



Products and services of the "Urban" THEIA Scientific expertise Centre

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PRODUCTS AND SERVICES OF THE "URBAN" THEIA SCIENTIFIC EXPERTISE CENTRE

1. LIVE, CNRS/Univ. Strasbourg, Strasbourg, France.
2. ESPACE-Dev / IRD, Montpellier, France
3. TETIS, CNRS/INRAE, Montpellier, France
4. ESPACE, CNRS/Univ. Aix-Marseille, France.
5. LASTIG, CNRS/Univ. Paris-Est, IGN, ENSG, Saint-Mandé, France.

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BACKGROUND and OBJECTIVES

The THEIA data and services centre (www.theia-land.fr) is a consortium of 10 French public institutions (CEA, CEREMA, CIRAD, CNES, IGN, INRAE, CNRS, IRD, Météo France, and ONERA) designed to foster the use of Earth Observations data for environmental studies.

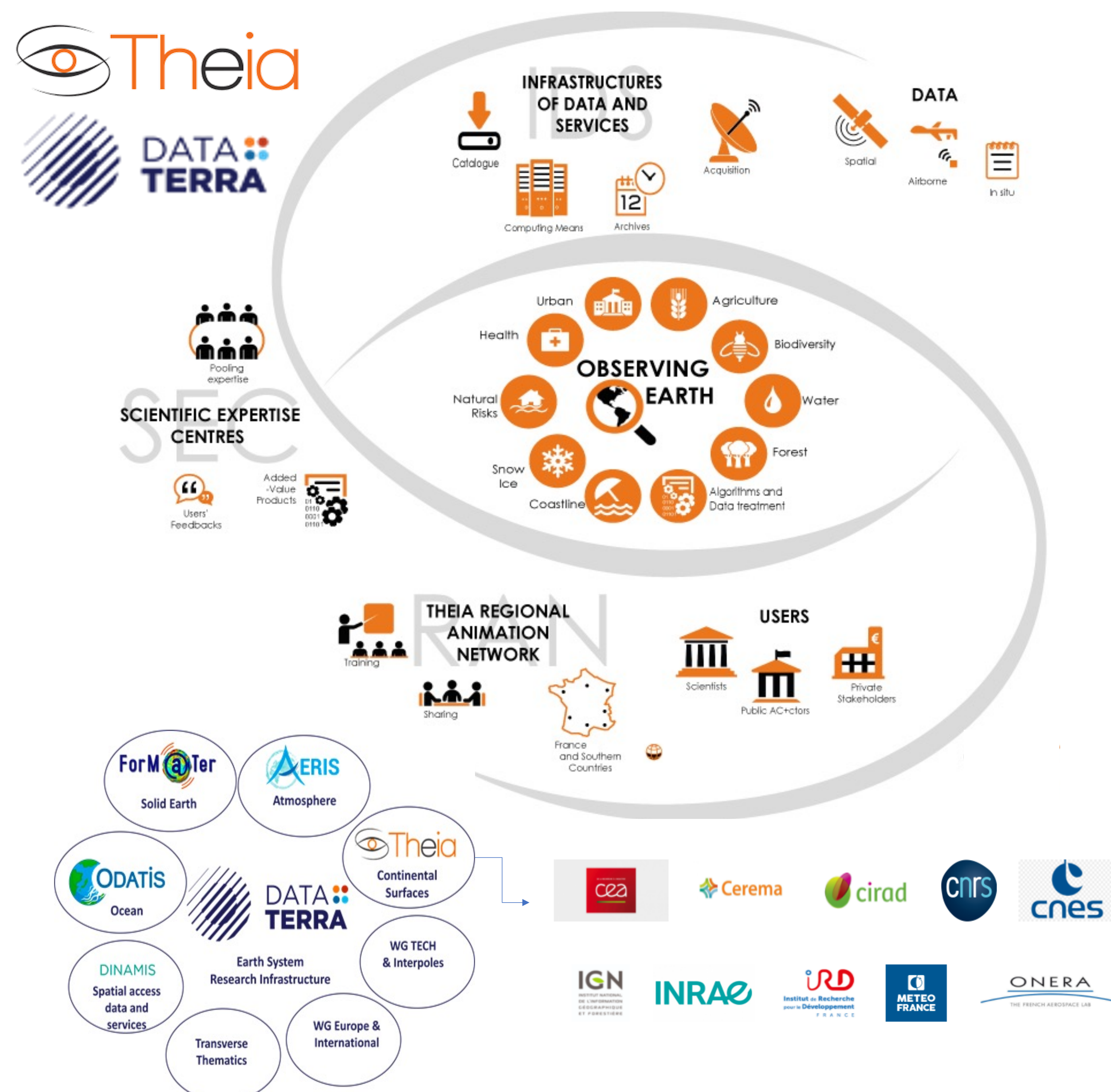
It was created in 2012 with the objective of increasing the use of space data in complementarity with in-situ and airborne data by the scientific community and the public actors.

