EUROPEAN CONFERENCE ON QUALITY IN OFFICIAL STATISTICS
2024 ESTORIL - PORTUGAL

Geographical data quality for spatial analysis and geospatial statistics

Julien Gaffuri

European Commission – Eurostat

Unit E4 – Regional Statistics and Geographical Information

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

eurostat

The conference is partly
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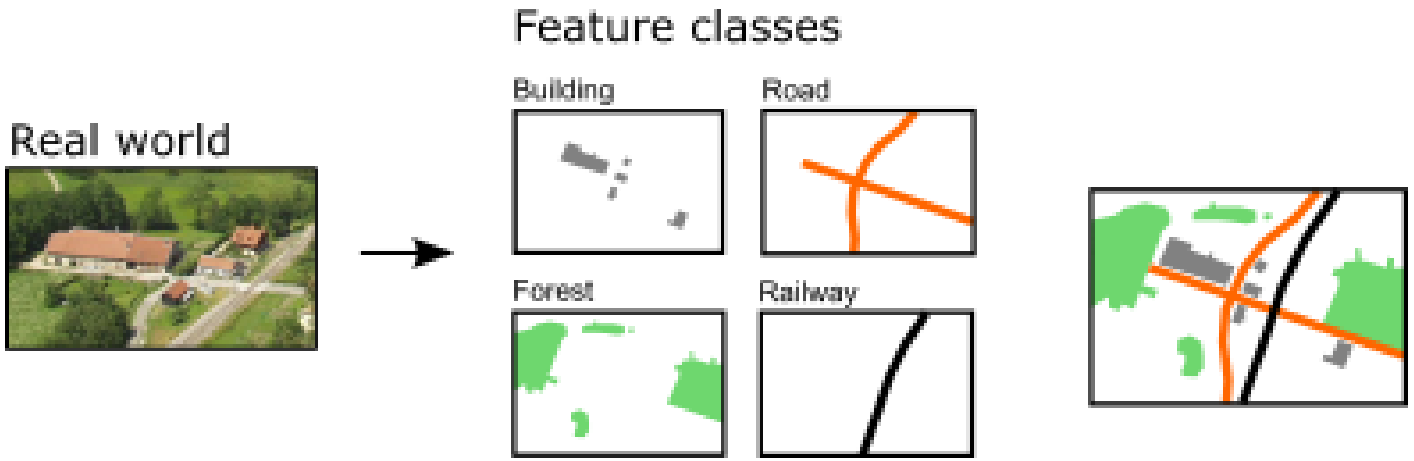
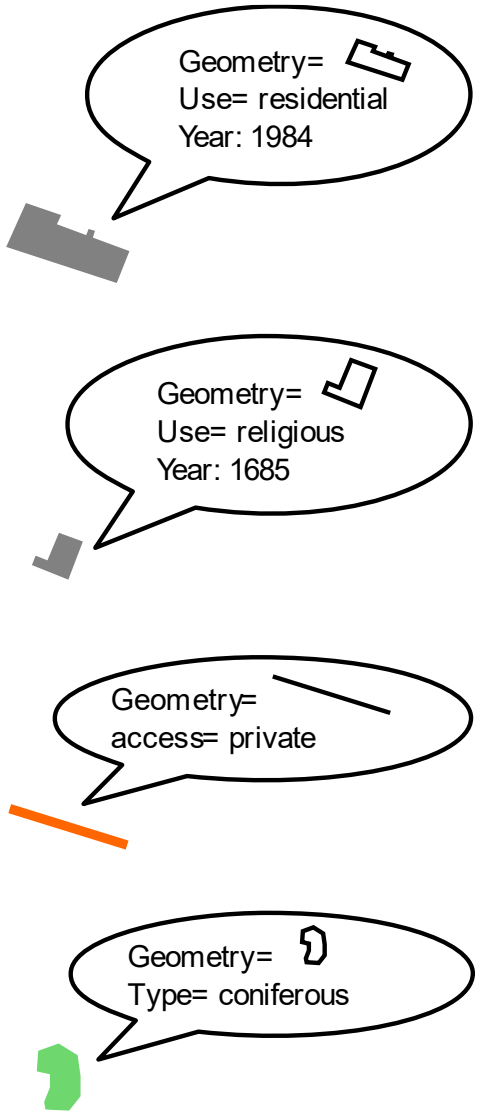
Outline

- Geographical data quality
- Controlling geographical data quality on spatial analyses
  - Building density analysis
  - Healthcare services accessibility analysis

Vector geographical data

- Features, attributes, relations





- Data specification document

CLASSE: **Rete ferroviaria (RT_FER - 010211)**

Classe con istanze monoscala

	DBSN -IGM	NC-DBSN -IGM
Popolamento della classe	P	

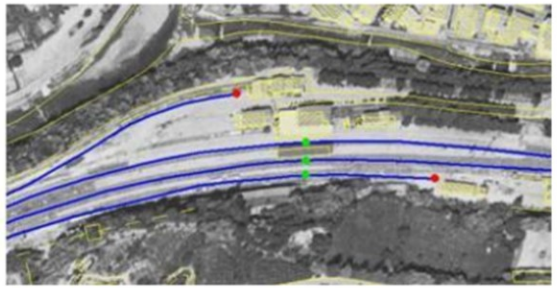
Definizione

La classe definisce quali entità costituiscono il grafo ferroviario. È costituito dalla connessione di elementi ferroviari attraverso giunzioni ferroviarie secondo le regole di definizione del grafo connesso. Ha più attributi geometrici perché può riferirsi al grafo bidimensionale od a quello tridimensionale.

