

3b. Feature Matching

The feature matching takes the reference data and attempts to identify corresponding features in the OSM data set. Feature matching is a necessary precondition to compare single features rather than feature characteristics on study area a grid cell level.

Method

Matching features in two road data sets with each their way of digitizing features and a potential one-to-many relationship between edges (for example in the case where one data set only maps road center lines, while the other map the geometries of each bike lane) is not a trivial task.

The method used here converts all network edges to smaller segments of a uniform length before looking for a potential match between the reference and the OSM data. The matching is done on the basis of the buffered distance between objects, the angle, and the undirected Hausdorff distance, and is based on the works of [Koukoletsos et al. \(2012\)](#) and [Will \(2014\)](#).

Based on the matching results, the following values are computed:

- The number and length of matched and unmatched edges, in total and per grid cell
- A comparison of the attributes of the matched edges: Is their classification of cycling infrastructure as protected or unprotected the same?

Interpretation

It is important to visually explore the feature matching results, since the success rate of the matching influences how the analysis of number of matches should be interpreted.

If the features in the two data sets have been digitized differently - e.g. if one data set has digitized bike tracks as mostly straight lines, while the other includes more winding tracks, the matching will fail. This is also the case if they are placed too far from each other. If it can be confirmed visually that the same features do exist in both data sets, a lack of matches indicates that the geometries in the two data sets are too different. If however it can be confirmed that most real corresponding features have been identified, a lack of matches in an area indicates errors of commission or omission.

Sections

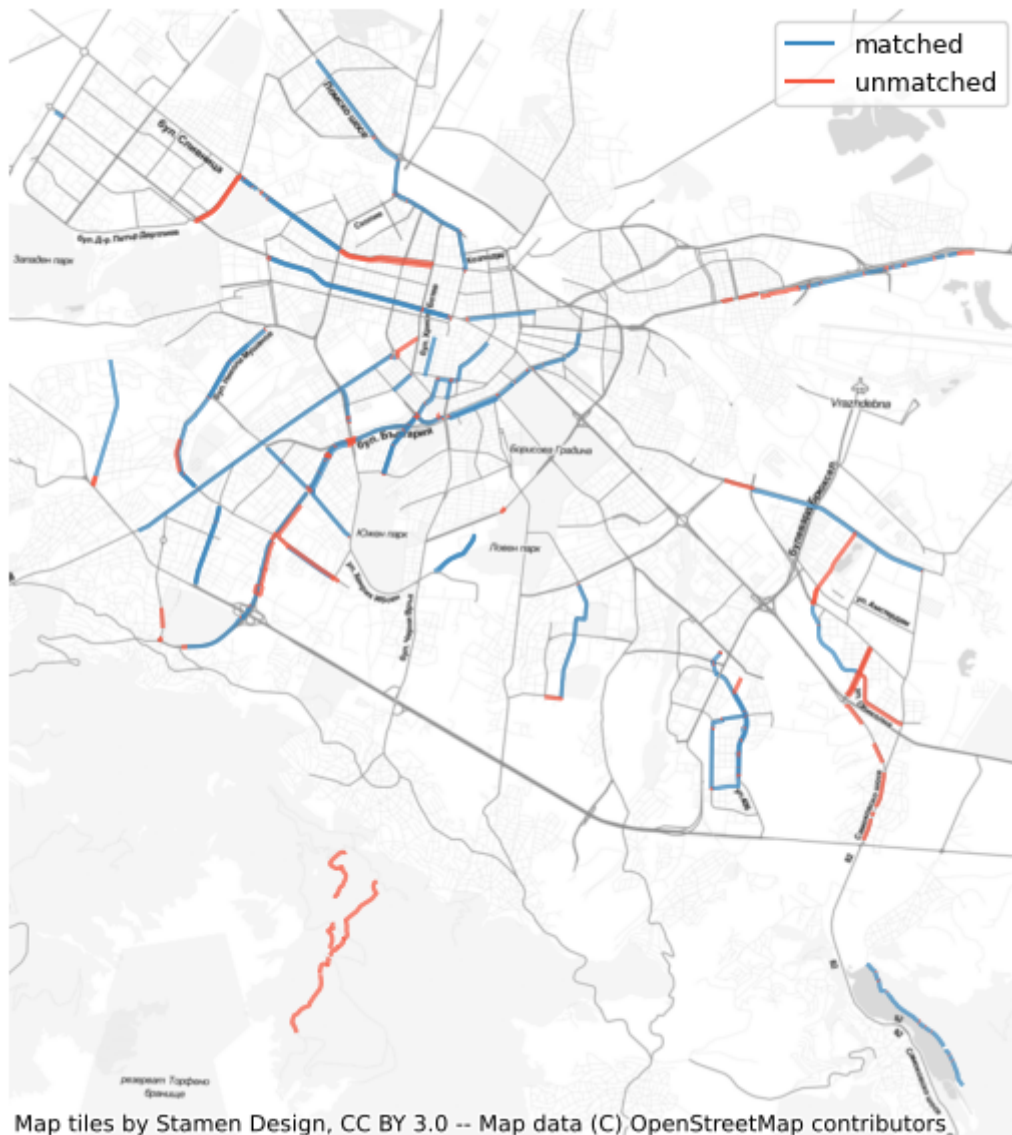
- [Match features](#)
 - [Run and plot feature matching](#)
 - [Matched and unmatched features](#)
 - [Feature matching summary](#)
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 - [Matched features by infrastructure type](#)
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Match features

