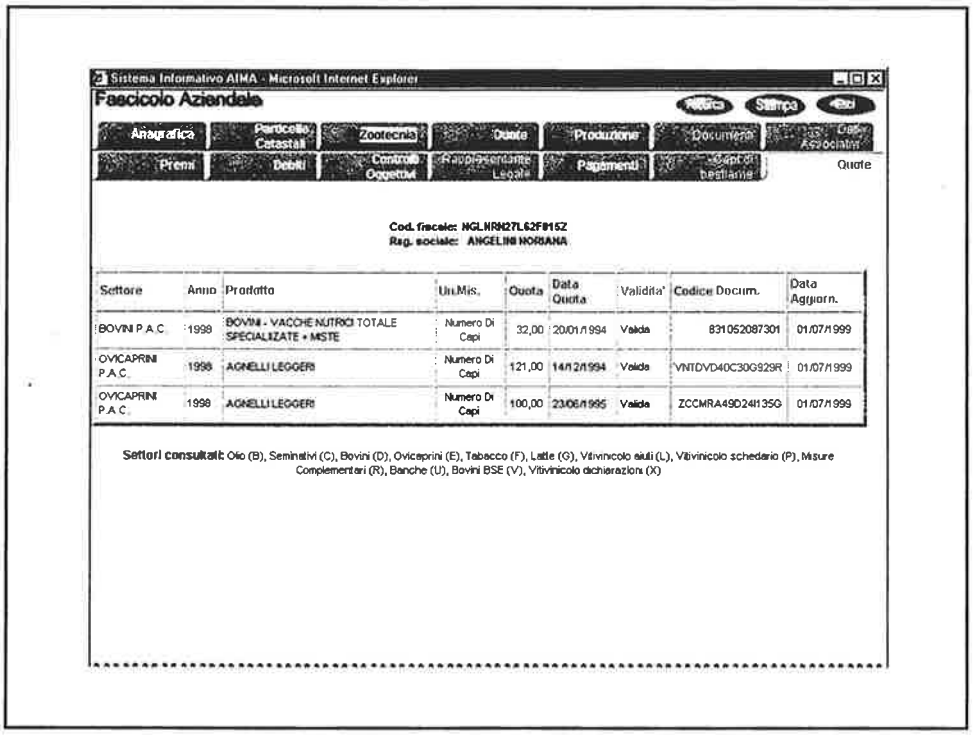

Sistema Informativo AIMA - Microsoft Internet Explorer
Sistema Informativo AIMA
Guida
Stampa
Esci
Particelle
Elenco Particelle
Totale elementi trovati: 93
Provincia
052 SIENA
Comune
028 SAN GIMIGNANO
Sezione Censuaria
Numero Foglio
0042
Numero Particella
Codice Subalterno
Cancella
Cod. Prov. | Prov. | Cod. Com. | Comune | Cod. Sez. | Num. Foglio | Num. Partic. | Cod. Sub.
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00001 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00002 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00003 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00004 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00005 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00006 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00007 | 000
052 | SI | 028 | SAN GIMIGNANO | | 0042 | 00008 | 000
Pag. 1 / 12
Settori consultati: Olio (B), Seminativi (C), Bovini (D), Ovicaprini (E), Tabacco (F), Latte (G), Vitivinicolo aiuti

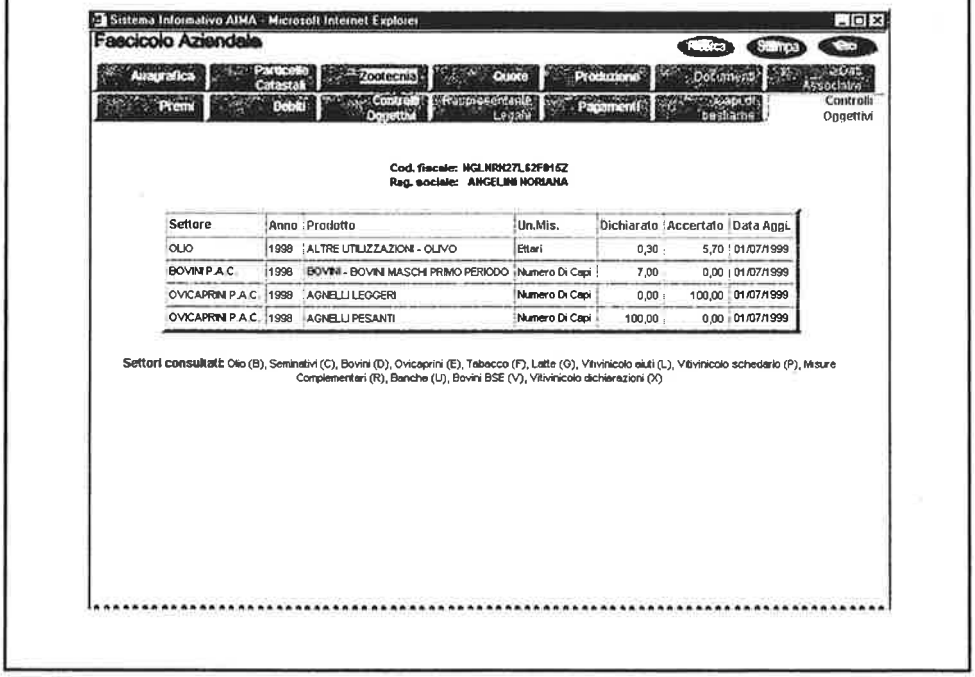

Sistema Informativo AIMA - Microsoft Internet Explorer
Fascicolo Catastale
Ricerca
Stampa
Esci
G.I.S.
Particella Catastale
Utilizzi
Anomalie Particella
Particella Catastale
Cod. Provincia: 052
Provincia: SI
Cod. Comune: 028
Comune: SAN GIMIGNANO
Cod. Sezione:
Num. Foglio: 0042
Num. Particella: 00005
Cod. Subalterno: 000
Partita Catast. | Stallo | Prodotto (Desc. Qual.) | Cod. Classe | Superficie | Mutaz. Prec. | Validita' dal | Validita' al | Mutaz. Succ.
0005890 | 3 | SEMINATIVO | 04 | 1,37 | 0162632
0005265 | 2 | SEMINATIVO | 04 | 1,37 | 0096912
0002725 | 1 | SEMINATIVO | 04 | 1,37 | 0071145

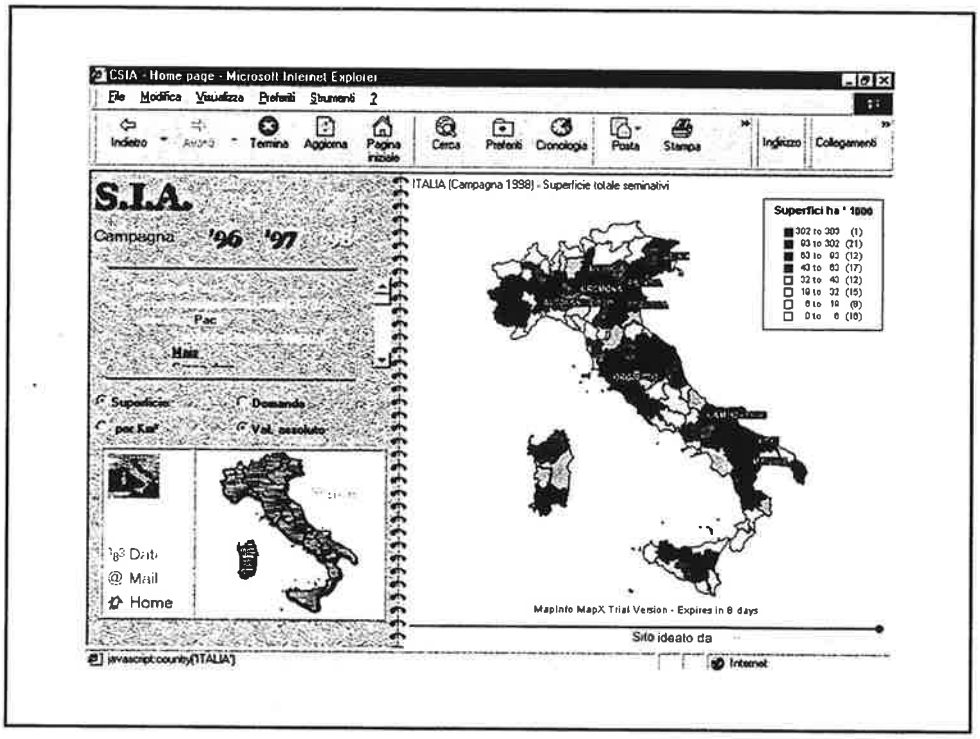

Sistema Informativo AIMA - Microsoft Internet Explorer
Fascicolo Catastale
Ricerca
Stampa
Esci
G.I.S.
Particella Catastale
Utilizzi
Anomalie Particella
G.I.S.
File
Visualizza
Modifica
Utilità
Overview
X:+1658912.625070 Y:+4817386.879539
Mod: 052028 - Foglio: 042 - Particella: 5
Elimina file scaricati in locale

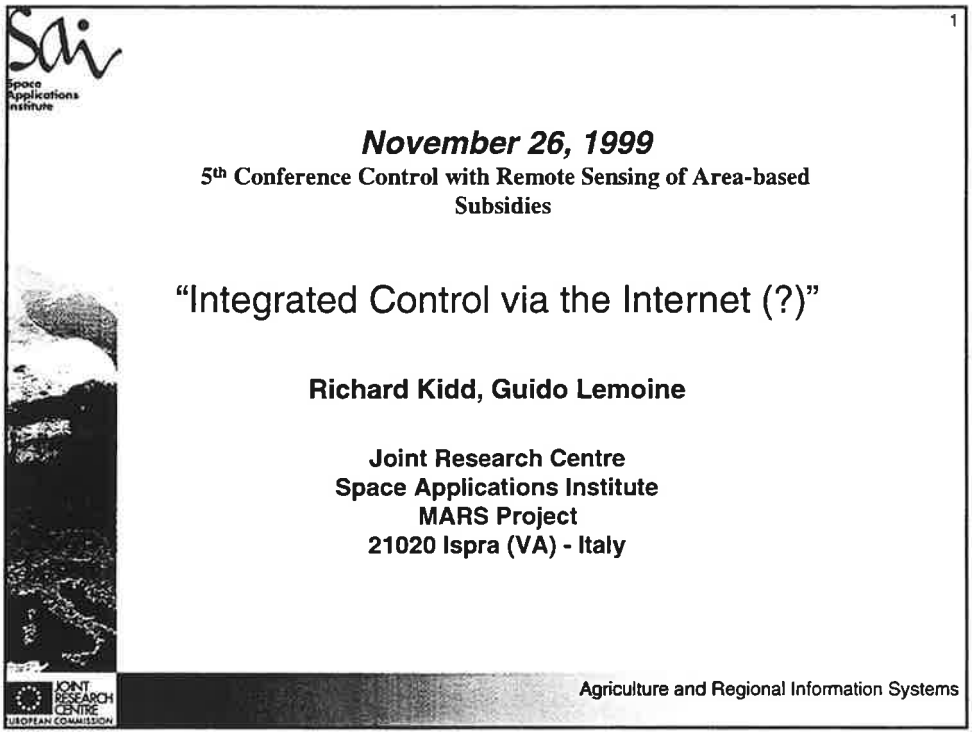

Sistema Informativo AIMA - Microsoft Internet Explorer
Fascicolo Aziendale
Anagrafica
Particelle Catastali
Zootecnia
Quote
Produzione
Documenti
Premi
Debiti
Controlli Oggettivi
Pagamenti
Anagrafica
Codice Fiscale Validato: NGLNRN27L62F815Z
Tipo Validazione: Validazione Interna
Cognome (Denominazione): ANGELINI
Nome: NORIANA
Sesso: F
Comune di Nascita: MURLO
PR Nasc.: SI
Data Nascita: 22/07/1927
Data Aggiorn.: 27/05/1999
Partita Iva: 00530640523
Anno: Indirizzo: C.A.P.: Comune: Prov: Telefono:
1998 LOC.LA BEFA 53016 MURLO SI -
1998 VIA G.MARCONI 6 00000 SI
1998 VIA G.MARCONI 6 53016 MURLO SI 0577-814272
1998 VIA MARCONI 6 53016 MURLO SI 0577-814272
1998 VIA MARCONI 6 53016 MURLO SI
Settori consultati: Olio (B), Seminativi (C), Bovini (D), Ovicaprini (E), Tabacco (F), Latte (G), Vitivinicolo aiuti (L), Vitivinicolo schedario (P), Misure Complementari (R), Banche (U), Bovini BSE (V), Vitivinicolo dichiarazioni (X)

