

LASTIG lab.

A short introduction

Bruno VALLET, Ana-Maria RAIMOND, Mathieu Brédif

01/2026

<https://www.umr-lastig.fr/>

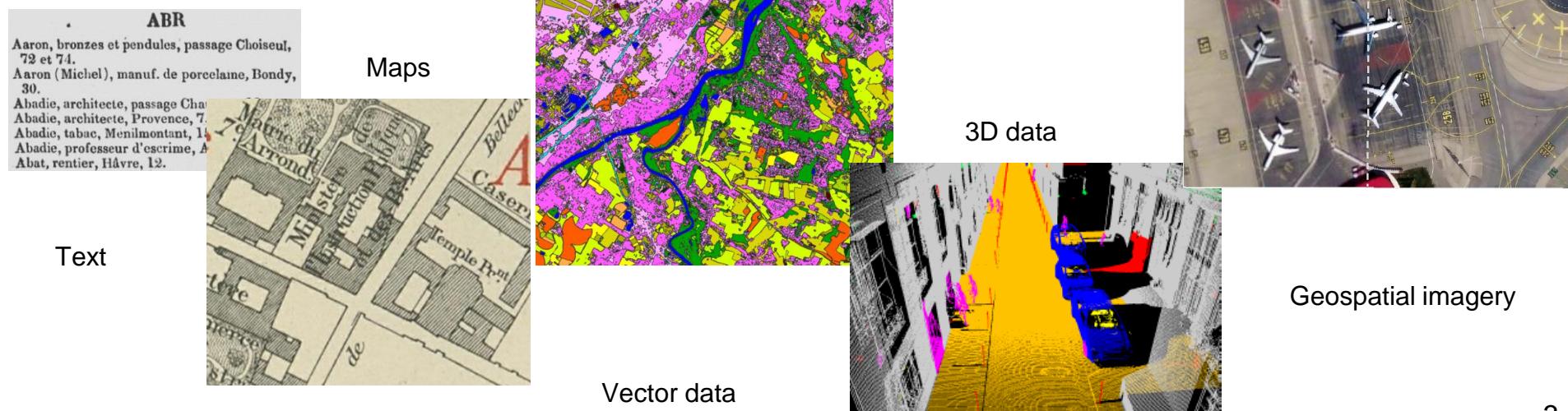
LASTIG lab

- Research in **Sciences and Technologies in Geographic Information**
 - Context: climate change, environmental and societal impacts
- **Objectives:**
 - Data, knowledge, methods and tools for modeling, analysis, simulation and visualizing the territories and spatio-temporal phenomena
- In-between:
 - Computer Sciences
 - Machine Learning
 - Image/Signal processing
 - Physical measures
 - Computer Vision
 - Computer Graphics
 - Visualization
 - Human-Computer Interaction
 - Geography
 - Social and Human Sciences
 - Environmental Sciences

LASTIG lab

- **Environmental transformations:** *public policy monitoring (land-use/land-cover, Common Agricultural Policy), pollution, urban climate, flooding, etc.*
- **Historical and social mutations:** *past urban dynamics, urban planning, archival data analysis*

→ Multi-source, multi-scale, massive, inaccurate and massive data.



ID card

Basic info:

- LASTIG = IGN-ENSG + Université Gustave Eiffel + Ecole des Ingénieurs de la Ville de Paris (EIVP)
- Method-based researches with an operational flavour
- **Current project time frame:** 2026-2030
- *Interdisciplinarity, open and reproducible science*

Composition

- **45** permanent members
(5 DR, 6 CR MTE, 9 MCF/EC, 14 Ing. DR,
11 IE/IR)
(40 IGN, 3 Univ Eiffel, 2 EIVP)
- 25 PhD, post-doc, engineers



ID card

4 teams

ACTE: Image/Lidar/Radar data acquisition and processing

STRUDEL: Spatio-temporal Structures for Spatial Analysis

MEIG: Mediation and Enrichment of Geographic Information

GEOVIS: Visualization, Interaction, Immersion

Management

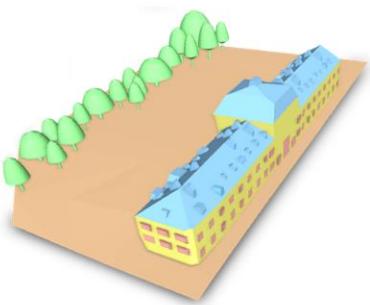
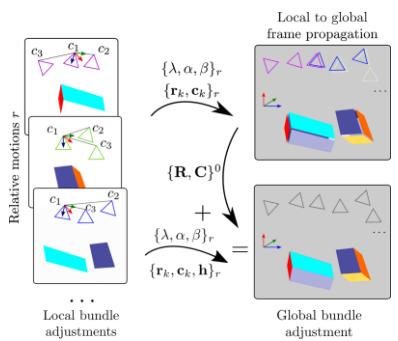