Vedi: Stralcio di grafo ferroviario:elementi e giunzioni ferroviarie

Figure

- Stralcio di grafo ferroviario:elementi e giunzioni ferroviarie



Attributi

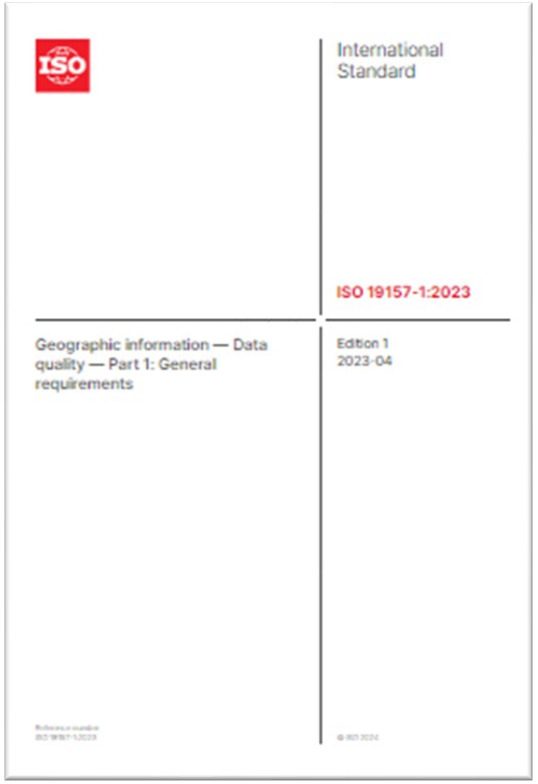
Attributi della classe				DBSN -IGM	NC-DBSN -IGM
01021199	TXT	metadato operativo	String(1024)	P	
	Annotazioni riguardanti l'origine e le successive modifiche del dato				
010211000		meta_ist	Enum		P
	Metadato di istanza che descrive la fonte del dato in riferimento principalmente alla geometria editata.				
	Dominio (Meta_ist)			DBSN -IGM	NC-DBSN -IGM
	01	igm	Dato acquisito da IGM		P

DBSN (DataBase di Sintesi Nazionale)
https://www.igmi.org/

Geographical data quality

- Specific requirements for geographical data quality
- External and internal quality
- For internal quality, various practices and standards
  - “Spatial Data Quality”
  - 4th International Workshop on Spatial Data Quality
  - ISO 19157-1:2023 – Geographical information – Data quality

    See https://www.iso.org/standard/78900.html

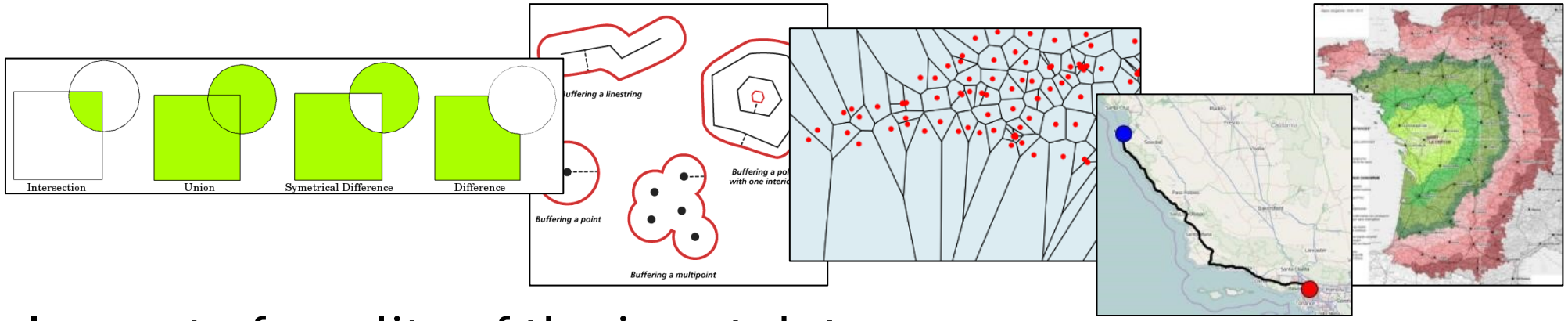


Geographical data quality components

- Completeness (ommission and commission)
- Conceptual consistency
- Domain consistency
- Topological consistency
- Absolute positional accuracy
- Relative positional accuracy
- Thematic accuracy
- Temporal validity
- Temporal accuracy
- Metaquality
- …

Controlling geographical data quality on spatial analyses

- Geographical data and GIS-based spatial analyses



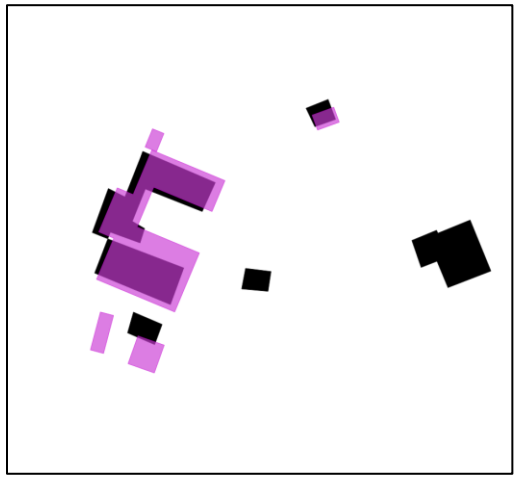
- Impact of quality of the input data
  - Example: completeness and counts
- 2 examples from Eurostat activities:
  - Building density analysis
  - Healthcare services accessibility analysis

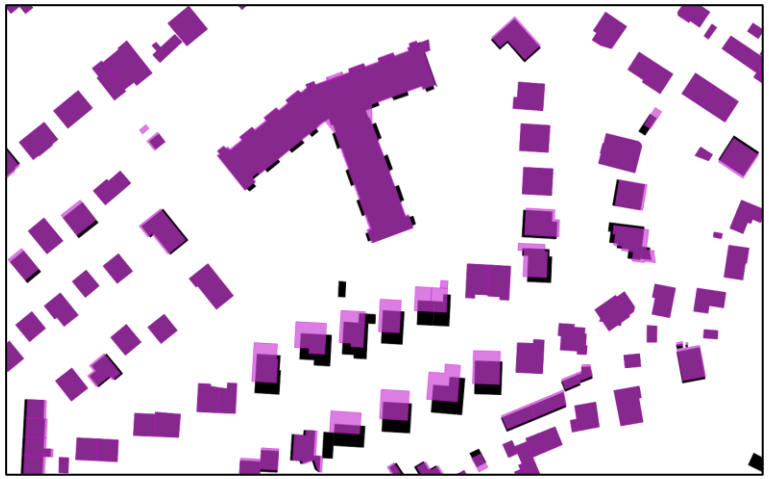
Building density analysis

- Measure evolution of building stock (density, type, usage, energy performance, etc.).
- Various indicators at 100m cell level.