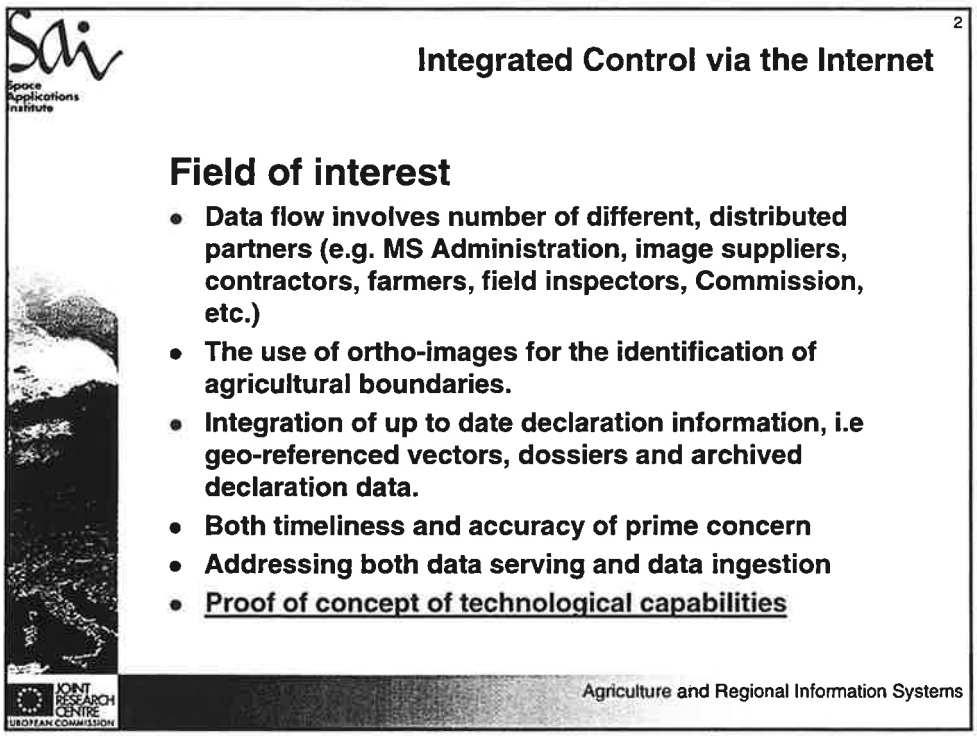

Sistema Informativo AIMA - Microsoft Internet Explorer
Fascicolo Aziendale
Anagrafica
Particelle Catastali
Zootecnia
Quote
Produzione
Documenti
Premi
Debiti
Controlli Oggettivi
Pagamenti
Zootecnica
Cod. fiscale: NGLNRN27L62F815Z
Rag. sociale: ANGELINI NORIANA
Settore Anno Prodotto Capi Dich. Capi Amme. Capi March. Documento Data Aggi.
BOVINI P.A.C. 1998 BOVINI - BOVINI MASCHI TOTALE PRIMO + SECONDO PERIODO 1 1 0 831045122801 01/07/1999
BOVINI P.A.C. 1998 BOVINI - VACCHE NUTRICI TOTALE SPECIALIZZATE + MISTE 3 3 3 831045122801 01/07/1999
OVICAPRINI P.A.C. 1998 AGNELLI PESANTI 10 0 10 832004772601 01/07/1999
Settori consultati: Olio (B), Seminativi (C), Bovini (D), Ovicaprini (E), Tabacco (F), Latte (G), Vitivinicolo aiuti (L), Vitivinicolo schedario (P), Misure Complementari (R), Banche (U), Bovini BSE (V), Vitivinicolo dichiarazioni (X)

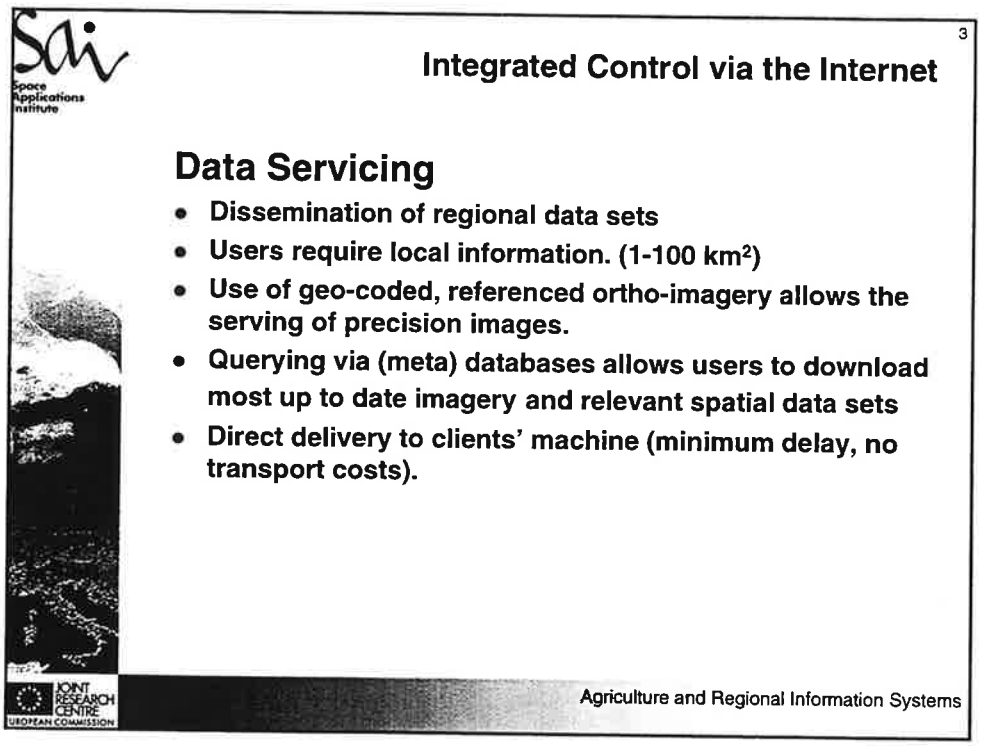

Sistema Informativo AIMA - Microsoft Internet Explorer
Fascicolo Aziendale
Anagrafica
Particelle Catastali
Zootecnia
Quote
Produzione
Documenti
Dati Associativi
Premi
Debiti
Controlli Oggettivi
Rappresentante Legale
Pagamenti
Aspetti Gestionali
Quote
Cod. fiscale: NGLNRN27L62F815Z
Rag. sociale: ANGELINI NORIANA
Settore | Anno | Prodotto | Un.Mis. | Quota | Data Quota | Validita' | Codice Docum. | Data Aggiorn.
BOVINI P.A.C. | 1998 | BOVINI - VACCHE NUTRICI TOTALE SPECIALIZZATE + MISTE | Numero Di Capi | 32,00 | 20/01/1994 | Valida | 831052087301 | 01/07/1999
OVICAPRINI P.A.C. | 1998 | AGNELLI LEGGERI | Numero Di Capi | 121,00 | 14/12/1994 | Valida | VNTDVD40C30G929R | 01/07/1999
OVICAPRINI P.A.C. | 1998 | AGNELLI LEGGERI | Numero Di Capi | 100,00 | 23/06/1995 | Valida | ZCCMRA49D24H35G | 01/07/1999
Settori consultati: Olio (B), Seminativi (C), Bovini (D), Ovicaprini (E), Tabacco (F), Latte (G), Vitivinicolo aiuti (L), Vitivinicolo schedario (P), Misure Complementari (R), Banche (U), Bovini BSE (V), Vitivinicolo dichiarazioni (X)

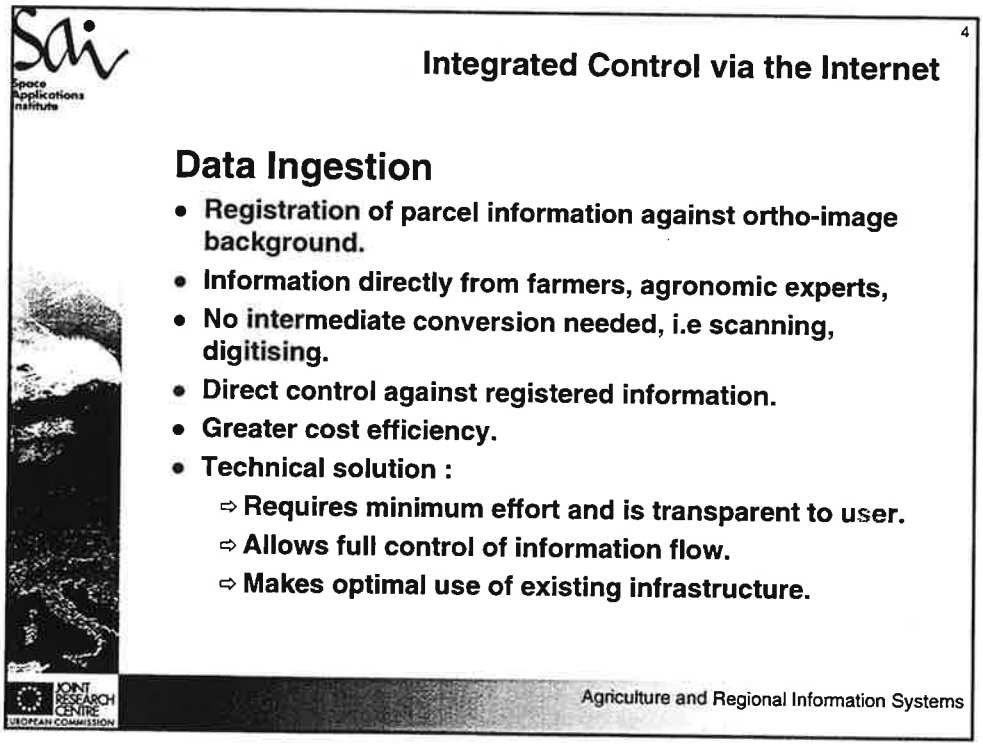

Sistema Informativo AIMA - Microsoft Internet Explorer
Fascicolo Aziendale
Anagrafica
Particelle Catastali
Zootecnia
Quote
Produzione
Documenti
Dati Associativi
Premi
Debiti
Controlli Oggettivi
Rappresentante Legale
Pagamenti
Aspetti Gestionali
Controlli Oggettivi
Cod. fiscale: NGLNRN27L62F815Z
Rag. sociale: ANGELINI NORIANA
Settore | Anno | Prodotto | Un.Mis. | Dichiarato | Accertato | Data Aggi.
OLIO | 1998 | ALTRE UTILIZZAZIONI - OLIVO | Ettari | 0,30 | 5,70 | 01/07/1999
BOVINI P.A.C. | 1998 | BOVINI - BOVINI MASCHI PRIMO PERIODO | Numero Di Capi | 7,00 | 0,00 | 01/07/1999
OVICAPRINI P.A.C. | 1998 | AGNELLI LEGGERI | Numero Di Capi | 0,00 | 100,00 | 01/07/1999
OVICAPRINI P.A.C. | 1998 | AGNELLI PESANTI | Numero Di Capi | 100,00 | 0,00 | 01/07/1999
Settori consultati: Olio (B), Seminativi (C), Bovini (D), Ovicaprini (E), Tabacco (F), Latte (G), Vitivinicolo aiuti (L), Vitivinicolo schedario (P), Misure Complementari (R), Banche (U), Bovini BSE (V), Vitivinicolo dichiarazioni (X)

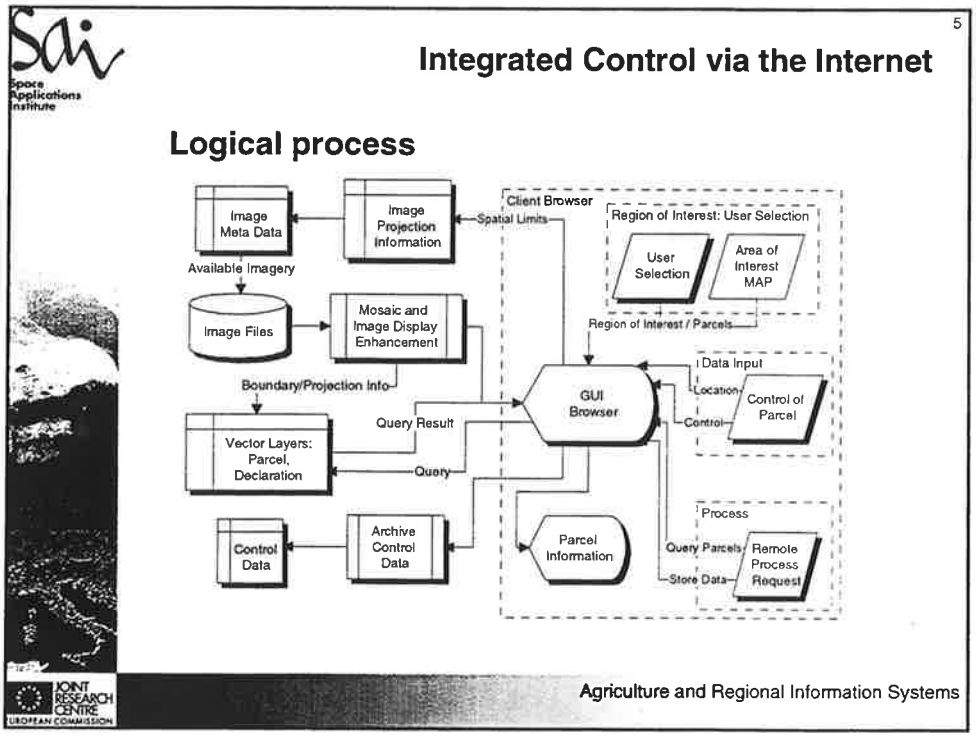

CSIA - Home page - Microsoft Internet Explorer
File Modifica Visualizza Preferiti Strumenti ?
Indietro Termina Aggiorna Pagina iniziale Cerca Preferiti Cronologia Posta Stampa Indirizzo Collegamenti
S.I.A.
Campagna '96 '97
Pac
Mais
Superficie
Domanda
per Kal*
Val. assoluto
Mail
Home
ITALIA (Campagna 1998) - Superficie totale seminativi
Superfici ha * 1000
302 to 303 (1)
93 to 302 (21)
63 to 93 (12)
43 to 63 (17)
33 to 43 (12)
18 to 33 (15)
8 to 18 (8)
0 to 8 (16)
MapInfo MapX Trial Version - Expires in 8 days
Sito ideato da
javascript:county('ITALIA')
Internet

