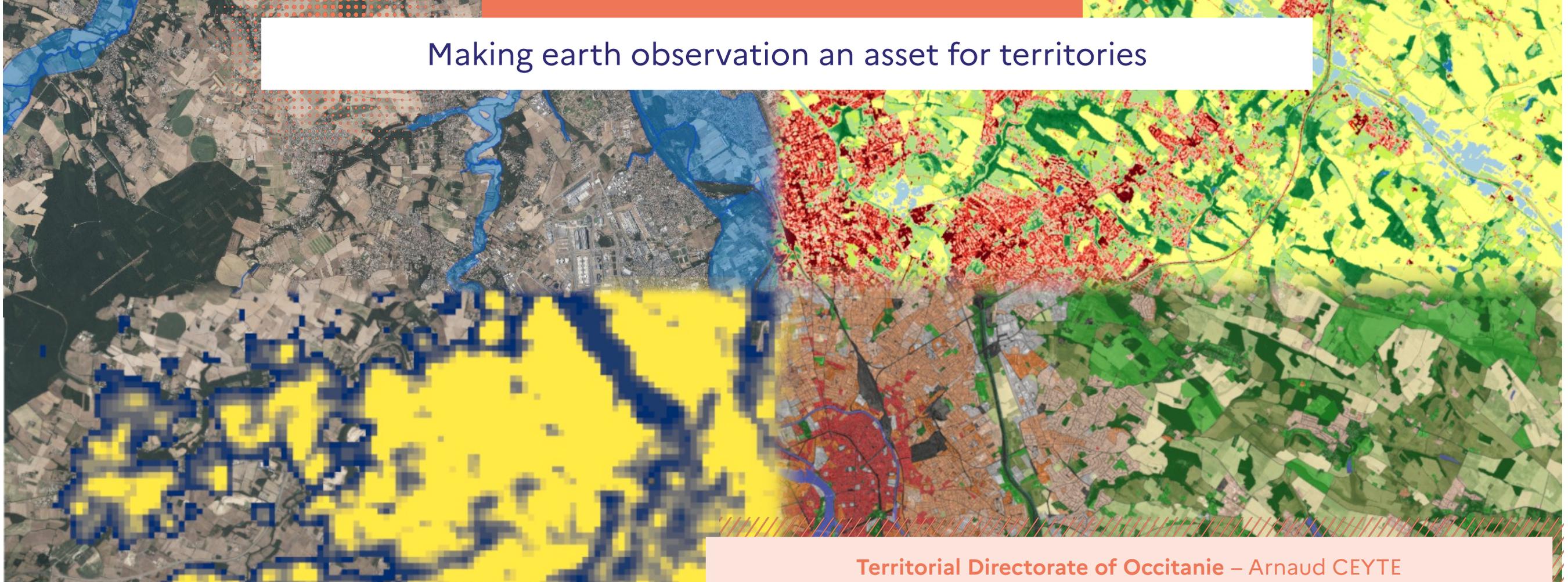# Satellite Applications Team

Making earth observation an asset for territories

Territorial Directorate of Occitanie – Arnaud CEYTE

The satellite applications team of Cerema

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

MISSIONS AND OBJECTIVES

Technical stakeholders in the space area
- CNES
- ESA
- Industrials
- Research organization
- Service providers
- SME
- …

Access to images

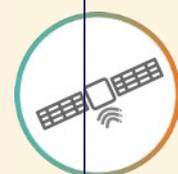Data processing

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
- …

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Cerema
CLIMAT & TERRITOIRES DE DEMAIN

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
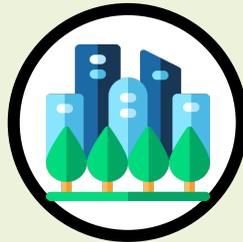
Risks : flooding, storms

