



The role of FP7 Geoland2 in support to the clarification of the concept of Good Agriculture Conditions laid down in the EU CAP - ReSAC activities on the Bulgarian test site



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Abstract:

The policies integration process between agriculture and environment in Europe fosters the development of agricultural practices that preserve the environment and safeguard the countryside. The current principles laid down in the EU Common Agriculture Policy are also aligned with that process, giving prominence to the sustainable development of the rural areas and the protection of the biodiversity. Each policy needs reliable information and robust indicators in order to implement successfully its objective. There are two important sets of indicators in the EU CAP, which are critical to the proper assessment of the balance between farming and environment – the Good Agriculture Conditions (GAC) and the Good Agriculture and Environment Conditions (GAEC).

The aim of the AgriEnvironment Service, part of the FP7 Geoland 2 project, is to contribute to the improvement of the timely and accurate monitoring of agricultural land use state and its changes at European, national and regional levels by providing common methodologies and indicators covering various temporal, spatial and thematic scales. One of its particular objectives is the monitoring and assessment of the area and rate of abandoned arable land. This is still a hot topic in the last two EU Member States, Bulgaria and Romania, which also are subject of specific conditions by the EC in respect to the GAC. The first years of CAP implementation in those countries, revealed that the problem with the proper assessment of the land abandonment is directly linked with the criteria used to decide whether the agriculture land is in GAC or not.

The purpose of the presentation is to share some preliminary findings of the Land Abandoned project package of Geoland2 in respect to monitoring of the abandoned land with the combined use of EO and in-situ data. Examples from the field visits recently performed on the Bulgarian test site in Struma Valley are presented. A comparative analysis between the remote sensing data and the ground truth is shown in order to evaluate the degree of reliability of HR satellite data to detect and monitor abandoned land. Some potential outcomes of that study in support to the proper definition of GAC in Bulgaria are outlined at the end.

GMES (Global Monitoring for ENVIRONMENT and SECURITY):

Europe's response to the global need for environment and climate monitoring

An independent earth observation system for Europe

The largest fleet of satellites and atmosphere/earth-based monitoring instruments in the world

GMES Objectives

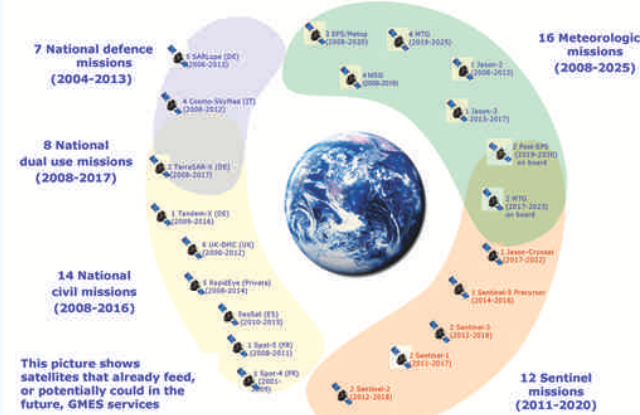
To monitor and better understand our environment and to contribute to the security of ever citizen.

How our planet is changing?
Why is it changing?
How this might influence our daily lives?

GMES will provide

Decision-makers who rely on strategic information with regard to environment and security issues with an independent and permanent access to reliable data.