dir-lastig@ign.fr

Team leaders



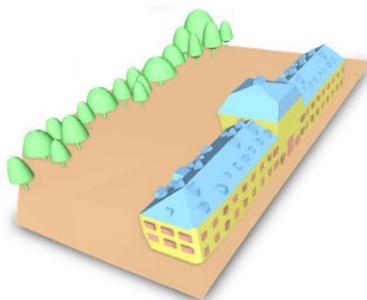
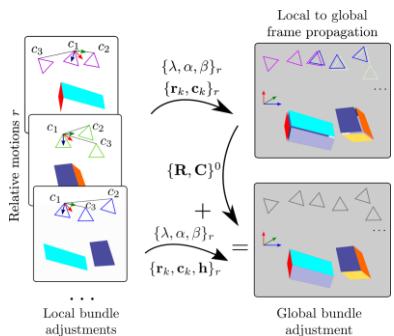
Structuration



Photogrammetry & reconstruction 3D

ACTE

Structuration



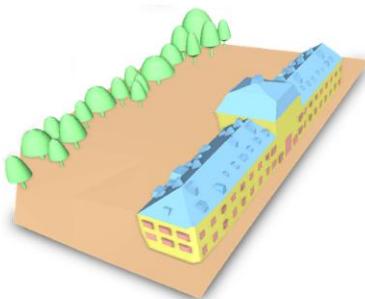
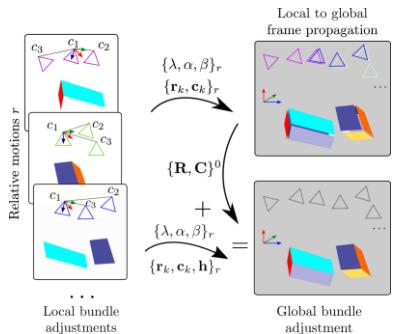
Photogrammetry & reconstruction 3D



Changes: validation & integration

ACTE **MEIG**

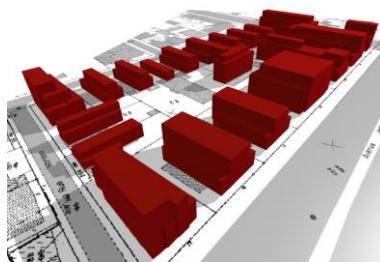
Structuration



Photogrammetry & reconstruction 3D

ACTE MEIG

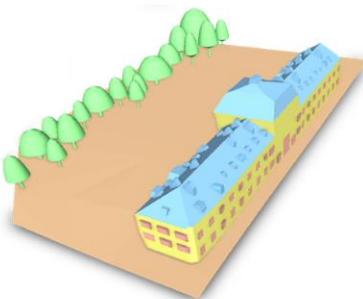
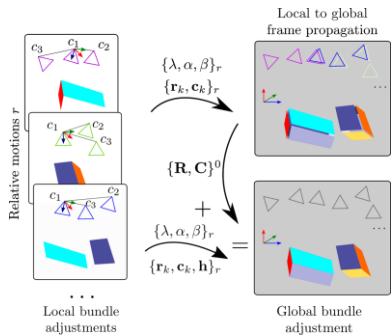
STRUDEL



