



Land Monitoring

# Copernicus Land Service

## Local component - review of products

16<sup>th</sup> April 2018

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Expert meeting on use of satellite data for ecosystem  
accounting (in contxt of KIP INCA)





## Local Component - Overview

- Vector based VHR LCLU mapping of hot spot areas
- MMU between 0.25ha-1ha
- Tailored nomenclature
- 6 year cycles: status and change mapping
- Urban Atlas, Riparian Zones, Natura 2000
- In preparation: Coastal Zones and Snow & Ice

UA  
2006-12-18



CZ 2018



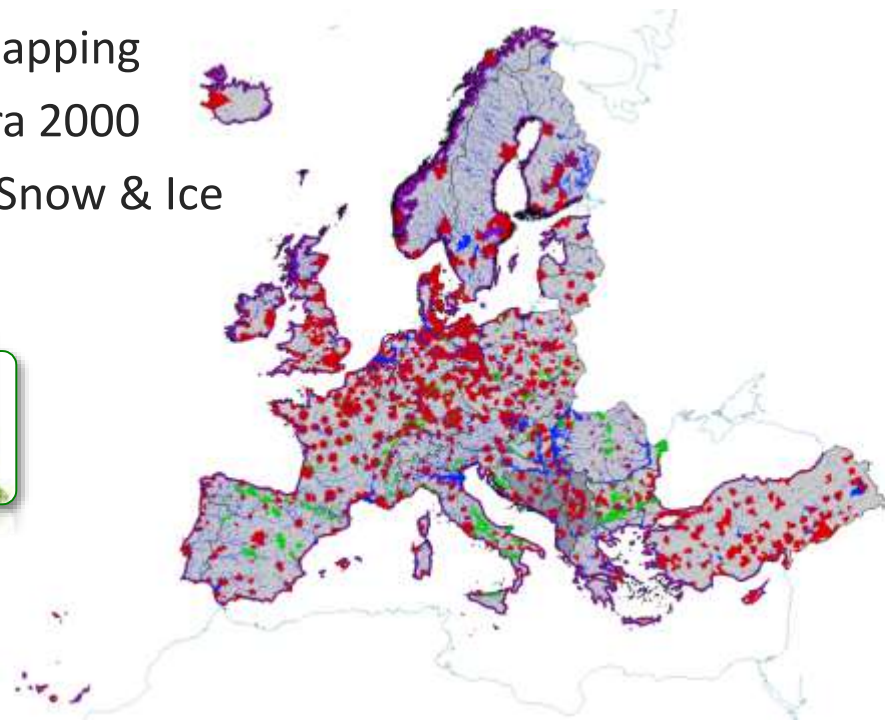
RZ  
2012-18



Snow & Ice



N2K  
2006-12





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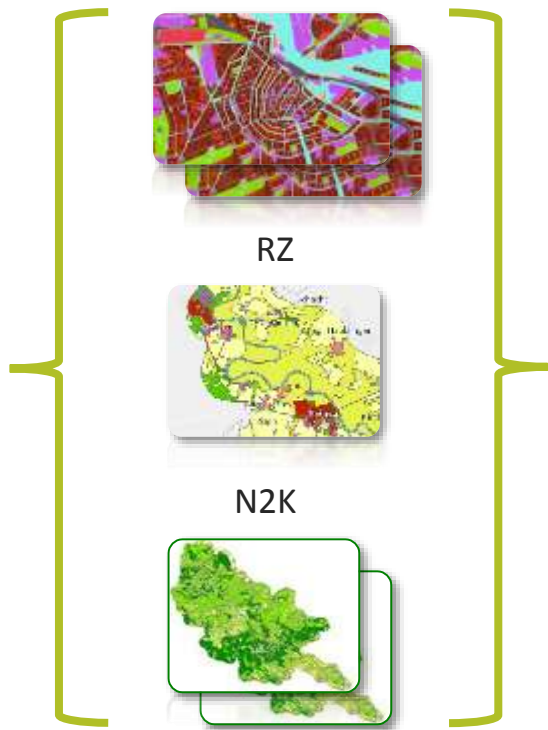
# Local Component - Data

