

Towards zoomable, multi-scale, interactive schematic maps?

Guillaume Touya



ÉCOLE NATIONALE
DES SCIENCES
GÉOGRAPHIQUES



INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE



Funded by
the European Union

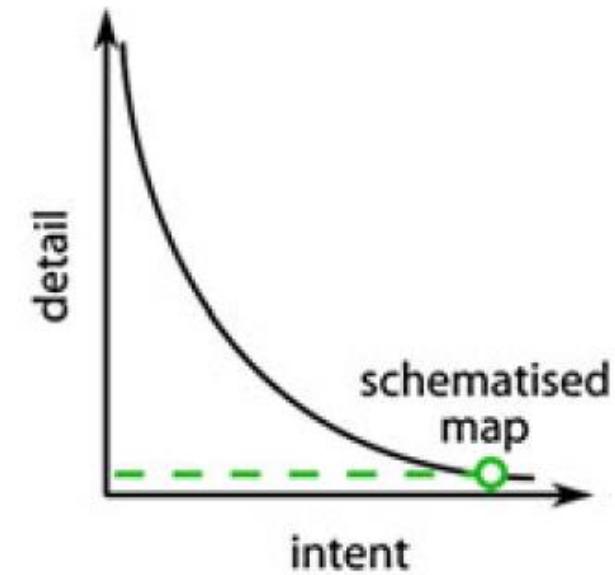
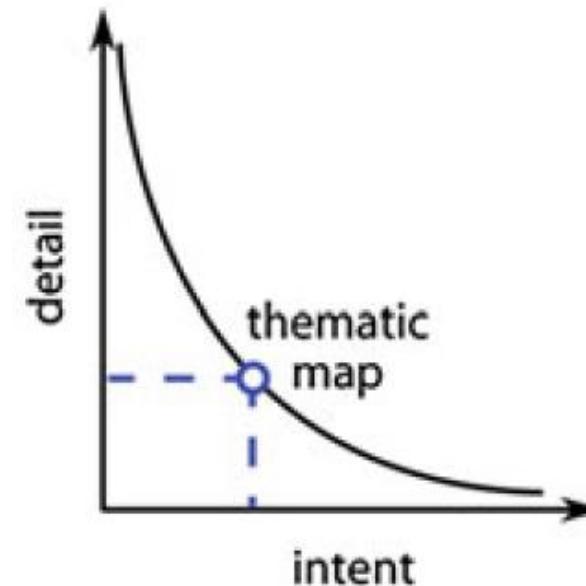
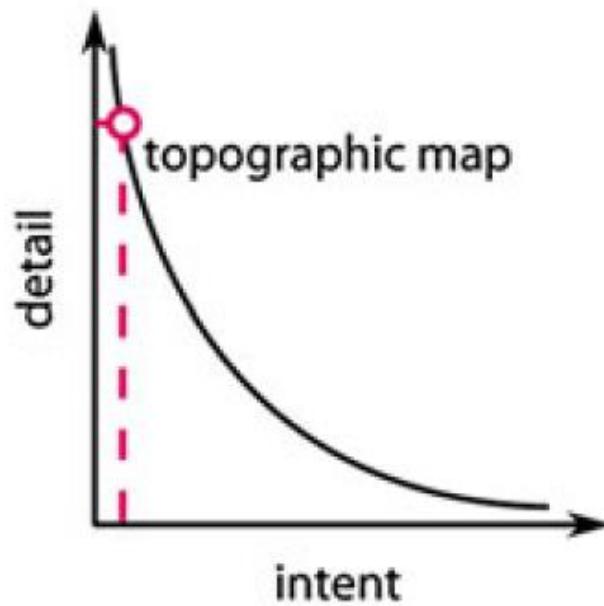


European Research Council
Established by the European Commission

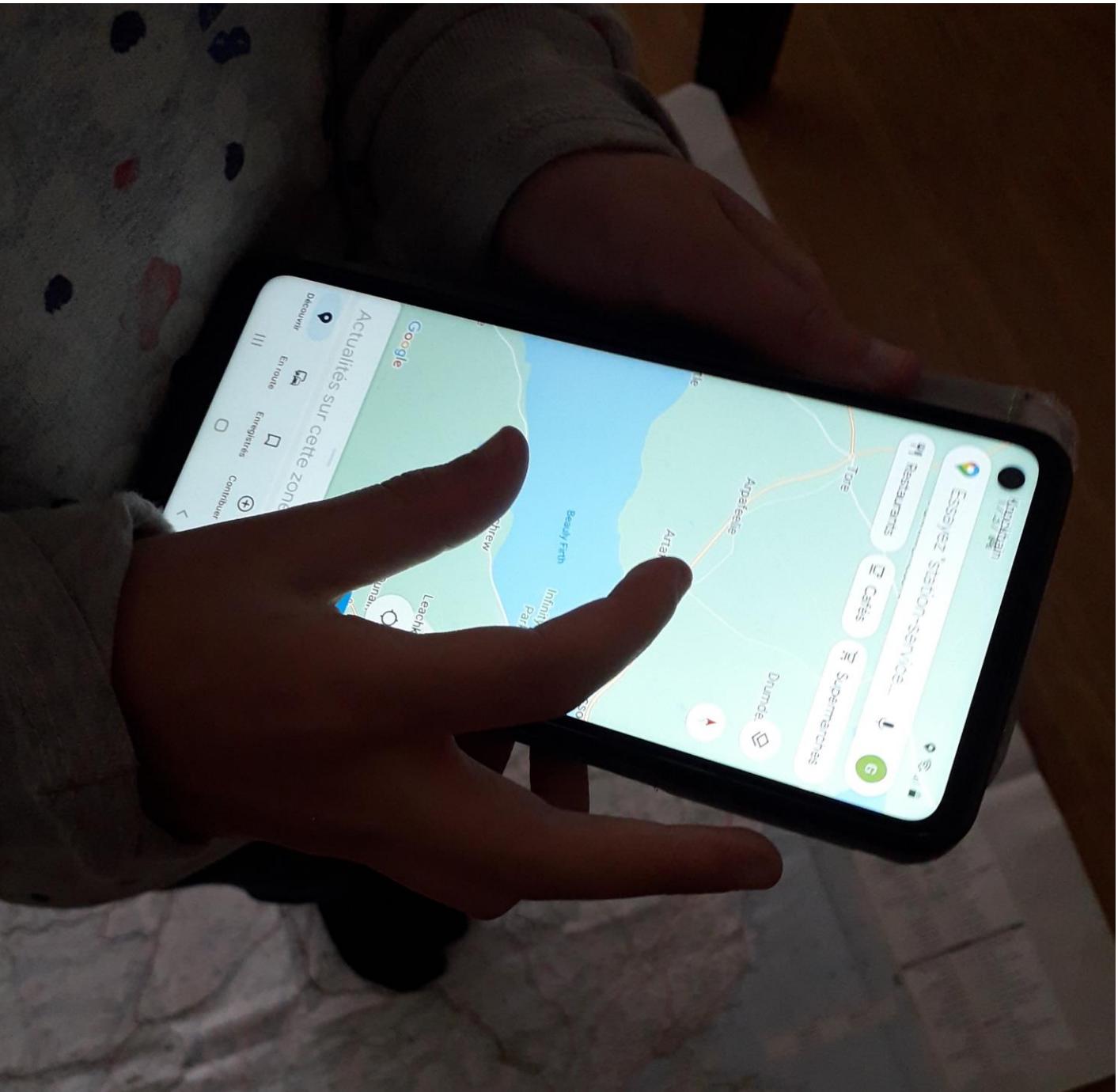
Pan-Scalar Maps

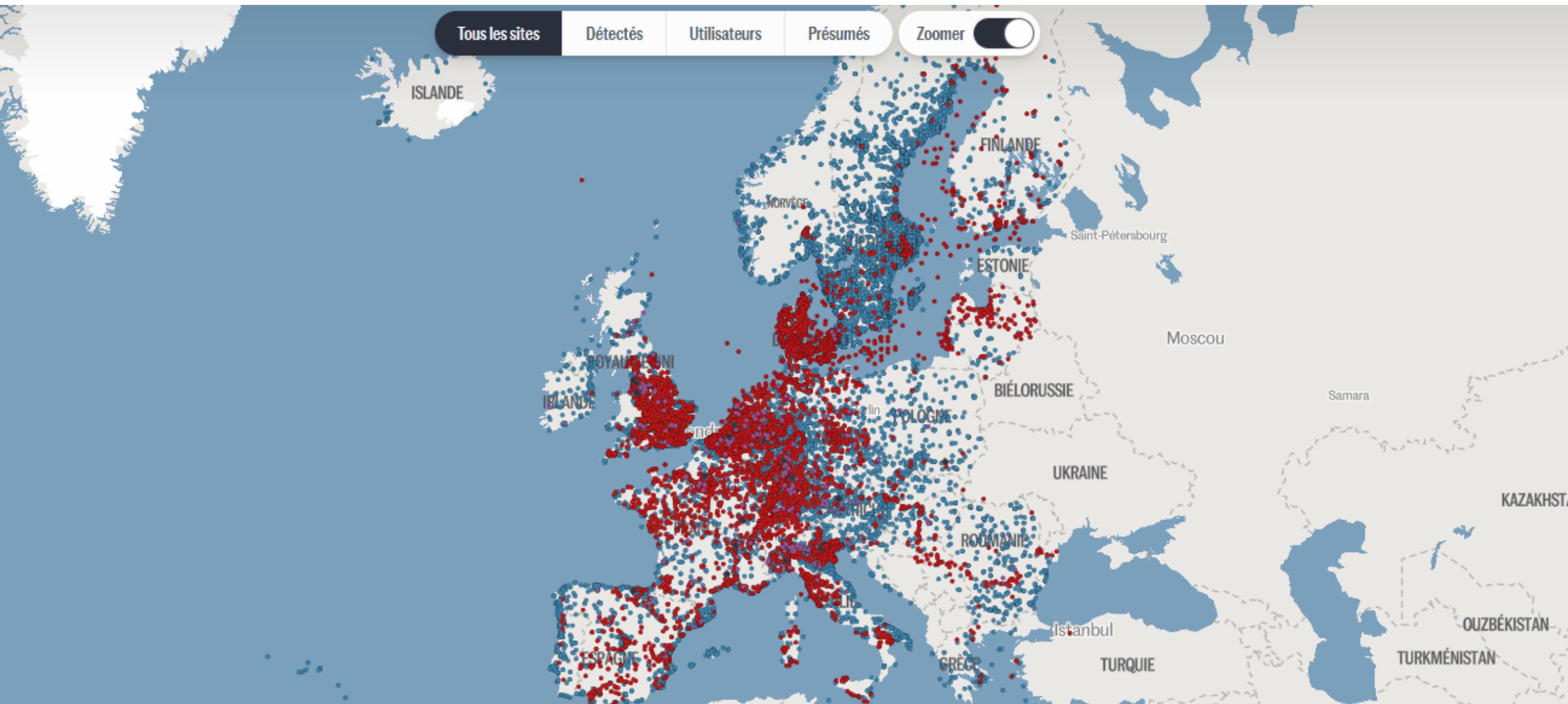


Topographic vs schematic maps

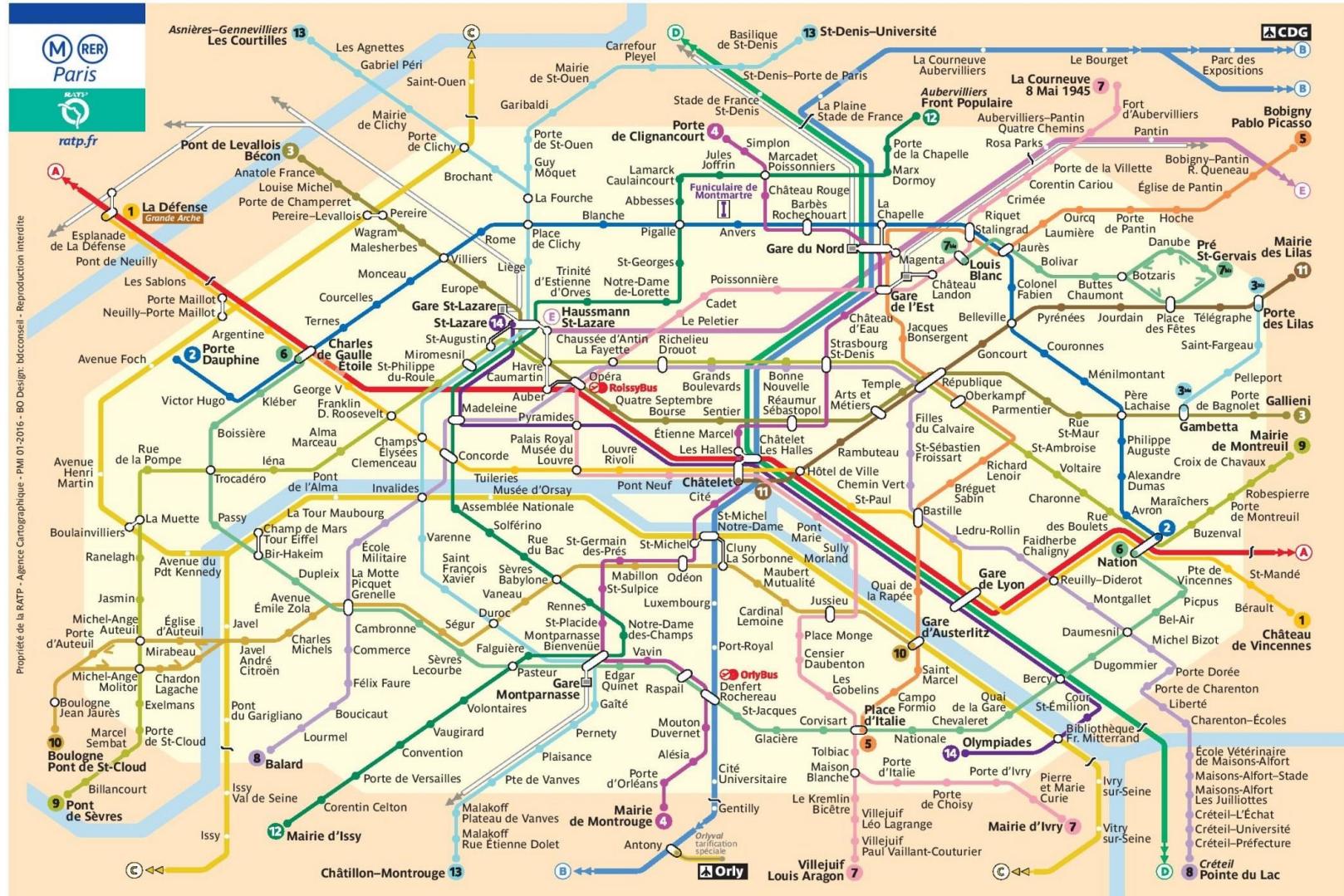


[Mackaness & Reimer 2014]



