

## ***Interactive comment on “Comparison of algorithms and parameterisations for infiltration into organic-covered permafrost soils” by Y. Zhang et al.***

**Anonymous Referee #1**

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This is a nice, well-written paper summarizing the state-of-the-science on infiltration in permafrost regions. The paper presents a tight analysis comparing commonly used algorithms and makes some important recommendations. I think it is very close to publication-ready. I just have a few comments/suggestions. First, I list some general comments followed by some specific, mostly editorial, comments.

General Comments: 1. The text mentions calibration and validation several times, but there is no explicit section describing how this was done. I'd like to see a short section or sub-section explain the calval process. I would make sense to include it in Section

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3.3.

2. The results sections contains of lot of discussion. This is OK, but I suggest renaming the section to Results and Discussion, and then Conclusions.

3. The depth of thaw is a critical calculation. However, I don't see any explanation about how the various algorithms are accomplishing this. I think the heat transfer components of the various infiltration models are just as important as the water transfer components. However, heat transfer receives just casual mentions. The methods section should explain how temperature and thawing fronts are calculated in as much detail as how infiltration is explained.

Specific Comments: (page, line) 5711, 9-17: These sentences could be deleted. It is not worth listing the parameters that are already in tables. The paragraph could start with “Practically all of the parameters in Eqs. 1-6. . .”

5815, 7: Add the word “scenarios” after “infiltration” so that the sentence doesn't sound like a general statement about infiltration.

5715, 18: This approach to estimate snowmelt assumes that sublimation and evaporation from the melting snow are negligible. While this may be true, I think it is worth stating.

5718, 2-5: Begin the list components with the verbs with used, designed, and required.

5718, 22: Finite difference is a numerical method. In the previous review the authors stated that numerical methods are rarely used because they are computationally intensive. They therefore did not review numerical methods. Perhaps some clarification is needed.

5719, 24: I suggest placing the figure reference at the end of the sentence such as shown below. There are several examples throughout the text like this.

All three commonly used methods in Table 5 are able to fit observed soil water retention

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curves in moderate soil moisture ranges for several organic soils (Fig. 1).

5722, 15: In line with the previous comment, the phrase “Results show that…” is unnecessary. This is the Results section, so you don’t have to say it again. There are many examples of this writing habit throughout the text.

5723, 22-23: This sentence can be deleted, and then include (Table 7) at the end of the next sentence.

5723, 27: This sentence is unnecessary. It simply states what is in the figure. This can be accomplished in the figure caption.

5726, 10: Delete the phrase “This study demonstrates that. . .”. Just say it.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5705, 2009.