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Atmospheric Measurement Techniques Discussions

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

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Thank you for your comments. Please find our responses to your comments and the corresponding changes to the manuscript that we have made below.

(Comment) In the introduction (page 3, paragraph from line 13 onwards), there are some fairly recent citations with regard to in-situ particle measurements in the mesosphere. I would highlight a number of relevant publications from the 1960s, specifically of particle capture-return via different rocket-borne substrates (e.g. Soberman and Hemenway, JGR, 70, 4943-, 1965; Blanchard et al., JGR, 73, 6347-, 1968; Farlow, JGR, 73, 4363-, 1968; Farlow et al., JGR, 75, 6736-, 1970; Fechtig and Feuerstein, JGR, 75, 6751-, 1970), and suggest that these are deserving of citation in the paper to give a more complete historical context, but will also be of use for a comparison/contrast of sampled particle features.

(Response) Thank you for the comment and the reminder about the early rocket experiments. We included the papers in the introduction and we will certainly include them in the upcoming detailed analysis of the RAIN experiment. We included a sentence on page 8163, line 8: "First in-situ measurements of meteoroic smoke particles in the mesosphere were conducted in the 1960s (Soberman and Hemenway (1965), Blanchard et al. (1968), Farlow (1968), and Fechtig and Feuerstein (1970)." Further, we cite now Farlow et al. (1970) on page 8163, line 19.

(Comment) Similarly, there are a few published accounts (e.g. Bigg et al., Tellus, 22, 550-, 1970; Testa et al., Earth Planet. Sci. Lett., 98, 287-, 1990, and very recently, Della Corte et al., Space Sci. Rev., 169, 159-, 2012) of balloon-borne upper stratospheric particle sampling onto EM grids and filters which the authors may wish to consider citing and again, may be of use for comparison of imaged particle size/shape and analyzed composition from this region of the atmosphere. Incidentally, all three of these report sampling significantly above the 30 km 'ceiling' indicated on page 3, line 25.

(Response) Thank you for the comment. We included following sentence on page 8166, line 18: "TEM grids were previously used in aerosol collection experiments on stratospheric balloons (e.g. Bigg et al., Tellus (1970), Testa et al. (1990), and Corte et al. (2012)) and sounding rockets (Gumbel et al. (2005))." We also changed the 30 km ceiling on page 8163, line 25, to 40 km.

(Comment) Regarding post-capture analysis, the authors state that SEM will be used for particle imaging and compositional analysis. This is fine for the larger particles which will have been captured in the stratosphere, but I suggest that TEM with ED X-ray analysis (as used in MAGIC) would be more suitable for the significantly smaller (< 20 nm) smoke particles sampled in the mesosphere. This technique would also allow

for”

(Response) We agree and included the following sentence on page 8165, line 15: “The returned FFUs will have their aerosol collection samples analysed using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). “ and page 8165, line 21: “For the analysis of smaller particles (<20nm) a TEM with energy-dispersive X-ray spectrometer will be used. The TEM analysis can provide number, size, and shape of the detected particle as well as the elemental composition. “

(Comment) The ‘Plan, J.’ reference should read ‘Plane, J.’

(Response) Thank you for the comment. We have changed this.

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