

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

### **Anonymous Referee #2**

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There are some very nice element to this paper, however they are rather hidden by the over complicated analysis used in the paper.

The paragraphs need to be shorter.

I think some major changes and simplifications would help the paper. I became lost in sections as to what the focus of the paper was. Is this a paper on terrain analysis methods; is it a statistical classification exercise or was it a ground truth exercise?

I think the paper needed to address the issue of trafficking through saturated ground. However I do not believe this paper has really added to discussion on this problem in terms of any recommendations or management options. Does knowledge of wetness patterns allow better management? If yes, I would expand this part into the paper.

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The paper refers to the issue in the abstract; the introduction and then briefly in the conclusion. The authors must decide if this is a paper about the problems of machinery driving through wet soils or not?

The abstract is full of jargon and acronyms.

The bulk of the abstract refers to terrain analysis methods and in essence it sounds good. But, I think the paper does not back up the abstract and the terrain analysis does not back up the trafficking issue.

The paper is reliant on a classification of land units, based on soil properties and this does seem to be a very robust way of characterising the wetness map. As the soil classification is so good, and given the later analysis it might suggest that more soil mapping effort may be all that is needed to define sensitive saturated zones.

I am surprised that the text did not discuss connectivity of flow pathways. Also can the authors define the subsurface flow pathways and surface pathways more clearly? It is the switch from subsurface fed saturated zones turning into saturated zones containing open channel flow that seems most important to this study.

The primary use of TWI in most applications is to allow a dynamic mapping of wetness in time. It is the change in seasons and changes during storm events that are the focus of most studies. This classification seems static and not dynamic, and as it is not fed into a hydrological model such as TOPMODEL.

I will assume that large areas of DEM can be created for the study areas. So I believe that TWI and Dtw can be created for large areas. Therefore the onus is now on the test of accuracy, which is the main part of the paper. So the main test is mapping indices against the ground truth which is the soil- based classification. The paper now gets into trouble. Generally the jargon and the acronyms make the task of reading and understanding the text quite difficult.

I do like the Dtw index as it is simple and informative - so keep this. However, can it be

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made dynamic to reflect the season and storm event dynamic?

I do not like Fig 2, as this is a classification of something that is already classified, i.e. the soil property. I also do not believe the detailed statistical analysis is adding anything to this paper.

I would rewrite 2.4. There is too much detail and the methods are not really telling me anything. Can one simple statistic be used?

Fig 3 is good but needs to be justified as there are many papers on DEM resolution effects.

Fig 4 is good but too much is going on. Try zooming in to a detailed area of study.

Fig 5 is also good.

The points about the crucial role of channel initiation is also good. A figure could help reflect this.

This is where I think the emphasis of the paper and the analysis should change. I would like to see more maps and more verification evidence on the maps (and not using false positive statistics etc...). Maps that use overlays of the TWI, the soil classes, Dtw and DEMs are very convincing. Through visual matches and anomalies the reader can quickly evaluate the goodness of fit. Maps allow a broader hydro-geomorphological interpretation of the goodness of fit rather than just using a blind statistic.

So my conclusion is to keep most of the paper. Add some new map-based analysis (showing the accuracy of methods). I would then add new text on the case study and on the importance of machinery driving through wet zones. Can you discuss the options of where to drive and when to drive the machinery or even if you need a bridge across the permanent wet areas?

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