Copernicus activities at EEA

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European Environment Agency

EO4EA, Copenhagen 27.03.2017

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Programme objectives

"The Union Earth observation and monitoring programme"

Monitor the environment

Protect people and assets

Increase general knowledge on the state of the Planet

Improve environmental policy effectiveness

Facilitate adaptation to climate change

Foster downstream applications in a number of fields

Help managing emergency and security related situations

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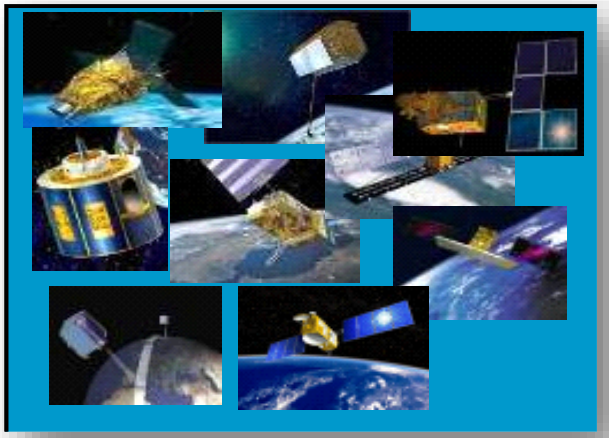
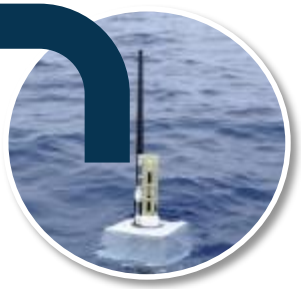
Overall programme architecture

6 services use Earth Observation data to deliver …



Sentinels

Contributing missions



in-situ

…added-value products

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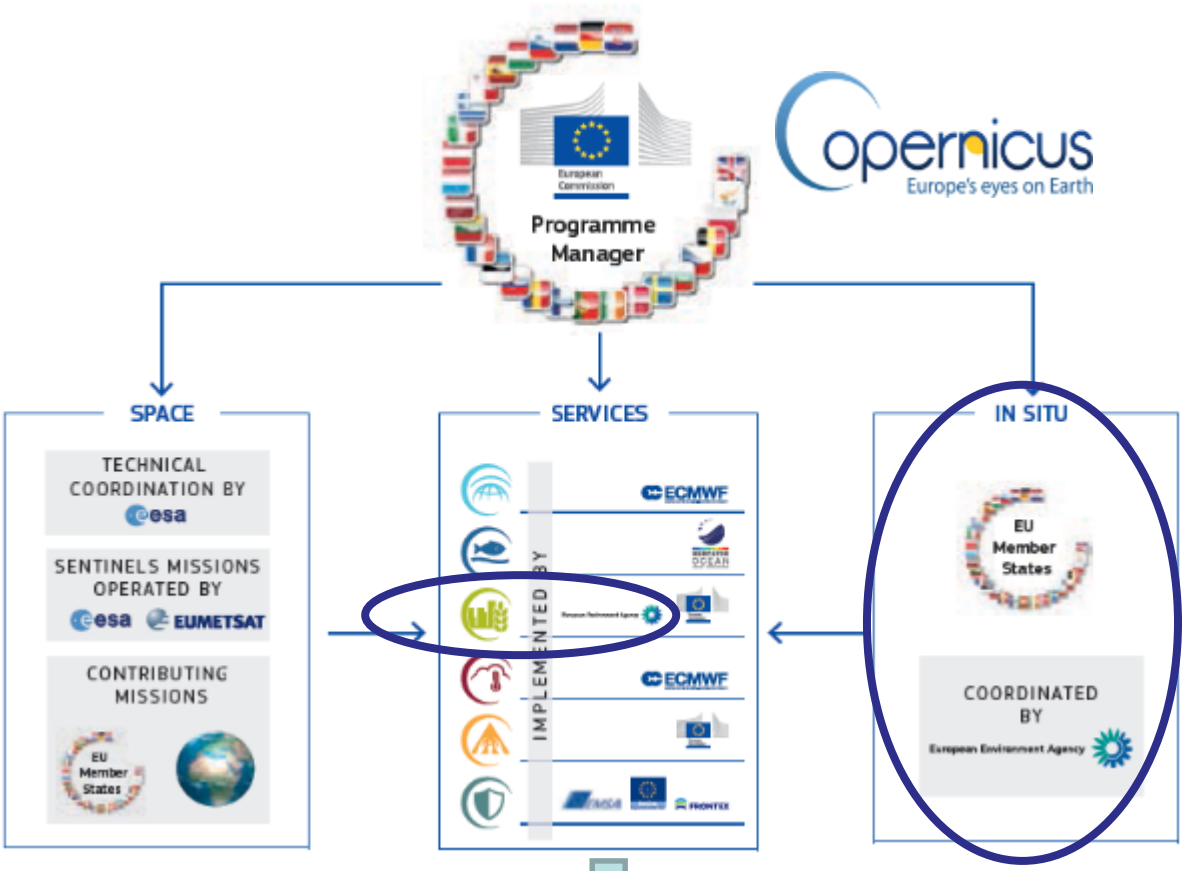
ESA Sentinel family of satellites: Copernicus dedicated Earth Observation missions

- **S1:** Radar Mission — **S1A LAUNCH: 3.04.2014**, **S1B LAUNCH: 22.04.2016**
- **S2:** High Resolution Optical Mission — **S2A LAUNCH: 23.06.2015**, **S2B LAUNCH: 06.03.2017**
- **S3:** Medium Resolution Imaging and Altimetry Mission — **S3A LAUNCH: 16.02.2016**
- **S4:** Geostationary Atmospheric Chemistry Mission
- **S5P:** Low Earth Orbit Atmospheric Chemistry Precursor Mission
- **S5:** Low Earth Orbit Atmospheric Chemistry Mission
- **S6 (Jason-CS):** Altimetry Mission

Copernicus and the role of EEA



Delegation agreement 2014-2020, 87 M€

Core

Users

- Air pollution, transport and noise
- Industrial Pollution
- Climate change mitigation and energy
- Climate change impacts, vulnerability and adaptation
- Marine and maritime, fisheries and coastal
- Water management, resources and ecosystems
- Biodiversity, ecosystems, agriculture and forests
- Urban, land use and soil
- Waste and material resources

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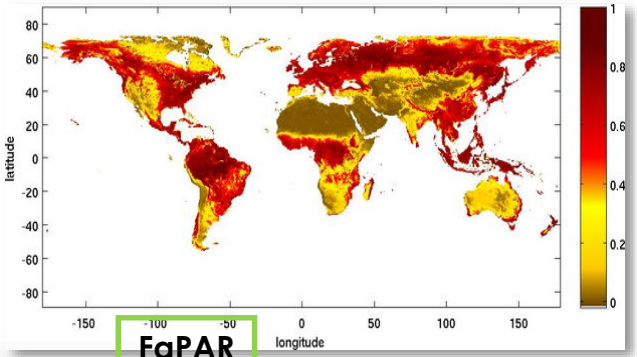
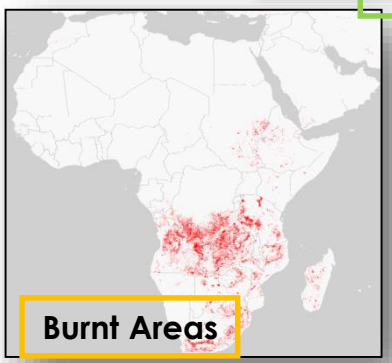
Global Land Monitoring Service (GLMS): Global vegetation, water & energy parameters

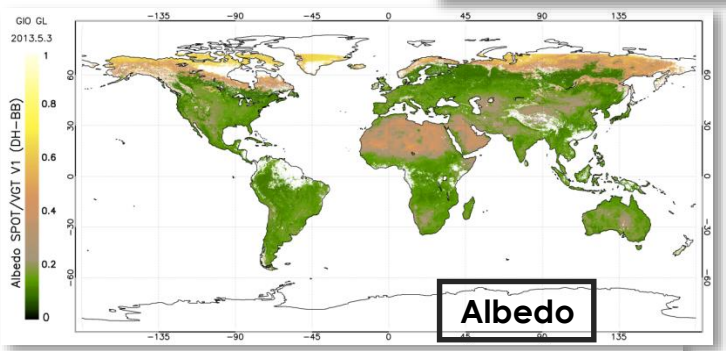


FaPAR

Water bodies v2 (NEW)

