Castile and Leon Crops and Natural Land Map

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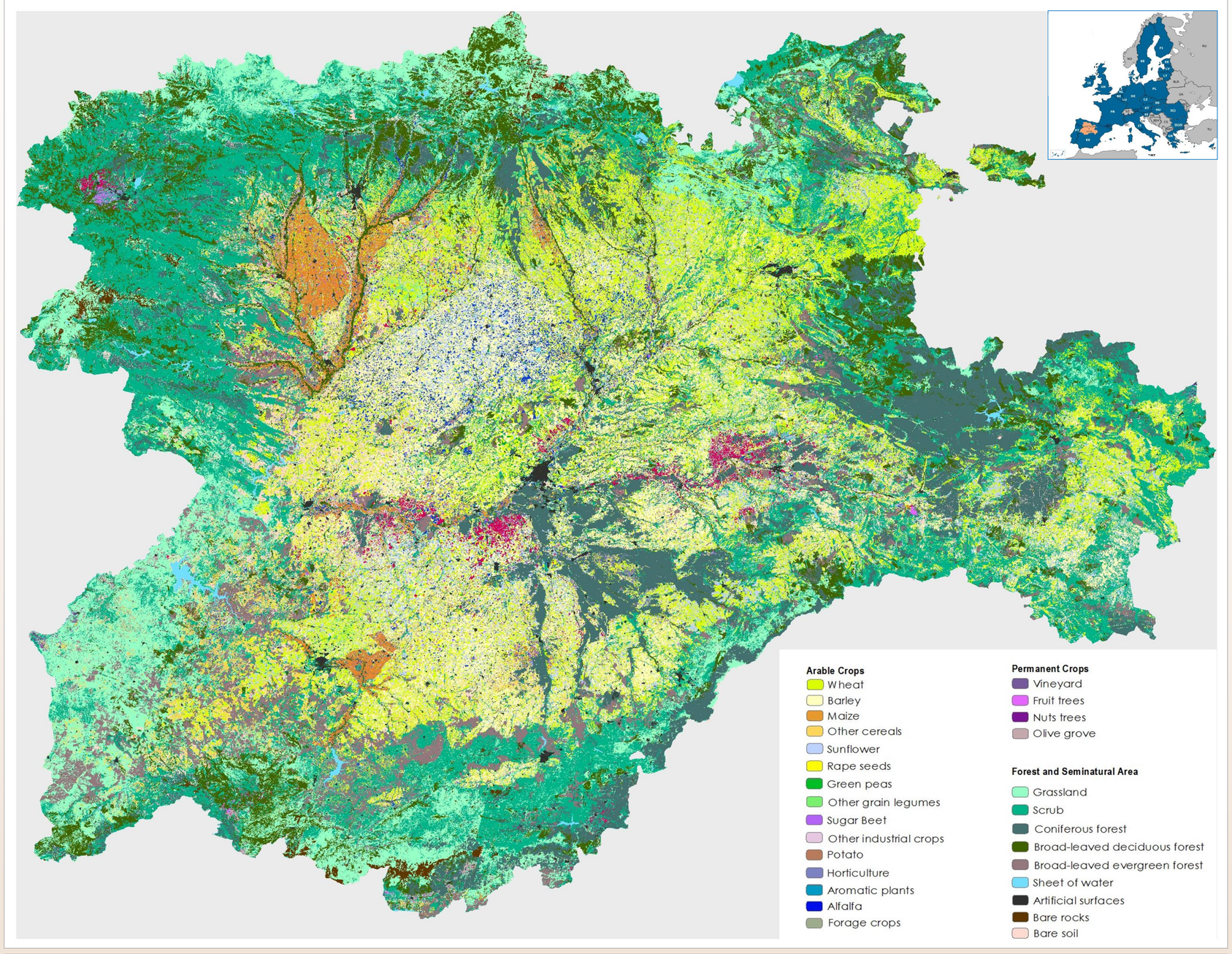
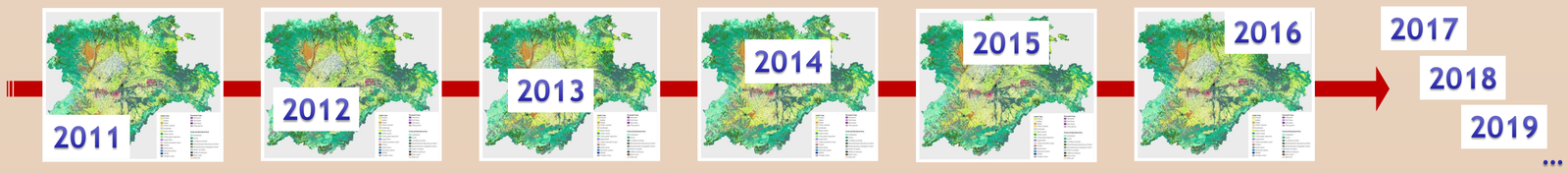
General description

