



EGUsphere, referee comment RC2  
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## **Comment on egusphere-2022-33**

Anonymous Referee #2

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Referee comment on "The realization of autonomous, aircraft-based, real-time aerosol mass spectrometry in the upper troposphere and lower stratosphere" by Antonis Dragoneas et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-33-RC2>, 2022

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The manuscript by Dragoneas et al. entitled "The realization of autonomous, aircraft-based, real-time aerosol mass spectrometry in the upper troposphere and lower stratosphere" describes the development and technical details of a combined instrument to measure single particle (laser ablation-based) and ensemble aerosol chemical composition with a thermal desorption/electron ionization system. In total the instrument has three separate time-of-flight mass analyzers.

The description of the instrument is quite thorough and the description of the development storyline, especially during early deployments, is nice to see.

It would be nice to see more descriptions of how the SP and TD/EI mass spectrometry systems work together to provide a more complete dataset than is currently possible. Do the data sets from ERICA-LAMS and ERICA-AMS strongly educate one another in the context of UT/LS deployments? Such a demonstration would highlight the (already fair) statement that the two aerosol MS approaches are complementary. Perhaps some of this material is published in other papers on this instrument, but herein lies the confusion that can ensue without a good overview, in what is truly an instrument development paper. How does the output of this instrument and its unique configuration/construction/engineering/implementation advance science? It would be entirely germane to discuss the complementarity of the LAMS and AMS subsystems in the context of the UT/LS studies that have been indicated in the paper already. There is a short mention of this concept toward the end of the paper, but it is perhaps the most important advancement that this instrument affords from a data collection perspective (of course the high-altitude capabilities are clear).

What fraction of the particles that enter the inlet trigger an ERICA-LAMS spectrum, compared to the particle mass that is detected by the ERICA-AMS part of the instrument during these high altitude flights? Is there a notable improvement in the quality of data obtained by this instrument above and beyond that afforded by other aircraft-ready

instruments? The easy answer is an unqualified “yes” – but the answer remains to be demonstrated. There could certainly be devils in the details, and it would be helpful to evaluate the limitations of the instrument in the UT/LS environment.

Overall, the paper is well written, detailed, and is certainly commensurate with the quality of AMT after consideration of the comments in this review.