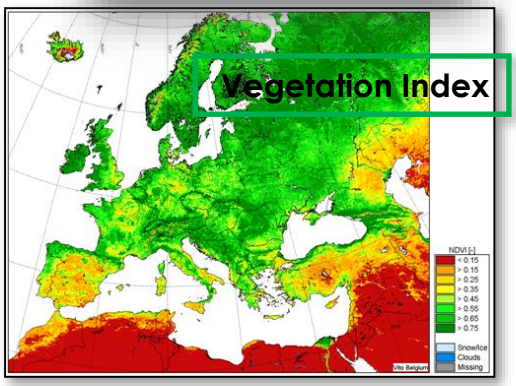


Burnt Areas

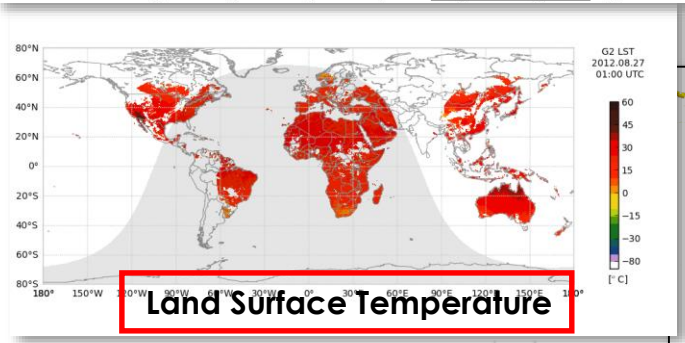


Albedo

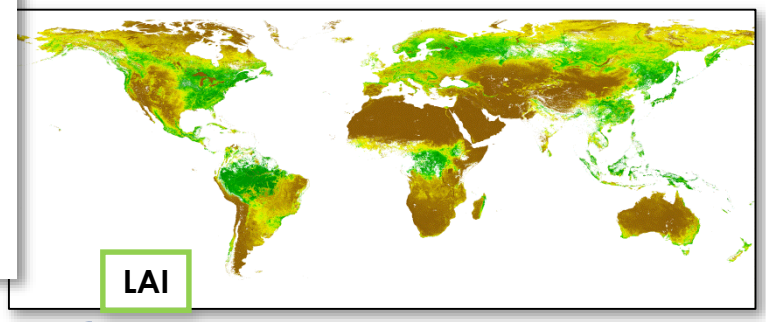
Dry Matter Productivity



Vegetation Index

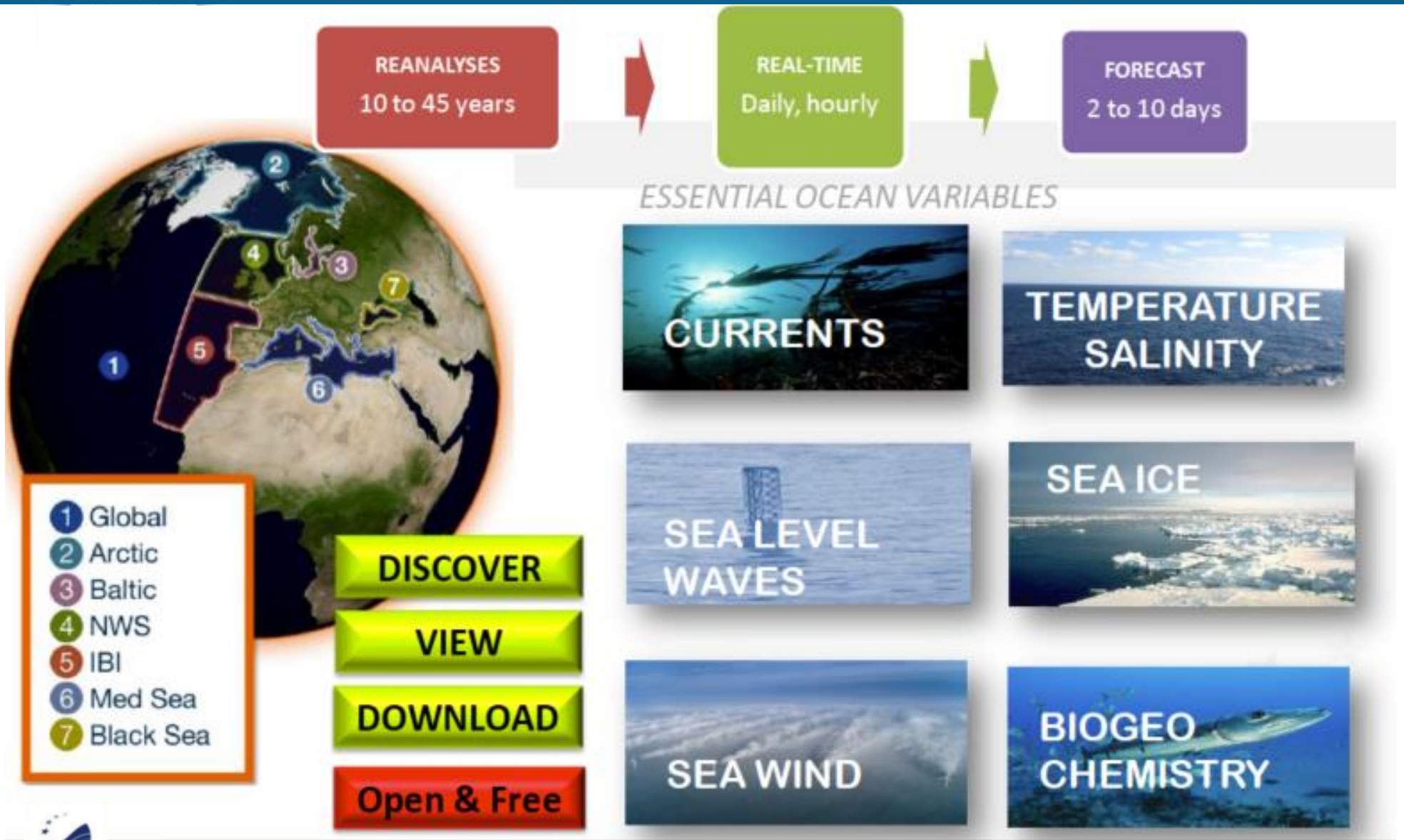


Land Surface Temperature



LAI

The Copernicus Marine Environment Monitoring Service (CMEMS)



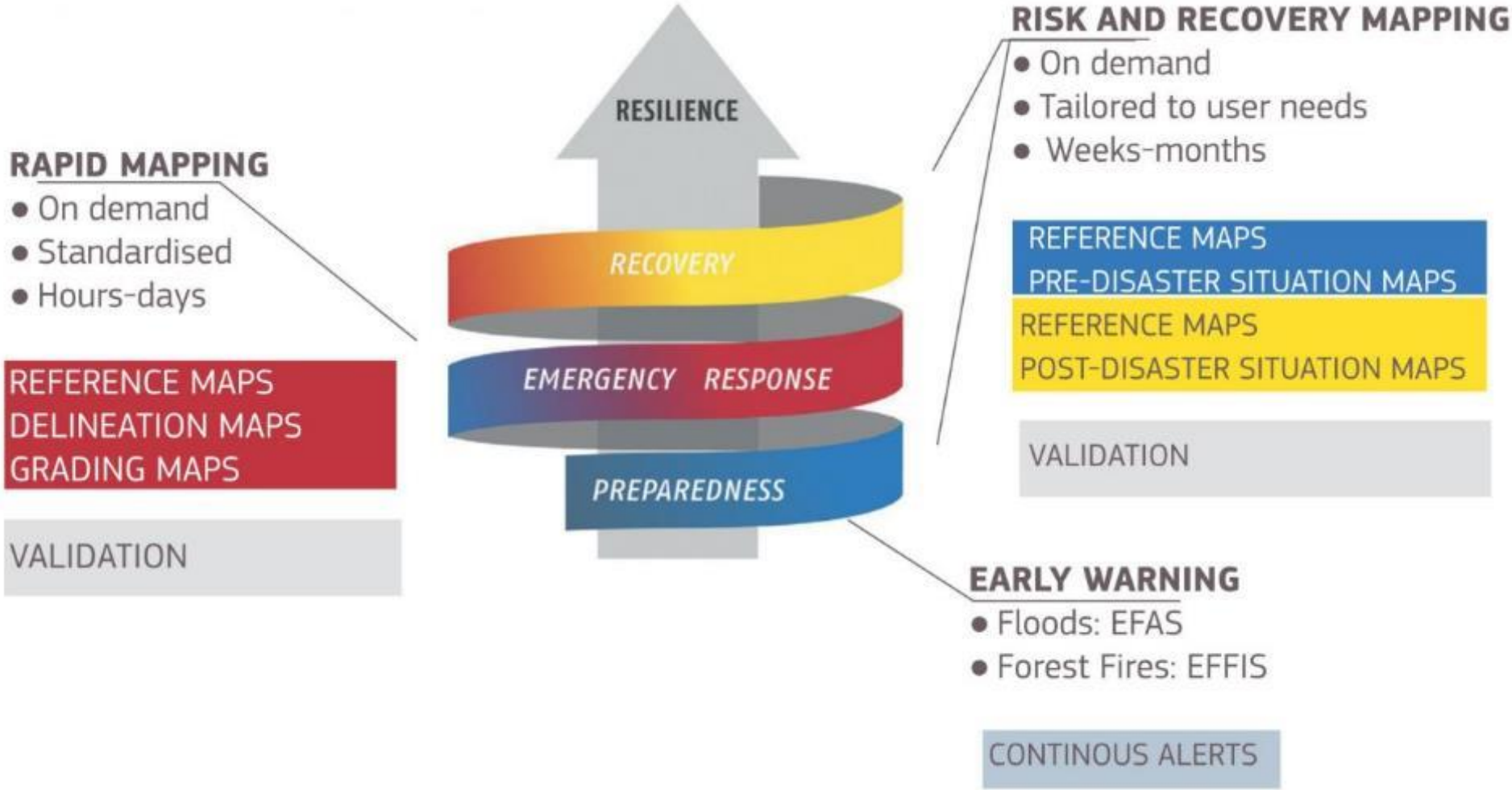
Copernicus Atmosphere Monitoring Service (CAMS)

1. Search the on-line interactive catalogue

Portfolio	Product groups
A. Regional products	European AQ NRT analyses
	European AQ NRT forecasts
	European AQ interim reanalyses
	European AQ reanalyses
B. Global products (troposphere and stratosphere)	Global atmospheric composition NRT analyses
	Global atmospheric composition NRT forecasts
	Global atmospheric composition reanalyses
C. Supplementary products	Policy support products
	Solar radiation
	Greenhouse gas fluxes
	Climate forcings
D. Emissions products	Anthropogenic emissions
	Fire emissions