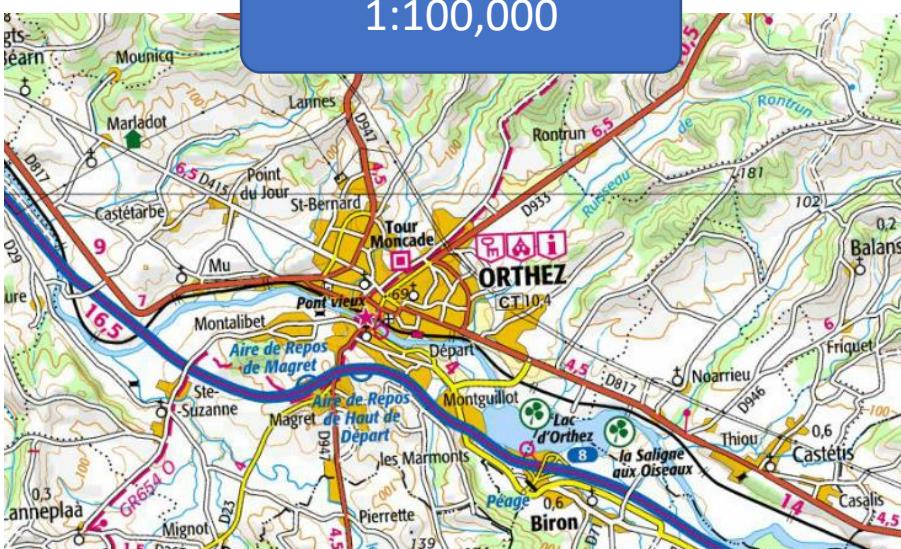
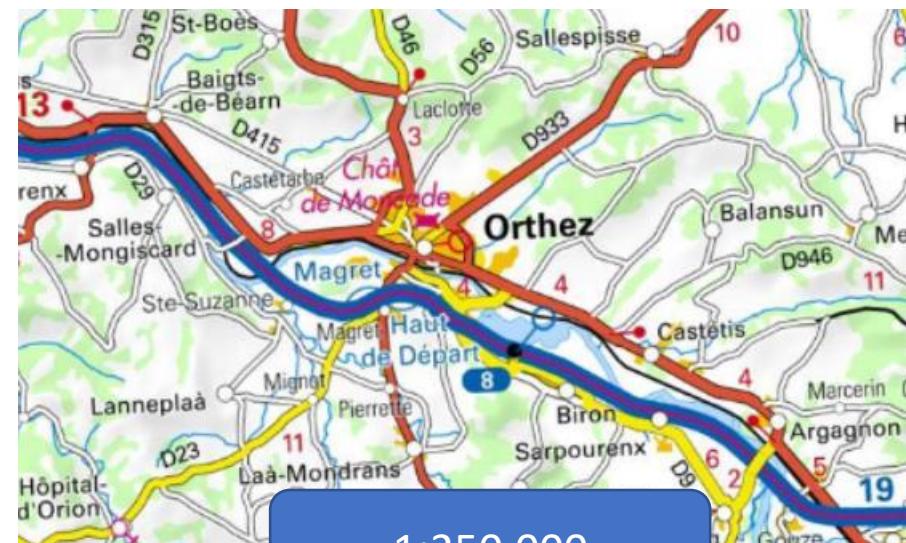


What about schematic maps ?

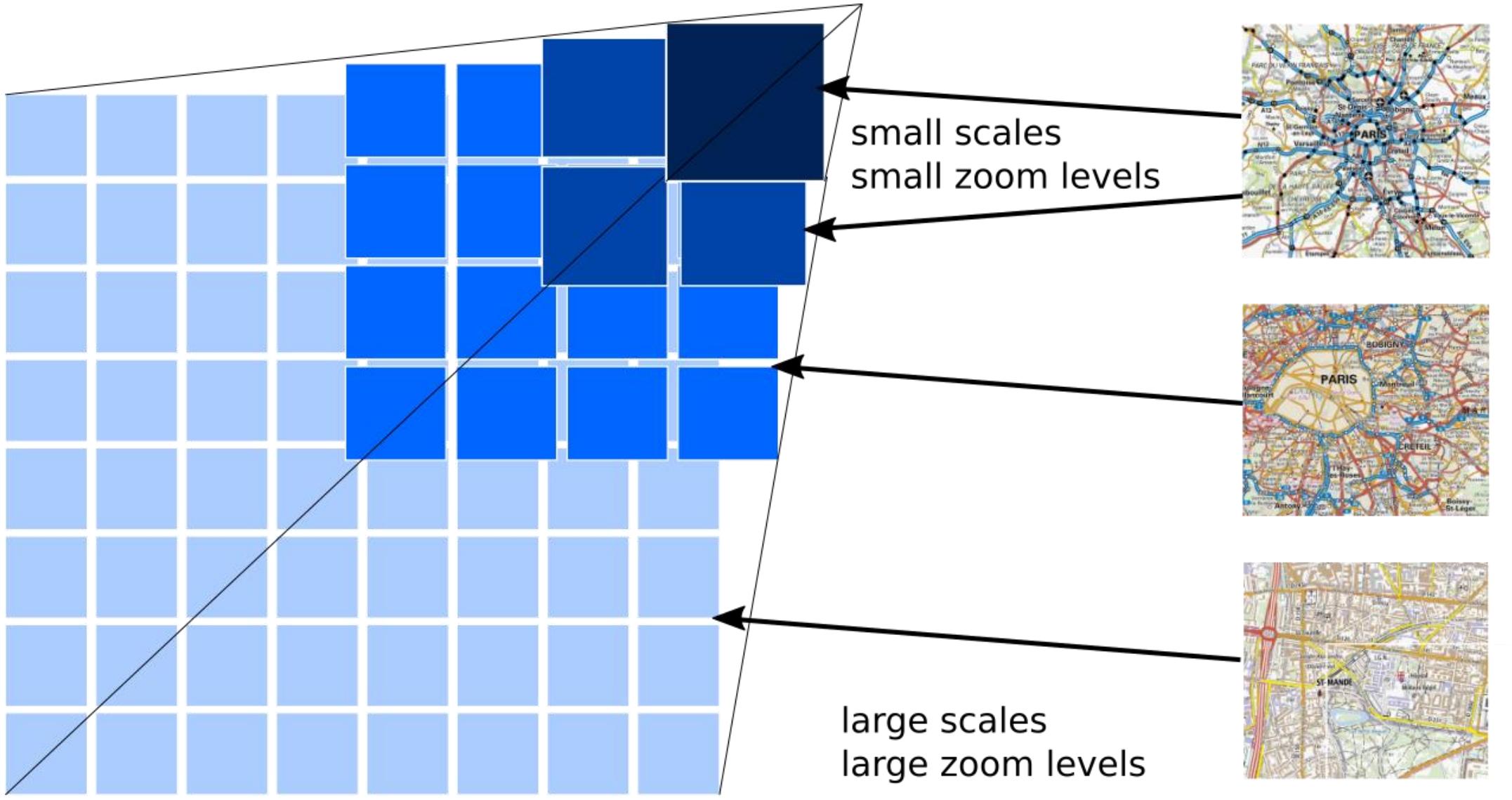


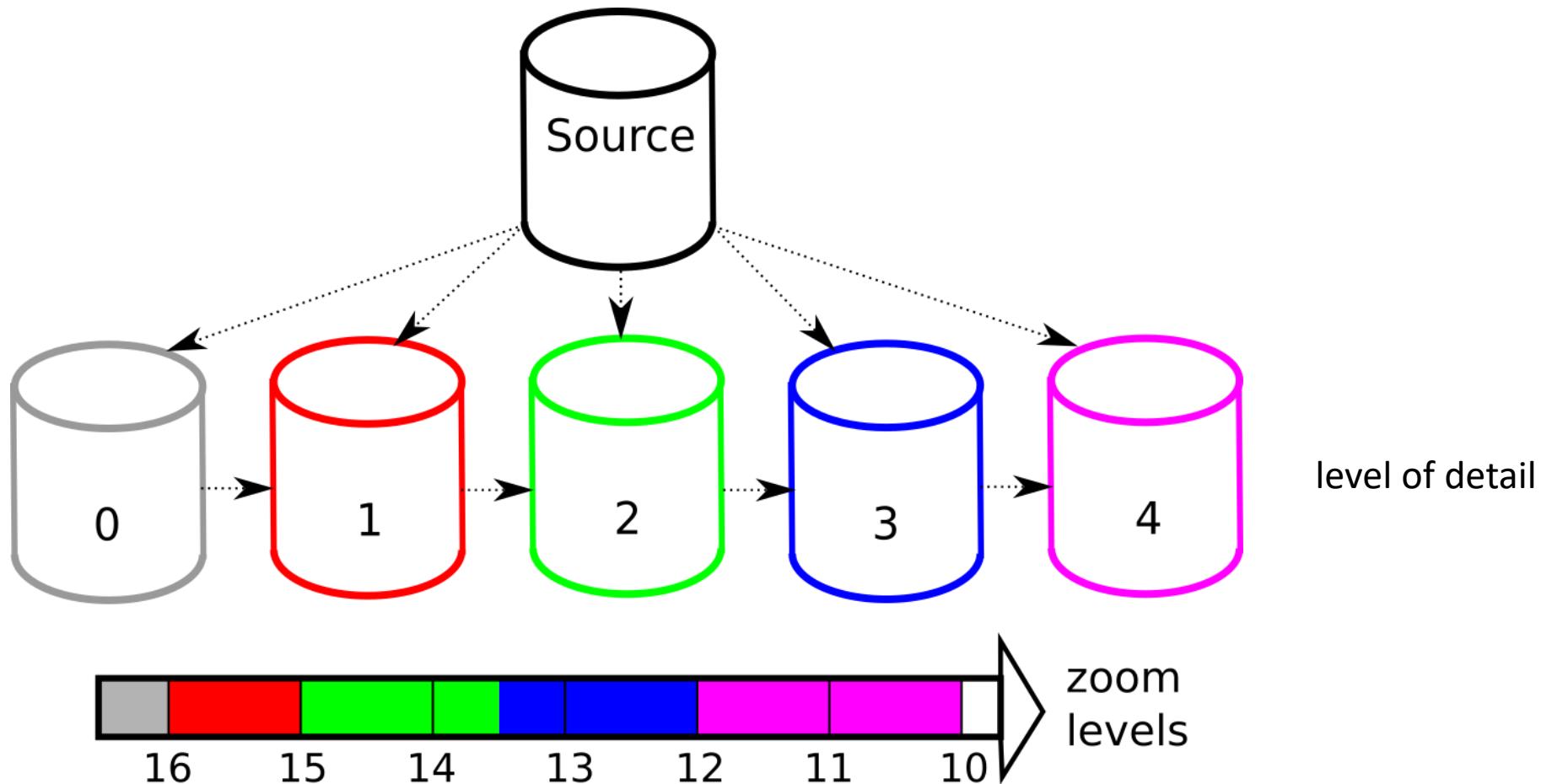
Do we need multi-scale,
zoomable, interactive schematic
maps?

