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The Cryosphere Discussions

Interactive comment on "Soil infiltration characteristics and pore distribution under freezing-thawing conditions" *by* Ruiqi Jiang et al.

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Response to the referee comments by Anonymous Referee #2

Dear Referee: Thank you very much for your attention and the referee comments on our manuscript "Soil infiltration characteristics and pore distribution under freezing-thawing conditions". We are honored to have the opportunity to communicate with you and learn from you; if you have any other suggestions or questions after reading the responses, please feel free to contact us.

Response to Major Comments

We apologize that our English is not good enough, resulting in some long sentences that may be awkward to read. The revised paper will be polished by professional or-

ganizations. The estimated hydraulic conductivity of frozen soil is considered for the glycol solution, and the hydraulic conductivity of unfrozen soil is considered for the water. The saturated hydraulic conductivity can reflect the permeability of the soil to some extent, and the values of saturated hydraulic conductivity are given in Table 4. The water content of the soil sample is given in the main text, as seen in L136. The pre-freezing water content of the soil column was preset to 0.3, and after the column was filled, the sensor showed a moisture content in the range of 0.30 ± 0.02. Some of the specific data from the sensors will be provided in the supplement as a reference.

Response to Minor Comments

L20-24: As you suggest, the statement here is indeed incomplete. The complete expression should be 'selected black and meadow soils and chernozem as test subjects.' We will take another look at the language and structure of the manuscript after revision have been made.

L26 and L188-189: Punctuation and formatting issues will be corrected in the revised version.

Table 1: We have identified the cause of the format conversion problem during submission. The soil textures of the meadow and chernozem soils are both silt loam.

Methods: The initial water content of the samples was 0.3, and water and aqueous solutions were both used for the experiments. In a supplemental experiment, we used an electric drill to collect soil samples and then dried them. The unfrozen water content and ice content data of the soil samples are provided in the supplement. The hydraulic conductivity in frozen soil is for glycol solution, and that in unfrozen soil is determined for water.

Figures 3 and 4 do have similarities, but cumulative infiltration and infiltration rate are different concepts, and we believe they provide a more complete reflection of the changes in soil infiltration capacity.

L45: Figure 4 represents the infiltration rate over time under the different treatments. The unsaturated hydraulic conductivity is shown in Figure 5, and the saturated hydraulic conductivity is given in Table 4.

Figure 5: In the revised paper, we will provide a more detailed description and discussion in the text. The saturation of the soil changed significantly after freezing, and the saturated hydraulic conductivity better reflected the relevant issues.

L273: The stable frozen state usually indicates that no drastic changes in temperature and water content occur.

Fig. 6: The Y-axis of the internal expansion chart will be standardized to scientific notation.

Please also note the supplement to this comment:
https://tc.copernicus.org/preprints/tc-2020-280/tc-2020-280-AC2-supplement.zip

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