The first five years have made it possible to structure the national science and user communities, pool resources, facilitate access to data and processing capacities, federate various previously independent initiatives, and disseminate the French achievements on a national and international scale. Dissemination and training activities targeting users in other countries have since been developed.

THEIA is structuring the science community through:

- 1) **a mutualized Service and Data Infrastructure (SDI)** distributed between several centers, allowing access to a variety of products;
- 2) **Scientific Expertise Centres (SEC)** to provide the community with tools and treatment methods adapted to different thematic fields;
- 3) **the setup of Regional Animation Networks (RAN)** to federate users (scientists and public / private actors).

THEIA is a part of the "Earth System" Research Infrastructure DATA TERRA with ODATIS (Ocean Data and Service), ForM@Ter (Solid Earth Data and Services) and AERIS (Atmospheric Data and Services).



ACTIVITIES OF THE URBAN SCIENTIFIC EXPERTISE CENTRE



The "Urban" SEC brings together teams from several research laboratories in France that carry out research and develop innovative data processing methods for **urban remote sensing** using optical and SAR sensors. They are working on validation of the urban products provided by the THEIA SDI, and try to demonstrate user-tailored applications.

... towards a portfolio of complementary urban products

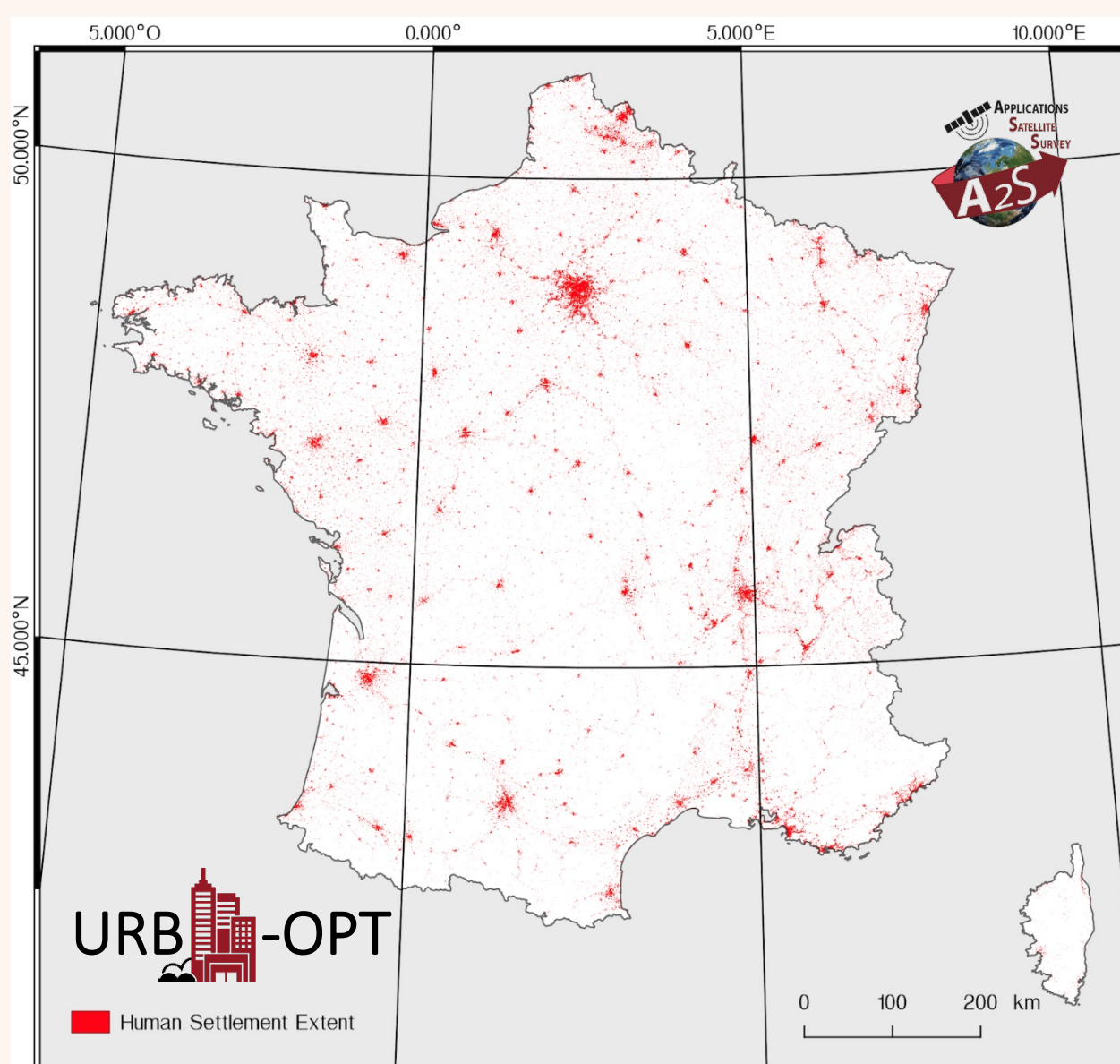
... for users of several communities (scientific, final users, students)