Building density analysis

- Input data:
  - French national topographic dataset BD TOPO®
  - OpenStreetMap
- Different qualities

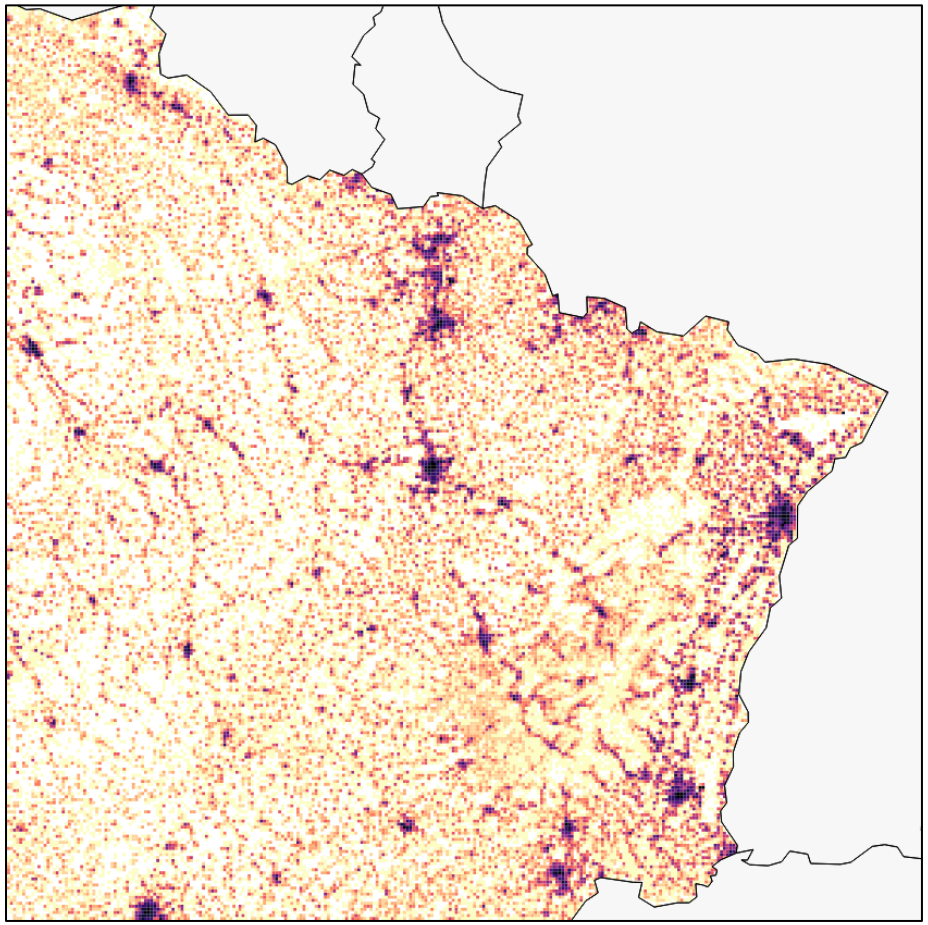




BD TOPO
OpenStreetMap

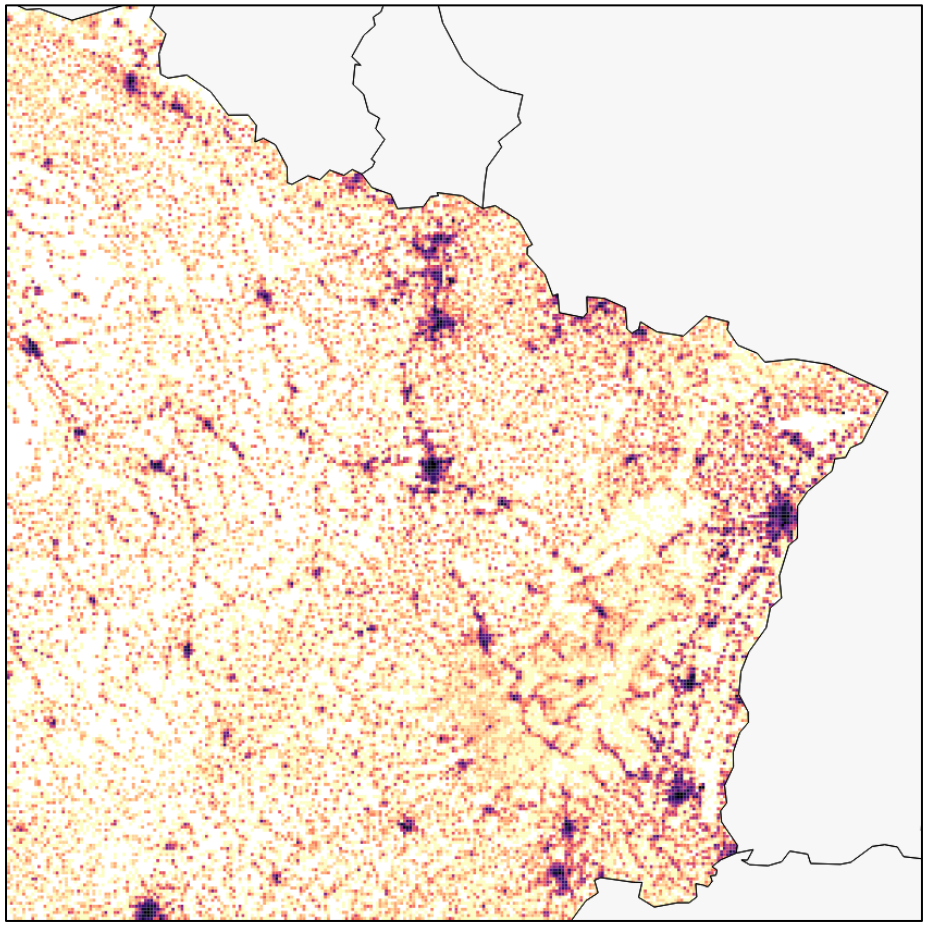
Building density analysis – total ground area