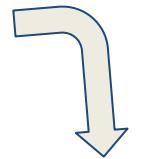
Changes: validation & integration

Simulation & temporal monitoring

Structuration



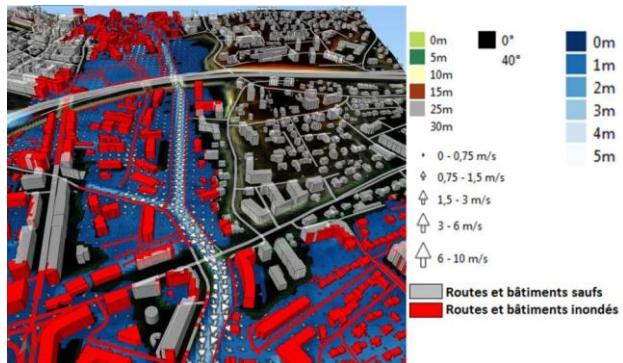
Photogrammetry & reconstruction 3D



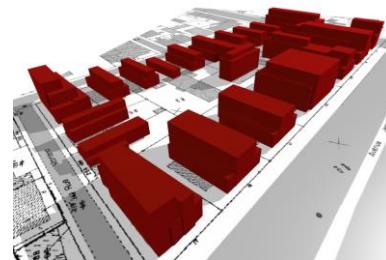
Changes: validation & integration

ACTE MEIG

GEOVIS STRUDEL

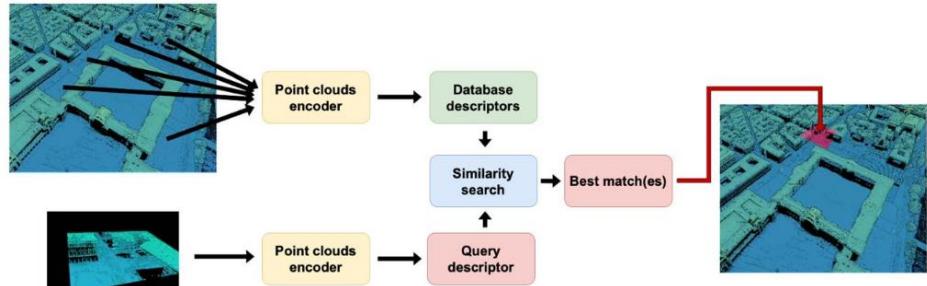


Visualisation & interaction



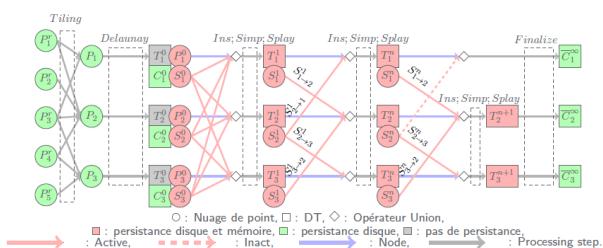
Simulation & temporal monitoring

Structuration



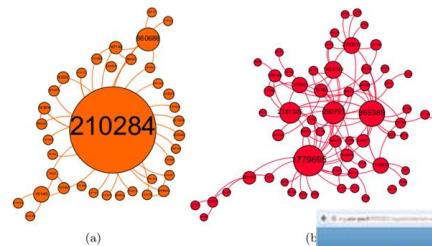
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Indexation and retrieval



Parallel computing

ACTE

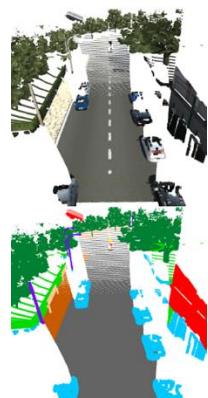


Text analysis



Graph analysis

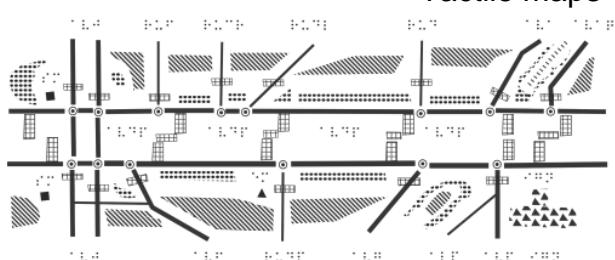
MEIG



2D/3D learning



Complex systems



Augmented reality



GEOVIS

Visualisation & interaction

ACTE TEAM

▪ Spatial data acquisition techniques and photogrammetry



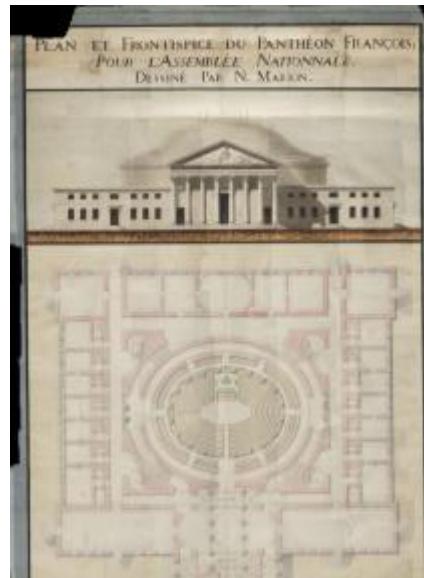
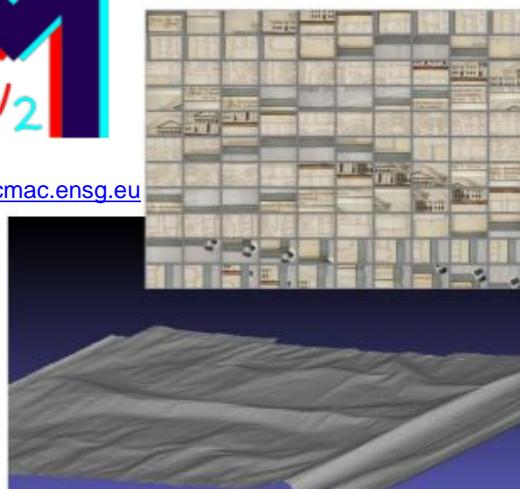
Stereopolis: multi-sensor
3D mobile mapping
system for street
visualisation and 3D
metrology



