

This is a well-written paper with a novel topic that seeks to extract neutral densities from meteor measurements. The authors are missing some citations, including references to more rigorous modeling that better maps the RCS to size (and mass). Also, the authors need to address how sensitive the results are to bin size and smoothing window when talking about the statistical robustness.

Line 25-30:

Another type of reflection that needs to be included is the range-spread trail echo or non-specular trail. This one does not require perpendicular condition with the trail, but instead relies on the perpendicular condition with the background magnetic field. Please include this and cite:

Dyrud et al., “Plasma and Electromagnetic Wave Simulations of Meteors” (2008)

Dyrud et al., “Modeling high-power large aperture radar meteor trails” (2005)

Close et al., “Dependence of radar signal strength on frequency and aspect angle of nonspecular meteor trails (2008)

Line 30-35:

The HPLA head echo measurements are quite accurate, though agreed that it is difficult to extract neutral densities without assumptions. Please make sure to add a more thorough description of head echoes and cite:

Close et al., “Determining meteoroid bulk densities using a plasma scattering model with high-power larger-aperture radar data” (2012)

Tarano et al., “Inference of meteoroid characteristics using a genetic algorithm” (2019)

Line 50: What is the polarization? (please see Close et al., “Polarization and scattering of a long-duration meteor trail” (2011)

Figure 1: Was the range cutoff at 130 km? (70-130 km?)

Line 95: I’m assuming you mean at each radar facility. Altitude will depend upon the polarization and frequency of the radar, as well as (slightly) the angle of the head echo with respect to the background magnetic field. Please clarify.

Line 113 - 115: The RCS depends upon the incident frequency and the altitude as well as the velocity. There are models that are more rigorous to correlate RCS with size. Please read and cite:

Marshall et al., "Plasma distributions in meteor head echoes and implications for radar cross section interpretation",

Close et al., "A technique for calculating meteor plasma density and meteoroid mass from radar head echo scattering" 2004

Line 120: Ablation depends on composition, emissivity and thermal state (may not average out year-to-year) and detection depends on plasma production and radar sensitivity (not just mass loss). Please add a few sentences clarifying this.

Line 145: 40% density changes in this region are a bit high – add a quantitative comparison and clarify that this is due to the upper-tail events (not typical)