Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Non-target and suspect characterisation of organic contaminants in Arctic air, Part II: Application of a new tool for identification and prioritisation of chemicals of emerging Arctic concern in air" *by* Laura Röhler et al.

Anonymous Referee #2

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This study identifies and prioritises known and potential new chemicals of emerging Arctic concern in two pooled high-volume air samples from the Arctic background monitoring station Zeppelin (Svalbard). In total, 73 compounds previously not reported in Arctic environments were classified at high confidence level using a non-destructive wide scope clean-up method combined with GCxGC-LRMS for a suspect and non-target screening approach. The focus of this paper is the application of the method to Arctic samples and the data processing, whereas the authors refer to their companion

paper for details on the development of the analytical method ("Non-target and suspect characterisation of organic contaminants in ambient air, Part I: Combining a novel sample clean-up method with comprehensive two-dimensional gas chromatography").

The large number of identified or tentatively identified compounds that have not been reported in Arctic environments before underlines the significance of this study and the importance of comprehensive suspect and non-target screening approaches. The findings can be incorporated in discussions for future monitoring programs and the development of targeted analytical methods. As the majority of suspect and non-target screening studies are based on LC-HRMS approaches, the chosen GCxGC-LRMS technique in combination with the wide scope clean-up offers a new perspective and a focus on different compounds. In addition, it is of specific interest that the study deals with samples from a remote region.

As the manuscript is scientifically sound, well structured and well written, I only have some minor comments/suggestions. - Figure 1: You list the numbers in the text, but it would be easier to grasp if you add the number of compounds included in the pie chart (and its different sections) in the graphical abstract as well. - Page 2, lines 2/3: There is a new paper from Wang et al. listing even more compounds (Environ. Sci. Technol. 2020, 54, 2575−2584, https://dx.doi.org/10.1021/acs.est.9b06379). Maybe it's worth to include it as reference? - Page 5, line 29/Figure 3: Based on which criteria does the software calculate the forward match percentage? This could be an important information to include as it is a major filtering step. - Page 6, lines 17/18: You say that an area threshold of 100 was chosen as areas are not adjusted for sample volumes. Could you mention how the volumes of sample and blanks differed? - Page 8, line 23/Table 2: If I get it correctly, at least two compounds in table 2 were classified as level 0 for which target quantification could be done. Are the determined concentrations in a similar range compared to the average data from Nizzetto et al.?

Technical corrections: The text is written very well, but still contains some typing/auto correction errors. Things I noticed while reading: - Page 1, line 13: possesses? - Page

1, line 14: "sparsely populated" doesn't fit grammatically - Figure 1: previously - Page 2, line 21: Air Pollution - Page 4, line 4: "in the" 2x - Page 5, line 17: word after slightly is missing - Page 8, lines 4 to 7: nested sentence, difficult to understand - Page 8, line 18: peak area - Page 8, line 29: that also has - Page 9, line 1: an/one isomer of TCEP? - Page 10, line1: emerging Arctic concern - Page 12, line 23: half-lives - Page 14: could be identified and prioritised? - Page 23, caption figure 3: Data processing