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Interactive comment on "Organic and inorganic decomposition products from the thermal desorption of atmospheric particles" *by* B. J. Williams et al.

Anonymous Referee #2

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General Comments:

The manuscript of Williams et al. investigates the thermal decomposition products which are formed due to thermal desorption of aerosol samples in the CTD cell of the thermal desorption aerosol gas chromatograph (TAG) instrument. Specifically Williams et al. investigate the usually omitted first section of the GC chromatogram (the "solvent delay") where the ion signals of the thermally unstable fragments which pass unretained through the column are detectable. A detailed analysis of typical mass fragments for inorganic and organic tracer ions of the "decomposition window" is given for a set of calibrations and two field studies. Additionally the TAG field study results are

also compared with results obtained from a co-located AMS using the same ions for inorganic and organic fragments which are well established in the AMS community to represent mass loadings of nitrate, sulfate, ammonium, and organics in the aerosol. The manuscript is well written and explores a new set of analysis techniques which shows that also the non-resolved signals in the GC chromatogram of the TAG instrument contains significant and important information. These analysis techniques show potential to be used to quantify thermally instable inorganic and organic components of aerosols which rely on desorption techniques.

I recommend publication in AMT after addressing some minor comments mainly addressing clarifications in the text and figure display.

Specific Comments:

p. 16, l. 17ff: It would be instructive to mention if and how much carryover was also observed in the case of injecting calibration compounds. It might help to understand better if carryover is due to not long enough heating time or e.g. maybe the organic matrix in the ambient aerosol versus the pure inorganic compounds injected.

p. 18, l. 13: "Since there is no subtraction of background (cell blank)..." I have trouble understanding this sentence and it would be beneficial to split it up in more sentences. I have the impression that too much information is squeezed into one sentence. It is said that there is no subtraction of the background (no cell blanks) signal. Does this mean no gas phase background to subtract due to the use of the gas phase denuder? Couldn't there be any particle residue background which needs to be subtracted using subsequent cell blanks? What is the "additional" subtraction; additional to what? How often were the "additional" cell blanks acquired? Was the average percentage of cell blank signal obtained for the whole 16 min region?

Figure 4e) to 4g) It is confusing to read the graphs if the right and left y-axis have different ranges. E.g. 4e) m/z48 as lower values than m/z64 which would be clearly visible if both y-axis have the same range. Especially true for 4g) and 4h) which indicates the opposite behavior of m/z30 to m/z 46, and m/z53 to m/z82, respectively, by looking at the graph.

Figure 5a) and 5b) Was the injection of each concentration repeated? If so how often? It is especially for calibration correlations informative to have error bars for each data point. Please add the error bars to the graphs.

Figure S3c: The legend is obscured by the graph.

Figure S4: The run numbers are not very informative. The date for each sample could be put better into context e.g. with graph S5).

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 13377, 2015.