Multi-scale maps



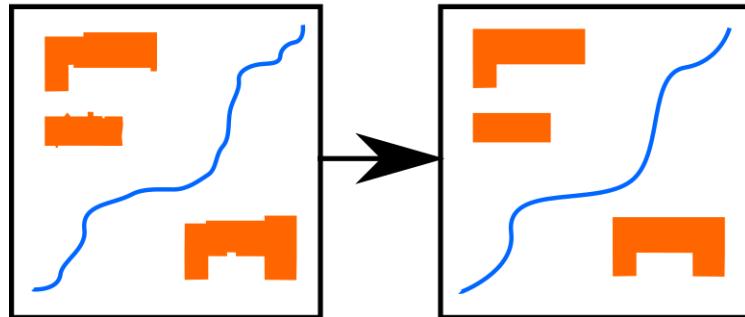
Zoom levels vs Mathematical scales



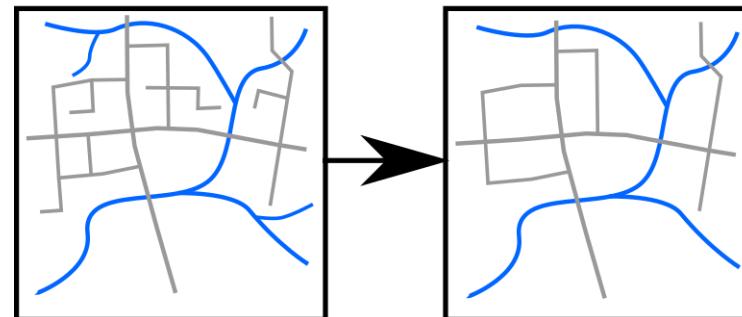


Map generalisation

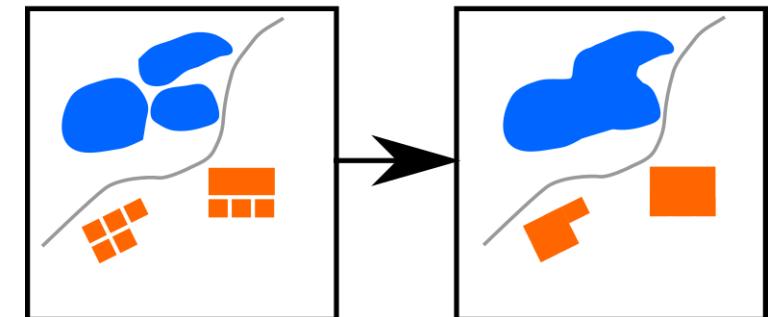
Simplification



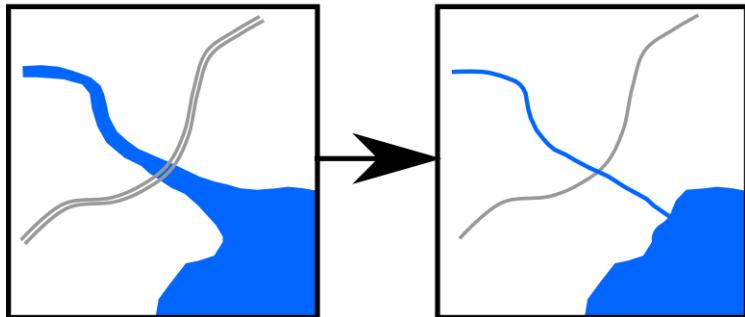
Selection



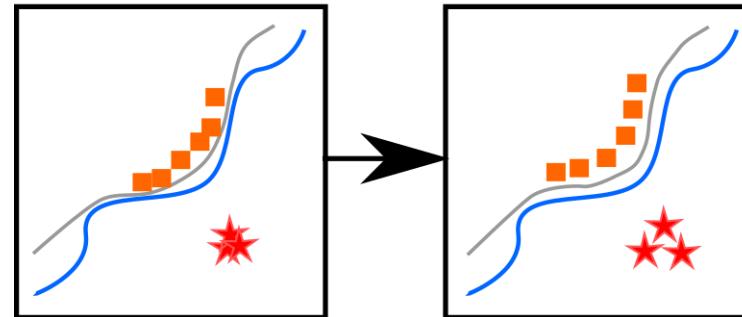
Aggregation



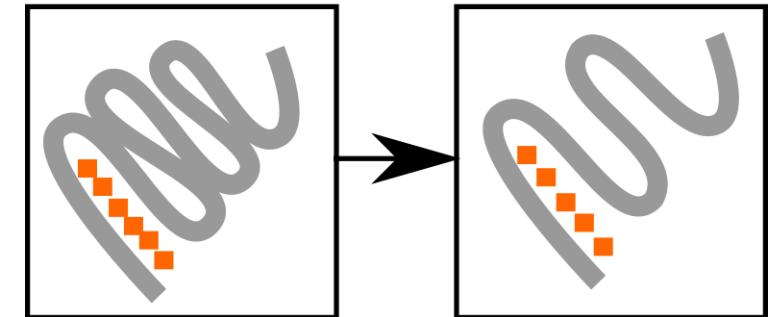
Collapse



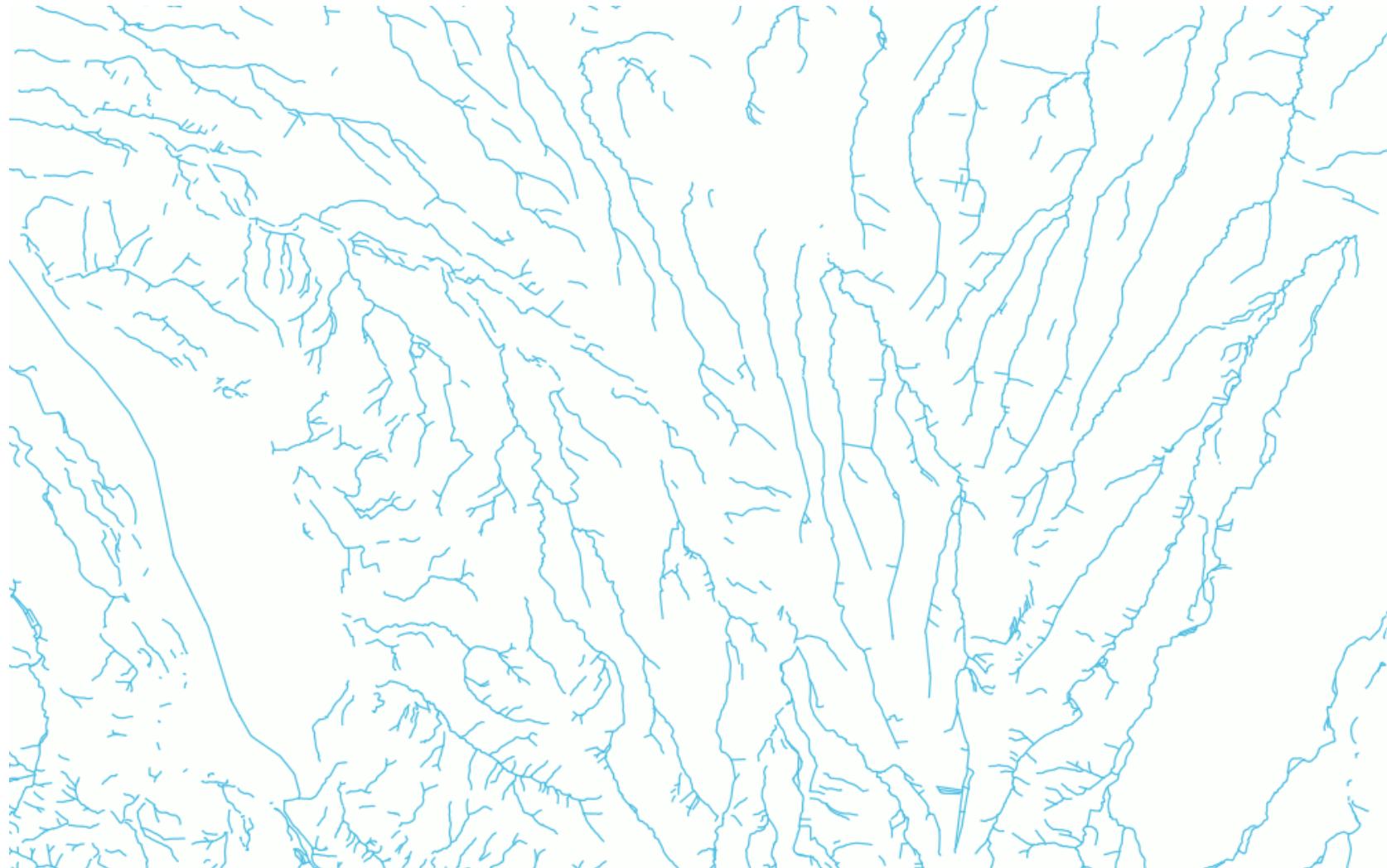
Displacement



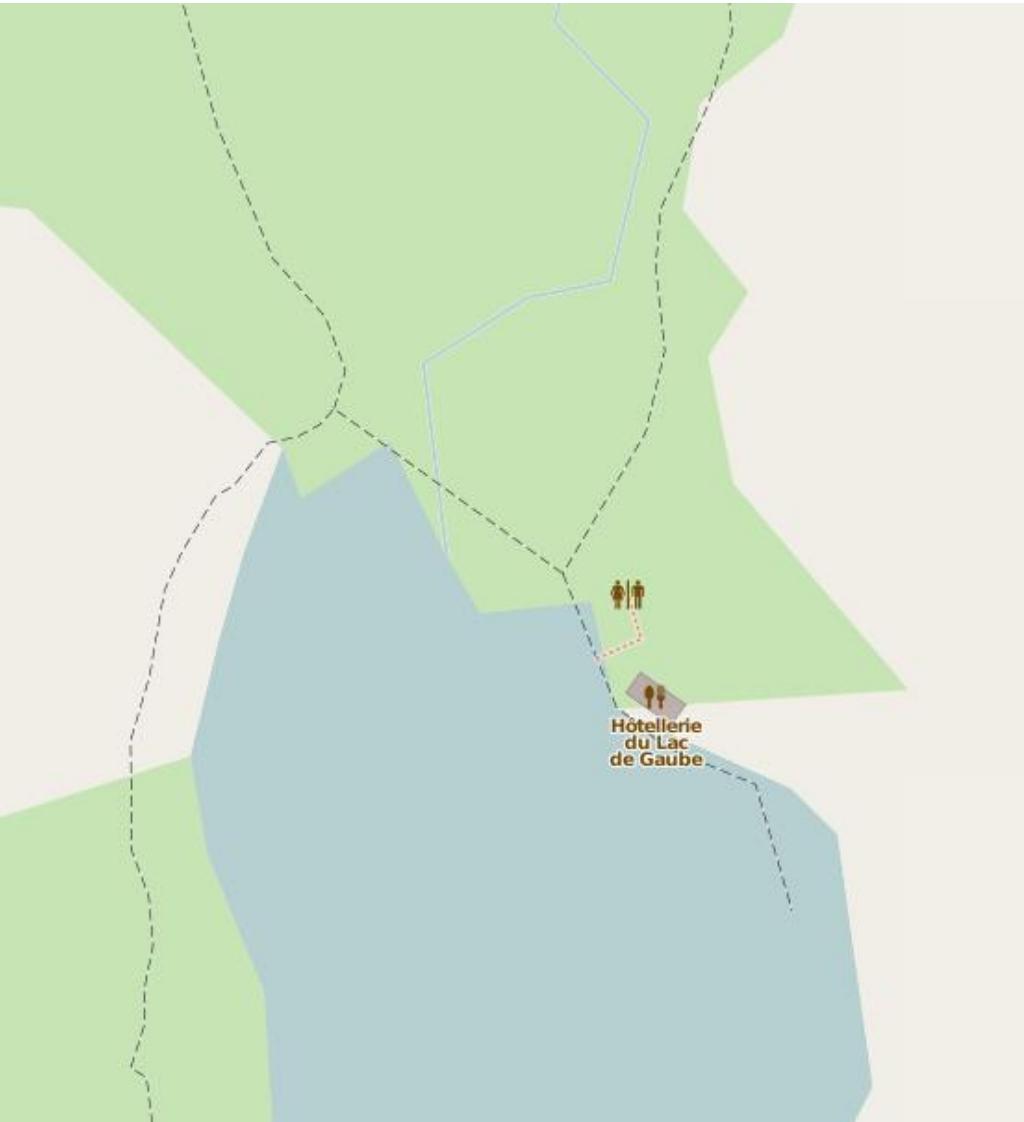
Typification



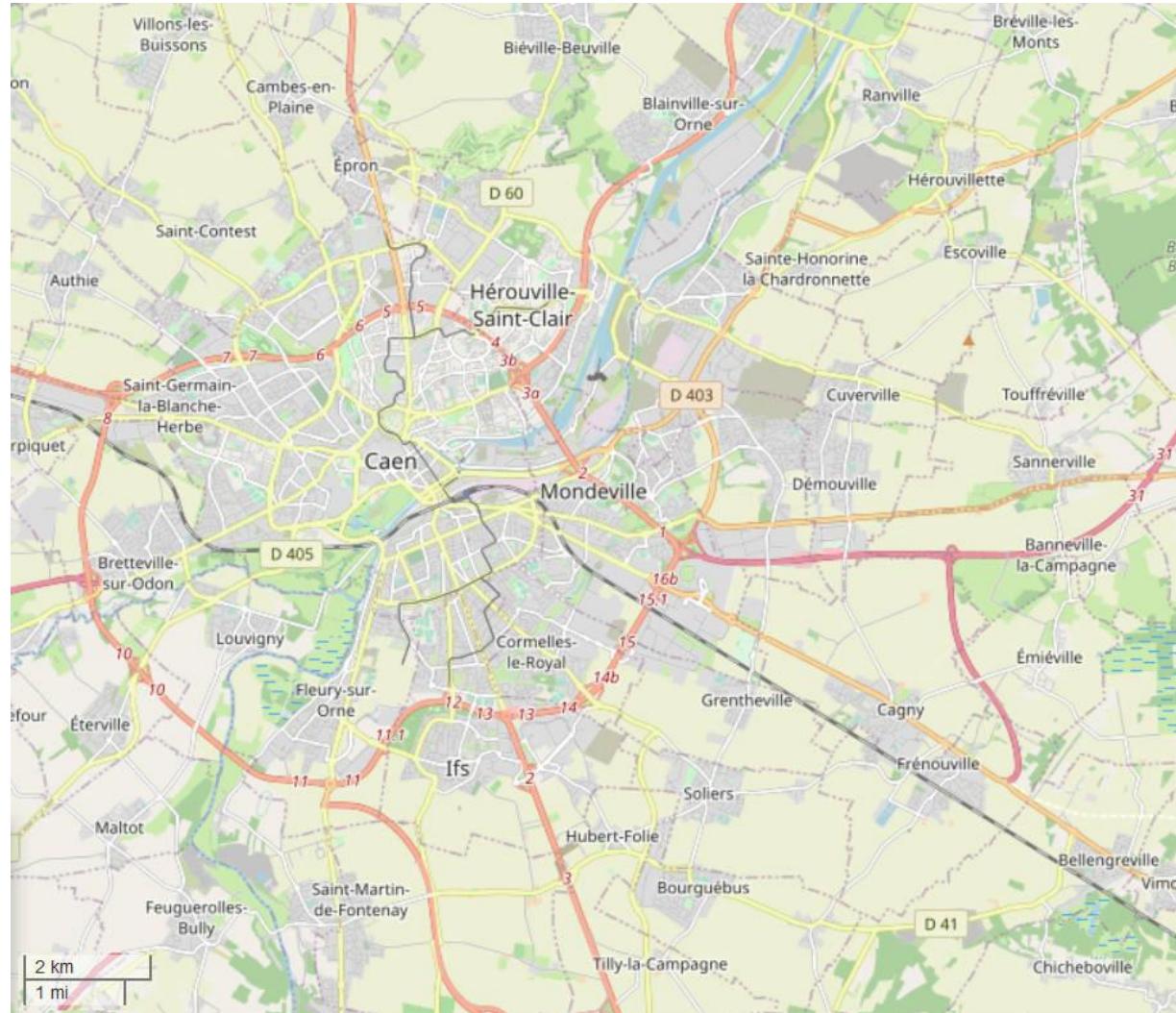
Continuity and breaks



Focus on inconsistencies...