MicMacV2 : Open source
photogrammetric library



<https://micmac.ensg.eu>

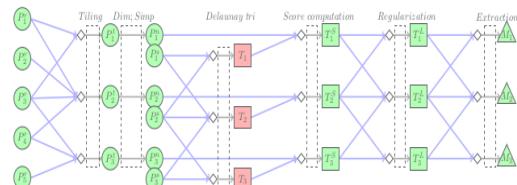


Backpack image/lidar acquisition

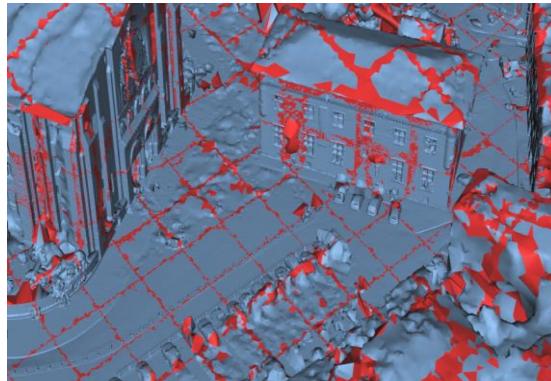
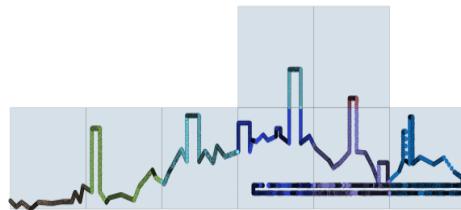
ACTE TEAM

▪ Processing of raw data

Massive reconstruction of 3D surfaces



○ : Nuage de point, □ : DT, ◇ : Opérateur union,
 ■ : persistance mémoire et disque, ■ : persistance disque,



Texturing of 3D meshes



Image indexing/searching 3D

© Charles
Lansiaux /
DHAAP /
Roger-
Viollet
(1916)

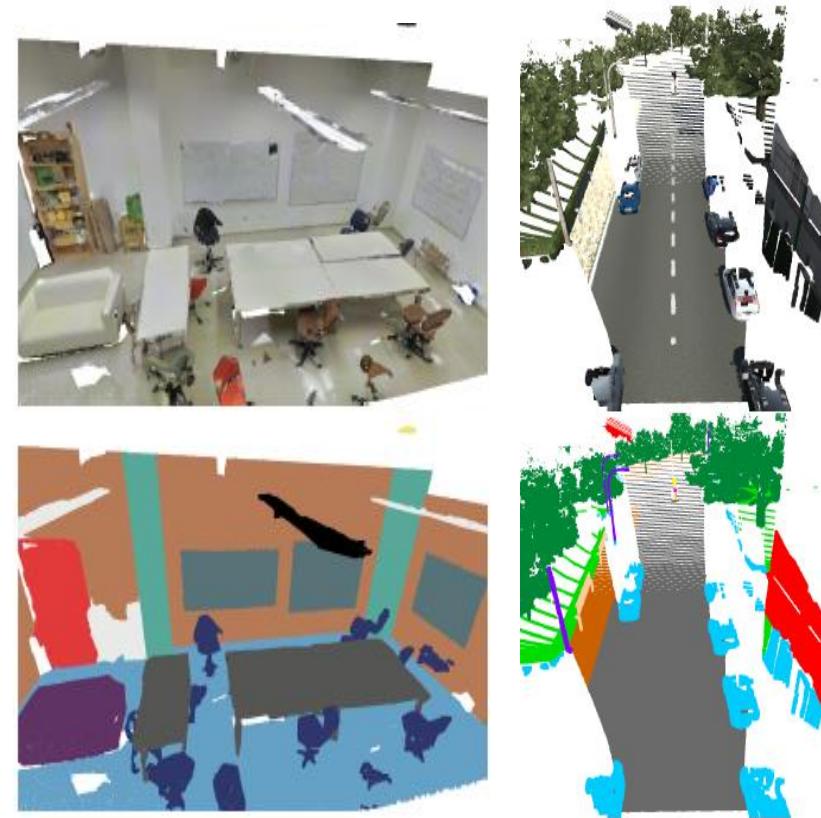
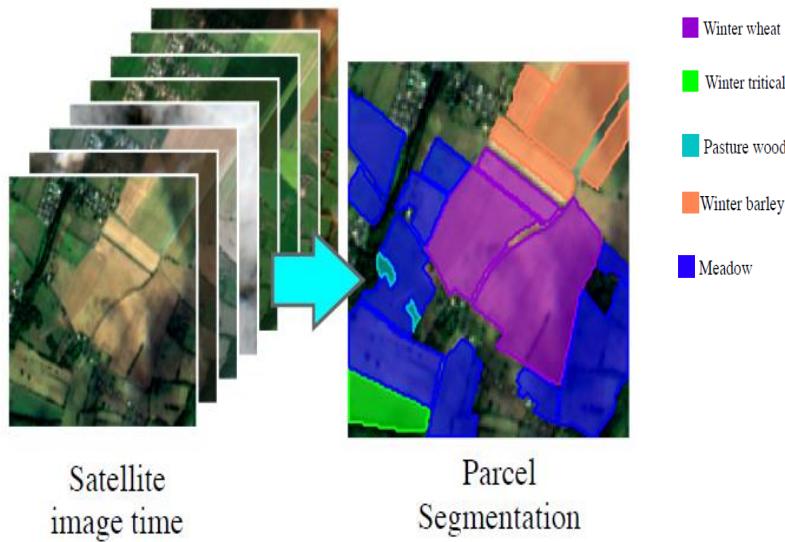