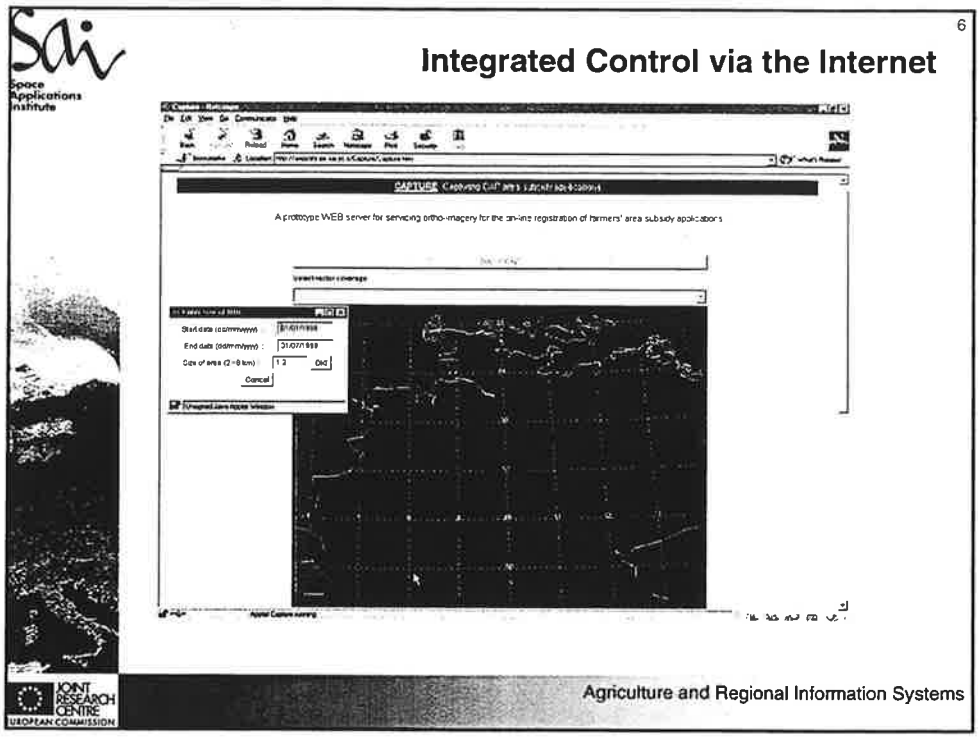

1
Space Applications Institute
November 26, 1999
5th Conference Control with Remote Sensing of Area-based Subsidies
"Integrated Control via the Internet (?)"
Richard Kidd, Guido Lemoine
Joint Research Centre
Space Applications Institute
MARS Project
21020 Ispra (VA) - Italy
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture and Regional Information Systems

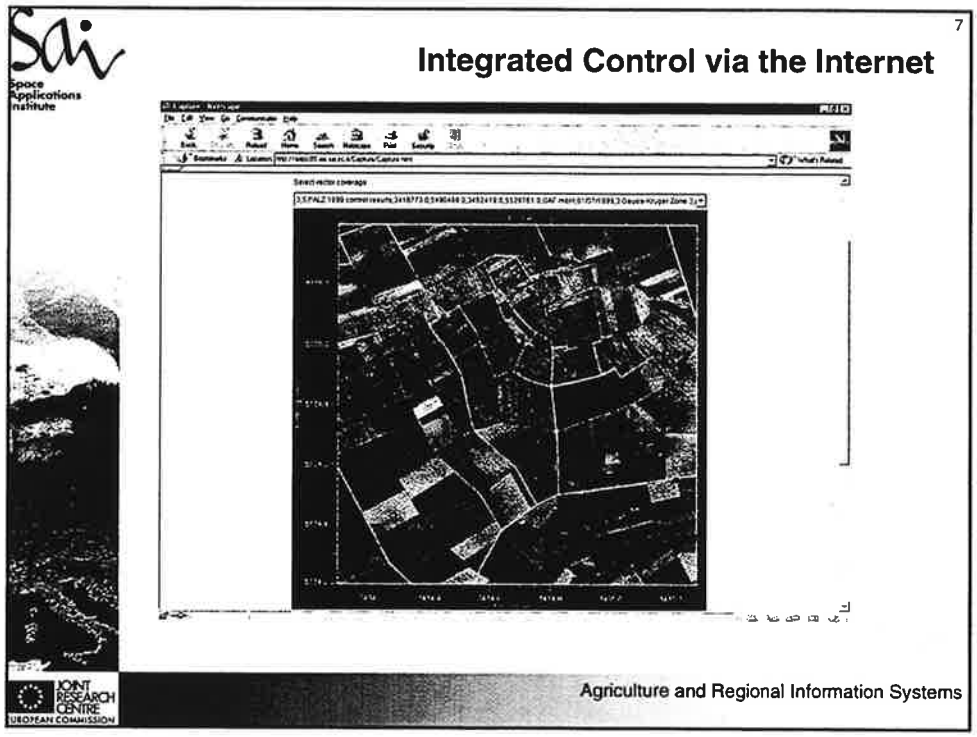

2
Space Applications Institute
Integrated Control via the Internet
Field of interest
Data flow involves number of different, distributed partners (e.g. MS Administration, image suppliers, contractors, farmers, field inspectors, Commission, etc.)
The use of ortho-images for the identification of agricultural boundaries.
Integration of up to date declaration information, i.e geo-referenced vectors, dossiers and archived declaration data.
Both timeliness and accuracy of prime concern
Addressing both data serving and data ingestion
Proof of concept of technological capabilities
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture and Regional Information Systems

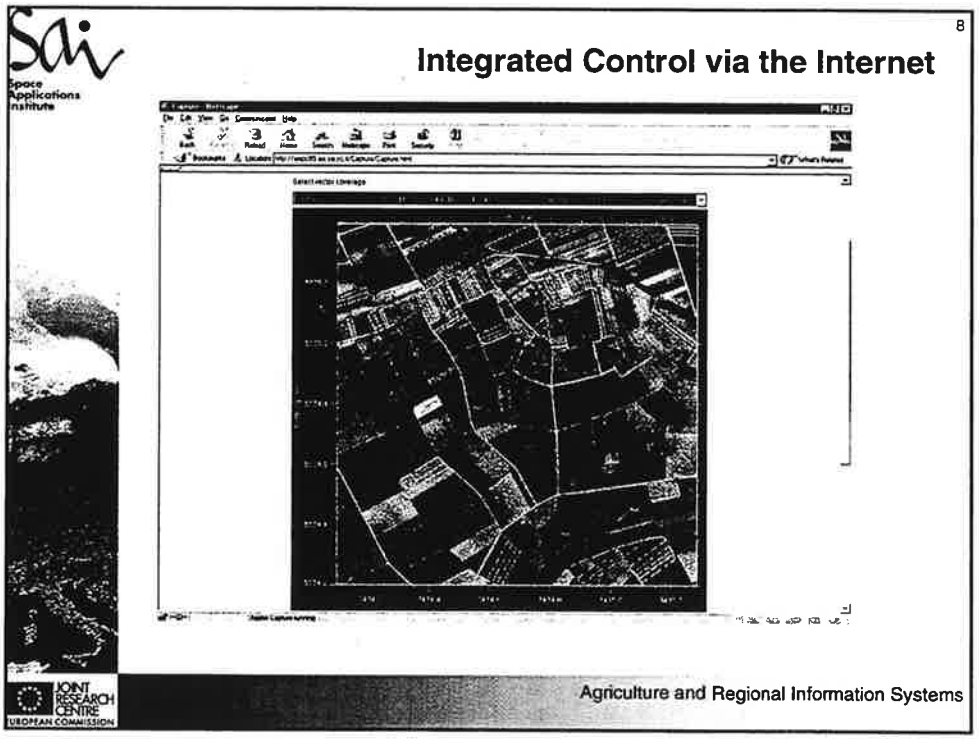

3
Integrated Control via the Internet
Data Servicing
• Dissemination of regional data sets
• Users require local information. (1-100 km²)
• Use of geo-coded, referenced ortho-imagery allows the serving of precision images.
• Querying via (meta) databases allows users to download most up to date imagery and relevant spatial data sets
• Direct delivery to clients' machine (minimum delay, no transport costs).
Agriculture and Regional Information Systems

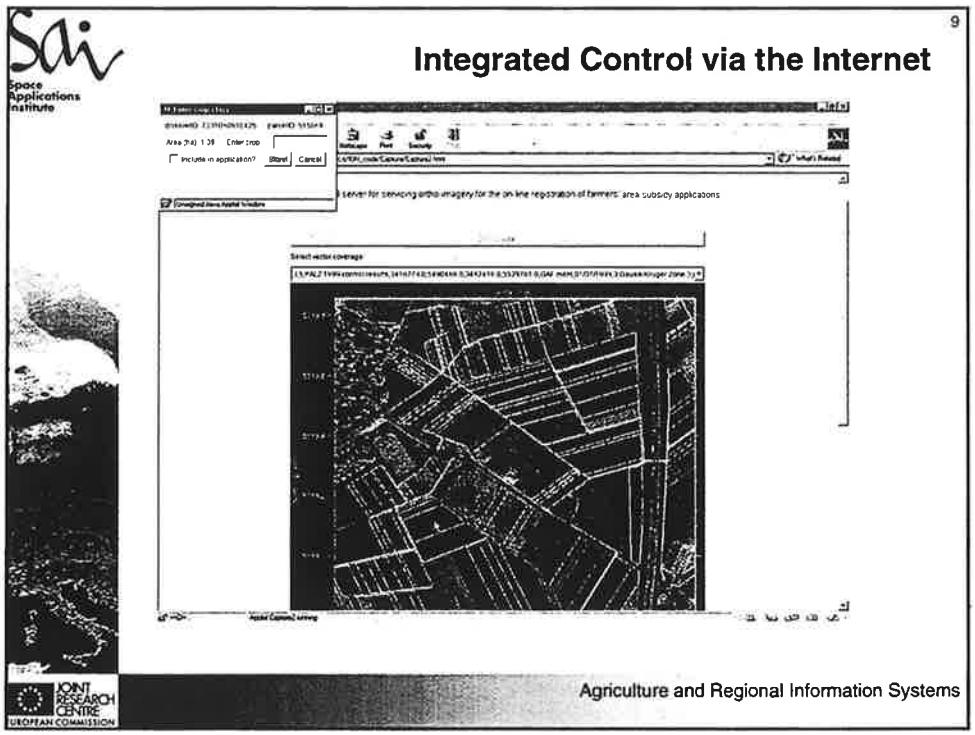

4
Integrated Control via the Internet
Data Ingestion
• Registration of parcel information against ortho-image background.
• Information directly from farmers, agronomic experts,
• No intermediate conversion needed, i.e scanning, digitising.
• Direct control against registered information.
• Greater cost efficiency.
• Technical solution :
⇨ Requires minimum effort and is transparent to user.
⇨ Allows full control of information flow.
⇨ Makes optimal use of existing infrastructure.
Agriculture and Regional Information Systems

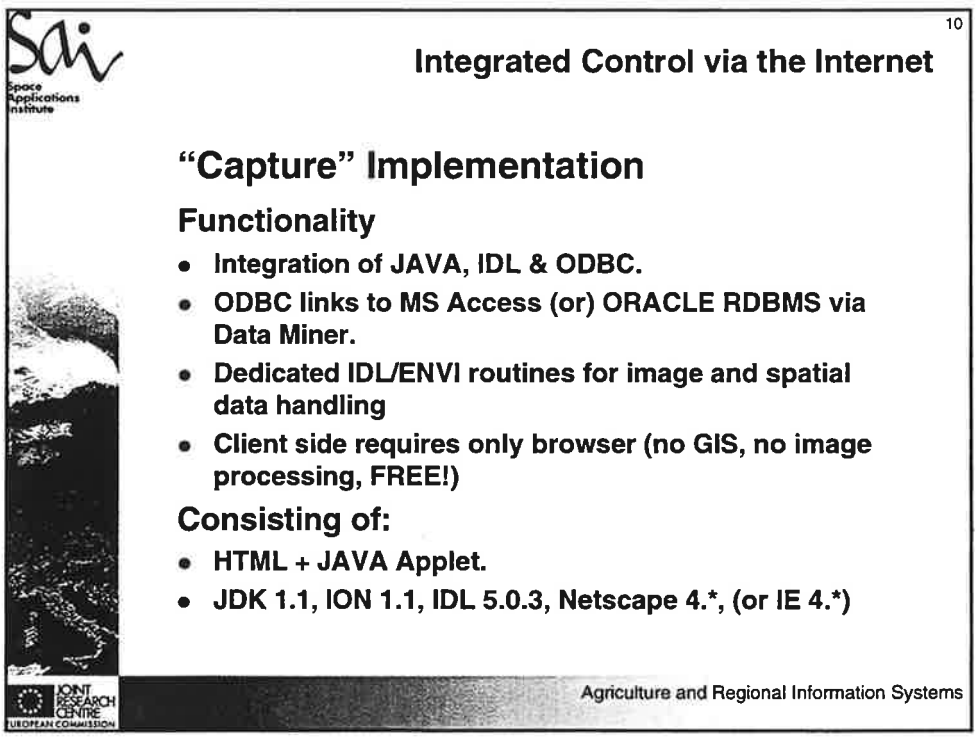

5
Integrated Control via the Internet
Logical process
Image Meta Data
Image Projection Information
Client Browser
Spatial Limits
Region of Interest: User Selection
User Selection
Area of Interest MAP
Available Imagery
Image Files
Mosaic and Image Display Enhancement
Region of Interest / Parcels
Data Input
Location
Control of Parcel
Boundary/Projection Info
GUI Browser
Control
Query Result
Vector Layers: Parcel, Declaration
Query
Process
Control Data
Archive Control Data
Parcel Information
Query Parcels
Remote Process Request
Store Data
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems

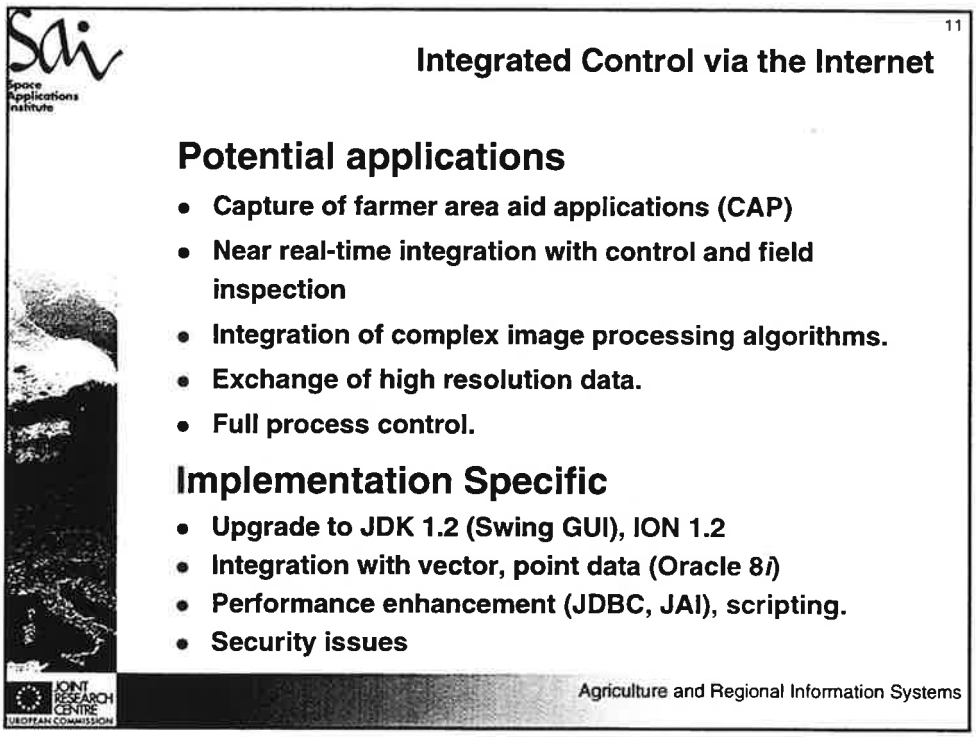

6
Integrated Control via the Internet
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems


7
Integrated Control via the Internet
Space Applications Institute
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems


8
Integrated Control via the Internet
Space Applications Institute
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems


9
Integrated Control via the Internet
Space Applications Institute
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems


10
Integrated Control via the Internet
Space Applications Institute
"Capture" Implementation
Functionality
• Integration of JAVA, IDL & ODBC.
• ODBC links to MS Access (or) ORACLE RDBMS via Data Miner.
• Dedicated IDL/ENVI routines for image and spatial data handling
• Client side requires only browser (no GIS, no image processing, FREE!)
Consisting of:
• HTML + JAVA Applet.
• JDK 1.1, ION 1.1, IDL 5.0.3, Netscape 4.*, (or IE 4.*)
JOINT RESEARCH CENTRE
EUROPEAN COMMISSION
Agriculture and Regional Information Systems


11
Integrated Control via the Internet
Space Applications Institute
Potential applications
• Capture of farmer area aid applications (CAP)
• Near real-time integration with control and field inspection
• Integration of complex image processing algorithms.
• Exchange of high resolution data.
• Full process control.
Implementation Specific
• Upgrade to JDK 1.2 (Swing GUI), ION 1.2
• Integration with vector, point data (Oracle 8i)
• Performance enhancement (JDBC, JAI), scripting.
• Security issues
JOINT RESEARCH CENTRE EUROPEAN COMMISSION
Agriculture and Regional Information Systems

5th Conference on

Control with Remote Sensing of Area-Based Subsidies

Serving Large Image Data Sets

James Cutler and Justin Saunders

GISL Limited

26th November 1999

www.gisl.co.uk

GI

Serving Large Image Data Sets

- The Scenario
  - multi-user access to large image data sets
  - overlapping use of the data sets
  - integration with existing vector data sets
  - cost minimisation
  - management and administration overhead
  - communicate and disseminate results

GI

Serving Large Image Data Sets

- Current Approach
  - duplication of data sets to/by contractors and national administrations
  - individual access at any one time
  - reduced ability to exploit opportunities to integrate different data sets and communicate results
  - substantial time and cost overhead

GI

Serving Large Image Data Sets

- Why Change?
  - improve security and control over data
  - improve integrity
  - enable area aid application completion by on-line farmers
  - improve cost-efficiencies
  - increase speed of operation
  - exploit new/emerging technologies and tools

GI

Serving Large Image Data Sets

- Technology
  - compression (uses wavelet domain)
  - serving (hardware, communications)
  - decompression (at user end, on-the-fly, only according to need)
  - open systems required (for GIS and customised software development)

GI

Applications

A closer look at applications

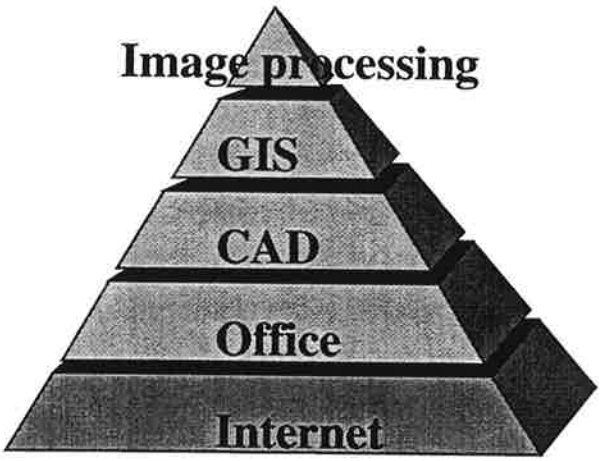
- People need to work with imagery within their existing applications
- Mass market access does not require raw data, simply locationally accurate and informative data
- Applications include web browsers, MS Office, CAD and GIS applications
- All can benefit from using Enhanced Compressed Wavelet (ECW) technology

GI

Applications

Users of imagery

# of Users	Application
50,000	Image processing
500,000	GIS
5,000,000	CAD
50,000,000	Office
200,000,000	Internet



GI

Applications

How do we handle TB images?

- Data volumes are growing rapidly
- Must be accessible to all users
- People need access via their standard tools (GIS, CAD, Office and Web products)
- Compression and Internet offer new ways to distribute and use imagery

GI

Serving Large Image Data Sets

- How?
  - historically - could not - tools and technology neither available or used
  - currently - two+ options - use compression
    - Image Web Server and ECW
    - MrSID Web Server
    - JPEG 2000?
  - future - GIS web serving with efficient image handling option on-line

GI

Real world examples

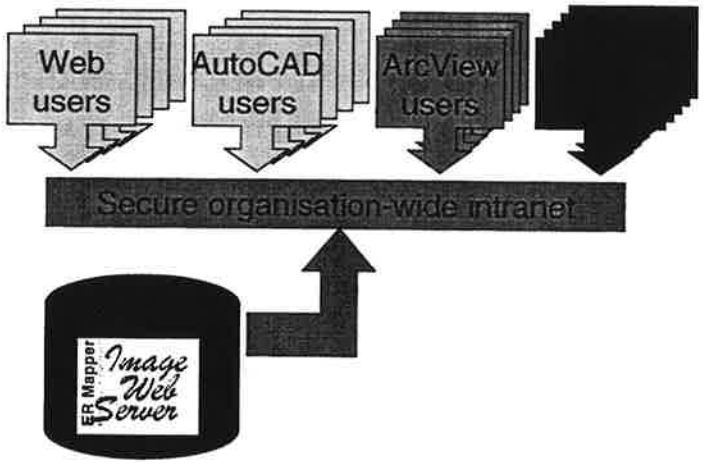
Secure intranet image server

- An example intranet web server:
  - Using existing intranet
  - Low cost PC based web server
  - Serving 500GB of airphotos etc to:
    - 1,000 Information users (web)
    - 500 Engineering users (CAD)
    - 200 Planning users (GIS)
    - 100 Environmental/reporting users (WORD)

GI

Real world examples

Secure intranet image server: Implementation



Real world examples

Secure intranet image server: Benefits

- Secure internal imagery access
- Support all applications and build custom applications
- Control access to imagery
- Providing information and context

Real world examples

(e-commerce) Image Web Sites

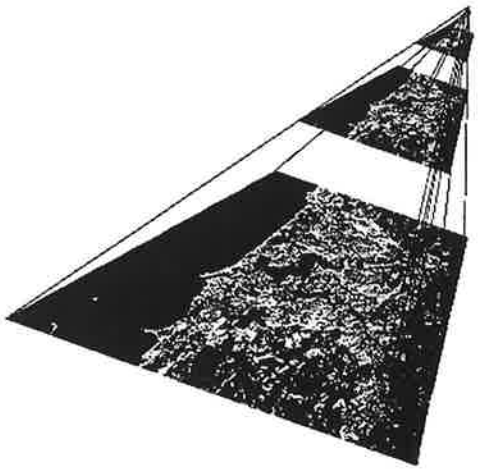
- Low distribution costs
- Sell per view
- Sell subscription access
- Serve free data as well
- Providing information and context
- Market size:
  - For 1 million people, 20,000 users. At US$100 / year subscription US$2,000,000 revenue

GI

Real world examples

E-Commerce image web sites: On-line image subset sales

- Low cost to sell
- Sell image Views ***NOT*** image scenes!
- Provides users what they want



GI

Real world examples

E-Commerce image web sites: user benefits

- Low cost
- Raw data with DN values is secure, protecting professional market revenues for data providers
- View based not image based
- Quick turnaround
- Direct access to imagery within user applications

GI

Serving Large Image Data Sets

- Image Web Server
  - Launched by ER Mapper in July 1999
  - Seems set to revolutionise access to large image data sets via the web
  - Compressed data held on server
  - Data decompressed locally at user site
  - intranet and internet applications
  - plug-ins to GIS and many desktop applications (Office, Photoshop etc.)

GI

Serving Large Image Data Sets

- Image Web Server
  - Simultaneous multi user access
  - Roam and zoom large images
  - Integrated photography and mapping
  - Data protection enabled
  - Accessible to everyone including via e-commerce
  - Limited only by available bandwidth

GI

Serving Large Image Data Sets

- Delivering the data and the information
  - acquire data - digital orthophotos, IKONOS satellite imagery or other
  - geometrically correct, enhance and mosaic data as required
  - add value if required (e.g integrate national mapping)
  - compress data
  - serve across intranet or internet

GI

Serving Large Image Data Sets

- Intranet and Internet
  - high speed secure distribution/access
  - no unnecessary copies and cost/admin overhead
  - "shrink-wrapped" application can be distributed to farmers with form
    - e.g. using Java or MapObjects
  - farmer access online increasing
  - application number initiates zoom to previously declared parcel extents in underlying online image database

Annex 1:

Summary Tables

Table 1: Number of dossiers submitted and checked

Member State	MS code	Declared dossiers (1998)	Declared area (ha) (1998)	Dossiers checked on spot (1998)	Dossiers checked with RS (1999)	% dossiers checked with RS	Area checked with RS (ha)	% area checked with RS
AUSTRIA	AT	167,838	2,264,988	13,494	1,539	0.92%	20,998	0.93%
BELGIUM	BE	43,907	995,220	4,803	1,991	4.53%	63,250	6.36%
GERMANY	DE	361,654	13,831,212	25,674	13,223	3.66%	499,511	3.61%
DENMARK	DK	61,376	2,333,466	3,418	2,436	3.97%	103,226	4.42%
SPAIN	ES	455,252	17,993,048	39,364	24,064	5.29%	666,554	3.70%
FINLAND	FI	76,866	1,844,327	8,270	3,696	4.81%	103,920	5.63%
FRANCE	FR	457,658	25,317,363	30,436	11,826	2.58%	698,825	2.76%
GREECE	GR	293,313	2,433,822	39,730	4,895	1.67%	32,884	1.35%
LUXEMBOURG	LU	2,153	120,908	150	0	0.00%	0	0.00%
IRELAND	IE	132,654	4,608,868	6,823	4,687	3.53%	181,678	3.94%
ITALY	IT	681,570	7,793,498	179,934	159,744	23.44%	1,490,411	19.12%
NETHERLANDS	NL	49,956	577,350	3,795	3,114	6.23%	42,159	7.30%
PORTUGAL	PT	163,776	2,825,068	15,462	15,081	9.21%	1,279,120	45.28%
SWEDEN	SE	66,215	2,704,770	6,692	2,652	4.01%	150,989	5.58%
UNITED KINGDOM	UK	144,646	16,719,434	8,612	1,200	0.83%	171,296	1.02%
EU TOTAL		**3,158,834**	**102,363,342**	**386,657**	**250,148**	**7.92%**	**5,504,821**	**5.38%**
EU 1998		3,262,269	95,337,435	371,341	248,529	7.62%	4,577,454	4.80%

Note: The first three data columns contain 1998 data (ref. DG AGRI), since not all 1999 data are yet available.
The last four columns contain 1999 data, as reported by the contractors.