## Delineation and Characterisation

VHR images



In-situ  
data



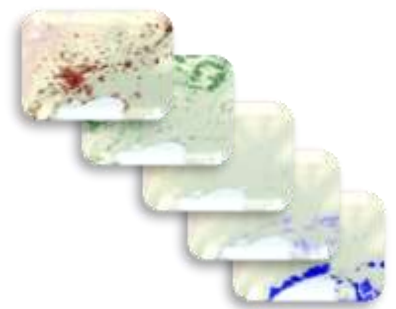
## Characterisation

HR images



HRLs

2006-09-12-15-18





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## Local Component - Spatial domain

- MMU:
  - 0.25 ha for artificial classes in UA (classes 1\*)
  - 1 ha for rural classes in UA (classes 2\*-5\*)
  - 0.5 ha for all classes in RZ and N2k
  - Several MMU exceptions down to 100 m<sup>2</sup>
- MMW:
  - 10 m
  - < 10 m over a distance of up to 100 m





# Local Component - Thematic domain

- Hybrid of LC and LU
- 3 levels hierarchical structure
- 4<sup>th</sup> level for characterisation (e.g. Tree cover density, Urban built-up intensity) (as attribute info)
- Highly contextual classes (e.g. ‘\* and associated land’) → mainly LU

Level 3
1.1.1 Urban fabric (predominantly public and private units)
1.1.2 Industrial, commercial and military units
1.2.1 Road networks and associated land
1.2.2 Railways and associated land
1.2.3 Port areas and associated land
1.2.4 Airports and associated land
1.3.1 Mineral extraction, dump and construction sites
1.3.2 Land without current use

2.3.1 Annual crops associated with permanent crops
2.3.2 Complex cultivation patterns
2.3.3 Land principally occupied by agriculture with significant areas of natural vegetation
2.3.4 Agro-forestry

Level 1	Level 2	Level 3	Level 4	
1 Urban	1.1 Urban fabric, industrial, commercial, public, military and private units	1.1.1 Urban fabric (predominantly public and private units)		
		1.1.2 Industrial, commercial and military units		
		1.2.1 Road networks and associated land		
		1.2.2 Railways and associated land		
		1.2.3 Port areas and associated land		
1.2 Transport infrastructure	1.2.4 Airports and associated land	1.2.4 Airports and associated land		
		1.3.1 Mineral extraction, dump and construction sites, land without current use		
		1.3.2 Land without current use		
		1.4 Green urban, sports and leisure facilities		
2 Cropland	2.1 Arable land	2.1.1 Arable irrigated and non-irrigated land		
		2.1.2 Greenhouses		
		2.2.1 Vineyards, fruit trees and berry plantations		
		2.2.2 Olive groves		
	2.2 Permanent crops	2.3.1 Annual crops associated with permanent crops		
		2.3.2 Complex cultivation patterns		
	2.3 Heterogeneous agricultural area	2.3.3 Land principally occupied by agriculture with significant areas of natural vegetation		
		2.3.4 Agro-forestry		
		3.1 Broadleaved forest	3.1.1 Natural & semi-natural broadleaved forest	
			3.1.2 Highly artificial broadleaved plantations	
3.2 Coniferous forest	3.2.1 Natural & semi-natural coniferous forest			
	3.2.2 Highly artificial coniferous plantations			
3.3 Mixed Forest	3.3.1 Natural & semi-natural mixed forest			
	3.3.2 Highly artificial mixed plantations			
	3.4.1 Transitional woodland and scrub			
	3.4.2 Lines of trees and scrub			
3.4 Transitional woodland and scrub	3.5 Damaged forest			
	4.1 Managed grassland			
4 Grassland	4.2 Natural & semi-natural grassland	4.2.1 Semi-natural grassland		
		4.2.2 Alpine and sub-alpine natural grassland		
		5.1 Heathland and Moorland		
5 Heathland and scrub	5.2 Sclerophyllous vegetation	5.1.1 Heathland and Moorland		
		5.1.2 Other scrub land		
6 Sparsely vegetated land	6.1 Sparsely vegetated areas	6.2.1 Beaches and dunes		
		6.2.2 River banks		
		6.3.1 Bare rocks and rock debris		
		6.3.2 Burnt areas (except burnt forest)		
7 Wetland	7.2 Peat bogs	6.3.3 Glaciers and perpetual snow		
		7.2.1 Exploited peat bog		
		7.2.2 Unexploited peat bog		
8 Lagoons, coastal wetlands and estuaries	8.2 Coastal waters	8.1.1 Coastal salt marshes		
		8.1.2 Salines		
		8.1.3 Intertidal flats		
		8.2.1 Coastal lagoons		
9 Rivers and lakes	9.2 Lakes and reservoirs	8.2.2 Estuaries		
		9.1.1 Interconnected water courses		
		9.1.2 Highly modified water courses and canals		
		9.1.3 Separated water bodies belonging to the river system		
		9.2.1 Natural water bodies		
10 Sea and ocean		9.2.2 Artificial standing water bodies		
		9.2.3 Intensively managed fish ponds		
		9.2.4 Standing water bodies of extractive industrial sites		