© Commission
du Vieux Paris
DHAAP / Roger
Viollet (1967)

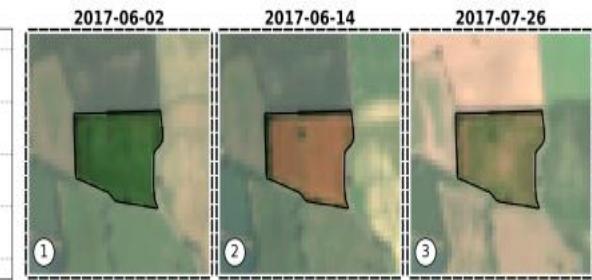
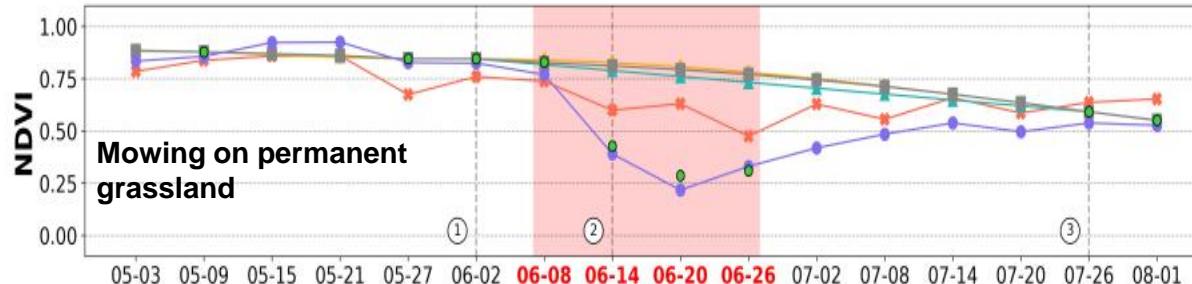


■ 2D/ 3D STRUCTURED PREDICTION

Parcel segmentation from multi-temporal satellite times series

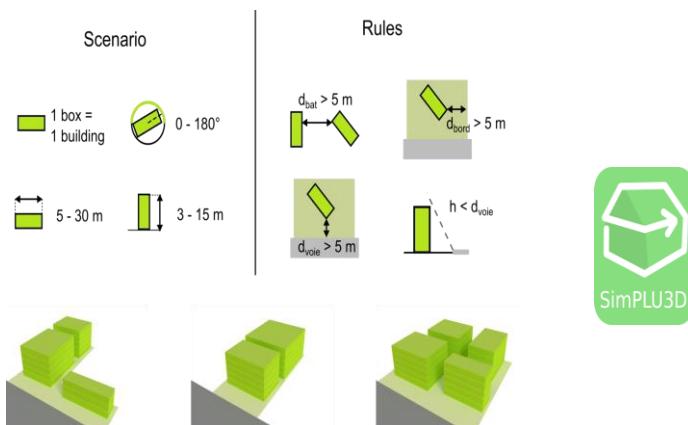
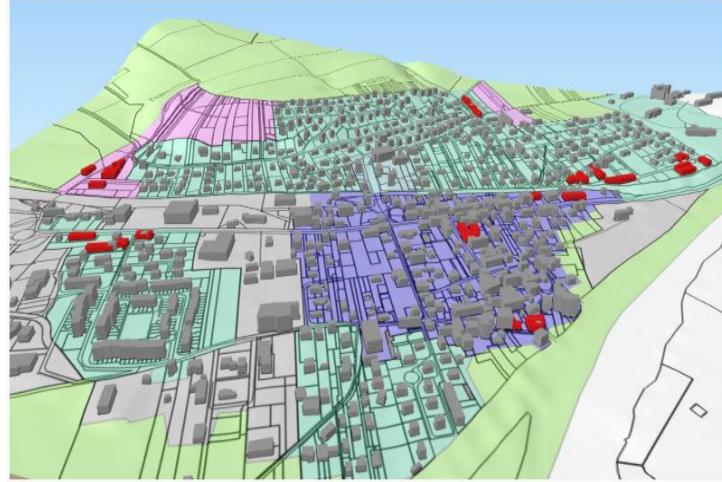


