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Atmospheric Measurement Techniques Discussions

Interactive comment on "Novel specular meteor radar systems using coherent MIMO techniques to study the mesosphere and lower thermosphere" *by* Jorge Luis Chau et al.

Anonymous Referee #2

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The authors present the application of multiple-input multiple-output techniques to specular meteor radars.

The presented observations are the first made with realizations of two particular realizations of MIMO configurations. The authors briefly describe their advantages and disadvantages and show how the measurements compare to ones obtained with a standard monostatic meteor radar. As such this paper clearly qualifies for publication in AMT provided that the following major and minor/techniqcal comments are properly addressed.

1) The only major point of criticism that I can see is that statements regarding agree-

ment or disagreement in terms of derived parameters (like winds) and other statements are made without proper quantitative assessment. It rather seems that for this initial publication the authors simply compare the observations presented in Figure 2, 4, 6, and 7 by eye (with the exception of Figure 8 and related discussion). While I agree that these are exciting "first" observations that prove the general concept, I think that more quantitative information is needed to make this publishable in the peer reviewed literature:

E.g., how well do derived zonal and meridional winds agree or disagree? While I agree that the fields presented look similar I can also see clear differences with the naked eye which should be quantified.

Also, how well do altitude distributions of meteor counts fit eachother, etc?

How well do the observations comply with expactations?

Minor/technical comments

*) Please spell out MIMO in the title of the paper.

*) Page 2, line 11: Please explain shortly, why the MMARIA concept is expected to increase the number of meteor counts? Is this just because the detection volume is increased or are there additional factors?

*) Page 2, line 23/24: It is claimed that later on the pros and cons of the MMARIA efforts will be elaborated in more detail. But later, the term "MMARIA" is hardy used any more. Please be specific and refer to the corresponding sub section of the paper so that the reader can find what you are referring to.

*) Page 3, line 17: Pleas explain the van Citter and Zernike theorem.

*) Page 3, line 18: Please explain why you consider spatial coherence. I agree it is a good idea to formally introduce the different observations concepts. But I feel that the current presentation is only a partial description of what is needed to fully understand

how AOA is derived. It would make this paper much better understandable if more detail is provided here.

*) Page 4, line 8: typos has -> have, used -> use, has -> have

*) The approach of Vaudrin et al (including the first author Chau) is mentioned here pointing out a possibility to derive uncertainties of derived AODs. However, in the current paper no information on uncertainties is provided at all. Wouldn't it be natural to include a discussion of uncertainties into the comparison between the different MIMO approaches.

*) Page 4, bottom line: Please explain, why diversity in coding is most suitable for specular meteor echoes.

*) Page 5, line 30: Is Stober et al. (2018) an original reference for the Juliusruh meteor radar?

*) Page 6, line 19-22: Please explain in more detail how the five synthetic receivers are realized.

*) Page 7, line 1-3: Please demonstrate the statement here quantitatively.

*) Page 8, line 16-18: Here the authors refer to the many advantages of the MIMO approach, however, the advantages have not been demonstrated quantitatively. Please be more specific and quantitative.

*) Figure 1: Please explain nomenclature: R_xs and T_xs

*) Figures 2,4,6,7: Please provide color bars for panel b and d.

*) I suggest to add a table with quantitative parameters showing the differences and similarities between the different configurations at one glance.

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