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Satellite Applications Team

Making Earth observation an asset for territories

KRIHS - May 13, 2026

Territorial Directorate of Occitanie - Arnaud Ceyte

Satellite Applications Team

The satellite applications team of Cerema

A team committed for over 10 years to the development and promotion of satellite applications for territories.

Technical stakeholders in the space area

- CNES
- ESA
- Industrials
- Research organization
- Service providers
- SME
- ...

MISSIONS AND OBJECTIVES

Access to images

Data processing

Production of spatialized data and indicators

Copernicus AMBASSADOR

Actors in public and territorial policies

- Local authorities
- State services
- Public institutions
- Other teams within Cerema
- European organizations
- ...

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The missions

Activity typology

Data production from local to national levels

Research & Development
New data processing algorithms, methodologies for emerging professional data, integration of satellite/drone/Lidar data, etc.

Operational services integrated with other Cerema teams

Raise awareness and train on the use of satellite data for projects and public policies

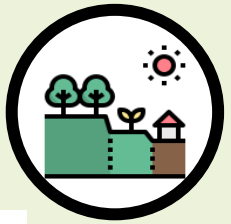
FOR WHOM ?

- Project R&D funders (CNES, European Union…)
- Local authorities
- Central government administrations
- Decentralized State services
- Other public institutions : water agencies, OFB…
- Public and private consulting firms

Fields of application

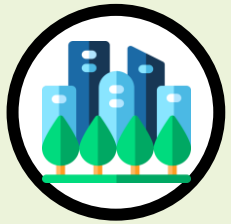
Risks : flooding, storms

Shoreline



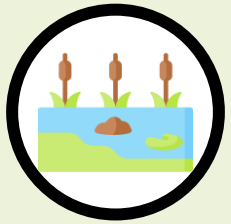
Land cover/Land use

Urban planning (parking areas, green infrastructure, and impervious surface management)



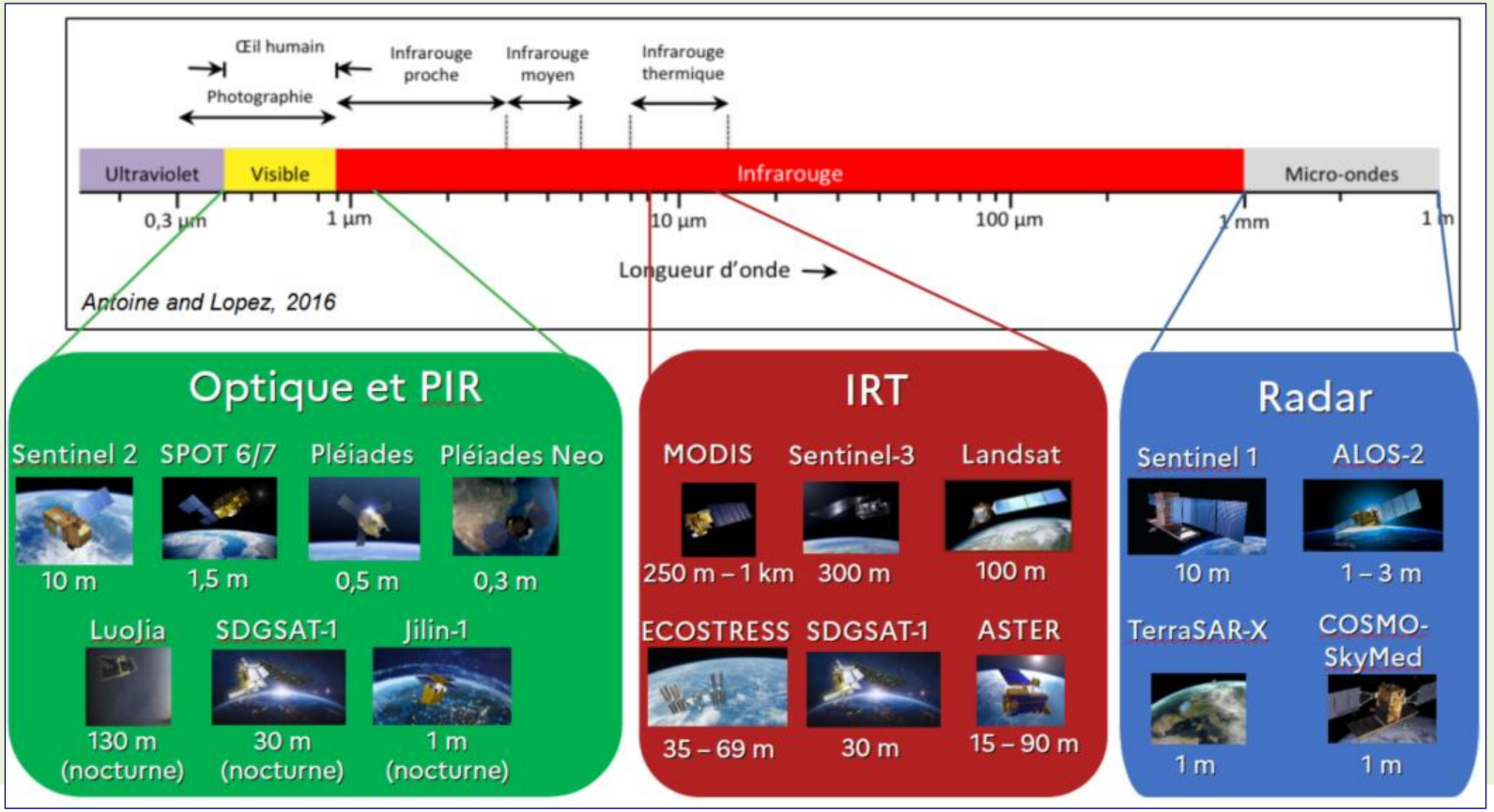
Dark ecological corridor
Light pollution