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## Local Component - Temporal domain

- Status maps every 6 years (2006-12-18-...)
  - Based on VHR satellite data of each reference year +/- 1 year acquisition window.
- Change mapping 2006-12, 2012-18,...



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# Local Component-Status mapping workflow (UA)

In-situ data

VHR images



HR images



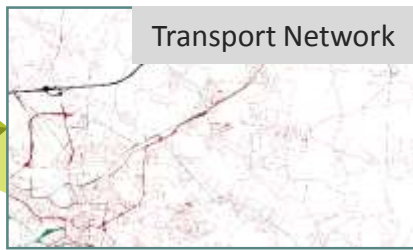
CLC



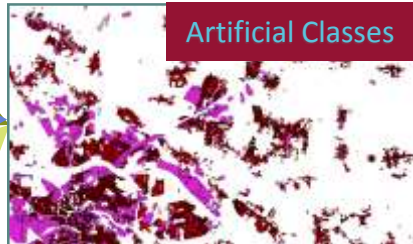
HRLs



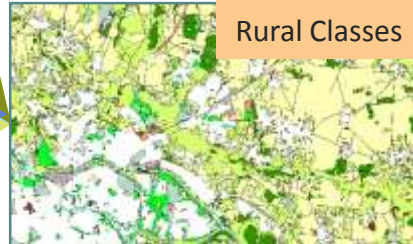
Transport Network



Artificial Classes



Rural Classes



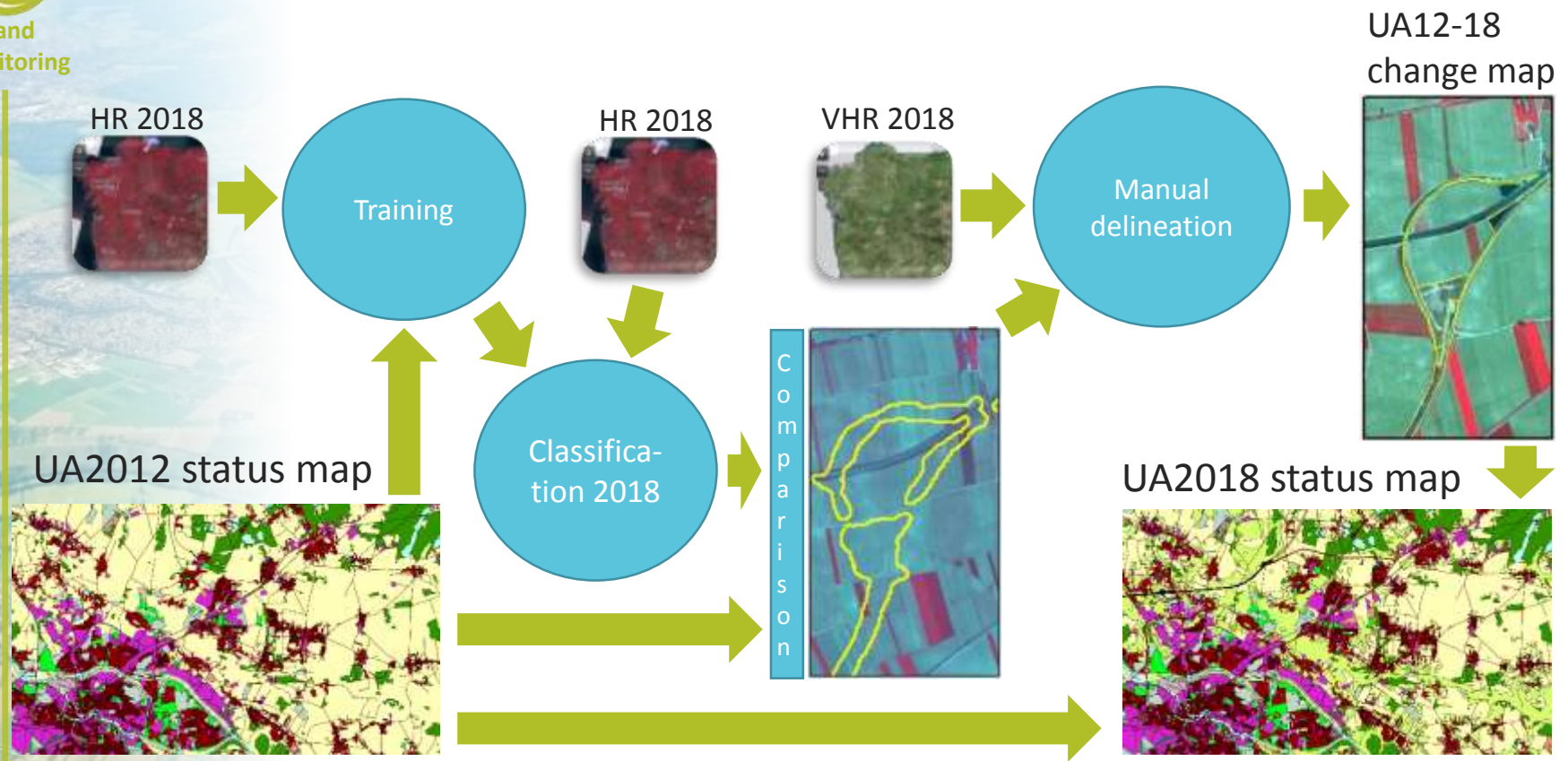
Status Map





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# Local Component - Change mapping workflow (UA)