BD TOPO



Building density analysis – total ground area

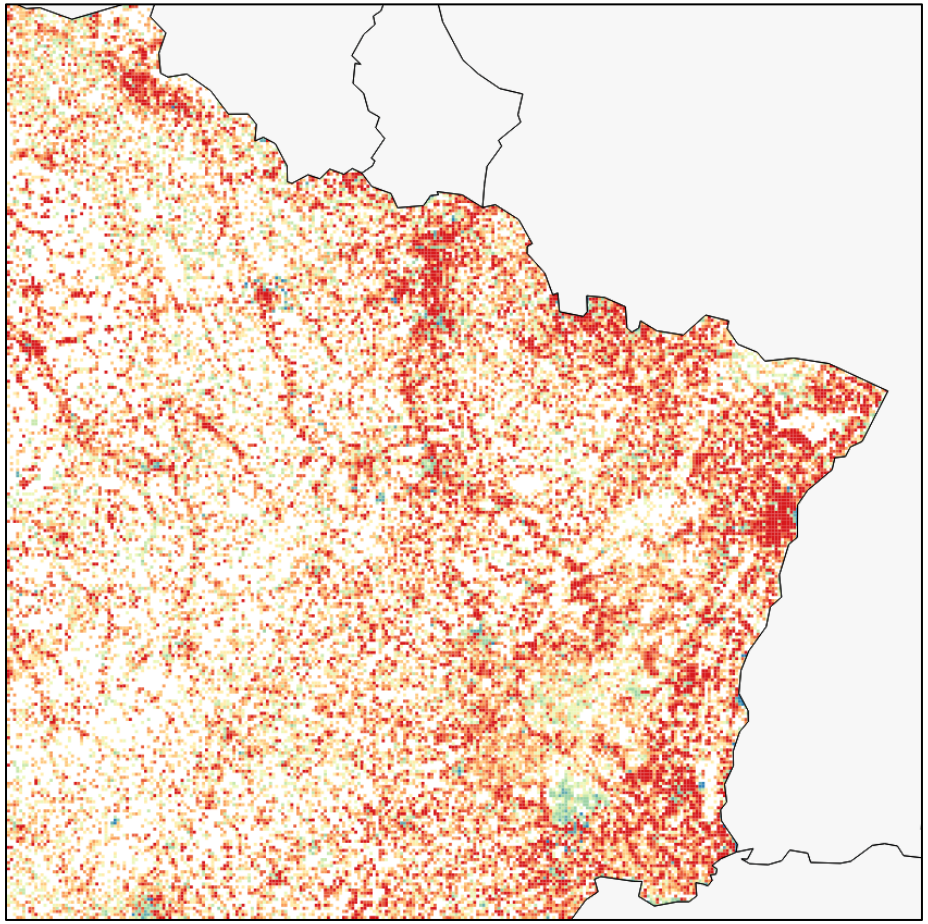
OpenStreetMap



< 2611 sqm
2611 - 8967
8967 - 17407
17407 - 27818
27818 - 40973
40973 - 57415
57415 - 78021
78021 - 104642
104642 - 138274
138274 - 187174
187174 - 291425
> 291425 sqm