Heat Urban Island



Wetlands

Satellite data used



Green Urban Sat (SCO project)

CONTEXT

- **Greening cities:** a key lever in combating climate change, thanks to the **ecosystem services** provided by vegetation
  → Need for detailed mapping and monitoring of vegetation

- **Green Urban Sat** project objective:
  to develop a replicable method for high-resolution mapping of urban vegetation, based on very high-resolution Pléiades satellite imagery

GREEN URBAN SAT PROJECT

- Labeled and co-financed by the **Space Climate Observatory (SCO)**
- Duration : **2 years** (april 2022 - april 2024)
- Followed by additionnal development based on AI
- Partners :

Earth Observation team (Toulouse)
Urban Climate team (Nancy)

DATA

- Very high-resolution (VHR: 50cm) satellite imagery from the **Pléiades** satellite
  - → multi-temporal (2 img/year)
  - → multi-angular (stereo)

- 3D derived data (**Digital Surface Model**)

- Auxiliary data for learning and validation

Pléiades image over Nancy, 2022

DATATERRA DINAMIS

DINAMIS: a tool to access to VHR images at low prices (e.g: 1,80€/km² for new acquisition of Pléiades images)

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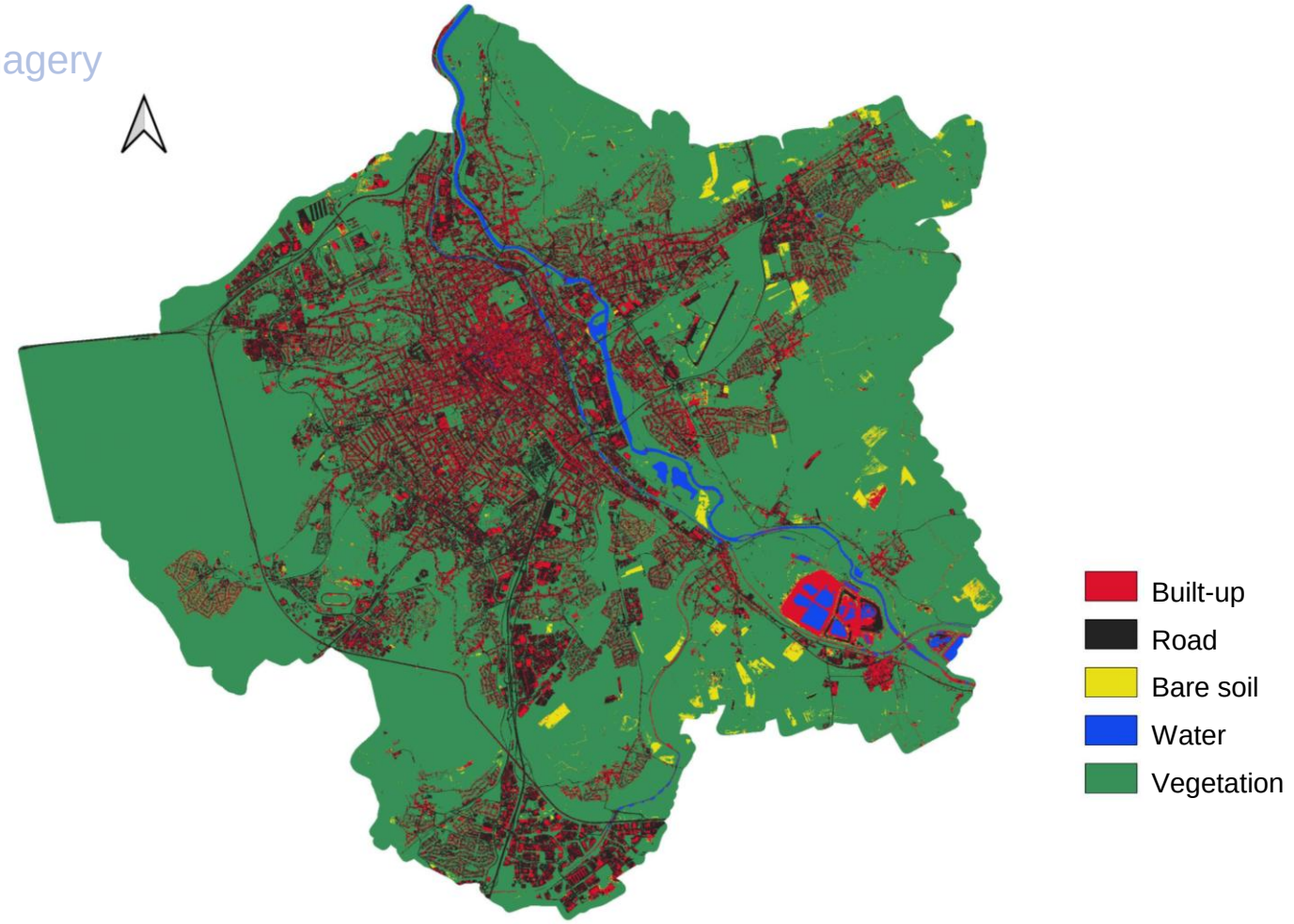
METHODOLOGY