Urban footprint France (10m)



Mapping urban footprint with machine learning algorithm based on object-oriented approach and **multi-temporal S2**

(<http://a2s-platform.unistra.fr>)



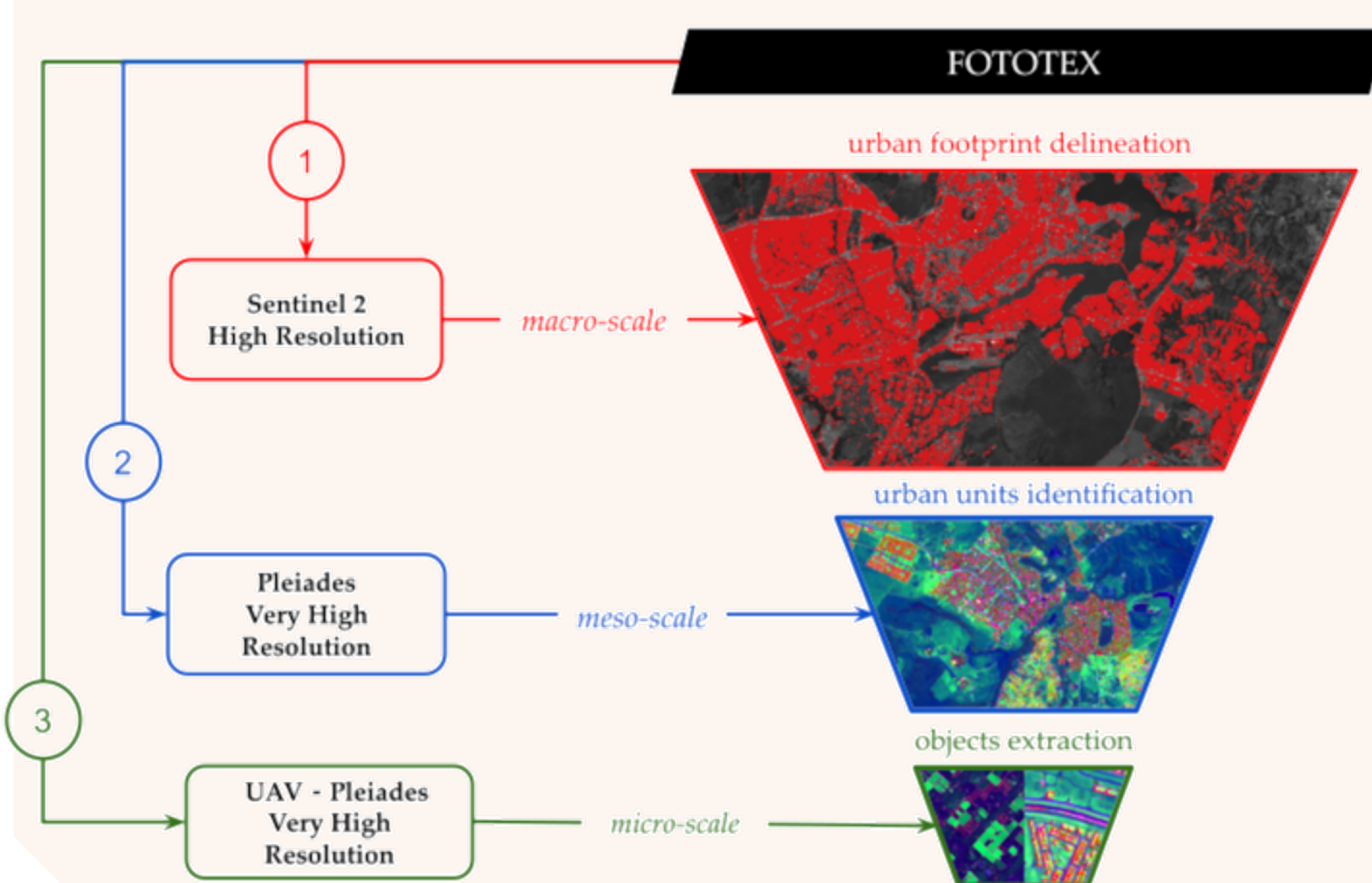
2018 / 2019 / 2020 / 2021 (production based on HRL-Imperviousness for training data sets)

