

Interactive comment on “Meteor velocity determination with plasma physics” by L. P. Dyrud et al.

Anonymous Referee #1

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The paper presents a novel technique to determine the velocity of meteoroids from the non-specular radar echoes. In this technique, the plasma instability altitude extension, as determined from a radar, is used to determine the meteoroid velocity. This method complements existing techniques and may help to resolve the average meteoroid velocity "controversy", among other potential applications. Although I recommend its publication on ACP, the following issues should be addressed in the final revision.

MAJOR COMMENTS

1. Instability altitude extension (IAE) is everything for the technique. Obviously it depends on meteoroid entry velocity. It makes the paper much easier to read if the authors can summarize/clarify what other parameters, such as meteoroid mass, composition, and entry geometry, also affect IAE and to what extent.

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2. I assume that the non-specular echo altitude range observed by radars is matched to the theoretical IAE to obtain the velocity. The manuscript makes no mention of how radar wavelength and power affect the observed non-specular echo altitude range. It appears that radar characteristics do not affect the results. This needs to be clarified. If the radar power and frequency are assumed to have no bearing on the observed non-specular echo altitude extension, this needs to be justified. I would be very surprised to find that non-specular echoes (from the same meteor) are observed in the same altitude range by two completely different radars.

3. A figure on the relationship between IAE and meteoroid velocity for the most representative case would be a very useful addition to the manuscript. This figure would allow other people to use this technique and verify its validity.

4. Diurnal variation of the average velocity is another way to check whether the technique yields results consistent with expectation.

MINOR COMMENTS

1. p.1249, L18: change "every high powered radar" to "most high powered radars in the world". Russia/Ukraine have a couple of powerful radars that may not be used for meteor studies in the past few years.

2. p.1256, L19-21. The Doppler shift probably does not correspond to neutral wind.

3. p.1258, L16. Quantify "small meteors" either in relative or absolute terms.

4. Figure 2 and 5 are identical.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 1247, 2004.

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