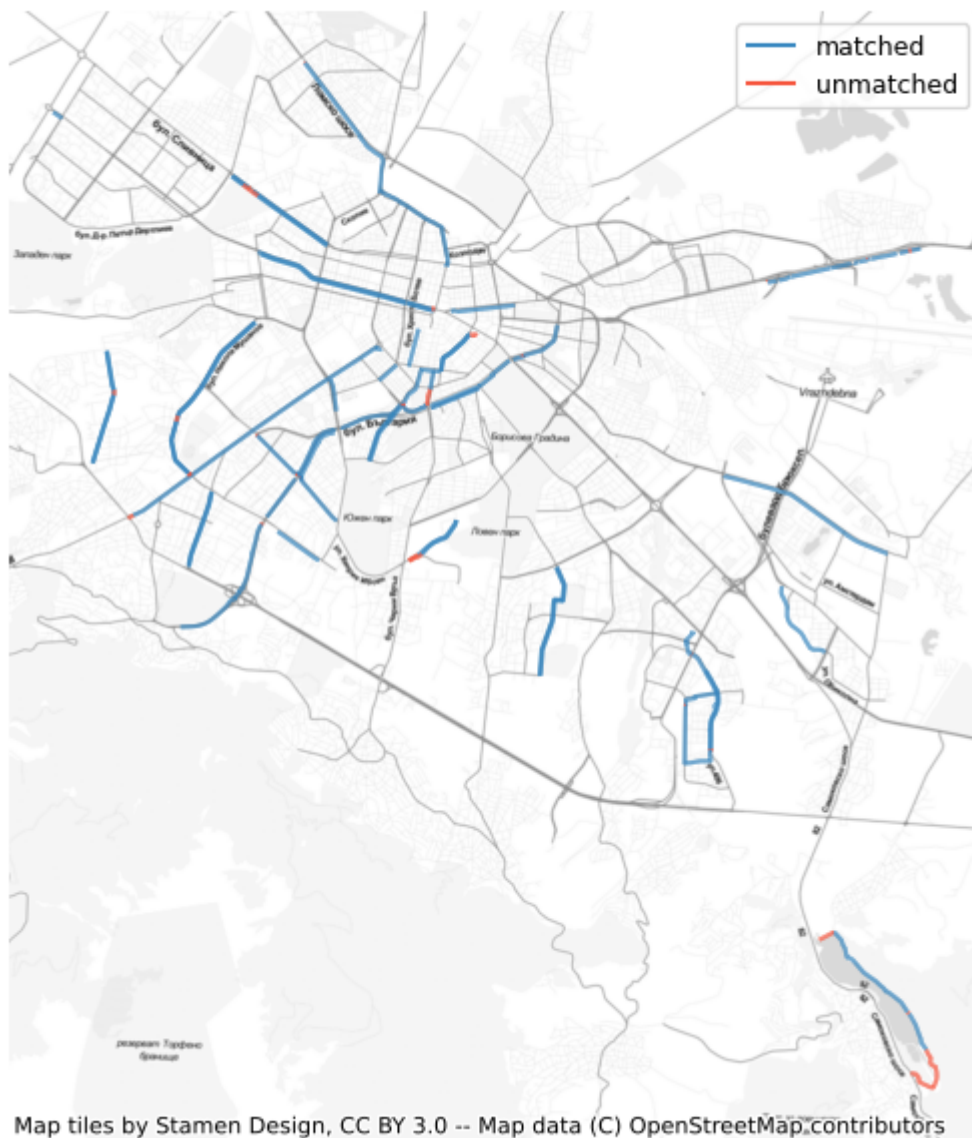
Run and plot feature matching

Interactive map saved at results/COMPARE/sofiaplan/maps_interactive/segment_matches_15_17_30_compare.html

Sofia: OSM matched & unmatched features



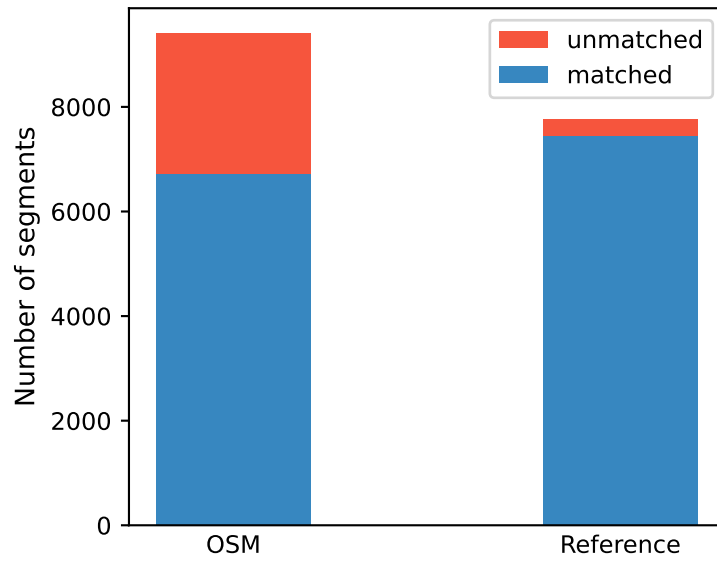
Sofia: SofiaPlan matched & unmatched features



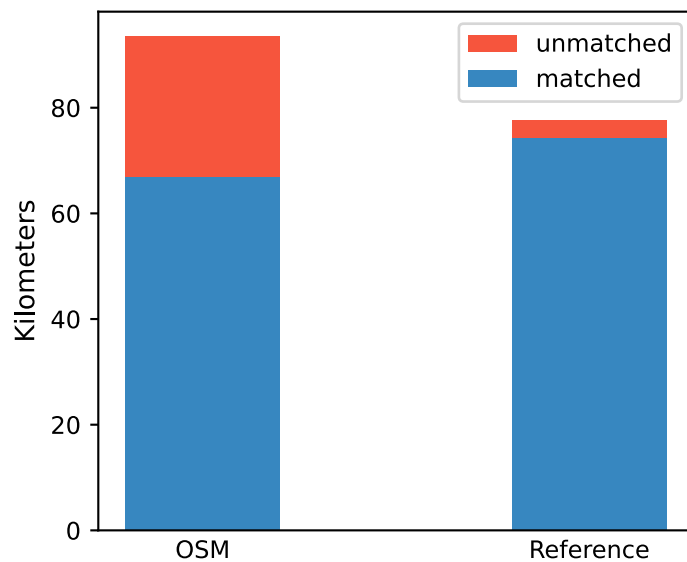
Feature matching summary

Edge count: 6704 of 9416 OSM segments (71.2%) were matched with a reference segment.
 Edge count: 7437 out of 7771 SofiaPlan segments (95.7%) were matched with an OSM segment.
 Length: 66.86 km out of 93.51 km of OSM segment (71.5%) were matched with a reference segment.
 Length: 74.30 km out of 77.63 km of SofiaPlan segments (95.71%) were matched with an OSM segment.

