Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-33

Anonymous Referee #1

Referee comment on "VAHCOLI, a new concept for lidars: technical setup, science applications, and first measurements" by Franz-Josef Lübken and Josef Höffner, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-33-RC1, 2021

General Comments

An excellent, well-written and readable paper on an autonomous, small, versatile, precise and robust lidar instrument. The instrument is an excellent idea, and it uses many different state-of-the-art and even cutting-edge lidar techniques. The manuscript describes the method and a prototype, presents a sample dataset and elaborates well on the kind of questions in atmosphere research that can be studied with an arrray of a reasonable number of such instruments. The text, figures, tables and equations are useful, clear and easy to understand.

Specific Comments

Somewhere, for instance near the end of the Introduction, it would be fair to make reference to the following publication by Kaifler and Kaifler (2020), which describes a similar small, precise, robust and autonomous lidar instrument: https://doi.org/10.5194/amt-2020-418 . A sentence or two about similarities and differences between VAHCOLI and CORAL would be useful.

Line 169-173: It does not become clear why no active control of the outgoing laser beam is necessary. Perhaps one important piece of information was not described, or the formulation is not clear enough.

Consider adding, for instance in section 2.4, information about the chopper rotation frequency and beam diameter at the chopper, which determines the opening time near 5 km in Figure 6.

Line 220 and perhaps several other places in the text: Consider adding "line-of-sight winds".

Line 225: consider adding "to derive metal atom number densities" or similar.

In section 3, Table 1, and Figs. 6-7, consider adding where these measurements were performed. From lines 163-165, the reader can guess that this was Kühlungsborn, but the information might be useful near the figures.

In lines 575, 586, and perhaps other places in the manuscript, please consider that to most non-specialist readers, an "ice layer" is a solid piece of plane ice, as on a frozen puddle. Perhaps another term, such as "layer of ice particles" or similar would be clearer to the non-specialists?

At the end of the Introduction, in line 571, or in the Oulook and Conclusion, consider adding the approximate price per unit and the approximate operation costs. I would, however, understand why these numbers might be difficult or awkward to specify.

Technical Corrections

line 177: "mirror"

lines 199 and 200: is the "max" in R^{max} and k^{max} not written as an index on purpose?

line 422: I believe the correct word is "anisotropic"