On-demand production by A2S for any adaptation to area of interest (based on 'user' training datasets)

Urban mapping adapted to South Cities



Mapping urban footprint with textural approach at several scales



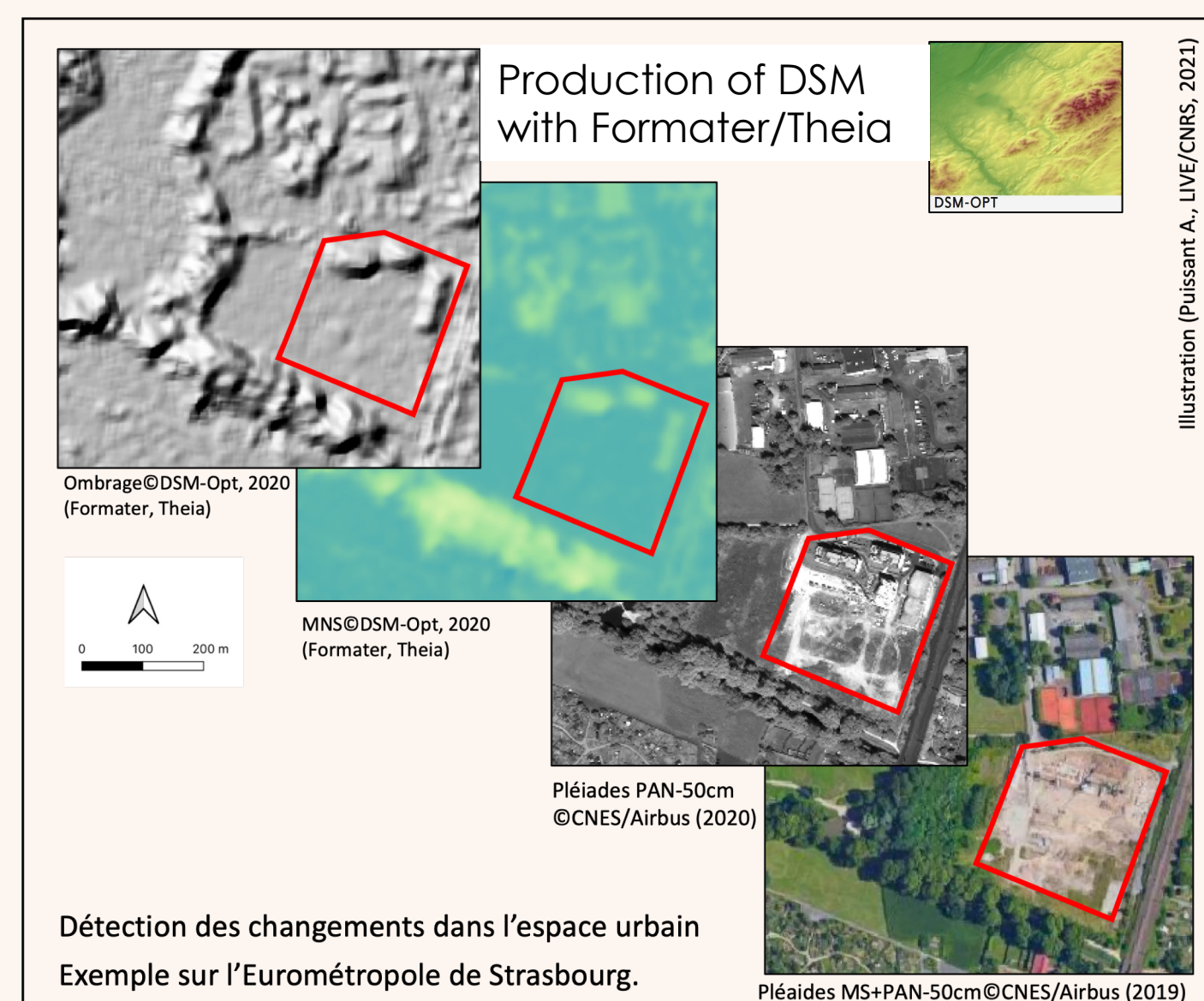
Ongoing Research

Teillet et al., Remote Sensing, 2022

Urban Change Detection



Monitoring urban building changes with machine learning algorithm based on tri-stereo **Pleiades** imagery