1 Vegetation extraction

Supervised classification on Pléiades imagery



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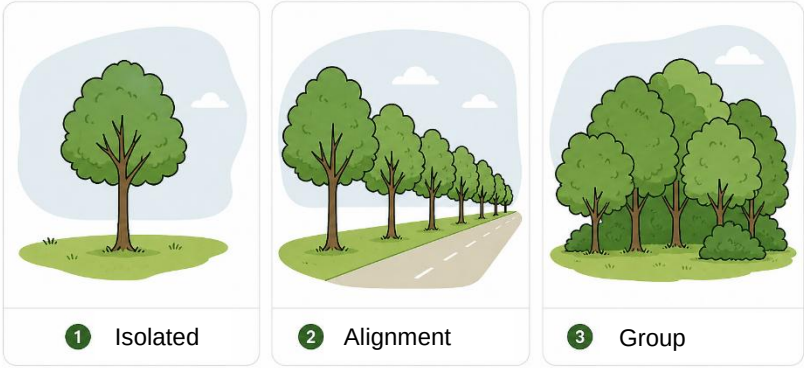

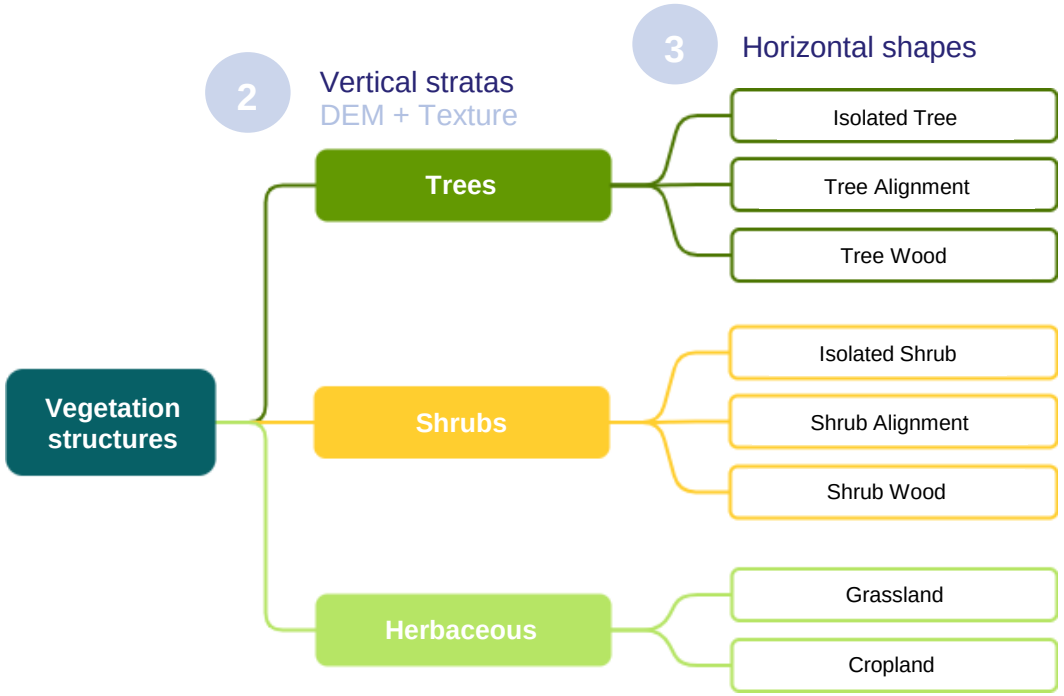

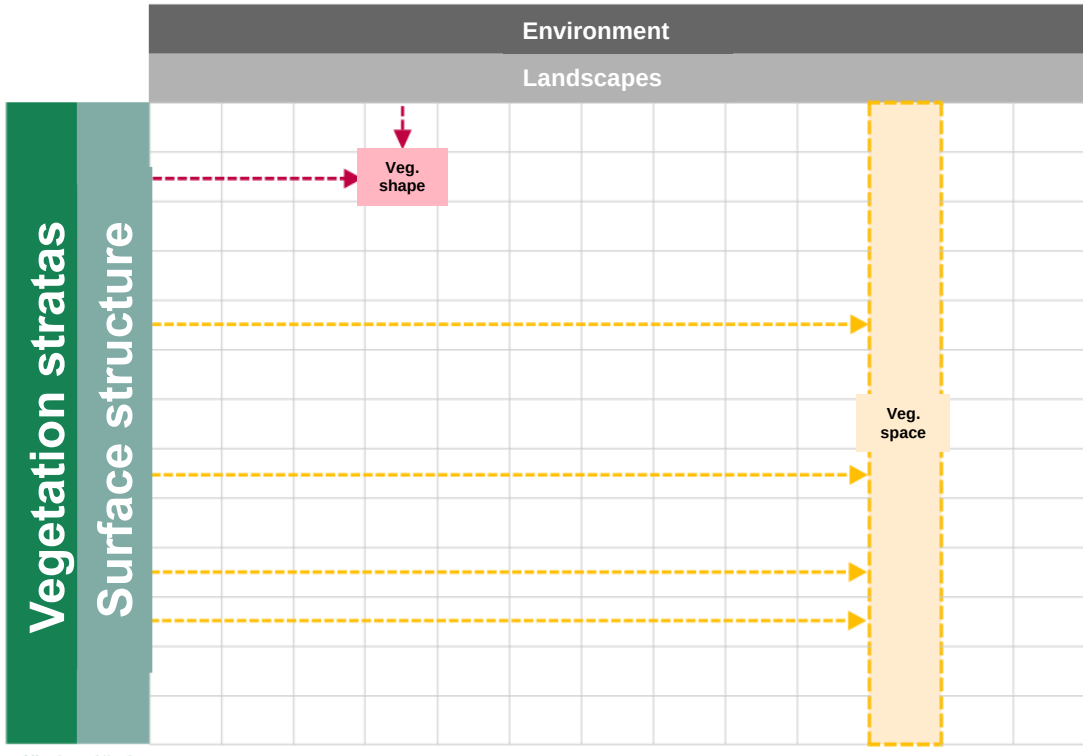

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