

FPA Copernicus User Uptake Action 2019-2-49 in Spain

Developing support for monitoring and reporting of GHG emissions and removals from land use, land use change and forestry (LULUCF)

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³ *European Topic Centre – Universidad de Málaga*

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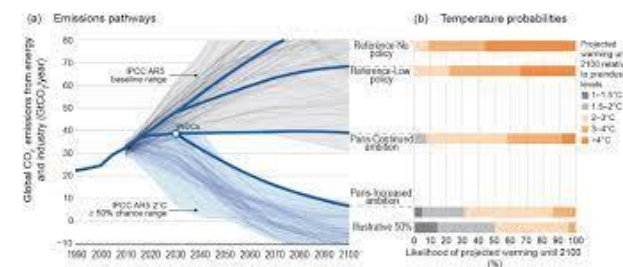
REPORTING OF THE LULUCF SECTOR

The emissions and removals from land use, land use change and forestry (**LULUCF**) are **annually reported** by the EU MS as part of the reporting requirements of the UNFCCC and the EU mechanism for monitoring and reporting of greenhouse gas emissions (Regulation (EU) No 525/2013).

By the adoption of the LULUCF regulation in 2018 (**Regulation EU 2018/841**), this has become part of the 2030 Climate and Energy targets, introducing as requirements:

- at least **tier 2** (nationally relevant emission calculations) and ideally **tier 3** for key categories of emissions and removals

- the use of geographically-explicit land-use conversion data (**IPCC Approach 3**)



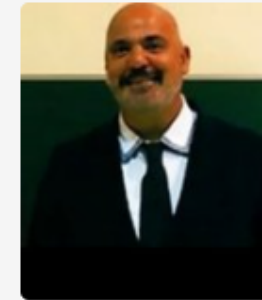
CRUCIAL ROLE IN SUPPORTING THE EU MEMBER STATES' ACCOUNTS/REPORTS

ONGOING ACTIVITIES AT THE EU LEVEL
FPCUP ACTION 2019-2-49

Developing support for monitoring and reporting of GHG emissions and removals from land use, land use change and forestry (LULUCF) in selected Member States (MS) on the basis of EU Regulation on (EU) 2018/841.

Four main axes of the Project at the EU level:

1. **Understanding** of the reporting system of each National Emissions Inventory System, i.e. (spatial information used, needs and gaps) through stakeholder **engagement** fostering an active *Copernicus User Uptake*
2. Analysis on **which Copernicus datasets can be used** by MS (i.e. CLMS as the forthcoming CLC+) to support LULUCF emission calculations;
3. **Methodological proposal** about improvements of LULUCF reporting by including Sentinel and other Copernicus data into *ad hoc* modelling frameworks
4. **Standardized MS and pan-European approaches** for proposed solutions



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URL: www.fmi.fi

Implementing Partner: [CASTRA](#), [CBK PAN](#), [CUNI](#), [FMI](#), [IGiK](#), [IHCantabria](#), [SRTI-BAS](#), [SYKE](#)

Implementing Country: [Bulgaria](#), [Czech Republic](#), [Finland](#), [Ireland](#), [Italy](#), [Poland](#), [Spain](#)

Primary Topic: [Atmosphere](#), [Climate Change](#), [Land](#)

Primary Target Users: [Public Sector](#), [Research Sector](#)

Primary Target Region: [Europe](#)

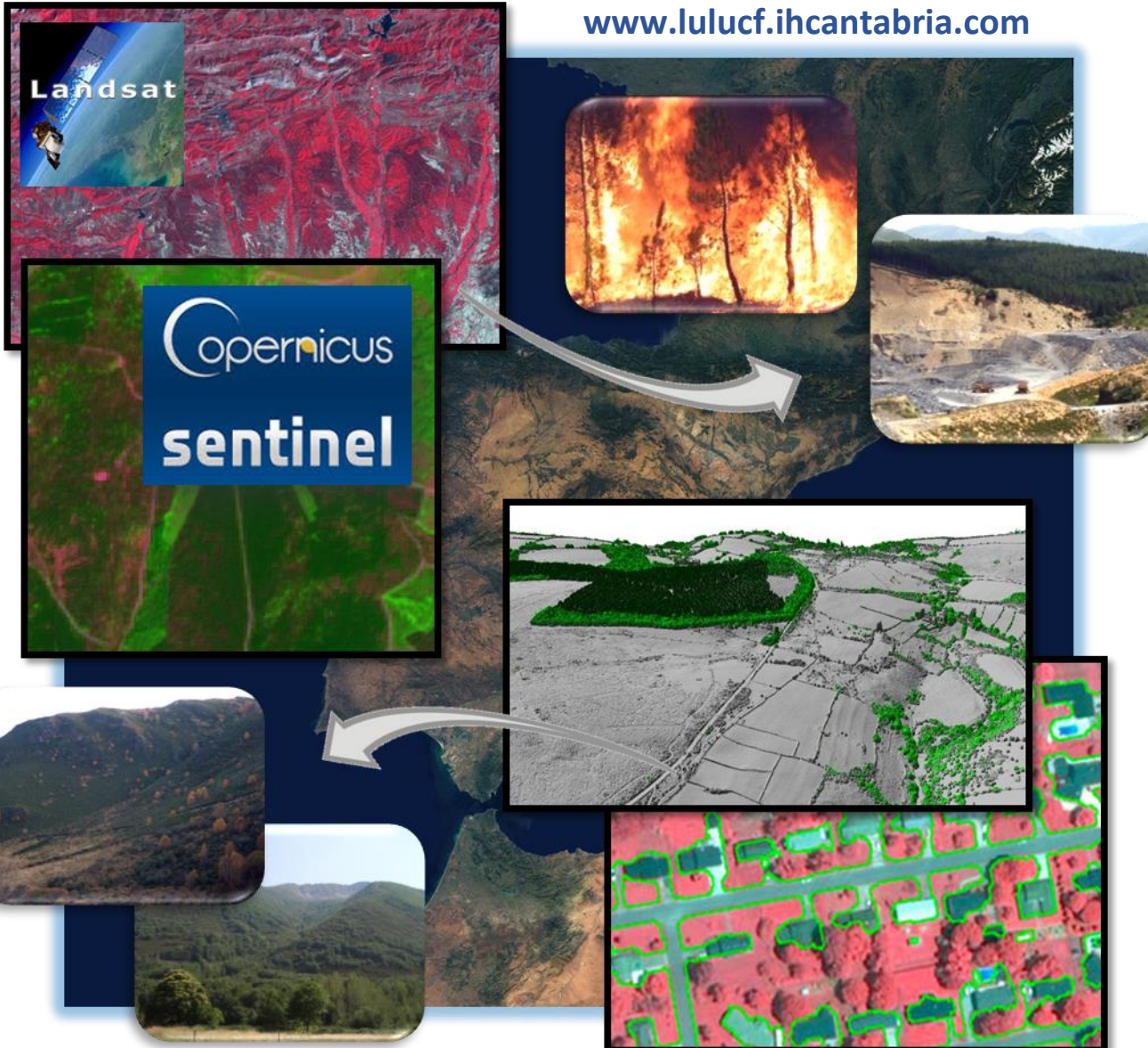
Europe: [Bulgaria](#), [Czech Republic](#), [Finland](#), [Ireland](#), [Poland](#), [Spain](#)

Type of Action: [National and multi-national information/training events](#)

Action No.: 2019-2-49

Duration: Dec 2019 - Feb 2021 Last Update: 17 Feb 2021

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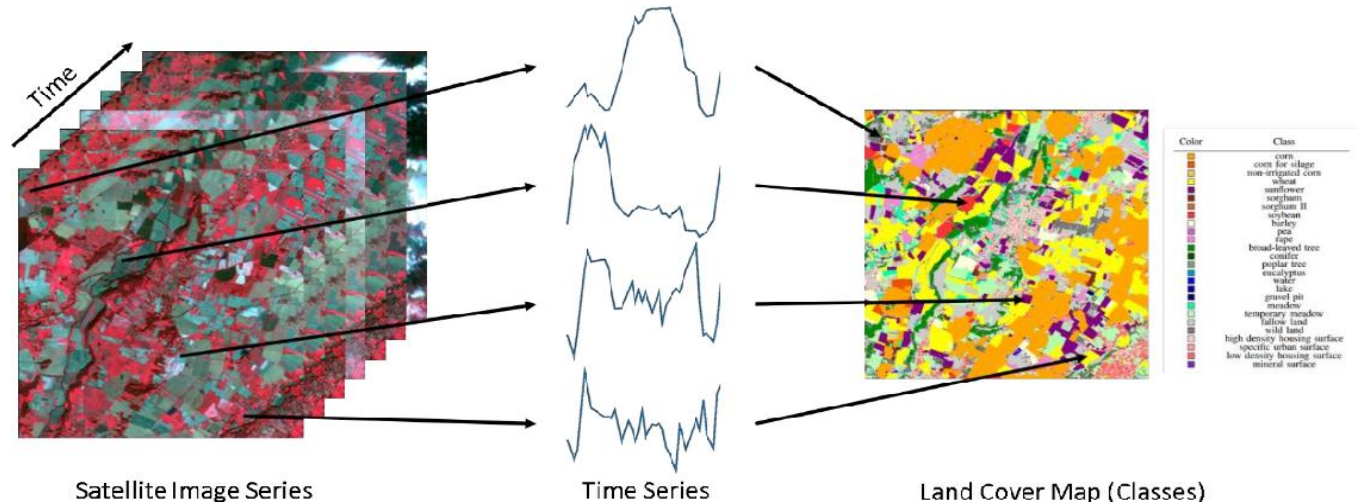


Implementation in Spain:

1. **Technical needs of data for LULUCF reporting** at the MS level, in exchange with the Ministry of Ecological Transition and Demographic Challenge (MITERD)
2. **Definition of “Gaps” of information** for LULUCF reporting. Methods and datasets for defining **solutions** based on existing methodologies: *a) CLMS data* (CLC+ and HRLs), *b) Spatial modelling and monitoring* using Sentinel/other RS sources and data mining/AI apps
3. **Success stories** with support of the **Advisory Research Group** (*Research centres and private companies – IT/RS*) that capitalize existing knowledge in 2a) and b)
4. **National-level workshops** with stakeholders for demonstration (NUTS2) of Copernicus solutions for LULUCF monitoring

Three additional objectives:

1. **Validation** of the National Emissions Inventory, *i.e.* time series of changes validated through time series of RS data;
2. **More specificity** in the LULCC types to be mapped (FL, GL, CL, WI...) and carbon pools by using spatial datasets available at the regional, national and EU levels or derived by specific analyses from projects or monitoring programs using Copernicus data and services as time series of S2...
3. **Update** of the LULC database using RS and auxiliary information, including future scenarios and uncertainty