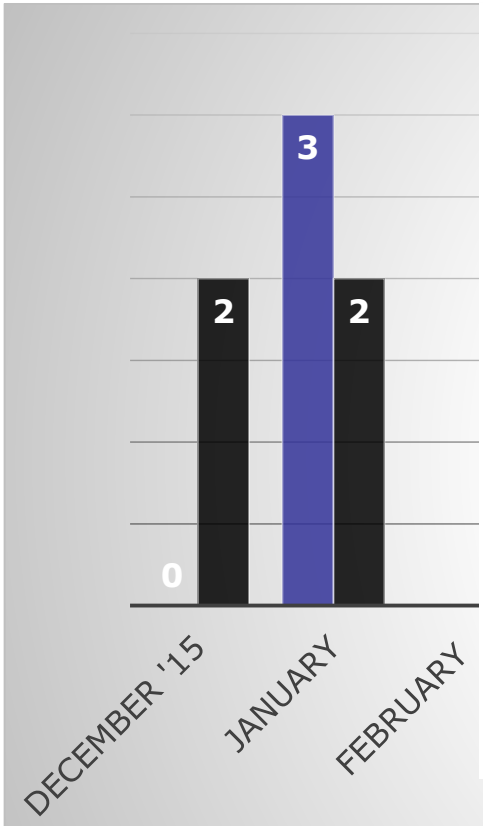
2. Or download the Service Products Portfolio (including detailed products data sheets) at: http://atmosphere.copernicus.eu/reports.

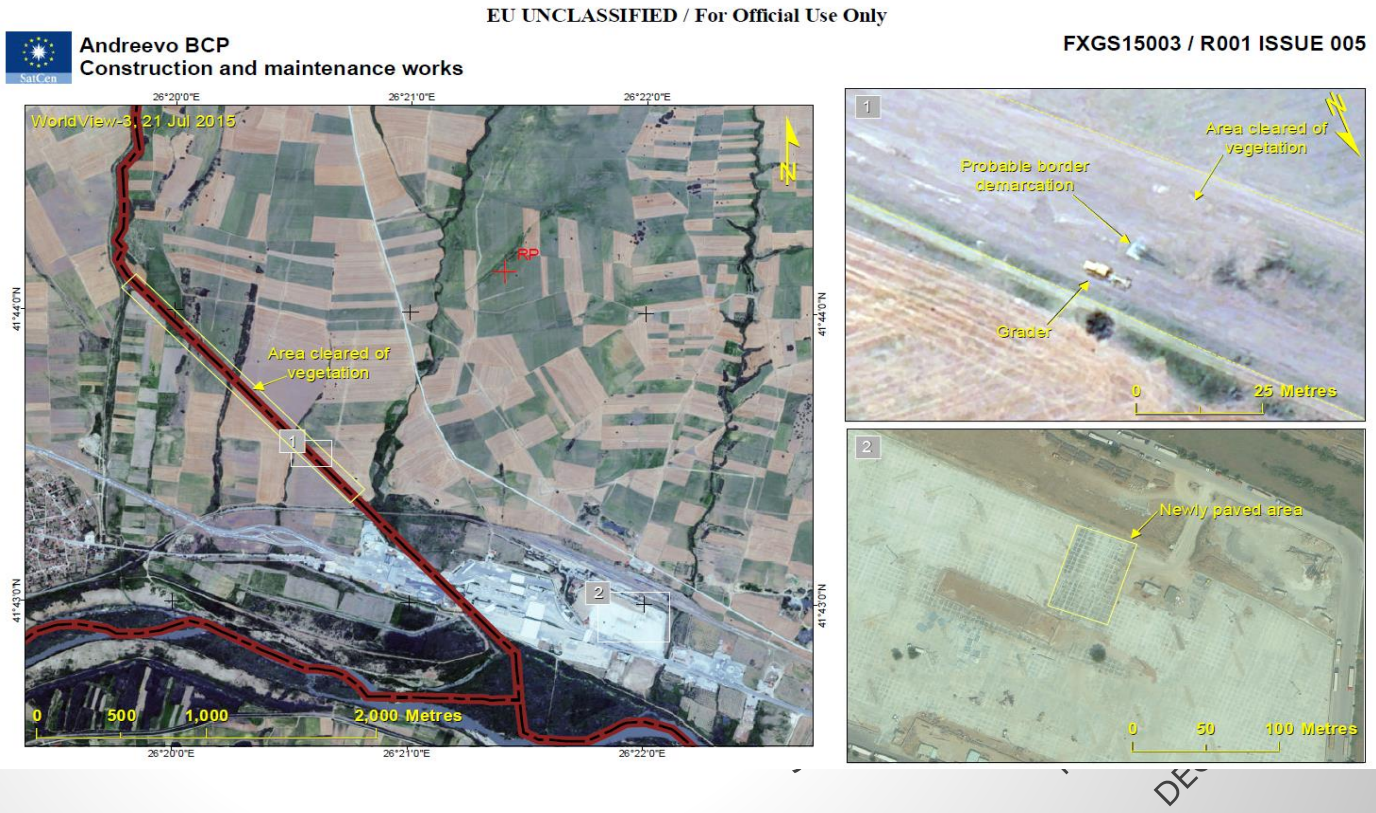
Copernicus Emergency Management Service (CEMS): Concept



Copernicus Security Service (CSS): Pre-frontier monitoring

Coastal Monitoring Service | **Pre Frontier Monitoring Service** | Reference Imagery / Mapping | Maritime Surveillance of an Area of Interest | Vessel Detection Service | Vessel Tracking and Reporting Service | Anomaly Detection Service | Environmental Assessment





■ Requested to EUSC ■ Delivered to MS

C3S: Climate Data Store (CDS) content

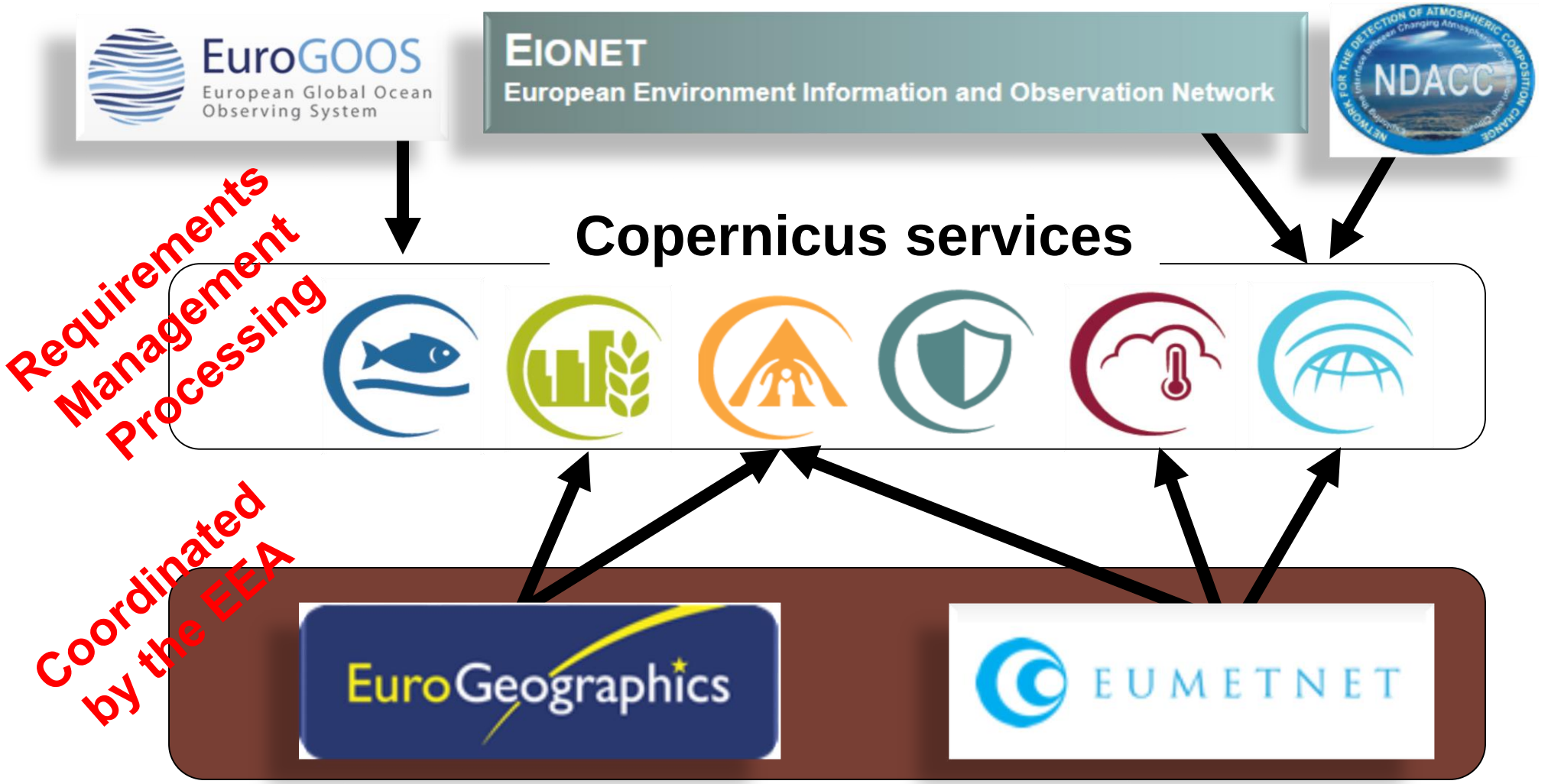
Scientific basis:

- Essential Climate Variables as defined by GCOS
- GCOS Status Report (GCOS-195)
- IPCC, CMIP