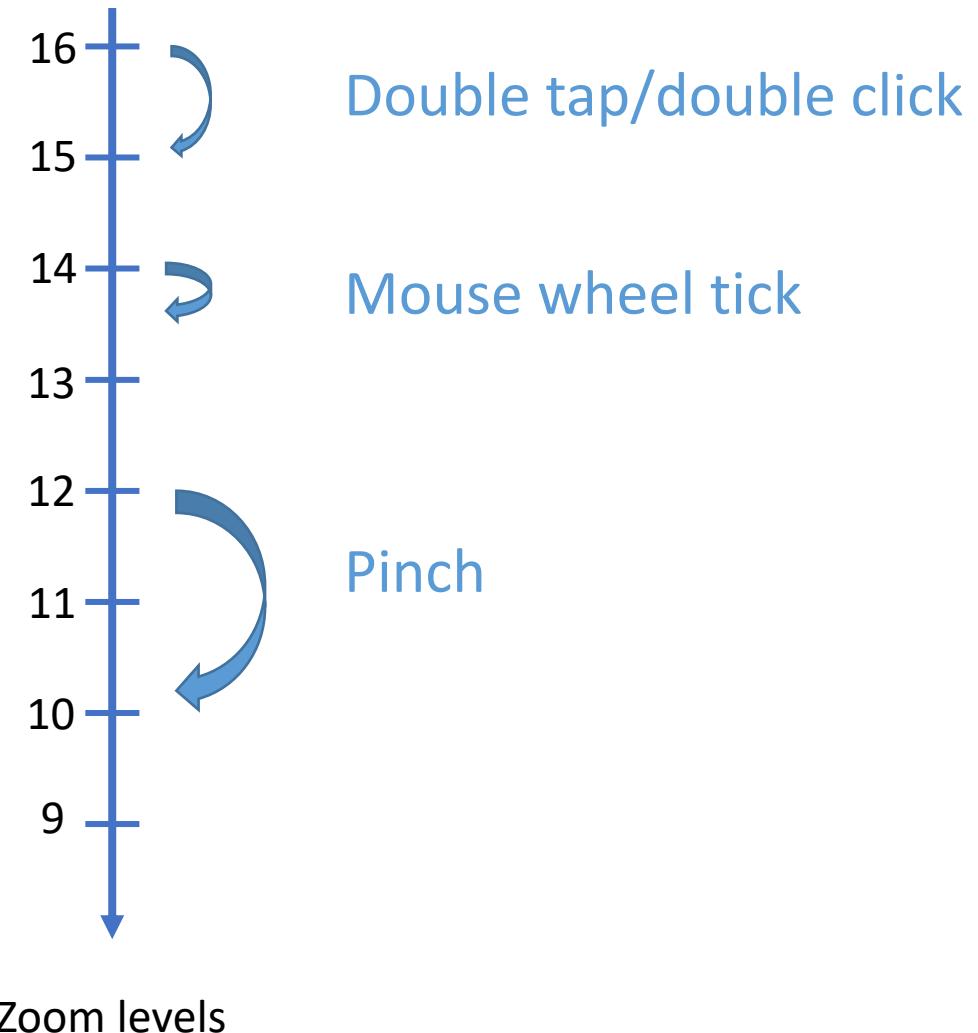


... and key patterns/structures

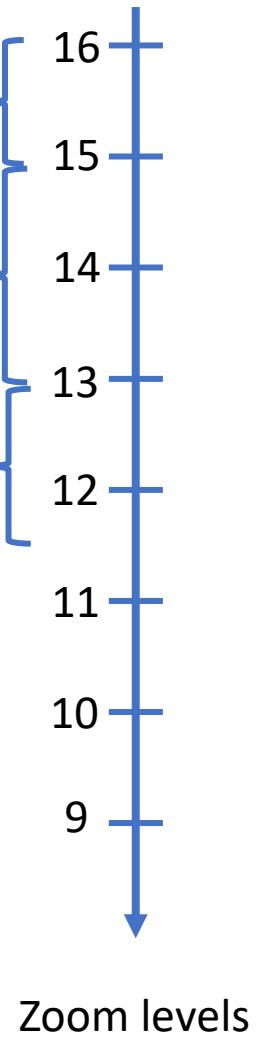
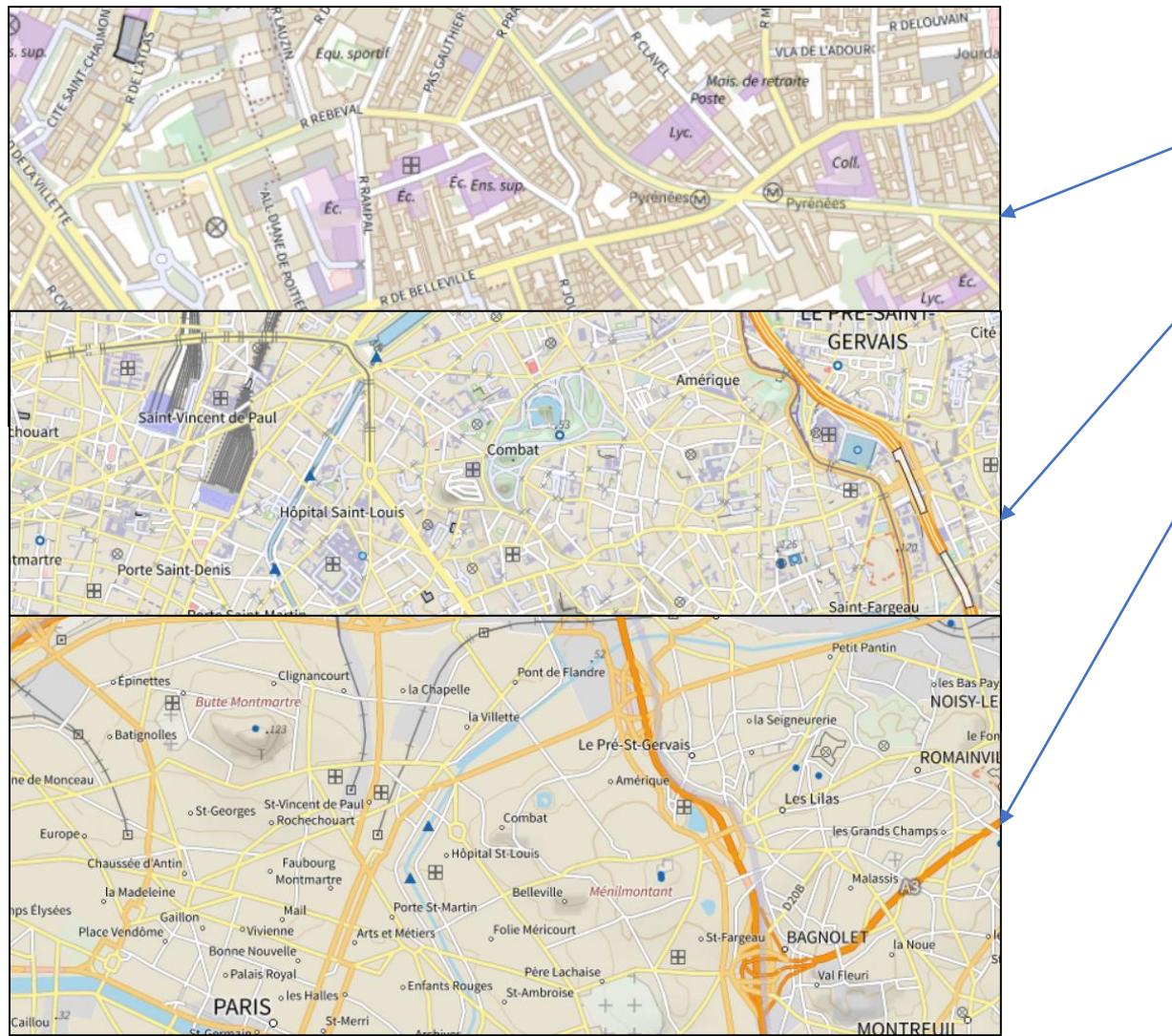


Zoomable maps

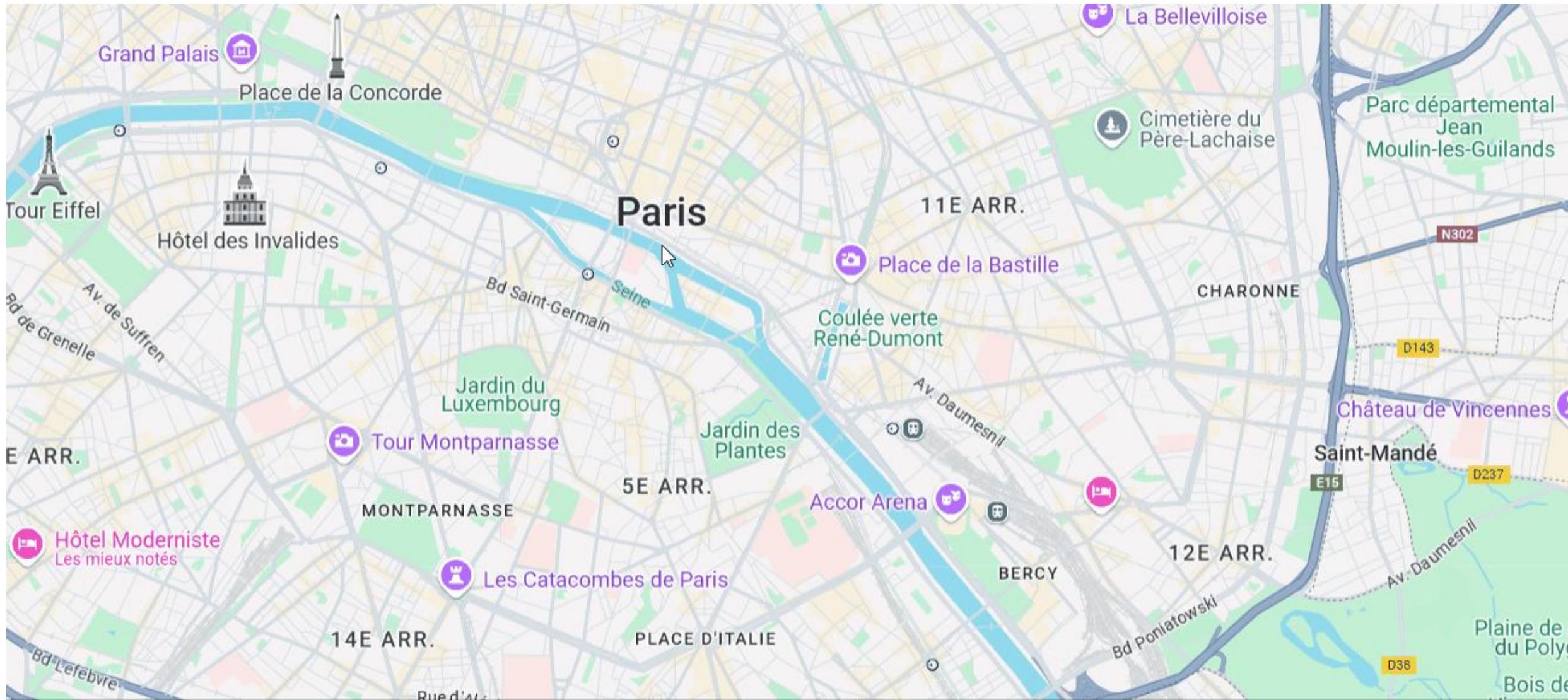
Zooming system



Zooming system



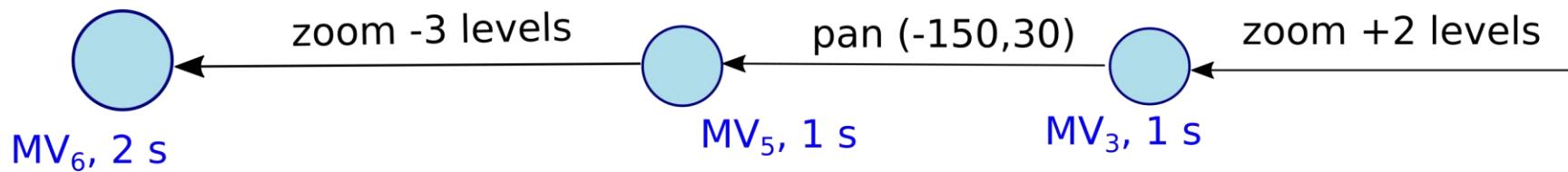
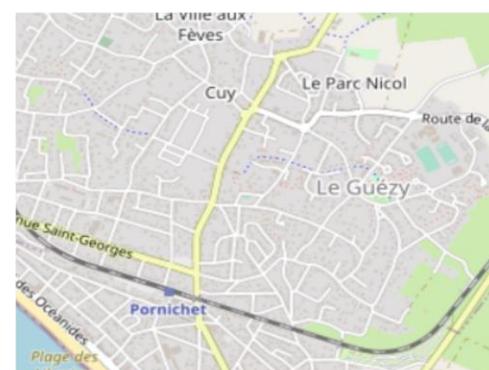
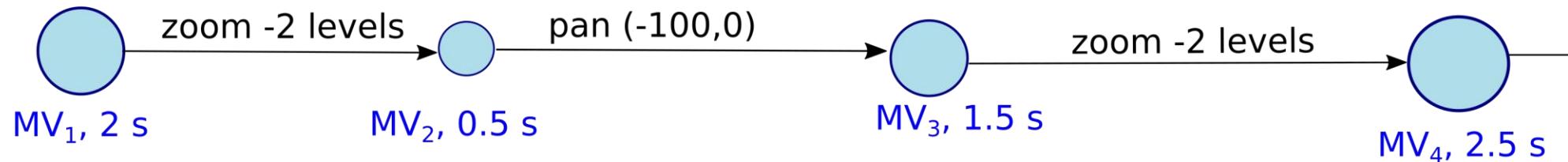
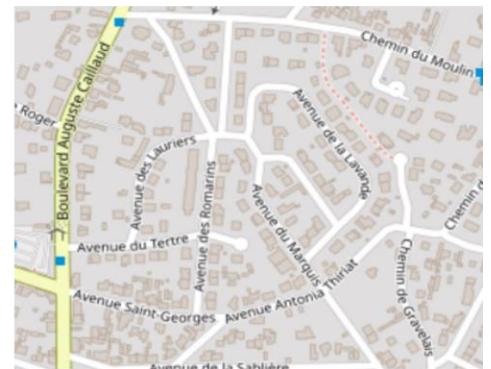
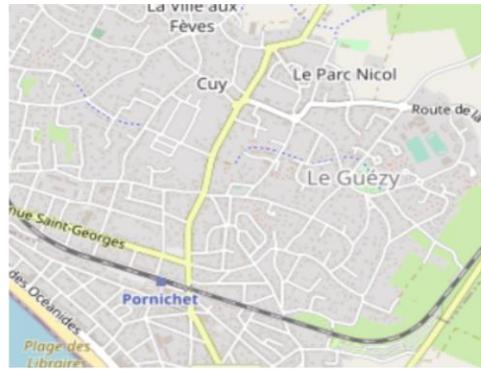
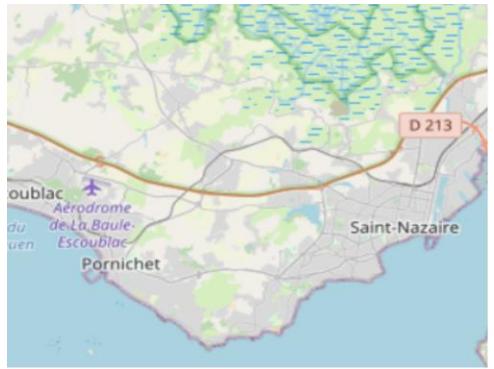
Exploring a map becomes a dynamic experience