Shoreline

Land cover/Land use

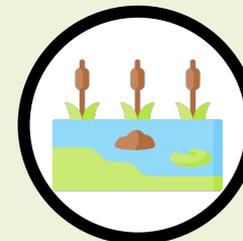Urban planning (parking areas, green infrastructure, and impervious surface management)
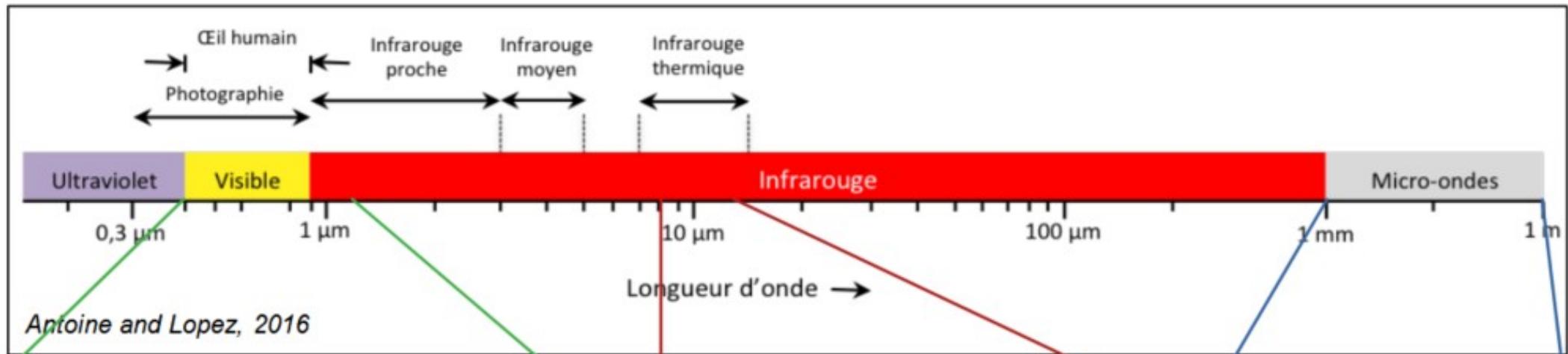
Dark ecological corridor Light pollution

Heat Urban Island

Wetlands

Antoine and Lopez, 2016

Examples of use cases

Urban heat island diagnosis: national mapping of Local Climate Zone (LCZ)

- **Co-funding from the Ministry responsible for Ecology**

- A **free pre-diagnosis service** for the vulnerability of cities to heatwaves (a dataset which is part of the French national 3rd Adaptation roadmap)

- Service covering *12 000* french municipalities,

  44 millions inhabitants,

  88 biggest urban areas

- **Widespread media coverage** in summer 2025 (over 60 press articles accross French media...)