Building density analysis – total ground area

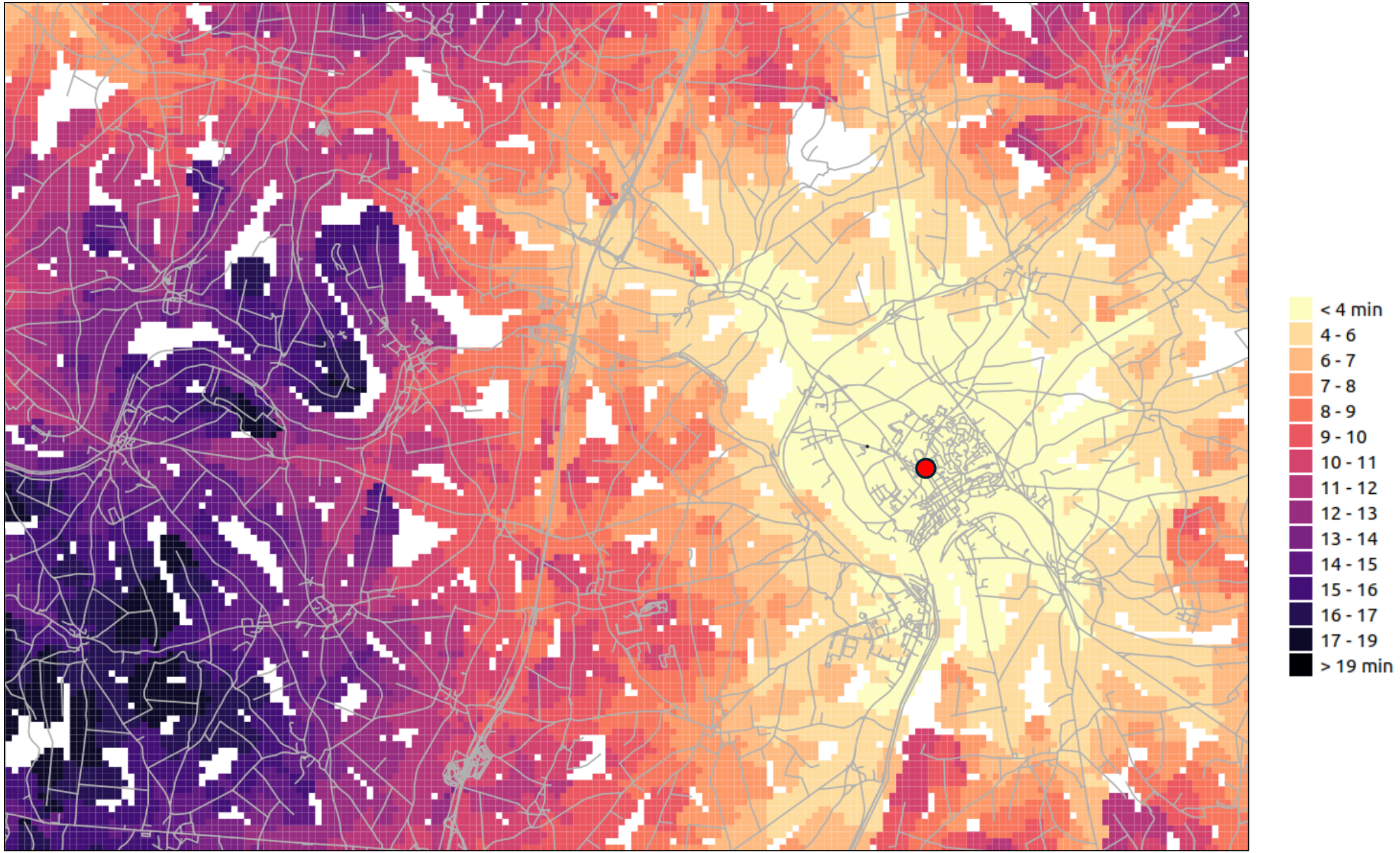
Difference
OpenStreetMap – BD TOPO



Identified quality components:
- Completeness
- Thematic accuracy
- Temporal validity
- (Absolute positional accuracy)

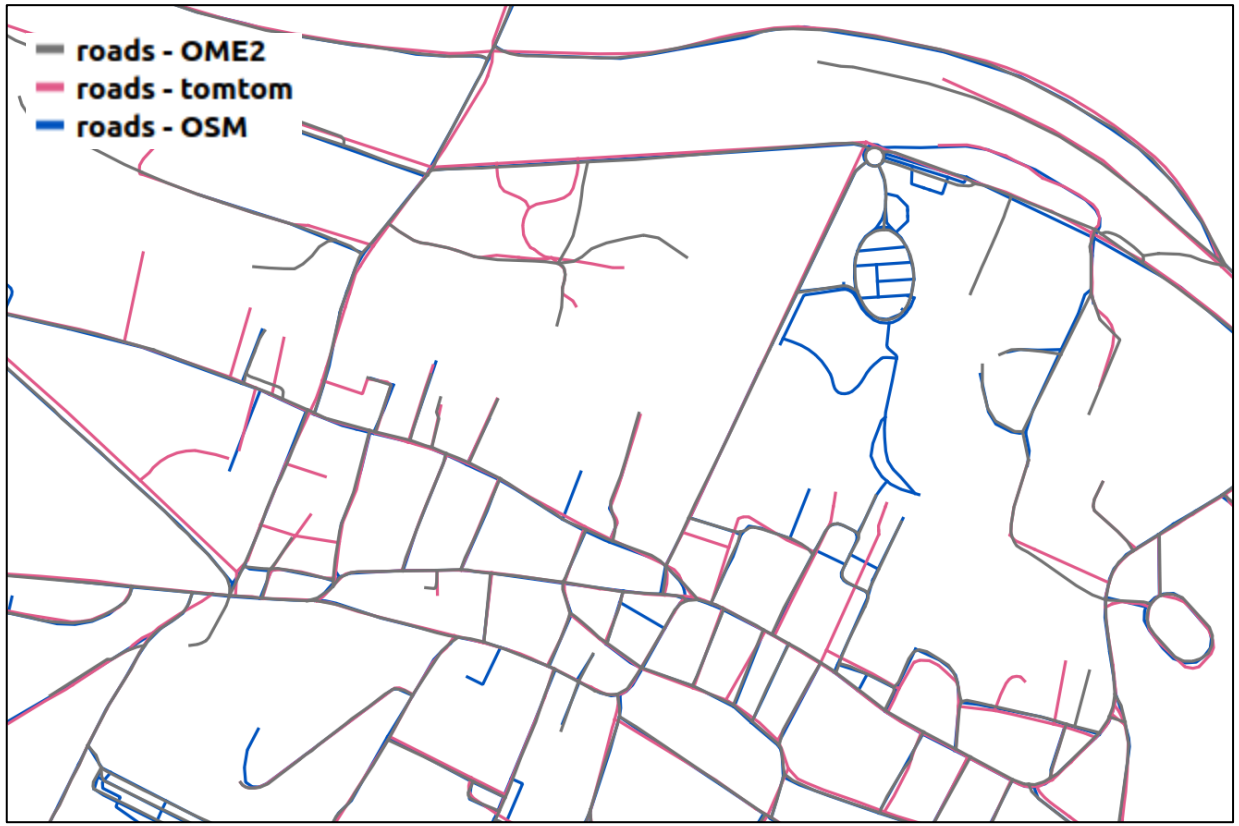
Healthcare services accessibility analysis

- Eurostat dataset on the localisation of main healthcare services in Europe.
- Accessibility at 100m resolution: Driving time to the nearest service by road network.


< 4 min
4 - 6
6 - 7
7 - 8
8 - 9
9 - 10
10 - 11
11 - 12
12 - 13
13 - 14
14 - 15
15 - 16
16 - 17
17 - 19
> 19 min