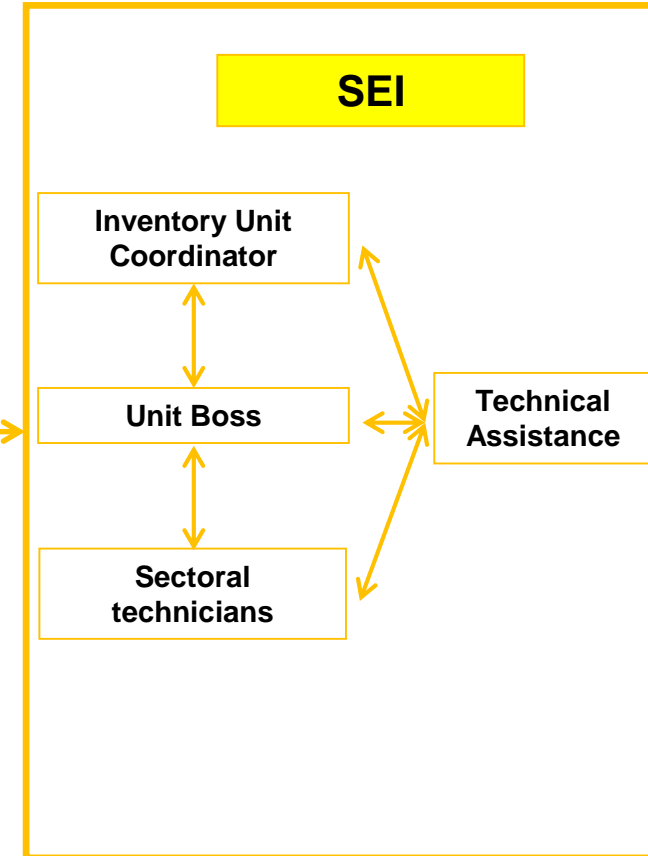
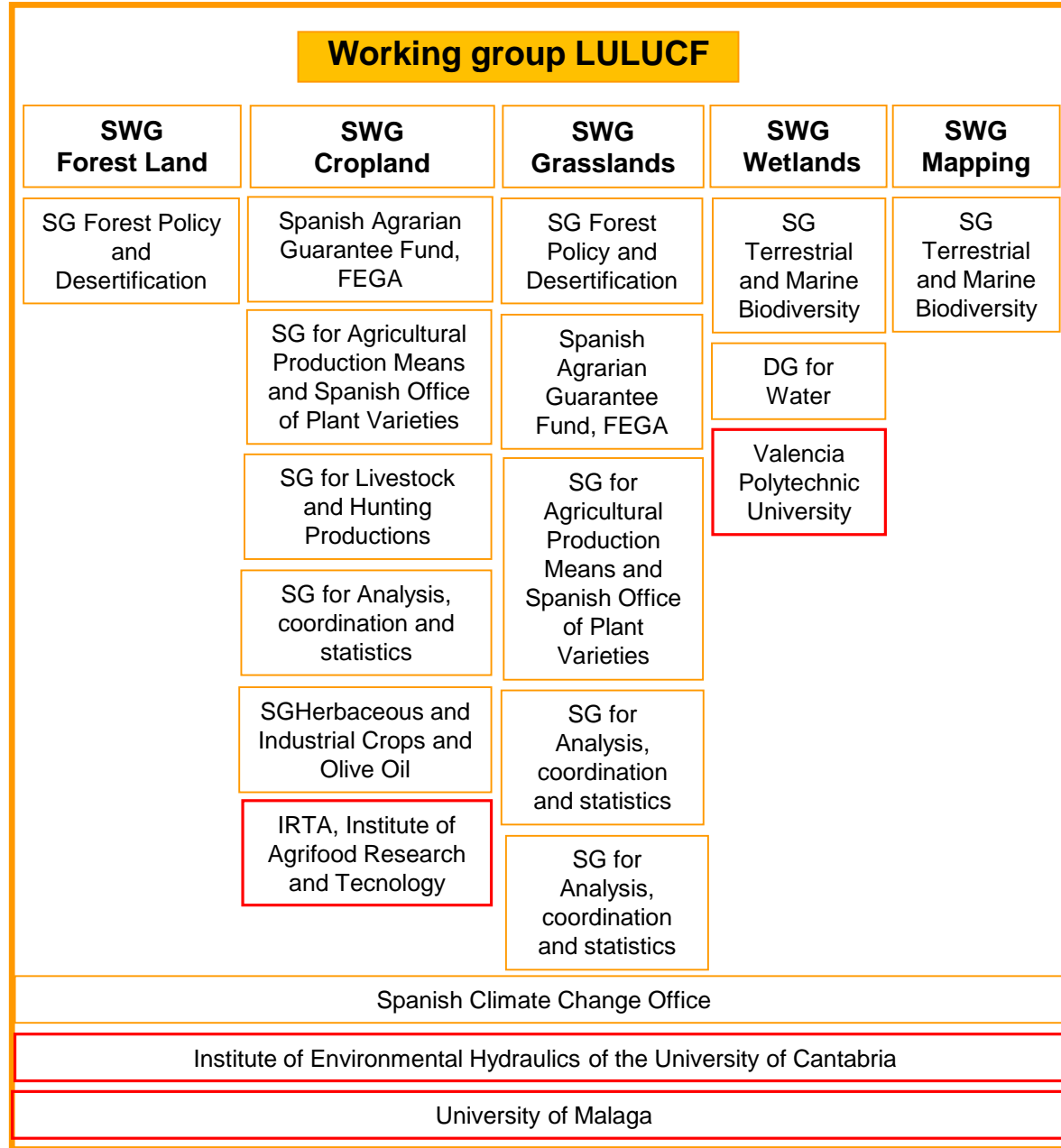


- **Competent authority of Spanish Emissions Inventory System (SEI)**
Directorate-General for Quality and Environmental Assessment (DG-CEA) at the Ministry for Ecological Transition and Demographic Challenge (MITERD)
- **Executive body**
Subdirectorate-General for Clean Air and Industrial Sustainability (SG-ALSI)
Inventories Unit
- **Regulatory framework**
Royal Decree 818/2018 of 6 July, designates the Directorate-General for Quality and Environmental Assessment as Authority in charge of the National Inventory System (SEI)
- **Focal Points Network**
Designated in 2009 and updated every year
- **Technical Working Groups for each sector**
Land Use Land Use Change and Forestry.(GT-LULUCF)



Sistema Español de Inventario (SEI)

CURRENT REPORTING ACTIVITY IN SPAIN



Spanish National Inventory System (SEI)

More than 25 years of experience

The national inventory provides valuable information in order to fulfil international commitments:

Geneva Convention on Long-Range Transboundary Air Pollution and its Protocols. Annual report and estimate of acidifying pollutant and ozone precursor emissions, heavy metals, particles and persistent organic pollutants.

United Nations Framework Convention on Climate Change, Kyoto Protocol and Paris Agreement. Annual report and estimate of greenhouse gas emissions.

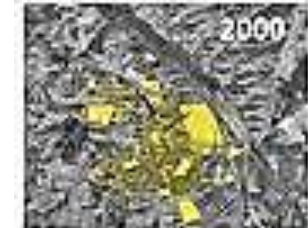
European Union:

- Regulation (EU) No. 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No. 280/2004/EC.
- DECISION No 529/2013/EU of the European Parliament and of the Council on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities
- DIRECTIVE (EU) 2016/2284 of the European Parliament and of the Council on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC



Current information sources used in LULUCF

Period time	Source
<u>Surfaces</u> estimated by mapping process	
1990-2005	<ul style="list-style-type: none"> - CORINE LAND COVER (CLC) 1990, 2000 y 2006⁽¹⁾, and their change use mapping. - National Forest Map. 1:50.000 (MFE50) 1996-2007⁽²⁾; - Croplands and Exploitation Map (MCA), editions 1980-1990 y 2000-2010⁽³⁾.
2006-2012	<ul style="list-style-type: none"> - Change forest use mapping (Foto Fija del MFE (FF) 2009 and 2012⁽⁴⁾. Deforestations from FL a CL, WL y SL.
2013-2018	<ul style="list-style-type: none"> - Deforestation surfaces are maintained since 2012 for transition from FL to CL and ST. For transition from FL to WL the average is applied for the 2006-2012 period. In addition, from transition from FL to GL, the annual transition Surface is extrapolated until complete the serie.





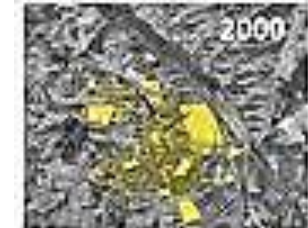
GOBIERNO
DE ESPAÑA

VICEPRESIDENCIA
CUARTA DEL GOBIERNO

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA
Y EL RETO DEMOGRÁFICO

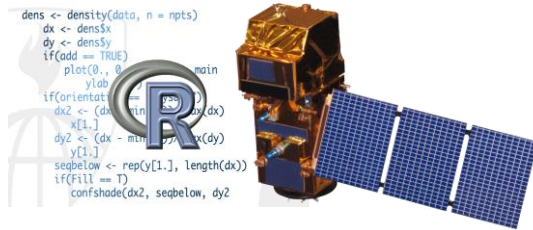
Challenge for 2022 NIR

- **New LULUCF mapping project:** an important challenge
- **New technologies** need to be considered and implemented
- **Coordination** between different stakeholders
- **FPACUP project** is a very important input for:
 - Gap filling
 - Innovation





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Which information is used and which Gaps exist? Which solutions to apply?

What has been done until now and how this will evolve?



European Environment Agency
European Topic Centre on Urban, Land and Soil Systems

Subcontractor



Information needs
Gap analysis
Success stories

Use of current data
Potential of CLMS

“Implementation” of Innovation pipeline and publication of research brief on Copernicus and LULUCF

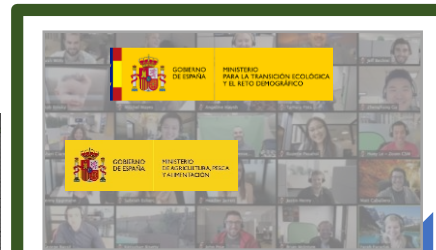


Identification of INFORMATION NEEDS, GAP ANALYSIS




Data organisation

- IHC organised data to identify information gaps

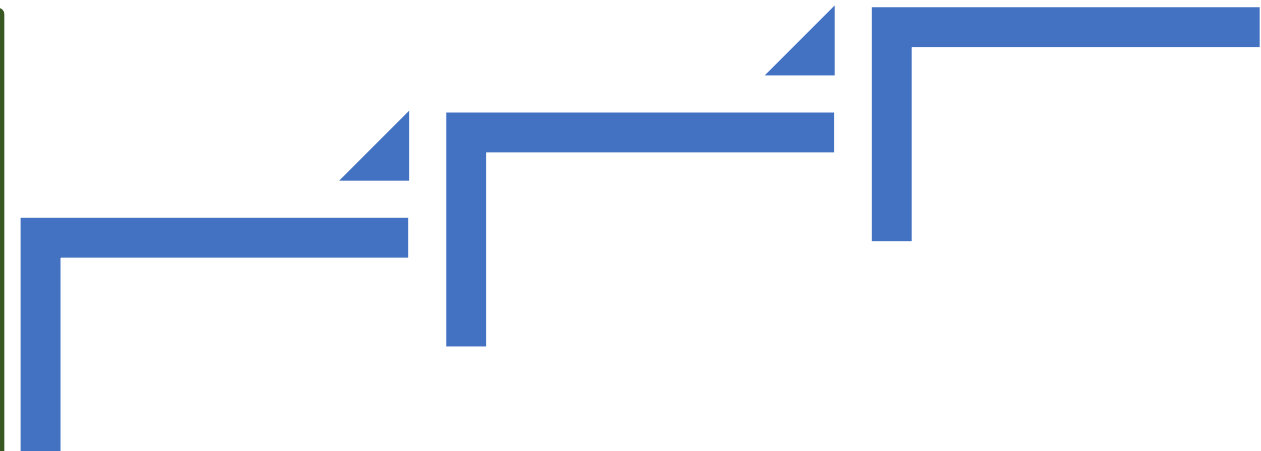


Ministry identified information gaps

- Series of working groups per land use category
- Inter-ministerial participation
- 16 sessions

2 core group meetings

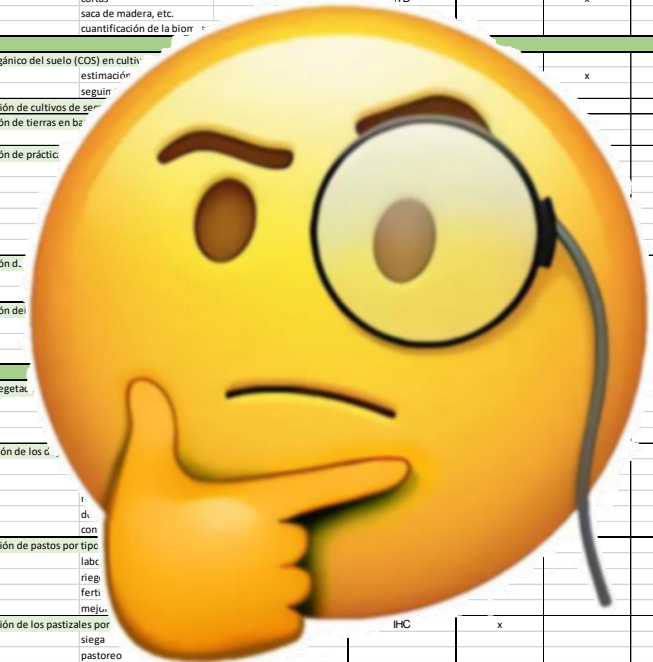
- Wish list: Actual spatial data needs for LULUCF reporting



ONGOING ACTIVITIES AT THE MS LEVEL (SPAIN)

ID Gap	TIPOLOGÍA	
	Nivel 1	Nivel 2
1. Tierras forestales (FL)		
1	Forestaciones/reforestaciones	
2	Identificación de otras perturbaciones naturales	
3	Identificación de aprovechamientos forestales de	
2. Tierras de cultivo (CL)		
4	Carbono orgánico del suelo (COS) en cultivos agrí	
5	Discriminación de cultivos de secano y regadío	
6	16 major groups, 73 in total	
7		
8	Identificación de prácticas de gestión de CL leños	
9	Identificación del sistema de gestión de residuos	
3. Pastizales (GL)		
10	Mapas de vegetación (mejora de la cartografía pa	
11	Cuantificación de los depósitos de carbono	
12	Discriminación de pastos por tipos de gestión	
13	Discriminación de los pastizales por aprovecham	
4. Humedales (WL)		
14	Mejoras en la identificación de usos en humedales	
15	Discriminación entre tipo de humedales	
16	Seguimiento de procesos relacionados con el agu	