Table 2: Distribution of sites and dossiers by image type

MS	Contractor	Method used	No. sites aerial photos only	No. sites satellites only	No. sites aerial and satellites	Total no. sites	No. dossiers aerial only	No. dossiers satellite only	No. dossiers aerial and satellite	Total no. dossiers	Dossiers per site
AT	**GEOSPACE**	aero+sat	0	0	2	2	0	0	1,539	1,539	770
BE	**MIN. AGRI.**	aero+sat	0	0	3	3	0	0	1,991	1,991	664
DE	**EFTAS**	aero+sat	1	12	0	13	89	6,600	0	6,689	515
DE	**GAF**	aero+sat	0	0	6	6	0	0	6,626	6,626	1,104
DK	**DIAS**	sat	0	4	0	4	0	2,436	0	2,436	609
ES	**DAP**	aero	19	0	0	19	4,154	0	0	4,154	219
ES	**TRAGSATEC**	sat, aero+sat	0	1	9	10	0	1,730	18,180	19,910	1,991
FI	**NLS**	aero+sat	0	0	6	6	0	0	3,696	3,696	616
FR	**SCOT**	sat	0	16	0	16	0	7,152	0	7,152	447
FR	**SIRS/ONIC**	aero, sat, aero+sat	1	5	2	8	316	2,202	571	3,089	386
GR	**ERATOSTHENES**	sat	0	1	0	1	0	2,447	0	2,447	2,447
GR	**GEOAPIKONISIS**	sat	0	1	0	1	0	2,448	0	2,448	2,448
IE	**ICON**	sat	0	3	0	3	0	4,687	0	4,687	1,562
IT	**CCIA (AERO)**	aero	30	0	0	30	147,354	0	0	147,354	4,912
IT	**CCIA (SAT)**	aero+sat	0	0	3	3	0	0	12,390	12,390	4,130
NL	**GEORAS**	aero, sat	0	4	0	5	372	2,742	0	3,114	623
PT	**GEOMETRAL**	aero, sat	1	1	0	5	7,015	1,524	0	8,539	1,708
PT	**TERRACARTA**	sat, aero+sat	4	0	5	5	0	0	6,588	6,588	1,318
SE	**SATELLITBILD**	aero+sat	0	0	5	5	0	0	2,652	2,652	530
UK	**RSAC**	sat	0	3	0	3	0	1,200	0	1,200	400
EU TOTAL			**56**	**51**	**41**	**148**	**159,300**	**35,168**	**54,233**	**248,701**	**1,680**
EU 1998						144	169,436	24,167	54,926	248,529	1,726

Table 3: Distribution of checked dossiers by scheme

MS	Contractor	Simplified scheme	%	General scheme	%	Forage only	%	Other schemes	%	Total
AT	**GEOSPACE**	365	23.7%	4	0.3%	1,170	76.0%	1,539	100.0%	1,539
BE	**MIN. AGRI.**	1,373	69.0%	219	11.0%	399	20.0%	0	0.0%	1,991
DE	**EFTAS**	3,285	49.1%	2,840	42.5%	541	8.1%	18	0.3%	6,684
DE	**GAF**	3,754	56.7%	1,668	25.2%	685	10.3%	516	7.8%	6,623
DK	**DIAS**	1,060	43.5%	1,355	55.6%	21	0.9%	0	0.0%	2,436
ES	**DAP**	1,985	47.8%	1,189	28.6%	0	0.0%	980	23.6%	4,154
ES	**TRAGSATEC**	8,192	41.1%	9,856	49.5%	211	1.1%	1,651	8.3%	19,910
FI	**NLS**	1,759	47.6%	1,741	47.1%	196	5.3%	0	0.0%	3,696
FR	**SCOT**	2,050	28.7%	4,762	66.6%	340	4.8%	0	0.0%	7,152
FR	**SIRS/ONIC**	958	20.5%	3,710	79.5%	0	0.0%	0	0.0%	4,668
GR	**ERATOSTHENES**	2,447	100.0%	0	0.0%	0	0.0%	0	0.0%	2,447
GR	**GEOAPIKONISIS**	2,444	99.8%	4	0.2%	0	0.0%	0	0.0%	2,448
IE	**ICON**	764	16.3%	417	8.9%	3,504	74.8%	2	0.0%	4,687
IT	**CCIA (AERO)**	122,575	83.2%	24,779	16.8%	0	0.0%	0	0.0%	147,354
IT	**CCIA (SAT)**	7,343	59.3%	5,047	40.7%	0	0.0%	0	0.0%	12,390
NL	**GEORAS**	2,550	81.9%	450	14.5%	114	3.7%	0	0.0%	3,114
PT	**GEOMETRAL**	7,977	93.4%	562	6.6%	0	0.0%	0	0.0%	8,539
PT	**TERRACARTA**	3,655	55.9%	2,539	38.8%	349	5.3%	0	0.0%	6,543
SE	**SATELLITBILD**	813	30.7%	1,753	66.1%	69	2.6%	17	0.6%	2,652
UK	**RSAC**	356	29.7%	784	65.3%	60	5.0%	0	0.0%	1,200
EU TOTAL		**175,705**	**70.2%**	**63,679**	**25.4%**	**7,659**	**3.1%**	**4,723**	**1.9%**	**250,227**
EU 1998		172,806	69.5%	64,337	25.9%			11,386 (incl. forage)	4.6% (incl. forage)	248,529

Note: In Austria, each application has been declared in the OPUL agro-environmental scheme and one of the others

Table 4: Distribution of declared parcels by scheme

MS	Contractor	Simplified scheme	%	General scheme	%	Forage only	%	Other schemes	%	Total
AT	**GEOSPACE**	7,128	39.6%	70	0.4%	10,824	60.1%	18,022	100.0%	18,022
BE	**MIN. AGRI.**	19,432	71.0%	5,209	19.0%	2,747	10.0%	0	0.0%	27,388
DE	**EFTAS**	47,244	36.3%	75,508	58.0%	7,293	5.6%	181	0.1%	130,226
DE	**GAF**	84,769	48.2%	72,335	41.1%	11,486	6.5%	7,436	4.2%	176,026
DK	**DIAS**	6,219	22.8%	21,036	77.0%	76	0.3%	0	0.0%	27,331
ES	**DAP**	7,665	38.5%	10,096	50.7%	0	0.0%	2,153	10.8%	19,914
ES	**TRAGSATEC**	63,430	18.9%	262,512	78.3%	1,957	0.6%	7,190	2.1%	335,089
FI	**NLS**	23,119	42.6%	29,709	54.8%	1,433	2.6%	0	0.0%	54,261
FR	**SCOT**	53,538	33.4%	99,487	62.1%	7,267	4.5%	0	0.0%	160,292
FR	**SIRS/ONIC**	26,120	12.5%	182,720	87.5%	0	0.0%	0	0.0%	208,840
GR	**ERATOSTHENES**	9,123	100.0%	0	0.0%	0	0.0%	0	0.0%	9,123
GR	**GEOAPIKONISIS**	28,341	99.4%	169	0.6%	0	0.0%	0	0.0%	28,510
IE	**ICON**	764	16.3%	417	8.9%	3,504	74.8%	2	0.0%	4,687
IT	**CCIA (AERO)**	1,810,698	67.0%	891,038	33.0%	0	0.0%	0	0.0%	2,701,736
IT	**CCIA (SAT)**	168,393	42.4%	228,493	57.6%	0	0.0%	0	0.0%	396,886
NL	**GEORAS**	29,009	73.6%	10,403	26.4%	0	0.0%	0	0.0%	39,412
PT	**GEOMETRAL**	152,312	87.7%	21,303	12.3%	0	0.0%	0	0.0%	173,615
PT	**TERRACARTA**	34,787	30.6%	74,370	65.4%	4,486	3.9%	0	0.0%	113,643
SE	**SATELLITBILD**	9,772	24.1%	29,967	74.0%	631	1.6%	134	0.3%	40,504
UK	**RSAC**	4,974	15.7%	25,869	81.6%	866	2.7%	0	0.0%	31,709
EU TOTAL		**2,586,837**	**55.1%**	**2,040,711**	**43.4%**	**52,570**	**1.1%**	**35,118**	**0.7%**	**4,697,214**
EU 1998		1,765,693	53.6%	1,457,563	44.2%			72,536 (incl. forage)	2.2% (incl. forage)	3,295,882

Note: In Austria, each application has been declared in the OPUL agro-environmental scheme and one of the others

Table 5: Distribution of declared area by scheme (in ha)

MS	Contractor	Simplified scheme	%	General scheme	%	Forage only	%	Other schemes	%	Total
AT	GEOSPACE	7,189	34.2%	88	0.4%	13,722	65.3%	20,998	100.0%	20,998
BE	MIN. AGRI.	38,046	59.7%	15,345	24.1%	10,361	16.3%	0	0.0%	63,752
DE	EFTAS	72,295	20.4%	267,648	75.5%	14,273	4.0%	207	0.1%	354,422
DE	GAF	64,513	33.0%	108,864	55.6%	11,303	5.8%	11,105	5.7%	195,785
DK	DIAS	14,912	14.4%	88,581	85.4%	215	0.2%	0	0.0%	103,708
ES	DAP	12,812	22.6%	39,053	68.8%	0	0.0%	4,880	8.6%	56,744
ES	TRAGSATEC	108,286	11.6%	774,546	82.7%	15,775	1.7%	37,852	4.0%	936,459
FI	NLS	41,852	39.9%	60,832	58.0%	2,219	2.1%	0	0.0%	104,903
FR	SCOT	60,727	12.9%	397,290	84.3%	13,114	2.8%	0	0.0%	471,131
FR	SIRS/ONIC	29,773	7.1%	390,286	92.9%	0	0.0%	0	0.0%	420,059
GR	ERATOSTHENES	12,374	100.0%	0	0.0%	0	0.0%	0	0.0%	12,374
GR	GEOAPIKONISIS	24,175	99.4%	145	0.6%	0	0.0%	0	0.0%	24,320
IE	ICON	34,564	18.5%	35,290	18.9%	116,850	62.6%	0	0.0%	186,704
IT	CCIA (AERO)	1,448,915	62.8%	857,578	37.2%	0	0.0%	0	0.0%	2,306,493
IT	CCIA (SAT)	68,153	31.1%	150,794	68.9%	0	0.0%	0	0.0%	218,947
NL	GEORAS	42,815	61.0%	27,336	39.0%	0	0.0%	0	0.0%	70,151
PT	GEOMETRAL	230,196	51.2%	219,367	48.8%	0	0.0%	0	0.0%	449,563
PT	TERRACARTA	149,992	17.9%	630,462	75.2%	57,635	6.9%	0	0.0%	838,088
SE	SATELLITBILD	23,279	15.4%	126,339	83.5%	1,459	1.0%	293	0.2%	151,370
UK	RSAC	20,045	11.5%	146,824	84.1%	7,734	4.4%	0	0.0%	174,603
EU TOTAL		**2,504,911**	**35.0%**	**4,336,667**	**60.6%**	**264,659**	**3.7%**	**75,335**	**1.1%**	**7,160,574**
EU 1998		2,073,648	37.0%	3,289,221	58.7%			245,399 (incl. forage)	4.4% (incl. forage)	5,608,267

Note: In Austria, each application has been declared in the OPUL agro-environmental scheme and one of the others

Table 6: Technical tolerances applied

MS	Contractor	group/ parcel option	buffer tolerance	P1 (2%)	P2 (50/75%)	P3 (50%)	S1 (ha)	L1 (m)	L2 (m)	L3 (m)	P4 (%)	S2 (ha)	S3 (ha)
AT	**GEOSPACE**	P	2m		50/75	50					3	0.5	2.0
BE	**MIN. AGRI.**	P	3m		75	50					2	0.5	2.0
DE	**EFTAS**	P	6m		75	50			4.0	6		0,5/2	
DE	**GAF**	P	2m		50/75	50	0,5	0,5				0.5	
DK	**DIAS**	G	-	2	50	50	0.5	0.5					
ES	**DAP**	P	2m								2	0.5	2.0
ES	**TRAGSATEC**	P	6m								2	0.5	2.0
FI	**NLS**	P	2m		50/75	50					2	0.5	2.0
FR	**SCOT**	P	5m								2	0.6	2.0
FR	**SIRS**	P	5m?						5.0	5	2	0.5	2.0
GR	**ERATOSTHENES**	P	6.2m		50					6.2	2	0.5	2.0
GR	**GEOAPIKONISIS**	P	6.2m		75	50				6.2	2	0.5	2.0
IE	**ICON**	P	?	2	50/75	50	0.3	0.3	4.0	6	2	0.5	2.0
IT	**CCIA (AERO)**	P	5% area, max 0.5 ha								2	0.3	2.0
IT	**CCIA (SAT)**	P	5% area, max 0.5 ha								2	0.3	2.0
NL	**GEORAS**	P	6m						4.0	6	2	0.5	2.0
PT	**GEOMETRAL**	G	-	2	75	50	2	2.0			2		
PT	**TERRACARTA**	G	-		75	50			4.0	6	2	0.5	2.0
SE	**SATELLITBILD**	P	5m or 6m		50/75	50			4.0	6	2	0.5	2.0
UK	**RSAC**	G	-	2	50/75	50	0.5	0.5			2		

Note: Values in parentheses indicate thresholds and maximums proposed

Table 7: Distribution of diagnostic codes, by number of parcels

MS	CONTRACTOR	Codification level	Total T	A1,A2,A3, A6	C1	C2	C3+	C3-	Total A+C	E1	X or OK	others	total	A4, A5, other T,C
AT	GEOSPACE	**After RFV**	2,997	160	40	0	1,215	299	1,714	7	13,304	0	**18,022**	0
BE	MIN. AGRI.	**After RFV**	528	798	164	0	2,589	2,487	6,038	0	0	0	**27,509**	0
DE	EFTAS	**After PI**	10,959	158	681	25	666	1,590	3,120	94	116,072	0	**130,245**	0
DE	GAF	**After PI**	7,418	82	563	28	1,312	3,418	5,403	153	113,097	207	**126,278**	0
DK	DIAS	**After PI**	340	233	495	0	0	0	728	85	26,141	0	**27,294**	37
ES	DAP	**After RFV**	1,454	1,312	1,633	0	2,405	2,245	7,595	0	10,212	0	**19,310**	49
ES	TRAGSATEC	**After PI**	75,654	0	25,842	0	1,410	0	27,252	0	175,716	0	**278,622**	56,467
ES	TRAGSATEC	**After RFV**	69,509	0	10,761	0	1,323	0	12,084	0	179,286	0	**260,879**	43,057
FI	NLS	**After PI**	1,648	112	182	0	2,924	2,468	5,686	0	46,927	0	**54,261**	0
FR	SCOT	**After PI**	30,261	1,111	1,136	0	978	160	3,385	0	98,225	2,157	**134,028**	0
FR	SIRS/ONIC	**After PI**	22,175	404	607	0	3,120	1,075	5,206	0	75,418	5,167	**107,966**	893
GR	ERATOSTHENES	**After PI**	637	262	363	188	401	669	1,883	0	6,158	0	**8,678**	7
GR	ERATOSTHENES	**After RFV**	616	262	363	188	401	669	1,883	0	6,179	0	**8,678**	7
GR	GEOAPIKONISIS	**After PI**	9,011	2,181	1,120	618	938	695	5,552	0	16,185	0	**21,737**	1,756
IE	ICON	**After PI**	2,091	1,075	207	1	1,964	4,801	8,048	0	21,073	190	**31,402**	0
IT	CCIA (AERO)	**After PI**	17,215	119,023	71,777	91,126	195,836	210,947	688,709	41,553	566,297	0	**1,313,774**	0
IT	CCIA (SAT)	**After PI**	37,010	11,690	25,070	0	127,540	33,228	197,528	447	62,572	0	**297,557**	0
IT	CCIA (SAT)	**After RFV**	6,650	11,595	21,109	0	152,651	32,298	217,653	367	72,887	0	**297,557**	0
NL	GEORAS	**Ater RFV**	593	193	96	28	0	0	317	928	13,594	299	**15,731**	0
PT	GEOMETRAL	**After PI**	14,187	11,396	9,184	7,669	6,103	12,172	46,524	72	110,808	2,022	**173,613**	2
PT	TERRACARTA	**After atendimento**	12,558	767	1,509	1,153	10,369	11,377	25,175	97	80,148	1,560	**119,538**	24
PT	TERRACARTA	**After RFV**	13,962	1,241	920	1,042	18,144	10,544	31,891	158	72,104	1,779	**119,894**	51
SE	SATELLITBILD	**After PI**	847	209	217	9	1,414	1,801	3,650	0	36,007	0	**40,504**	0
UK	RSAC	**After PI**	725	175	102	0	0	0	277	0	30,505	0	**31,507**	209