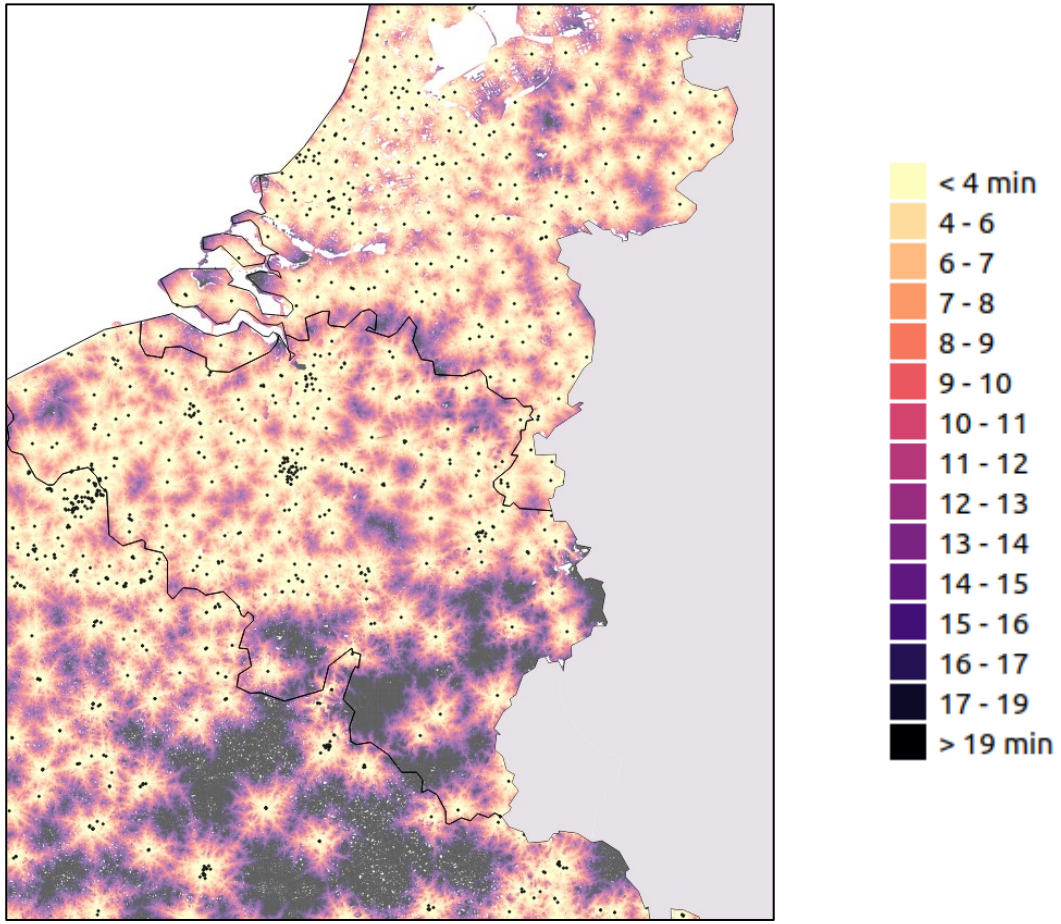
Healthcare services accessibility analysis

- Input transport network data:
  - OME2 Open Map for Europe 2
  - Multinet Tomtom
  - OpenStreetMap
- Different qualities



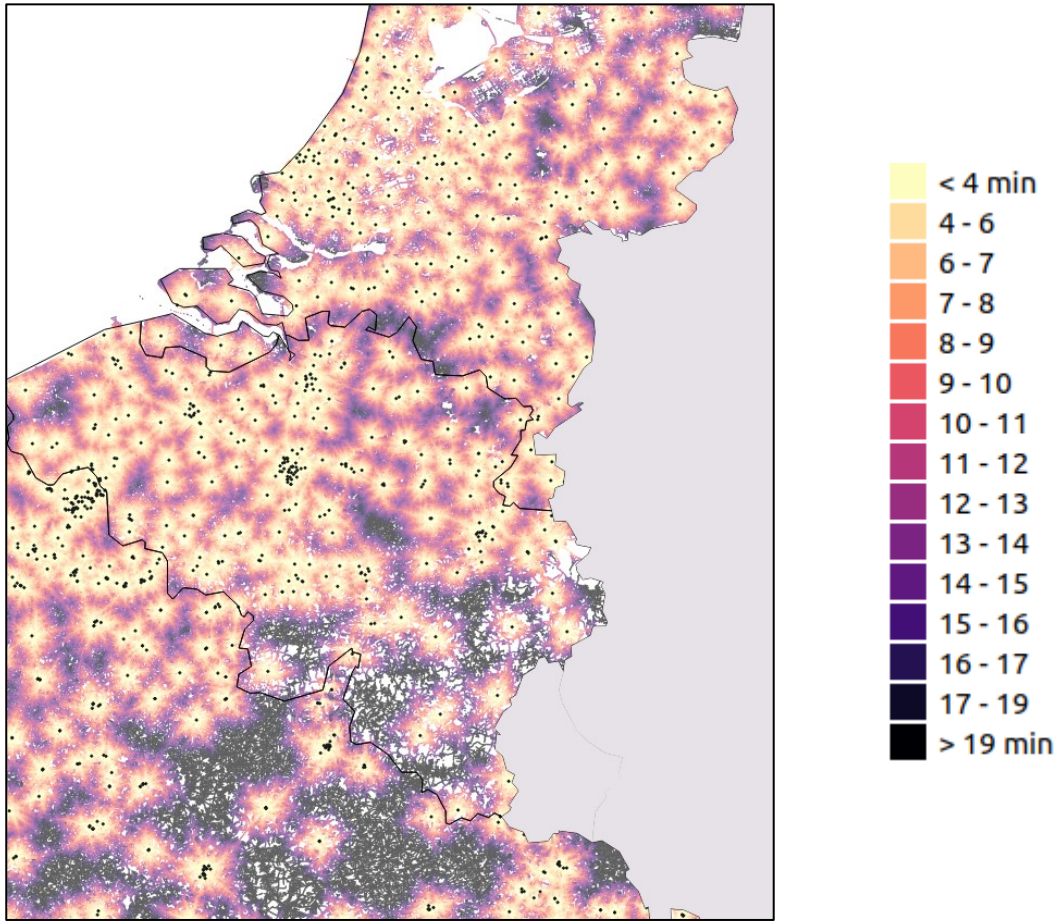
Healthcare services accessibility analysis

