

# ***Interactive comment on “Identifying (subsurface) anthropogenic heat sources that influence temperature in the drinking water distribution system” by Claudia M. Agudelo-Vera and Mirjam Blokker***

**Anonymous Referee #2**

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## General comments:

The presented study addresses the interesting and important issue of increasing drinking water temperatures due to surface and subsurface urban warming. While the lack of a tools and methods to tackle this problem is correctly identified, the proposed method is not well enough elaborated in the current manuscript to be directly applicable in this context. Only few results of the conducted field study are shown, and they are neither sufficient to support the conclusions, nor meaningful enough to demonstrate the practicability of the proposed method.

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The abstract should be restructured and more focus should be put on the developed method, results and conclusions, instead of on the background of the topic. While the aim of the study is specified as 'developing a method to identify and to localise potential underground hot spots' in the introduction, the method sections states that the aim is 'a method to identify subsurface anthropogenic heat sources'. The authors should be clear about the specific aims, and how the method supports the achievement of the aims. As the authors state correctly in the introduction 'modelling and random sampling are not enough to identify urban underground hot spots'. However, the method developed in this study is mainly based on soil temperature modelling and random measurements of tap temperature.

In general, the method section does not provide enough details, e.g. on parameterisation and the specific data used, to enable a replication of the analysis in a different urban area. The individual steps and inputs shown in Figure 1, such as the input of potential heat sources, are not explained in detail. It might also be easier to follow the approach, if the subchapters were structured according to the steps (1-5) in Figure 1. In addition, it seems contradictory that a list of potential heat sources is required as an input, when identification of heat sources is the aim of the study.

The results section partly contains information that is related to the methodology. In particular, section 3.3 is not based on observations from this study, but rather from literature. Oddly, the analysis of tap water measurements is based solely on a relative comparison to modelled soil temperatures. The absolute water temperatures, which are introduced as an important factor at the beginning, are neither shown nor discussed, and it is unclear how often the critical value of 25°C is actually exceeded. The result from the GIS are shown in a tiny figure that doesn't enable the reader to make any meaningful observations. Results from the soil temperatures measurement plan are not shown at all, and the statement that the simulation results are in good agreement with the measurement cannot be verified by the reader. The content of section 3.6 does not match the section heading. It contains many observations, conclusions

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and recommendations that are not based on results shown in this study, neither are citations for the statements given. This section should be thoroughly revised.

A discussion of the results is overall missing in terms of comparison to expected outcomes, comparison to results from previous studies, discussion of uncertainties associated with the obtained results, how representative the obtained results are, and regarding the transferability of the approach to other cities. Finally, the conclusion section provides a very short statement of the aim and approach of the study, but it does not highlight important findings, neither does it provide any conclusions.

Specific comments:

Page 1, line 20-21: please provide a citation for this statement.

Page 1, line 26-28: please restructure this long sentence.

Page 2, line 3: why specifically 10 x 10m?

Page 2, line 3: while the previous statement refers to subsurface temperature, you refer to surface temperatures here, and later again to subsurface. A better structure would help the reader to follow the reasoning in the introduction.

Page 2, line 14: please add a citation and some examples for this statement.

Page 2, line 20-21: please provide some examples for the numerous anthropogenic heat sources.

Page 2, line 22-23: please add a reference for the statement regarding the risk of exceeding the temperature limit.

Page 2, line 30: please rephrase '(x, y, and z)'.

Page 3, line 9: was the extension of the specified model part of the presented study or of Agudelo-Vera et al. (2015a)?

Page 3, line 19-21: it is not clear here (and in entire paragraph) which heat fluxes, heat

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sources and values refer to processes above ground and underground.

Page 4, line 3-8: please specify the spatial and temporal resolution of your simulation. Based on the wording in the paragraph it also appears that the study area has already been separated into average areas and hot-spot locations.

Page 4, Table 1: please provide more details on the values in the Table. What is the reasoning behind using the specific values, and how did you ensure that the values are representative and transferable from the cited studies?

Page 4, line 14-15: please provide more details on how the measurements were conducted, potential error sources, etc. and the reasoning behind the chosen classification scheme.

Page 5, line 5-11: please provide more details on this part of the analysis regarding the source of spatial information of anthropogenic heat sources, the tool used for solar radiation and its parameterisation, the conducted proximity analysis, and the classification of density of hot-spots. Please also state the mentioned hypotheses in the introduction.

Page 5: please provide more details on the measurement approach: how many measurements were conducted and where were they located (map)? What was the criterion used for the locations defined by Ttap? How were the anthropogenic sources used for selection of the measurement location identified (I thought they were a result of this analysis)? What is the accuracy of the measurement equipment, and what are other potential error sources? How was proper contact of the thermometer to the soil ensured?

Page 7, line 10: please specify (in the method section) how the shade conditions were quantified.

Page 7, line 13: please specify how significant these temperature changes are, and what a few meters are.

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Page 7, line 14: where exactly are these areas on the map? How many hot-spots define an area with a higher than usual occurrence?

Page 7, line 17-19: this sentence should be moved to the corresponding method section.

Page 8, line 15: please provide some examples for potential customised measures.

Page 9, line 6: please specify in what way this transferable approach is similar, identical or different to the one presented in this study? What elements of the approach need to be adapted to the investigated areas?

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