

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-14

Anonymous Referee #1

Referee comment on "Meteor radar observations of polar mesospheric summer echoes over Svalbard" by Joel P. Younger et al., Atmos. Meas. Tech. Discuss.,
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General comments

This article describes how observation data from an all-sky meteor radar can be used for the detection of PMSE layers in addition to pure meteor observation. In a case study, data from the Nippon/Norwegian Svalbard Meteor Radar (NSMR) are compared with standard PMSE observations from the Svalbard SOUSY Radar (SSR) and investigated in terms of layer morphology, wind estimation, and aspect sensitivity. The authors show that all-sky systems are able to continuously detect PMSE over a wide range of zenith angles and draw conclusions about fine structure in the PMSE layers and the movement of the scatterers. Despite the broad antenna characteristics of the meteor radar, the observed PMSE layers can be used to infer the wind speed in the layer and the aspect sensitivity of the scattering mechanism, assuming that these layers have a narrow vertical extent. The manuscript is well structured, the methods used are also well described and documented through their application using case studies. Based on the described methods and examples shown, the potential of all-sky meteor radars as a supplement to the measurements of MST radars, which are mainly used for PMSE observation, is demonstrated. The article is overall well written and I recommend it for publication in AMT, having considered the following minor comments:

Specific comments

- Fig.1, Fig.2: I recommend showing the same height range in both figures.
- P4 L96: The given reference to Chechowsky et al., 1989 could not be related to MAARSY results.
- P5 L104: The wide field-of-view is often mentioned here and elsewhere in the text and probably refers to the characteristics of the individual antennas. It would be interesting to find here some statements about the characteristics of the antenna pattern resulting from the five incoherently added receiving channels, which would clarify the mentioned advantage that different parts of the horizontally extended PMSE can be detected.

- Fig.4: To what height do these spectra belong?
- P10 L184: Fig.3 to Fig.5
- P10 L184ff: The horizontal wind shown in Fig.5 is in the range 76–100km. The statement that “the dashed lines in Fig.3” show that “the meteor wind estimates closely match the peak power of the range-Doppler profiles of PMSE return” is therefore somewhat misleading.