

## Review of ar-2024-11

The authors describe an application experiment in Innsbruck, Austria to demonstrate the capabilities of the CHARON inlet coupled to a high-resolution PTR-MS to detect PAHs with high sensitivity and time resolution in ambient air. The paper encompasses the concept of the instrument, some technical details, a matrix factorization data approach to deal with the high amount of data acquired by the instrument and its interpretation.

The study is interesting and sound and illustrates the impressive capabilities of the developed instrumentation. There are some points that could help to further improve the manuscript:

My main concern is that the paper sometimes sounds like an advertisement. This is not only inappropriate for a scientific paper but also unnecessary in view of the impressive results. Some examples: "...is highly capable..."(L12), "...highest precision and accuracy. IDA's high level of automation and parallelization allows for a fast analysis even for complex datasets."(L144), "The high instrumental stability and separation capability, high time resolution, good response to temporal variations and extremely low limits of detection [...] good data quality [...] excellent basis..." (L215). Etc. It is evident that this is a commercial instrument. However, potential customers will undoubtedly comprehend its benefits upon reading this paper, and they will not require such phrases and buzzwords.

### Further comments:

- L16/17: repetitive use of "unprecedented"
- L17: could it be helpful to explain "3- $\sigma$  limits"?
- L19: greater detail -> more detail
- L21: I have concerns with the phrase: "representing the vast majority of ambient organic aerosol." Can we know this? What means majority? Mass Concentration or number of species?
- L52: What is the "REMPI-TOF"? For single particles, there is the LDI approach (hard ionization) and a soft gas-phase method for PAHs, namely REMPI with prior laser desorption. The combination was published by Schade et al., Anal Chem. 2019, 91, 15, which replaced the former method by Passig et al., 2017. An application is correctly cited (Passig et al., 2022).
- L55: REMPI is a very soft ionization technology.
- L67: "TROPOS operated": Please be sure to include an explanation of any abbreviations used. (also REMPI).
- L76: repetition of L21.
- L82: SRI?
- L97: "preventing a successful coupling"? preventing → allowing for?
- L103: I do not understand the sentence beginning with "Simultaneously..."
- L 109: "All" → The...
- L117-121: Consider to provide more details in the SI. Increased size range compared to former Charon inlet? Shouldn't the ADL system be described before the vaporization?
- L125: It would be beneficial to consider a few words on the meteorological conditions, rather than merely referencing Karl et al.
- L134/135: "To increase the ..." Was the mass resolution reduced compared to the instruments full mass resolution?
- L162/163: Repetitions. Please rephrase.
- L175-177: Not necessary to mention the reason for the blackout. No one doubts the stability of the instrument.
- L234-236: Some language editing might be helpful.
- Figure 4: I recommend that the plots are not displayed next to each other, but on top of each other. This would make it much easier to compare the timelines and to see the coincidence of the plume events.