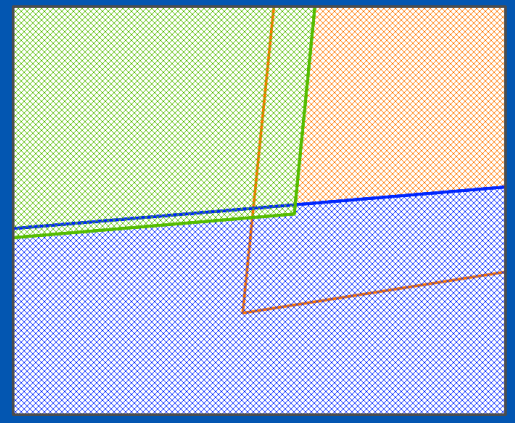
Harmonisation and edge-matching for comparable and pan-European spatial analyses

TDKEN - Harmonisation and Edge-matching

May 23rd, 2024



Outline

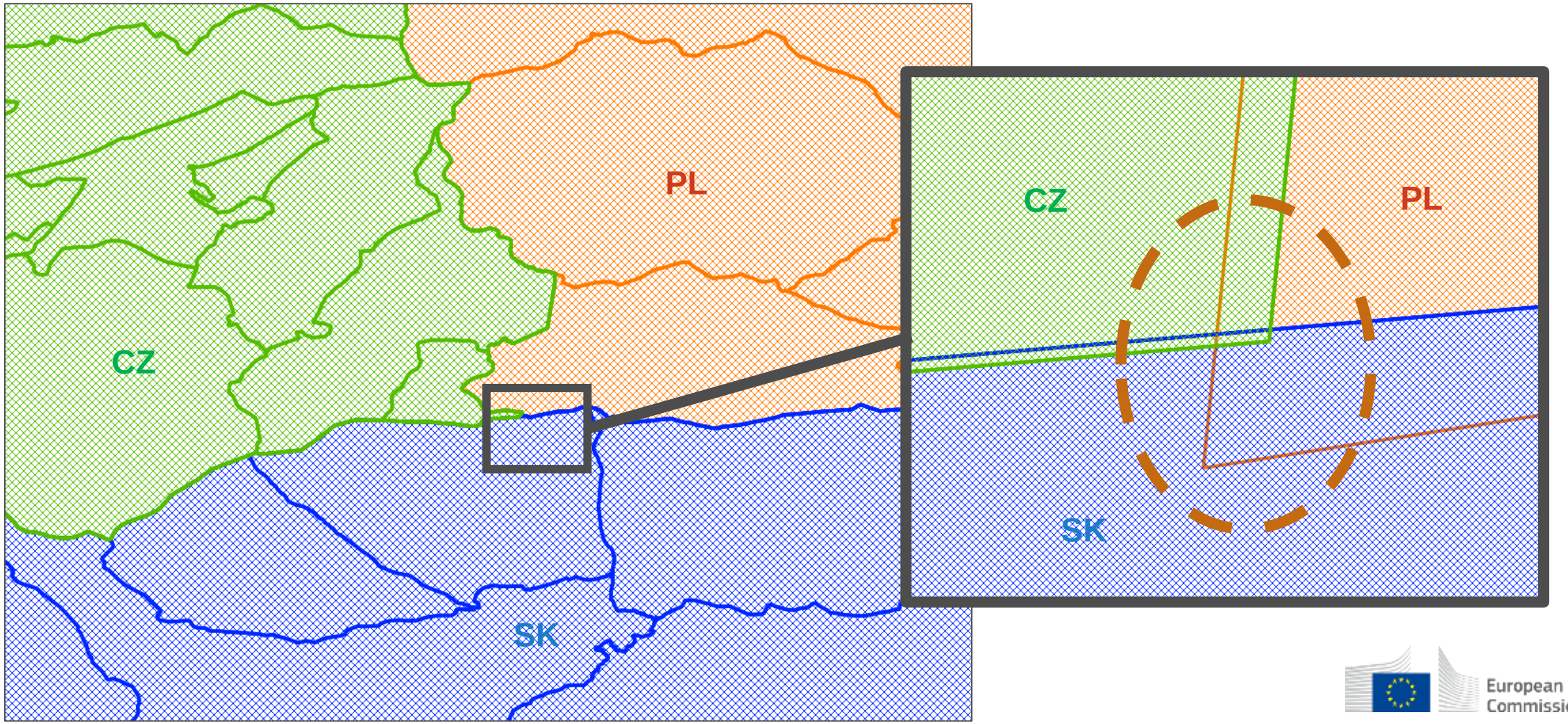
- Edge-matching
- Harmonisation

- Impact, examples, etc.

Edge-matching

- Three cases, depending on dataset type:
  - For tessellations: Topology – Avoid overlaps and gaps, ensure geometry noding.
  - For networks: Topology – Ensure connection at borders.
  - For pseudo-punctual features: Ensure non-duplicity.
- Need for same/comparable generalisation levels on both sides
- Edge-matching issues introduce bias (sometimes crashes) in the results of spatial analyses… and in decisions based on them.
- Edge-matching impact depends very much on the type of spatial analysis
  - Importance for completeness, topological consistency