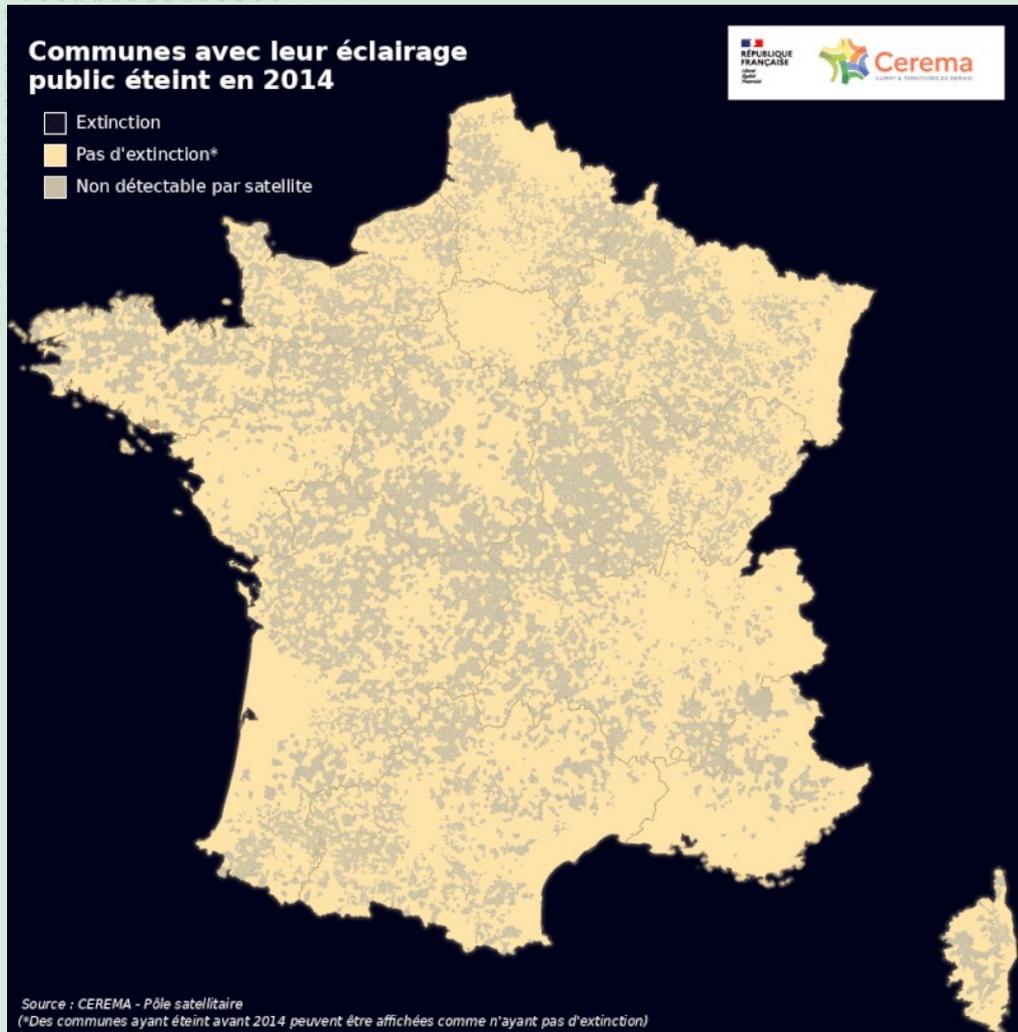- Data used: national cover of SPOT-6/7 2022 (DINAMIS), Urban Atlas 2018, IGN data
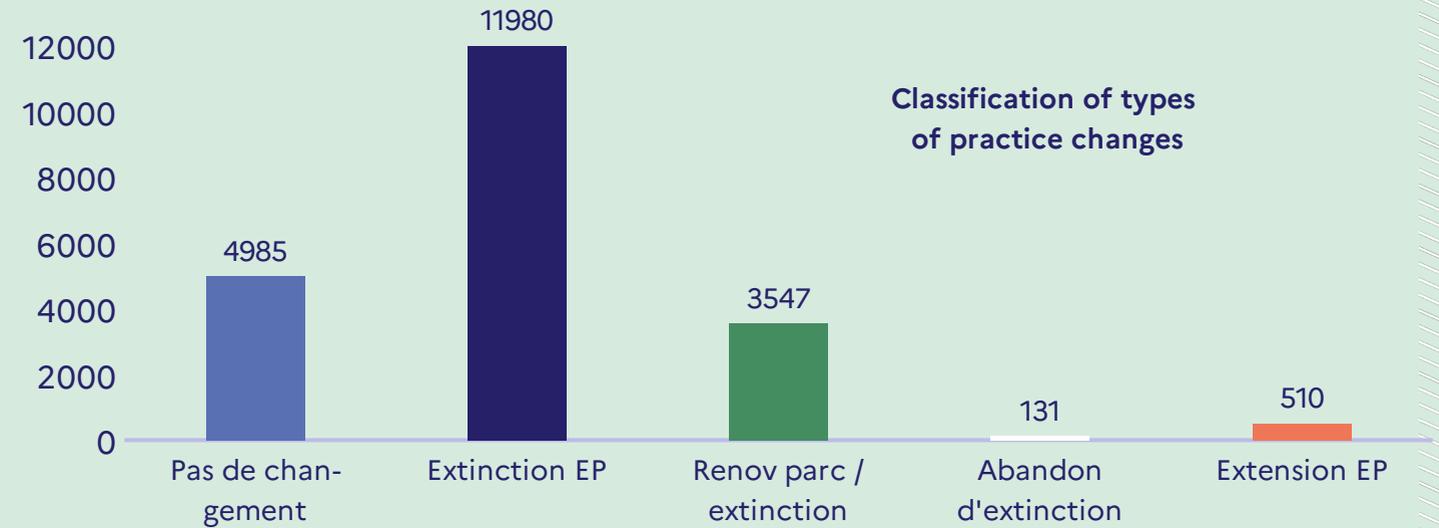