OME2



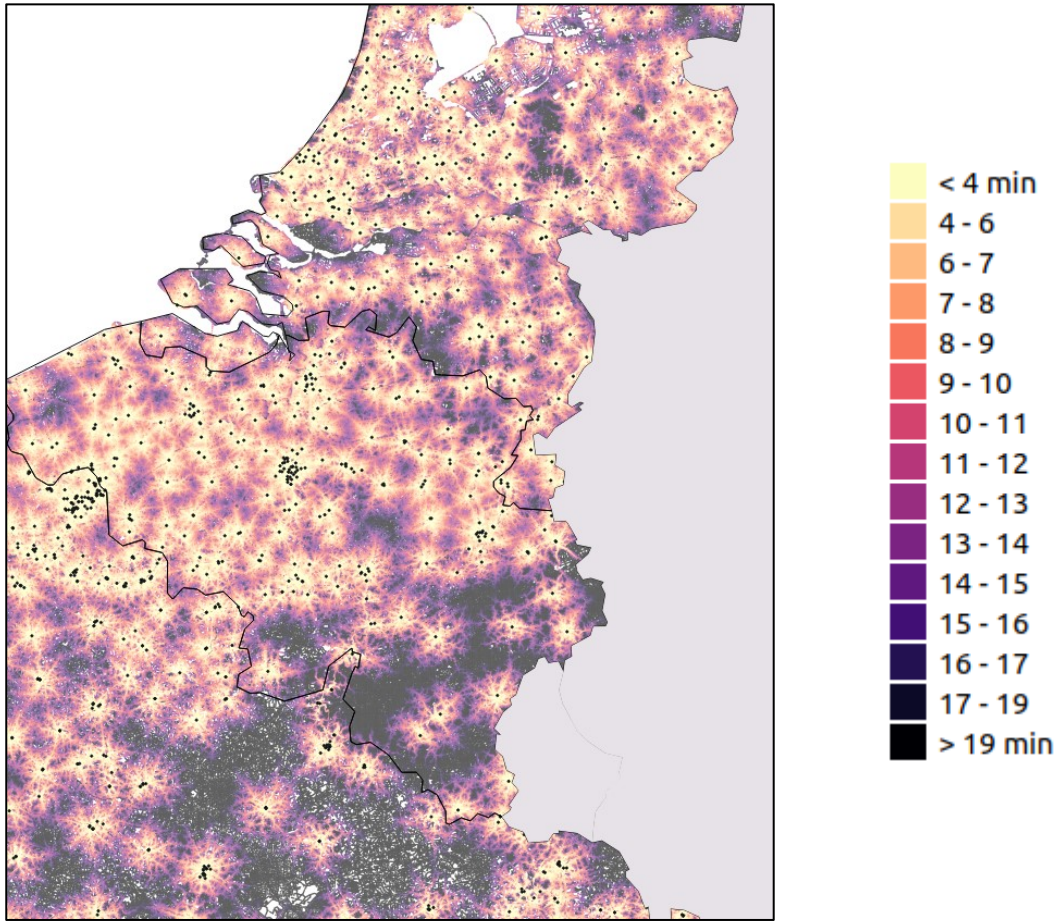
Healthcare services accessibility analysis

Tomtom



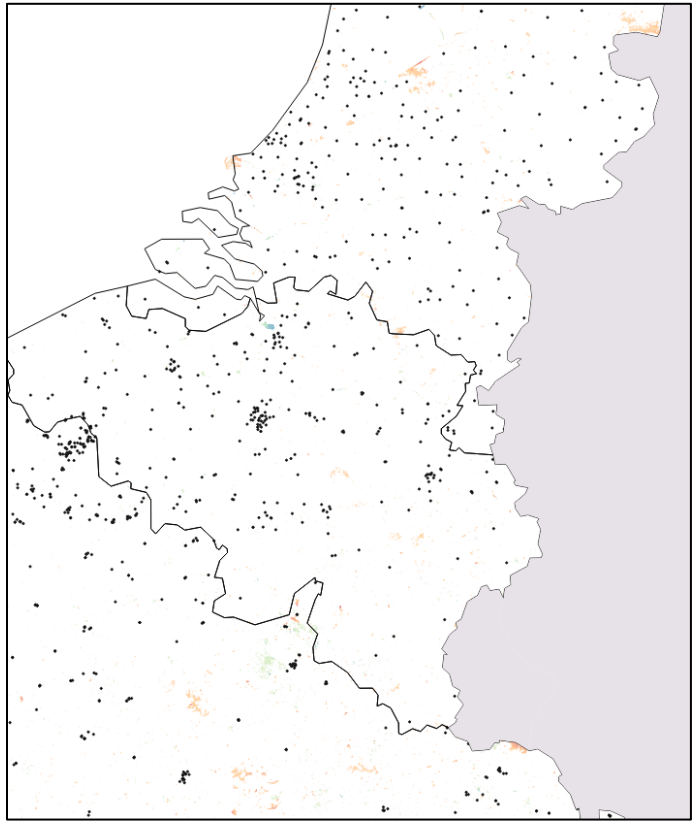
Healthcare services accessibility analysis