ID Gap	TIPOLOGÍA			Entidad/Persona que propone la solución	SOLUCIÓN			Comentarios
	Nivel 1	Nivel 2	Nivel 3		Solución CLMS Productos CLMS disponibles	Solución propuesta PROYECTO	TECNOLOGÍA PROPIA	
1. Tierras forestales (FL)								
1	Forestaciones/reforestaciones			JCL / GRA	x			
2	Ocurrencia			COT	x	x	x	
3	Identificación de especies			JCL	x		x	
3	Seguimiento del éxito							
2	Identificación de otras perturbaciones naturales				x			
1	infestaciones de enfermedades			ITD		x	x	
2	plagas de insectos			GRA			x	
3	eventos climáticos extremos (vendavales, etc.)			GRA			x	
4	perturbaciones geológicas			COT		x	x	
3	Identificación de aprovechamientos forestales de madera y leña							
1	daños			GRA			x	
2	podas							
3	cortas					x	x	
4	saca de madera, etc.			ITD				
5	cuantificación de la biom							
2. Tierras de cultivo (CL)								
4	Carbono orgánico del suelo (COS) en culti							
1	estimación					x	x	
2	seguim							
5	Discriminación de cultivos de se							
6	Identificación de tierras en bz							
7	Identificación de práctic							
1								
2								
3								
4							x	
5								
6								
8	Identificación d.							
1								
2								
9	Identificación de							
1								
2								
3								
3. Pastizales (GL)								
10	Mapas de vegetac.							
1								
2								
3								
11	Cuantificación de los d.							
1								
2								
3								
4								
5								
12	Discriminación de pastos por tipo							
1	labo							
2	riep							
3	ferti							
4	mejor							
13	Discriminación de los pastizales por siega			IHC	x		x	
1								
2	pastoreo							
3	intensidad del aprovechamiento				x			
4	intensivo							
5	extensivo							
4. Humedales (WL)								
14	Mejoras en la identificación de usos en humedales (pisifactorías, salinas, marismas, et			EBD/IHC	x	x	x	
15	Discriminación entre tipo de humedales				x			
1	lagos			COT		x	x	
2	salinas			COT		x	x	
3	marismas			COT		x	x	
4	embalses					x	x	
5	estanques							
6	balsas							
7	pisifactorías							
8	ríos			COT		x	x	
9	canales							
10	acequias							
11	arrozales			UMA			x	
16	Seguimiento de procesos relacionados con el agua y los sistemas húmedos				x			
1	variación del nivel de las masas de agua			UMA / UVA/ EBD	x	x	x	
2	alteración en los tiempos de residencia del agua			EBD			x	
3	tasas de sedimentación de las masas de agua							



Identification of INFORMATION NEEDS, GAP ANALYSIS



País	Organización	Nombre del participante	Función	Correo electrónico	Teléfono	Web
España	Ministerio de Transición Ecológica y Reto Demográfico	Francisco Sánchez	Director General de Cambio Climático	francisco.sanchez@mtes.mec.es	91 488 1000	www.mtes.mec.es
		María José López	Directora General de Estadística y Cuentas Ambientales	maria.jose.lopez@mtes.mec.es	91 488 1000	www.mtes.mec.es
		María José López	Directora General de Estadística y Cuentas Ambientales	maria.jose.lopez@mtes.mec.es	91 488 1000	www.mtes.mec.es
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		María José López	Directora General de Estadística y Cuentas Ambientales	maria.jose.lopez@mtes.mec.es	91 488 1000	www.mtes.mec.es
		María José López	Directora General de Estadística y Cuentas Ambientales	maria.jose.lopez@mtes.mec.es	91 488 1000	www.mtes.mec.es



Data organisation

- IHC organised data to identify information gaps

Ministry identified final information gaps

- Series of working groups per land use category
- Inter-ministerial participation



ETC-UMA reviews data gaps for coupling with CLMS

Search for EXISTING SOLUTIONS, NEW APPROACHES

2 core group meetings

- Wish list: Actual spatial data needs for LULUCF reporting

EEA in its role to support Member States and as Entrusted Entity for CLMS work on promoting the use of Copernicus data and services for LULUCF

ETC-UMA, as partner of the ETC ULS, supports the EEA in their facilitating role for the implementation of the EC regulation 2018/841

Assess potential of (current and future) CLMS products as input data to comply with the LULUCF requirements

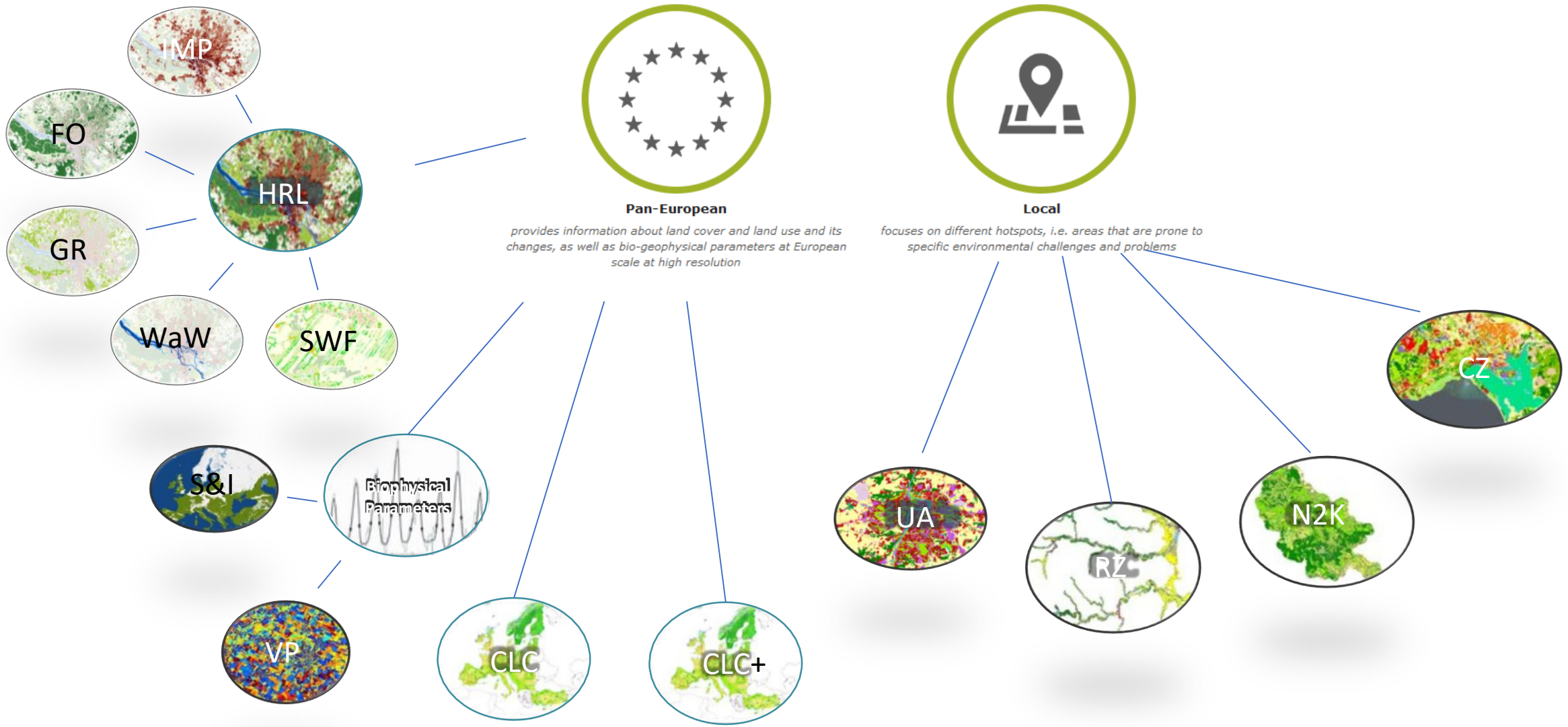


Tasks (2019 – ongoing): Support to LULUCF/Copernicus

- **cross-check of information needs** (categories, thresholds, etc.) and **CLMS definitions**, including nomenclature analysis
- **In-Depth analysis and validation** for specific countries (ES, AT, LU) and specific land use categories.
- Support of Copernicus Land Workshop on LULUCF:
<https://land.copernicus.eu/user-corner/events/using-copernicus-land-monitoring-services-clms-to-support-the-land-use-land-use-change-and-forestry-lulucf-regulation>



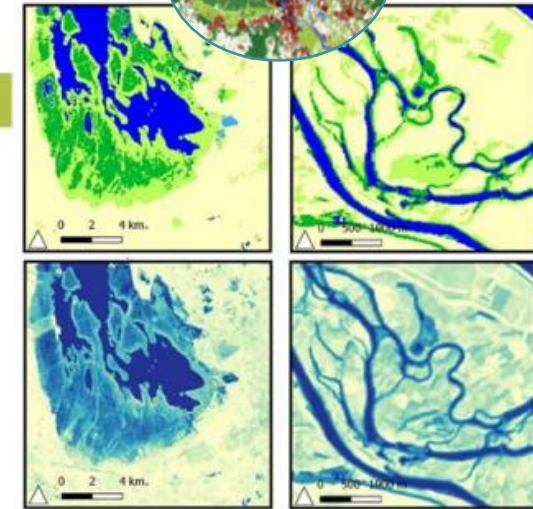
MERGING ACTIVITIES - EU / MS (SPAIN) LEVEL



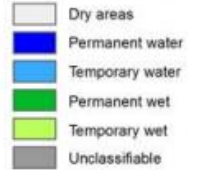
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EAGLE *Ei*ONET Action Group on Land Monitoring in Europe

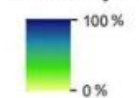
Towards Land use ingestion in CLC+ Core for the development of CLC+ instances (demonstrated for LULUCF)



Water and Wetness



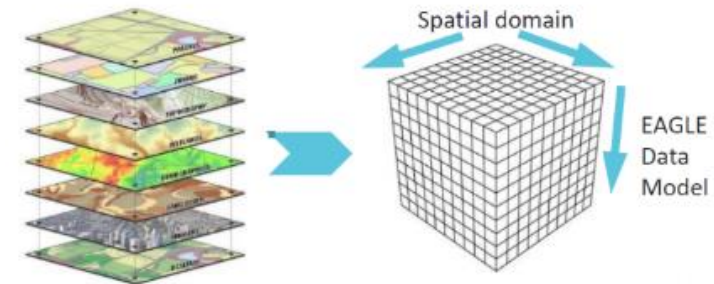
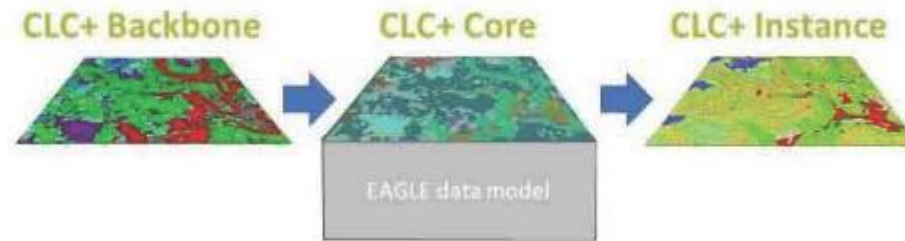
Water Wetness Probability Index (WWPI)



CLC+ product suite



- CLC+ is the suite of products which have been developed under the CLC 2nd Generation approach.
- The CLC+ product suite consists of
 - CLC+ Backbone
 - CLC+ Core
 - CLC+ Instances
 - CLC+ Legacy
 - CLC+ 1ha
 - CLC+ LULUCF**
 - Many more ...



Identification of INFORMATION NEEDS, GAP ANALYSIS



Organización	Nombre	Responsable	Contacto	Correo	Teléfono	Dirección	Web
INSTITUTO TECNOLÓGICO DE CANTABRIA
...



Data organisation

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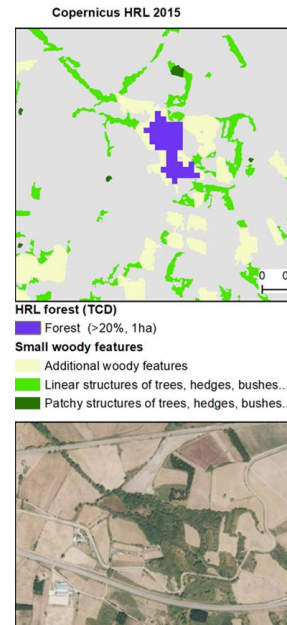
2 core group meetings

- Wish list: Actual spatial data needs for LULUCF reporting



Ministry identified final information gaps

- Series of working groups per land use category
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ETC-UMA reviews data gaps for coupling with CLMS



```
dens <- density(dens, n = npts)
dx <- dens$dx
dy <- dens$dy
if(dens == TRES)
  plot(dx, 0, 0, 0, 0, main)
  ylab)
  if(orient == "x")
    dx2 <- (dx - min(dx), max(dx))
  else
    dx2 <- (dx - min(dx), max(dx))
  ylab)
  sepbelow <- rep(1, length(dx))
  if(!is.na(T))
    confshade(dx2, sepbelow, dy2)
```

Logos: CREAM, UMIB, Copernicus Academy, Estación Biológica Doñana CSIC, CAESCG, agresta, ito, ito2, foro, cotesa, tecnosylva.