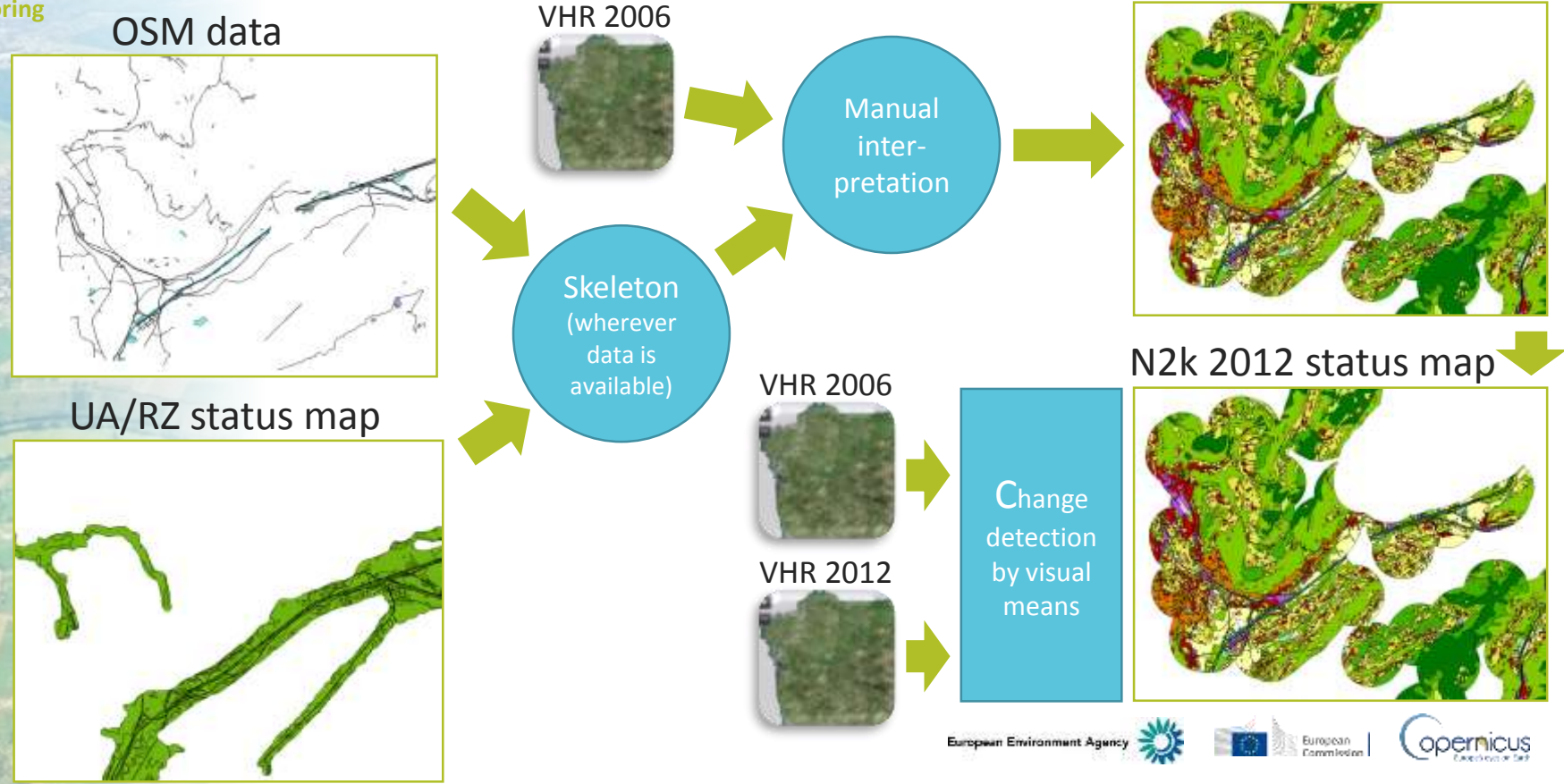






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# Local Component - Mapping workflow (N2k)