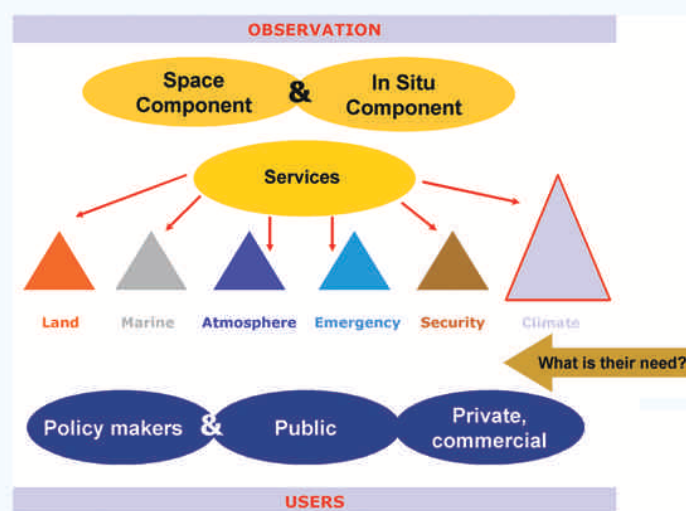
GMES Space Component



GMES Projects and Bulgarian Participation



GMES Infrastructure

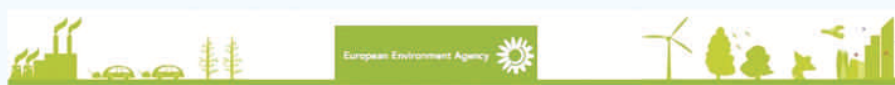


GMES In-situ component

In-situ sensors include ground stations, airborne and sea-borne sensors. Based on observation and monitoring infrastructures of different organizations within the European and international networks

From local, national to international level - covering needs outside GMES

The European Environment Agency (EEA) has started coordinating in-situ networks synchronized with INSPIRE and SEIS
<http://www.eea.europa.eu/>



Building on existing mechanisms and capacities, EEA will develop an innovative and sustainable framework for open access to in-situ data
GMES in-situ coordination (GISC) is a FP7 funded project and will last for three years (January 2010 - December 2012)
<http://gisc.ew.eea.europa.eu/>

ReSAC in GMES

Geoland2: pre-operational land service of GMES:
CMS: Seasonal/Annual Terrestrial Change Monitoring (SATCHMo)
CIS: Agri-Environmental Monitoring
CIS: Spatial Planning

SAFER: pre-operational emergency service of GMES
Flood Risk Management
Assets Mapping



GMES Space Component

Space Component
- Ensure sustainable delivery of data from Earth observation satellite for all GMES services
- Development of first generation of Sentinels

Major role: ESA and EUMETSAT
- ESA role is a main coordinator of the overall GMES Space Component
- Definition of overall GSC architecture and plan for future evolutions
- ESA is the operator of Sentinel 1, -2 and Sentinel-3
- Information about Land



- EUMETSAT is to prepare new operational satellite capabilities funded by the EC and developed by ESA
- EUMETSAT is the proposed operator of Sentinel-3 (Marine), Sentinel -4 and -5
- EUMETSAT will provide satellite data for Oceanography; Atmosphere, Climate and Global Land

GMES Services Component

2008 - 2010: GMES pre-operational services
Awarded in the 1st GMES call of 7th FP (thematic area „Space“)



ReSAC will provide local and regional products to support Global Monitoring for environment and Security program about Land Cover Change, Spatial Planning and Agri-Environment indicators.

In Bulgaria was founded Bulgarian Information Office for GMES to:
- Support for participation of Bulgarian institutions, organizations in GMES thematic projects
- Support in developing national and regional operational capacity in GMES services
- Support for growth of user segment of GMES-related projects
- GMES Operational Capacity Workshop 25 - 26 March 2010
- Coming soon II GMES Operational Capacity Workshop 2011.

<http://www.gmes-bg.org>



GMES Land Services

Benefiting from Earth Observation satellite data, the GMES land monitoring service provides accurate and cross-border harmonised geo-information at global to local scales.
It covers a wide range of thematic areas, like land use / land cover change, soil sealing, water quality and availability, spatial planning, forest monitoring and global food security.

The pre-operational land monitoring service of GMES is currently provided through the EU-funded project geoland2. The project develops a set of three mapping services which serve as a basis for the provision of a series of EUROLAND (Mapping service)

The European Land Monitoring Service addresses the local (i.e. the Urban Atlas) and the continental component (i.e. high spatial resolution, wall-to-wall land cover parameters and land cover change) of the land monitoring service. EUROLAND contributes developing and implementing an efficient processing chain for future updates of CORINE Land Cover.

BioPar (Mapping Service)

The Biogeophysical Parameters Service provides a series of parameters on regional, European and global scales, both in near-real-time and off-line mode, which describe the continental vegetation state, the radiation budget at the earth's surface and the water cycle.