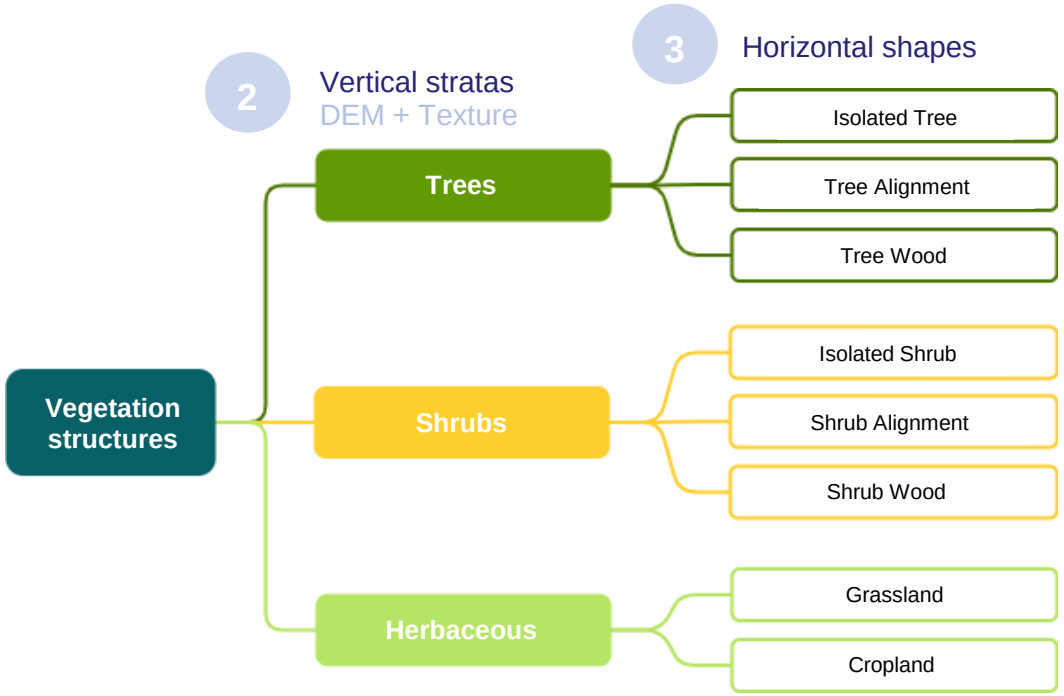
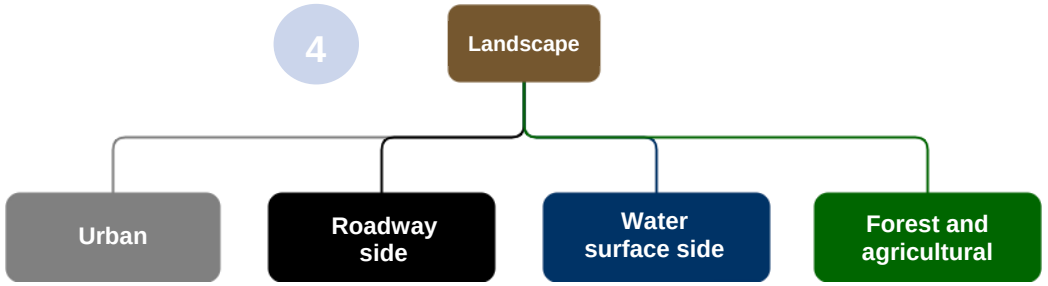
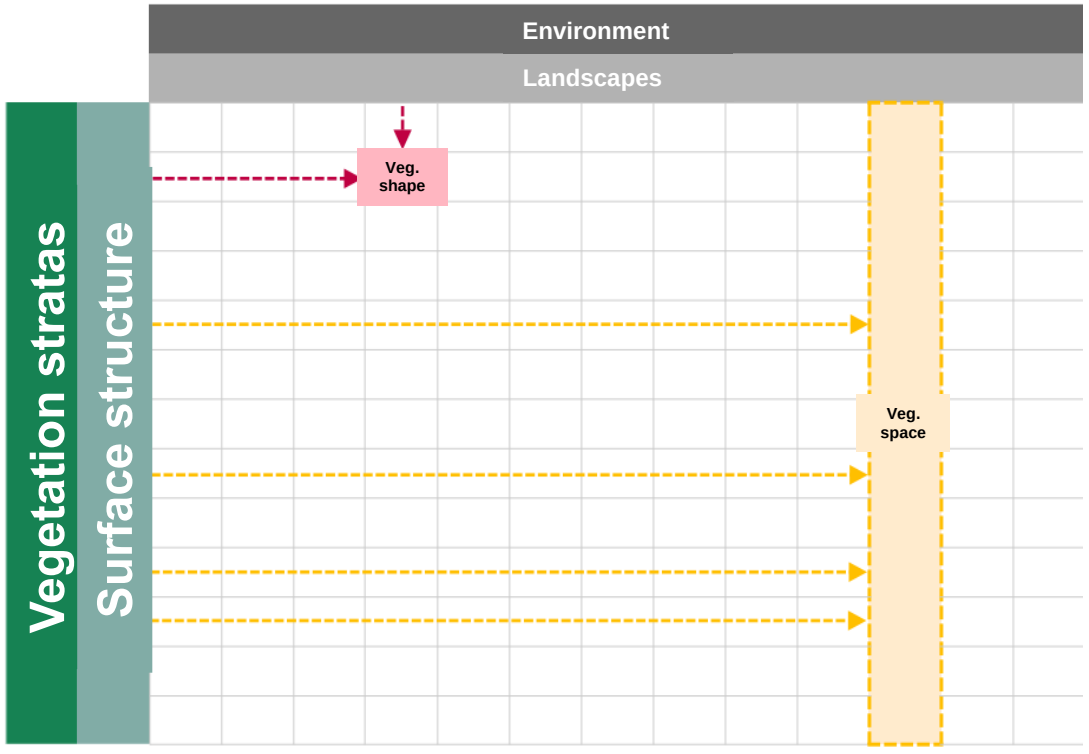