Example 1: Administrative units



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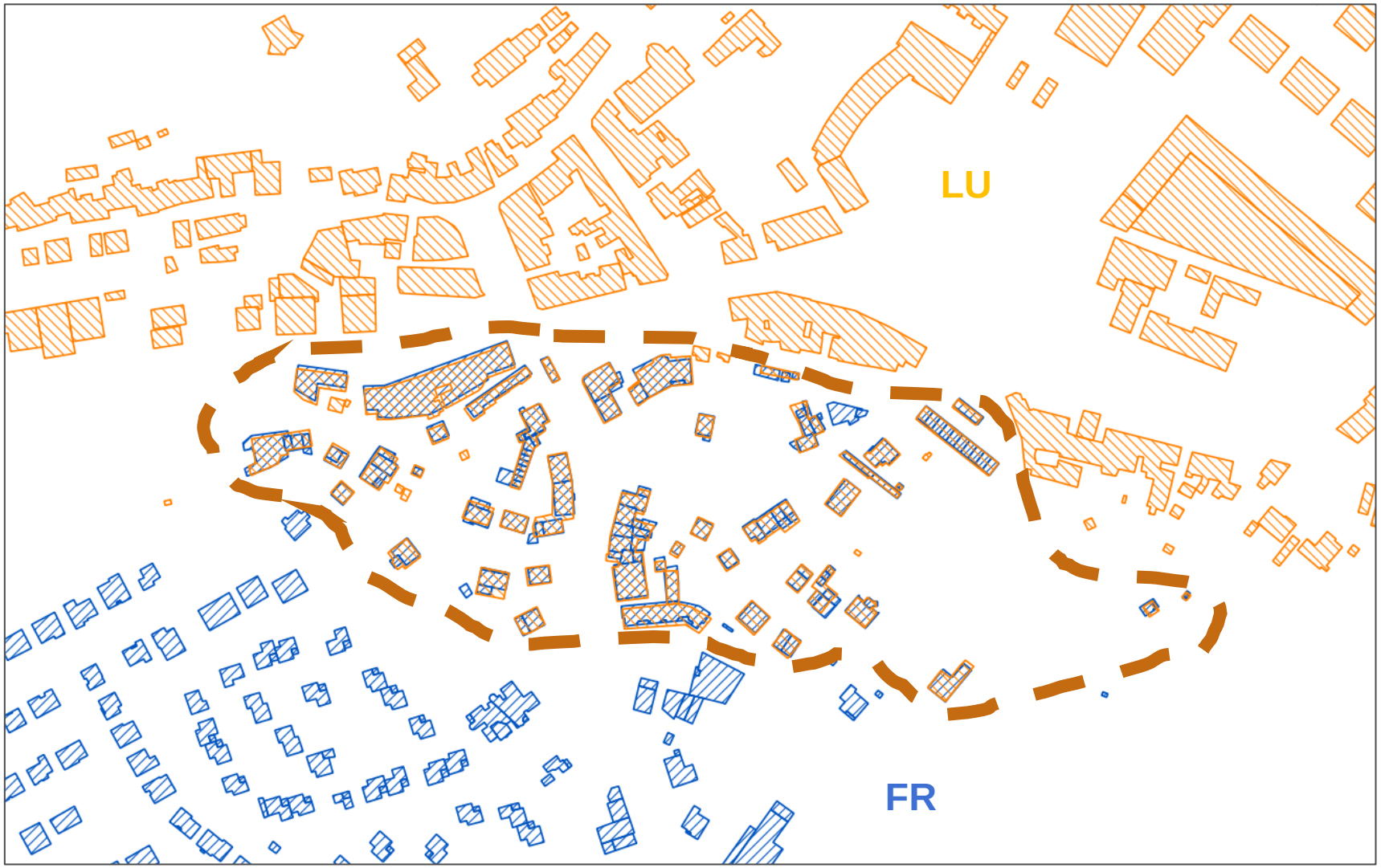
Example 2: Buildings