Webmapping tool: *https://bit.ly/plateforme-LCZ*
Available in open data:
https://www.data.gouv.fr/fr/datasets/6641c562e5acdb35c0e6051d/
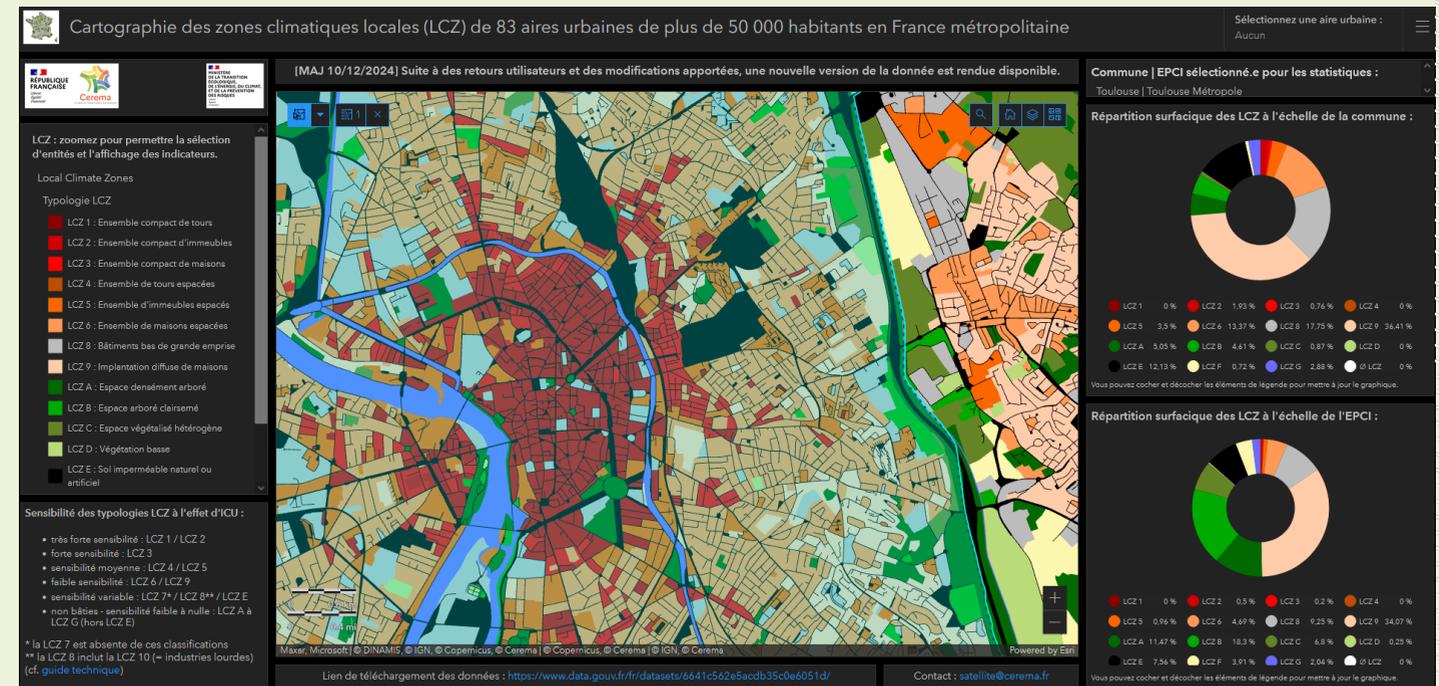
National monitoring of nighttime light switch-offs