Grassland monitoring/change detection



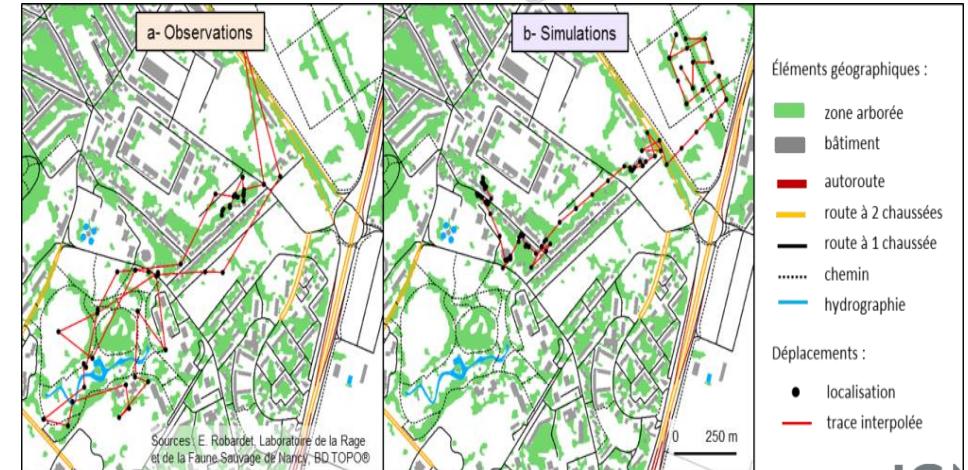
STRUDEL TEAM

■ Simulation and spatial analysis



Urban simulation by taking into account public policies

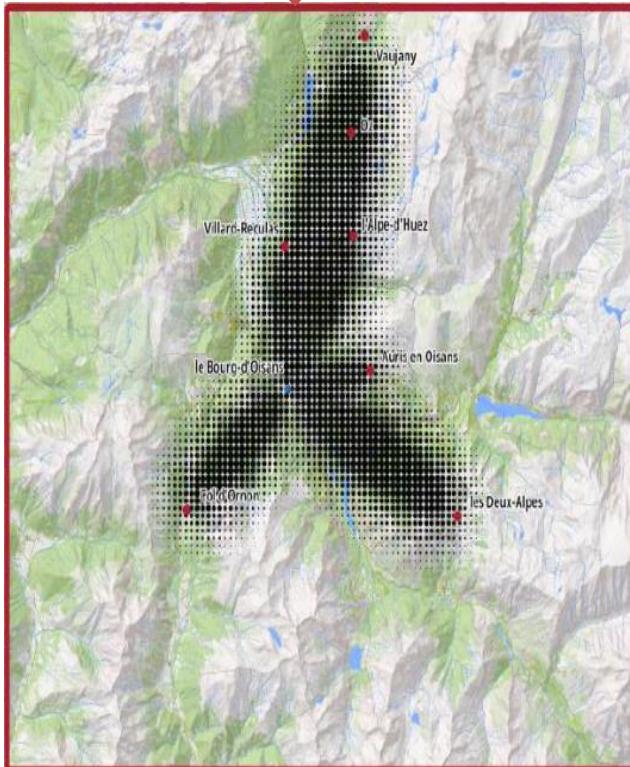
Street evolution in Paris from 1784-1894



MEIG TEAM

■ SPATIAL DATA ENRICHMENT

« I started to walk from Bourg d'Oisans city and towards a ski resort », where am I ?



