European Agriculture and Remote Sensing: Changes and Perspectives

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Spatial R.S.: the Improvements

- The old good stuff: LANDSAT, SPOT 1-4, ERS, IRS, RADARSAT
- Better revisit time: MODIS, MERIS
- Finer resolution: IKONOS, QUICKBIRD, SPOT SUPERMODE, ORBVIEW, EROS MSG2
- Wider Coverage: DMC
- Better prices
Aerial R.S.: the improvements

- Digital cameras: Leica Geosystems ADS40, Vexcel Ultracam, Z/I DMC
- Better radiometry (shadows)
- Lower final price (fly window time, no scanning, automatisation)
- True ortho for land administration
- Fine DSM for 2.5D rendering
R.S. Agricultural needs

- Crop Production Forecasts and Estimates
  - Area and yield
- GIS in Agricultural Management
  - Rural Resources Management
  - Farm Management
  - Aid Schemes Management
- Controls of CAP Direct Aids to Farmers
Production Forecast and Estimates
Africa, Asia, South America

METEO (ECMWF), SPOT VEGETATION, CROP MASK

Land cover class selection for crop monitoring by comparing historical CNDVI and Sorghum production

Sudan

Gezira

R² = 0.9521
r of WRSI and Soybean yield during the crop cycle

Coefficient of correlation (r)

Prediction capability of the independent variable

Argentina

$$R^2 = 0.9546$$

$$\text{RMSE} = 2,763,151$$
• 2005 July 15th
Press Release:
• 30 Millions Tons decrease for Cereals.
• Detailed analysis for 10 crops and 25 countries

• 2005 Sept: Katrina disaster impact
• on Agricultural products (1 billion $ of direct loses on Corn, soyabean, cotton)
Permanent challenge

Detailed models

Or

just Meteosat

Barley Yield Sept 2005

Maize Yield Sept 2005

MARS Forecast

Ears Forecasts
Area Estimates

- Need of EU areas in February, July, Sept
- Need of low CV and detailed crop categories at country level

Landsat: too low acquisition probabilities
SPOT, Radarsat: Too expensive, radar questionable
MODIS/MERIS: too few spectral bands and limiting resolution
DMC: not enough resources (1 Giga/day)
Envisat ASAR: more research than operational
GIS Management in Agriculture

Rural Resources Management:
Agriculture represents 50% of the land use

– Interest of Image2000 / Corine Land Cover
– Technical upgrades like Google.Earth
– Africa Observatory for Sustainable Development
– GMES Land Monitoring Fast Track Service
Farm management

- Precision Farming
- Diseases prevention
- Farm Advisory System (2007)
- Private Softwares:
  Planification, Tracability, Resources Optimization, Accounting
- Integration of Imagery, GPS signal, GIS
GIS management of Direct Aids

- From 01.01.2005, all Member States have to use a Digital GIS Field Identification System
  - Wall-to-wall image layer
  - Raster DEM
  - Agricultural fields/blocks vector layer

- Should be multipurpose: Forestry, Environment, Animal diseases, Hazard Monitoring, Private Sector

- US follows our traces
Image even better than GPS (3 km perimeter)
Need to give area to farmer

Ineligible use
Controls of Direct Aids

- Annual EU budget of 6 MEUR
- Some 200 control sites
- Around 1000 HR images (SPOT, LANDSAT, IRS)
- 150,000 Km² of VHR acquired (IKONOS, QUICKBIRD)
- Backup: SPOT Supermode, RADARSAT, EROS
- New sensors in test: ORBVIEW, DMC
- Use of DIGITAL Orthophotos
- Not only area and crop but also GAECS…
CAPI interface from the CY 2004 contractor

The main window (top left) is used for digitisation of the parcel limits from the VHR image. The secondary window (top right) allows the user to display a selection of imagettes, i.e. multi-temporal series, or a variety of band combinations, or NDVI, classification, etc.
Advantage of RFV method

Parcel found not compliant with good agricultural conditions at 30/06/2003 during RFV in PL
Advantage of RFV % CAPI: Birch trees not obvious to detect by CAPI on VHR sat imagery
MT: use of 15 cm orthophotos (in 2004)

Garrigue removed

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Parcel of wheat and melon on 15 cm orthophotos
@grision

Siracuse, Avola: citrus-almonds differentiation
Counting Nuts trees with
Labours following the terrain slope

**ASPECT**

aspect_sdom.img

Value: degree

- **N**: 0 - 22.5
- **NE**: 22.5 - 67.5
- **E**: 67.5 - 112.5
- **SE**: 112.5 - 157.5
- **S**: 157.5 - 202.5
- **SE**: 202.5 - 247.5
- **SO**: 247.5 - 292.5
- **NO**: 292.5 - 337.5
- **N**: 337.5 - 360

**PENDENZA**

slope.img

Value: percentuale

- 0 - 10 %
- 10 - 15 %
- 15 - 30 %
- 30 - 50 %
- 50 - 200 %
Labours following the terrain slope
Terraces maintenance
Terraces maintenance

Spain

Ortophoto

Slope image

Valori di pendenza percentuale ottenuti a partire da DTM 10x10 m

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Arable stubble management
Siracuse: permanent crops landscape

burnt stubbles of wheat
CwRS 2004 - Soil erosion over different crop fields
Other Requirement
Crop regrowing or set-aside?
Soil maintaining and correct olive groves pruning activity
Some Conclusions

• The needs exist
• The technique is operational
• Expertise is well spreaded
• GMES initiative should offer unique opportunities
• Europe needs civil Very High Resolution Satellites
• EU Space policy should be reinforced