Communes avec leur éclairage public éteint en 2014

☐ Extinction
■ Pas d'extinction*
■ Non détectable par satellite

Source : CEREMA - Pôle satellitaire
(*Des communes ayant éteint avant 2014 peuvent être affichées comme n'ayant pas d'extinction)

- A temporal monotoring of nighttime lighting at the municipal level (VIIRS/NASA data)

- 10 years of status on lighting practices in over 19 000 municipalities

- Requires a **combination of expertise from Cerema**: remote sensing, nighttime lighting, road safety

- An interactive map to visualize lighting practice changes in city during nighttime between 2014 and 2024

- Publication this summer, nearly **350 000 views on LinkedIn and international impact**

Webmapping tool: *https://urls.fr/vDOwGc*
Available in open data:
https://www.data.gouv.fr/datasets/cartographie-nationale-des-pratiques-declairage-nocturne/

Classification of types of practice changes

4985	11980	3547	131	510
Pas de chan-gement	Extinction EP	Renov parc / extinction	Abandon d'extinction	Extension EP

Urban vegetation: Green Urban Sat

- SCO project finished in 2024

- Development of a **detailed mapping** method for **urban vegetation**

- Demonstrator operational in Nancy (France) : https://experience.arcgis.com/experience/26491e66b93f48d9a20a5be57d9ff8ec/