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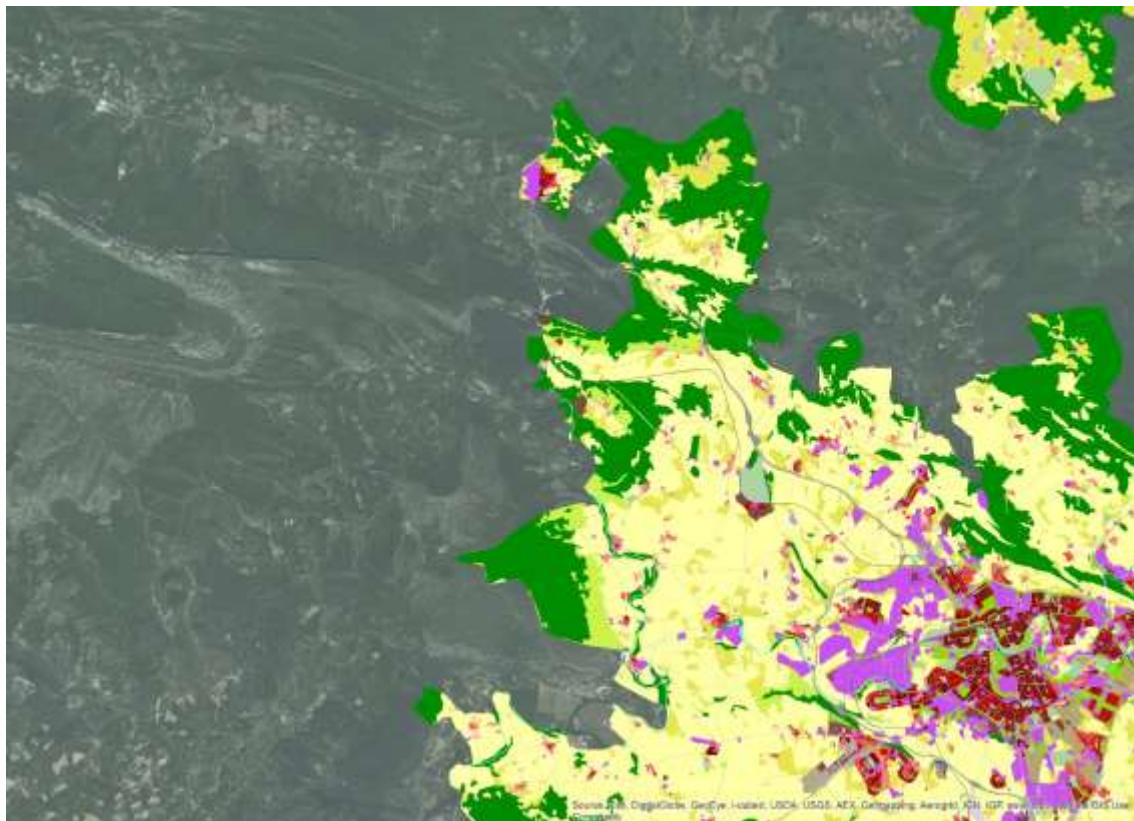
# Image data (region of Pamplona, Spain)





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# Urban Atlas (region of Pamplona, Spain)



Source: ESA, DigitalGlobe, GeoEye, IGN, USDA, USDA, AEX, DigitalGlobe, AeroGRID, IGN, IGP, and the European Commission. © 2011 ESA

European Environment Agency



European  
Commission





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# Riparian zones (region of Pamplona, Spain)