Observations	Global estimates of ECVs from satellite and in-situ data	Reprocessed CDRs, reference observations	Support for data rescue, climate data collections
Climate reanalysis	Global atmosphere, ocean, land	Regional reanalysis	Coupled climate reanalysis for 100 years
Seasonal forecasts and climate projections	Multi-model seasonal forecast products	Access to CMIP data and products	European multi-model climate projections

Climate Indicators

Cross-service in situ coordination



EEA's three main cross-cutting activities

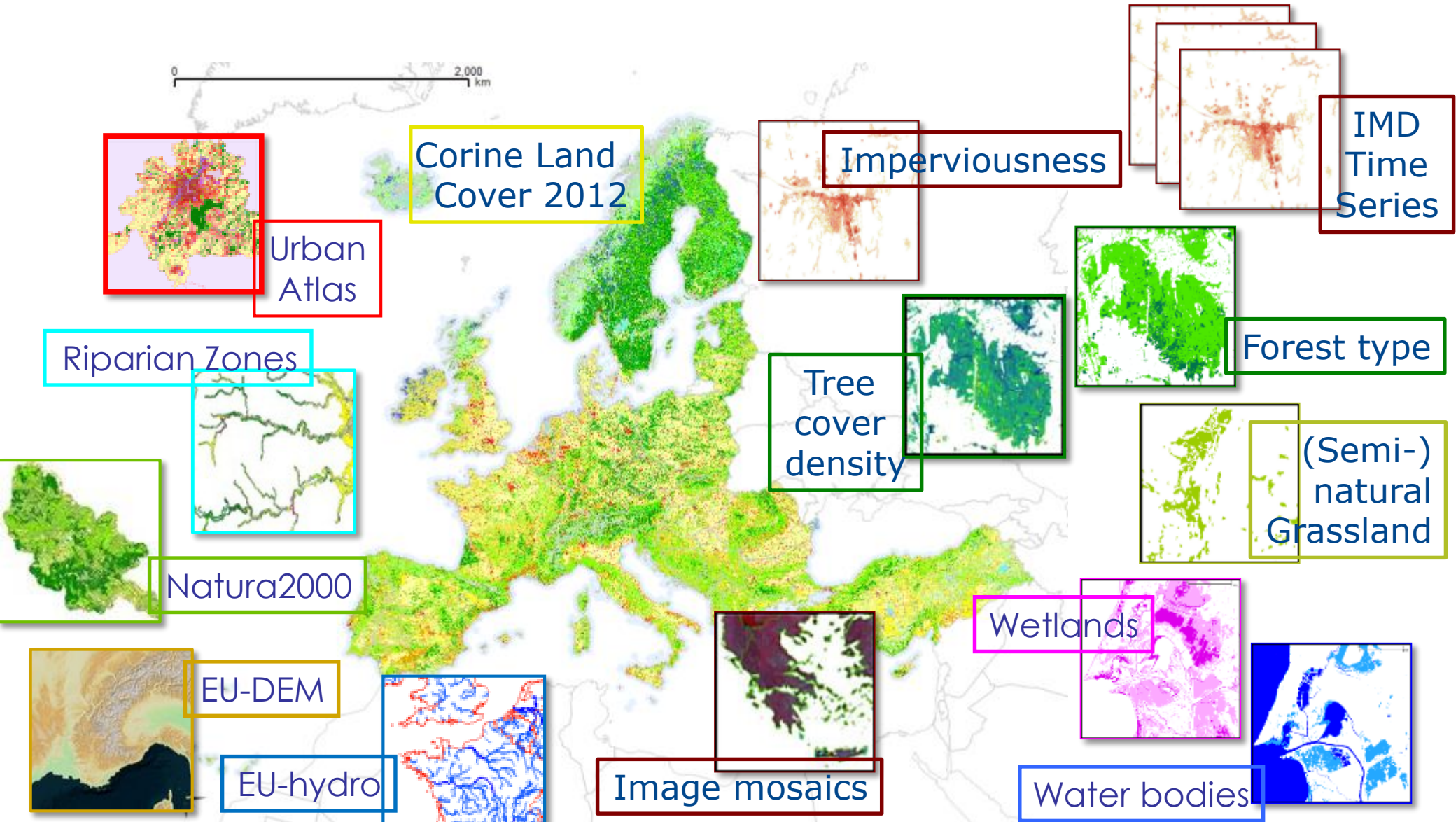
Maintain an overview of the Copernicus in situ component

Improve access to selected in situ data

Raise the awareness about the Copernicus in situ component

COPERNICUS LAND MONITORING SERVICE

Copernicus land monitoring service
pan-European, local & RDA products



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pan-European component – High Resolution Layers (HRL's)

Imperviousness

Degree of Imperviousness 2012 (20 m and 100 m)	Degree of imperviousness, values from 1-100 %
Impervious density change 2009-2012 (100 m)	Mapping degree of change over time, values from -100 to +100 %

Forest

Tree cover density (20 m and 100 m)	Tree cover density, values from 1-100 %
Forest Type (20 m and 100 m)	Mapping dominant leaf type: coniferous and broadleaved

Natural and semi-natural grassland

Natural and semi-natural grassland (20 m and 100 m)	Mapping natural and semi-natural grassland

Wetlands

Wetland (20 m and 100 m)	Mapping wetlands

Water bodies

Permanent water bodies (20 m and 100 m)	Mapping permanent water bodies, including small water bodies

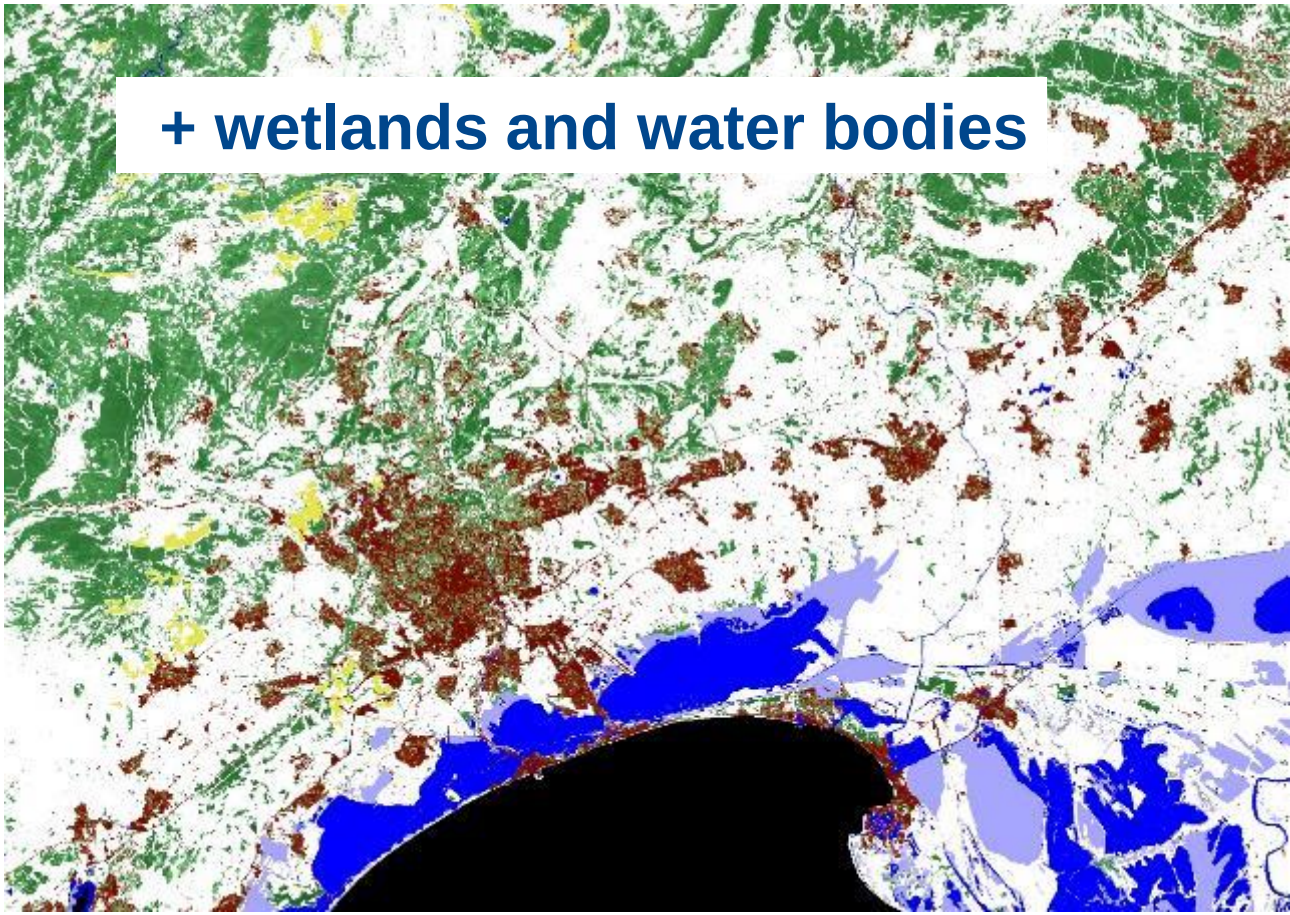
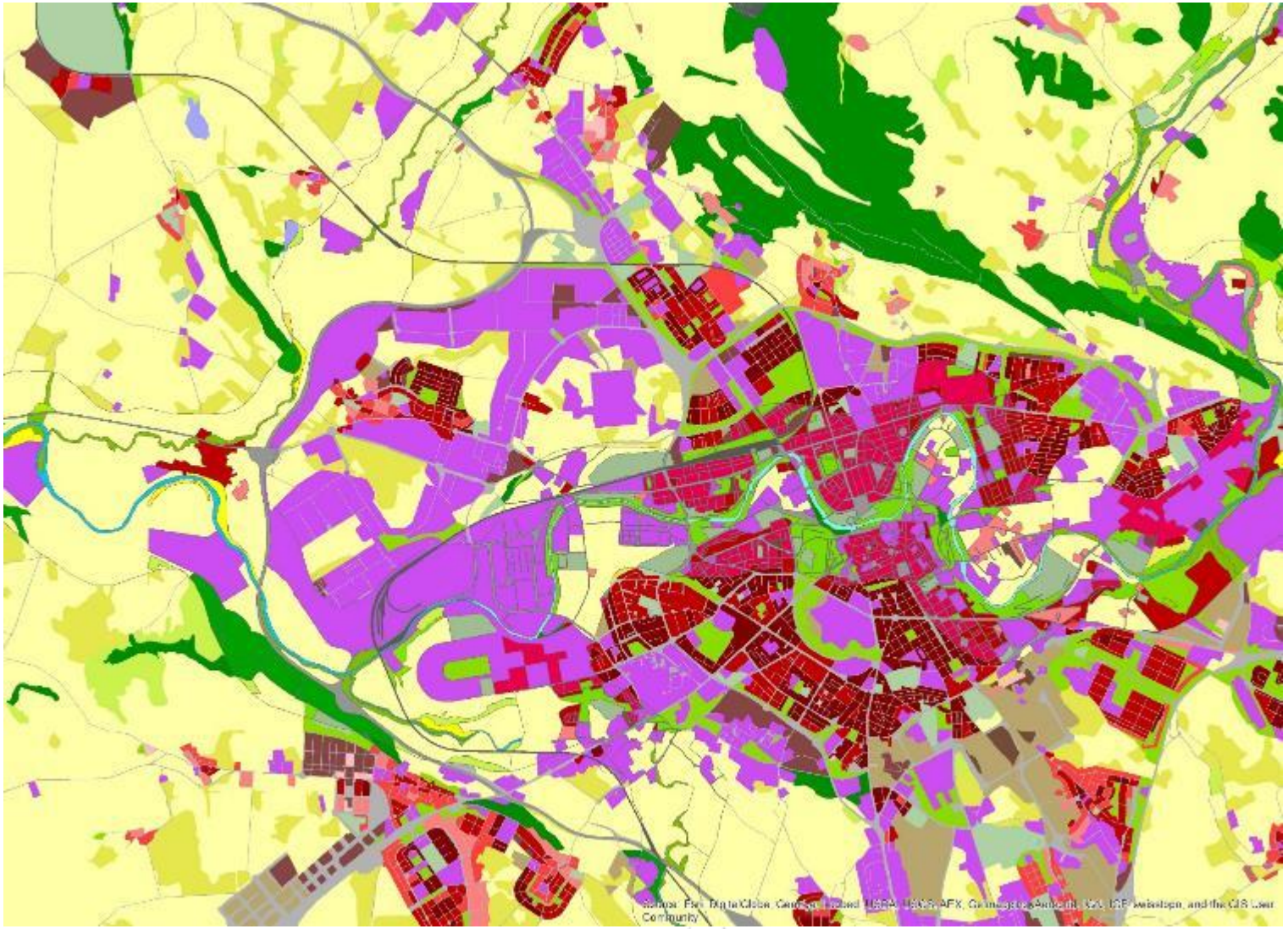