- **Method replicable** to other territories
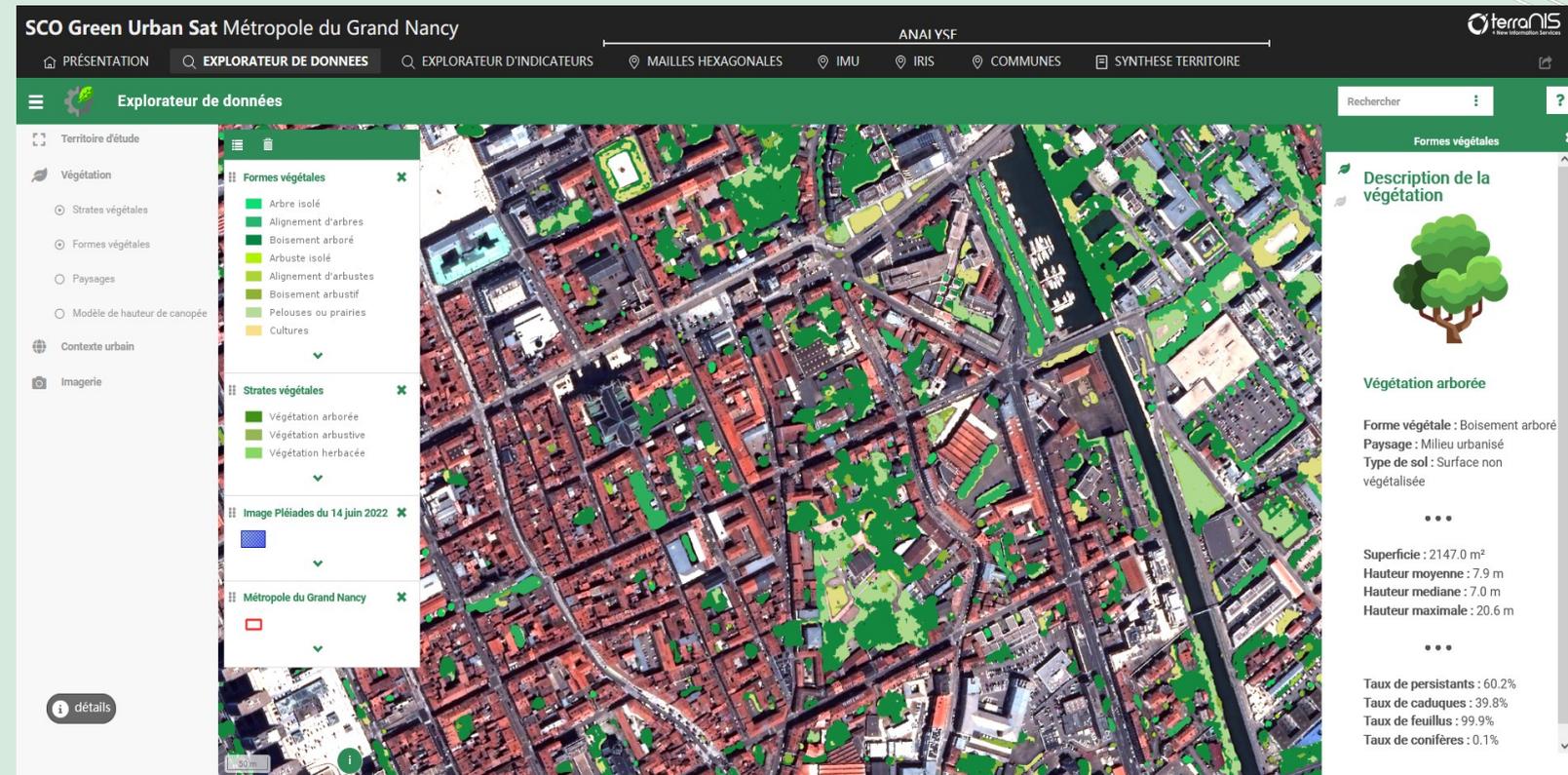