Castile and Leon Crops and Natural Land Map (MCSNCyL, Spanish acronym) is an operational country size (94.224 km2) land use layer, updated annually, obtained through satellite imagery and ancillary data. The goal of the project is to produce a land use map that represents the changes in annual arable crops as well as permanent crops and the areas of natural vegetation. The classification currently comprises 150 classes although for the published map they are grouped into 33 classes.

The project began in 2013, and since then layers for the years 2011, 2012, 2013, 2014, 2015 and 2016 have been generated.

The project is led by the Agricultural Technological Institute of Castile and Leon (ITACyL) and has the support of the Duero River Basin District Authority and the National Geographical Institute of Spain for the image acquisition. The Regional Ministry of Public Works and Environment and the Regional Ministry of Agriculture cooperate in the supply of training cases.



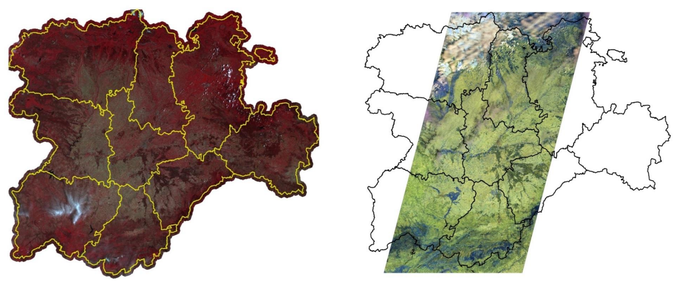


Data Sources and methods

The project is an adaptation of the US Crop Data Layer from US Department of Agriculture using databases available within the European Framework.

The procedure implies the use of images from Deimos-1 (2011-2016), Landsat 8 (2013-2016) and Sentinel-2A (2016) satellites. From 2017 onwards it is expected to improve the spatial resolution from 20 to 10 m as long as Sentinel-2 imagery becomes more reliable in terms of availability. Also ancillary data like DTM, vegetation parameters derived from LiDAR, climatology. The classification is performed using a machine learning algorithm trained with data retrieved from several sources, especially from Integrated Administration and Control System for Common Agricultural Policy subsidies database and some other Land use databases available in Spain and Europe (Land Parcel Identification System, LUCAS, etc.).

SATELLITE DATA



Deimos-1

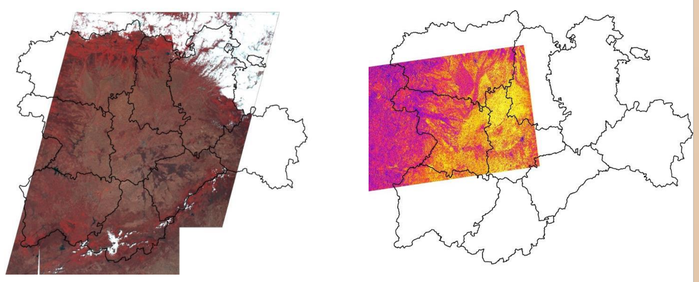
(2011-2016)

- Between 8-10 coverages per season.
- Resampled to 20 m GSD define project's frame.
- Acquisition dates accurately selected to achieve irrigation discrimination on winter crops.