Image data (region of Pamplona, Spain)

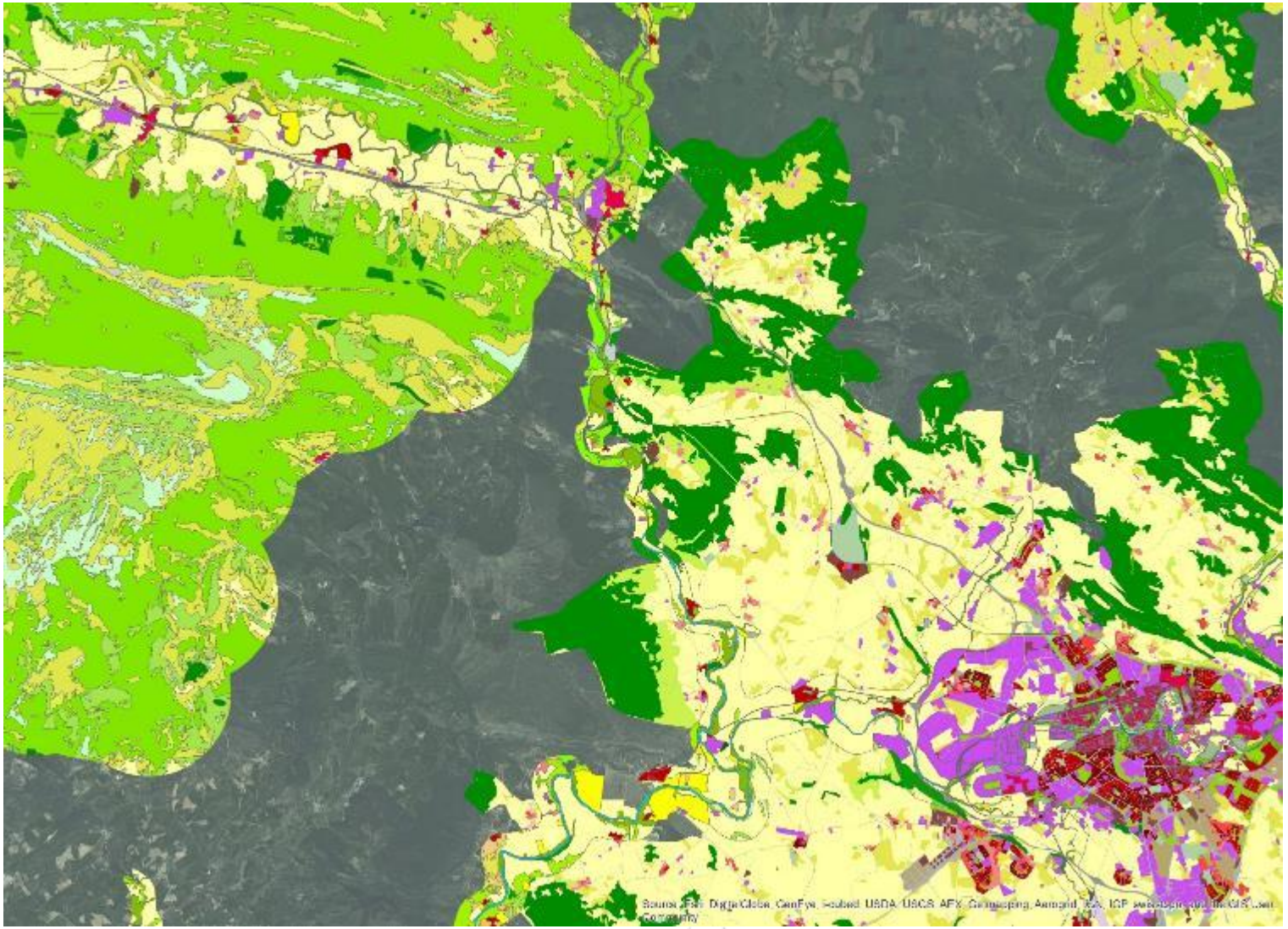
Urban Atlas (region of Pamplona, Spain)



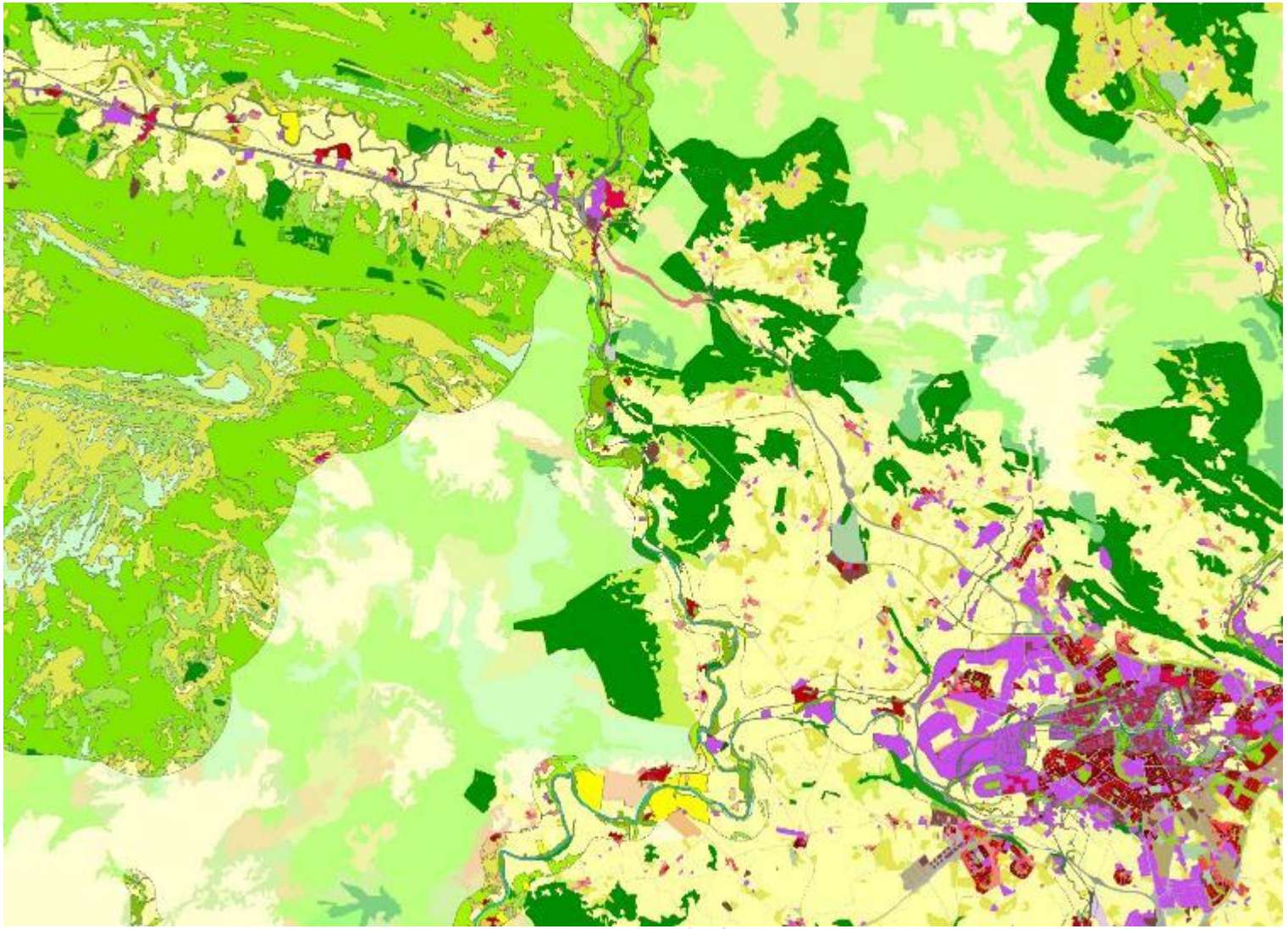
Riparian zones (region of Pamplona, Spain)

