

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-119

Anonymous Referee #1

Referee comment on "Decision tree-based detection of blowing snow events in the European Alps" by Zhipeng Xie et al., Hydrol. Earth Syst. Sci. Discuss.,
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The manuscript described the construction and evaluation of the machine learning based decision tree model (DTM) in detecting blowing snow occurrence by exploiting routine meteorological observations from 10 sites in the European Alps. The constructed DTMs demonstrated good performance in temporal extrapolation, and were also able to accurately detect blowing snow at stations outside the training range. In general, both the SSDTMs and SIDTM are useful tools in detecting the occurrence of blowing snow events, and achieve acceptable accuracy in terms of their spatiotemporal predictions.

Traditional blowing snow occurrence or simulation in land surface model or climate models has the difficulty of obtaining reliable observations for the required input. However, this study developed a simple but efficient tool to detect blowing snow occurrences and to advance our understanding of the relationships between blowing snow processes and ambient meteorological conditions. It also provide a potential insight to the future machine learning studies and modeling studies for the blowing snow events in the highland areas, such as the Tibetan Plateau.

Scientifically, the machine learning based DTM and the evaluations are well conducted and the results are reasonable. The manuscript of this paper is well organized and it is logical in its presentation. I believe this manuscript is suitable for publication in HESS, but have some primary concerns shown as following. I suggest publication of this paper with following minor revisions.

Some details are listed as follows:

- Could you give a schematic flowchart of the machine learning based decision tree model (DTM)? This would enrich your manuscript and also make it easier for the reader to understand.
- How is the DTM's computation cost? Your study just involve 10 sites over a small region. I'm not sure how much computation time it would take if this method was applied to large area or other regions.
- At line 38, it would be better to replace the "causing a loss of visual sight" by "causing severe reductions to visibility near the ground".
- Replacing the word "distribution" in line 40 by "redistribution".
- The definite article "the" in the "at the local scale" in line 47 is needless.
- At line 51, some references should be added to describe alternative methods that have been proposed.
- It would be better to replace "this method" in line 71 with "the remote retrieval algorithms".
- Maybe you need to check the manuscript again. For example, at line 504, "....., and can were also able to accurately....." It seems the "can" is needless.
- Please give the full name of ISAW while it first appears in the article.