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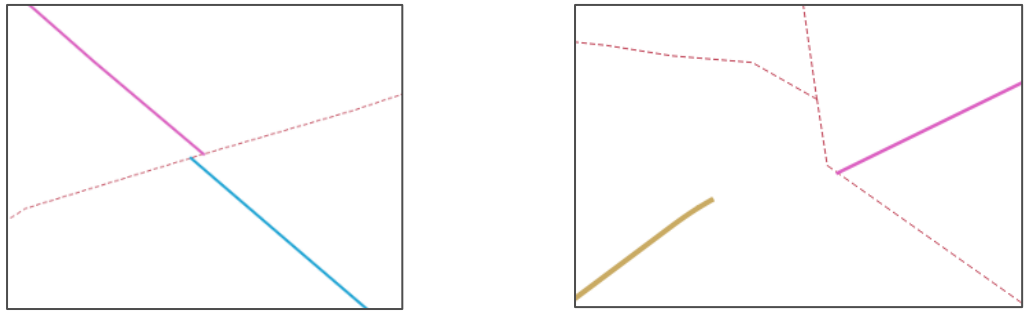
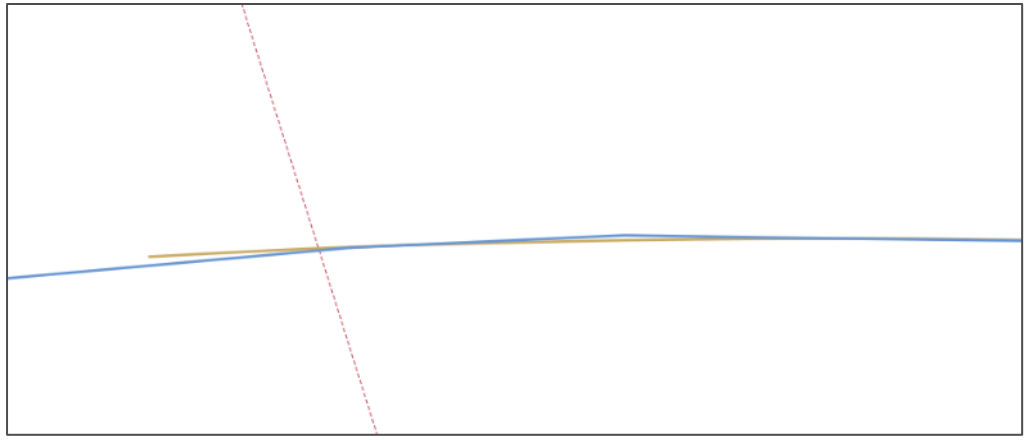
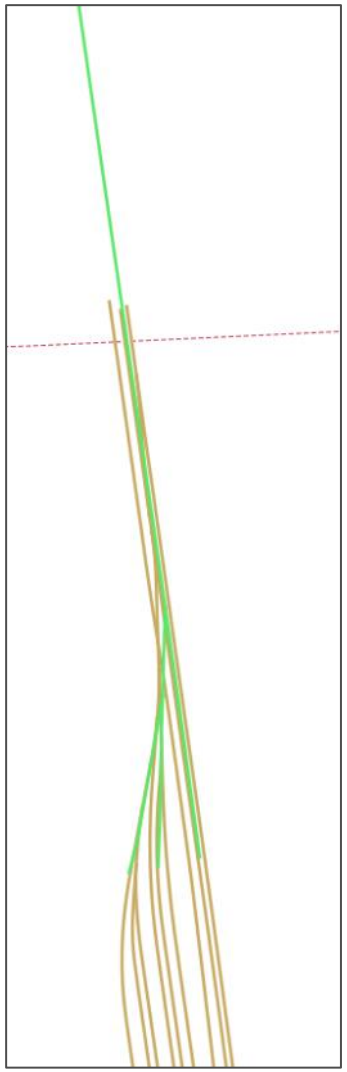
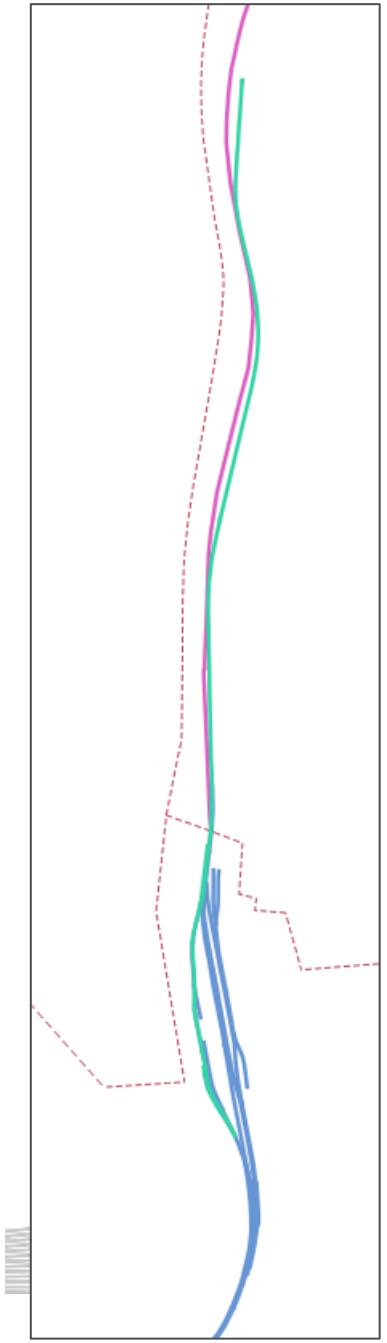
Example 3: Railway network

