Atmos. Meas. Tech. Discuss., 6, C1832–C1834, 2013
www.atmos-meas-tech-discuss.net/6/C1832/2013/

Atmospheric Measurement Techniques Discussions

Interactive comment on "A novel Whole Air Sample Profiler (WASP) for the quantification of volatile organic compounds in the boundary layer" *by* J. E. Mak et al.

J. E. Mak et al.

luping.su@stonybrook.edu

Received and published: 30 July 2013

We thank Dr. Nölscher for her constructive critical review. Our responses to her suggestions are below.

1. We have rearranged the manuscript as the reviewer suggests, with an overall description and basic concept of the WASP moved to the beginning of the paper. We emphasize that the air samples are only collected with the WASP and then analyzed after collection and after landing the aircraft. We moved certain descriptions of the WASP to a second paragraph in Section 2.1. Unfortunately the system is not very pho-

togenic; it is mostly covered and not very interesting; so we stick to a schematic of the system.

2. We have clarified the direction of flow for sample withdrawal and have explained more clearly the effect of flow direction on tracer peaks, and have resolved discrepancies between Figure 6 and the text. Subsequent to our original manuscript we have formalized sample withdrawal flow direction with more consistent results.

3. We completely agree with the reviewer about uncertainties in both the WASP and the subsequent chemical analysis, in this case by PTR-TOFMS. However, it is difficult to present all uncertainties for every species of interest, simply because there are many species and each species has its own set of uncertainties. We have given as example the calculated uncertainties and backgrounds in the WASP for the few key species mentioned here, including isoprene, MVK, and MACR. The same holds true for the selection of tubing we in fact have tried Teflon tubing and untreated stainless steel. For some species, Teflon is better, but for most species, silco treated stainless steel is the best. However it is not a universal material for all species, so the material of choice for the WASP depends partly on which species one is interested in. we have added this to the text, and have mentioned our work with Teflon tubing.

4. We have run standard gas through the silco treated stainless steel and directly into our PTR-TOFMS. We include these results in the paper. We chose not to use Teflon tubing, so the same tests were not performed for Teflon.

5. We added a couple sentences to describe our calibration procedure for the PTR-TOFMS.

6. We agree with the reviewer. For these preliminary flights, we did not have much ancillary data, so we do not have accurate boundary layer height information. However all samples were obtained in the afternoon during summer time, so we do not expect huge variations in boundary layer height during the profiles provided. We now routinely measure RH and T during sample collection.

7. Other than those from the WASP, there are no observations that were made above the canopy at this site; this is what motivated the development of the WASP. Furthermore, as can be seen in the paper, there are essentially no observations of vertical profiles of VOCs that have been published. Balloonborne profiles of VOCs are sparse, integrated over long periods of time, and have essentially no discernible vertical structure, because of the variability in reported values. Any relevant atmospheric chemistry modeling study predicting vertical profiles of such reactive species would require significant effort and modeling expertise, and we feel that is well beyond the scope of this methods paper.

8. The advantage of the WASP is that it measures vertical profiles above the canopy height; the vertical resolution is far better than that from a balloon; and it is not too expensive. Typically online measurement methods sample air from near the top, or just above, a forest canopy. Unless one samples from a very tall tower, there are no observations above the canopy. However, observations from a very tall tower to the height of 2000-3000 feet above the ground would be quite superior to using the WASP.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 4153, 2013.