Response to Referee #2:

*Thank you for your comments and for reviewing this manuscript. Please find our responses (*bold italics*) to your comments listed below:*

1) The free flying instrument apparently is apparently not stabilized with respect to its attitude. This makes me afraid that it might experience significant tumbling after ejection resulting in an ill-defined (or undefined) sampling geometry.

Both free falling units are spin-stabilised during their falls. At the time of ejection the rocket is spinning at 4 Hz. Due to frictional effects in the ejection system each probe exits the rocket with a spin rate of 2 Hz about its longitudinal axis. We included the following sentence on page 8162, line 2: " Spin-stabilized collection probes are ejected from a sounding rocket allowing for multipoint measurements.", on page 8165, line 4: "Given that the rocket is spinning at 4 Hz at ejection and frictional effects during the ejection process, the FFUs are ejected spinning at approximately 2 Hz about their longitudinal axes. This rotation results in a stabilising angular momentum." Lastly, on page 8172, line 15: "Two spin-stabilized collection probes or FFUs ejected from the sides of a sounding rocket collect aerosol particles between 85 and 17 km."

2) The instrument will experience significant heating upon "re-entry" at altitudes of about 20km. What will be the consequences for corresponding measurements? The heating should be quantified and corresponding effects should be discussed.

The heating has been deemed within operational limits for the samples that are being used. Data from previous REXUS flights indicate that the peak skin temperature of the rocket during re-entry was 120 degrees Celsius. We expect to see similar surface temperature on each of the FFUs.

3) The free-flyer has a rather blunt geometry such that aerodynamic effects (see e.g. paper by Hedin et al., ACP 2007) will propably prevent any sampling of particles in the mesosphere. This issue should be addressed with corresponding aerodynamic calculations. If such calculations should confirm my concern then it is clear that this instrument is not suitable for mesospheric particle collection and the paper should be modified accordingly.

No calculations have been performed regarding particle flow past the free falling unit. The particle flow analysis in Hedin et al. (2007a) has been referred to in formulating the collection solution for this experiment. Sticking probabilities of particles in the flow of particle to TEM grids have been verified by Reissaus et al. (2006) as mentioned on page 8166/18-19. The objective of this experiment is to be a proof of concept or technology demonstrator for future aerosol collection efforts. The results of our experiments could be used for future design iterations to collect aerosols in the stratosphere and mesosphere. Further, our collected flight dynamics data could be used for aerodynamics analysis to improve future instruments.

4) All collection surfaces are mounted in the same volume such that shattering or reflection of particles in the sampling volume may lead to severe contamination of surfaces which are not directly exposed to the air flow at that time.

As mentioned, starting on page 8168 on line 4, a seal is created between the collection plate and base plate by using teflon coated glass fibre covers that prevents particles from contaminating aerosol collection samples that are not exposed to the atmosphere. The atmospheric test described starting on page 8170 line 6 was used to verify that the ACE seal would prevent contamination. Further, before and after the launch multiple steps to prevent contamination were conducted. We have included the following paragraph on page 8168 after line 9: "To prevent contamination of the aerosol collection samples all structural components used in the FFUs are cleaned in an ultrasonic bath and then cleaned in isopropyl alcohol. The integration of the ACE and final assembly of the FFUs is performed in a clean room. The FFUs are placed in sealable bags for transportation and handling before final assembly with the RMU."