

The Cryosphere Discuss., referee comment RC1  
<https://doi.org/10.5194/tc-2021-56-RC1>, 2021  
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## **Comment on tc-2021-56**

Richard L.H. Essery (Referee)

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Referee comment on "Evaluating a prediction system for snow management" by Pirmin Philipp Ebner et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-56-RC1>, 2021

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Ebner et al. present an important and novel application for snow modelling, but I have some suggestions to clarify the paper.

9

Specifically, the comparison with Sentinel-2 data is for snow-covered area.

10

Redistribution of snow by skiers would not directly lead to a reduction in average snow depth. This may be a significant omission in simulations, but the statement in the abstract seems more confident than the discussion in the paper.

24

What is "early winter" in this context?

29

What do these national percentages represent? Can a link be provided for Lalli et al.

2019?

51

Monti et al. (2016) discusses initialization of a model with manual snow profiles, not remote sensing.

69

This is the width of the elevation bands, not the elevation bands themselves.

88

The snow management configurations in Table 1 are incomprehensible without reading Hanzer et al. (2020). Brief descriptions and reasons for selecting them should be given to make this paper more self-sufficient.

102

The SRU is a clever concept similar to the familiar HRU of hydrology, but it seems from the Supplementary Material that there is much more to the definition of SRUs than the slicing into elevation ranges described here.

158

In short, GNSS snow depth data were available for all pilot resorts except La Plagne.

184

The 0-1 range of SP has already been stated.

210

$i = 0, \dots, N$  would be  $N+1$  pixels

213

<https://doi.org/10.1029/2010EO450004>

226

Agreement between observations and models that the pistes are almost fully snow covered in the middle of the season is not surprising (these are ski resorts, after all!). A more interesting question, and a more important one for snow management, might be how much better the models perform in early and late season compared with simulations without snow management.

263

If slopes were not groomed, how are GNSS measurements available to quantify the model error? How does the lack of grooming lead to strong increases in RMSD?

278-279

Is something missing from this sentence? It does not seem to make sense.

281

Figure 7 is referred to before Figure 6

Figure 3

It seems counterintuitive that the brightest colour is the lowest snow persistence.

Figure 4

Having a zero line that is not in the centre of a radar plot is confusing. Absolute errors might be better, or at least highlight the zero line.

Figure 5

Having RMSD and MD on the same figure but with different axes is very confusing and makes it difficult to tell at a glance if an error is small or large. Using a single axis would compact the error range but would be much clearer (this is common in evaluations of weather forecast errors)

Figure 6

What is the nature of the large measured snow depth between 1400 m elevation? Is there a bump in the snow surface or a dip in the ground surface that is not resolved by the 10 m model?

Figure 7

Little variation is seen in MD between resolutions. Text in 4.3 discusses reduction in RMSD, so that might be a better variable to show.

Table C1

Why does the column for Sentinel-2 contain statements about errors in snow depth?