

Identification of agricultural land use

Dedication and professionalism for an agricultural sector that is competitive, quality driven and respectful of the environment



GrupoTragsa
Partners in excellence



Tragsatec is a leading international firm in the development and implementation of innovative, high-tech solutions for the identification of agricultural land use, as well the application of this information in the management of the Common Agricultural Policy (CAP) at the national level.

AGRICULTURAL
land use

development
IMPLEMENTATION

INTERNATIONAL
reference

Our main values

With more than 4,000 employees and 25 years of experience, we create solutions according to the needs and resources available. The principles that define us are:

- | We ensure the utmost professionalism and efficiency through the implementation of action protocols and quality controls.
- | We provide our services to local public administrations as well as to international governments with the objectivity and impartiality that the public sector offers.
- | We adapt the resources available to the particular characteristics of each agricultural sector, taking into account specific production systems and environmental conditions.



Products and services

Earth observation products

Photogrammetric flights

We annually produce between 100,000 and 200,000 km² of orthophotography, within the framework of the National Plan for Aerial Orthophotography (PNOA), and the Land Parcel Identification System (SIGPAC in Spain).

Its objective is to obtain digital aerial orthophotographs with 25 or 50 cm resolution and high-precision digital elevation models covering the whole of Spain and updated within a maximum time span of three years.

Photogrammetric flights and the processing of the data are carried out in accordance with the spirit of the INSPIRE Directive for the establishment of an infrastructure of geographical data in Europe, thus ensuring the consistency of geographic information used by all public bodies.

The orthophotographs serve as a layer of the Land Parcel Identification System (SIGPAC in Spain). Tragsatec is responsible for the proper integration of the orthophotographs in the image server and the Web Map Service (WMS) of the Spanish Agricultural Guarantee Fund (FEGA), coordinating body for the SIGPAC.

Satellite images

Tragsatec covers about 25,000 km² annually with satellite images of high and very high spatial resolution for the control of environmental and agricultural subsidies as part of the Common Agricultural Policy (CAP). These are scheduled on an ad hoc basis on at least four dates throughout the period of crop development.



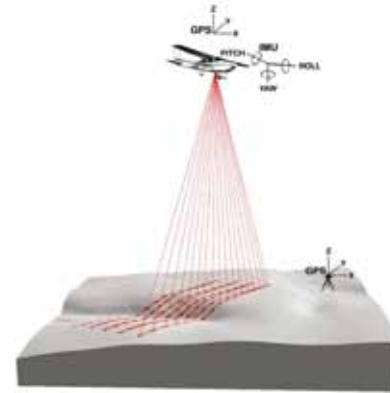
Orthoimages, vegetation indices and crop classifications are generated processing images with specialised programs, which serve as support for the assessment of a wide sample of parcels in a very short period of time.

Orthoimages are generated at a national level using the Deimos1 and RapidEye satellites to obtain a layer identifying areas with or without vegetation that serves as a base in the calculation of the Pasture Admissibility Coefficient for SIGPAC.

In addition there are annual local monitoring campaigns of agroenvironmental measures: at national level, tracking the status of rain-fed crops and pasture for the **Agrarian Data Geographic Information System (SIGA in Spain)** and, at international level, to obtain various derivative products.

LiDAR flights

The PNOA LiDAR project aims to cover the entire territory of Spain. The data is obtained using airborne LiDAR sensors, with a density of 0.5 points/m². From the resulting files, distinct layers showing different characteristics, such as the height of the vegetation, are generated.



Identification of agricultural land use

Tragsatec participates in:

- | The location and identification of land use by photo-interpretation and subsequent field visits.
- | The development of GIS and agricultural and forest inventories.
- | The analysis and interpretation of the information obtained.
- | The development of GIS applications tailored to specific needs and publication on web pages.



Key projects

| SIGPAC

Since 2003 we have been creating and updating the Land Parcel Identification System (SIGPAC in Spain), that covers 505,000 km². Its main objective is to manage the subsidies of the Common Agricultural Policy (CAP).

