

Interactive comment on “Effect of neutral winds on the creation of non-specular meteor trail echoes” by Freddy Galindo et al.

Anonymous Referee #1

Received and published: 9 August 2020

The manuscript discusses the effect of horizontal neutral wind on the generation and duration of nonspecular meteor echoes. The authors compare the simulation results from the nonspecular meteor trail echo simulator with radar observations, and report a threshold of horizontal neutral wind velocity 0.6 m/s controlling the generation of meteor trail irregularities. The results are important for understanding the nonspecular meteor echoes and associated meteor trail plasma instabilities. However, the physical process that how the horizontal wind affects or controls the generation of trail irregularities is not stated clearly and needs more clarification.

Specific comments,

lines 5-10: "for horizontal winds stronger than 1 m/s, a 0.316 μg meteoroid traveling at 35 km/s can produce meteor trail echo which is visible". Besides the properties of

C1

meteor trail itself, the radar detection capability also determines whether the meteor trail is visible or not. In the comparison of the simulation results and observations, measurements from both small and large radars were used. It is not clear how the authors determine the visible/invisible meteor trail echo.

lines 101-103 and 160-162: Please explain in more detail how the horizontal winds produce and sustain plasma instabilities.

It is seen from Figure 5 that the trail echoes last the longest around 95 km altitude where the horizontal wind is small. Please explain.

lines 187-189 and Figure 8: Is it possible to derive the neutral wind from the nonspecular meteor echoes by using the method proposed by Oppenheim et al. (2009) and thus demonstrate the neutral wind shear? By using the meteor head echo, the meteoroid properties (e.g., mass, velocity) could also be derived. This provides a good chance to verify the simulation results.

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2020-41>, 2020.