Discussion with Advisory Group and identification of success stories

- Including survey among experts

Search for EXISTING SOLUTIONS, NEW APPROACHES

ADVISORY RESEARCH WORKING GROUP



UNIVERSIDAD DE GRANADA





ABOUT THE PROJECT

IMPLEMENTATION IN SPAIN

LULUCF DOCUMENTATION

COPERNICUS DEVELOPMENTS

EVENTS




Zoom Reunión

Grabando...


<https://vimeo.com/user/12557206/folder/4398359>



 Copernicus for LULUCF
Workshops in Spain - Day 1

May 17, 2021, 10:38 AM



 Copernicus for LULUCF
Workshops in Spain - Day 2

May 17, 2021, 10:38 AM



FRAMEWORK PARTNERSHIP AGREEMENT ON COPERNICUS USER UPTAKE (FPCUP)

PROPUESTA DE METODOLOGÍAS CARTOGRÁFICAS
PARA CUBRIR NECESIDADES DE INFORMACIÓN O GAPS
DEL SECTOR LULUCF EN ESPAÑA

[A la encuesta](#)



[SOBRE EL PROYECTO](#)

[DESARROLLOS EN ESPAÑA](#)

[DOCUMENTACIÓN DE LULUCF](#)

[DESARROLLOS DE COPÉRNICUS](#)

[EVENTOS](#)



Gaps identificados en el sector LULUCF en España

Este cuestionario se centra en la definición de soluciones a los Gaps detectados en las tipologías siguientes:

- A. Tierras forestales (FL)
- B. Tierras de cultivo (CL)
- C. Pastizales (GL)
- D. Humedales (WL)

16 major groups, 73 in total: SELECTING THOSE WITH MAJOR EXPERTISE!

Haga clic en el enlace de cada uno de ellos que crea que se adaptan mejor a su experiencia para responder las preguntas y una vez haya terminado, vuelva al inicio para responder a otro Gap, y así sucesivamente.

<https://lulucf.ihcantabria.com/encuesta/>

ONGOING ACTIVITIES AT THE MS LEVEL (SPAIN)

Identification of INFORMATION NEEDS, GAP ANALYSIS



País	Organismo	Estado	Fecha	Descripción
ES	ETC-UMA	Activo	2019	...
ES



Data organisation

- IHC organised data to identify information gaps

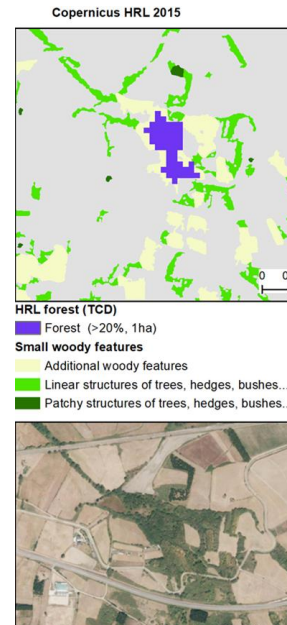
2 core group meetings

- Wish list: Actual spatial data needs for LULUCF reporting and wish list



Ministry identified final information gaps

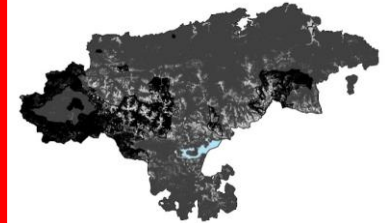
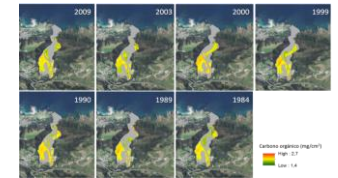
- Series of working groups per land use category
- Inter-ministerial participation



ETC-UMA reviews data gaps for coupling with CLMS

Discussion with Advisory Group and identification of efficient solutions

- Including survey among experts and bibliography - project reviews



Presentation of six success stories and potential funding of innovative RS-based approaches

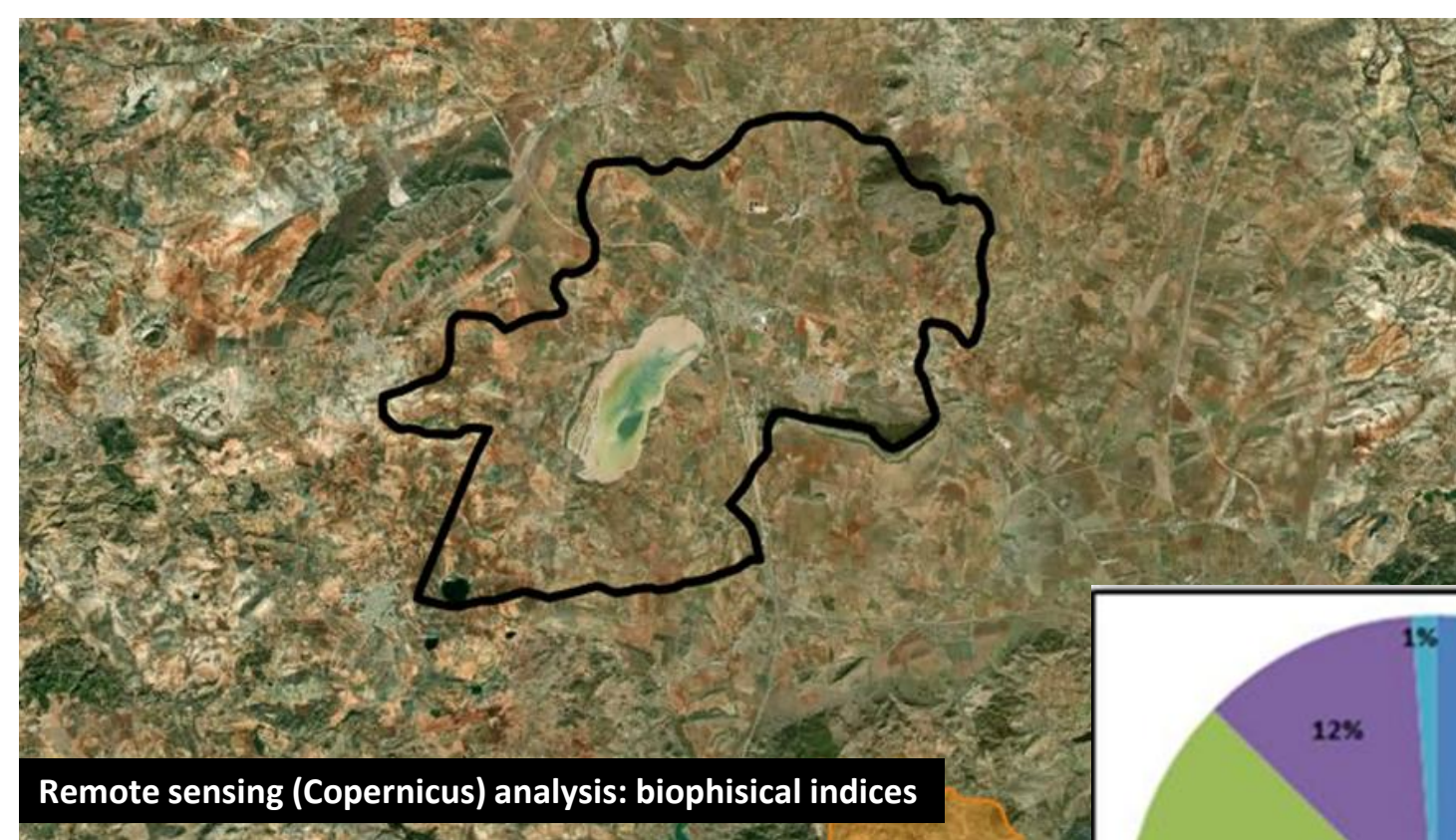


Funding opportunities for Copernicus User uptake: project development and implementation in LULUCF sector and beyond

SUCCESS STORIES - Earth Observation for Wetlands



SWOS
Satellite-based Wetland
Observation Service

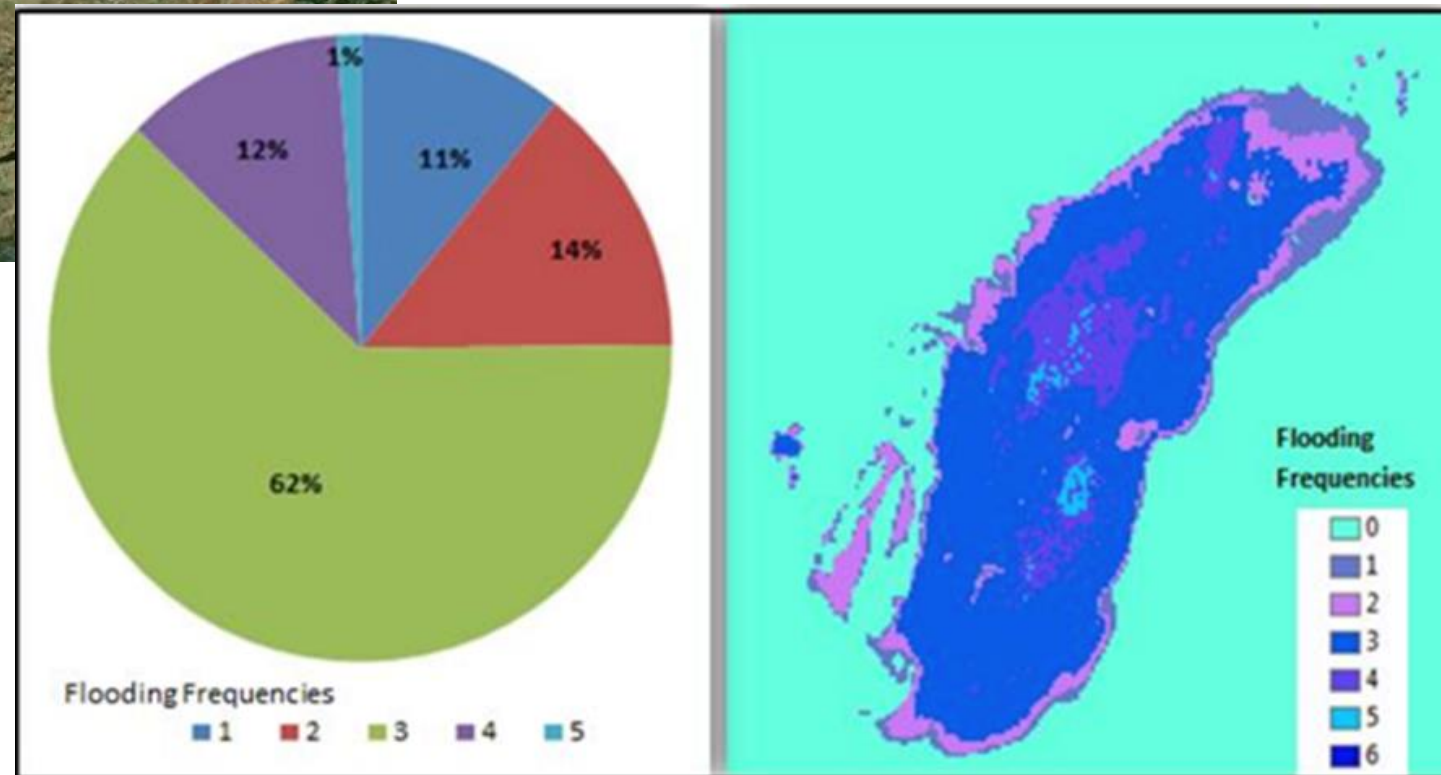
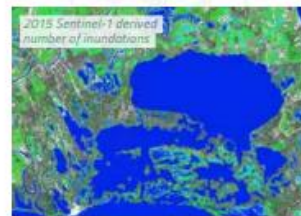
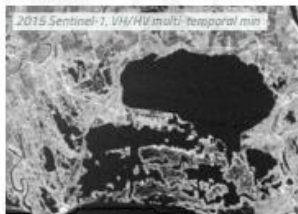
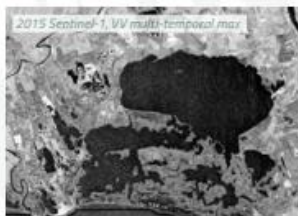


Remote sensing (Copernicus) analysis: biophysical indices

SATELLITE DATA TO BE USED:

