

Detailed point by point response to the *new reviewer*

Below are summarize each comment of the new reviewer. For each comment, we have tried to give an answer and we have also highlighted the corresponding changes made in the manuscript (in this section, all lines refer to the marked-up manuscript version).

Comment 1

Reviewer (R): The one main uncertainty I had was in understanding exactly how the RSUs were outlined and perhaps to what extent that influences the LCZ designation. As an example, near the bottom of Figure 1 on the right hand side, the building density along the east-west road that marks the boundary of the RSU would probably be characteristic of a different LCZ than that of the overall polygon that is used (although the spatial extent of that development is narrow in the north-south axis). I can't tell what exists further south of the boundary (i.e. whether the urban structure along this road is confined to near the road or is more broadly typical). Assuming that what is south of the boundary is similar to what is north, it presumably points to the variability of structure that can occur within an LCZ

Authors (A): We are not sure to fully understand the reviewer's comment. Is the comment related to the domain extend and the fact that the area seems here artificially cut at the edges of the bounding box ? Or is it more related to the choice of the RSU definition ?

If the comment is related to the first point: for any study area of interest, we perform all our analysis on an extended zone (1,000 m larger than the original study area) and then the results are cropped for the initial zone of interest. This limits the edge effects at the boundary of the study area.

If the comment is related to the second point: for sure the RSU definition will affect the results of the classification. A specific investigation might be

performed in the future to better evaluate the uncertainty generated by the partitioning step (as it is stipulated in the Conclusion section l. 363-364). However, the geometries that partition the most the territory are roads and the road network between OSM and the BDT is quite similar even though sometimes slightly different.

- Changes in the manuscript : We have added a sentence related to our answer to the first point.

Comment 2

Reviewer (R): Line 115 To me, this seems like an odd definition of a “block”. There is a relation between the houses, but in my view a block is often defined by streets, at least in North American type cities.

Authors (A): Indeed, “block” is often seen from the road network perspective in the North American cities. To make it clearer, we propose to distinguish “building block” and “urban block”, the first being the definition given l. 115 and the second being the one defined by streets.

- Changes in the manuscript : We have replaced the few occurrences of “block” by “building block”.

Comment 3

Reviewer (R): Line 150 – This assumption incurs some error? Perhaps that should be mentioned here?

Authors (A): Yes the reviewer is right, this assumption clearly incurs some errors.

- Changes in the manuscript : We have added a short sentence about the potential errors that this assumption incurs.

Comment 4

Reviewer (R): Line 161 “respectively 0.1 and 0.3” - Figure 3 has water fraction as 0.4 so should this fraction and that listed in the quotes match?

Authors (A): Reviewer is right, the mistake has been made in the Figure.

- Changes in the manuscript : We have replaced 0.4 by 0.3 in Figure 3.

Comment 5

Reviewer (R): Line 154 What thresholds are these - impervious and water? Perhaps state this explicitly?

Authors (A): The reviewer is right, this was not clear as describe in the previous version

- Changes in the manuscript : We have added a sentence in the corresponding paragraph to better illustrate the philosophy and the implications of these thresholds.

Comment 6

Reviewer (R): Line 281 Although the urban LCZ here only occupy a small % of the urban area, they are potentially relatively important in terms of how they impact e.g. the urban heat island, and also potentially in the exposure of

relatively high population density to urban climate in that area. This may be worth a comment either here or in the discussion section.

Authors (A): Line 281 and the corresponding paragraph are related to all cities studied in the article, not only Saint-Nicolas de Redon (Figure 6). On average, the “urban LCZ” (all “built type” LCZ plus the “paved and bare rock” LCZ) occupy about 39% of the urban area (from 0.31 to 89% depending on the city), which, in our opinion, is not that small. However, if the reviewer means that misclassifying forest and low vegetation types is not as problematic as misclassifying forest and any urban built type ? If so we have gathered LCZ types into urban and rural types and calculated the percentage of agreement using these new classes. On average, for all cities considered, it results in 87% agreement (the minimum being 68% and the maximum 99%).

- Changes in the manuscript : The previous information (degree of agreement between OSM and BDT using only urban and rural types as classification) has been added in the paragraph dedicated to the analysis of all territories results.

Comment 7

Reviewer (R): Figure 8 Suggest making the font size for axes labels and values larger to enhance readability.

Authors (A): The reviewer is right.

- Changes in the manuscript : The Figure has been updated with the proposed suggestions.

Comment 8

Reviewer (R): I separately provide the manuscript pdf with minor wording suggestions

Authors (A): Thank you to the reviewer for these suggestions. Most of them have been accepted in the new manuscript version.

- Changes in the manuscript : Most of the reviewer suggestions have been applied throughout the new manuscript version.