Natura 2000 (region of Pamplona, Spain)

UA + RZ + N2K (region of Pamplona, Spain)

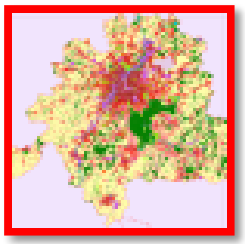


All + CLC (region of Pamplona, Spain)



Land portfolio interdependencies & integration: Riparian Zones example

VHR imagery



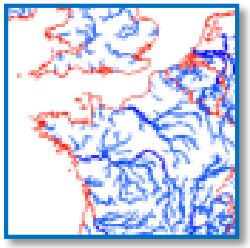
Urban Atlas

HRL Forest

RZ LCLU

Extent RZ

GLEs

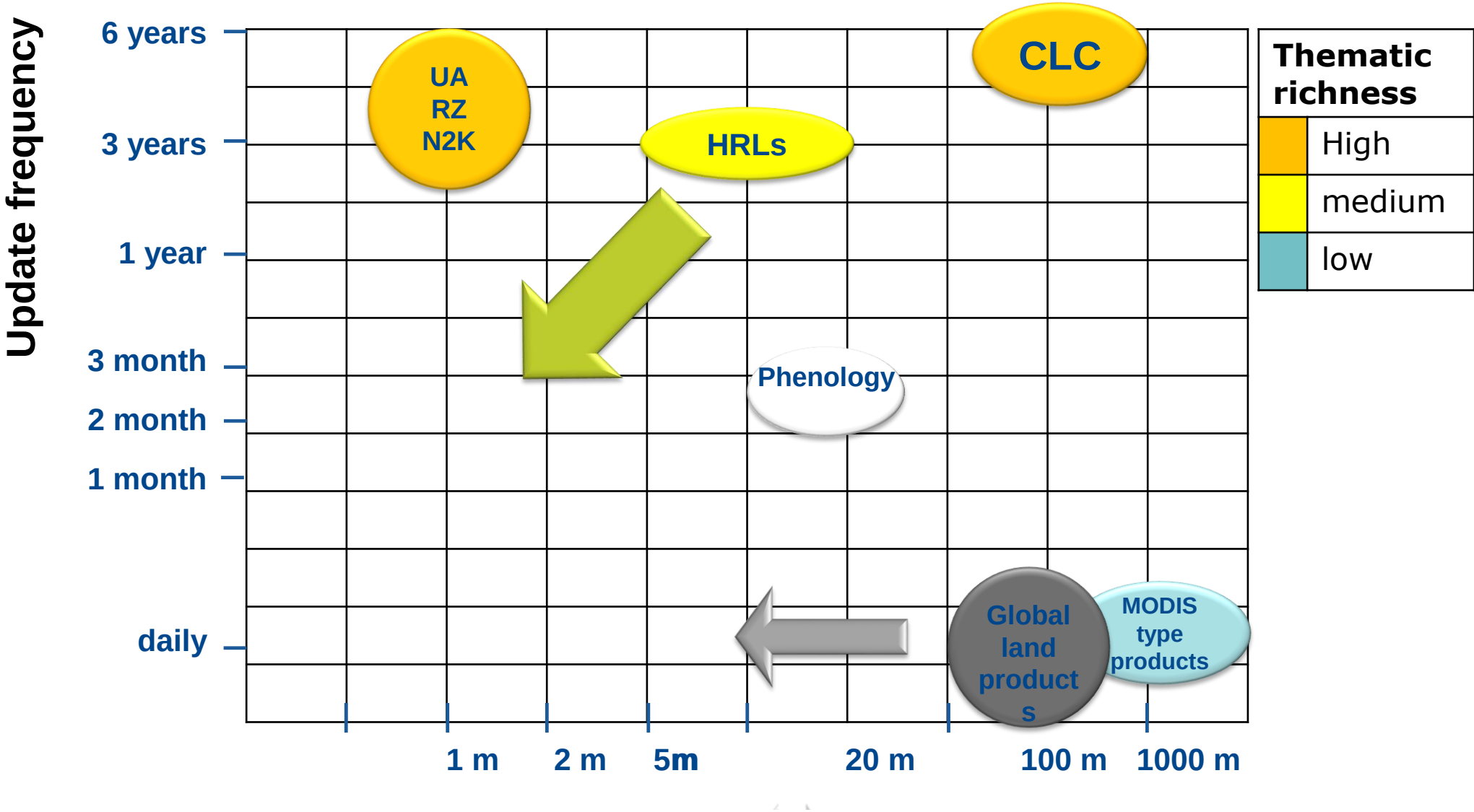


EU-hydro

EU-DEM

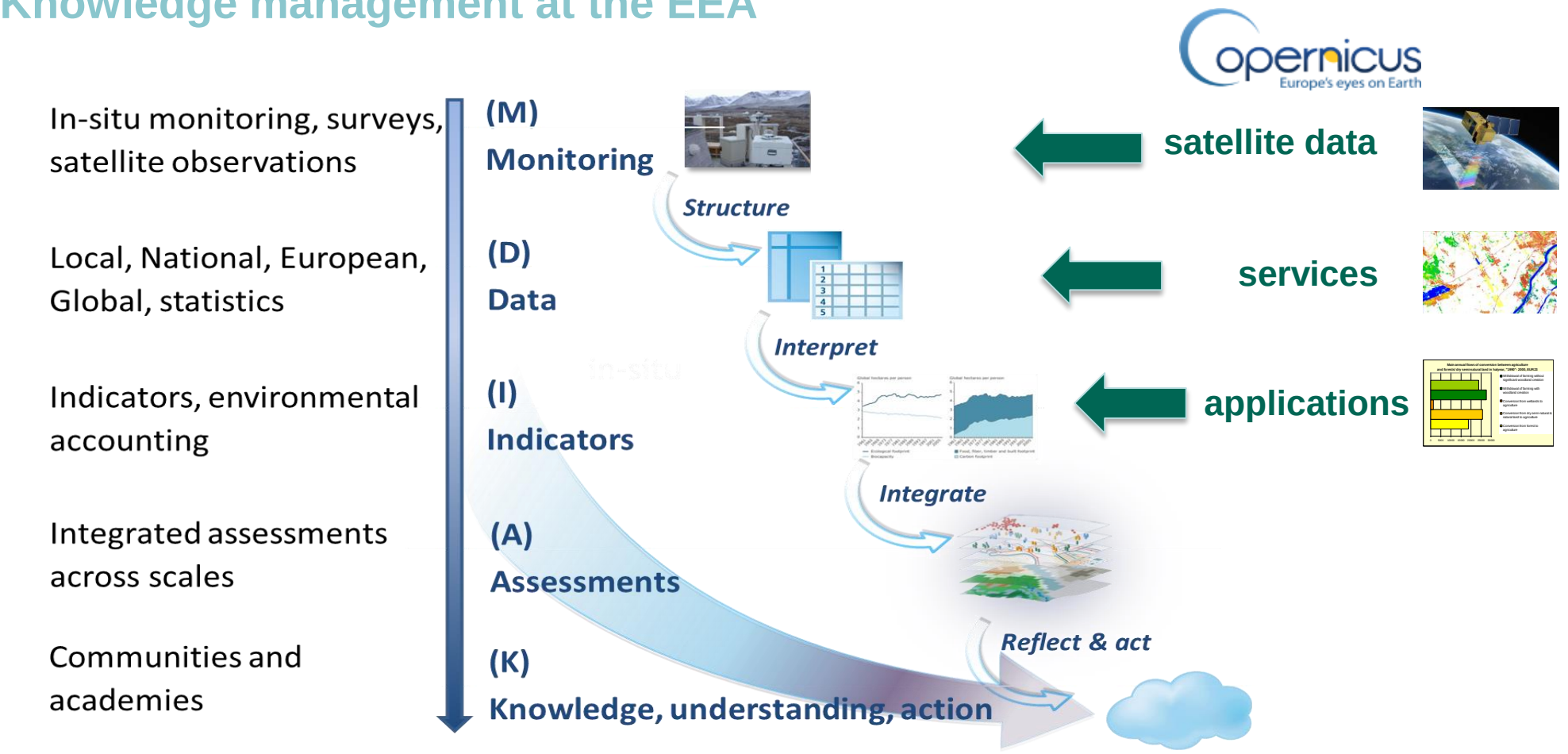
EO4EA USE POTENTIAL

Evolution in update frequency and spatial resolution

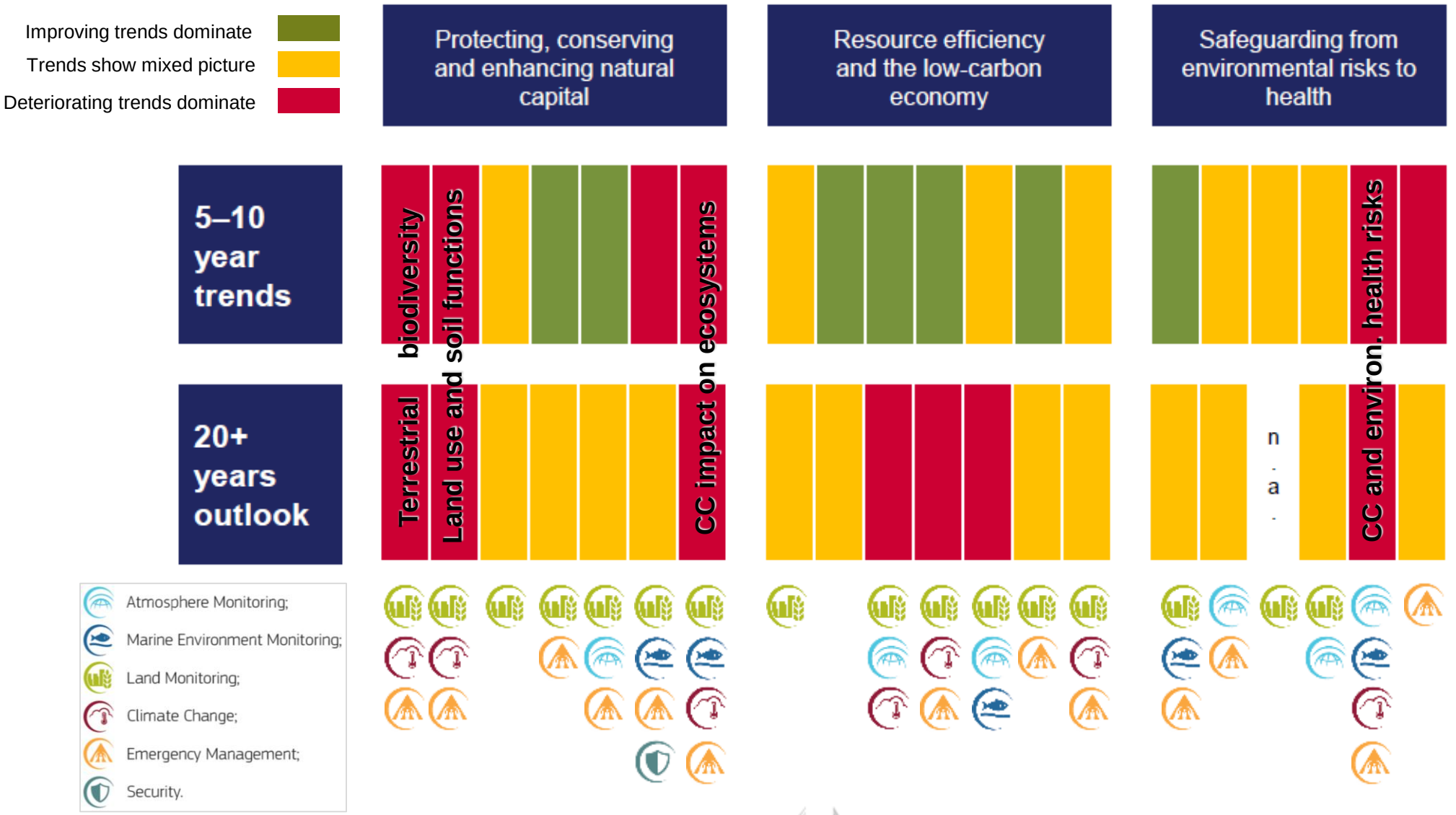


Sentinels for evidence based decision making

Knowledge management at the EEA



Potential use of Copernicus services @ EEA