- **Sentinel-1** // Identification of water (inundated areas), Information on soil moisture
- **Sentinel-2** // Land monitoring (such as LULC), Inland water monitoring
- **Sentinel-3** // Sea and land surface temperature, water quality
- **Landsat 1...7** // Historical land and inland water monitoring back to 1970s
- **Landsat 8** // Land monitoring (such as LULC), Inland water monitoring, Land Surface Temperature
- **Envisat MERIS** // Water Quality (historical 2002 – 2011)
- **MODIS** // Land and sea surface temperature

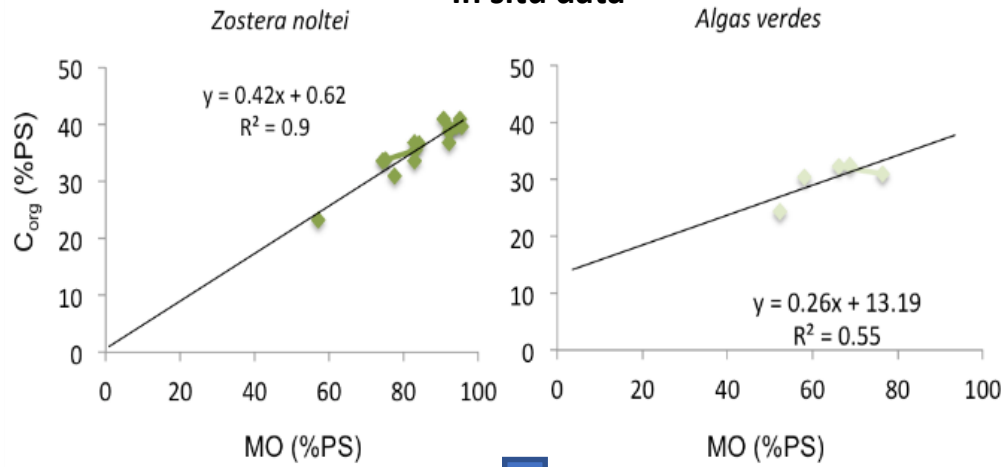
The Radar perspective: SAR-based monitoring of inundation (Camargue, France, ©Contains modified Copernicus Sentinel-1 data 2015)



Predictive model of carbon sequestration from living biomass

SUCCESS STORIES - Carbon pools accounting

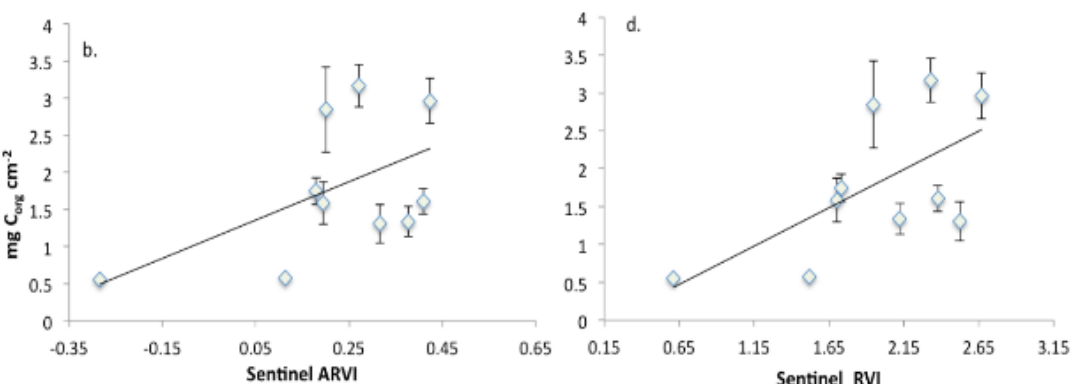
In situ data



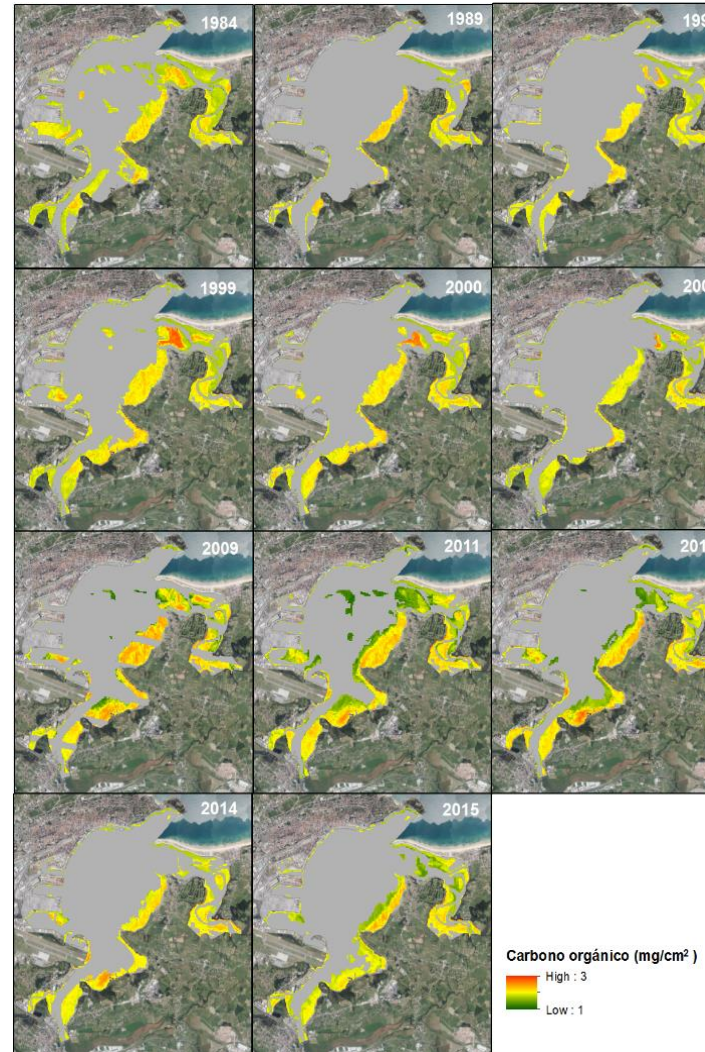
Remote sensing (Copernicus) analysis: biophysical indices

Satélite	Análisis de regresión	Modelo	R ²	p
Landsat	GNDVI vs. C _{org} %PS	C _{org} %PS = 32.41 + 15.51*GNDVI	0.68	<0.0001
	GNDVI vs. mg C _{org} cm ⁻²	mg C _{org} cm ⁻² = 1.85 + 1.011*GNDVI	0.21	<0.001
	ARVI vs. C _{org} %PS	C _{org} %PS = 32.46 + 21.14*ARVI	0.85	<0.0001
	ARVI vs. mg C _{org} cm ⁻²	mg C _{org} cm ⁻² = 1.84 + 1.20*ARVI	0.2	0.001
Sentinel-2	RVI vs. C _{org} %PS	C _{org} %PS = 9.90 + 11.09*RVI	0.5	<0.0001
	RVI vs. mg C _{org} cm ⁻²	mg C _{org} cm ⁻² = -0.19 + 1.01*RVI	0.31	<0.0001
	ARVI vs. C _{org} %PS	C _{org} %PS = 25.56 + 27.56*ARVI	0.35	<0.0001
	ARVI vs. mg C _{org} cm ⁻²	mg C _{org} cm ⁻² = 1.23 + 2.59*ARVI	0.23	0.0005

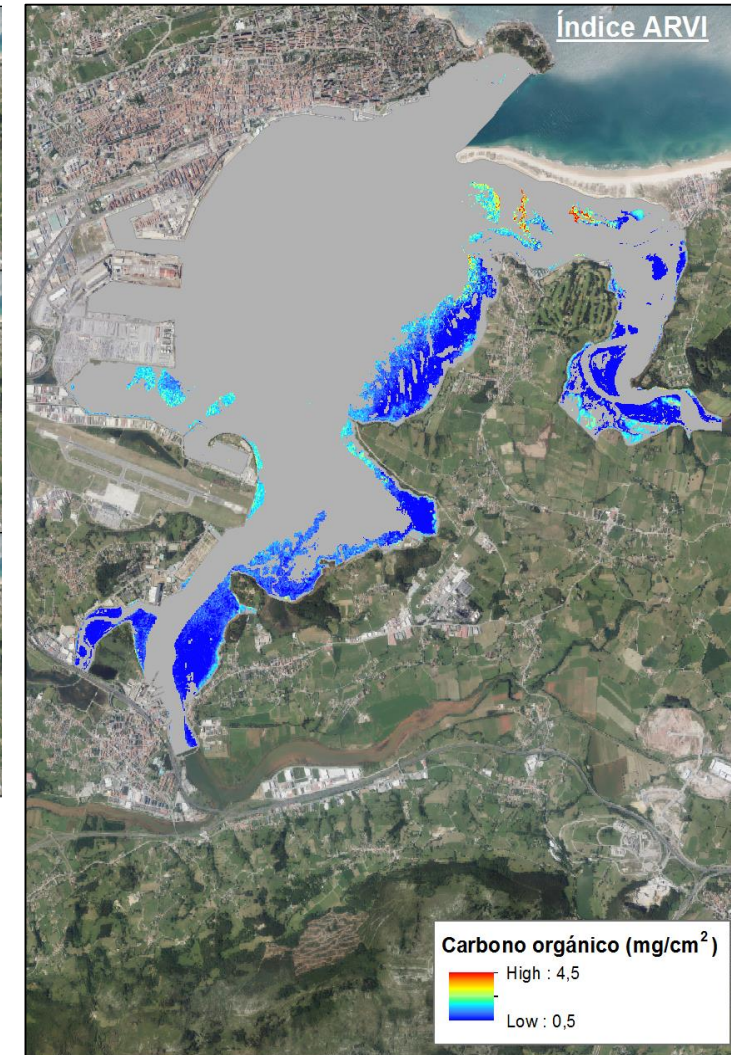
Predictive model of carbon sequestration from living biomass



Retrospective analysis about carbon sinks



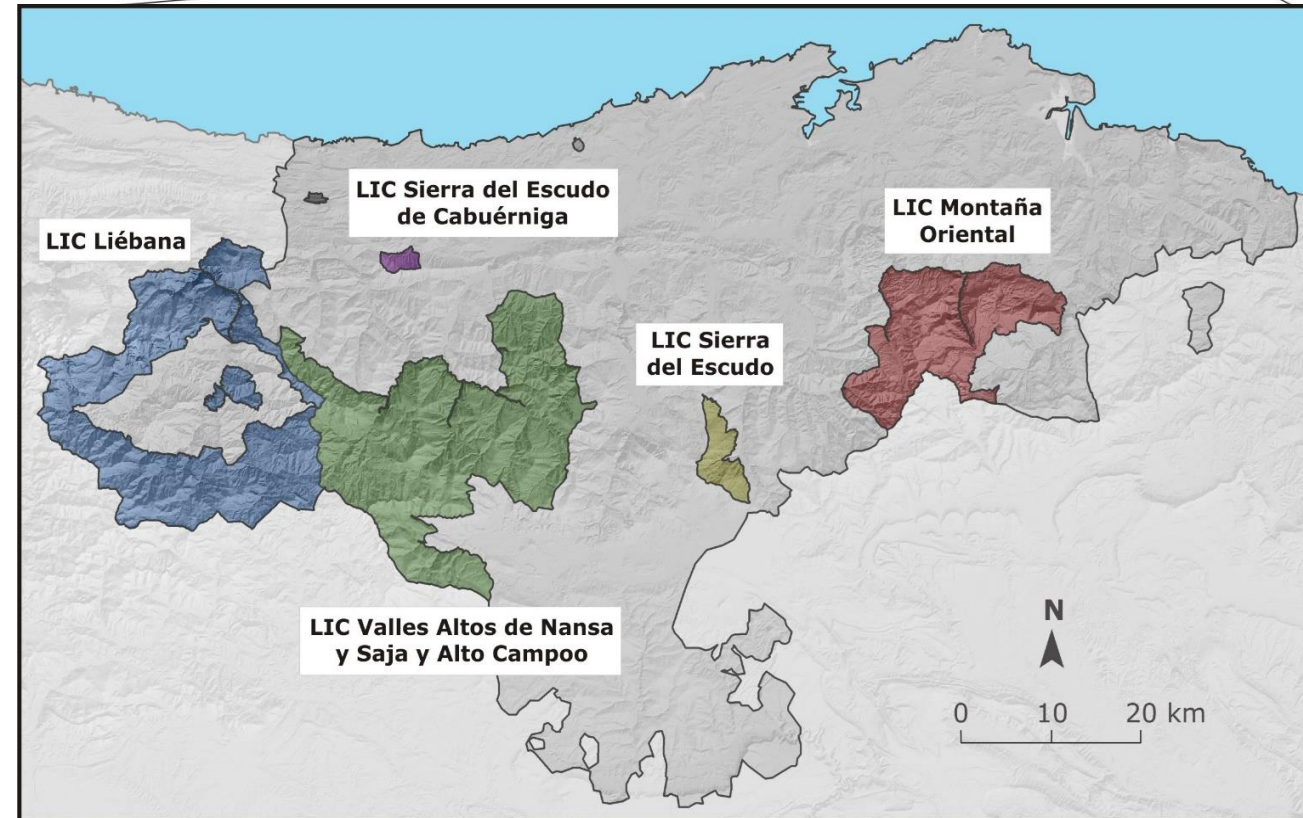
Current carbon sinks



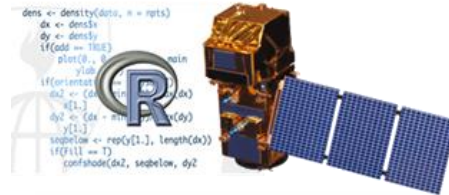
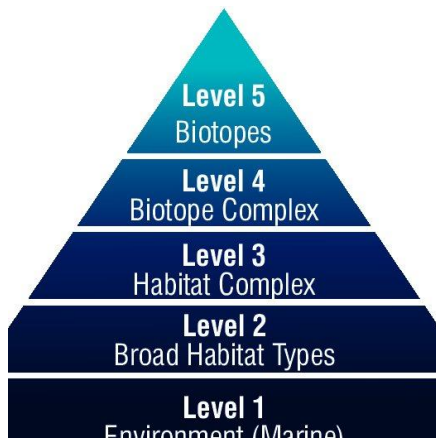
SUCCESS STORIES - mapping vegetation types