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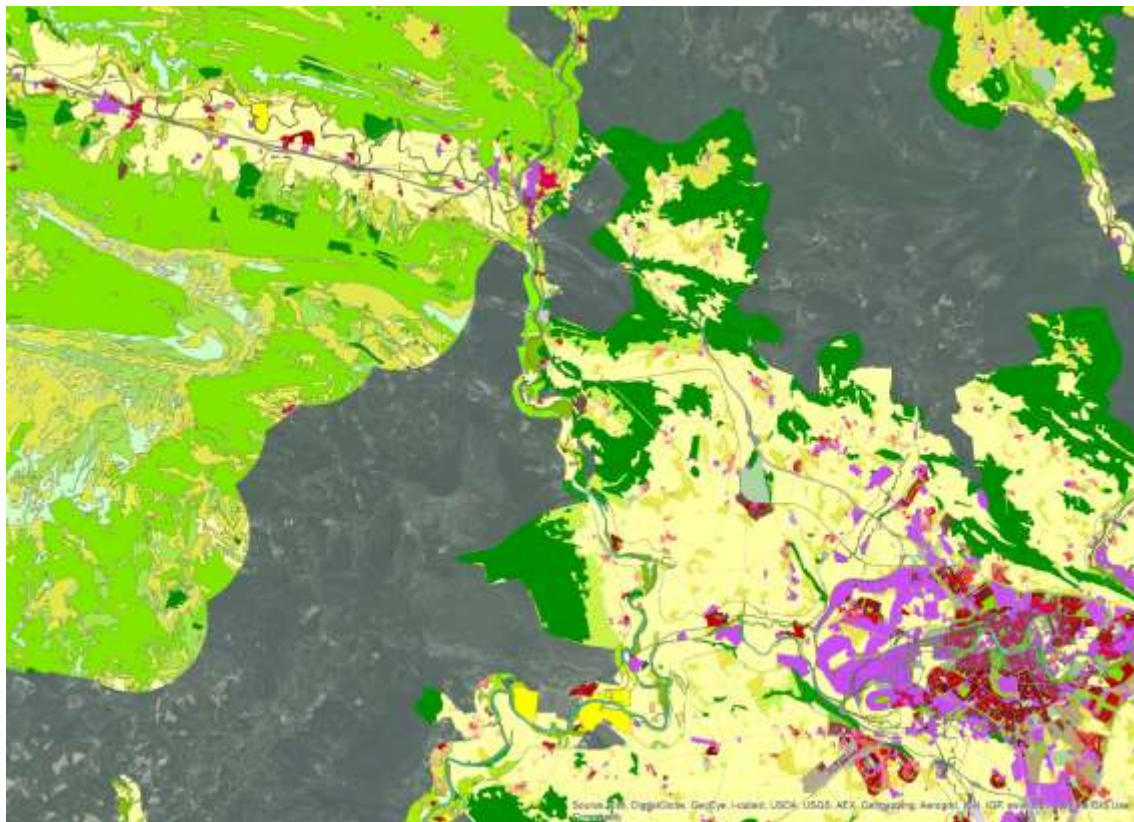
# Natura 2000 (region of Pamplona, Spain)





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U A + R Z + N 2 K (region of Pamplona, Spain)



Source: Copernicus Sentinel-1, Sentinel-2, Landsat, USGS, USGS, AEX, Copernicus, Sentinel-1, IGP, Copernicus, Sentinel-2, Landsat

European Environment Agency



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Commission

Copernicus  
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# All + CLC (region of Pamplona, Spain)