SATCHMo (Mapping Service)

The Seasonal and Annual Change Monitoring Service (SATCHMo) aims to close the gap between low-resolution global coverage and the high-resolution by providing seasonal to annual European-wide coverage of physical properties describing bio-geophysical information parameters, such as land cover and land cover change.

Spatial Planning (Information Service)

The Spatial Planning Service provides highly accurate products and tools to describe, explain and forecast urban land use changes, from regional to European scale. Combining geographic information with ancillary geospatial and statistical data, the service helps analysing demographic developments and urban land take trends. It also help describing the state of land consumption and its impact on the environment.

Agri-Environmental Monitoring (Information Service)

The AgriEnvironment Service supports the timely and accurate monitoring of agricultural land use state and its changes at European, national and regional levels. It provides indicators addressing agricultural land use and trends, farming pressure on water and soil resources, and the impact of agricultural land use changes on biodiversity and landscapes.

Water Monitoring (Information Service)

The Water Monitoring Service provides a pan-European model in order to allow an integrated analysis of transnational water bodies. In particular it addresses water balance, flow rates and flow depths in all major streams and rivers, soil moisture level, lake/reservoir depths and levels, snow depths, snow water equivalent and Forest Monitoring (Information Service)

The Forest Monitoring Service provides highly accurate and spatially detailed information on the state and development of forests. It contains information for Forest Area by four forest types (coniferous forest, broad-leaved forest, mixed forest and un-stocked areas/clear-cuts) as well as Forest Area Change.

Land Carbon (Information Service)

The Land Carbon Service aims to set up pre-operational infrastructures for providing variables related to the terrestrial carbon cycle, in near-real-time (NRT), for describing the continental vegetation state (leaf area index and biomass), the surface fluxes (carbon and water), and the associated soil moisture.

Natural Resource Monitoring in Africa (Information Service)

The Natural Resource Monitoring in Africa Service will provide decision makers with factual environmental information. The thematic focus is on natural resource management in a seasonal as well as multi-annual perspective to facilitate decision making processes and medium term planning exercises.

Global Crop Monitoring (Information Service)

The Global Crop Monitoring Service provides objective, near real-time assessments of crop conditions and yield forecasts in support of European policies in the fields of agriculture, trade and food security.

Geoland2 - Operational Monitoring Services for our Changing Environment

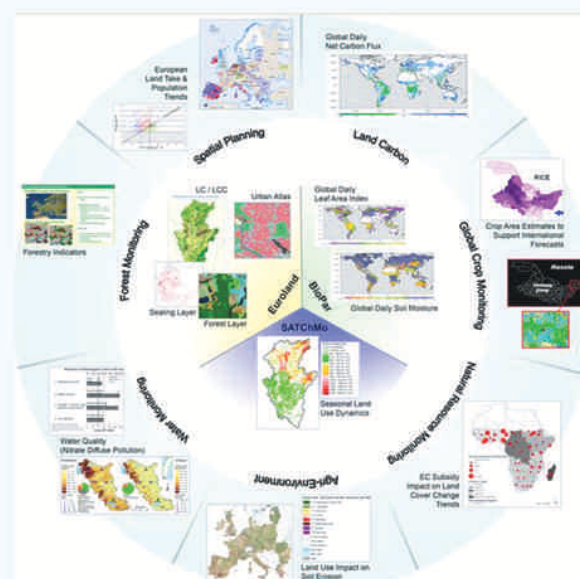
What is Geoland2 ?



Geoland2 Key Facts

- * Project Start: September 2008
- * Project Duration: 4 years
- * Project Partner: 51 European public and private partners
- * Project Stakeholder: > 80 major international User Organisations
- * Financing: funded by EC within the 7th Framework Program.

Geoland2 Architecture



Geoland2 Common Agricultural Policy (CAP) and Related Services

Core Information Services Agri Environmental Monitoring

The policies integration process between agriculture and environment in Europe fosters the development of agricultural practices that preserve the environment and safeguard the countryside. Various EU directives and programmes, such as the Rural Development Programme, the Water Framework Directive, the Nitrate Directive and others, set strategic guidelines for the Common Monitoring and Evaluation Framework by defining objectives and indicators to evaluate the progress and achievement in environmental protection measures.