Mapping broad-scale vegetation patterns (EUNIS) in complex mountainous territories across time

Habitat maps using RS based modelling techniques in Natura 2000 Network in Cantabria (NW Spain)



Álvarez-Martínez et al, 2018



ID	EUNIS	N	Descripción
1	A2	103	Littoral sediment
2	A2.61	37	Seagrass beds on littoral sediments
3	C1	271	Surface standing waters
4	C2.2	169	Permanent non-tidal, fast, turbulent watercourses
5	D1.21	385	Hyperoceanic low-altitude blanket bogs, typically with d
6	E1.2	62	Perennial calcareous grassland and basic steppes
7	E1.263	227	Middle European [Brachypodium] semidry grasslands
8	E1.7	41	Closed non-Mediterranean dry acid and neutral grasslan
9	E1.712	95	Sub-Atlantic [Nardus]-[Galium] grasslands
10	E1.721	131	Nemoral [Agrostis]-[Festuca] grasslands
11	E2.1	243	Permanent mesotrophic pastures and aftermath-grazed meadows
12	E2.11	436	Unbroken pastures
13	E2.111	612	Ryegrass pastures
14	E2.112	171	Atlantic [Cynosurus]-[Centaurea] pastures
15	E2.2	328	Low and medium altitude hay meadows
16	E2.21	125	Atlantic hay meadows
17	E2.22	595	Sub-Atlantic lowland hay meadows
18	E5.31	40	Sub-Atlantic [Pteridium aquilinum] fields
19	F2.2	52	Evergreen alpine and subalpine heath and scrub
20	F2.231	73	Mountain [Juniperus nana] scrub
21	F3.13	31	Atlantic poor soil thickets
22	F3.17	125	[Corylus] thickets
23	F3.171	40	Atlantic and sub-Atlantic hazel thickets
24	F3.25	37	Piornales
25	F3.252	136	Northwestern Iberian [Genista florida] fields
26	F4.2	978	Dry heaths
27	F4.23	120	Atlantic [Erica]-[Ulex] heaths
28	F4.237	190	Cantabro-Pyrenean [Erica vagans]-[E. cinerea] heaths
29	F7.4	138	Hedgehog-heaths
30	F7.4451	834	Pyreneo-Cantabrian cushion-heaths
31	FA	46	Hedgerows
32	G1	40	Broadleaved deciduous Woodland
33	G1.21	252	Riverine [Fraxinus] - [Alnus] woodland, wet at high but no
34	G1.214	130	Pyreneo-Cantabrian alder galleries
35	G1.6	134	[Fagus] woodland
36	G1.62	353	Atlantic acidophilous [Fagus] forests
37	G1.624	65	Pyreneo-Cantabrian acidophilous beech forests
38	G1.625	179	Western Cantabrian acidophilous beech forests
39	G1.64	247	Pyreneo-Cantabrian neutrophile [Fagus] forests

Mapping habitat types (EUNIS, EC)

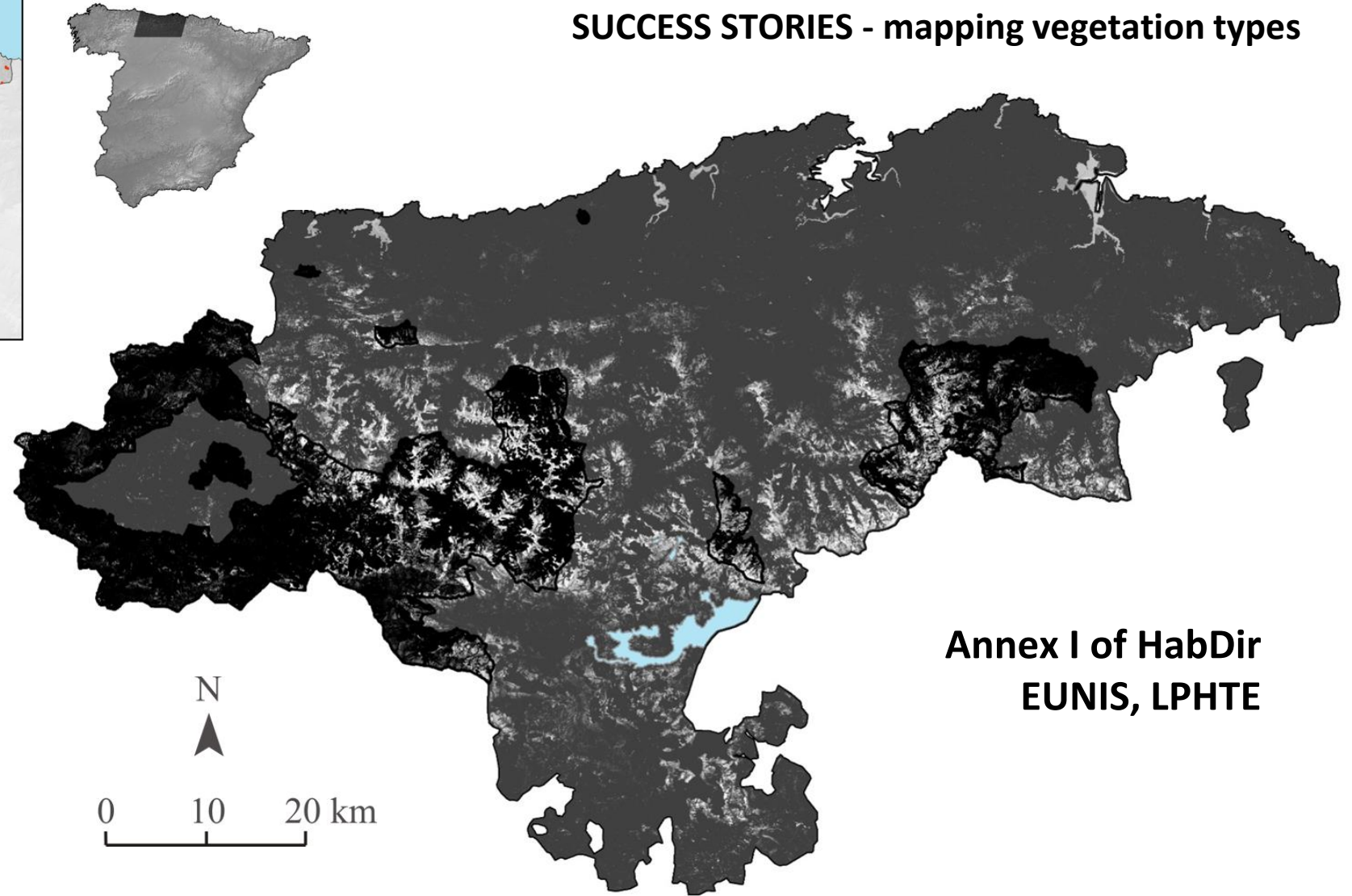
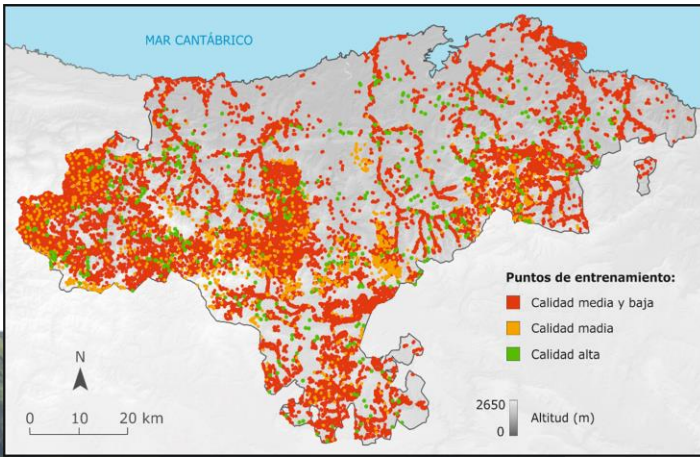
Annex I HabDir