Landsat- 8

(2013-2016)

- Intensively processed in order to be adapted to project frame (including pan-sharpening)
- Complements Deimos-1 data with more spectral bands (helps crops identification)



Sentinel-2

(2016)

- Lots of problems in 2016 spring. Probably one satellite it's not enough to replace Deimos-1.
- New Project frame with 10 m de GSD in 2017.

Sentinel-1

- To be used within SENSAGRI H2020.

Accuracy

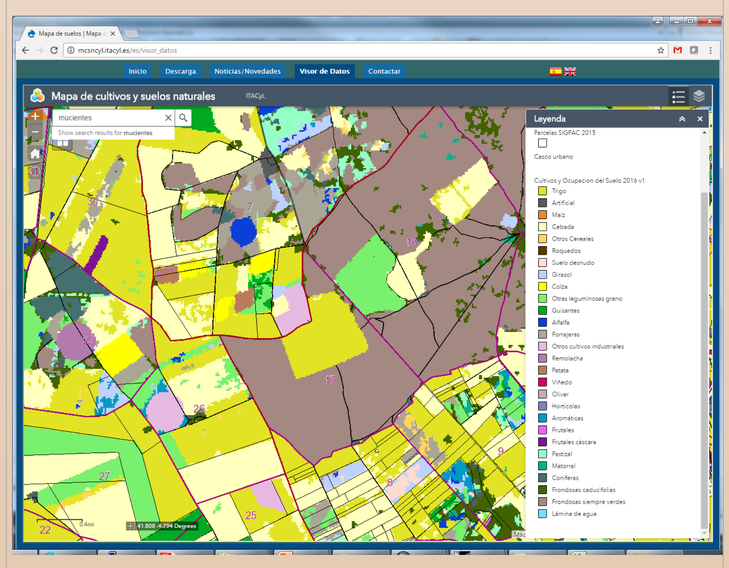
The overall classification accuracy is 82% (kappa) on average, being generally much higher in crop classes than in natural land. Accuracy in summer crops reaches 98-96% while the discrimination of winter crops falls below 80% in most cases. The layer discriminates between irrigated and rainfed crops. The accuracy of the irrigation discrimination is much lower in winter crops.

CLASS	SUCCESS %	CLASS	SUCCESS %
Fruit trees	99	*Sunflower*	91
Artificial Surfaces	99	*Other Irrigated Cereals*	90
Olive Grove	99	*Irrigated Alfalfa*	90
Horticulture	99	*Rape Seeds*	90
Fruit trees	99	*Barley*	87
Vineyard	98	*Wheat*	85
Sheet of water	98	*Irrigated Sunflower*	85
Sugar Beet	96	*Bare Rocks*	80
Maize	95	*Broad-leaved Evergreen Forest*	76
Potato	94	*Alfalfa*	73
Other Grain Legumes	93	*Green Peas*	72
Grassland	92	*Bare Soil*	68
Scrub	91	*Irrigated Wheat*	68
Coniferous Forest	91	*Irrigated Barley*	62
Broad-leaved Deciduous Forest	91	*Forage Crops*	61

Coincident between layer training pixels and map.

Dissemination

The layers are disseminated trought an specific web page. Users can identify parcels using Land Parcel Identification System usen a WEB-GIS viwer or download the entire raster dataset for a GIS desktop aplication.



http://mcsncyl.itacyl.es

Applications

The layer provides valuable information at different levels for government and private sector. It offers very updated information about land cover for general use. These are some use case examples: Water use monitoring, LPIS update, CAP subsidies on-the-spot checks. Environmental monitoring (NATURA 2000), Market supply information, Agronomic studies and Crop modeling.

This work is part of the H2020 project Sentinels Synergy for Agriculture SENSAGRI In response of the EO Work programme "EO-3-2016: Evaluation of Copernicus Services". The project will exploit the synergy of optical and radar measurements to develop prototype services capable of near real time operations like crop type mapping.

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