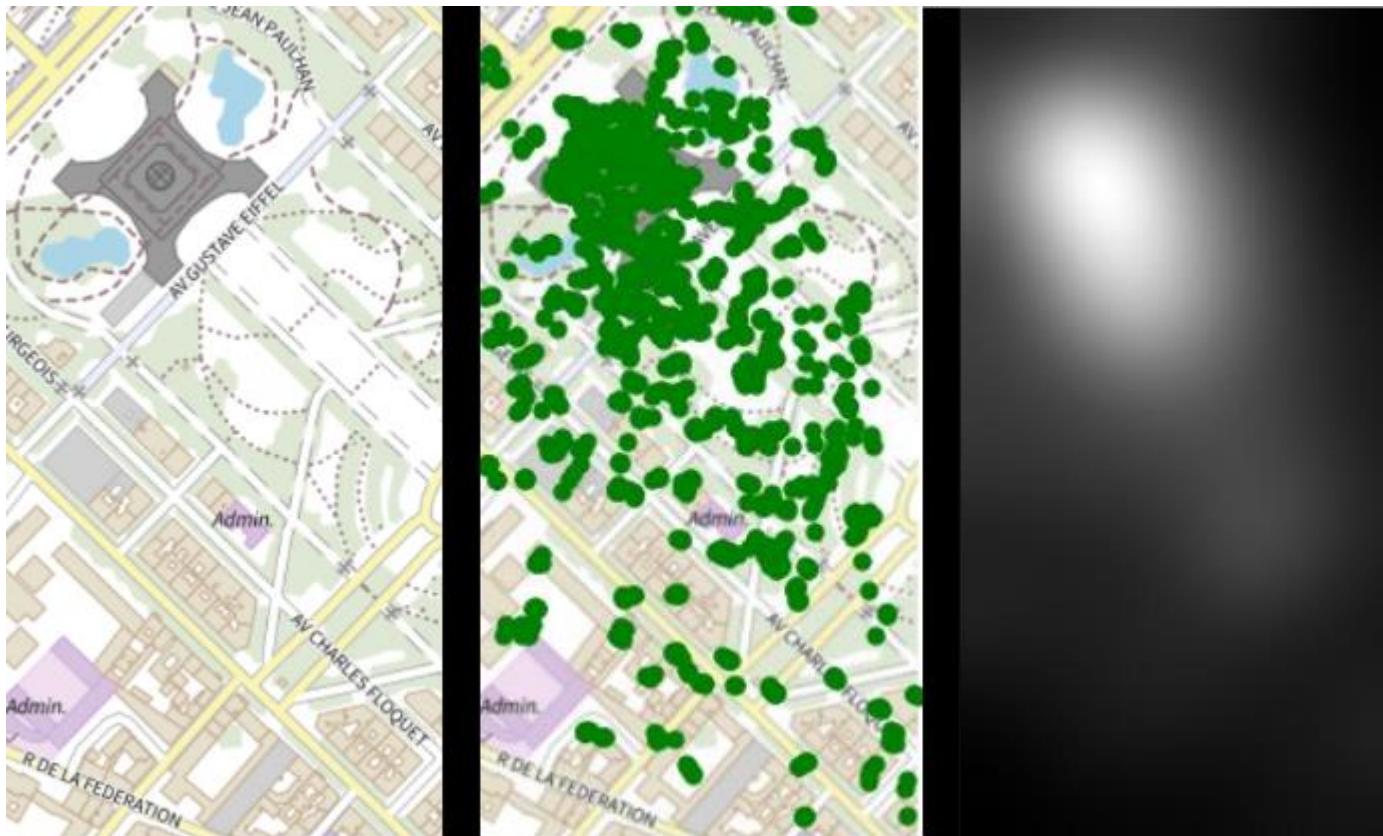


©Vincent van Gogh

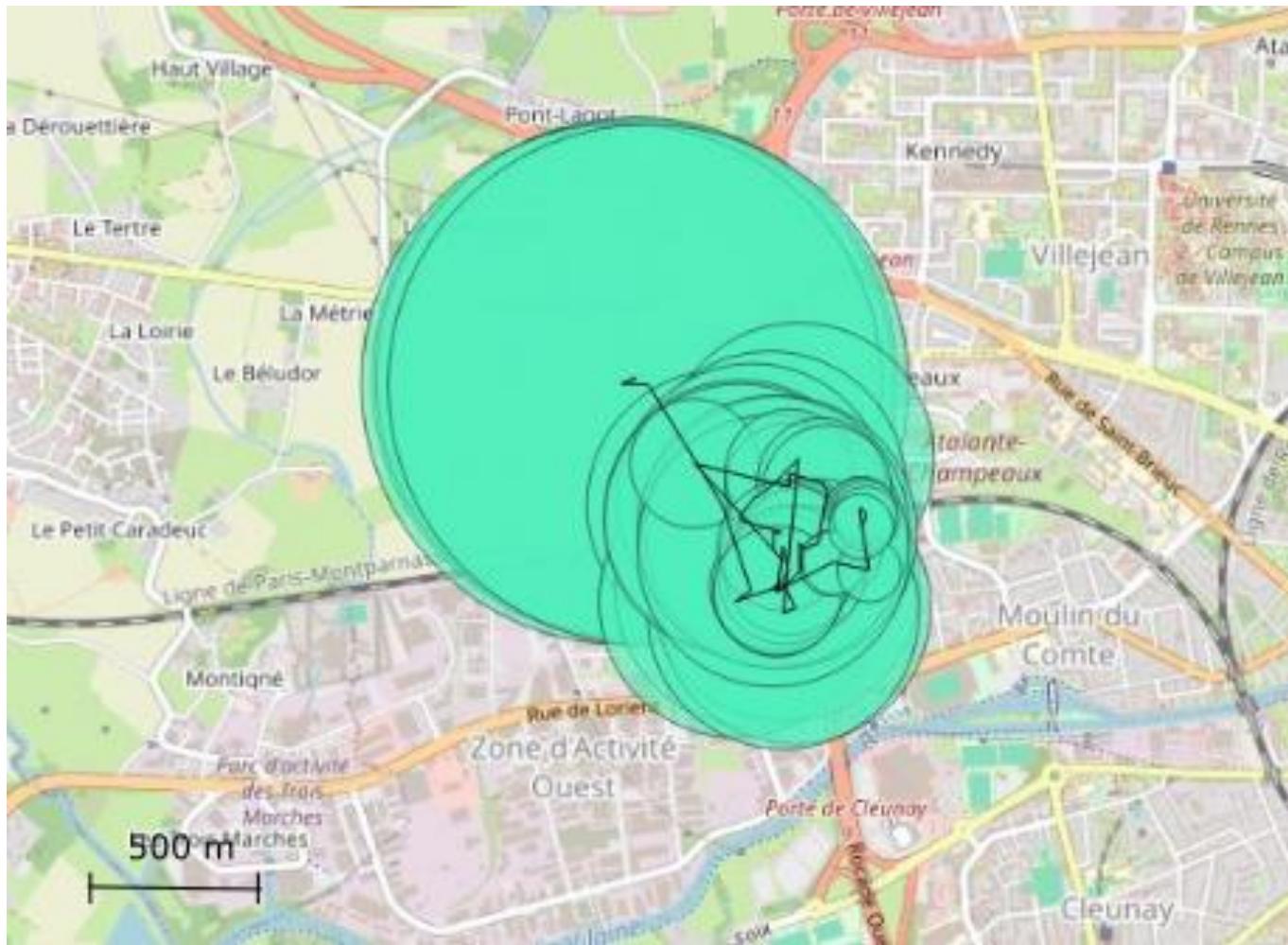




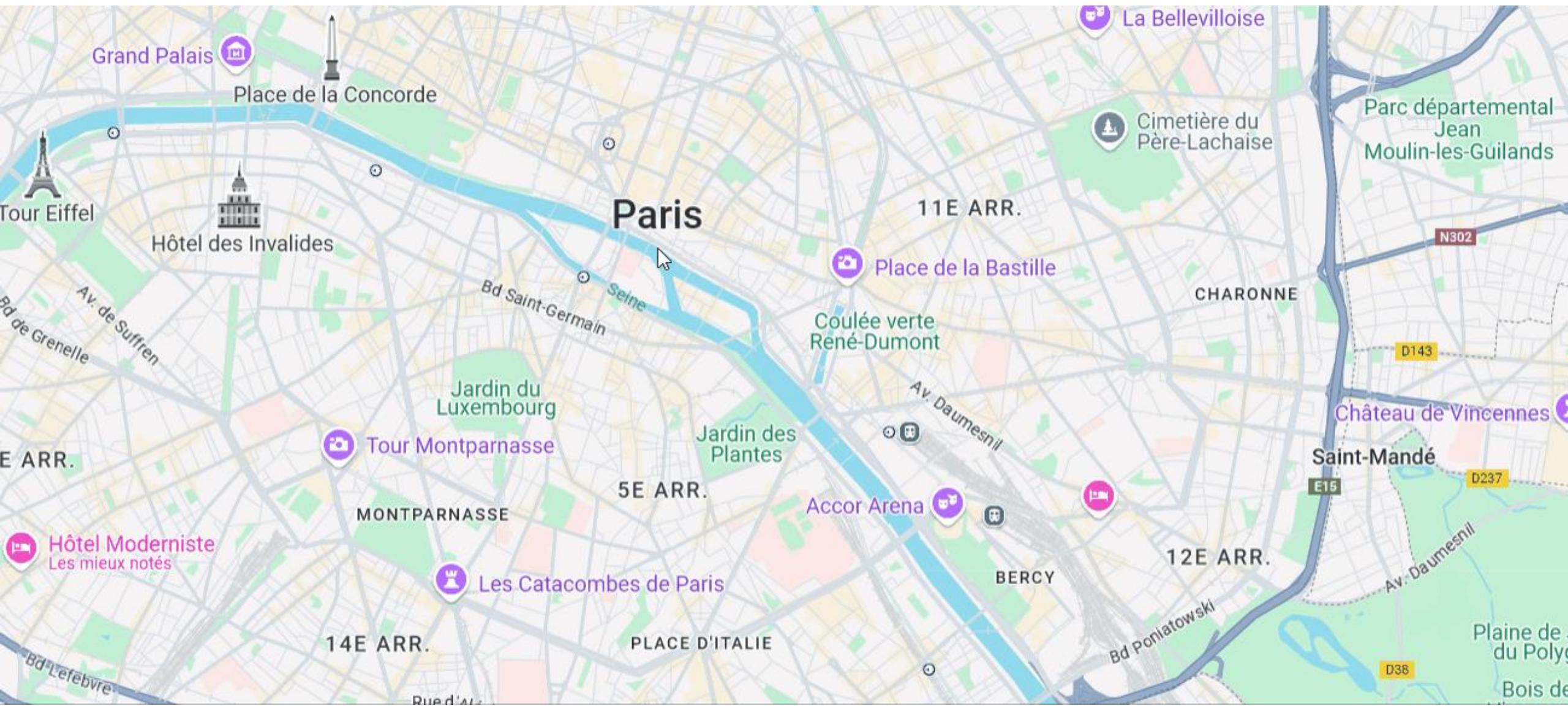
Static phases



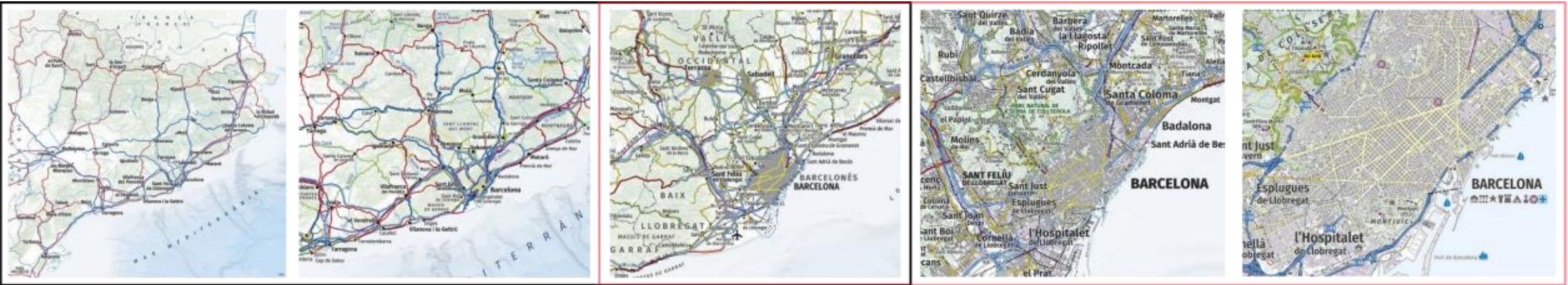
Transition phases



Short-term memory



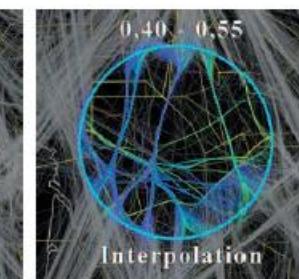
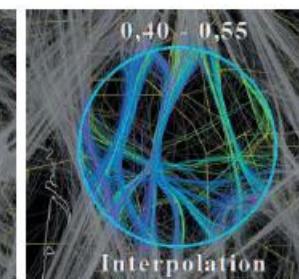
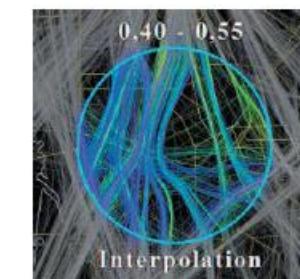
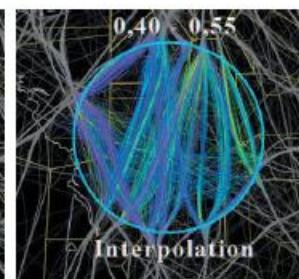
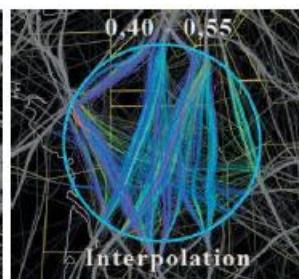
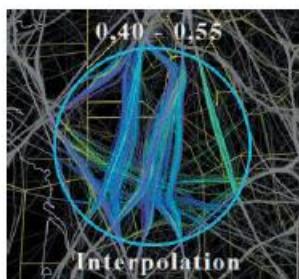
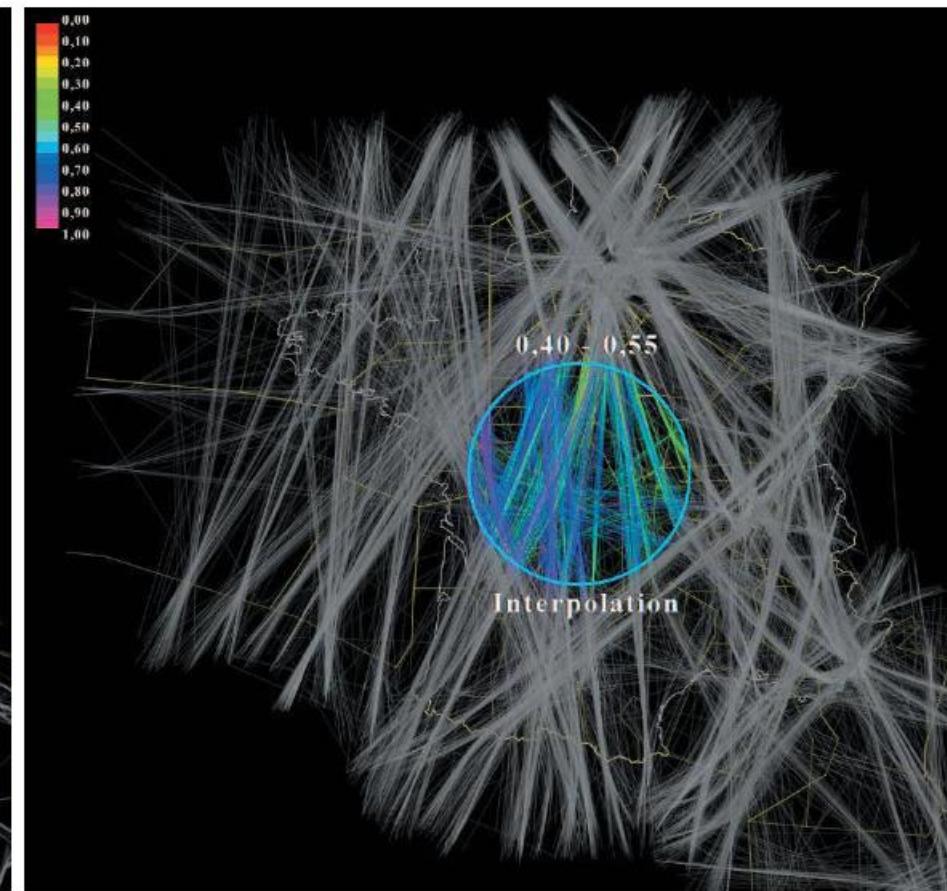
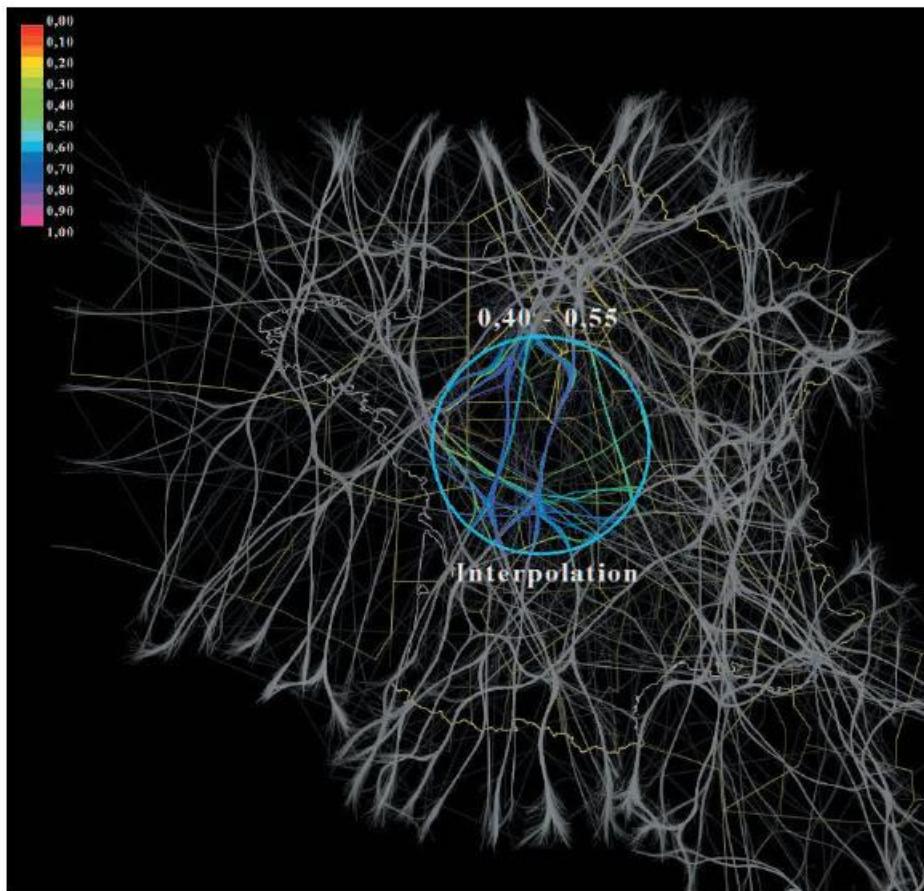
Design sequences



Interactive maps



Iron Man 2



[Hurter et al. 2011]