Country border

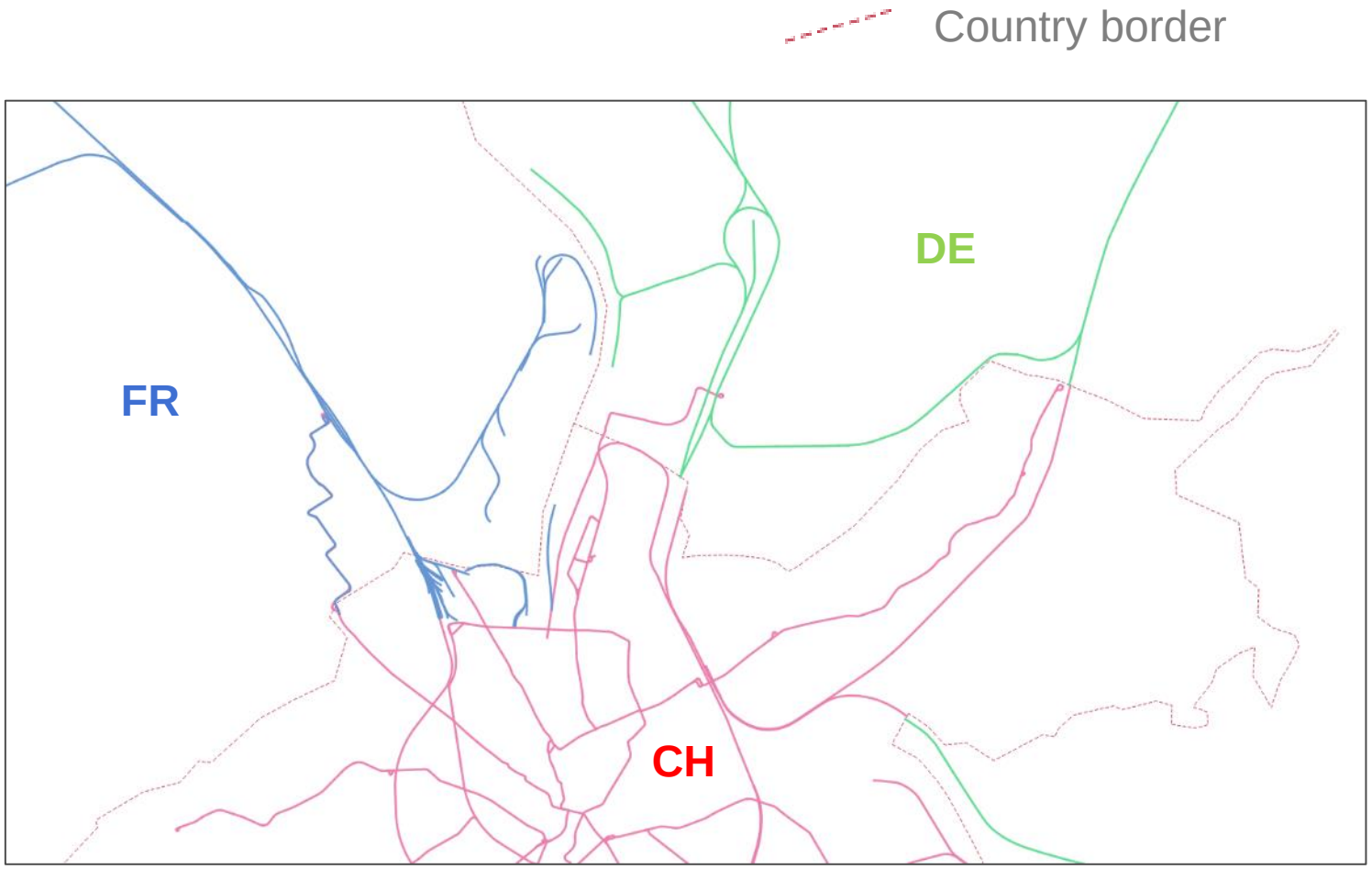






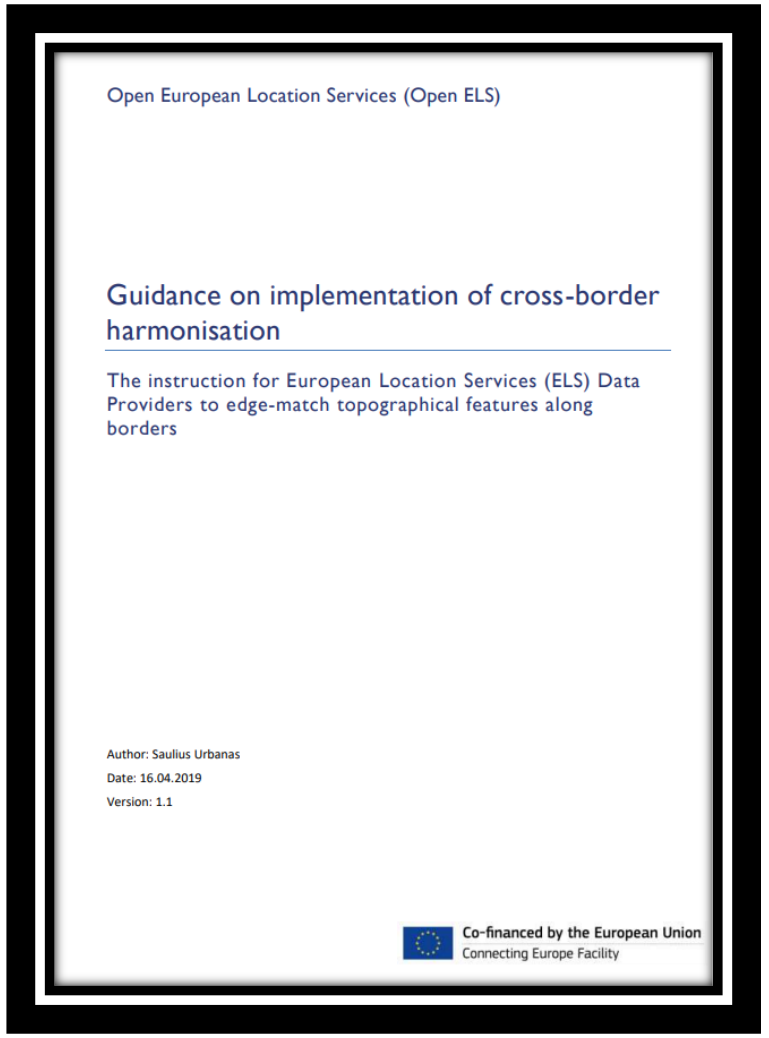


Example 3: Railway network



Edge-matching

- 2 Methods proposed in OpenELS project:
  - Bilateral agreement on “connecting features”
  - Centralised edge-matching
- Complementary methods
- Are bilateral agreements in place ?
- What about a centralised server for connecting features ?



https://eurogeographics.org/app/uploads/2019/04/OpenELS_guidance_edgematching_version1_1.pdf