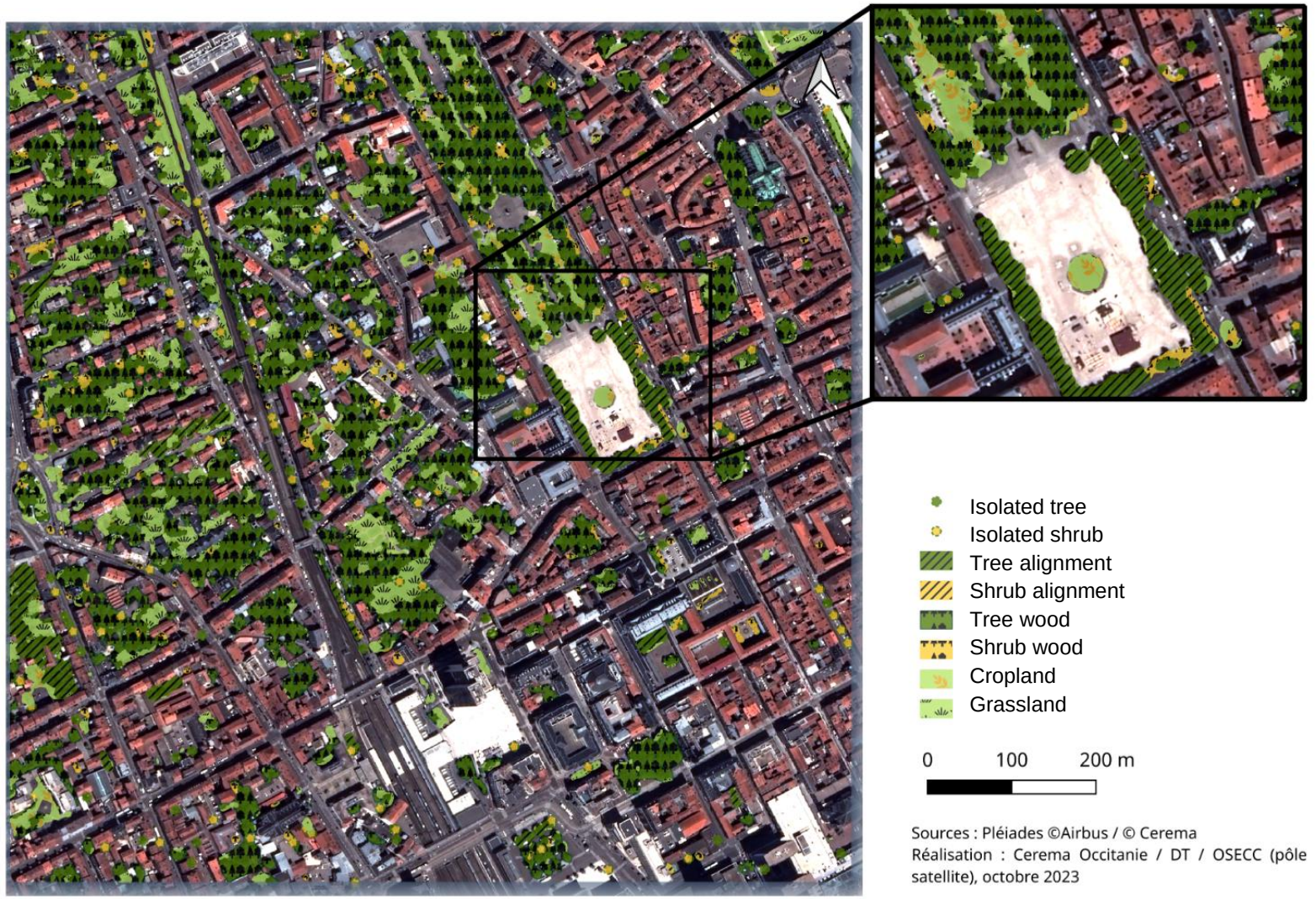


5 VEGETATION DESCRIPTIVE CHARACTERISTICS

Vegetation morphology	Vegetation cover	Vegetation soil	Landscape
• Vertical strata • Vegetation shape • Surface • Height and statistics (mean, median, std, min, max) • Canopy volume • Surface density • Trunk mean diameter	• % deciduous/evergreen • % broadleaf/needleleaf • Seasonality • Species • LAI • Health status	• Soil type (vegetated or not) • Humidity rate	• Level 1 (urban, roadway side, water surface side, agricultural and forest)

RESULTS

Vector GIS layer



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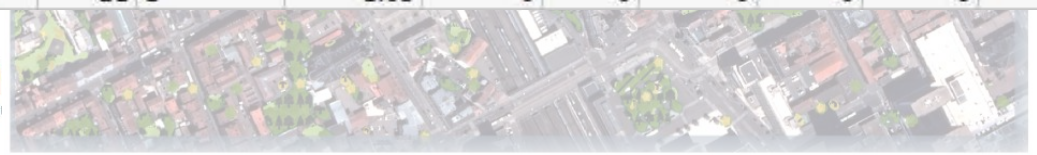
RESULTS

