

Interactive comment on “A novel rocket-based in-situ collection technique for mesospheric and stratospheric aerosol particles” by W. Reid et al.

Anonymous Referee #1

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General remarks

The paper describes a rocket-based free falling instrument to collect particles from the mesosphere to the stratosphere. Information on the particles from these regions seems to be scarce, and as such it presents a valuable addition to the measurement equipment. The instrument could have a high potential of gaining insight into the composition and structure of the high altitude particles. Probably a considerable development time was necessary, as the instrument seems to be developed from scratch.

The manuscript expands in great detail on the technical aspects and construction of the instrument, which in my opinion can't be evaluated by the reader without further explanation. E. g., no explanation on the importance of particular construction details

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is given. Especially, any information on air flow around the instrument and on particle collection effects and their efficiency under atmospheric conditions of intended use is missing.

A test is performed by exhibiting the sampler earth surface conditions from within a driving car, and particles between 0.25 and 200 μm are found. However, from the referenced literature I find that the interest in mesosphere is rather at particle sizes below 30 nm, so the significance of the test remains questionable to me.

As the goal seems to be finally the chemical / mineralogical analysis of the collected samples, also the construction material of the instrument would be of quite an importance, as the single particle methods are usually sensitive enough to see all the particles abraded from surfaces by mechanical, chemical and temperature stress. I guess the structure is made of aluminum, but whether it was surface-sealed or whether any other potentially contaminants are present doesn't become clear to me.

I would suggest removing the details on the electron microscopy quicklooks, as they do not add significantly to the manuscript.

If the manuscript needs to be published quickly, I suggest publishing it as a technical note. Otherwise, first real measurements should be included to prove its usefulness.

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Remarks/Questions

8171/6-7: Couldn't there be expected problems in the memory unit due to high energy electromagnetic radiation in mesosphere?

8170/6-11: How can the car test at 25 m/s and (probably) 1000 hPa/270 K in terms of particle collection and sample contamination represent mesospheric conditions of 300-600 m/s (estimate from timing) 0.01-100 hPa, and 210-270 K? Flow regimes (free path/slip/viscosity/compressibility) are quite different. Also temperature stress and chemical stress (e. g., sulfuric acid) is pretty much different.

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At the end I don't see any particular value of the SEM images, as all necessary information is given in text (i. e. no contamination is present for the blind sample, while the others collected some particles). Thus, I suggest removing them.

8170/16-18: The "road salt" particles, which should be described by spectrum 4 do obviously not contain any Cl, and also no Na is shown; instead we have Si and F here. Either substantial data is missing, or the interpretation is illogic. Fig 9b looks to me rather like a piece of metal abrasion.

8172, 13: It is rather a summary.

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Minor remarks

8162/6-9: This creates the impression as if these experiments were already performed and results including the mentions electron microscopy can be found in the paper. As this is not the case, please indicate that it is intended use/a possibility.

The figure order 1-3 doesn't fit the order of references in text.

8165/15: like already stated in the interactive discussion by others, TEM should also be mentioned as suitable method for smaller particles and for assessing the internal particle structure / crystal structure.

8169/20: Probably a JEOL instrument.

8170, 1-5: A fiber from a PTFE-coated glass fiber filter should contain fluorine and carbon, and depending on thickness of the coating should also show silicon, so this explanation doesn't fit the spectrum.

8171, 3: "Saf" check reference

Table 2: Palladium never shows a value, so it can be removed.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8161, 2012.