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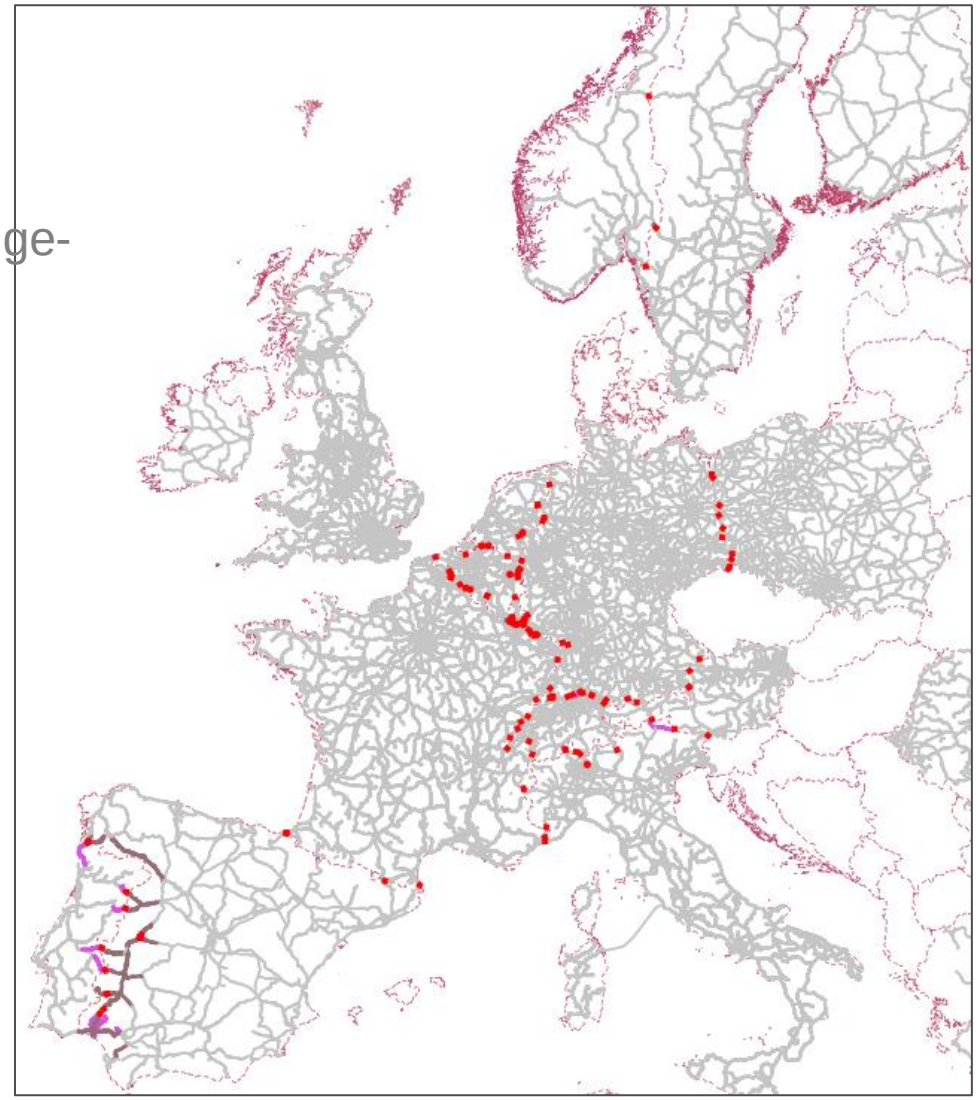
Edge-matching correction algorithm

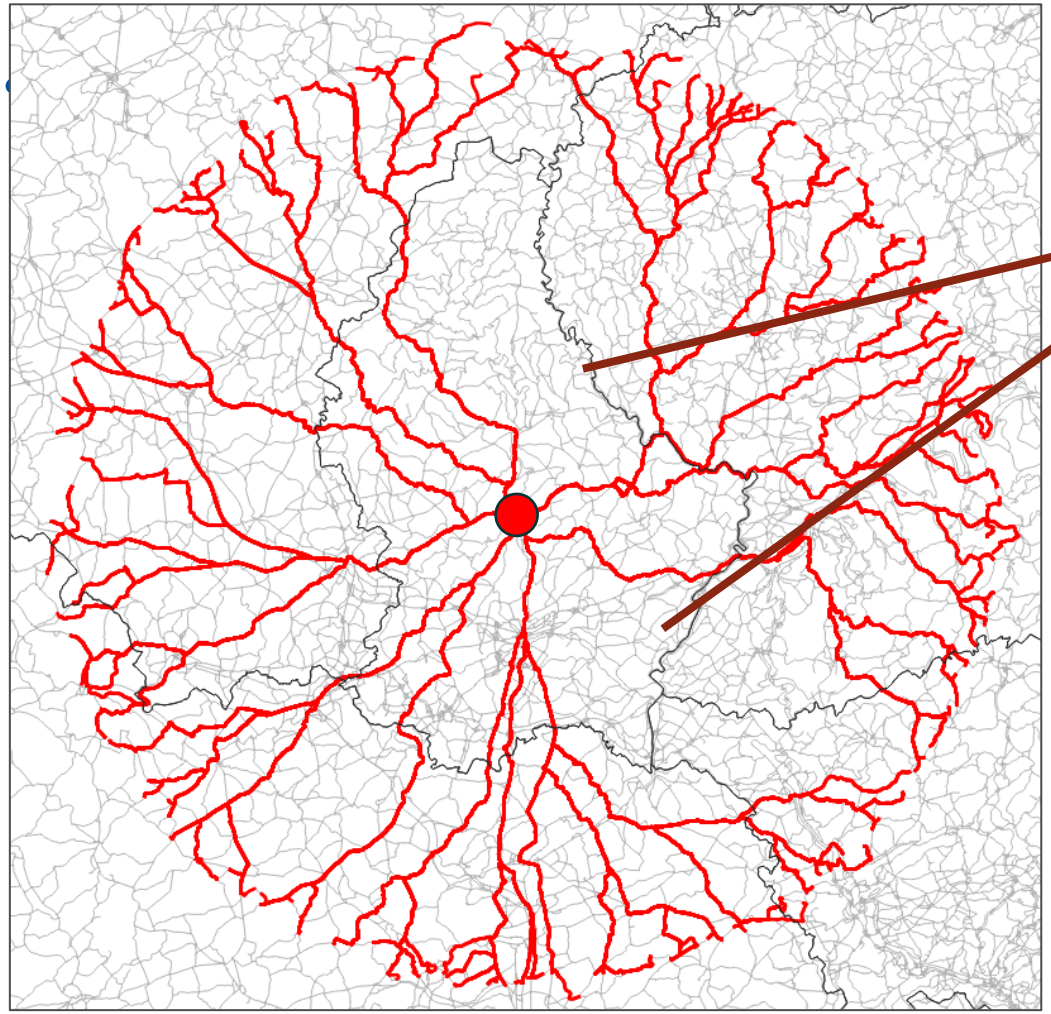
- Automated edge-matching procedure at Eurostat:
  - Clipping of country features depending on a priority order defined with the different resolutions of the MS datasets.
  - Construction of new edges based on proximity criteria and graph analysis
- See code on: https://github.com/eurostat/JGiscoTools/tree/master/modules/graphalgo/src/main/java/eu/europa/ec/eurostat/jgiscotools/graph/algo/edgematching