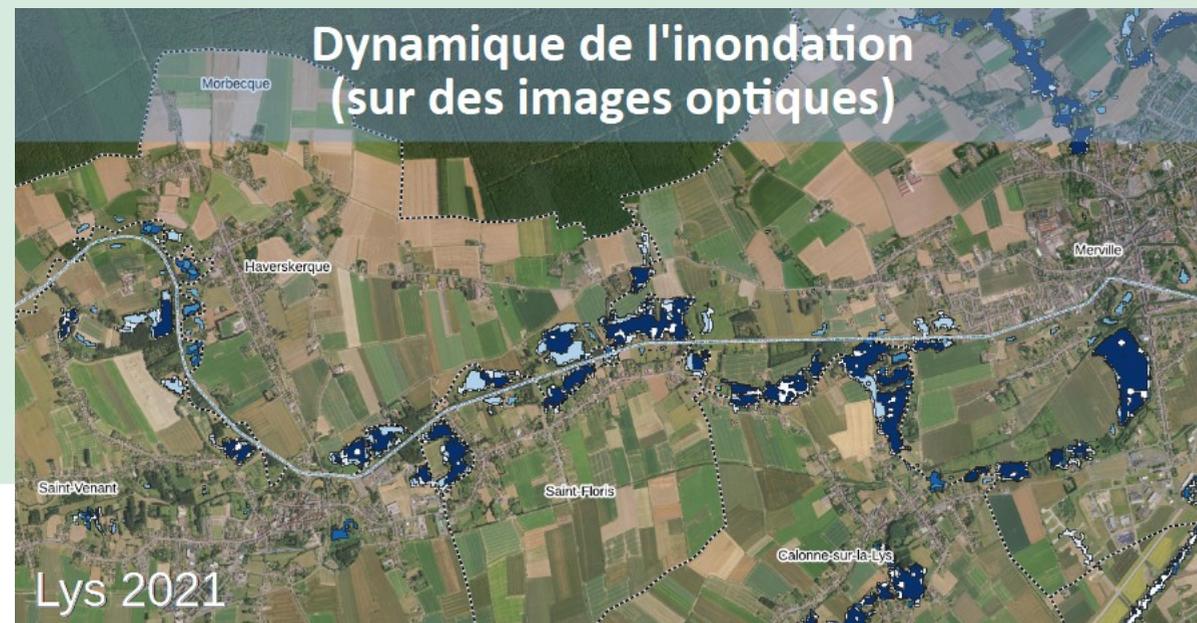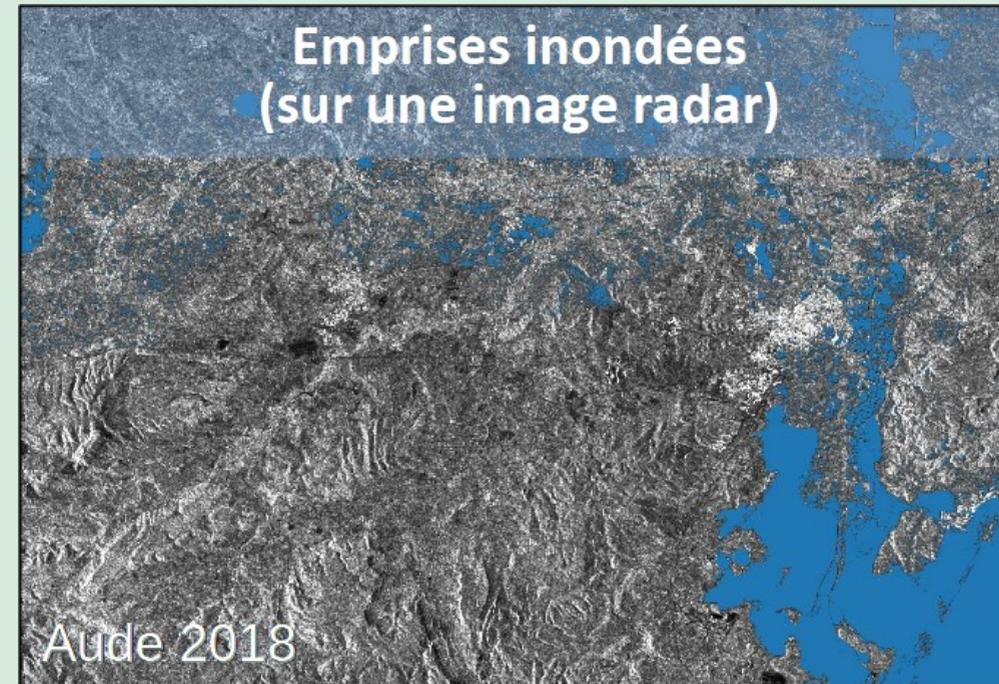# Floods: mapping of flooded areas