Multi-Scale Interactions

Pan and Zoom

Overview +
detail

Focus +
context

Cue-based
interaction

Multi-Scale Interactions

Pan and Zoom

Overview +
detail

Focus +
context

Cue-based
interaction

Diapositives

Police

Paragraphe

Dessin

Édition

17

Multi-Scale Interactions

Pan and Zoom Overview + detail Focus + context Cue-based interaction

18

Multi-Scale Interactions

Pan and Zoom Overview + detail Focus + context Cue-based interaction

19

20

Multi-Scale Interactions

Pan and Zoom Overview + detail Focus + context Cue-based interaction

21

22

Multi-Scale Interactions

Pan and Zoom

Overview +
detail

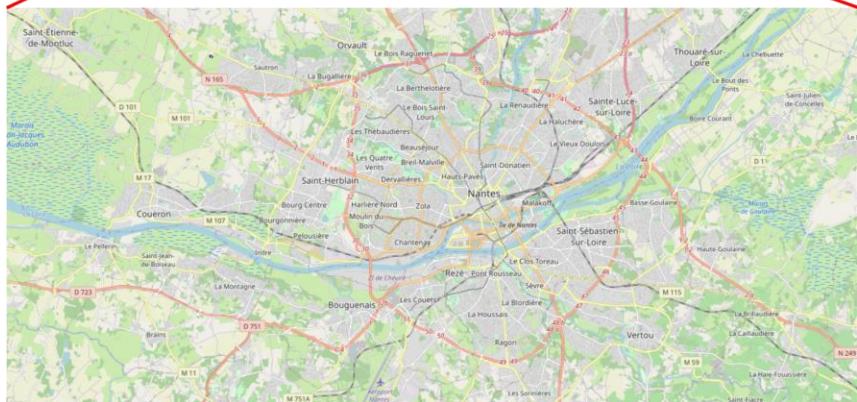
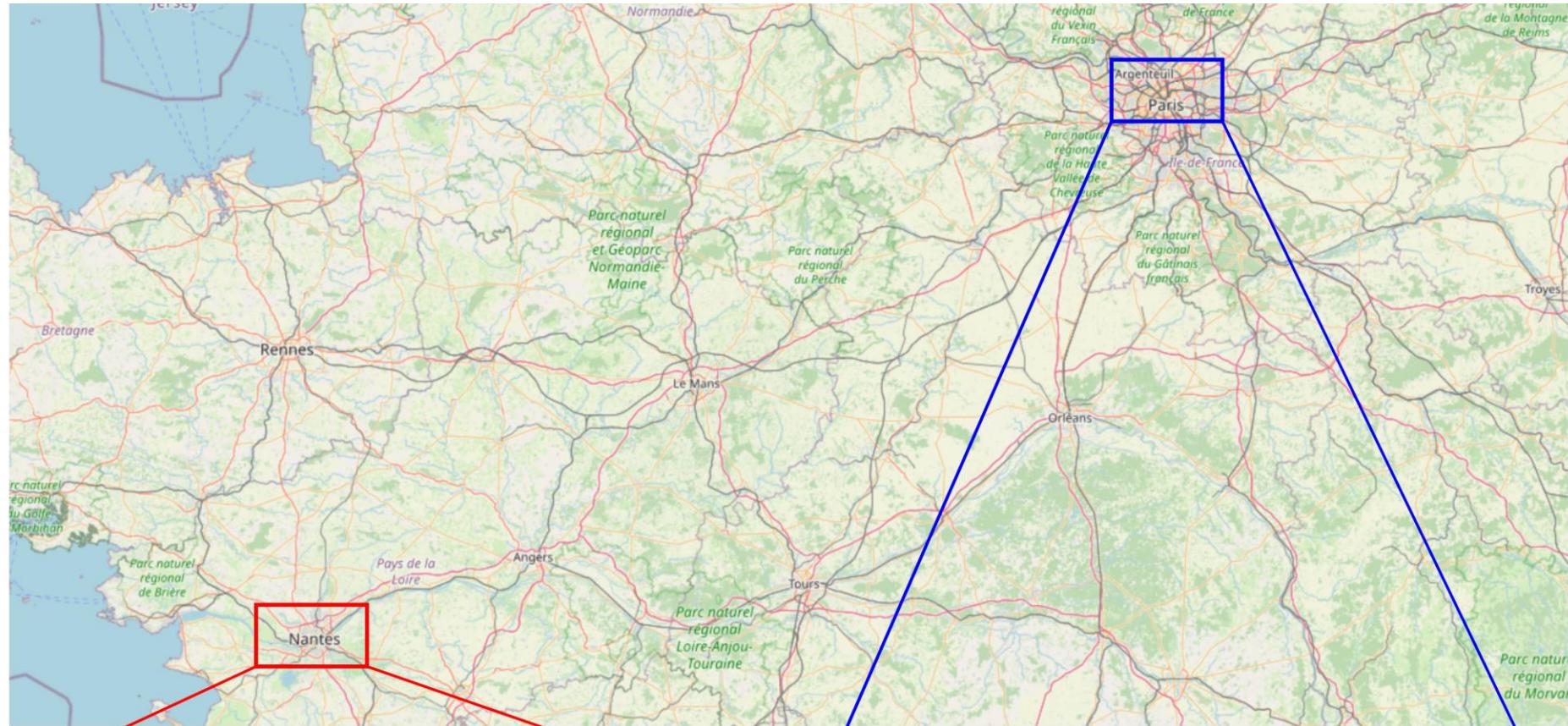
Focus +
context

Cue-based
interaction

overview

detail





PolyZoom

[Javed et al. 2012]

Multi-Scale Interactions

Pan and Zoom

Overview +
detail

Focus +
context

Cue-based
interaction



[Pindat et al. 2012]



[Alvina et al. 2014]

Multi-Scale Interactions

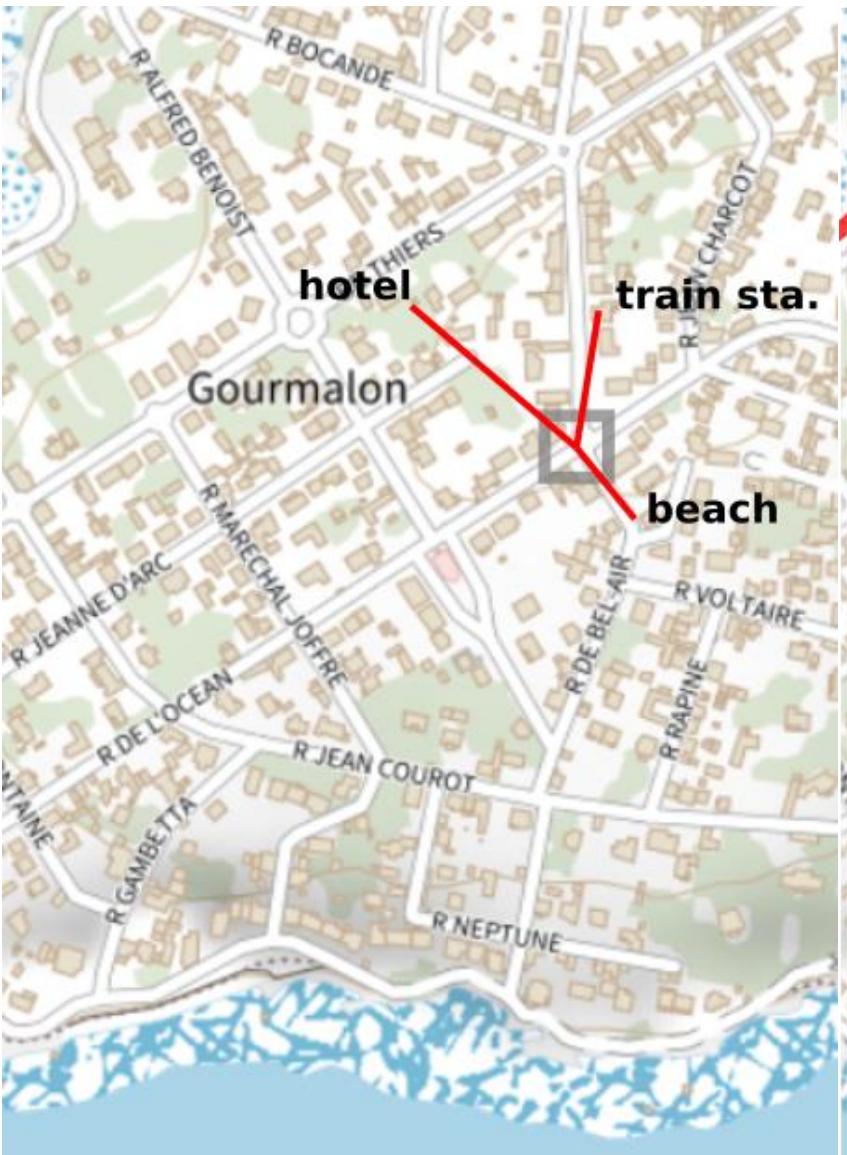
Pan and Zoom

Overview +
detail

Focus +
context

Cue-based
interaction

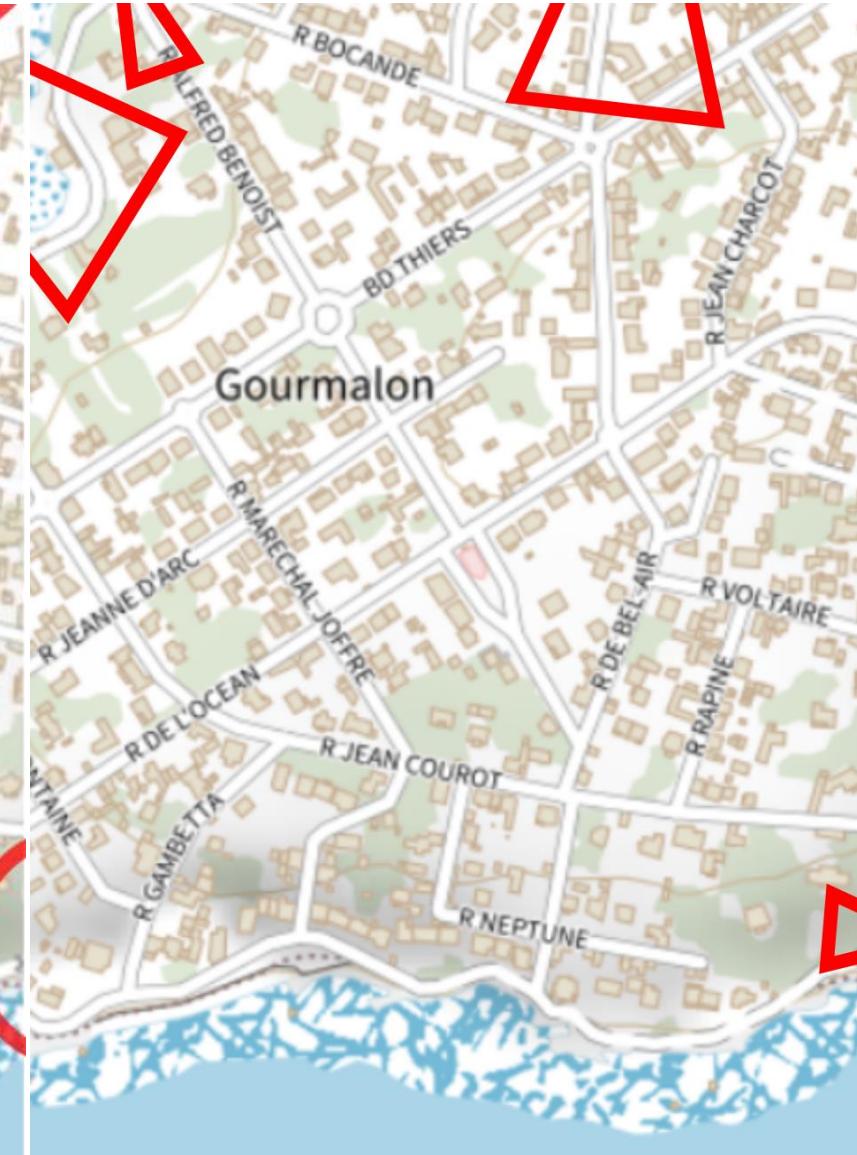
Compass



Halo



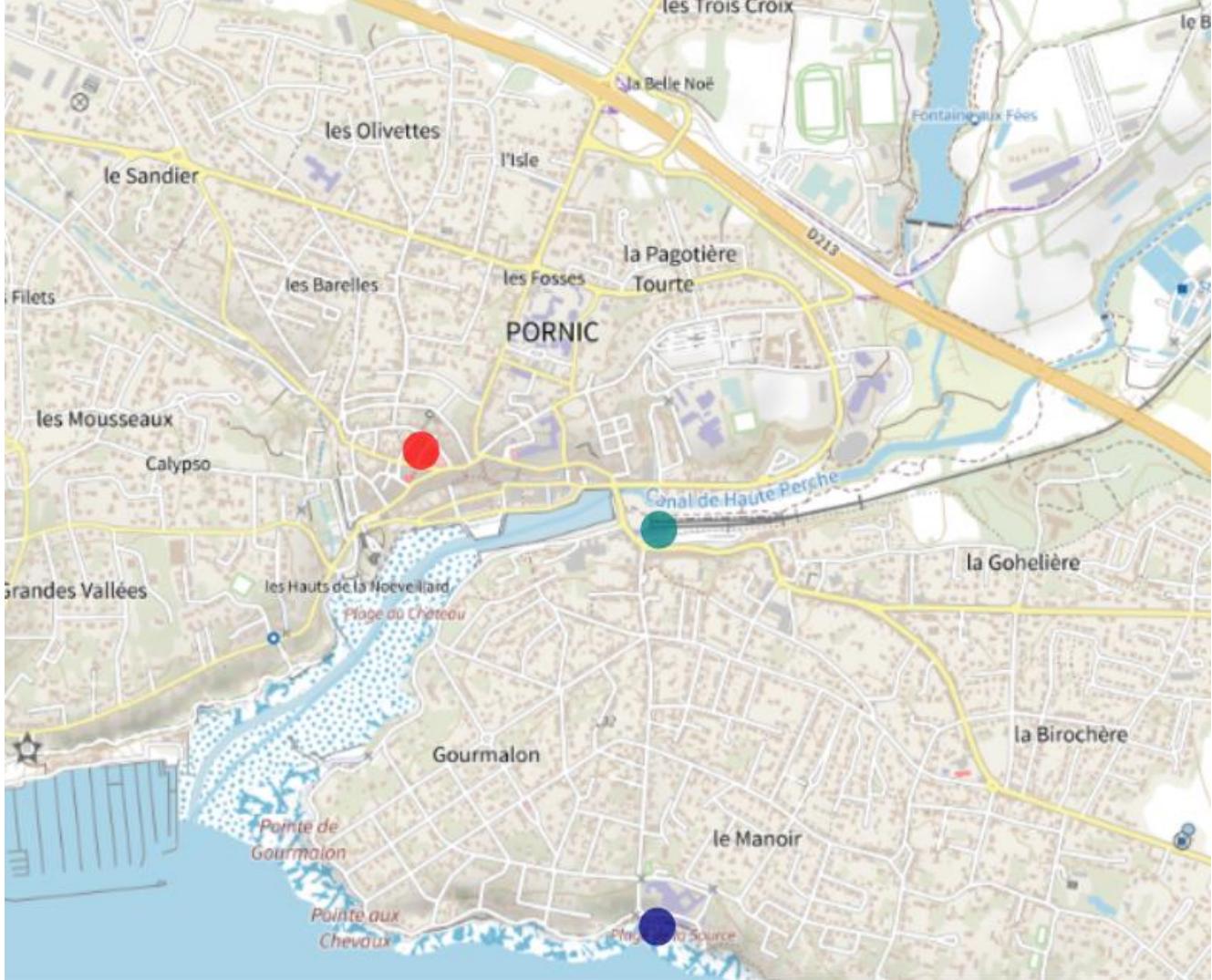
Wedge



[Miau & Feiner 2016]