Table 8: Distribution of diagnostic codes, by area (in ha)

MS	CONTRACTOR	Codification level	Total T	A1,A2,A3, A6	C1	C2	C3+	C3-	Total A+C	E1	X or OK	others	Total	A4, A5, other T,C
AT	**Contractor**	**After RFV**	2,342	28	28	0	1,541	373	1,970	5	16,680	0	**20,998**	0
BE	**MIN. AGRI.**	**After RFV**	570	1,939	197	0	7,264	8,373	17,773	0	47,035	0	**65,378**	0
DE	**EFTAS**	**After PI**	18,369	449	1,756	26	2,631	6,225	11,087	312	324,680	0	**354,449**	0
DE	**GAF**	**After PI**	6,738	117	379	4	3,419	9,584	13,503	179	148,006	468	**168,893**	0
DK	**DIAS**	**After PI**	180	444	1,374	0	0	0	1,817	207	101,380	0	**103,585**	124
ES	**DAP**	**After RFV**	4,958	3,191	3,668	0	8,943	12,587	28,390	0	23,243	0	**56,590**	153
ES	**TRAGSATEC**	**Before RFV**	254,405	0	61,594	0	4,791	0	66,385	0	468,696	0	**789,486**	146,971
ES	**TRAGSATEC**	**After RFV**	217,412	0	29,013	0	4,181	0	33,194	0	476,468	0	**727,074**	97,692
FI	**NLS**	**After PI**	1,353	7	300	0	6,045	4,195	10,548	0	93,002	0	**104,903**	0
FR	**SCOT**	**After PI**	58,899	579	1,958	0	5,241	696	8,475	0	402,489	2,964	**472,257**	0
FR	**SIRS/ONIC**	**After PI**	62,331	378	793	0	15,293	3,360	19,824	0	319,555	3,368	**405,078**	0
GR	**ERATOSTHENES**	**Before RFV**	438	325	409	374	805	1,091	3,004	0	8,932	0	**12,374**	134
GR	**ERATOSTHENES**	**After RFV**	435	325	409	374	805	1,091	3,004	0	8,935	0	**12,374**	134
GR	**GEOAPIKONISIS**	**After PI**	3,809	379	0	523	1,088	800	2,790	0	15,287	0	**21,885**	0
IE	**ICON**	**After PI**	10,019	6,332	639	7	16,193	30,845	54,016	0	114,566	3,764	**182,365**	0
IT	**CCIA (AERO)**	**Before RFV**	18,743	114,061	58,108	114,750	120,442	243,894	651,255	25,552	583,993	0	**1,279,543**	0
IT	**CCIA (SAT)**	**After PI**	19,798	7,689	8,792	0	67,958	22,872	107,311	337	41,845	0	**169,291**	0
IT	**CCIA (SAT)**	**After RFV**	5,096	7,619	7,565	0	79,908	20,146	115,239	225	48,730	0	**169,291**	0
NL	**GEORAS**	**After RFV**	956	287	178	84	2,057	2,533	5,138	2,366	33,741	0	**42,201**	662
PT	**GEOMETRAL**	**After PI**	3,692	10,029	6,740	12,282	21,265	41,868	92,184	91	348,185	5,411	**449,563**	1
PT	**TERRACARTA**	**After atendimento**	13,191	3,020	10,214	14,721	81,616	59,978	169,548	865	642,966	11,523	**838,093**	65
PT	**TERRACARTA**	**After RFV**	24,483	7,550	6,152	13,428	137,470	51,414	216,014	632	583,895	12,826	**837,851**	125
SE	**SATELLITBILD**	**After PI**	2,184	223	713	49	5,315	5,539	11,839	0	127,927	0	**141,950**	0
UK	**RSAC**	**After PI**	3,202	204	363	0	0	0	567	0	169,665	0	**173,433**	1,100

Table 9. Results of rapid field visits, where relevant (incomplete data)

MS	Contractor	no. sites wih rapid visits/all sites	total parcels processed RFV sites	checked land use	measured area	visited for other reasons	total inspected in rapid visits	% inspected/ total processed	mean parcels visited/ inspector-day	rejected for land use	rejected for surface area	rejected for locali-sation	rejected for other reasons	uncertain after rapid visit	total rejected + uncertain
AT	**GEOSPACE**	2/2	18,022	1,402	0	0	1,402	7.8%		34	0	0	0	0	34
BE	**MIN. AGRI.**	3/3	27,200	2,919	0	0	2,919	10.7%	66	226	0	0	0	2	228
DE	**EFTAS**	N.R.													
DE	**GAF**	N.R													
DK	**DIAS**	N.R													
ES	**DAP**	19/19	20,536	20,536	0	0	20,536	100.0%	38	1,633	2,786	711	0	775	5,905
ES	**TRAGSATEC**	9/10	316,980	22,723	8,684	19,450	50,857	16.0%	22	10,265	7,985	0	0	264	18,514
FI	**NLS**	N.R													
FR	**SCOT**	4/16	34,138	155	0	0	155	0.5%		48	0	0	0	0	48
FR	**SIRS/ONIC**	6/14	31,405	712		72	784	2.5%	10-30	39	11		4	9	46
GR	**ERATOSTHENES**	1/1	8,041	21	0	0	21	0.3%	21						0
GR	**GEOAPIKONISIS**														
IE	**ICON**	N.R.													
IT	**CCIA (AERO)**	30/30	1,310,600	1,174,467	0	0	1,174,467	89.6%	60-100	134,762	110,064	118,933	0	14,075	377,834
IT	**CCIA (SAT)**	3/3	353,275	69,103	42,204	0	111,307	31.5%		34,205	43,270	0	0	0	77,475
NL	**GEORAS**	3/4	2,358	1,010	74	0	1,010	18.1%	79						0
PT	**GEOMETRAL**	5/5	170,402	7,762	0	101,720	109,482	64.2%		28,249	12,172	0	0	323	40,744
PT	**TERRACARTA**	5/5	113,099	7,767	0	0	7,767	6.9%	29						0
SE	**SATELLITBILD**	N.R.													
UK	**RSAC**	N.R.													
EU TOTAL			**2,406,056**	**1,308,577**	**50,962**	**121,242**	**1,480,707**	**61.5%**		**209,461**	**176,288**	**119,644**	**4**	**15,448**	**520,828**

N.R. - not relevant
Note: FR SIRS/ONIC data incomplete, GR Geoapikonisis data pending

Table 10: Results of photo-interpretation of parcels

MS	Contractor	within tolerance			outside tolerance				total		
		number	area declared	area measured	number	area declared	area measured	area accepted	number	area declared	area measured
AT	**GEOSPACE**	16,508	19,084	16,700	1,514	1,914	1,720	1,720	18,022	20,998	18,420
BE	**MIN. AGRI.**	22,312	48,116	48,254	5,076	15,637	15,941	15,367	27,388	63,753	64,195
DE	**EFTAS**	116,072	325,330	325,940	14,173	29,768	9,558	10,371	130,245	355,098	335,498
DE	**GAF**	113,097	148,006	181,821	4,730	13,003	12,887	12,216	117,827	161,009	194,708
DK	**DIAS**										
ES	**DAP**	10,212	23,243	N.D.	9,098	33,501	N.D.	26,443	19,310	56,744	N.D.
ES	**TRAGSATEC**	289,448	781,481	781,481	27,532	105,704	36,532	37,655	316,980	887,185	818,013
FI	**NLS**	48,869	94,662	94,579	5,392	10,241	10,120	10,094	54,261	104,903	104,699
FR	**SCOT**	100,771	402,489	402,549	2,122	7,781	4,582	4,582	102,893	410,270	407,131
FR	**SIRS**	75,418	319,555	328,934	4,802	19,446	16,880	16,880	80,220	339,001	345,814
GR	**ERATOSTHENES**	6,971	10,039	9,879	1,070	1,896	2,291	1,576	8,041	11,936	12,171
GR	**GEOAPIKONISIS**	24,746	18,148	18,586	2,058	2,778	3,212	1,913	26,804	20,926	21,798
IE	**ICON**	21,073	114,565	114,801	6,765	47,046	49,186	49,186	27,838	161,611	163,987
IT	**CCIA (AERO)**	776,369	721,889	808,495	534,231	556,282	164,382	164,382	1,310,600	1,278,171	972,877
IT	**CCIA (SAT)**	225,538	128,639	139,063	72,019	40,652	24,120	25,230	297,557	169,291	163,183
NL	**GEORAS**	13,990	38,273	38,805	1,741	4,590	4,997	4,854	15,731	42,863	43,802
PT	**GEOMETRAL**										
PT	**TERRACARTA**										
SE	**SATELLITBILD**	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
UK	**RSAC**										
EU TOTAL		**1,861,394**	**3,193,518**	**3,309,887**	**692,323**	**890,239**	**356,409**	**382,469**	**2,553,717**	**4,083,758**	**3,666,296**

N.D. - no data
Note: DK, PT and UK applied technical tolerances at group level

Table 11: Results of conformity test at group level

MS	Contractor	groups accepted		groups rejected		total no.	area accepted		area rejected		total
		no.	%	no.	%	groups	ha	%	ha	%	area (ha)
AT	GEOSPACE	2,135	93.5%	148	6.5%	2,283	18,902	90.0%	2,096	10.0%	20,998
BE	MIN. AGRI.	3,263	86.8%	496	13.2%	3,759	23,875	81.5%	5,413	18.5%	29,288
DE	EFTAS	10,367	92.6%	830	7.4%	11,197	185,698	85.9%	30,402	14.1%	216,101
DE	GAF	23,424	95.2%	1,178	4.8%	24,602	301,441	89.9%	33,807	10.1%	335,248
DK	DIAS	4,760	91.6%	435	8.4%	5,195	84,257	91.0%	8,347	9.0%	92,604
ES	DAP	5,489	69.6%	2,396	30.4%	7,885	32,535	57.3%	24,208	42.7%	56,744
ES	TRAGSATEC	43,269	76.6%	13,198	23.4%	56,467	663,709	74.8%	223,475	25.2%	887,185
FI	NLS	17,403	94.9%	941	5.1%	18,344	262,531	93.3%	18,803	6.7%	281,334
FR	SCOT	27,234	96.9%	863	3.1%	28,097	451,689	95.9%	19,442	4.1%	471,131
FR	SIRS	19,394	95.3%	953	4.7%	20,347	385,102	92.4%	31,786	7.6%	416,888
GR	ERATOSTHENES	2,400	85.5%	406	14.5%	2,806	4,776	76.6%	1,455	23.4%	6,231
GR	GEOAPIKONISIS	2,420	65.9%	1,255	34.1%	3,675	11,715	48.6%	12,399	51.4%	24,113
IE	ICON	5,239	87.1%	775	12.9%	6,014	146,293	83.4%	29,084	16.6%	175,377
IT	CCIA (AERO)	126,465	64.6%	69,178	35.4%	195,643	658,919	51.6%	619,122	48.4%	1,278,041
IT	CCIA (SAT)	18,408	70.8%	7,592	29.2%	26,000	101,910	60.2%	67,381	39.8%	169,291
NL	GEORAS	3,816	89.3%	455	10.7%	4,271	36,582	85.3%	6,280	14.7%	42,863
PT	GEOMETRAL	19,697	78.3%	5,463	21.7%	25,160	377,237	83.9%	72,327	16.1%	449,563
PT	TERRACARTA	20,505	94.7%	1,159	5.3%	21,664	755,312	90.1%	82,776	9.9%	838,088
SE	SATELLITBILD	5,930	93.3%	428	6.7%	6,358	117,207	91.6%	10,795	8.4%	128,002
UK	RSAC	7,056	98.0%	144	2.0%	7,200	143,117	95.3%	6,984	4.7%	150,100
EU TOTAL		**368,674**	**77.3%**	**108,293**	**22.7%**	**476,967**	**4,762,807**	**78.5%**	**1,306,383**	**21.5%**	**6,069,190**