Automated edge-matching



Edge-matching quality check

EuroRegionalMap



Missing cross-border connections !

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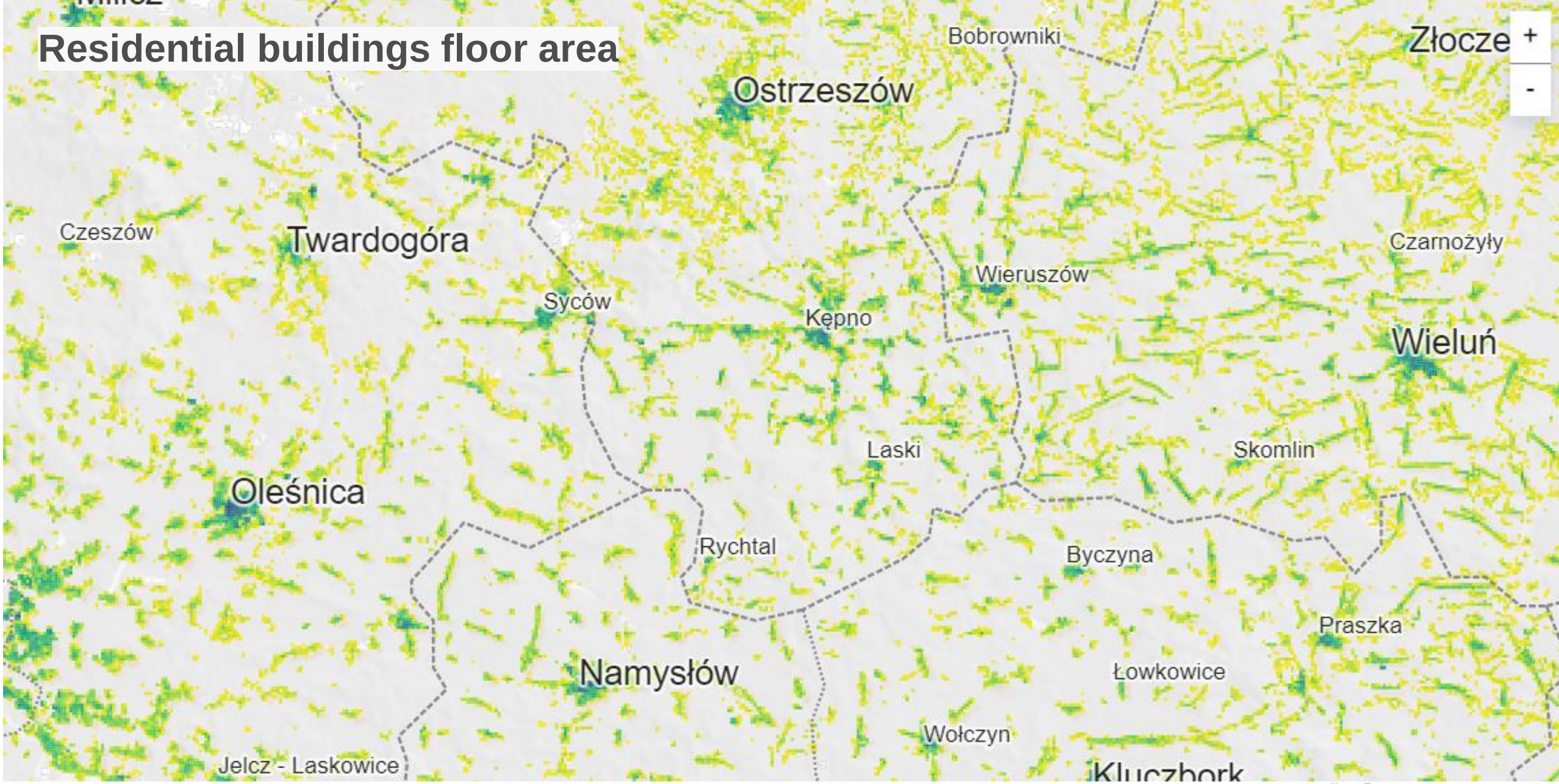
Harmonisation

- Harmonisation for comparability:
  - across space (from country to country, region to region)
  - across time (specifications stability across versions)
  - across scales (need for comparable generalisation – consistency across scales)
- Non-harmonisation introduces bias in the results of spatial analyses… and in decisions based on them.
- Non-harmonisation impact depends very much on the type of spatial analysis
  - Importance of completeness, thematic accuracy, temporal accuracy, positional accuracy

Example 1: Building demography

- Objective: measure the evolution of building stock, by type and usage.
- Computation of indicators on building areas on a 100m resolution grid from cadastral/topographic datasets.
  - Ground and floor areas.
  - By nature, usage, year of construction, energy performance.

