Referee #1

In the following, the referee's comments are reproduced (black) along with our replies (blue) and changes made to the text (red) in the revised manuscript.

General statement:

This is a well written article. Most of my comments were already addressed during the pre-review stage. I still think that the manuscript would benefit from a more detailed comparison of this new electrical discharge method with the existing corona ion sources, but it's not absolutely necessary. In my opinion, the paper is publishable once all comments by the 2 reviewers have been addressed.

We thank the referee for the positive evaluation of our manuscript which we modified according to the comments listed below.

A detailed comparison of our ion-source with existing corona ion sources operating with I^- primary ions would indeed be most useful. However, we are unaware of other CIMS instruments using iodide with a corona source. We now write:
Potential alternatives are corona discharge and x-ray ion sources as commonly used in atmospheric pressure chemical ionisation mass spectrometers (AP-CIMS) (Jost et al., 2003; Skalny et al., 2007; Kürten et al., 2011; Zheng et al., 2015). We are unaware of previous usage of corona discharges for the generation of iodide ions.

General comments:

A comment on the other reviewer's comment regarding the MPI group being the only one to report PAA data: The detection of PAA by iodide CIMS is chemically similar to detection of peroxynitric acid (PNA) that was reported by Veres et al. ACP 2015, 15(4), 8101. In fact, my group's iodide CIMS is very sensitive to PAA - we just haven't reported any data as we havn't developed a calibration source to determine response factors and customized the inlet setup as the Crowley group has done.
We are not the only group to detect PAA using I^- primary ions.
The discussion to our original ACP paper on PAN and PAA detection (Phillips et al, Atmos. Chem. Phys., 13, 1129-1139, doi:10.5194/acp-13-1129-2013, 2013.) confirmed sensitivity of other Iodide-CIMS to ambient PAA.
In addition, Furgeson et al. (2011) report detection of PAA. The following text has been added:
Unlike other TD-CIMS instruments that describe an absence of a residual signal when NO is added to the inlet (e.g. Warnecke et al., 2016), the I-CIMS deployed by Phillips et al. (2013) as well as the instrument presented in this study are very sensitive to PAA at

m/z 59. Furgeson et al. (2011) also describe an interference at m/z 59 that is not titrated by NO and suggest detection of PAA which is produced in their photochemical source used for PAN generation. In addition, Veres et al. (2015) report a very similar mechanism to PAA detection for the detection of pernitric acid (PNA). Differences in the sensitivities of various I-CIMS instruments to PAA at m/z 59 are likely to be associated with different de-clustering potentials.

Specific comments:

pg 7 - "Mathieu differential equations" please provide a reference
We deleted the sentence regarding “Mathieu differential equations” as it is not of relevance for our manuscript.

Figure 8 - have you plotted the CIMS against the SMEAR SO2 data? Consider adding the fit parameters (slope, intercept, r) to the text.
This is not warranted. The point of this figure was not to make a detailed inter-comparison of the two SO_2 instruments, which were not co-located with the SMEAR instrument mounted above the canopy. In addition, much of the data reported by the SMEAR instrument are below its detection limit (0.1 ppbv) and only occasional plumes of SO_2 are observed.