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Discussions

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Interactive comment on "Evaluating digital terrain indices for soil wetness mapping – a Swedish case study" *by* A. M. Ågren et al.

Anonymous Referee #1

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General comments

The manuscript evaluates several digital terrain indices for their ability to identify the location of wet forest soil areas. The evaluation was done on three areas representing different soil types. One of the studied indices, the depth-to-water index was shown to predict the mapped soil "wetness" with a reliable and consistent manner. The results of the study are new and highly valuable and applicable when mechanized forest harvesting, planting and soil preparation operations are planned. In many countries it is becoming unacceptable to cause soil rutting and to enhance soil erosion when carrying out forestry operations. In addition wet soils can also increase the costs of the forestry operations since forest machines get easily stuck on wet soils. The manuscript is mostly well written and can be published after minor revision taking into account the

following specific and technical comments.

Specific comments

The introduction on page 4105, lines 2-9 give an impression that rutting increases the export of Hg into watercourses. The mechanism behind that phenomenon should be briefly described.

The introduction justifies nicely the practical importance of the study. What is, lacking is a short description of the existing, available wetness indices and the experiences of their use on forest soils. Now there are only references to the literature and the reader has to find out by him/herself, what is the current status of the development of these indices (page 4104, lines 19-21).

It would also be good to mention in the introduction what are the main criteria for good wetness indices to be useful in practice.

The method for determining the soil "wetness" in the field is described in high detail on pages 4106-4107, however, it should be made clear what was the resolution for determining the soil wetness classes on the transects lines.

The used soil wetness classification includes wetness classes which pertain the depth to the groundwater table. It would be informative to give an explanation how that is determined.

Page 4110, lines 3-4. What are the locations where water is estimated to be at surface?

Page 4111, chapter 2.4.3. It would be could to justify why a matrix with only four classes (DTW$\leq$1 m and > 1m) was chosen for the evaluation). Was that sensitive enough to reveal the conformance of the index in real practical applications?

Please, add in the discussion some discussion about the sensitivity of the results to the seasonal variation in soil wetness and what that means in practice. To my understanding the machine drivers should know beforehand the time when the soil is wet

and vulnerable to rutting and they should avoid driving. The wetness might change day by day depending on the climatic conditions. Describe how the wetness indices described in this study sensitive to the variation in climatic conditions or changes in soil wetness e.g. after clear-cutting?

Technical comments

The Figures should be numbered in the order they are referred to in the text.

Description of the calculation of the different indices are described on pages 4108-4109.

It is unclear why some of the words/indices are written in italics?

Page 4109, line 13. Unclear text on that line.

Table 1. Would it be possible to include also the number of observation points in the Table?

Figure 2. Figure caption is not informative enough. Some more information is needed for the variables included in the analyses, the abbreviations are not all clear even after reading the text.