Residential buildings floor area



https://observablehq.com/@eurostat-ws/building-demography

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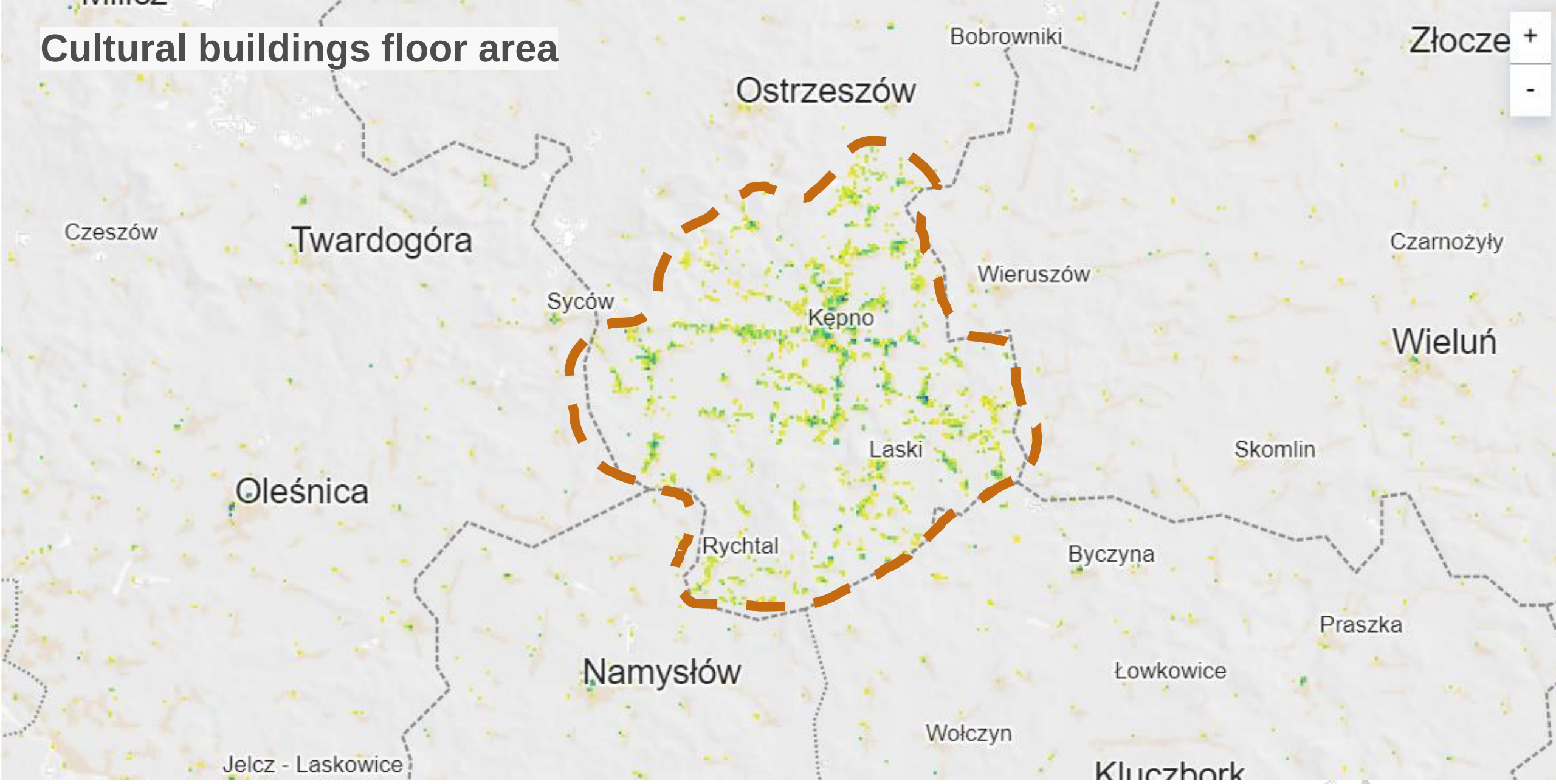
Cultural buildings floor area