Matched vs. unmatched number of segments



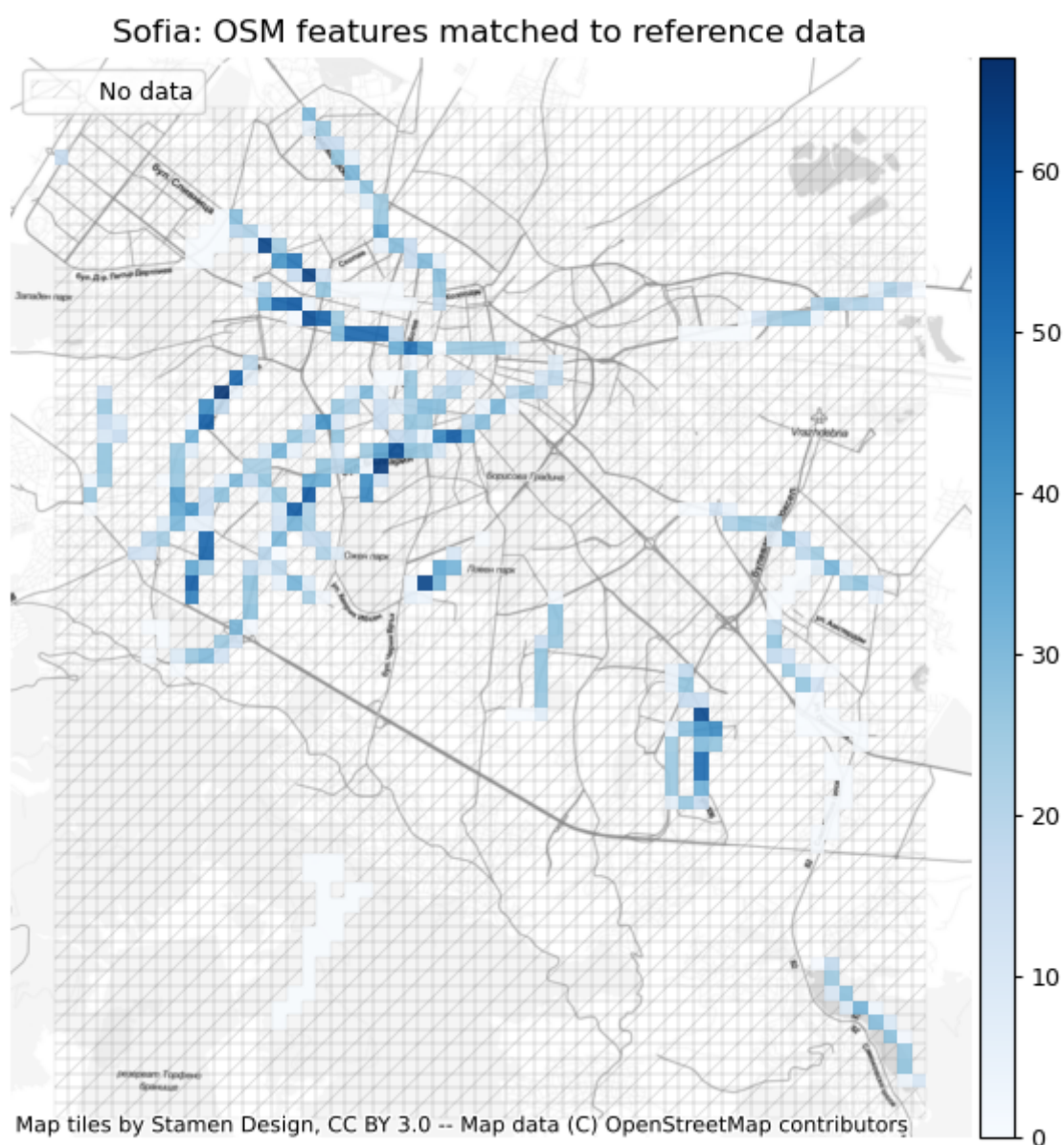
Matched vs. unmatched kilometers



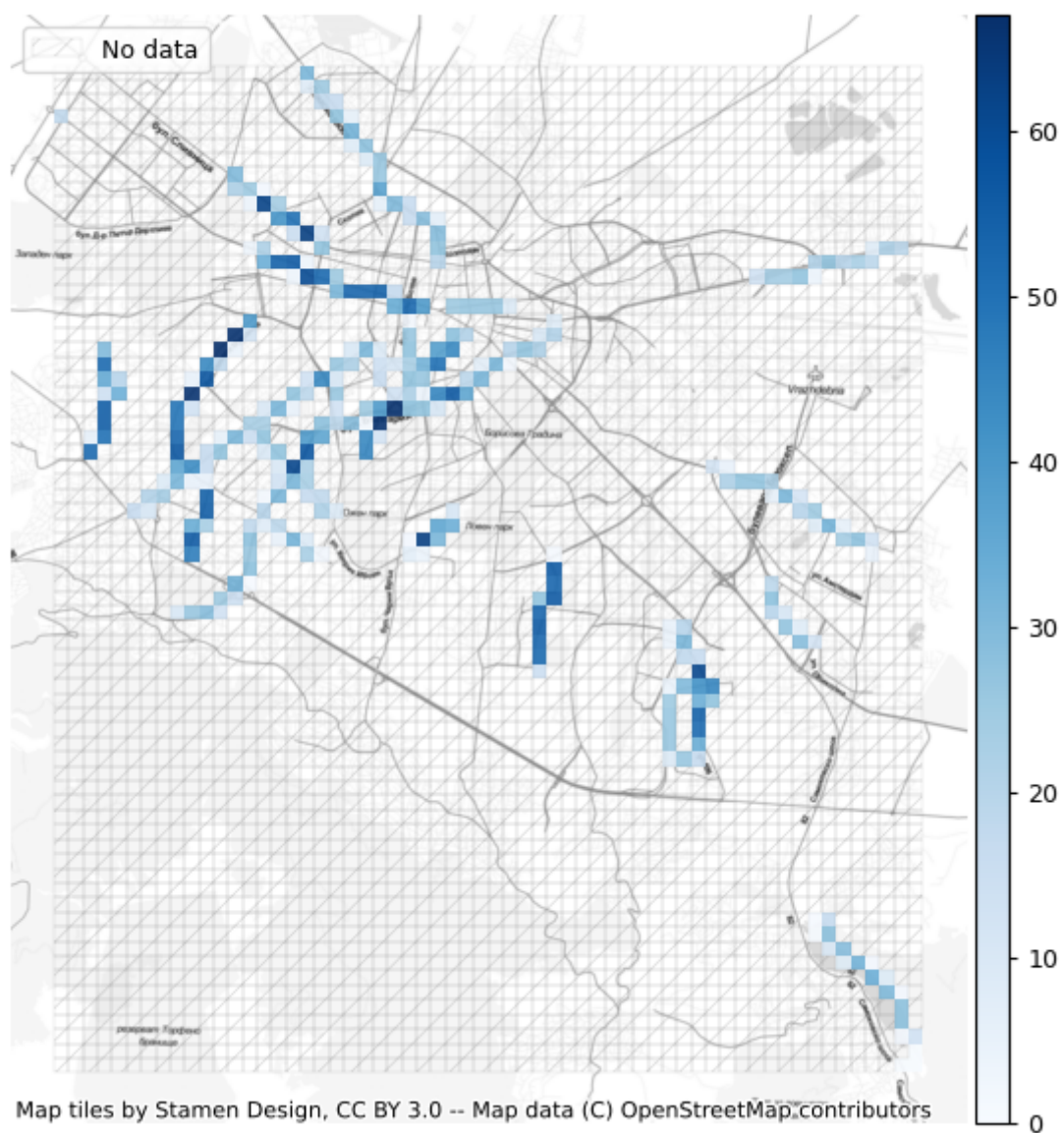
Analyze feature matching results

