

Interactive comment on “Atmospheric trace gas measurements using ion mobility spectrometer” by A.-K. Viitanen et al.

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The authors appreciate the critical comments from referees on this manuscript. We agree, and understand, that in order to be used for certain distinct trace gases, a careful compound calibration is always needed, as was also stated out by both referees. That is true.

However, the authors would like to point out that the primary goal of the study was not to identify certain trace gases. For this, several other techniques exist, as kindly pointed out also by referee 1. The goal of the study was to investigate the overall gas phase composition of prevailing atmosphere. One must note, that each peak detected indicates presence of ‘some’ trace gas component. And as was confirmed by the study,

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some peaks appear simultaneously with new particle formation, some peaks exist in other situations. This goal was given in the paper. And, the authors still think that this goal was successfully achieved and demonstrated with several case-studies. The authors believe, that IMS technique, has a potential to be used as a general monitor for ambient air, and may give additional information about ongoing atmospheric processes, not only about presence of explosives and toxic compounds, where IMS is conventionally used.

The authors would like to re-formulate the paper in this direction, if an opportunity is given.

Response to specific comments:

- The authors agree that the separation of different peaks in IMS was not explained in detail.
- There was an unfortunate typo in the manuscript concerning the form of positive reaction ion: the positive reactant ion is naturally protonated $H^+(H_2O)_n$.
- The authors agree that probably the technique was not discussed thoroughly enough. The correlation with other techniques is possible and can be done.
- In the paper the authors concluded that the IMS is suitable for fast on-line screening of prevailing gas phase in field. While the IMS is small in size and does not require vacuum it can be easily transported to untypical measurement sites. The authors agree that the measurement techniques with a vacuum are irreplaceable.
- The instrument used does not allow the use of purified air as a drift gas. The data that was recorded after the filter lifetime was exceeded, has not been used. Despite this, small variation depending on filters may have occurred and should be considered as the referee pointed out.
- Most of the data recorded in Hyytiälä site is recorded or averaged in 10-minute spans. This is why 10-minute averages were used. A higher sampling rate would not bring

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additional advantage.

- The origins of the peaks have been presented only as an educated guess as stated by the authors.
- The code searched sufficient parameters from the data to be able to calculate peak area in each case. This was not apparently stated clearly enough.
- The API-TOF was mentioned in the introduction as it is a novel technique in atmospheric sciences.
- The resolution of the instrument is around 20-30.
- On p.4964, l.4 the authors are referring to Mäkelä et al. 1996 while this paper presents the fit done based on Kilpatrick's data. Thus the Kilpatrick data is not used in this study, only the fit. The word 'old' is maybe inconvenient, but correct. Also new data exist, see e.g. Ehn et al. 2011 (DOI:10.1080/02786826.2010.547890), but easy-to-use wide range fits are lacking.

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