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Protecting, conserving and enhancing natural capital

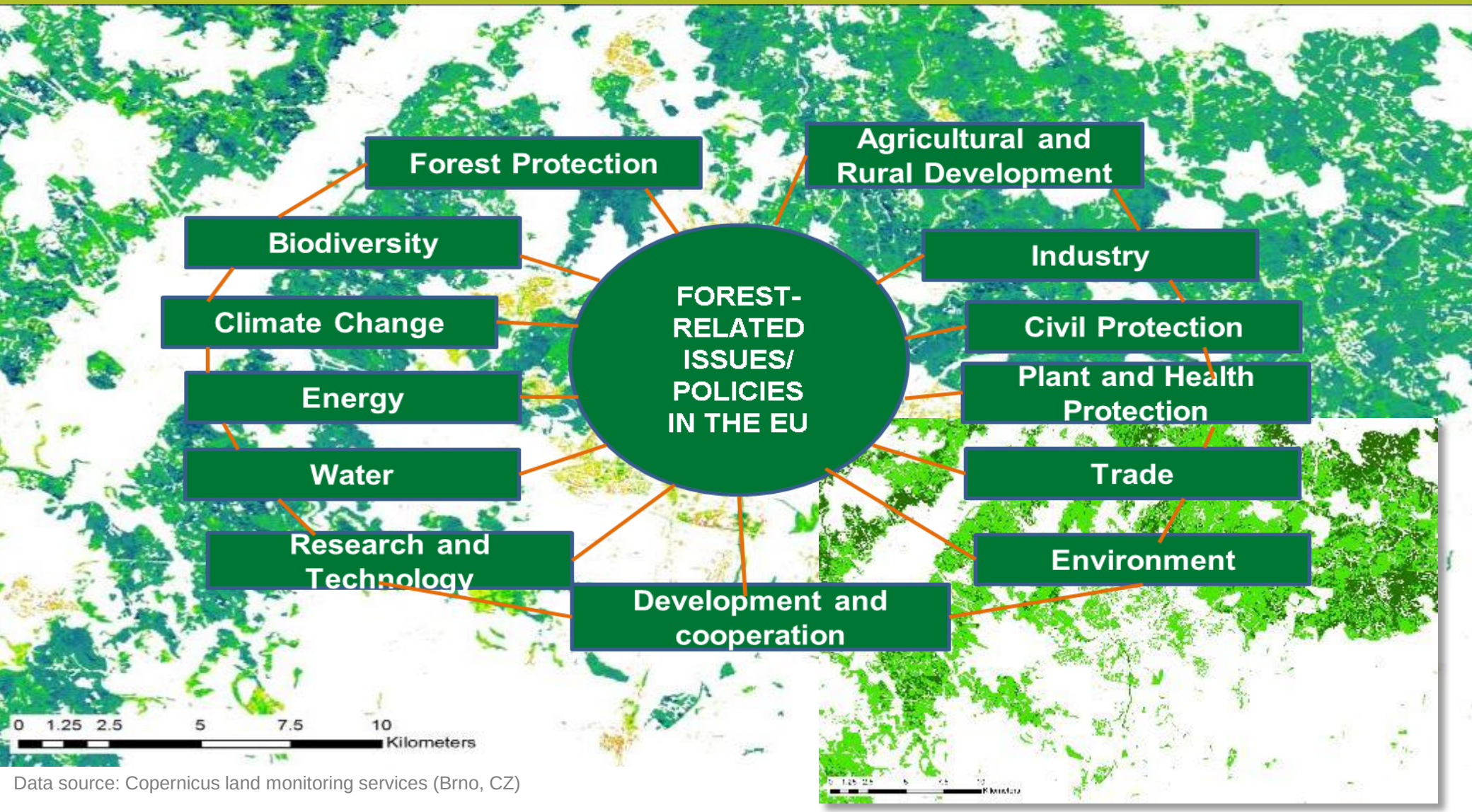
✓ Copernicus current and potential contributions

	5–10 year past trends	20+ years outlook	Progress to policy targets
✓ Terrestrial and freshwater biodiversity			☐
✓ Land use and soil functions			No target
✓ Ecological status of freshwater bodies			☒
✓ Water quality and nutrient loading			☐
? Air pollution and its ecosystem impacts			☐
? Marine and coastal biodiversity			☒
✓ Climate change impacts on ecosystems			No target

Improving trends dominate		Largely on track ☑
Trends show mixed picture		Partially on track ☐
Deteriorating trends dominate		Largely not on track ☒

★ Source: EEA. SOER 2015 Synthesis report.