Table 12: Results of completeness test at dossier level

MS	Contractor	complete		incomplete		total no.	area complete		area incomplete		total
		no.	%	no.	%	dossiers	ha	%	ha	%	area (ha)
AT	GEOSPACE	41	61.2%	26	38.8%	67	239	82.6%	50	17.4%	290
BE	MIN. AGRI.	1,991	100.0%	0	0.0%	1,991	63,753	100.0%	0	0.0%	63,753
DE	EFTAS	10,170	96.7%	348	3.3%	10,518	211,836	98.0%	4,266	2.0%	216,102
DE	GAF	21,181	99.7%	66	0.3%	21,247	334,760	99.9%	486	0.1%	335,246
DK	DIAS	2,436	100.0%	0	0.0%	2,436	92,605	100.0%	0	0.0%	92,605
ES	DAP	3,752	90.3%	402	9.7%	4,154	49,211	86.7%	7,433	13.1%	56,743
ES	TRAGSATEC	17,747	89.1%	2,163	10.9%	19,910	593,059	66.8%	294,126	33.2%	887,185
FI	NLS	10,034	98.3%	171	1.7%	10,205	274,586	97.6%	6,747	2.4%	281,333
FR	SCOT	6,448	90.2%	704	9.8%	7,152	359,929	81.0%	84,621	19.0%	444,550
FR	SIRS	7,109	87.4%	1,023	12.6%	8,132	623,828	80.9%	147,618	19.1%	771,446
GR	ERATOSTHENES	2,420	98.9%	27	1.1%	2,447	6,143	98.6%	88	1.4%	6,231
GR	GEOAPIKONISIS	2,222	90.8%	226	9.2%	2,448	21,376	88.6%	2,737	11.4%	24,113
IE	ICON	4,480	95.6%	207	4.4%	4,687	144,417	95.1%	7,510	4.9%	151,927
IT	CCIA (AERO)	187,968	98.6%	2,703	1.4%	190,671	2,032,156	98.5%	31,546	1.5%	2,063,702
IT	CCIA (SAT)	12,280	99.1%	110	0.9%	12,390	164,849	97.4%	4,441	2.6%	169,291
NL	GEORAS	3,094	99.4%	20	0.6%	3,114	42,232	98.5%	630	1.5%	42,863
PT	GEOMETRAL	8,506	99.6%	33	0.4%	8,539	449,499	100.0%	64	0.0%	449,563
PT	TERRACARTA	11,592	99.8%	29	0.2%	11,621	756,626	99.9%	439	0.1%	757,065
SE	SATELLITBILD	5,110	99.2%	40	0.8%	5,150	152,890	99.7%	494	0.3%	153,384
UK	RSAC	1,200	98.5%	18	1.5%	1,218	148,440	97.2%	4,209	2.8%	152,649
EU TOTAL		**319,781**	**97.5%**	**8,316**	**2.5%**	**328,097**	**6,522,436**	**91.6%**	**597,507**	**8.4%**	**7,120,042**

Table 13: Global results by dossier, COP scheme (1999)

MS	Contractor	accepted				rejected				total	
		complete	incompl.	total	%	complete	incompl.	total	%	complete	incompl.
AT	GEOSPACE	1,493	25	1,518	**98.6%**	20	1	21	**1.4%**	1,513	26
BE	MIN. AGRI.	1,192	0	1,192	**75.4%**	388	0	388	**24.6%**	1,580	0
DE	EFTAS	5,159	234	5,393	**88.1%**	728	0	728	**11.9%**	5,887	234
DE	GAF	5,058	18	5,076	**93.6%**	336	10	346	**6.4%**	5,394	28
DK	DIAS	2,050	0	2,050	**84.2%**	386	0	386	**15.8%**	2,436	0
ES	DAP	1,448	252	1,700	**53.6%**	1,348	126	1,474	**46.4%**	2,796	378
ES	TRAGSATEC	8,938	1,015	9,953	**55.1%**	7,086	1,009	8,095	**44.9%**	16,024	2,024
FI	NLS	3,148	63	3,211	**90.8%**	319	8	327	**9.2%**	3,467	71
FR	SCOT	5,876	639	6,515	**91.1%**	572	65	637	**8.9%**	6,448	704
FR	SIRS	3,254	628	3,882	**83.1%**	678	110	788	**16.9%**	3,932	738
GR	ERATOSTHENES	2,033	18	2,051	**83.8%**	387	9	396	**16.2%**	2,420	27
GR	GEOAPIKONISIS	1,280	109	1,389	**56.7%**	942	117	1,059	**43.3%**	2,222	226
IE	ICON	3,572	175	3,747	**79.9%**	940	0	940	**20.1%**	4,512	175
IT	CCIA (AERO)	63,123	20	63,143	**44.7%**	75,547	2,423	77,970	**55.3%**	138,670	2,443
IT	CCIA (SAT)	5,970	56	6,026	**48.6%**	6,310	54	6,364	**51.4%**	12,280	110
NL	GEORAS	2,592	17	2,609	**87.4%**	370	5	375	**12.6%**	2,962	22
PT	GEOMETRAL	4,208	33	4,241	**49.7%**	4,298	0	4,298	**50.3%**	8,506	33
PT	TERRACARTA	5,759	37	5,796	**88.6%**	745	2	747	**11.4%**	6,504	39
SE	SATELLITBILD	2,207	4	2,211	**89.4%**	261	0	261	**10.6%**	2,468	4
UK	RSAC	1,024	0	1,024	**89.8%**	101	15	116	**10.2%**	1,125	15
EU TOTAL		**129,384**	**3,343**	**132,727**	**55.7%**	**101,762**	**3,954**	**105,716**	**44.3%**	**231,146**	**7,297**

Table 14: Global results by dossier, other schemes (1999)

MS	Contractor	Less-favoured areas			Agro-environment			Forage scheme			Other schemes		
		accepted	rejected	total	accepted	rejected	total	accepted	rejected	total	accepte	rejected	total
AT	GEOSPACE				1,397	142	1,539						
BE	MIN. AGRI.										279	120	399
DE	EFTAS	776	140	916	436	73	509	4,551	435	4,986			
DE	GAF	4,499	265	4,764	7,476	441	7,917	3,378	125	3,503			
DK	DIAS												
ES	DAP										786	194	980
ES	TRAGSATEC							1,303	559	1,862			
FI	NLS	3,144	247	3,391	2,975	301	3,276						
FR	SCOT												
FR	SIRS												
GR	ERATOSTHENES												
GR	GEOAPIKONISIS												
IE	ICON												
IT	CCIA (AERO)												
IT	CCIA (SAT)												
NL	GEORAS				303	8	311	439	69	508			
PT	GEOMETRAL	3,140	58	3,198							124	31	155
PT	TERRACARTA												
SE	SATELLITBILD												
UK	RSAC												
EU TOTAL		**11,559**	**710**	**12,269**	**12,587**	**965**	**13,552**	**9,671**	**1,188**	**10,859**	**1,189**	**345**	**1,534**

Notes:
AT - agro-environment data include OPUL scheme
ES, DAP - other schemes include cotton
ES, Tragsatec - forage data include other schemes

Table 15: Global results by dossier, reference checks

MS	Contractor	ac cepted				re jected				% ac cepted (of no.)	
		no.		declared area (ha)		no.		declared area (ha)			
		set-aside	1986-91	set-aside	1986-91	set-aside	1986-91	set-aside	1986-91	set-aside	1986-91
AT	GEOSPACE										
BE	MIN. AGRI.										
DE	EFTAS										
DE	GAF										
DK	DIAS		210		6,246		25		2,206		89.4%
ES	DAP										
ES	TRAGSATEC										
FI	NLS		633		16,983		15		619		97.7%
FR	SCOT										
FR	SIRS										
GR	ERATOSTHENES		848		1,983		152		553		84.8%
GR	GEOAPIKONISIS										
IE	ICON	418	1,501	2,612	11,681	0	0	0	0	100.0%	100.0%
IT	CCIA (AERO)										
IT	CCIA (SAT)										
NL	GEORAS		2,917		38,340		197		4,523		93.7%
PT	GEOMETRAL										
PT	TERRACARTA		5,455		216,703		738		433,459		88.1%
SE	SATELLITBILD										
UK	RSAC	783	1,072	11,940	108,158	1	75	1,473	14,578	99.9%	93.5%
EU TOTAL		**1,201**	**12,636**	**14,552**	**400,094**	**1**	**1,202**	**1,473**	**455,938**	**99.9%**	**91.3%**

Table 16: Number of satellite images procured for the 1999 campaign

		No. optical images acquired						No. radar images acquired			No. archive imags. (< 01 Sep 1998)		Total no. images per provider						
MS	**Contractor**	**IRS LISS**	**Landsat TM**	**SPOT XS**	**SPOT XI**	**IRS PAN**	**SPOT PAN**	**ERS AMI**	**Radar-sat 1**	**IRS 1C/1D**	**Landsat TM**	**SPOT**	**Euromap**	**Eurimage**	**Spot Image**	**NRSC**	**Total no. images ordered**	**No. sites (satellite)**	**Mean no. images per site**
AT	GEOSPACE	0	0	3	3	0	0	0	0	0	0	0	0	0	6	0	6	**2**	3.00
BE	MIN. AGRI.	0	2	0	4	0	0	0	0	0	0	0	0	2	4	0	6	**4**	1.50
DE	EFTAS	8	2	24	4	0	12	9	0	2	4	2	10	15	42	0	67	**13**	5.15
DE	GAF	3	1	4	3	0	0	0	0	2	3	1	5	4	8	0	17	**6**	2.83
DK	DIAS	5	0	7	4	0	4	12	0	0	6	6	5	18	21	0	44	**4**	11.00
ES	TRAGSATEC	0	3	27	11	0	1	0	0	1	0	0	1	3	39	0	43	**10**	4.30
FI	NLS	0	4	8	5	0	0	21	0	0	10	0	0	35	13	0	48	**6**	8.00
FR	CNASEA	2	0	6	2	0	0	0	0	0	0	0	2	0	8	0	10	**4**	2.50
FR	SCOT	7	6	25	25	0	16	0	0	0	5	6	7	11	72	0	90	**16**	5.63
FR	SIRS-Eurosense	4	3	23	20	0	12	23	0	0	0	0	4	26	55	0	85	**12**	7.08
GR	ERATOSTHENES	0	0	3	1	0	1	0	0	0	12	1	0	12	6	0	18	**1**	18.00
GR	GEOAPIKONISIS	0	1	2	1	0	1	0	0	0	0	0	0	1	4	0	5	**1**	5.00
IE	ICON	0	1	2	1	0	4	0	9	2	4	0	2	5	7	9	23	**3**	7.67
IT	CCIA	3	4	3	2	0	0	0	0	0	0	0	3	4	5	0	12	**4**	3.00
NL	GEORAS	0	1	6	9	0	4	16	0	0	40	7	0	57	26	0	83	**5**	16.60
PT	GEOMETRAL	1	1	10	8	0	0	0	0	0	0	0	1	1	18	0	20	**5**	4.00
PT	TERRACARTA	5	1	21	11	0	0	0	0	0	0	0	5	1	32	0	38	**9**	4.22
SE	SATELLITBILD	3	1	14	2	0	5	15	0	0	0	0	3	16	21	0	40	**5**	8.00
UK	RSAC	0	4	4	3	0	3	8	3	0	32	10	0	44	20	3	67	**3**	22.33
EU TOTAL		**41**	**35**	**192**	**119**	**0**	**63**	**104**	**12**	**7**	**116**	**33**	**48**	**255**	**407**	**12**	**722**	**113**	**6.39**

Table 17: Cost of satellite images procured for 1999 campaign (in euro)

		Optical Images acquired						Radar images acquired		Archive images (< 01 Sep 1998)			Total cost by image provider				
MS	Contractor	IRS LISS	Landsat TM	SPOT XS	SPOT XI	IRS PAN	SPOT PAN	ERS AMI	Radar-sat 1	IRS 1C/1D	Landsat TM	SPOT	Total Euromap	Total Eurimage	Total Spot Image	Total NRSC	Total cost (Euro)
AT	GEOSPACE	0	0	10,580	12,080	0	0	0	0	0	0	0	0	0	22,660	0	22,660
BE	MIN. AGRI.	0	2,812	0	19,008	0	0	0	0	0	0	0	0	2,812	19,008	0	21,820
DE	EFTAS	19,707	2,800	84,799	18,913	0	50,556	5,790	0	4,921	1,954	3,220	24,628	10,544	157,488	0	192,660
DE	GAF	7,351	1,648	17,008	11,604	0	0	0	0	5,441	3,795	2,152	12,792	5,443	30,764	0	48,999
DK	DIAS	12,853	0	28,062	16,858	0	16,904	9,574		2,641	3,840	9,704	15,494	13,414	71,528	0	100,436
ES	TRAGSATEC	0	283	95,710	46,651	0	1,652	0	0	0	0	0	0	283	144,013	0	144,296
FI	NLS	0	5,610	31,269	18,525	0	0	18,000	0	0	6,140	0	0	29,750	49,794	0	79,544
FR	CNASEA	4,651	0	22,912	9,504	0	0	0	0	0	0	0	4,651	0	32,416	0	37,067
FR	SCOT	17,504	3,181	89,557	101,830	0	62,939	0	0	0	3,175	9,600	17,504	6,356	263,926	0	287,786
FR	SIRS-Eurosense	9,384	4,447	70,998	73,248	0	50,543	15,414	0	0	0	0	9,384	19,861	194,789	0	224,034
GR	ERATOSTHENES	0	0	12,721	2,568	0	4,217	0	0	0	7,440	1,652	0	7,440	21,158	0	28,598
GR	GEOAPIKONISIS	0	1,400	8,452	2,576	0	1,626	0	0	0	0	0	0	1,400	12,654	0	14,054
IE	ICON	0	106	8,504	2,152	0	9,104	0	16,515	5,441	2,456	0	5,441	2,562	19,760	16,515	44,278
IT	CCIA	8,182	6,048	7,504	6,854	0	0	0	0	0	0	0	8,182	6,048	14,358	0	28,588
NL	GEORAS	0	1,405	21,134	32,060	0	16,930	9,338	0	0	24,294	11,304	0	35,037	81,428	0	116,465
PT	GEOMETRAL	2,720	2,700	28,116	25,678	0	0	0	0	0	0	0	2,720	2,700	53,794	0	59,214
PT	TERRACARTA	10,923	2,693	54,252	36,658	0	0	0	0	0	0	0	10,923	2,693	90,910	0	104,526
SE	SATELLITBILD	7,413	1,405	46,104	6,800	0	21,060	13,644	0	0	0	0	7,413	15,049	73,964	0	96,426
UK	RSAC	0	5,612	12,223	9,887	0	10,104	4,664	5,535	0	20,109	16,156	0	30,385	48,370	5,535	84,290
EU TOTAL		**100,688**	**42,150**	**649,905**	**453,454**	**0**	**245,635**	**76,424**	**22,050**	**18,444**	**73,203**	**53,788**	**119,132**	**191,777**	**1,402,782**	**22,050**	**1,735,741**

