Hydrol. Earth Syst. Sci. Discuss., 7, C660–C661, 2010
www.hydrol-earth-syst-sci-discuss.net/7/C660/2010/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Evidence for enhanced infiltration of ion load during snowmelt" *by* G. Lilbæk and J. W. Pomeroy

Anonymous Referee #2

Received and published: 27 April 2010

This paper reported an interesting laboratory study that simulates the ion load behaviors during snowmelt water infiltrating into frozen ground. The results of this study have potential applications in environmental impact assessments of cold region hydrological cycles. Therefore the research topic of this manuscript well fits into the publication scope of HESS. The manuscript was generally well prepared; the experiments were well designed and clearly described; the results were well presented. However, this reviewer finds some sections of manuscript, e.g. "1. Introduction" and "4. Discussion", are difficult to follow and could be improved in the revised version. In conclusion, this reviewer suggests the publication of this manuscript in HESS provided the following issues could be explained or revised in the final version.

(1) I found that the title of the manuscript is somewhat misleading. The readers would

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

expect some field evidence by this title. I suggest to add " Laboratory" in front of the "Evidence".

(2) The introduction part could be more focused. A considerable portion of the text in this section are devoted to describe the factors that influence the infiltrations into frozen soils (e.g. line 14 page 1433 to line 25 page 1434), such as macropores, basal ice, migrations of moisture to frozen front, etc., yet there were very little statements that relates those factors to the "enhanced infiltration" phenomenon, which is the main subject of this study. Further more, all those factors were not presented in the experiments of this study. I suggest reducing the texts about the non-essential factors in "Introduction", but address them BRIEFLY in "Discussion". Some other questions I would like to know in "Introduction" are: (i) is this "enhanced infiltration" unique in frozen soil or it could occur in unfrozen soil as well? (ii) what are the major similarities and discrepancies between the snowmelt infiltration and that of the experiments in this study?

(3) Lines 9-20 Page 1443. I suggest deleting or reducing those discussions for general frozen soil infiltration so that it could be more focused on "enhanced infiltration of ion loads".

(4) Lines 3-5 page 1446 and in Fig. 5 (Page 1457): I am not very clear about the term "volume of liquid water" or "percentage of initial water volume". Is it just the initial volumetric soil water content or is it related to the added water? Please clarify.

(5) Lines 12-14 page 1446: if I understood correctly, the 0.03-0.6 °C freezing point depression is only for the saturated condition (Fig. 5). As showed in Fig. 5, the freezing point could reach -6 °C for dry soil, which means the dry soil will not freeze at all in this experiment (about-1 - -2 °C, table 1). If this is the case, it will be a big discrepancy between this experiment and the field condition. Please clarify.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 1431, 2010.