Copernicus forest type and tree cover density monitoring



Data source: Copernicus land monitoring services (Brno, CZ)

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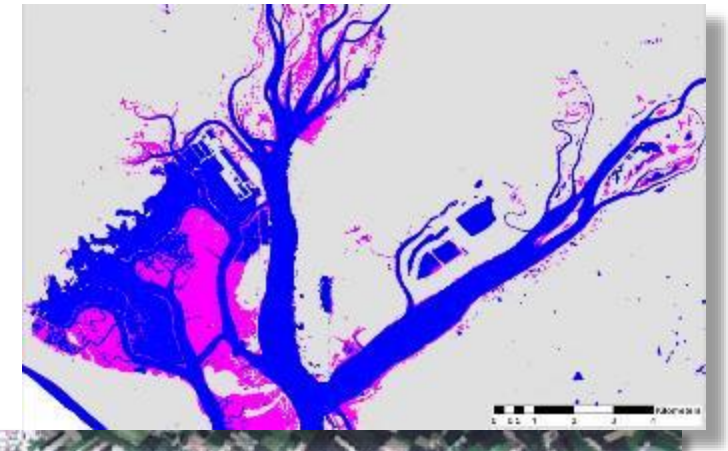
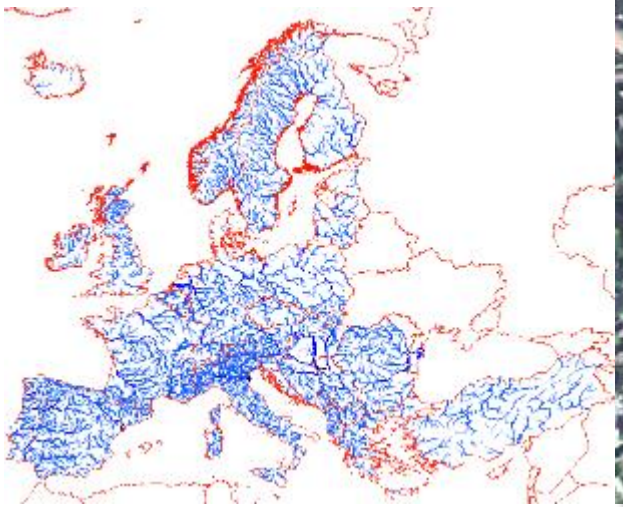
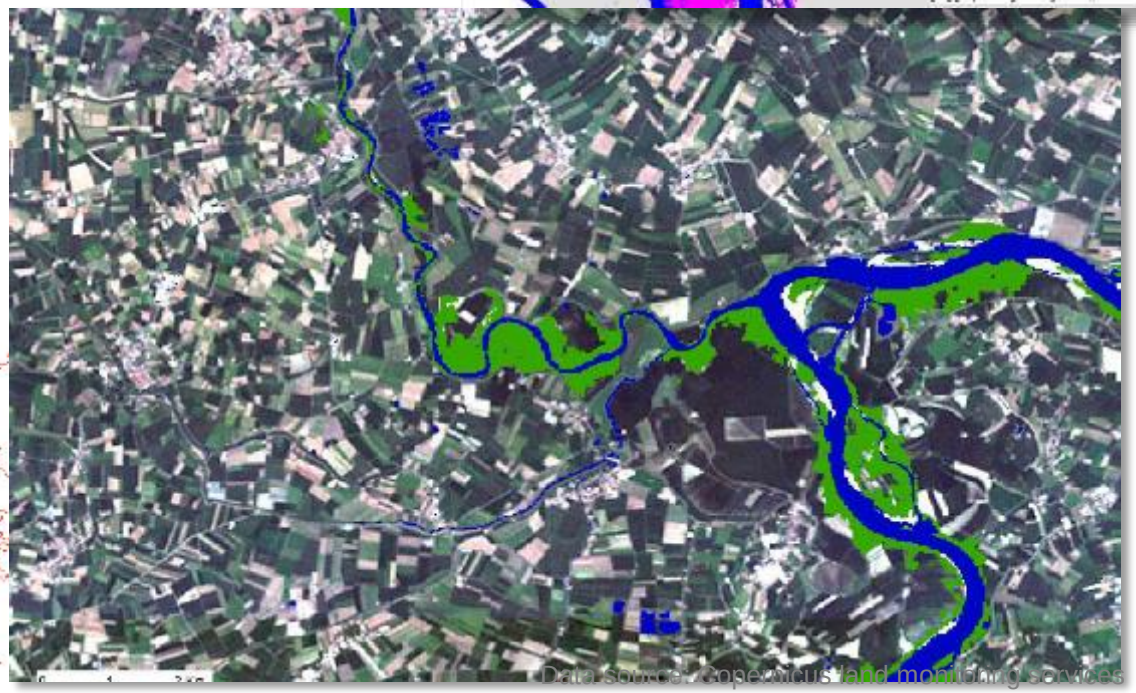
Copernicus land cover change monitoring in wetlands and riparian zones

- Regulation of water flows
- Moderation of extreme events
- Erosion prevention
- Climate regulation
- Maintenance of soil fertility
- Maintenance of life cycles of migratory species (incl. nursery service)
- Recreation
- …







Data source: Copernicus land monitoring services

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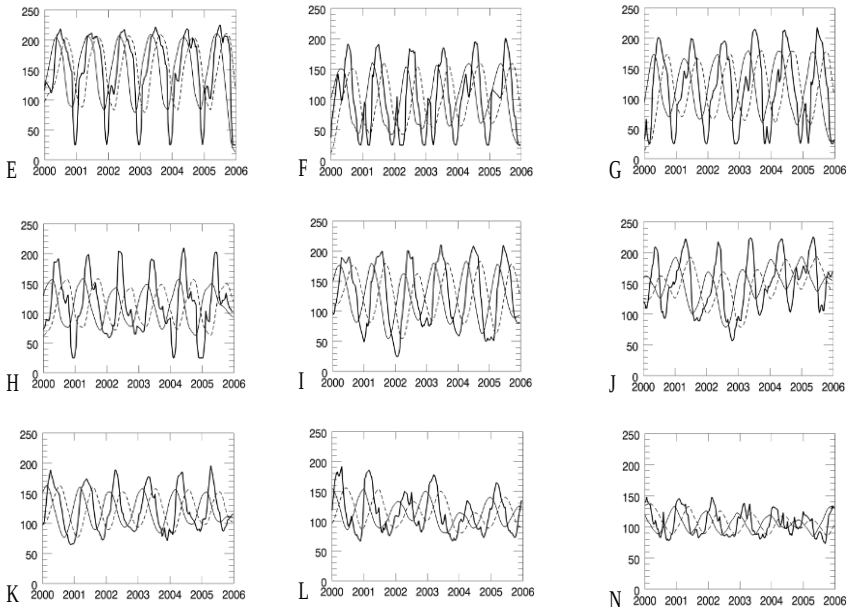
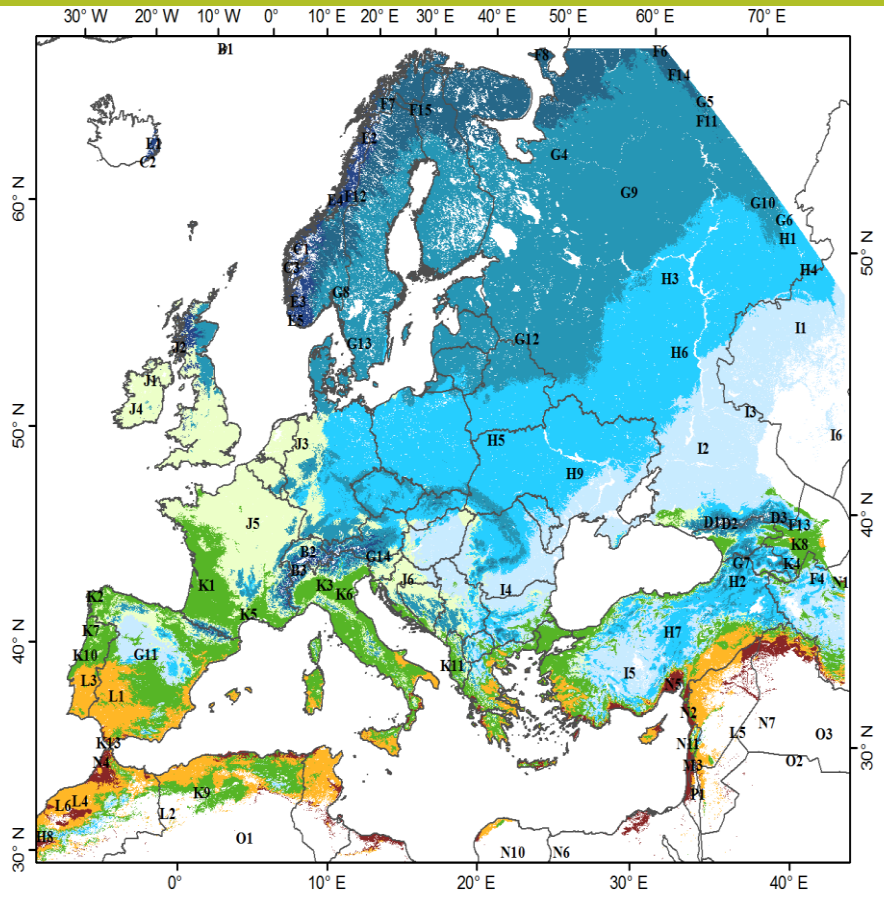
Ecosystems and land cover can be characterised based on their phenological profiles





Ecozones:

E: Cold and wet

F: Extremely cold and mesic

G: Cold and mesic

H: Cool temperate and dry

I: Cool temperate and xeric

J: Cool temperate and moist

K: Warm temperate and mesic

L: Warm temperate and xeric

N: Hot and dry

Studies showed:

- Phenology explain approx. 60 % of the variance in climatic gradients across Europe
- Phenology explain 78% of the variance in the land covers in Europe – improving land cover products?

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Conclusions

- ★ The Copernicus programme offers a long term commitment to ensure EO for environmental monitoring
- ★ The core services of the Copernicus programme provide a wealth of basic geospatial information
- ★ Copernicus becomes a valuable tool for ecosystem accounting ?

Thank you for your attention