The AgriEnvironment Service will contribute to the improvement of the timely and accurate monitoring of agricultural land use state and its changes at European, national and regional levels by providing common methodologies and indicators covering various temporal, spatial and thematic scales.

Based on user requirements, the AgriEnvironment Service aims at developing and improving agri-environmental indicators assessing:

- * Agricultural land use and trends;
- * Farming pressure on water and soil resources;
- * Impact of agricultural land use changes on biodiversity and landscapes.

These indicators will be generated simultaneously on four selected demonstration sites. They will be supplied at two scales: at the national/ catchment scale to provide an overview of the general status of the site and at the scale of hot spot areas requiring more specific monitoring techniques.

Key Benefits

- Provision of a consistent and integrated set of agri-environmental indicators covering various temporal, spatial and thematic scales;
- Analysis of the impact of agricultural land use changes on the environment and biodiversity;
- Indicators provided at national/catchment scale and for hot spot areas.

Other CAP-related services: Euroland, SATCHMo
For more information please visit: www.gmes-geoland.info

Core Mapping Services Biogeophysical Parameters

The goal of the Biogeophysical Parameters Service (BioPar) is to set up pre-operational infrastructures for providing an extensive range of bio-geophysical parameters on regional, European, and global scale, both in near-real-time (NRT) and off-line mode. These variables describe:

- The continental vegetation: Leaf Area Index (LAI), Fraction of Absorbed PAR (FAPAR), Fraction of vegetation cover, Dry Matter Productivity (DMP), Normalised Density Vegetation Index (NDVI), Phenology, Burnt Areas;
- The energy budget: albedo, downwelling shortwave and longwave fluxes, Land Surface Temperature (LST);
- The water cycle: Soil Water Index (SWI), freeze and thaw conditions, small water bodies.

The BioPar concept relies on research actions (definition, improvement and customisation of algorithms to match user requirements, development activities), development activities (implementation of these algorithms in processing lines) and demonstration operations (generation of test data sets for validation and user utility assessment). Independent teams perform the product validation following guidelines defined by the Land Product Validation (LPV) group of the CEOS (Committee on Earth Observation Satellites). The operation centres perform the pre-operational production in NRT and the resulting bio-geophysical products are disseminated to the users via the Spatial Data Infrastructure (SDI).