Road reconstruction from text



Detection of traffic signs from GPS data



▪ DESCRIPTION, MULTI-SOURCE INTEGRATION

5 DQ_ThematicClassificationCorrectness

| 2

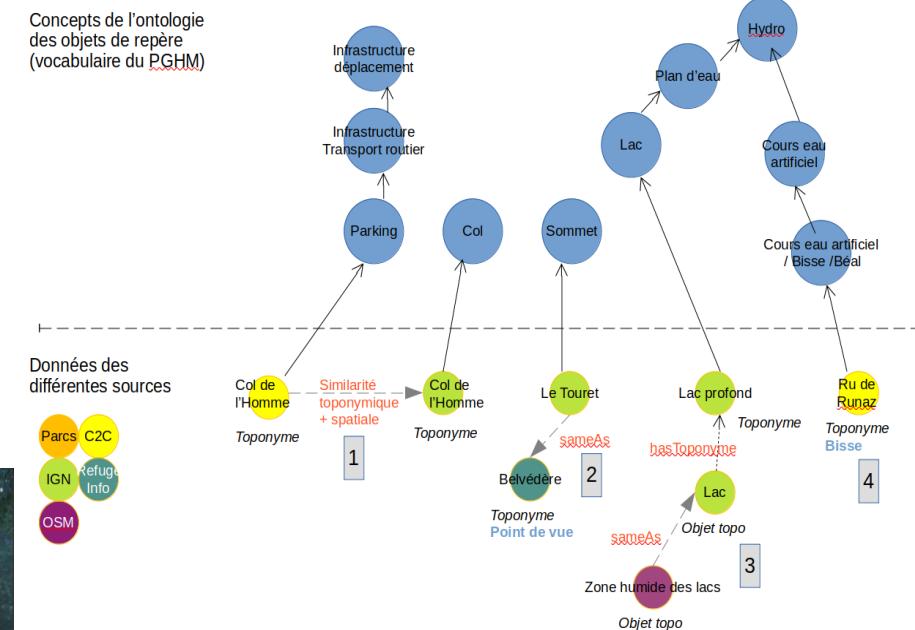
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Quality assessment and metadata- machine readable GPS data