Matched features by infrastructure type

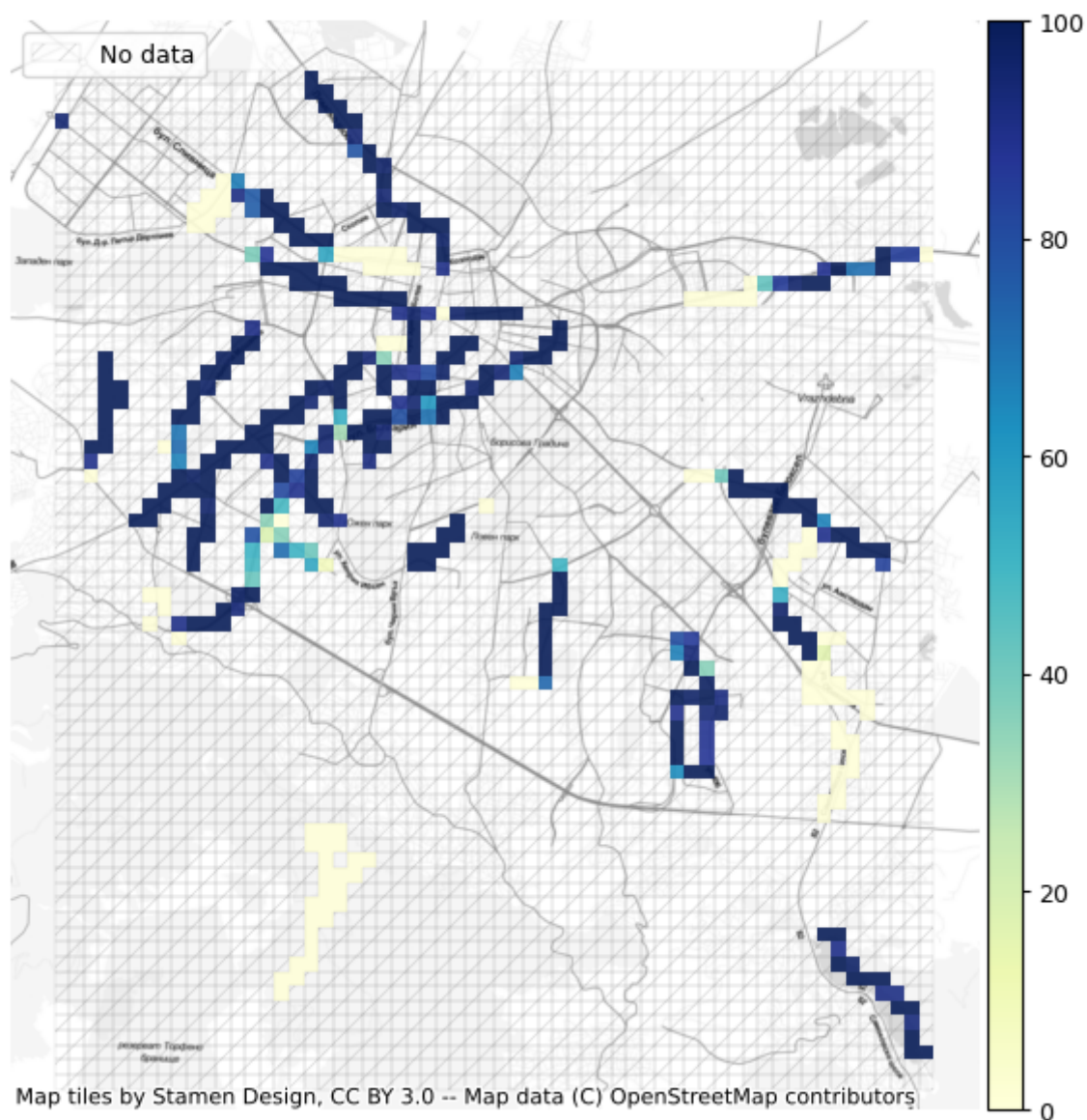




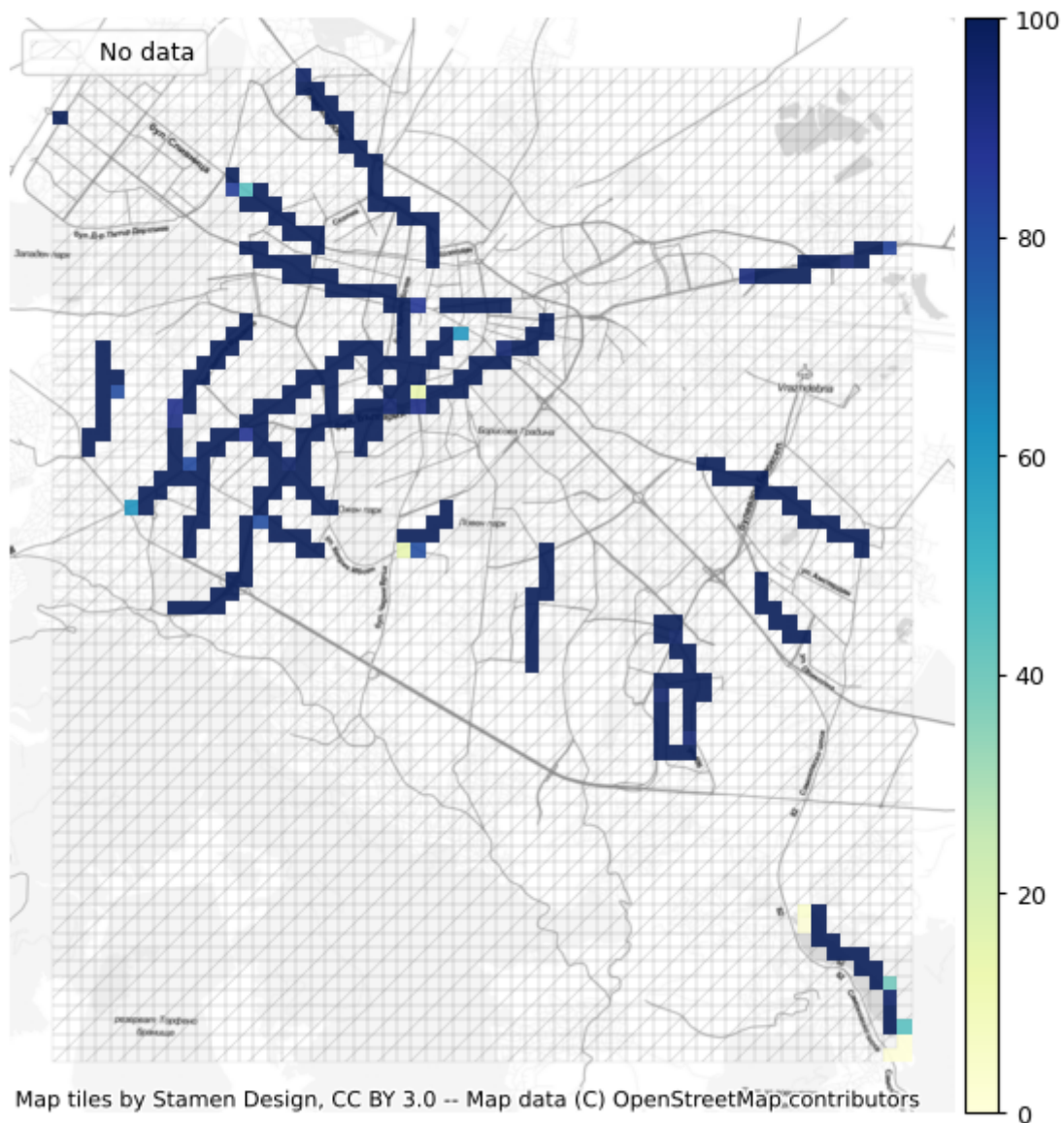
Sofia: SofiaPlan features matched to OSM data