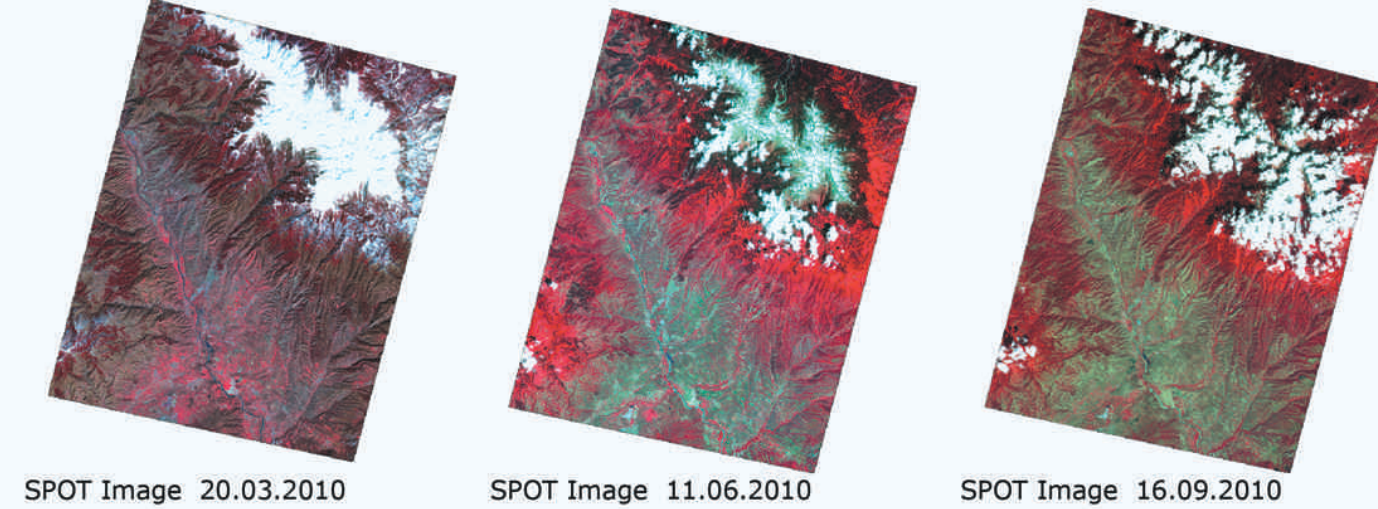
Key Benefits

- Bio-geophysical parameters provided on regional, European and global scale in NRT and off-line;
- Indicators cover vegetation state, energy budget at surface level and water cycle;
- Support of European policies on environment and water management, agriculture and food security.



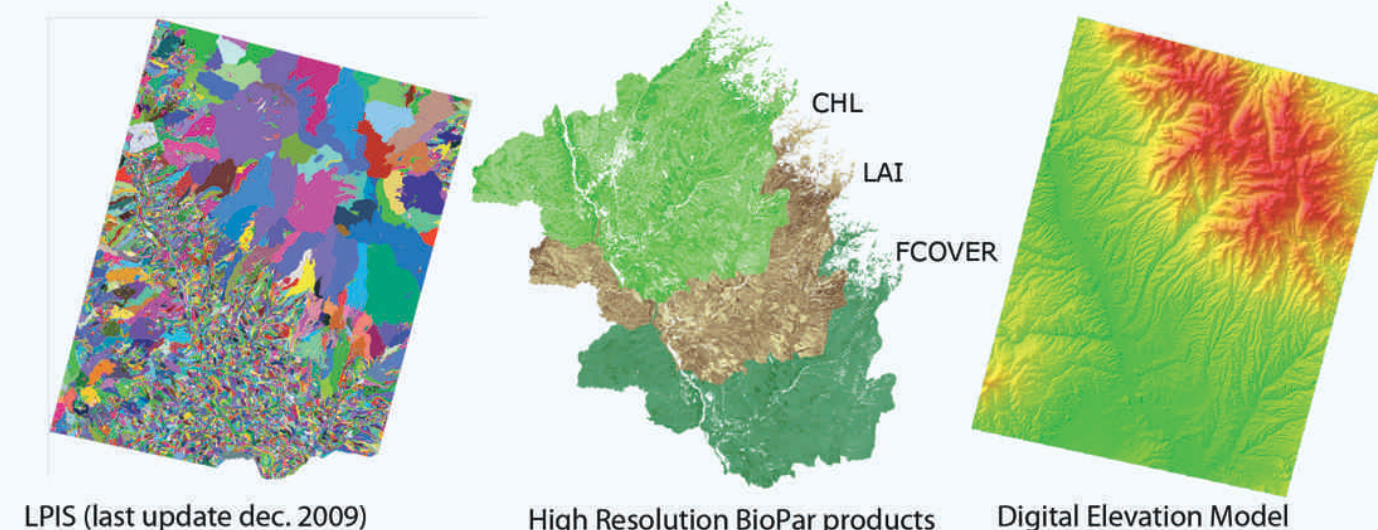
Test site: Strouma valey, Bulgaria

Source Data:



