

Dear Author,

Thank you for an interesting and well-written manuscript on cold roof cavities and the influence of ventilation. I find the topic very relevant, and a topic that through the years have been investigated in e.g. the Nordic countries. You have performed a substantial work that combine different approaches and investigations. The manuscript need some additional information mostly in the introduction and method to become even better for the reader.

1. Introduction

L33-35: Can you insert a reference to the Acceptable Solutions/Verifications Methods ect. This will help the reader if they find the approach interesting regarding their national building code.

<https://www.building.govt.nz/building-code-compliance/e-moisture/e3-internal-moisture/#jumpto-acceptable-solutions-and-verification-methods>

I get a little confused when I read the introduction, because in L41 you mention that *roof spaces would not be 'deliberately' ventilated*, however, in L43 *roof ventilation is specified as part of a building code*. To fully understand the NZ building style, it would be beneficial if this is explained more, e.g. the ratio for free vent area, i.e. what are the ventilation requirements in New Zealand? You can consider adding a figure of the principles of venting or not venting the roof space.

L60-64: Why is it important that the roof is airtight? If you have ventilation in eaves and ridge, you do not have it airtight.

L68-70: How much is the changes in the temperature of the roof space during winter? Please, elaborated on the consequences of this. You could also insert a reference.

L68-84: This paragraph deals with air barrier and moisture transport by convection. I think it would be relevant to include a section of the use of vapor barrier layers. Also if this is not a standard part of a ceiling construction.

L96-98: Can you add a reference?

2. Materials and Methods

Section 2.1 + 2.2. : I would like more information on the ceiling structure, i.e. insulation thickness, material properties, boundary conditions and perhaps a figure of the exterior climate (T + RH). From the information provided, it is not possible to redo the WUFI 2D simulations. The NRC guideline do provide a list of the needed information to mention. Perhaps not all of the information from the NRC guideline is needed in the manuscript.

L141: Please insert a new line before *Hygrothermal*.

Figure 1: Please insert dimensions.

L206-208: The climate file you mention here, is that different from the exterior climate (New Zealand weather)?

Figure 2: Could you indicate on Figure 2 which ventilation rates from Table 1 that act on the surfaces.

L253-254: A general comment. In this sentence, you mention *the guideline*, which I presume is the NRC guideline. I suggest you to add a reference each time you mention this document, thus no confusion occur.

L274-278: You have done measurement of the temperature and relative humidity in both indoor and outdoor climate. Have you calculated the 'internal humidity class'/the moisture contribution to classify the indoor environment for these 71 dwellings, see ISO 13788:2012. In the introduction, you mention the indoor environment as an important boundary condition. This information could give you information on the moisture load from room to roof.

L280: Could you comment on the location near the hatch. Earlier you mentioned that these might be leaky, thus it could be that the measure is not representative for the roof space.

3. Results

Figure 4: Please consider the used colors. Outside and Roof space 2 are difficult to separate.

Figure 6 +7: The figures are difficult to read regarding font size and especially the left ones are difficult to see the graphs. They must be improved. Furthermore, you should add (a) and (b), this is relevant for other figures too.

L362-363: I think it will strengthen your work if you include how the 71 dwellings indoor climate is, e.g. expressed by internal humidity class, ISO 13788:2012.

L397-399: Please elaborate on the materials that can absorb moisture in the roof space. In the introduction, it could be presented how this moisture is handled constructional.

L550: Could you elaborate on how the mold growth problems were evaluated. Was it visually, measured etc. I think this is interesting because you might measure mold but not see it.

L560-562: Where is it shown that the indoor environment influences the roof space if the ceiling is airtight? The ventilation rate in the roof space is much more dominant; however, it depends on the design in New Zealand. It could be relevant to include a reference, or elaborate on this regarding the different (non)ventilation strategies.

Figure 14 + 15: Insert (a) and (b) on the figure. They are in the caption.

4. Discussion

L598-603: How would the results be if WUFI standard values were used as a practitioner? Has the weather data been compared? As you want to evaluate the NRC Guideline, that document only mentions what you must specify and not how to get those values. In some cases, in-depth assessment must be taken to get the best input for the simulations.

L625-627: Please elaborate on how this study is bringing you closer to determine a service life for fasteners.

5. Conclusion:

L632-635: I do not think the discussion reflects much on the construction moisture levels as the moisture source in the roof space. I suggest that you elaborate on this in the discussion and that you also consider the influence of the exterior climate. See also L644-646.

L658-660: Why do you say that the NRC guideline will be used on solutions that are known to work well? These solutions should probably not be documented using hygrothermal simulations. You should perhaps consider how the NRC guideline could be used to document the service life of 5, 15 or 50 years as mentioned in the introduction.

References

I suggest including a few newer references in the document on e.g. cold ventilated attics. These could support and give a broader view of the present research.