1. Spatial distribution

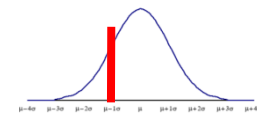
2. Conservation Status

3. Management Plan-Local actions

SUCCESS STORIES - mapping vegetation types



Annex I of HabDir
EUNIS, LPHTE

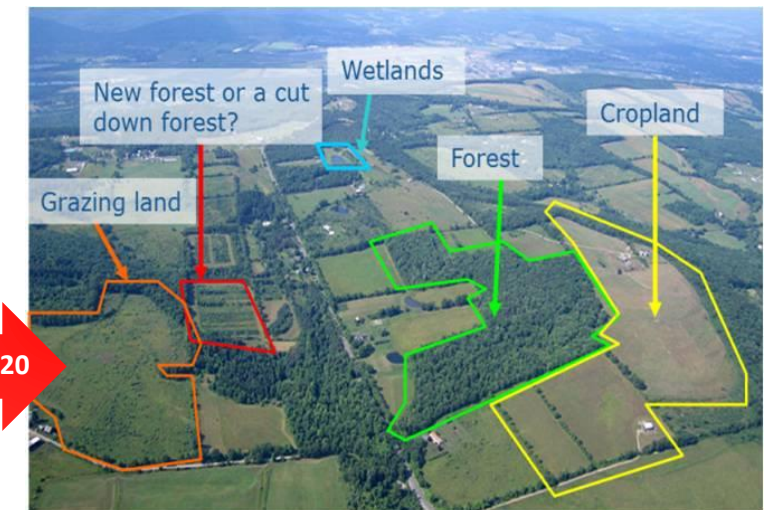
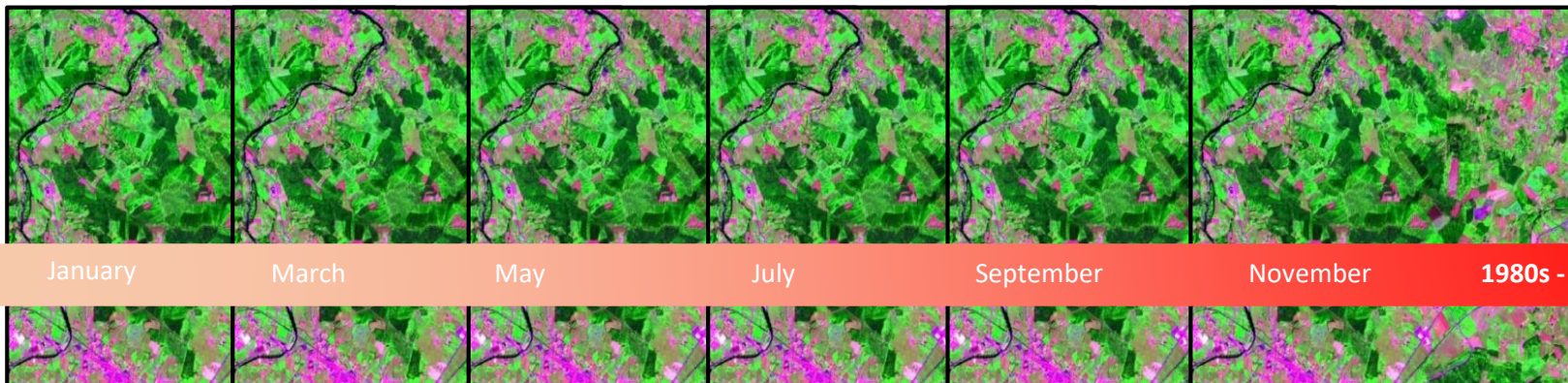
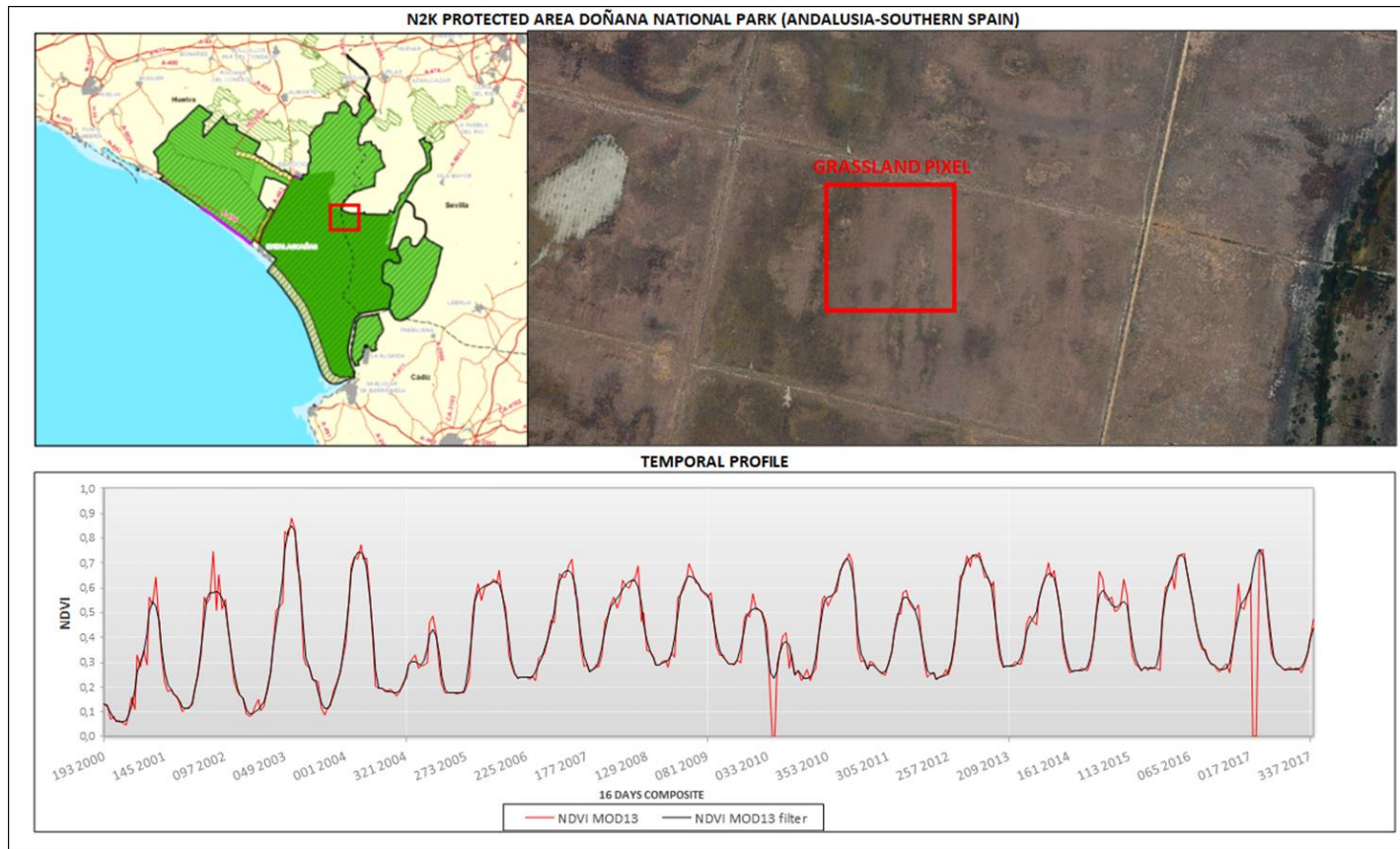


SUCCESS STORIES - ecological status and trends

Processing in real time of data series of imagery

Landsat, MODIS and Sentinel 2

Data for the 1980s - present period - future (scenarios)



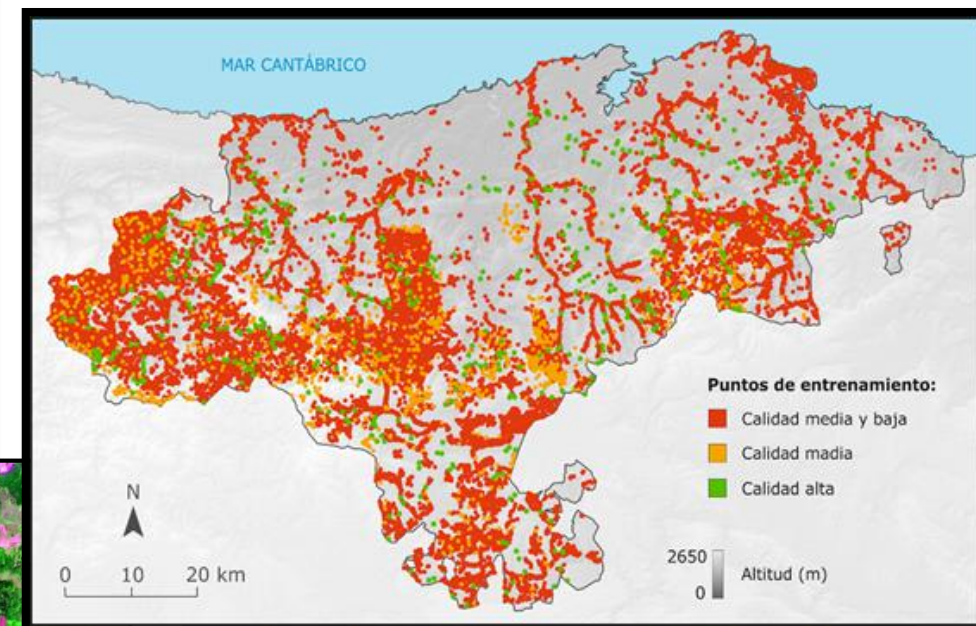
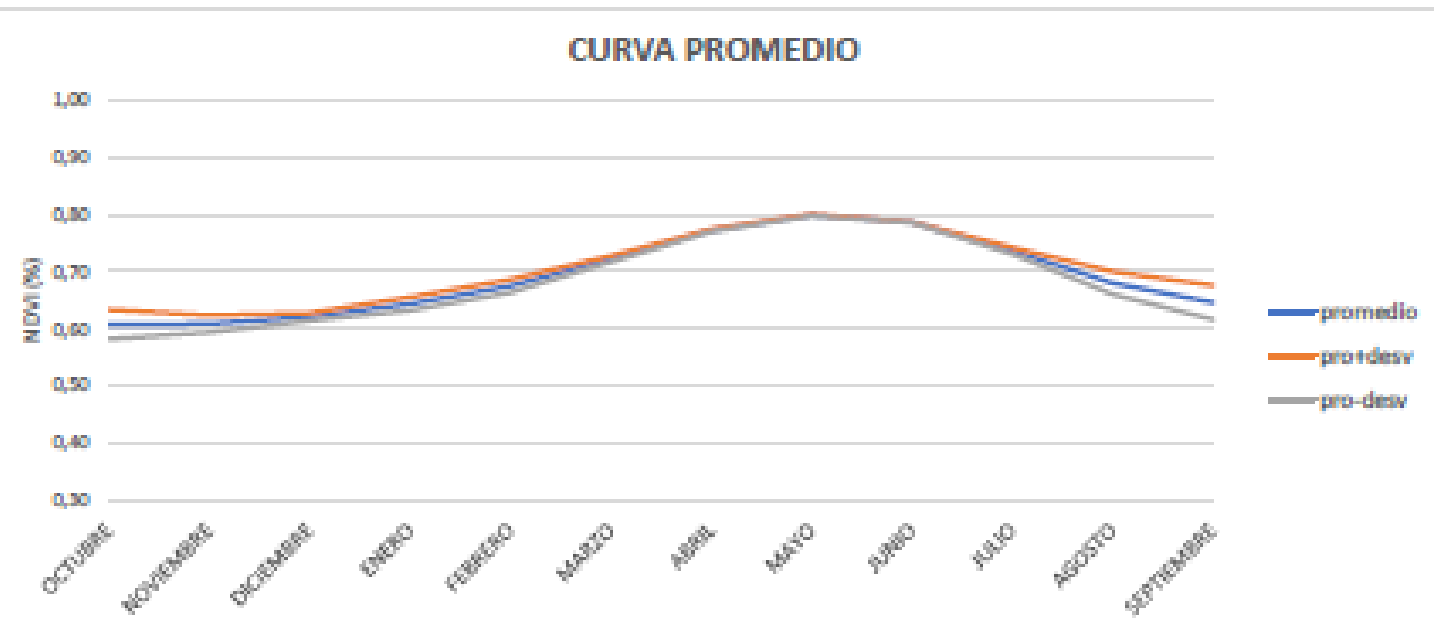
SUCCESS STORIES - ecological status and trends