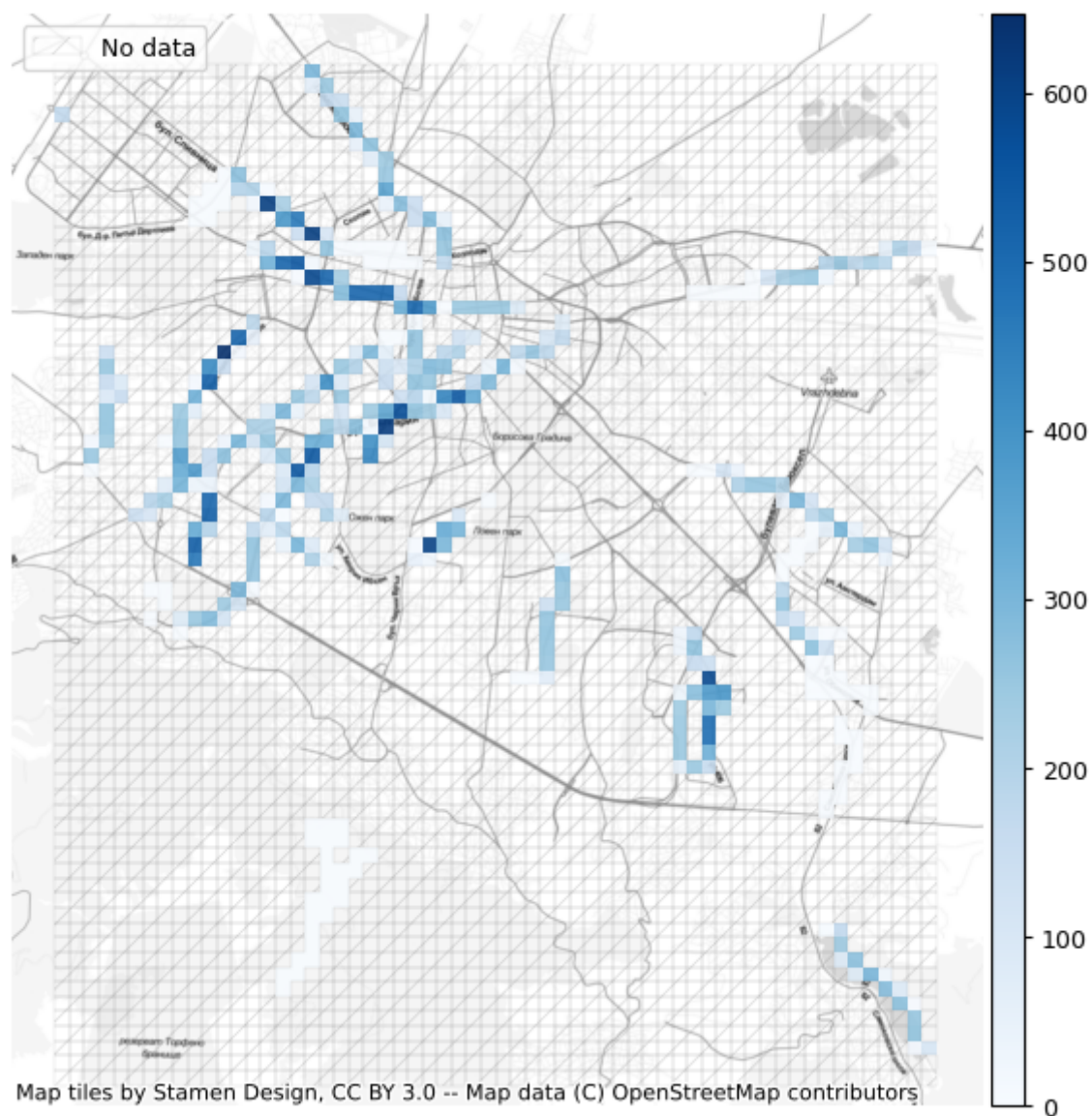
Sofia: percent of OSM features matched to reference data2



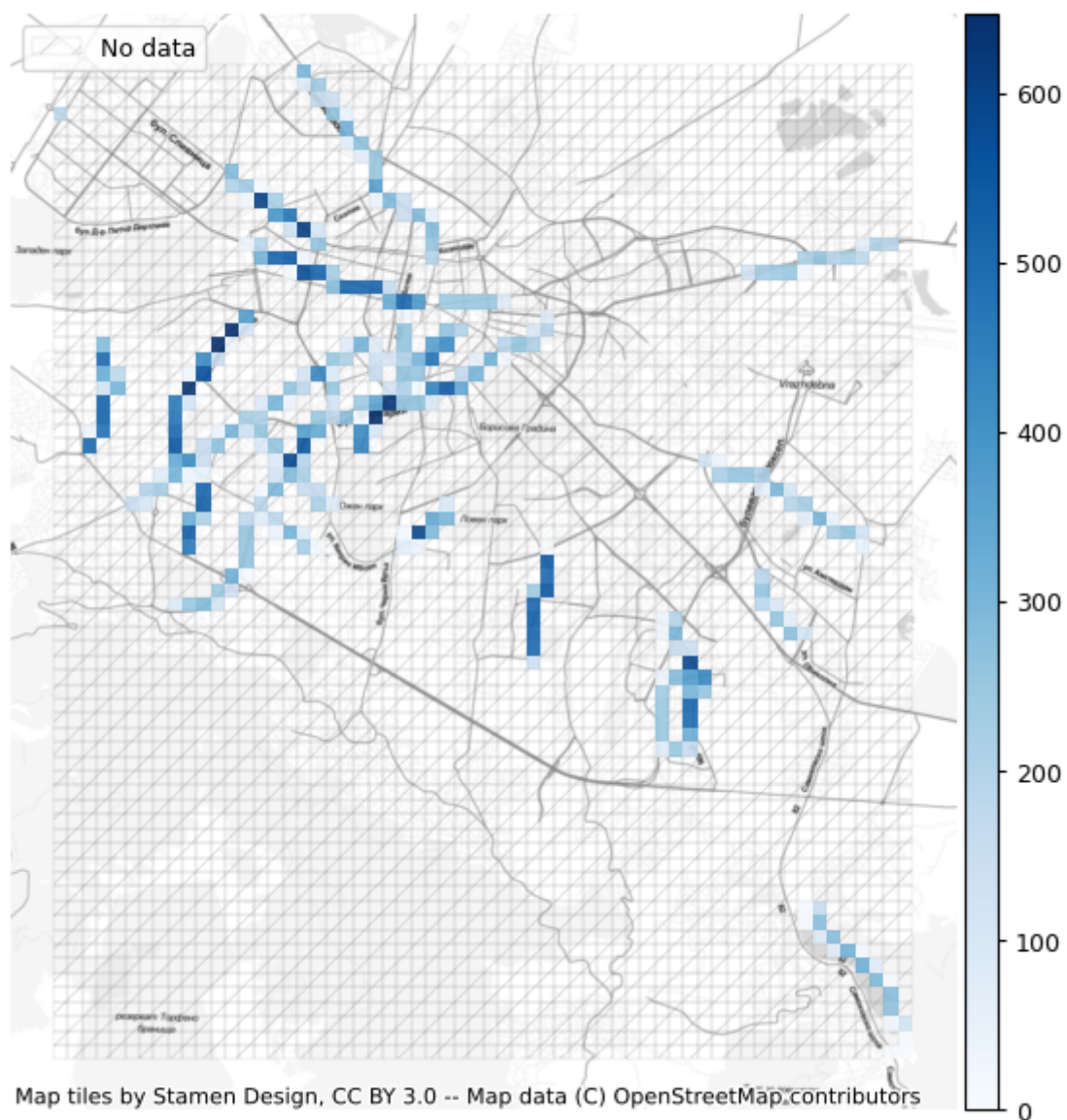
Sofia: percent of SofiaPlan features matched to OSM data2