Table 18. Technical details of aerial photos used

MS	Contractor	photos from LPIS	photos from archive	photos acquired for RS Control	no. sites with aerial photos	tot. area covered by end product (km2)	flight dates	film type	camera (with/ without FMC)	naviga-tion system	mean flight altitude (m)	scale	overlap (longit./ lateral) (%)	scanning equipment	aero-triangu-lated (yes/no)	mosaic (yes/no)	used as stereo (yes/no)	mean area surveyed per site (km2)	mean no. photos used per site	mean area covered per site (km2)	end product (pixel size, no. bits)
AT	GEOSPACE	N.R.	N.R.	N.R.	0																
BE	MIN. AGRI.	yes	no	no	3	2420	Mar-Jul 1995	Agfa Pan 50 and 150	Wild RC10, RC20		6700	1:43500	60/?	PS1	yes	yes	no	807		769	1 m, 8 bits
DE (Saarland)	EFTAS	no	no	yes	1	180	May + Jul 1999	Kodak Aerochrome IR 2443	Zeiss RMK Top 15/23 FMC	CCNS	6000	1:36000	60/20	Phodis SC, Scanner SCAI	yes	yes	no	259	2 x 8	180	28 u, 1 m, 24 bits
DE	GAF	no	no	yes	6	3800	May-Jun 1999	Kodak Aerochrome IR 2443	Zeiss Top 12/23, A15/23 FMC	CCNS-4, T-Flight T-Nav	2174/ 1690	1:36000/ 1:40000	60/30	Zeiss-SCAI, Orthovision 950	yes	yes	no	2100/ 1690	79/ 57	1500/1166	1 m, 24 bits
DK	DIAS	yes	no	N.R.	0																
ES	DAP	no	no	yes	19	4750	May	Agfa Aviphot	Leica RC-30	GPS	5980	1:38000	60/30	Zeiss Scada	yes	yes	no	280	8	250	1 m, 8 bits
ES	TRAGSATEC	N.R.		N.R.	0																
FI	NLS			yes	6	12800	Jun 1999	Kodak Aerochrome IR 2443	Wild RC20	GPS	8520	1:55000	65/30	XLvision	yes	yes	no	2350	31	2133	1 m, RGB, 8 bits
FR	SCOT	N.R.	no	N.R.	0																
FR	SIRS	no	no	yes	2	756	May + Jul 1999	Kodak Panatomic X 1412	Leica Wild RC20 FMC	CCNS	5360	1:35000	60/20	HELL S3300	yes	yes	yes	350/750	11/40	170/586	40 u, 1.5 m, 3 bands
GR	ERATOSTHENES	yes	no		0																
GR	GEOAPIKONISIS	yes	no		0																
IE	ICON	yes	no	no																	
IT	CCIA (AERO)	yes		yes	*30*	85000	Apr-Jun 1999	Kodak Panatomic X 2412	Wild RC20, RC30, Zeiss RMK 15/23, FMC all	WOR DME GPS	6000	1:40000	60/20	SKAY Zeiss	yes	yes	no	2835	343	2835	21 u, 1 m, 8 bits
IT	CCIA (SAT)	yes		yes	*3*	114	May-Jul 1999	Kodak Panatomic X 2412	Wild RC20, RC30 FMC	WOR DME GPS	6000	1:40000	60/20	SKAY Zeiss	yes	yes	no	500	20	38	21 u, 1 m, 8 bits
NL	GEORAS	no	no	yes	1	553	May 1999	Agfa Aviphot Pan 50 PE	Zeiss RMK Top 15/23 FMC	CCNS-4, T-Flight T-Nav	6100	1:40000	15-20/15-20	Optronics Colorgetter 3Pro	no	yes	no	760	15	553	50 u, 2 m, 8 bits
PT	GEOMETRAL	no	no		4	16660	Jun-Aug 1999	Agfa Pan 50	Wild RC20, RC30 FMC	Ascot ACU30 GPS 9212 Aero	7600	1:43000	60/47	PS1 Zeiss Intergraph	yes	no	yes	4165	417	4165	1 m, RGB, 8 bits
PT	TERRACARTA	yes	no	yes			Jun 1999	Pan	FMC		5750	1:33000	60/20	Vexcel 4000	yes	yes	no			2400	1 m, 24 bits
SE	SATELLITBILD	no	yes	yes	3	300	1993 and 1995	Pan Double-X, Aero LX	Zeiss LMK 005A, Wild RC30, RMK Top15	GPS	9200/4600	1:60000/ 1:30000	64-82	Teragon, Leica Helewa	yes	no	no	100		100	1 m, 8 bits
UK	RSAC	N.R.	N.R.	N.R.	0																

Table 19. Main dates of 1999 contracts

MS	Contractor	satellite sites proposed	contract signed	begin receive maps	end receive maps	begin receive 1998 dossiers	end receive 1998 dossiers	begin receive 1999 data	end receive 1999 data	begin receive corrected dossiers	end receive corrected dossiers	begin ground data collection	end ground data collection	begin rapid field visits	end rapid field visits	begin field docs, 1st/2nd phase	end field docs, 1st/2nd phase	submit reference checks results	submit quality control data	begin receive on-the-spot feedback	end receive on-the-spot feedback	submit final report
AT	GEOSPACE	9-Oct-98						19 Apr/ 15-Jun	9-Jul			10-Jun	24-Jun	15-Jul	15-Aug					20-Jul	16-Aug	21-Oct
BE	MIN. AGRI.*	3-Nov-98												16-Aug	13-Sep				21-Sep			20-Oct
DE	EFTAS	21-Oct-98	25-Feb	15-Jan	15-Aug		15-Feb		15-Jun		15-Aug	3-May	5-Jun			21-Jun	20-Sep			28-Sep		15-Oct
DE	GAF	21-Oct-98	12-Mar/ 7-Jun		4-Jun		26-Feb		14-Jun								6-Aug					2-Nov
DK	DIAS	end-Sep-98	1-Feb	23-Mar	23-Mar	13-Jan	19-Jan	17-May	14-Jul	17-May	14-Jul	23-Jun	29-Jun	NR	NR	25-Jul	30-Jul	29-Jul	20-Sep		16-Feb	14-Oct
ES	DAP*	8-Oct-98		1-May	24-May			11-May	11-May		15-Aug			1-Jun	16-Jul	17-Aug	10-Oct					21-Oct
ES	TRAGSATEC	8-Oct-98	14-Apr	28-Jan	11-May	25-Jan	11-Mar	12-May	3-Jun	11-Jun	31-Aug	19-Apr/ 15-Jun	28-May/ 12-Aug	31-May/ 2-Aug	2-Aug/ 8-Sep	7-Jul/ 10-Aug	6-Aug/ 17-sep		16-Sep			15-Oct
FI	NLS	22-Dec-98	31-Mar	12-May	1-Jul	16-Jun	23-Jun	18-Jun	9-Jul	9-Jul	9-Jul	21-Jul	5-Aug			16-Aug	31-Aug	30-Sep	17-Sep			18-Oct
FR	SCOT*	23-Oct-98		17-Feb	30-Mar		15-Apr			31-May	2-Aug			20-Jul	24-Aug	12-Jul	4-Sep		12-Oct			October
FR	SIRS*	23-Oct-98		1-Mar	20-Jun		28-Apr			5-Jun	28-Jul	16-Jun	30-Jun			18-Jul/ ?	?/ 10-Sep		22-Sep	22-Oct		October
GR	ERATOSTHENES	6-Oct-98	11-May		9-Jun		26-May		8-Jul			8-Jul	1-Aug	24-Aug	27-Aug		18-Oct	8-Oct	26-Oct			28-Dec
GR	GEOAPIKONISIS	6-Oct-98	28-May	24-Jun	20-Sep				21-Jul			25-Oct							15-Nov			
IE	ICON*	6-Nov-98	24-Apr		14-Sep				6-Aug			28-Jul	5-Aug				14-Sep		21-Sep			19-Oct
IT	CCIA	26-Nov-98	1-Apr - 1-Jul		15-Aug				15-Jun		16-Jul/ 3-Aug	1-Sep	15-Oct	1-Sep	15-Nov	1-Jun	31-Jul		12-Nov	15-Jul	30-Sep	October
NL	GEORAS*	25-Sep-98	25-Mar	13-Jan	10-Apr	NR	NR	21-May	9-Aug	10-Jun	8-Aug	1-Aug	30-Aug	1-Aug	30-Aug		?/ 3-Sep		23-Sep	1-Aug	30-Aug	15-Oct
PT	GEOMETRAL	7-Oct-98	7-Jun						30-Jun		9-Jul	20-Jul	13-Sep	20-Jul	13-Sep	25-Aug	17-Sep		7-Oct			19-Oct
PT	TERRACARTA	7-Oct-98	7-Jun		8-Jul				6-Aug			14-Jun	2-Jul									October
SE	SATELLITBILD	9-Oct-98	13-Apr	27-Apr	5-Jul			27-Apr	5-Jul				28-Jun	7-Jul		15-Jul	22-Aug		13-Oct		6-Oct	19-Oct
UK	RSAC	25-Sep-98	7-Apr		7-Apr			1-May	30-Jun			10-Jun	21-Jun			23-Jul	19-Aug	19-Aug	13-Sep	18-Aug		21-Oct

* contract extended from 1998

Table 20. Hardware and software used

MS	CONTRACTOR	hardware	database	image processing	geometric corrections	GIS	management/ categorisation
AT	**GEOSPACE**	Sun Solaris 2.5, Pentium II PC	MS Access 7.0	Erdas Imagine 8.3	RSG 3.30	MapAgri 4.0a, ArcView 3.0	MS Access 7.0
BE	**MIN. AGRI.**	PC P200-P300, IBM Risk 6000, DEC Alpha	Oracle 7.3	EASI/PACE 6.3	EASI/PACE 6.3	SIGEC (in-house)	SIGEC (in-house)
DE	**EFTAS**	SG Indigo 2, Sun Sparc 5, 10, IBM PC	MS Access 7.0	Erdas Imagine 8.3	Orthomax 8.2	MapAgri 4.0a	MS Access 7.0, Excel 7.0
DE	**GAF**	HP 9000/30, Sun Sparc, PC Pentium	Foxpro 2.6	Erdas Imagine 8.3	Erdas Imagine 8.3, Geoimage	ArcInfo 7.04, ArcView	Zeus 4.2
DK	**DIAS**	Sun Sparc Ultra 1, PC Pentium	MS Access 97	Erdas Imagine 8.3	Erdas Imagine 8.3	CABS (ArcView application)	MS Access 97, Office 97
ES	**DAP**		MS SQL server, Borland	PICASSO (in-house)	PICASSO (in-house)	PICASSO (in-house)	PICASSO (in-house)
ES	**TRAGSATEC**	PC Pentium I, II	MS Access 97, Clipper 5.3, Info 4.2	ER-Mapper 5.5, Erdas 8.3	Erdas Imagine 8.3	Dinamap 1.02, ArcInfo 7	MS Office 97, Dinamap 1.02
FI	**NLS**	DEC Alpha 250/500, PC Pentium II	Oracle 7.0.16, MS Access 2.0	Erdas Imagine 8.3	Erdas Imagine 8.3, Leica-Helava Socket	ArcInfo 7.1, Topos, Imagine	Cachoo 7.1
FR	**SCOT**	HP 9000, X terminal	Oracle 7.3.3, MS Access	Erdas Imagine 8.3			ArcInfo 7.04, Oracle 7.3.3
FR	**SIRS**	PC Pentium II, Iomega Jaz 2 disk	ArcInfo 7.2	Erdas Imagine	Erdas Imagine	ArcView 3.1	MS Office 97
GR	**ERATOSTHENES**	Sun Sparc 20, PC Pentium	Oracle 8, MS Access 97	ER-Mapper 5, ArcInfo 7	ER-Mapper 5.2	ArcInfo 7	MS Office 4.2
GR	**GEOAPIKONISIS**	UNIX, PC Pentium, Digitizer	Oracle 7.3	Advanced Imager 6	Advanced Imager 6	MGE 6	MS Access 97
IE	**ICON**	PC Pentium	MS Access	ER-Mapper 6.0	ER-Mapper 6.0	MS Geographics, Map Info 5.0	MS Access
IT	**CCIA**	Sun, PC Pentium	MS Access, Sybase 5.0 SQL	Erdas Imagine, Silicon - Zeiss Fodis	Erdas Imagine	ArcInfo, TN Catadig	Galileo 99 NTS 99 (in-house)
NL	**GEORAS**	Intergraph TD 3, 310 (pentium)	Dbase	Advanced Imager	Advanced Imager	FACTS	FACTS
PT	**GEOMETRAL**	Intergraph TD300, PC Pentium III	GeoMedia Pro 3.0, Oracle 7.3	Erdas Imagine 8.3	Erdas Imagine 8.3	ArcInfo 7.3	MS Access 97
PT	**TERRACARTA**	SGI Indy 4400SC, Sun Sparc 20, PC Pentium III	MS Access 7.0	IRASC	Softplotter 1.8.3	ArcInfo 7.2, MGE 7.0	MS Access 7.0
SE	**SATELLITBILD**	VAX-6410, Sun Ultra 30, PC Pentium	MS Access 97	Erdas Imagine 8.3	in-house	ArcInfo 7.2.1, ArcView 3.1	MS Project, AGRI
UK	**RSAC**	Sun Sparc 5/20, PC XPS, V400	Oracle	Erdas Imagine 8.3	Erdas Imagine 8.3, PCI Radarsoft	Laser-Scan IGIS	Oracle, MS Access