

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2021-48

Anonymous Referee #2

Referee comment on "Synoptic control on snow avalanche activity in central Spitsbergen" by Holt Hancock et al., The Cryosphere Discuss.,
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The authors investigated the relationship between the avalanche activity classified as 3 types (no avalanche days, avalanche days, and avalanche cycles) based on observation data and 11 synoptic types classified using ERA-5 reanalysis data in the Nordenskiöld Land region, Spitsbergen. They showed that avalanche activity depends on the synoptic condition with precipitation, wind speed and temperature. Namely, Avalanche activity becomes active under the condition including large precipitation, strong wind, rapid rising temperature. They also investigate the relationship between avalanche types (dry, mix, and wet) and synoptic types. Finally, they tried to discuss the influence of climate change in avalanche activity based on their findings.

It is clear to see that a lot of hard work has been put into the study, especially for the quality check of avalanche data. Therefore, I do not doubt that their results based on these reliable data should be contribute to the avalanche studies in the study area although their findings are not so much different from the previous studies.

The manuscript, figures and table are designed well, but some of parts include so long sentences that the readers are forced to understand their implication harder. Therefore, I recommend to revise these parts briefly before publication in TC. Additionally, please consider to clear the following two points, which should be related to foundation of their discussion, before making the final version of the manuscript.

- The AAI is a key term in the manuscript, but its definition is not cleared in the text. Therefore, the reader can not understand the benefit to use AAI. Please add more detailed description of AAI.
- They classified the avalanche days and avalanche cycles based on AAI and discuss their relationship with synoptic types, but the determination method of the threshold values between avalanche days and avalanche cycles seems to be ambiguous. Please add more description how to determine the threshold value with scientific evidence if possible.