Emprise inondée lors de la crue
du Var de juin 2010.
Zoom en aval de Draguignan.

Limites communales
La Nartuby
Emprise inondée

Sources : Cerema Sud-Ouest DALETT - BD Ortho® et BD Topo® IGN
Réalisation : Cerema Sud-Ouest DALETT - Septembre 2019

Emprises inondées
(sur une image radar)

Aude 2018

Dynamique de l'inondation
(sur des images optiques)

Lys 2021
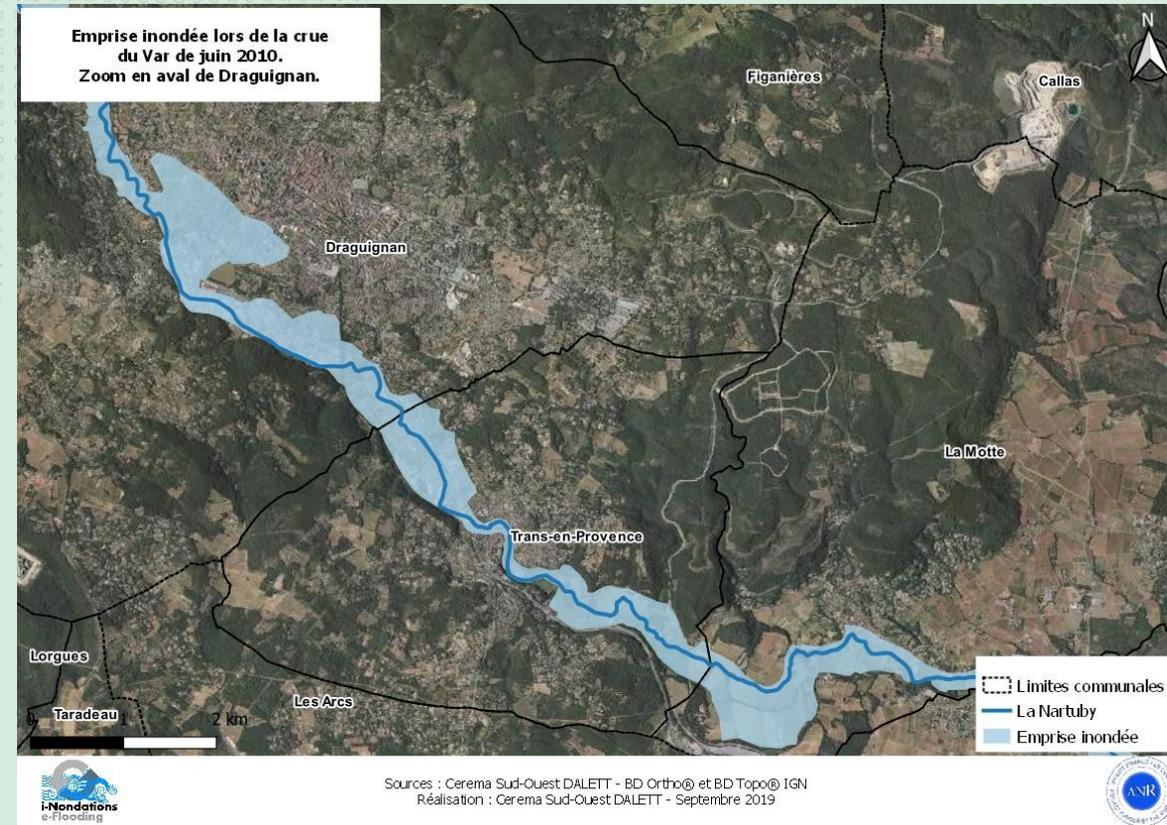
- Use of optical and radar satellite images
- Automated processing
- Development of a QGIS CartEau plugin

Floods: Pléiades4UrbanFlood

Context:

Climate change

Growing urbanization

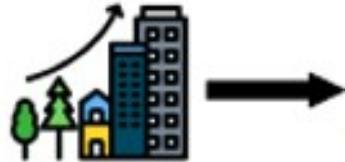- **increase in surface runoff**
- **Increase in risk of flooding**

Pléiades4UrbanFlood project

An **innovative approach combining satellite observation** (land cover) and modeling to assess **flood hazard** using Pléiades imagery. The study conducted in the municipality of Grabels demonstrates the potential, accuracy, and international replicability of this method.

SCO
SPACE FOR CLIMATE OBSERVATORY

- Challenge of the Pléiades4UrbanFlood project: integrating satellite data as input for modelling tools

- Use of high-resolution monoscopic satellite images to analyze the spatio-temporal evolution of flood hazard (water height and flow speed), particularly in urban areas

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Cerema
CLIMAT & TERRITOIRES DE DEMAIN

Better understand post-disaster reconstruction management strategies

- Project Relev: **reconstruction** of the islands of Saint Martin and Saint Barthelemy **following hurricanes** Irma and Maria in Sept 2017

- Cofunded by the French Nationale Research Agency

- Use of satellite images:
  - Land cover
  - Shoreline evolution
  - Impact on vegetation
  - Impact on buildings

Dégâts sur les résidences de Baie Nettlé, à St-Martin, suite au passage de l'ouragan Irma en septembre 2017

Pléiades, avant Irma (10/03/2017)

Pléiades, 3 mois après Irma (15/12/2017)

0   100   200 m

Réalisation : Cerema, août 2020
Sources : Pléiades © CNES, IGN - Distribution Airbus DS

Coastline: coastline mapping of the Occitanie region

- Mapping of the intermediate limit of the shore jet using Pléiades imagery

- 1 à 2 acquisitions/year since 2014 (end of winter or end of summer)

- Data available as opendata

Thank you for your attention

satellite@cerema.fr   arnaud.ceyte@cerema.fr

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Cerema
CLIMAT & TERRITOIRES DE DEMAIN

Applisat
Communauté du satellitaire

https://www.applisat.fr/