According to land use, we were initially able to differentiate 68 million distinct reference parcels within the registered parcels. Every three years there is an update that differentiates: 19 permanent and 4 non-permanent agricultural uses, and 6 non-agricultural uses. Since 2005 the SIGPAC has been publicly accessible via the Internet. In recent years new layers have been incorporated, including: the **Natura 2000 Network** (includes Special Areas of Conservation, SAC, and Special Protection Areas, SPAs), **areas**

vulnerable to pollution by nitrates (to control and reduce pollution through the establishment of parameters for the application of fertilisers), **areas for 'montanera'** (the fattening of Iberian pig), **landscape features**, **permanent pasture**, **zones with a risk of erosion** and **less-favoured areas**.

| Other SIG

| **Olive tree GIS.** Identification with UTM coordinates of more than 300 million olive trees using orthophoto photo-interpretation and field visits.

| **Citrus tree GIS.** Identification of the land registry parcels used for citrus cultivation: species, field pattern, variety, planting pattern and irrigation.

| **Nut tree GIS.** Identification with UTM coordinates of 75 million almond, hazel, walnut, pistachio and carob trees.

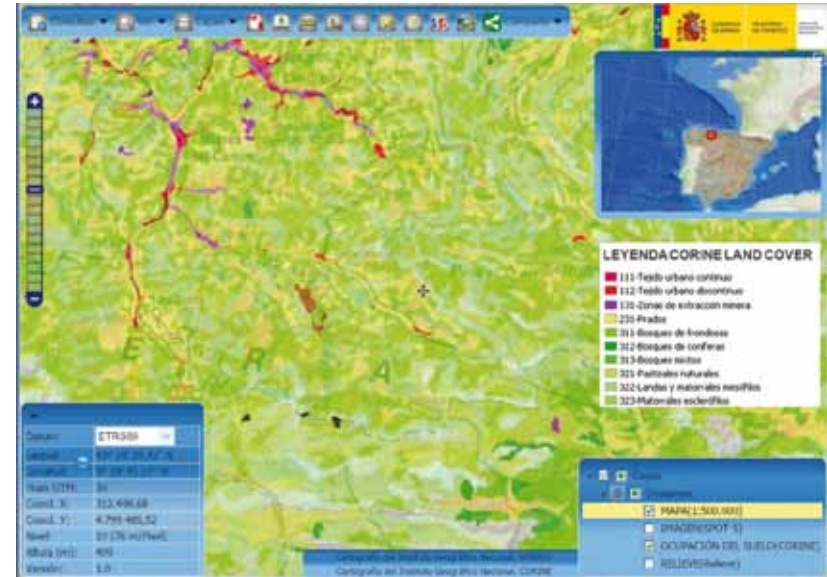
Land use mapping

| SIOSE

The Information System on Land Cover (SIOSE in Spain) is a 1: 25,000 scale database that integrates the information available from the autonomous communities (CC.AA) and the General State Administration (AGE). It uses a conceptual land use object-oriented model, with standardized data, interoperable and harmonised, according to the principles of the INSPIRE Directive. We also fulfil a number of other roles including: quality control, consolidation, drafting of manuals, technical support to the National Geographic Institute (IGN) and to the autonomous communities, cartographic production, development of computer applications for production, maintenance, consulting and quality control of SIOSE and SIOSE generalisation with CORINE Land Cover.

| CORINE

Within the CORINE programme (Coordination of Information on the Environment) the project CORINE Land Cover (CLC), a European land database at 1:100,000-scale and 25 ha minimum mappable unit has been created, proving useful for territorial analysis and European policy management. We provided technical support to the National Geographic Institute for the generation of the Spanish CORINE Land Cover over three updates made since 1990 (2000, 2006 and 2012), performing methodological development for the generalization of SIOSE, nomenclatural gateways for SIOSE-CORINE and photo-interpretation of changes for about 250,000 km², 50% of the national land area, based on information provided by the reference satellite images.



Monitoring of agricultural aid

We collaborate with public administrations in the monitoring of aid to farmers, acquiring extensive knowledge on the subject and meeting new challenges in the field in an agile and innovative way.

Among the services provided are the following:

- | Collection and processing of information necessary for assessment: requests for assistance, adequate mapping, satellite images, orthophotographs, etc.
 - | Study of the agronomic characteristics of the assessed area and witness sampling (field poll).
 - | Photo-interpretation of the parcels selected for the assessment.
 - | Quick on site visits to areas with incidents.
 - | Communication of results and support to the customer for the interpretation of resulting data.
- In order to achieve this we employ the latest available technologies:
- | High resolution (VHR) satellite images that allow photo-interpretation of land use.
 - | Applications designed to allow analysis, study and the generation of results for the relevant cases.
 - | Telematic data transfer that allows communication between field agents and head office in real time.
 - | Ruggedized tablet PC's for fieldwork that facilitates the work and the integration of records into a centralized database.