Descriptive characteristics

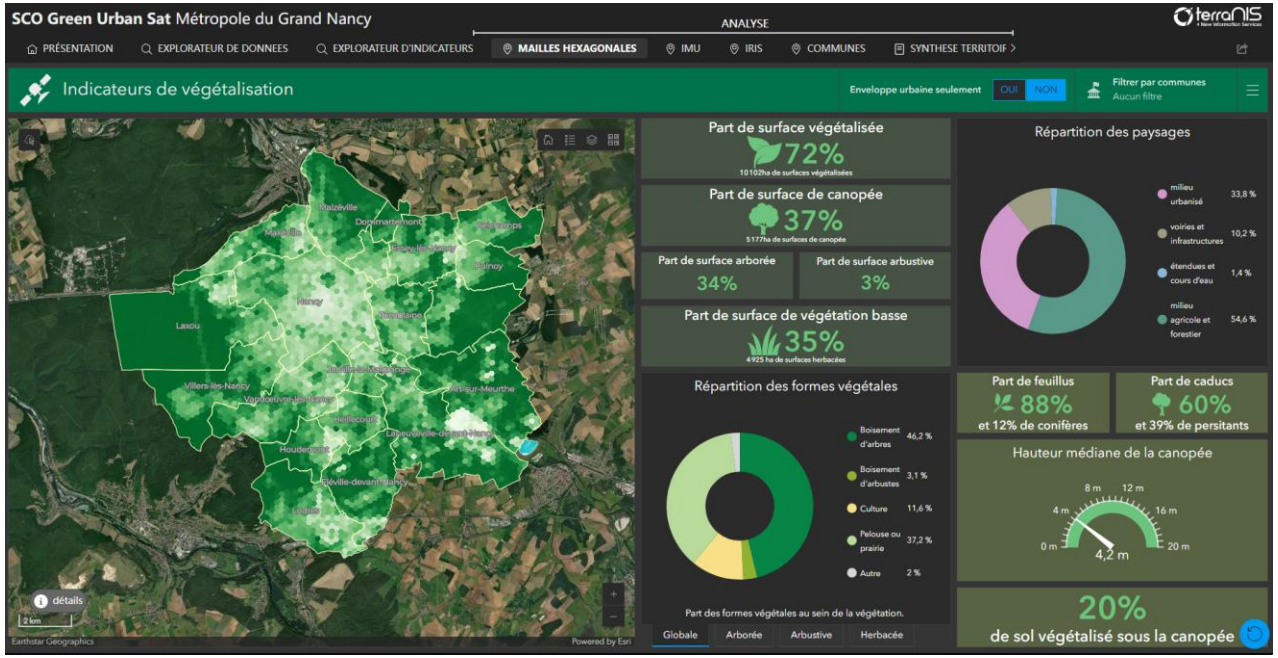
fid	strate	fv	fv_r	paysage	surface	h_moy	h_med	h_et	h_max	h_min	perc_persistant	perc_caduc	perc_conifere	perc_feuillu	type_sol
52	Au	Aul	21	1	8.19	0.92	0.98	0.67	2.52	0	100	0	5.88	94.12	surface non vegetalisee
53	Au	Aul	21	1	3.28	1.05	0.83	0.68	2.66	0	100	0	0	100	surface non vegetalisee
54	Au	Aul	21	1	1.66	0.84	0.89	0.19	1.12	0.57	100	0	0	100	surface non vegetalisee
55	A	Al	11	1	4.22	4.12	4.17	0.42	4.93	3.22	100	0	100	0	
56	Au	Aul	21	4	7.19	0	0	0	0.03	0	86.67	13.33	0	100	surface non vegetalisee
57	Au	Aul	21	1	12.88	2.35	2.42	0.69	3.35	0.9	100	0	0	100	surface non vegetalisee
58	Au	Aul	21	2	1.88	0.01	0	0.01	0.03	0	100	0	0	100	surface non vegetalisee
59	Au	Aul	21	2	4.16	0.01	0	0.02	0.05	0	100	0	0	100	surface non vegetalisee
60	Au	Aul	21	1	1.25	1.95	1.76	0.75	3.13	0.85	100	0	100	0	
61	A	Al	11	1	1.94	9.57	8.89	2.33	14.08	6.88	100	0	0	100	surface non vegetalisee
62	A	Al	11	1	2.28	3.23	3.16	0.59	4.24	2.4	100	0	0	100	surface non vegetalisee
63	A	Al	11	1	13.5	1.51	1.26	0.69	3.85	0.81	96.3	3.7	14.81	85.19	surface non vegetalisee
64	Au	Aul	21	1	1.03	0	0	0	0	0	100	0	0	100	surface non