https://observablehq.com/@eurostat-ws/building-demography

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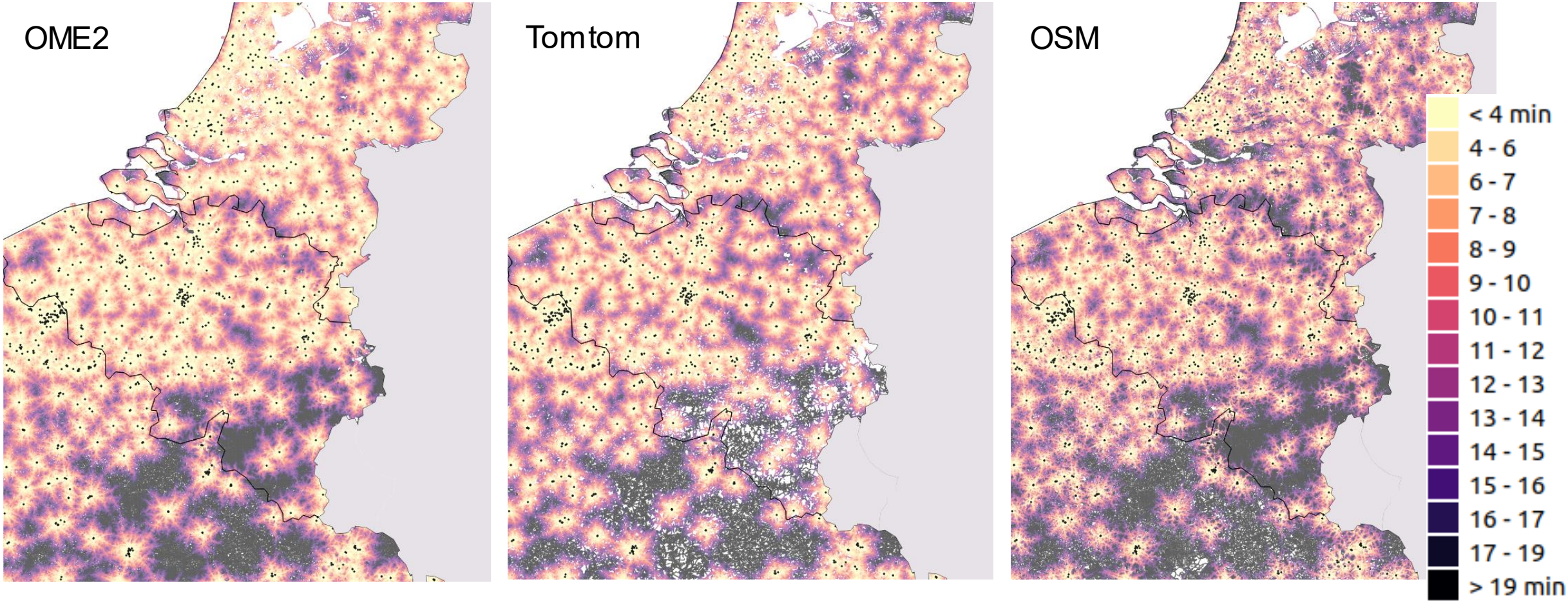
Example 2: Accessibility analysis

- Objective: Measure accessibility to basic services.
- Computation of travel time from grid cells (100m) to the nearest healthcare service by road network
- Comparison of 3 road network datasets: OME2, tomtom, osm

Example 2: Accessibility analysis



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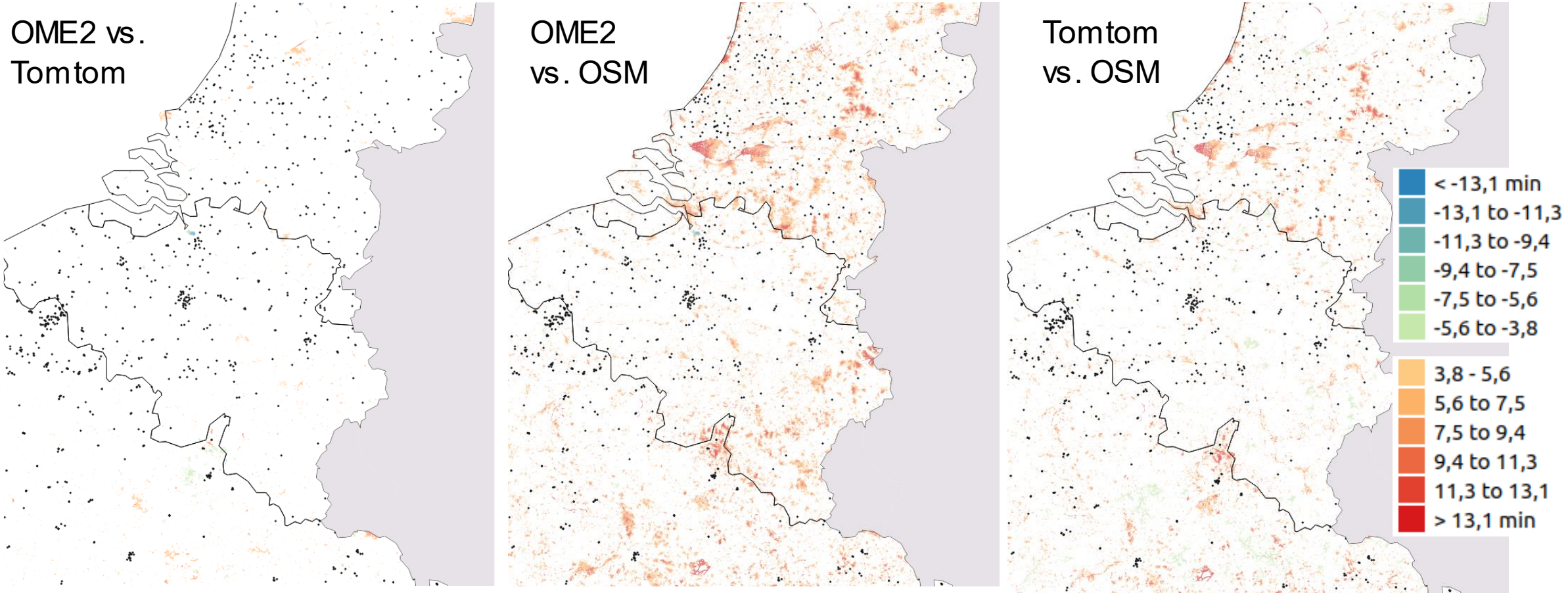
Example 2: Accessibility analysis



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Requirements

7 main requirements for pan-European datasets

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Thank you

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