[Baudisch & Rosenholtz 2003]

[Gustafson et al. 2008]

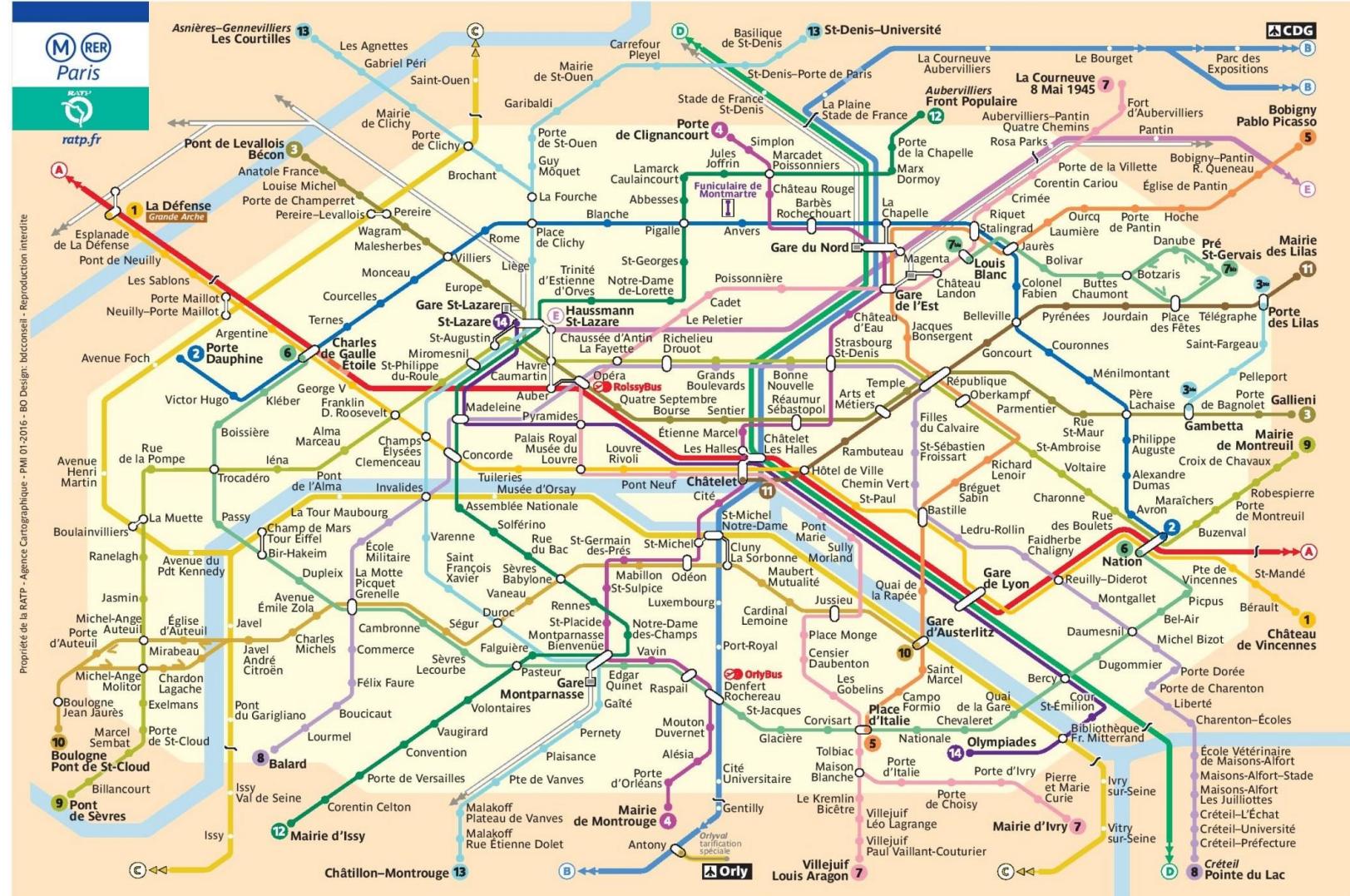


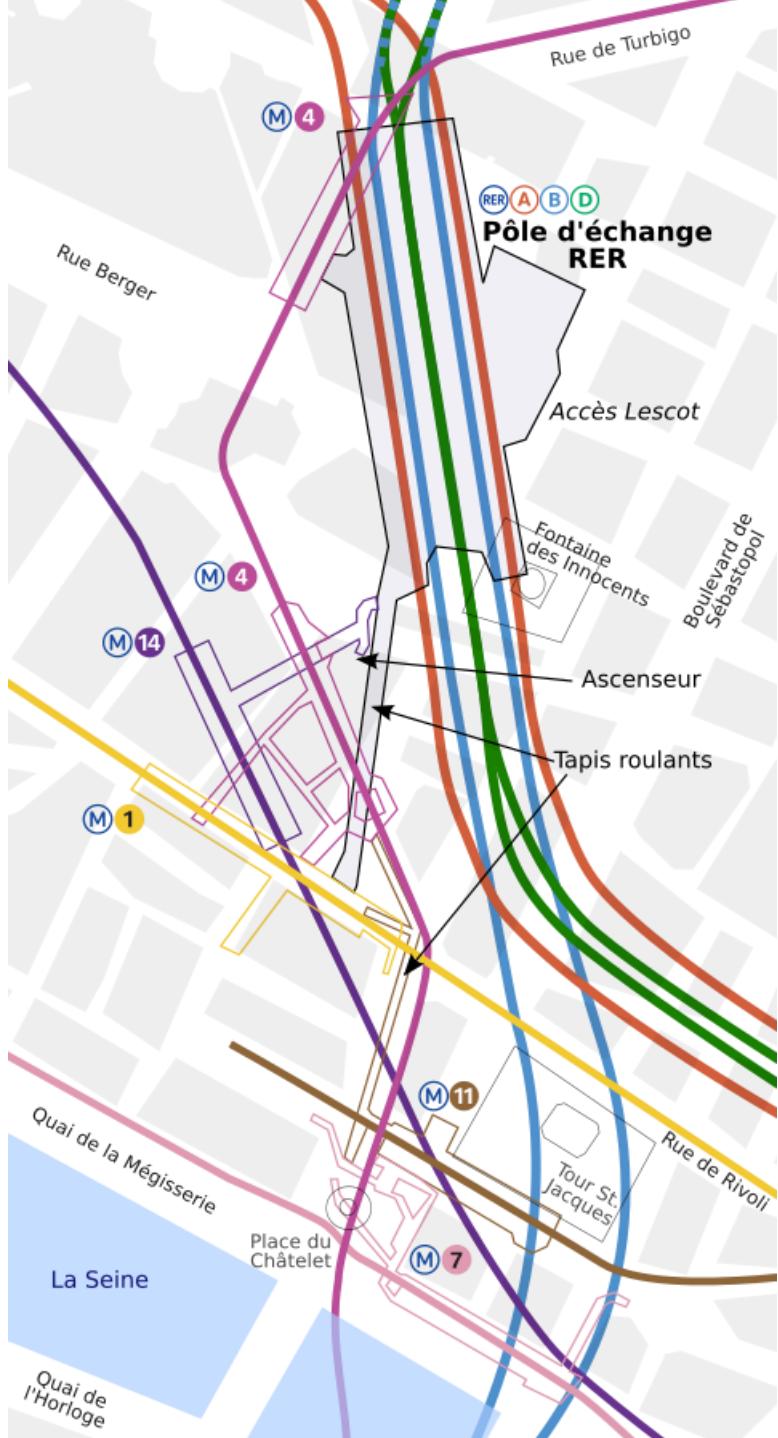
TrailMap

[Zhao et al. 2013]