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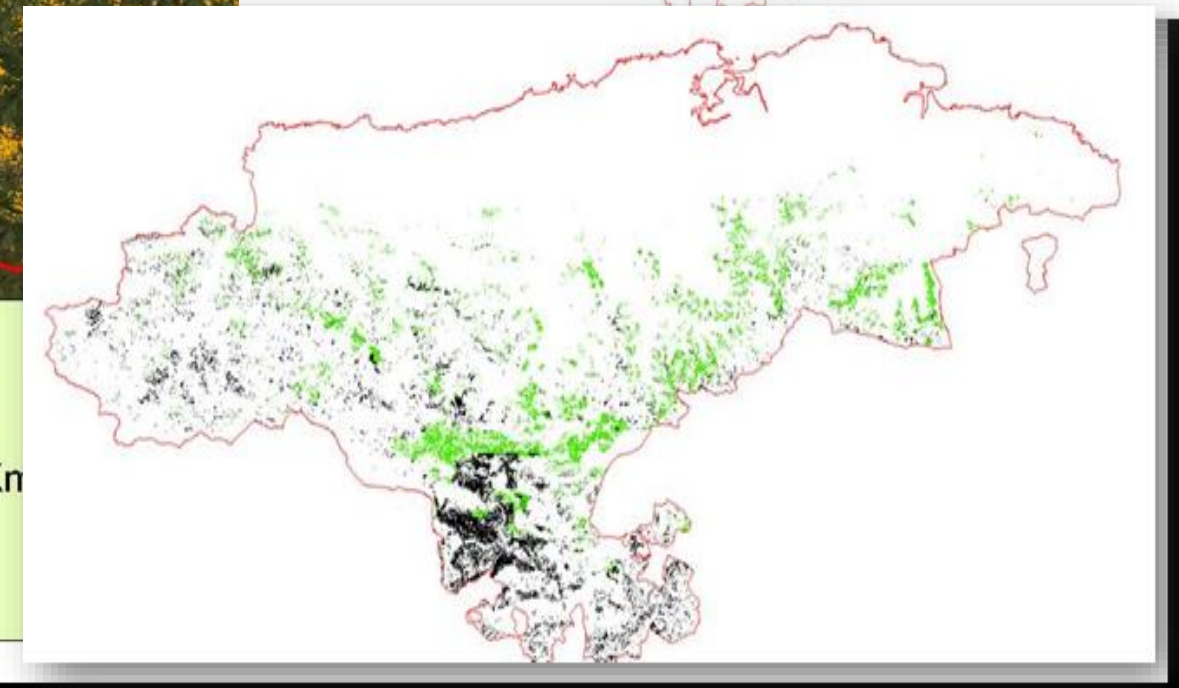
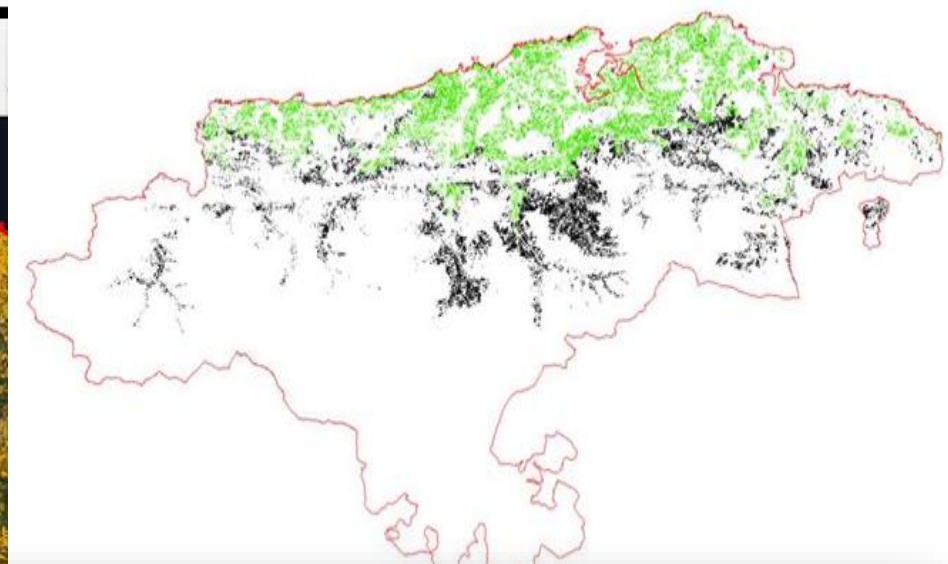
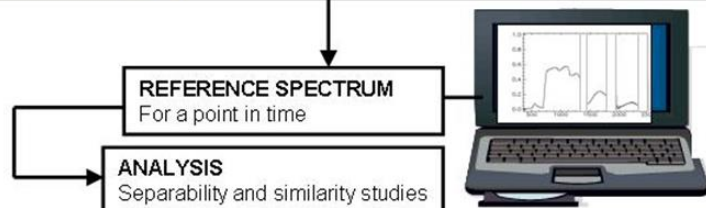
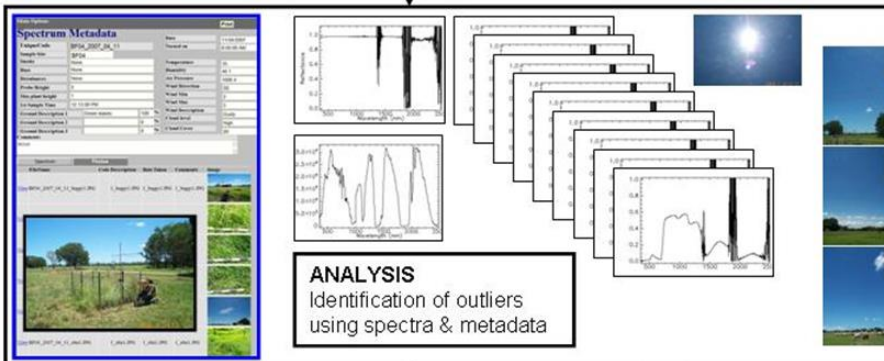
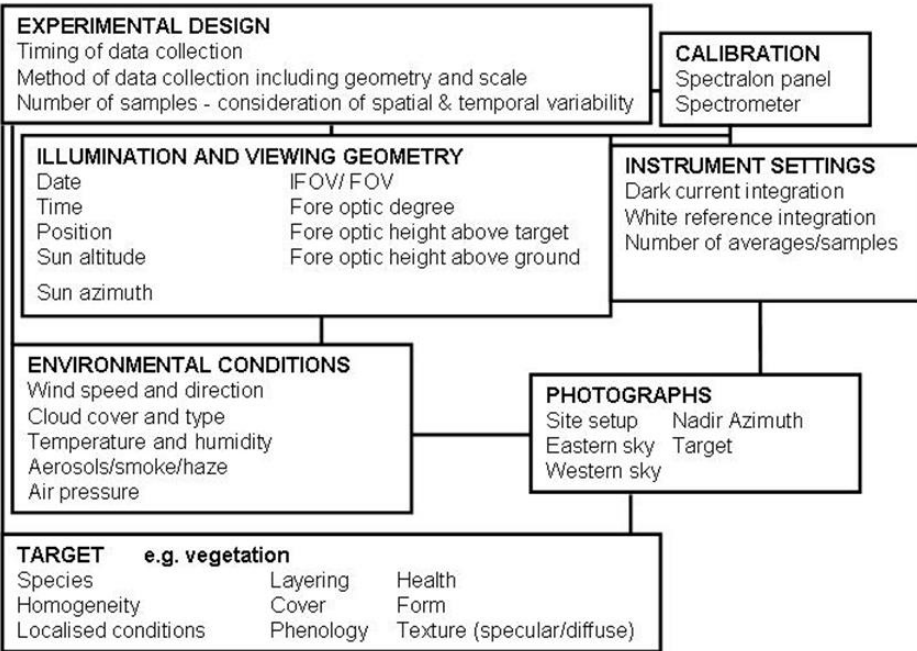
E223	Prados de siega	
Nº ACC=1	40	
Acronym	Phenological Interpretation	
SOST	Beginning of measurable photosynthesis in the vegetation canopy	DICIEMBRE
SOSN	Level of photosynthetic activity at the beginning of measurable photosynthesis	0,62
EOST	End of measurable photosynthesis in the vegetation canopy	OCTUBRE
EOSN	Level of photosynthetic activity at the end of measurable photosynthesis	0,68
MAXT	Time of maximum photosynthesis in the canopy	MAYO
MAXN	Maximum level of photosynthetic activity in the canopy	0,80
DUR	Length of photosynthetic activity (the growing season)	10
AMP	Maximum increase in canopy photosynthetic activity above the baseline	0,18
TIN	Canopy photosynthetic activity across the entire growing season	7,08



1980s - 2020

SUCCESS STORIES - ecological status and trends

ISSUES TO CONSIDER WHEN OBTAINING REFERENCE SPECTRA





LIFE20 CCM/ES/001812

TECHNICAL APPLICATION FORMS

Part B - technical summary and overall context of the project

LIFE grassCARBON



8 associated beneficiaries across Spain and EU

LIFE20 CCM/ES/001812 - B1

SUMMARY DESCRIPTION OF THE PROJECT (Max. 3 pages; to be completed in English)

Project title:
LIFE Improvement of CARBON accounting in GRASSlands

Project objectives
The goal of LIFE GRASSCARBON is to improve the Spanish current system of carbon accounting (emissions and removals) and reporting the land use Grasslands of the LULUCF sector. To achieve this goal LIFE GRASSCARBON pursues a number of specific objectives:

- 1) Identifying different typologies of grassland that enhance the knowledge and accuracy of the estimations;
- 2) Mapping grassland's typologies at key reference dates applying methods based on remote sensing technologies;
- 3) Developing tools for detection and monitoring of annual changes in land use and/or use intensity, management and biomass gains and losses and applying those tools temporarily from 1990 to 2020;
- 4) Designing adaptive grassland management models that improve the current carbon balances;
- 5) Evaluating carbon emissions and removals from 1990 to 2020 due to changes within the grasslands, and set the procedure to update that estimations for the 2021-2030 period;
- 6) Generating a carbon emissions and removals estimation system for Spain and extendible to other European countries.

Actions and means Involved
The LIFE GRASSCARBON project include preparatory, implementation, monitoring, dissemination and management actions:

Preparatory actions:
Initial review of the legal and regulatory framework.
Evaluation and diagnosis of the state of the art in land cover mapping, detection of changes and carbon accounting in grasslands.

Implementation actions:
National mapping of grasslands at key dates for estimation and reporting of carbon emissions and sinks.
Development of methodologies for identification of annual change of grassland typology and intensity of use.
Development of tools to implement the methods at national scale.
Development of technical guides for users.
Implementation of a living lab implementation.
Development of grazing models that enable an improvement of carbon balances.
Diagnostic report to identify lessons learned from the project.

FUNDING OPPORTUNITIES FOR SOLVING GAPS



Project objectives

El objetivo de LIFE GRASSCARBON es mejorar el actual sistema español de contabilidad del carbono (emisiones y absorciones) y de información sobre el uso de la tierra de los pastizales del sector UTS. Para alcanzar esta meta LIFE GRASSCARBON persigue una serie de objetivos específicos:

- 1) Identificar diferentes tipologías de pastizales que mejoren el conocimiento y la precisión de las estimaciones;
- 2) Cartografiar las tipologías de pastizales en fechas de referencia clave aplicando métodos basados en tecnologías de teledetección;
- 3) Elaborar instrumentos para la detección y la vigilancia de los cambios anuales en el uso de la tierra y/o la intensidad de uso, la gestión y las ganancias y pérdidas de biomasa, y aplicar esos instrumentos temporalmente de 1990 a 2020;
- 4) Diseñar modelos de gestión de pastizales adaptables que mejoren los actuales equilibrios de carbono;
- 5) Evaluar las emisiones y absorciones de carbono de 1990 a 2020 debido a cambios dentro de los pastizales, y establecer el procedimiento para actualizar esas estimaciones para el periodo 2021-2030;
- 6) Generar un sistema de estimación de emisiones y absorciones de carbono para España y extensible a otros países europeos.

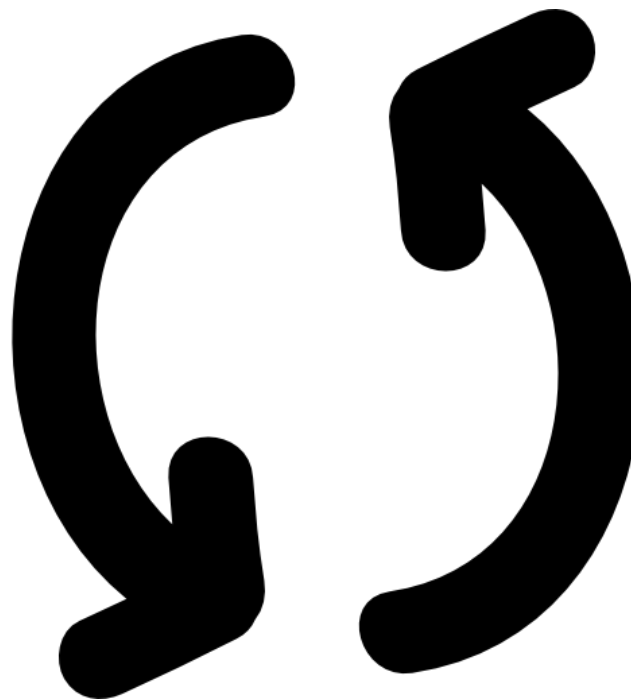
+ Congresses (IGARSS) and papers (Remote Sensing special issue)

<https://igarss2021.com/tutorials.php>

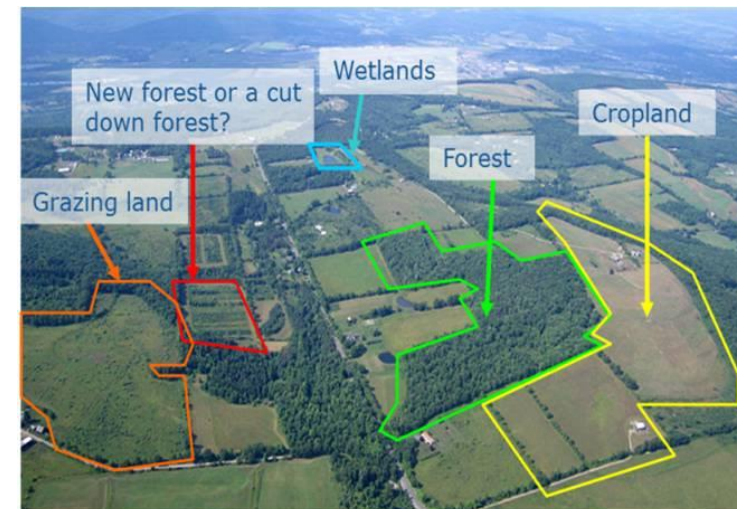




Capitalizing research
Increasing strength



LULUCF needs
Innovative solutions



Coordinated capabilities

1

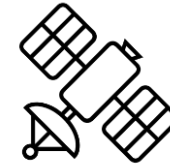


Make existing R&I -
knowledge available to
users through a
collaborative approach

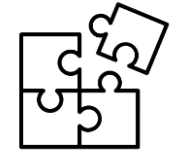


**Member states express
their needs, gaps, sharing
national info (if exists) and
solutions for an improved
LULUCF reporting**

2



Promote the usefulness of EO
data and Copernicus services
to serve concrete user needs



**Copernicus Land provides
adapted products (CLC+,
EAGLE nomenclature,
HRLs, local components)
that aim at adapting to
user needs. RS data and
methods allow advancing
research through
innovative approaches**

3



Cross-fertilise and create
synergies between EU
financed initiatives



**Show the added value of the Copernicus data and
products to engage with public authorities and
other Copernicus beneficiaries**



José Manuel Álvarez-Martínez <jm.alvarez@unican.es>
Maria Jose Alonso Moya <MJAMoya@miteco.es>

Project financed by:



Action Title	Partner
Tier 2: Global actions (1 additional Action)	
2019-2-49 Developing support for monitoring and reporting of GHG emissions and removals from land use, land use change and forestry	FMI, IGIK, SYKE, SRTI-Bas, CUNI, CBK PAN, Castra, IHCantabria, NUIM