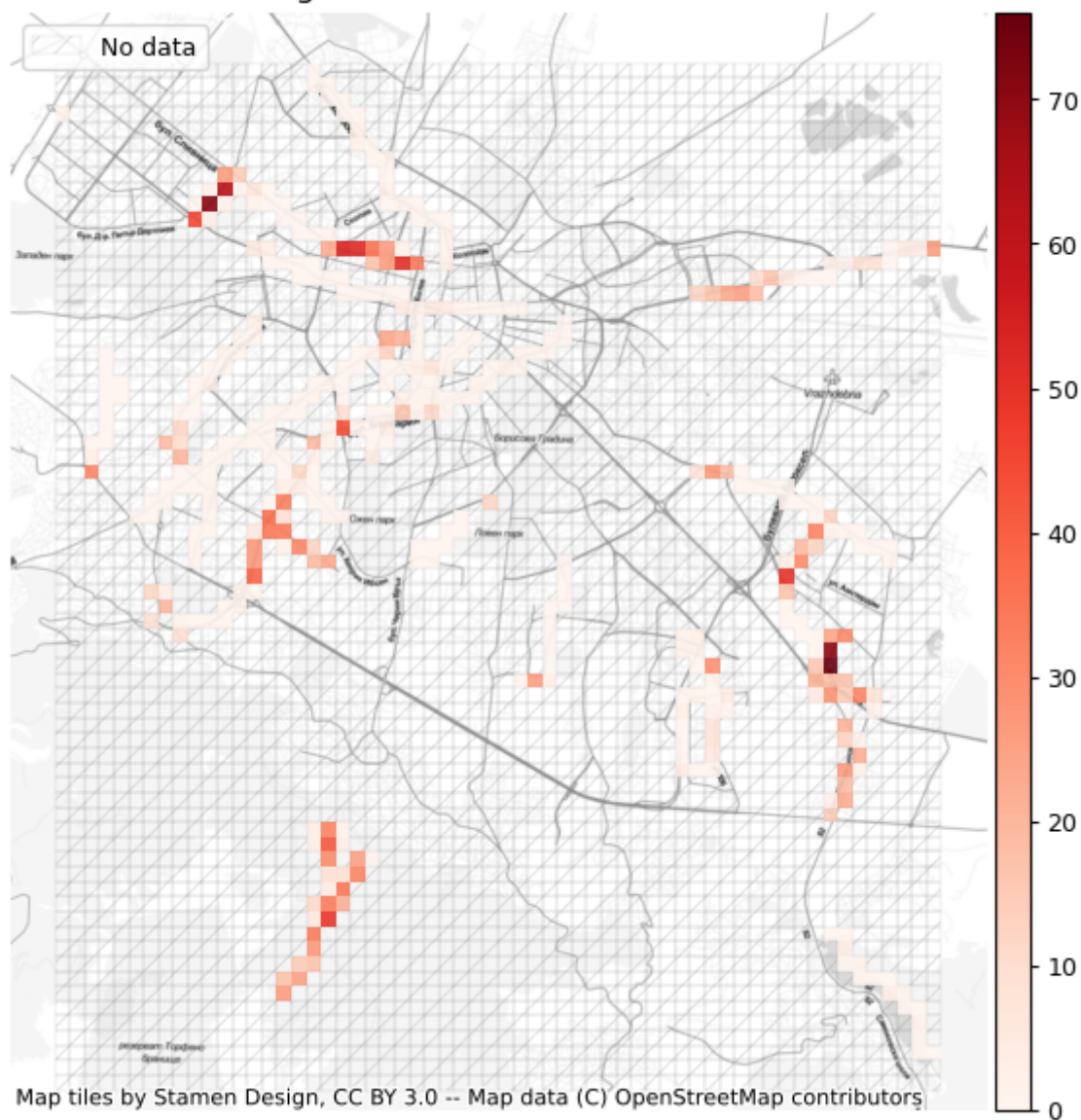
Sofia: length of OSM features matched to reference data (m)



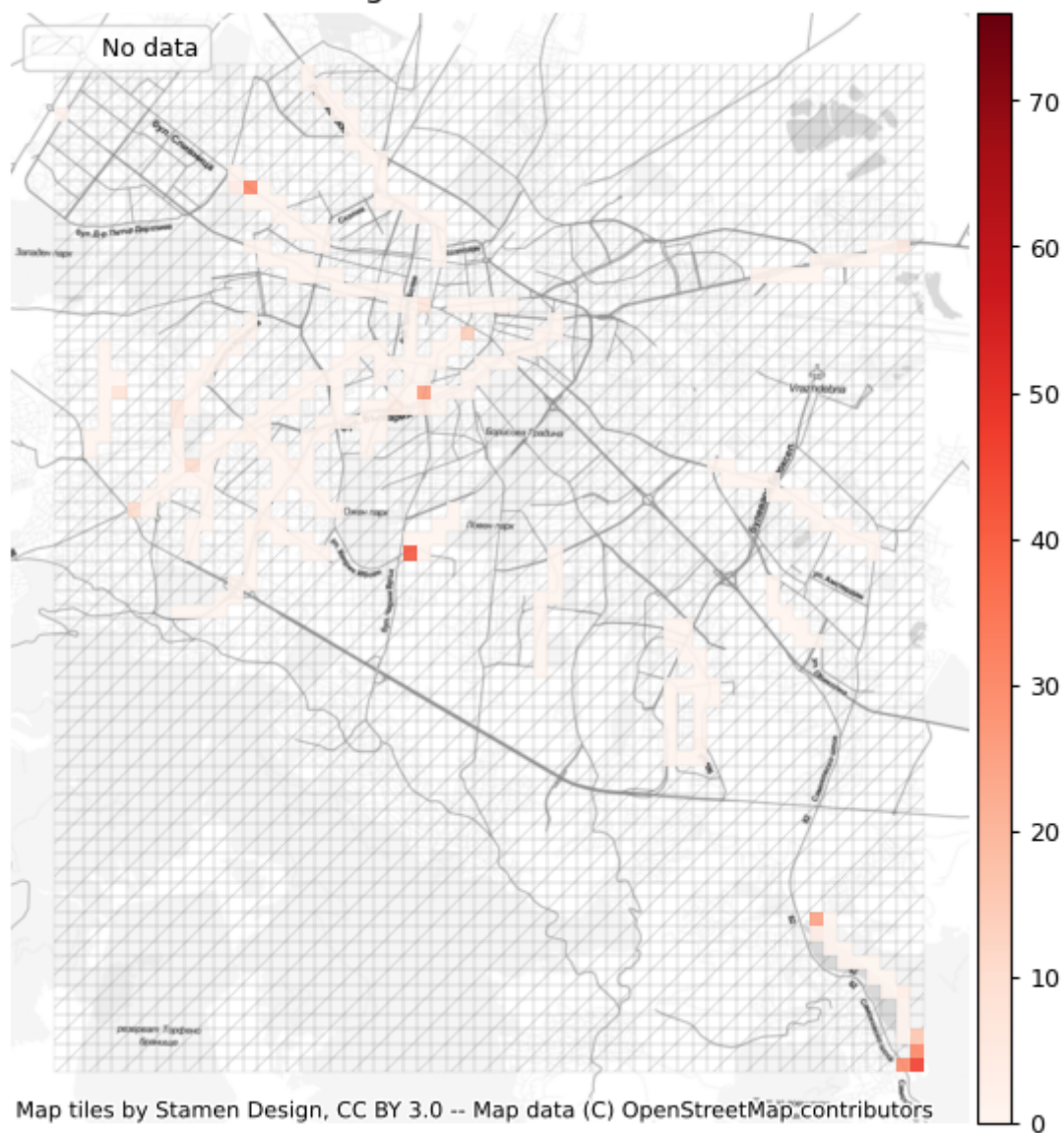
Sofia: length of SofiaPlan features matched to OSM data (m)