OpenStreetMap

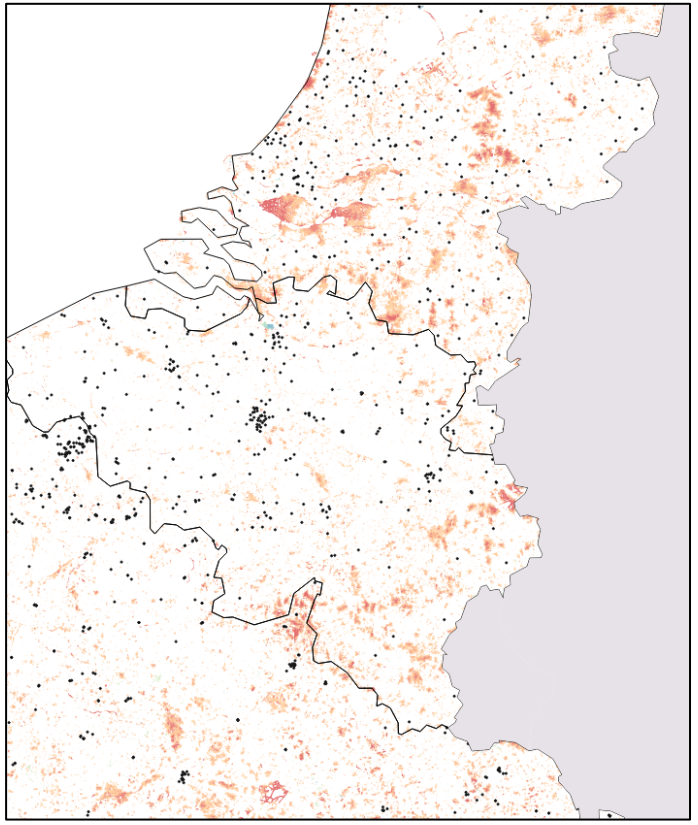


Healthcare services accessibility analysis

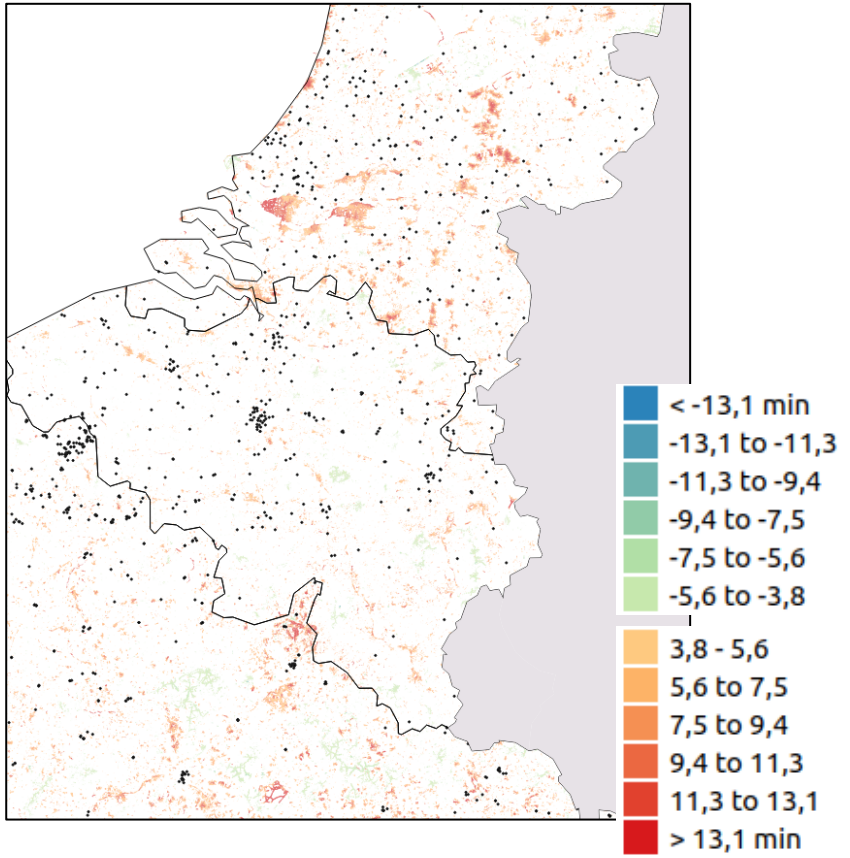
OME2 - Tomtom



OME2 - OpenStreetMap

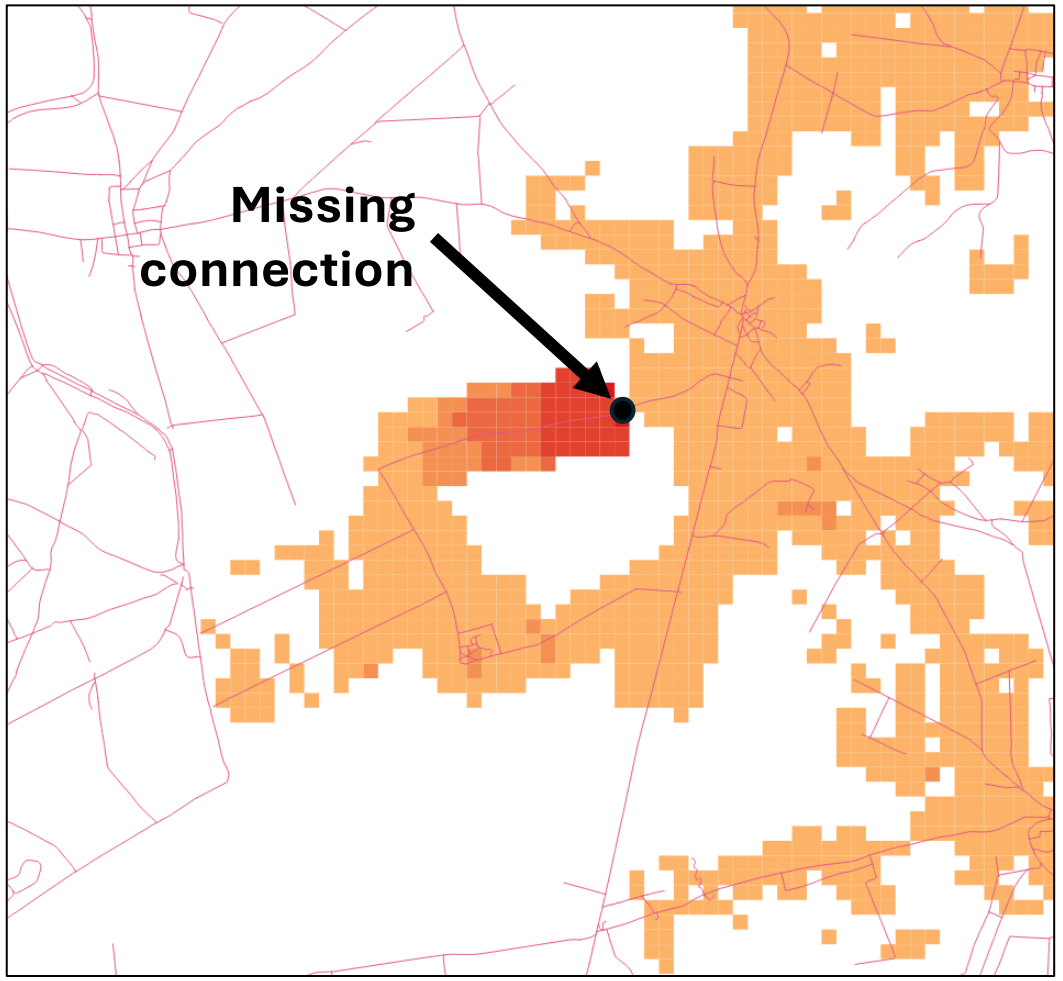


Tomtom - OpenStreetMap



Healthcare services accessibility analysis

- Identified quality components:
  - Completeness and temporal validity
  - Thematic accuracy
  - Topological consistency



Conclusion

- Quality frameworks in geographical information science
- Impact on GIS-based spatial analyses
  - Illustration on two examples from Eurostat activties

- Use quality-controlled reliable data (!)

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