Sources : Pléiades ©Airbus / © Cerema
Réalisation : Cerema Occitanie / DT / OSECC (pôle satellite), octobre 2023

DELIVERABLES

- **Vector SIG layer** over **Greater Nancy**:
  - ➢ Integrated into Green City portal (TerraNIS) https://greencity.terranis.fr/sco_gus_public
  - ➢ Dashboards at various scales
  - ➢ WMS flux



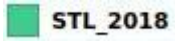
- **Code**: https://github.com/CEREMA/dterocc.sco.gus

- **Final Report**:

https://doc.cerema.fr/Default/doc/SYRACUSE/600057/green-urban-sat-rapport-de-synthese-du-projet

CONTRIBUTION OF GREEN URBAN SAT (GUS)

- **Copernicus : Street Tree Layer (STL)** et **High Resolution Layer (HRL)**



HRL Tree Cover Density (%)

HRL Grasslands

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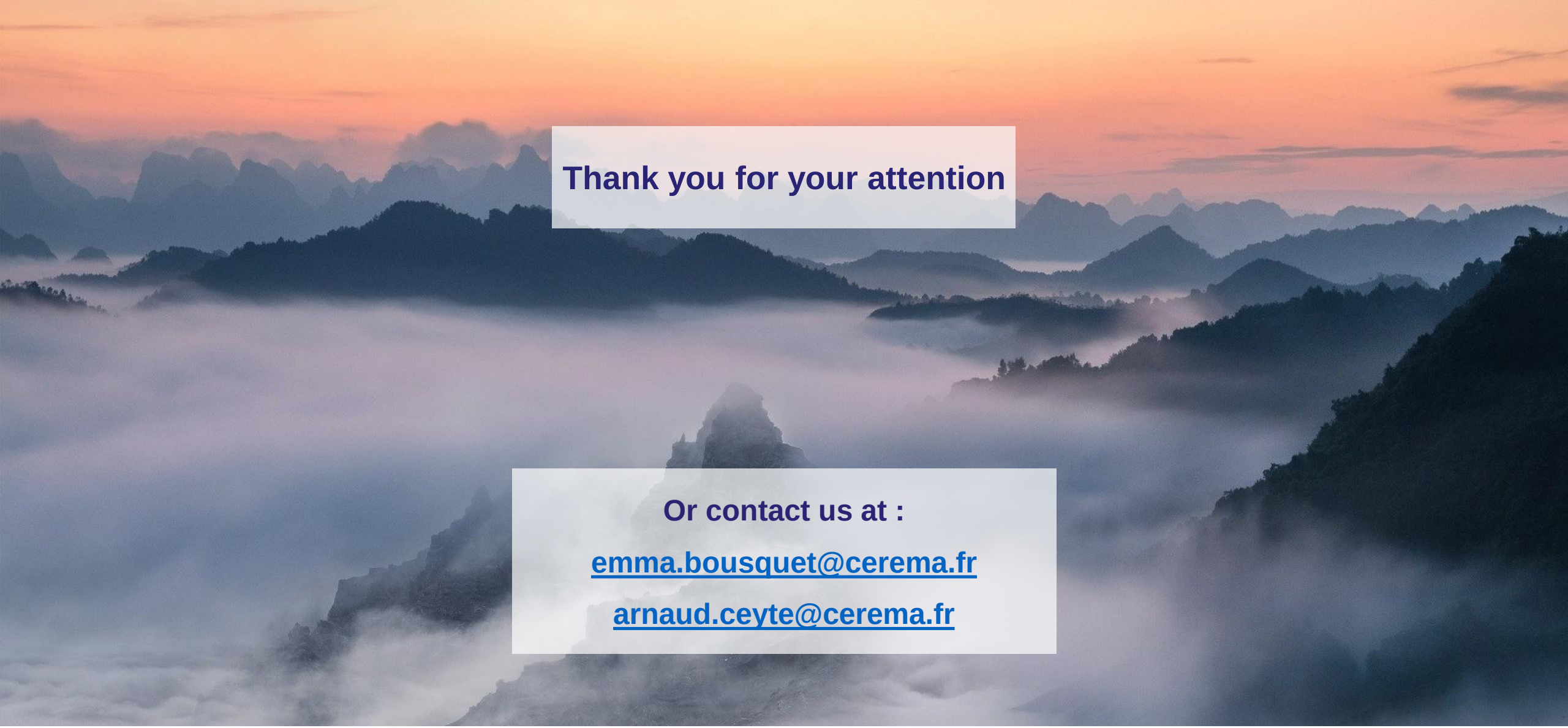

Thank you for your attention

Or contact us at :

emma.bousquet@cerema.fr

arnaud.ceyte@cerema.fr

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