Agrarian Data Geographic Information System (SIGA in Spain)

We carry out the following work in relation to SIGA:

1. MCA

1999-2009: 1999-2009: Update of the Crops and Land Use Map (MCA in Spain) information to 1: 50,000-scale and 2010 update of the MCA to scale 1:25,000. The basis of this work is the photo-interpretation of the aerial orthophotos and satellite images, dividing the national surface into 1: 50,000 or 1:25,000 sheets. In addition nationwide coverage is generated with continuous information, and cartographic and alphanumeric information is published through the publishing service of the Ministry of Agriculture, Food and Environment (MAGRAMA) and the SIGA portal (<http://sig.magrama.es/siga/>).

2. Atlas of agro-climatic characterization

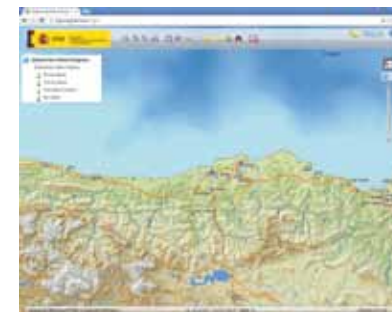
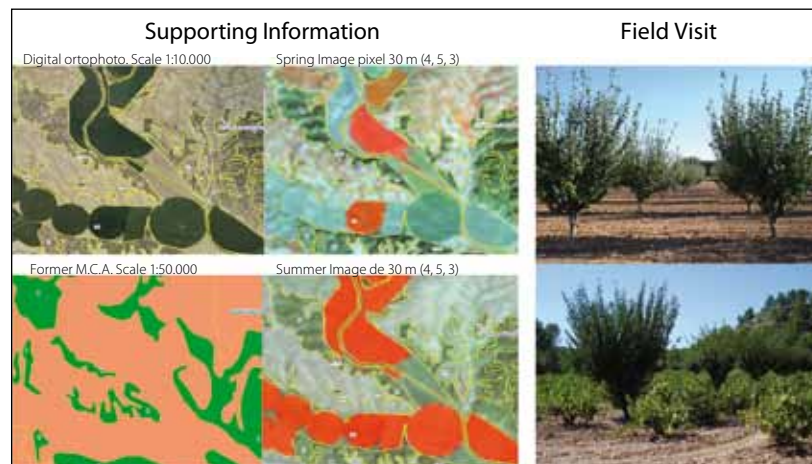
This information is produced based on the series of temperature and rainfall data provided by the State Meteorological Agency (AEMET), that once processed are modelled for the entire national territory, using geostatistical interpolation methods for the different parameters (warm period, monthly average temperature, annual average rainfall, annual ETP (Thornthwaite...) generating different coverages, including the Papadakis classification.

3. Monitoring of drought and its effects on crops

An early detection system is available for anomalous situations in the vegetative cycle of rain-fed areas and grasslands based on the comparative analysis of vegetation indices (NDVI) resulting from the daily images of the NOAA-AVHRR satellite between 1993 and 2010 and from MODIS at the present time.

4. Crop prediction through statistical methods

There are numerous studies focused on the investigation of the different factors that affect the behaviour of cultivated species, as well as attempts to recreate on a theoretical basis all the developmental stages that determine final harvest. Controlling the main variables involved in real time makes it possible to obtain information about the state of harvests in advance, allowing us to analyse the situation of certain sectors and establish support measures or market strategies.



Technological innovation

We have developed an architecture and an interoperable corporate geographical information system enabling the customer to have the tools necessary for the comprehensive treatment of geographic information.

We have computer applications and mathematical models for the identification of agricultural land use and assessment of CAP aid.

We apply technologies of “linked data” on the reuse of information in the sector according to the W3C standards.

We also analyse projects that handle large volumes of information to study the possibility of treatment with Bigdata technology (sensor information, internet of things, LiDAR, agriculture of the future...).

Another area of work that we are aiming for is the use of RPAS (drones or unmanned aerial vehicles) technologies for the realization of field data collection and recognition work and even the use of such vehicles for carrying out certain tasks where human access is limited or difficult.



We are experts

- | We have implemented immediate measures of control and assurance laid down in the Common Agricultural Policy.
- | We are the resource for public administrations requiring the organization of effective and agile teams for the implementation of official programmes.
- | We have continued experience in the management and operation of agricultural and environmental databases.

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