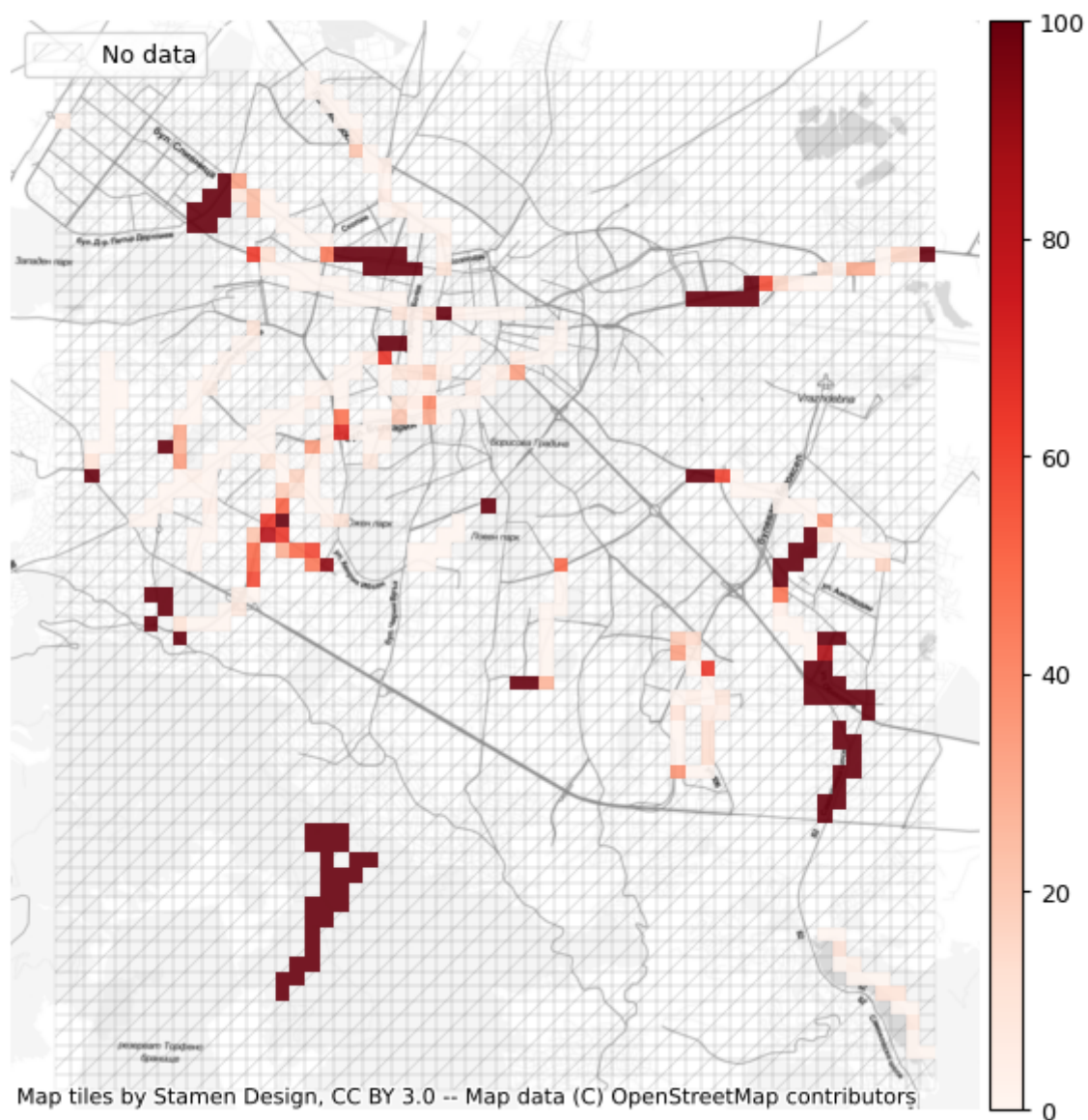
Sofia: OSM segments not matched to reference data



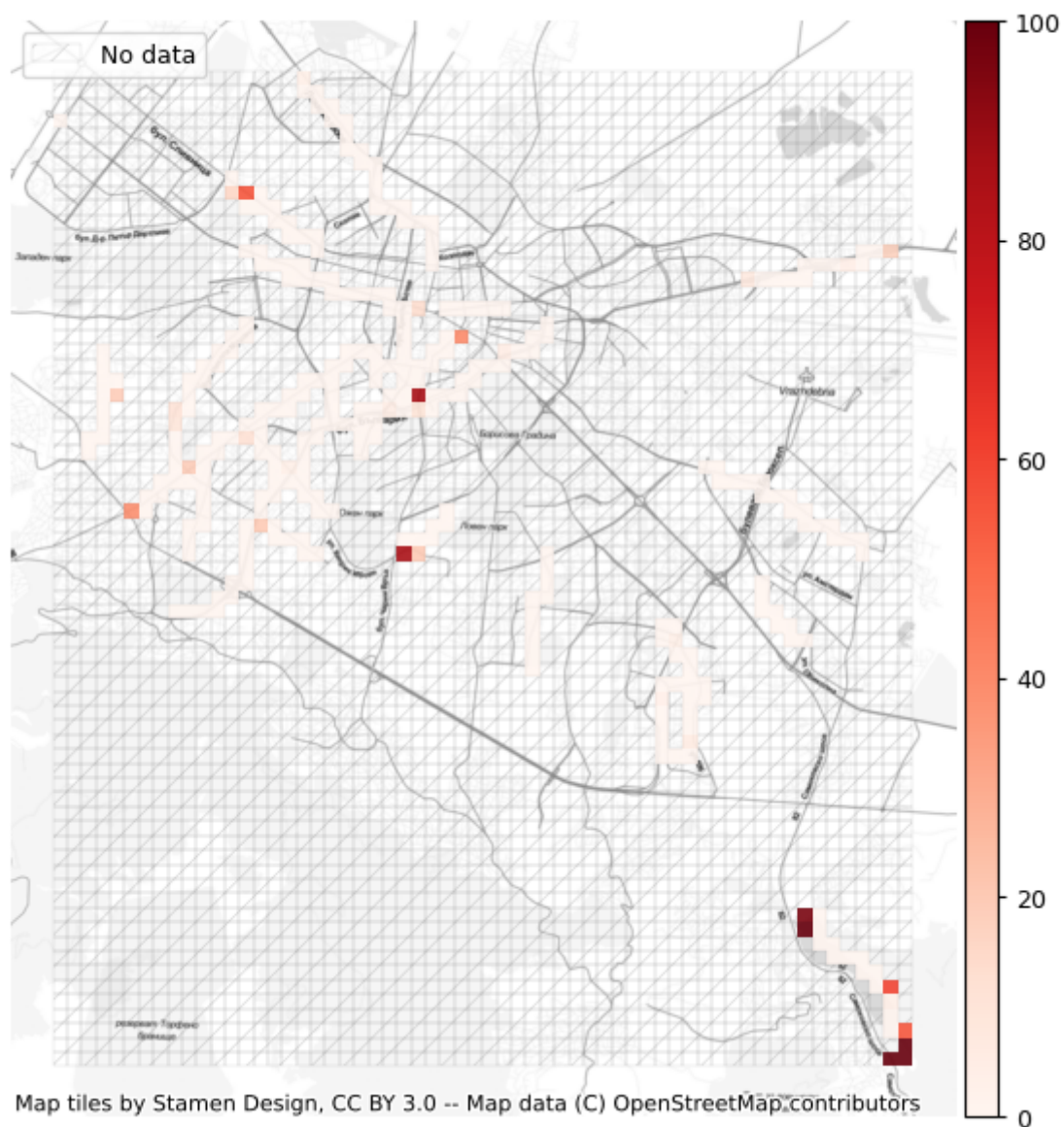
Sofia: SofiaPlan segments not matched to OSM data