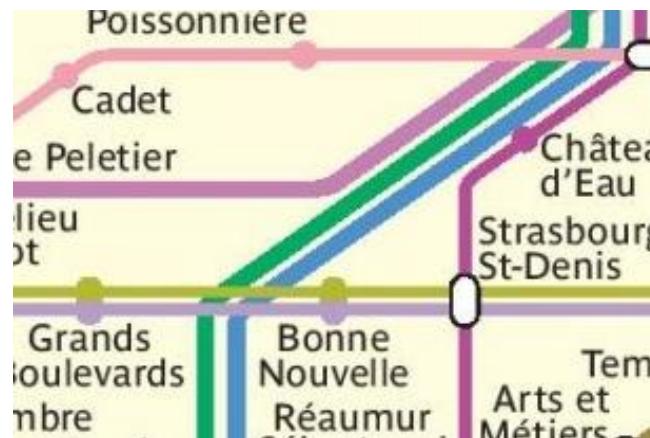
Use Case: Paris metro map



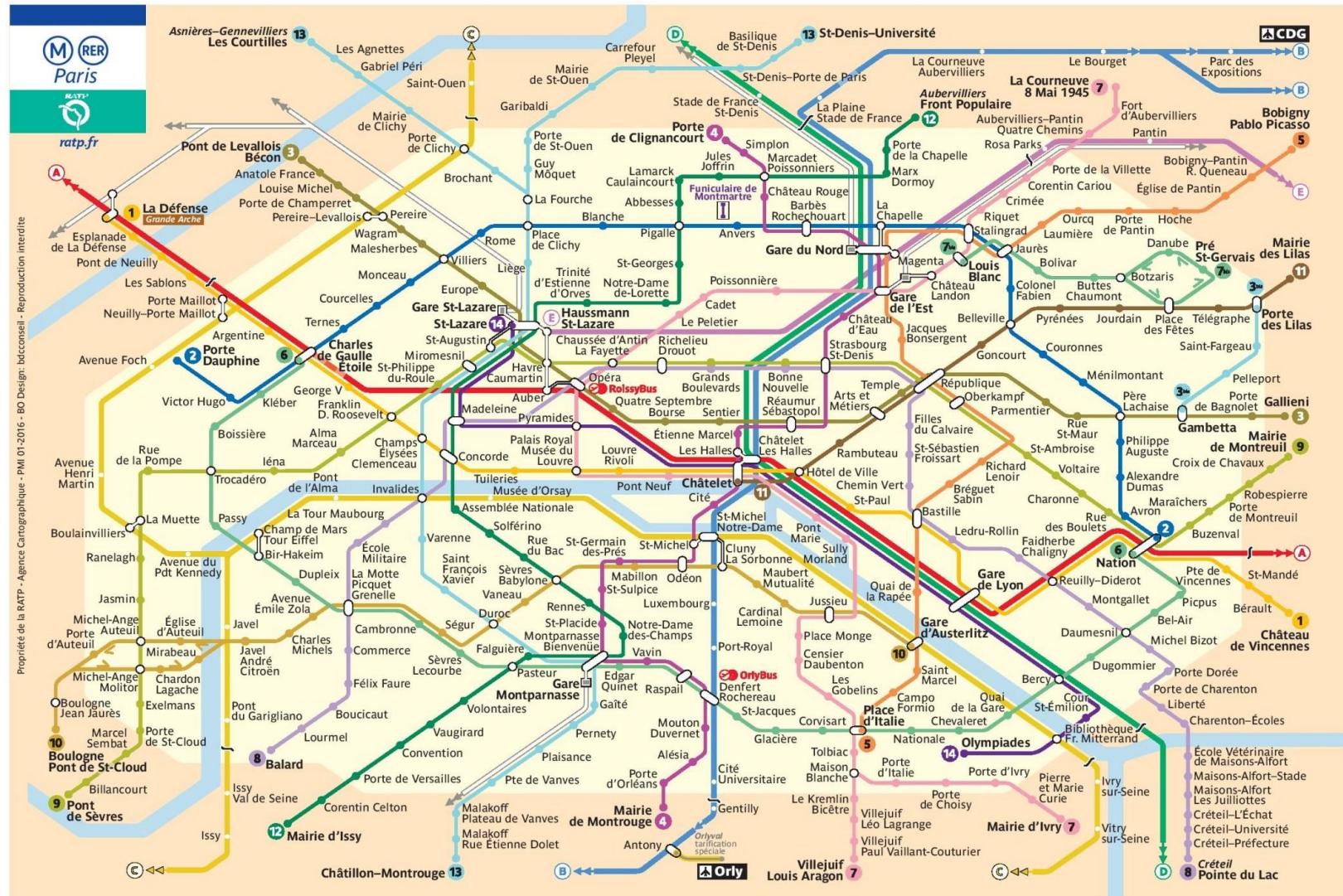


Châtelet-les Halles metro hub

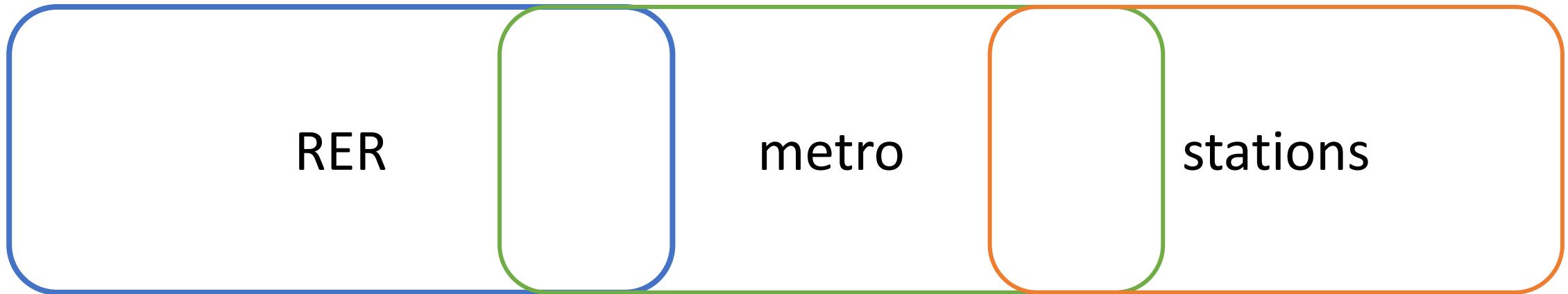
Important structures



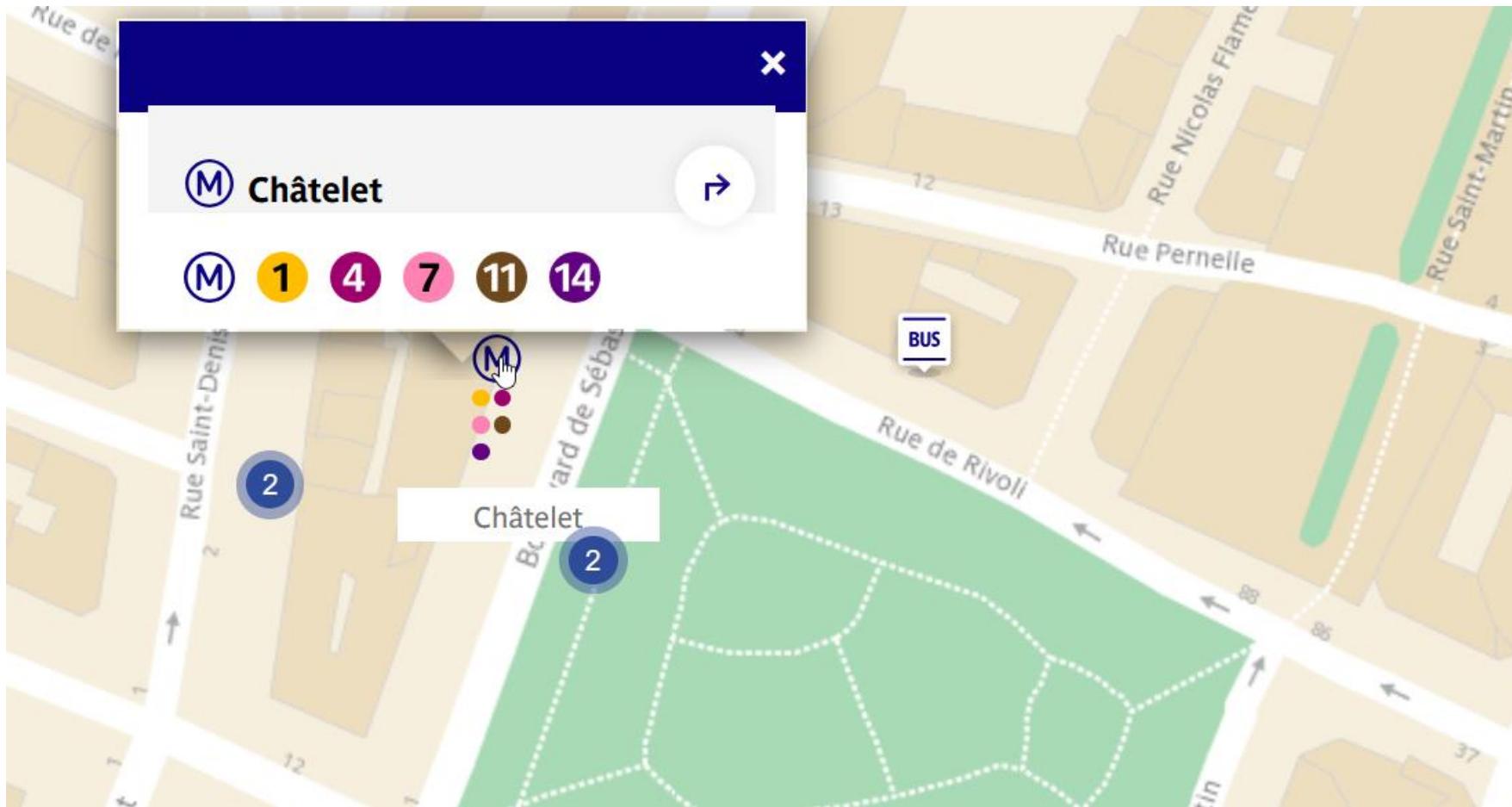
Background topographic information



3 sequences ?



Interactivity with the layers of the map



Point d'arrivée : Ecole des Ingénieurs de la Ville ...

10:42 – 11:26 (44 min)



À pied > (M) 4 > à pied > (M) 11 > à pied

À 10:57 de Montparnasse - Bienvenue
2,50 € à pied 24 min toutes les 3 minutes

Ajouter à Agenda

10:42 O Gare Montparnasse Hall 2
5 Pl. des Cinq Martyrs du Lycée Buffon,
75015 Paris

À pied

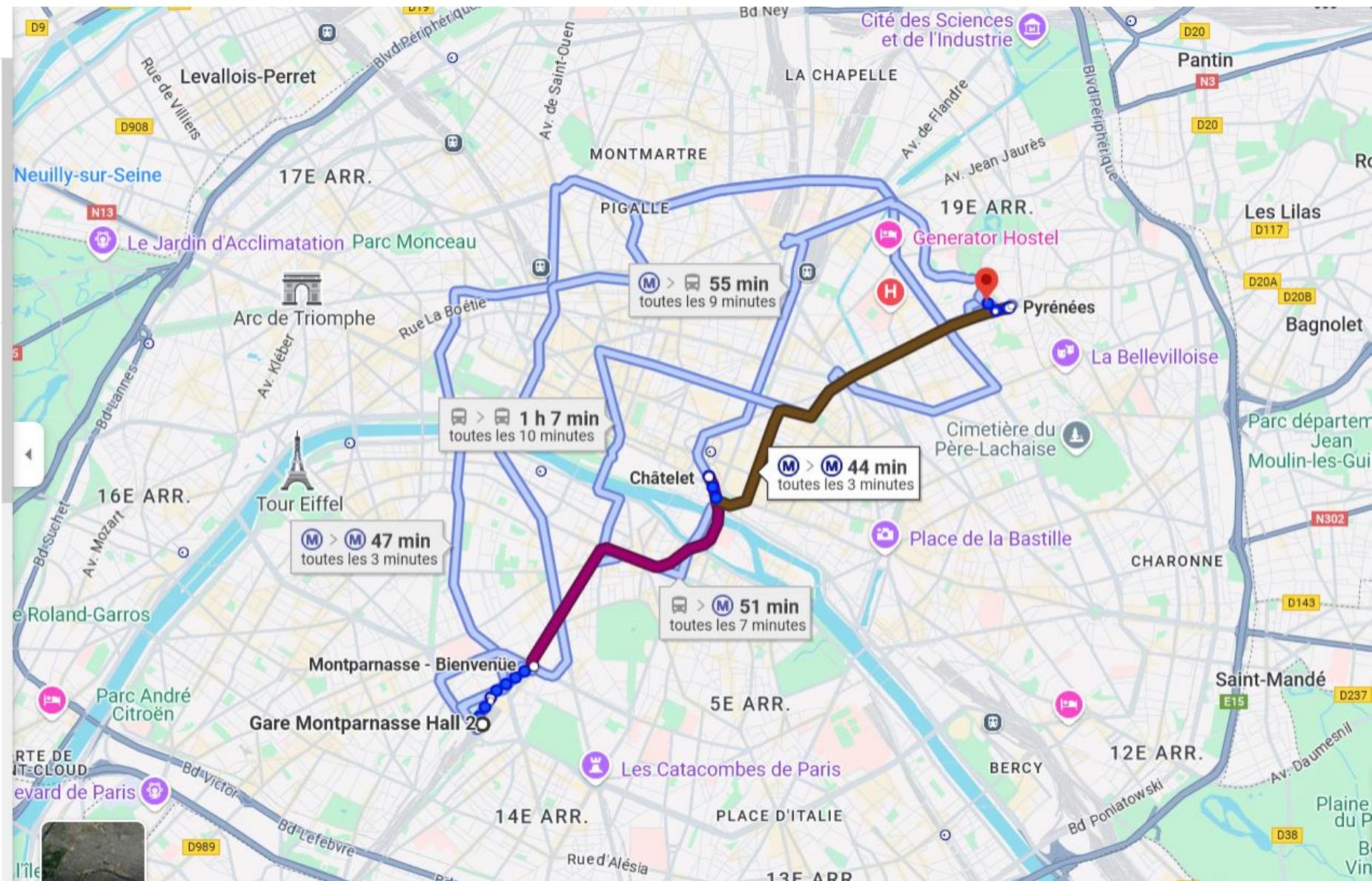
Environ 15 min, 1,0 km

10:57 O Montparnasse - Bienvenue

(M) 4 Porte de Clignancourt

8 min (7 arrêts)

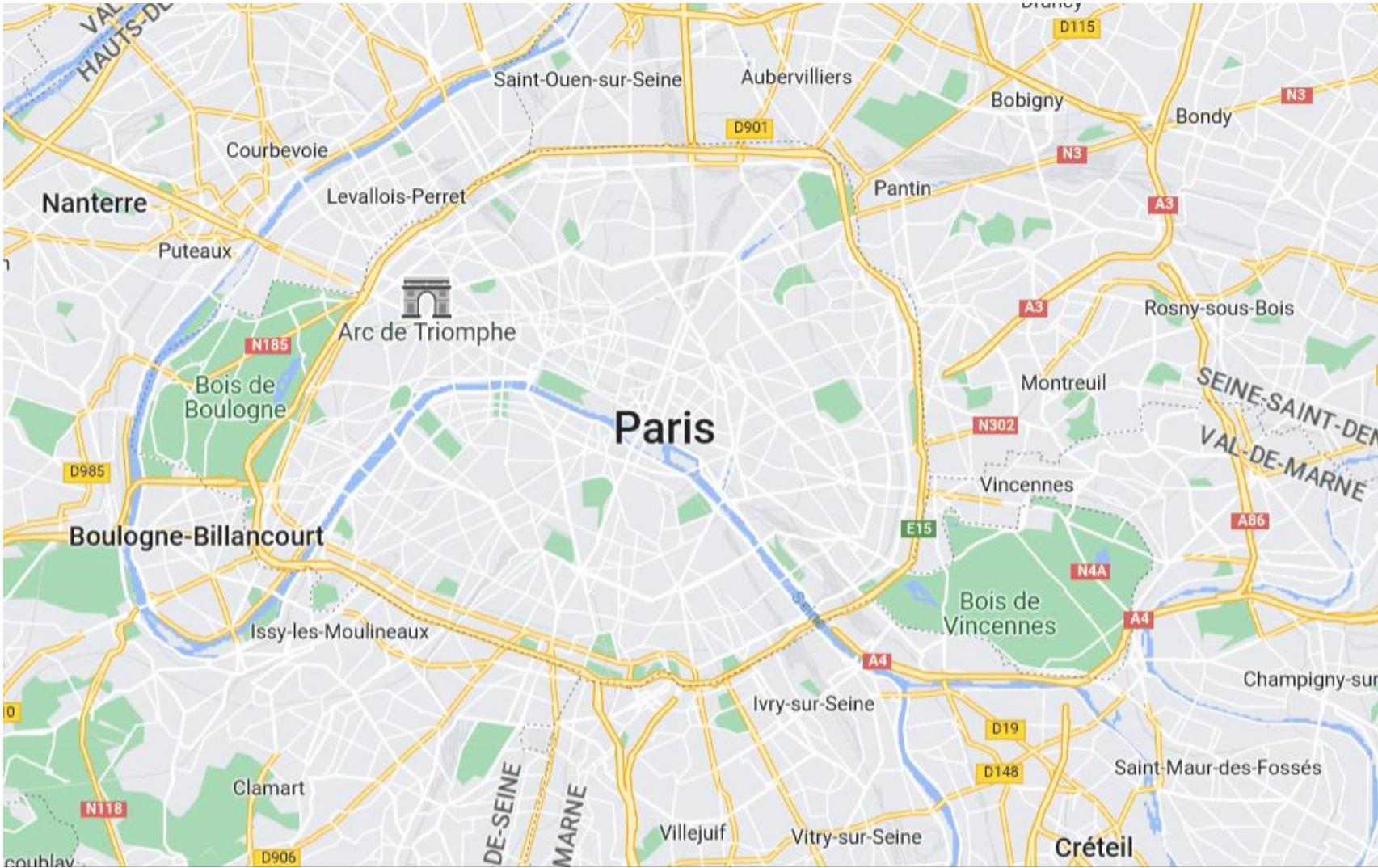
11:05 O Châtelet





Pan-scalar is not just *better*

Cartographic Disorientation



Do we still need maps?

Point d'arrivée : Ecole des Ingénieurs de la Ville ...

10:42 – 11:26 (44 min)



➤ M 4 ➤ ➤ M 11 ➤ ➤

À 10:57 de Montparnasse - Bienvenue

2,50 € ➤ 24 min toutes les 3 minutes

Ajouter à Agenda

10:42 Gare Montparnasse Hall 2

5 Pl. des Cinq Martyrs du Lycée Buffon,
75015 Paris

➤ À pied

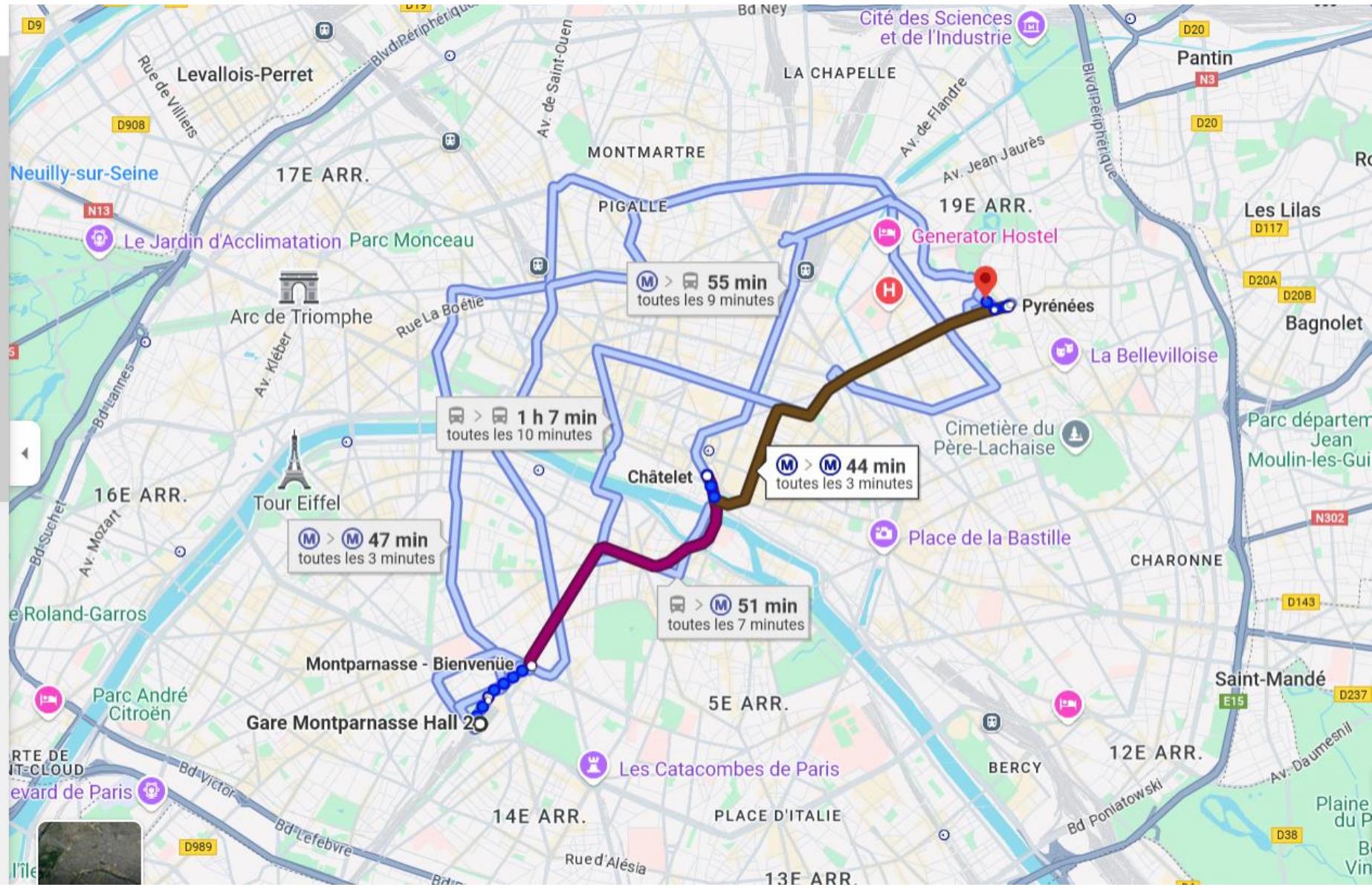
➤ Environ 15 min, 1,0 km

10:57 Montparnasse - Bienvenue

M 4 Porte de Clignancourt

➤ 8 min (7 arrêts)

11:05 Châtelet



Any question?

Towards zoomable, multi-scale, interactive schematic maps?

Guillaume Touya



ÉCOLE NATIONALE
DES SCIENCES
GÉOGRAPHIQUES



INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE



Funded by
the European Union



European Research Council
Established by the European Commission