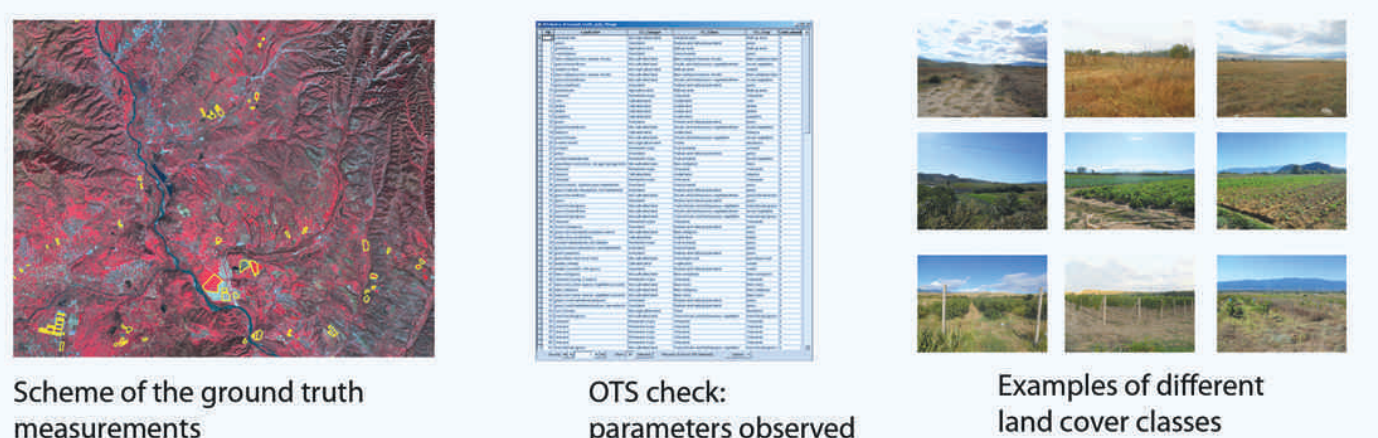
Satellite images

To map different land cover classes and especially to differentiate abandoned land from pastures and some crops, multitemporal images have been used acquired during the vegetation season



Auxiliary Information

In order to facilitate the classification process auxiliary information was used: LPIS to concentrate on the agricultural land and to check the LPIS thematic accuracy; HR BioPar products, to use additional vegetation parameters in classification; DEM, to separate grassland areas according to their elevation.