Crowdsourcing platforms

GEOVIS TEAM

- Geovisualisation, representation, spatial cognition, interaction



Present and past co-visualisation



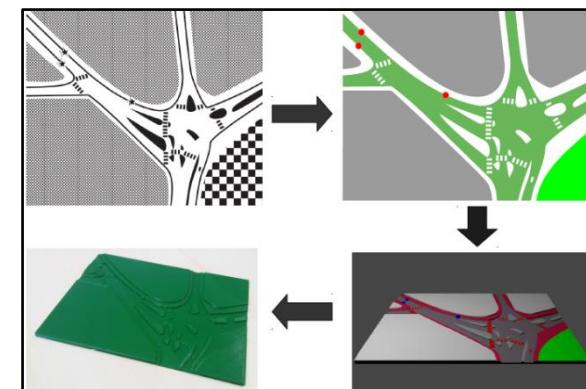
Adapting the representation to the user



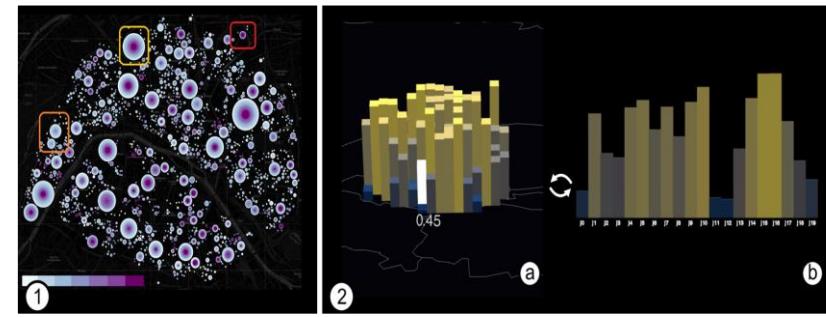
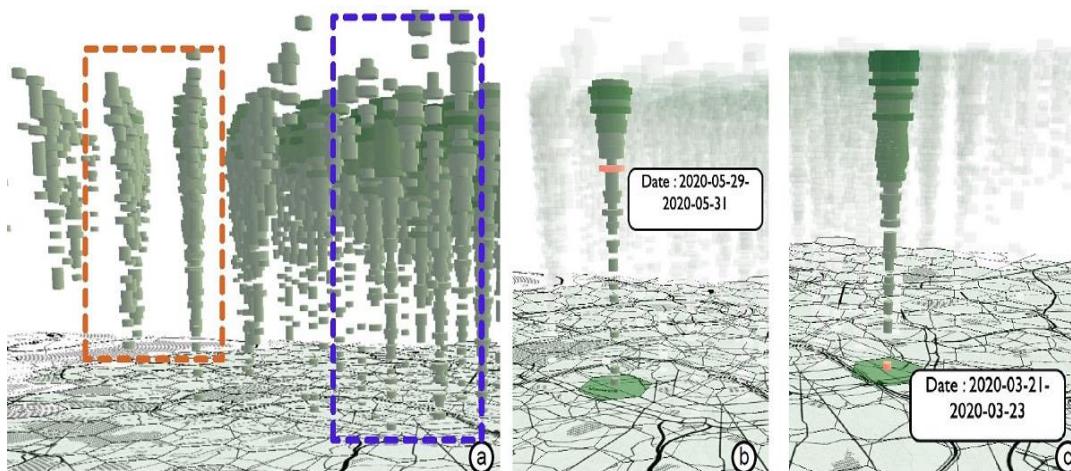
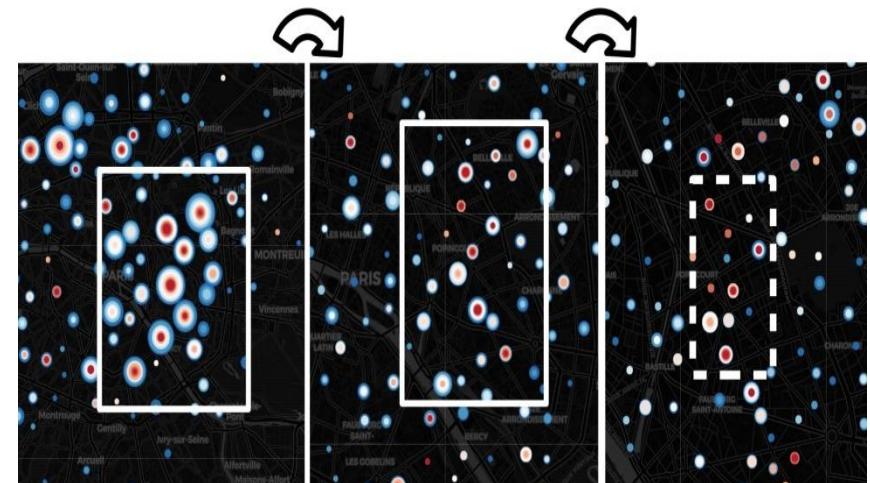
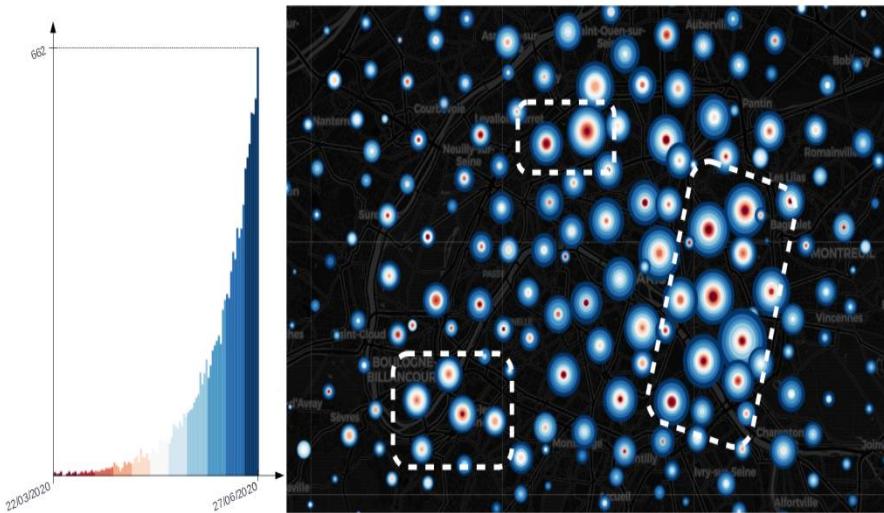
Style transfer



Maps for blind people



- Spatio-temporal clusters of COVID data visualization



Territory dynamics @ LASTIG

ACTE:

- Deformation monitoring (buildings bridge, post-seismic)
- *3D change detection and update LiDAR/Image geometric change detection. Teng Wu*

STRUDEL:

- Spatio-temporal Analysis
- Temporal series analysis
- *Bi-temporal VHR image change detection with text. Yanis Benidir*

MEIG:

- Multi-source fusion for change detection
- *Seeing Urban Densification through the Buildings' Lens: A User-Oriented and Collaborative Approach. Ana-Maria Raimond*

GEOVIS:

- Visualization of dynamic processes (weather, epidemics,...)

Territory dynamics @ IGN

Mapping the anthropocene:

- Monitoring the impacts of anthropic activity in a context of
 - Climate change
 - Ecologic transition

Change detection an update in IGN production:

- Currently dispatched in various independent services/production units
- Roadmap for coordination and factorization of Change Detection and Update at IGN : **Nicolas Gonthier**