Ongoing Research

Bressant et al., poster LPS 2022 (Tosca-CNES)

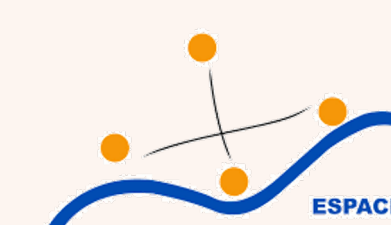
Building footprint France (1.5 m)



Mapping urban buildings with semantic segmentation of **Spot 6/7 images** using deep convolutional neural networks



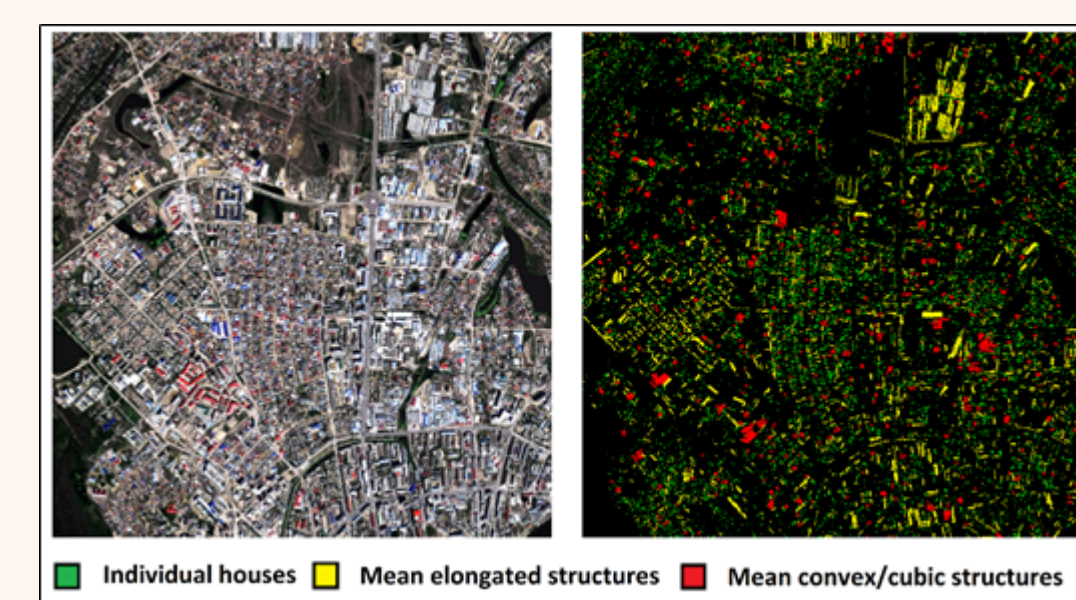
2016 / 2017 / 2018 / 2019 (production based on BD Topo for training datasets)



Ongoing Research

(Gadal, Ouerguemmi, 2019)

