Detailed point by point response
to *Csilla Gal (reviewer 1)*

<u>General comments</u>

<u>Csilla Gal (CG):</u> I would like to thank the authors for their work and scientific contribution.

The wind model presented in the manuscript constitutes an important contribution to the modelling science within the scope of Geoscientific Model Development. It addresses an important gap in urban microclimate and outdoor thermal comfort comodeling, thereby having potential to advance these fields.

The manuscript is well-structured, providing sufficient detail regarding both the model and the experiment. The strengths and limitations of the model are presented in a balanced manner. Moreover, the accessibility of the data and code ensures the reproducibility of the results.

It is strongly recommend that the paper undergoes a technical revision. In particular, the authors are advised to adress the following sentences or sections:

<u>Authors (A):</u> We would like to thank Csilla Gal for her very careful reading. We have accepted most of the proposed modifications in the pdf version that was enclosed on the platform. Moreover, we have taken into account each of her specific comments (cf. below).

Comment 1

<u>CG:</u> Line 248, entire paragraph: The paragraph starting at line 248 should be restructured for improved clarity. It may be beneficial to introduce and explain the 'heighest stacked block rule' (mentioned in line 253) prior to referencing it. Additionally, clarification is needed regarding what do 'If equal' (in line 250 and 251) refer to. Shouldn't the first 'If equal' (line 250) be 'If unequal'?

A: We agree that this paragraph was not that clear. It has been largely modified.

→ Modifications performed: As proposed by CG, we have added a first paragraph introducing the "heighest stacked block rule" before referencing it afterward. We have also changed all "steps" occurrences by "task" which is also the word used in the Figure 13. Thus the word "task" which was originally used for subtask of Steps has been changed to "subtask". Clarification regarding the double use of "if equal" has also been performed. We hope it will lead to improved readability.

Comment 2

CG: Line 359, 'below 0.5 and above 1.5 m/s': As written, it implies no wind speeds within the range of 0.5—1.5 m/s.

A: It is a mistake, it is between -0.5 and +1.5 m/s

→ Modifications performed: The sentence has been changed to "URock vertical wind speed values are low (remaining between -0.15 and 0.05 m/s), while observations show a higher wind speed range (from -0.5 to 1.5 m/s)".

Comment 3

CG: Line 137, bulleted list: I recommend changing the bulleted list to a numbered list, for clarity.

A: We agree.

→ Modifications performed: Numbered list has been used. The equation corresponding to each number has been set to simplify the readability.

Comment 4

CG: Line 301, links in the paragraph: The links within the paragraph are advised to be moved into footnotes, for readability.

A: This paragraph has been updated since URock 2023 is now integrated into UMEP.

→ Modifications performed: All links in this section have been put as footnotes.

Comment 5

CG: Line 331, new paragraph/description: For clarity and consistency, I suggest providing a brief description of the evaluation steps, such as via a single-sentence description of what sub-images on Figure 17 present and how were obtained.

A: A short paragraph was added at the beginning of the section.

→ Modifications performed: Paragraph added: *"The simulations of each AIJ case has been run using the input wind profile measured in the wind tunnel for a given wind direction. The sensors being not necessarily located at the center of a simulation cell, linear interpolation is used in order to compare the wind at the exact sensor location. Figures presented in the next subsections are created using URock and QUIC-URB outputs in QGIS for top view figures and using the module \textit{URock analyzer} for the sectional view figures."*

Comment 6

CG: Line 396, 'green dash line': Please note that there is no dashed line in the referenced figure.

A: It is a mistake, the green line is a solid line

→ Modifications performed: We have removed the word "dash".

Detailed point by point response
to *reviewer 2*

<u>General comments</u>

<u>Reviewer 2 (R2):</u> The authors have developed a valuable open-source urban wind simulation model, which has been integrated into UMEP. This model utilizes the Röckle (1990) methodology. It has been demonstrated that this open-source model generates a wind field comparable to that of the QUIC-URB model, highlighting its promising potential. The authors have done a commendable job of presenting the data. Overall it is a good paper. However, there are some instances where sentences appear incomplete or somewhat incoherent, and it is suggested that the authors aim for more direct and concise writing.

<u>Authors (A):</u> Reviewer 1 (Csilla Gal) has proposed numerous modifications for the article writing.

<u>→ Modifications performed:</u> Even though the total manuscript length has not changed, many modifications have been performed according to reviewer 1 comments (cf. diff file between old version and the version taking into account reviewer 1 comments).

Comment 1

<u>R2:</u> The abstract could be drafted in a more scientifically question-driven tone, resembling a publication for a scientific journal rather than a manual.

<u>A:</u> The manuscript is a model description paper (cf. https://www.geoscientific-model-development.net/about/manuscript_types.html), thus the abstract should contain a non-negligible part of informations relative to the model and code availability. However, some of the interesting results (improvement potential) were missing from the abstract. They have been added in the last version

→ Modifications performed: The following modifications have been made in the abstract (**bold**): *"The correlation between URock and QUIC-URB is high and URock reproduces quite well the spatial variation of the wind speed observed in the wind tunnel experiments**, even in complex settings**. **However,** sources of improvements, which are applicable both for URock and QUIC-URB, are highlighted. **URock and QUIC-URB overestimate the wind speed downstream the upwind edges of wide buildings and also downstream isolated tree crowns.**"*

Comment 2

R2: While the open-source nature of the model is its most important feature, the authors should also highlight other significant aspects, such as underlying mechanisms. If this model is merely an open-source version of QUIC-URB, it would be valuable to explain its scientific importance.

A: Indeed, the most important feature of the URock model is the fact that it is open-source. This will lead to a non-negligible number of new users who will use diagnostic models such as URock or QUIC-URB. Thus, these models will be tested in more numerous urban settings that might lead to improvements in the future. Having an open source version is a good opportunity for anyone to easily test new schemes and then share them with the community. A new module could be created to simplify this testing.

→ Modifications performed: We do not think that our manuscript is specifically the place to argue the advantages of having open-source softwares. Thus, no modifications were carried concerning this specific point.

Comment 3

R2: The conclusion should be more concise and straightforward, clearly highlighting the improvements made and how these advancements contribute to the field.

A: Instead of showing the results of improvements, this manuscript tries to show that a new model called URock reproduces well the outputs of the well

validated QUIC-URB software. Additionnally, URock and QUIC are tested using urban settings that has never been used to validate QUIC. Thus, the conclusion is a summary of the main findings in these specific situations and also a place where improvements proposition are made, which might explain the length of the manuscript.

→ Modifications performed: The conclusion section has been renamed to "Conclusion and discussions"