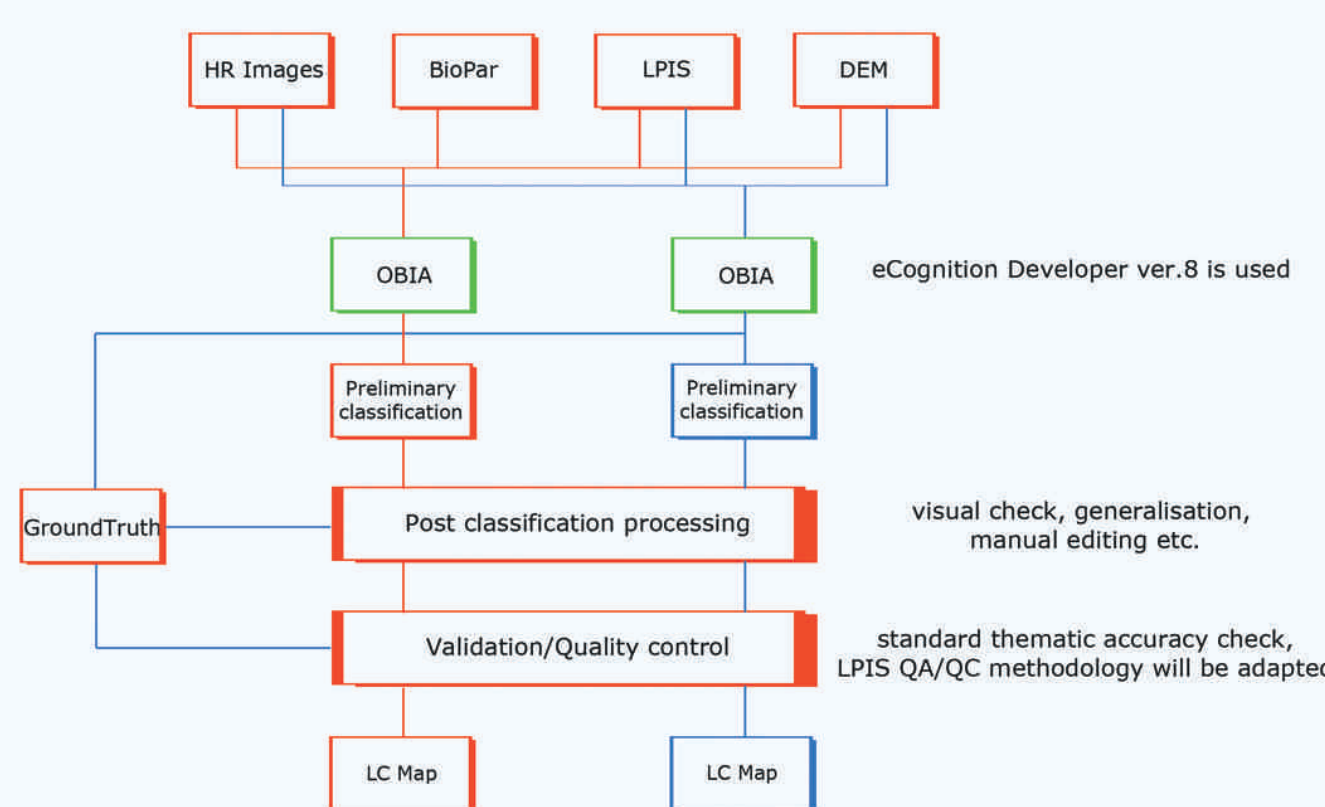
Ground truth measurements

Ground truth measurements were performed to collect information on the different crop types and especially to collect samples for abandoned land and pastures.

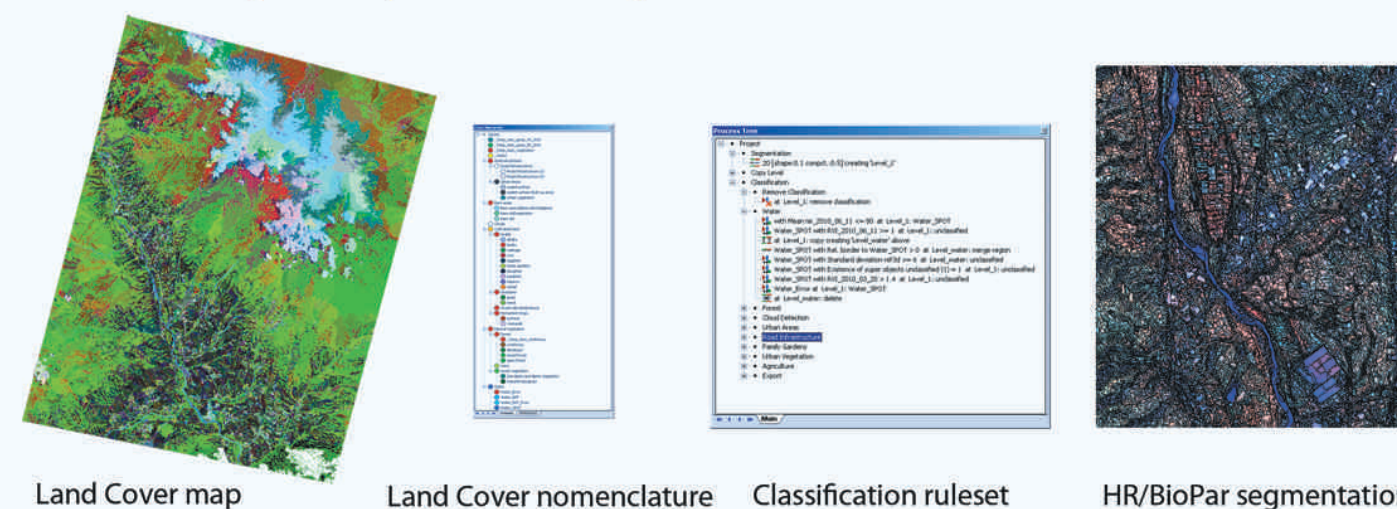
ReSAC activities in AgriEnvironmental Indicators work package:

- Source data delivered;
- Auxiliary information used;
- Ground truth measurements performed;
- Methodology developed;
- First preliminary results obtained.

Classification methodology



Processing chain product examples



Conclusions and future developments

- Geoland2 project and its services will generate different thematic products which could be used in CAP activities;
- Combination of multitemporal satellite images with auxiliary information could be used in updating LPIS in regard to land abandonment and pasture mapping;
- The use of ground truth data is extremely important in differentiation of crop types, and especially abandoned land/grassland;
- In order to be able to update LPIS also on parcel level (geometry) VHR images should be used together with multitemporal HR images.

For more information www.resac-bg.org