

Earth Syst. Sci. Data Discuss., referee comment RC1  
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## Comment on **essd-2020-406**

Anonymous Referee #1

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Referee comment on "Turbulence dissipation rate estimated from lidar observations during the LAPSE-RATE field campaign" by Miguel Sanchez Gomez et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-406-RC1>, 2021

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The manuscript presents a data set on the turbulent dissipation rate derived from 3 lidar systems during the LAPSE-RATE field campaign in the San Luis Valley, Colorado. Although the calculations of the dissipation rate are based on previously published methods and algorithms is the data set of interest, as it includes the possibility of comparison and validation of the algorithms i) at two different locations (by two identical Leosphere WindCube lidars) and ii) for two different lidar systems at one location (Leosphere Windcube v1 vs. Halo Streamline).

The manuscript is in general clearly written and well structured and the data are well described and presented. I see, however one main issue in the lowest layers of the Halo instrument. The yellowish and very constant (at least in height) "bright band" around 50 m looks rather suspicious, and I am rather in doubt that this is an expression of the surface layer as the authors state. I hypothesize that this is some kind of measurement artefact close to the ground. If it would be a real (and of course expected) enhancement due to the surface layer, I would expect a clear diurnal variation in its vertical extension (which I can only see in very weak nuances) and an additional clear dependency on the wind speed. This has to be closer investigated and discussed before I can recommend the manuscript to be considered for publication. I firmly believe there is a measurement/evaluation issue in the lowest range gates for the Halo system. A first important test would be to look into (and also present) two additional time height plots of horizontal and vertical velocity in Fig. 4.

Minor issues:

- line 50: which type of the HATPRO are you using? would be useful and consistent with the type for the lidar

- line 50: is the Atmospheric Emitted Radiance Interferometer "home-made" or do you also have manufacturer and type for it?

- Fig. 1: an additional overview map on the location on a bit larger scale would be desirable! And I also would highly prefer the x and y axes labeling in km instead of degree

- Fig. 6: I assume you have an issue with artificially enhanced dissipation rates by the Halo lidar that is related to the strange bright band in the figure 4a

- references: inconsistencies in abbreviating/not-abbreviating journal names