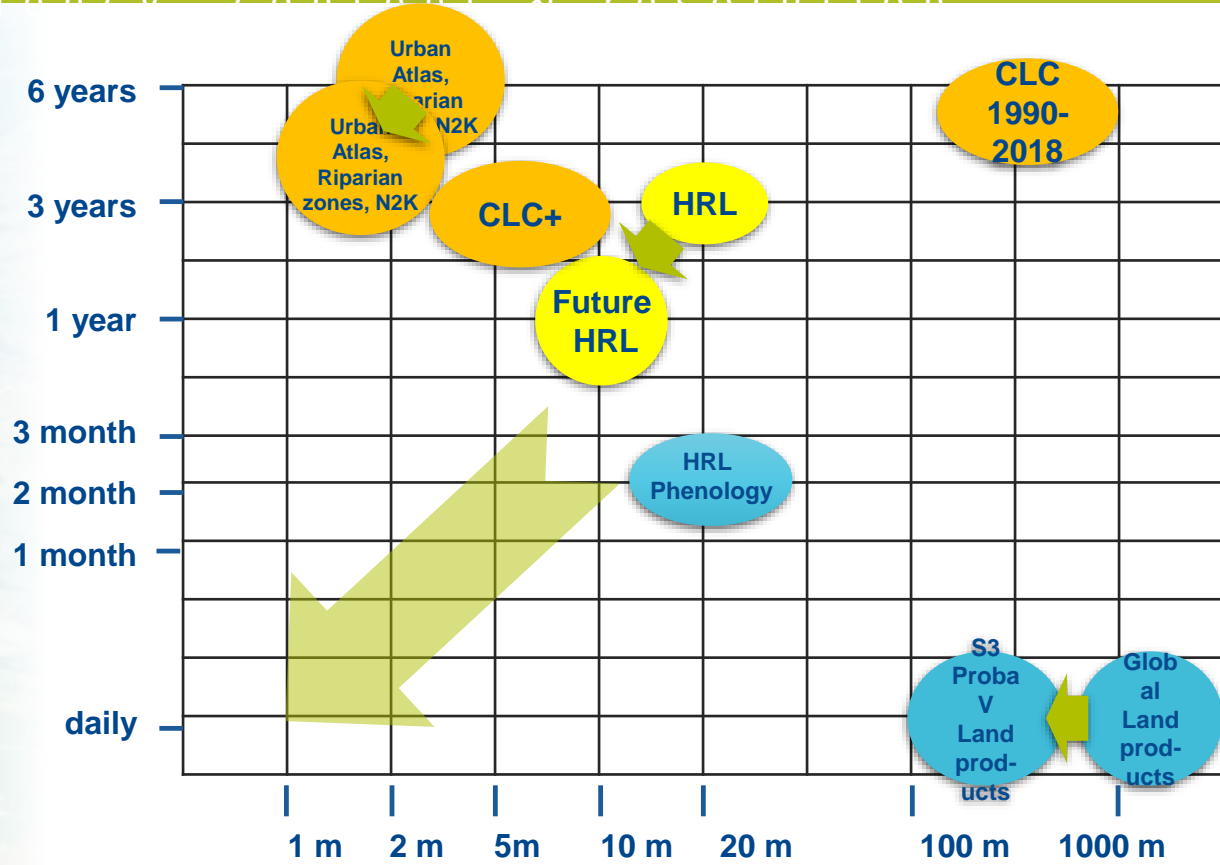




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# Copernicus Land monitoring: update frequency, content & resolution

Update frequency



Thematic richness	
High	Orange
medium	Yellow
low	Blue

Spatial resolution





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# Copernicus Land Monitoring service

Copernicus Land Monitoring service Webpage:

<http://land.copernicus.eu/>

- View data
- Download data
- WMS

The screenshot shows the Copernicus Land Monitoring Service website. At the top, there is a navigation bar with links for 'Site Map', 'About', 'Contact us', 'Log in', and 'Register'. Below this is a search bar and a button labeled 'Ask the service desk'. The main content area features a large aerial photograph of agricultural fields. Below the photo is a text block explaining the service: 'Copernicus is an European system for monitoring the Earth. Data is collected by different sources, including Earth observation satellites and in-situ sensors. The data is processed and provides reliable and up-to-date information about six thematic areas: land, marine, atmosphere, climate change, emergency management and security. The land theme is divided into four main components: Global, Pan-European, Local, and Reference data.' Below this text are four circular icons representing these components: a globe for 'Global', the European Union flag for 'Pan-European', a location pin for 'Local', and a database icon for 'Reference data'. Each icon is accompanied by a brief description of the component's focus. At the bottom of the screenshot, there is a colorful satellite-derived land use map.

Copernicus is an European system for monitoring the Earth. Data is collected by different sources, including Earth observation satellites and in-situ sensors. The data is processed and provides reliable and up-to-date information about six thematic areas: land, marine, atmosphere, climate change, emergency management and security. The land theme is divided into four main components:

- Global**  
provides a series of bio-geophysical products on the status and evolution of the land surface at global scale at mid and low spatial resolution
- Pan-European**  
provides information about the land cover and land use (LC/LU), land cover and land use changes and land cover characteristics
- Local**  
focuses on different hotspots, i.e. areas that are prone to specific environmental challenges and problems
- Reference data**  
All of the Copernicus services need access to in-situ data in order to ensure an efficient and effective use of Copernicus space-borne data