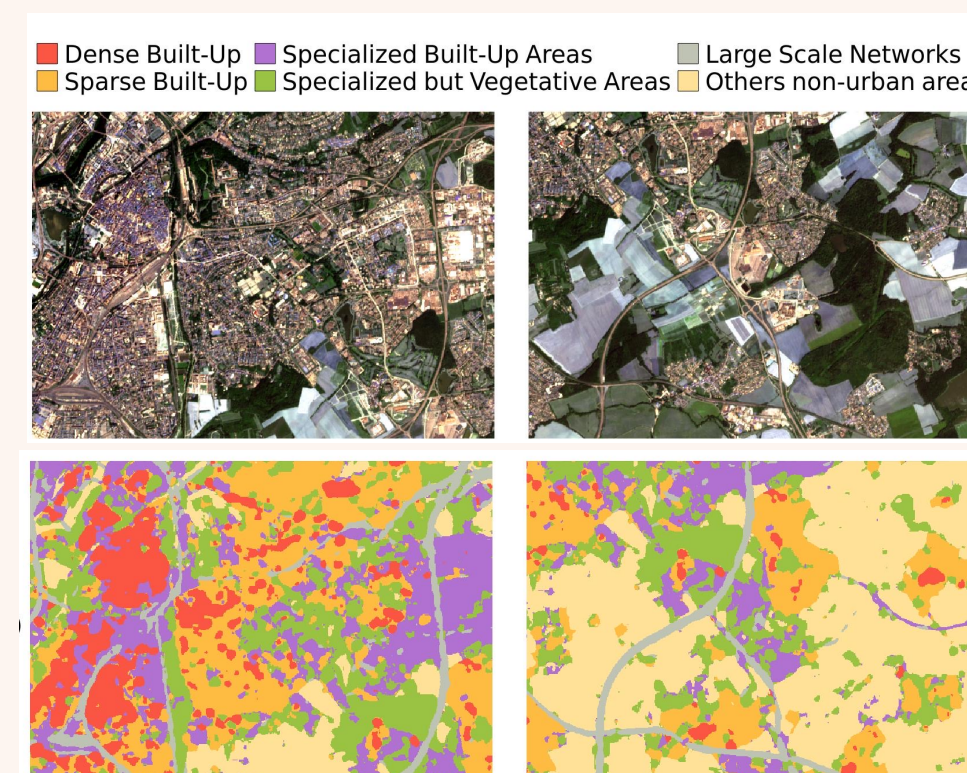
Semantic enrichment of building on Arctic Cities



Urban fabric mapping (10m)



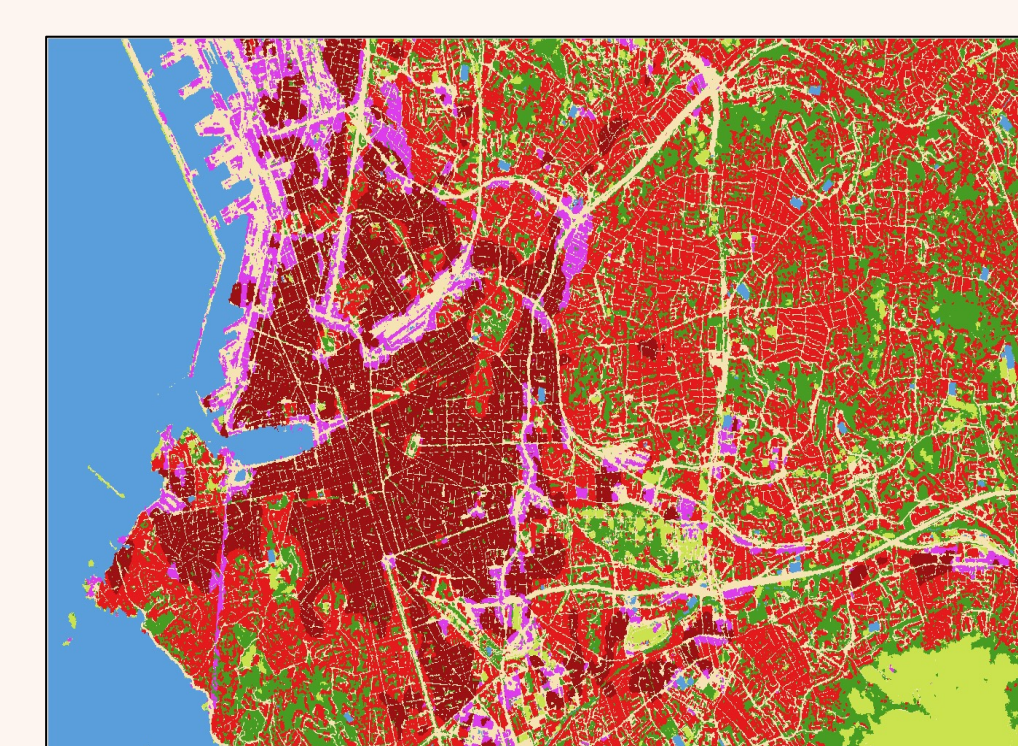
Deep learning approach on multitemporal and multimodal imagery (S1/S2)



Ongoing Research

Wenger et al., Poster LPS 2022 (ANR TIMES - TOSCA/CNES)

Fusion (Spot6/S2) and deep learning approach



Ongoing Research

Le Bris et al. (TOSCA/CNES)