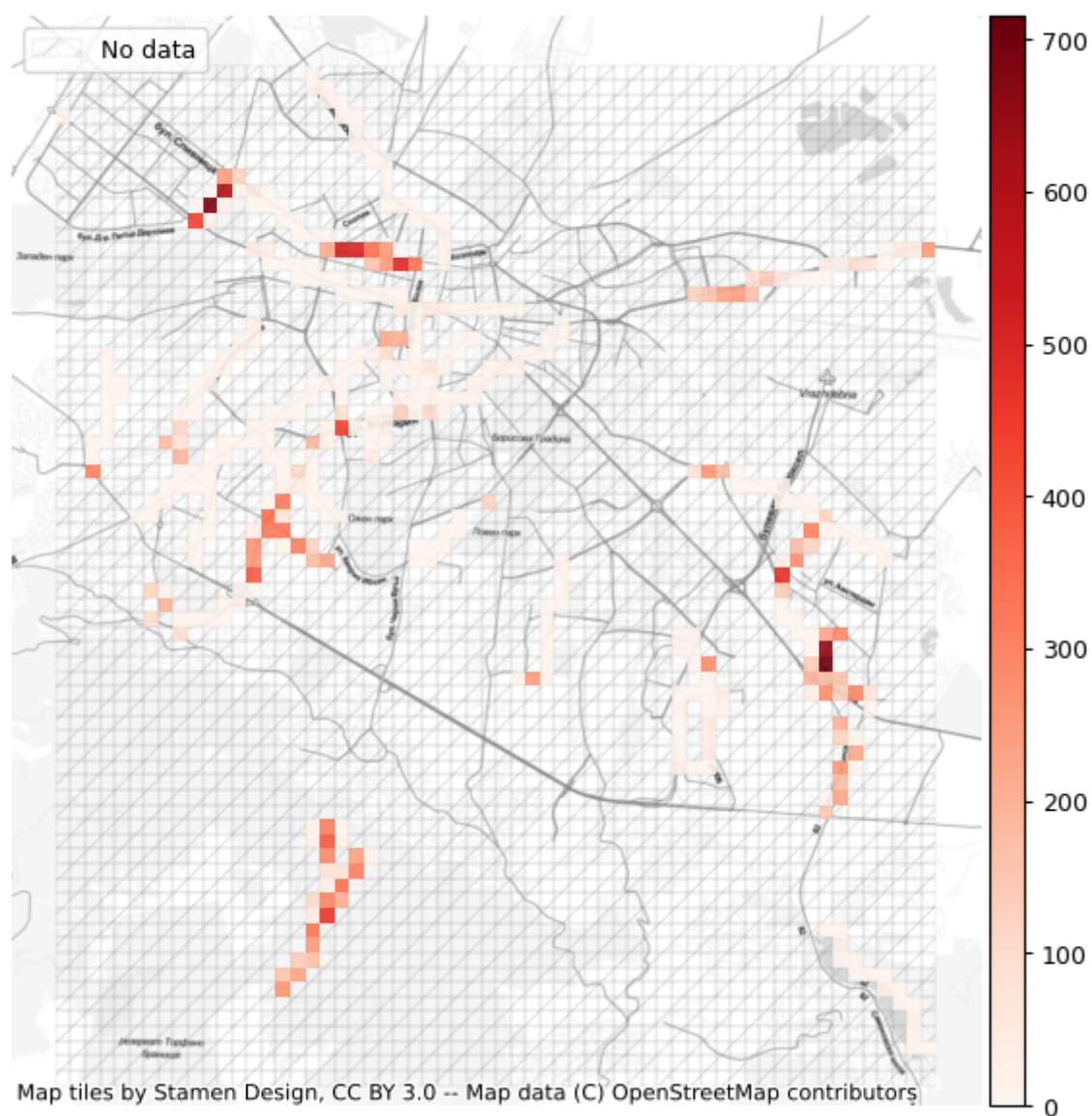
Sofia: percent of OSM segments not matched to reference data



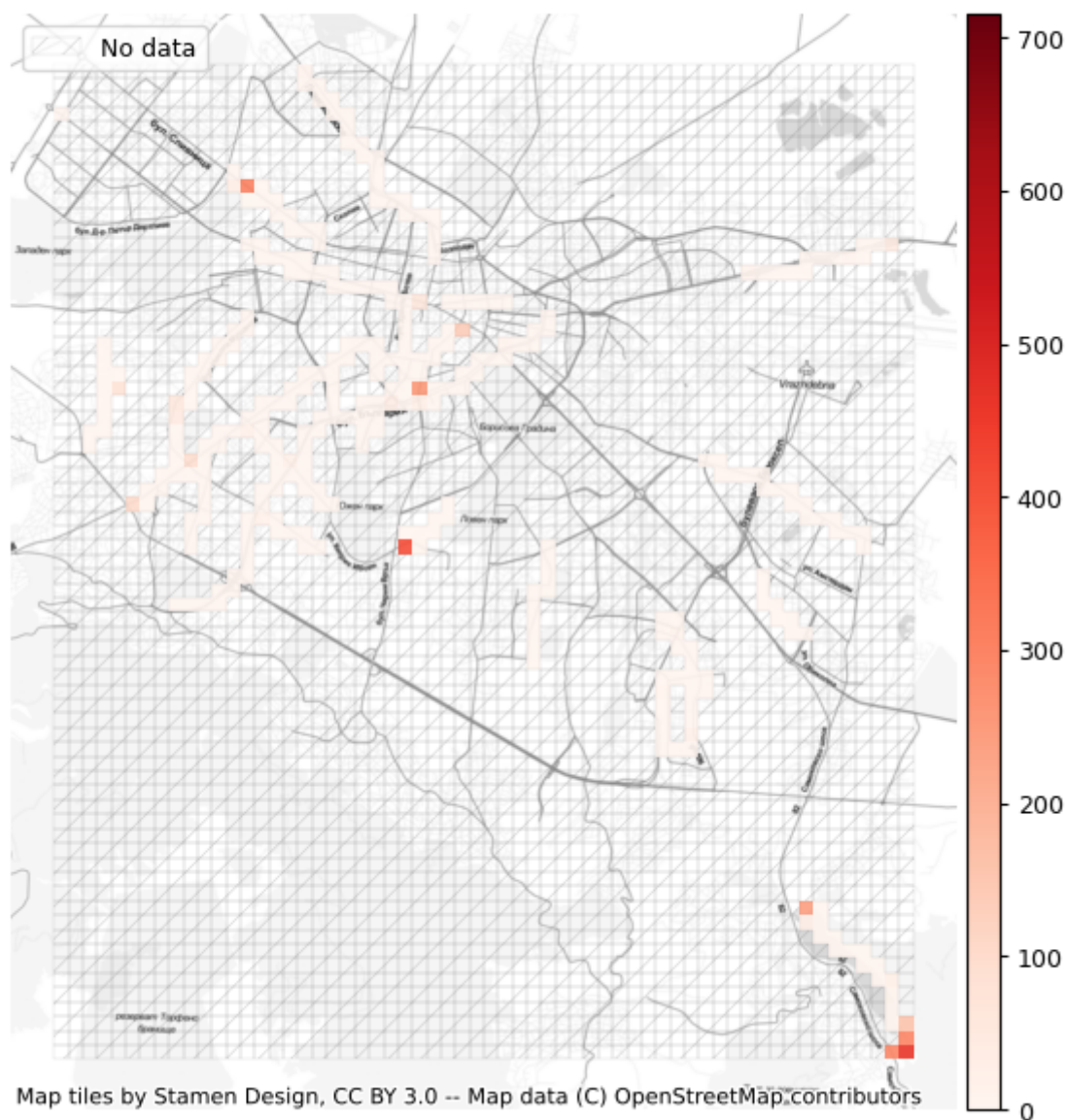
Sofia: percent of SofiaPlan segments not matched to OSM data



Sofia: length of OSM segments not matched to reference data



Sofia: length of SofiaPlan segments not matched to OSM data



Summary

Feature Matching Results

	OSM	SofiaPlan
Count of matched segments	6,704	7,437
Percent matched segments	71%	96%
Length of matched segments (km)	67	74
Percent of matched network length	72%	96%
Local min of % matched segments	8%	4%

Local max of % matched segments	100%	100%
Local average of % matched segments	92%	98%