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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurement report: Molecular composition and volatility of gaseous organic compounds in a boreal forest: from volatile organic compounds to highly oxygenated organic molecules" *by* Wei Huang et al.

Anonymous Referee #2

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Huang and coauthors compared the measurements of gas-phase organic compounds by Vocus PTR-ToF, Nitrate CIMS and a Br CIMS. They found different chemical compositions from the three different techniques. The measured diurnal profiles from the three techniques are different even for compounds with the same molecular. The authors claimed that a more comprehensive understanding of molecular composition and volatility can be obtained by this kind of comparison and combined analysis. This manuscript is generally well written. I can be accepted in Atmospheric Chemistry and Physics, after addressing my following comments.

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(1) Line 115, a stainless-steel tube of 0.9 m long inlet was used for the MION API-TOF. Will SVOC and HOMs loss to the stainless-steel tube. Why not using PFA, See Deming et al., 2019 AMT.

(2) Line 120: I am not sure about how data processing was done for Br CIMS. As Bromine has two isotopes, 79 and 81. Then, each compound would generate at least two product ions, even there is no fragmentation or other chemical pathways. Did the author take into account both, or just one? Will this cause problem to detect compounds with two hydrogen apart (e.g. CxHyOz and CxHy+2Oz)?

(3) Line 120-125: As Br CIMS is kind of new reagent ion, can the authors provide some information about the types of compounds can be measured by Br CIMS. It would be if the advantages and also disadvantages for Br CIMS can be provided somewhere in the manuscript.

(4)Line 136: why to scale the measurement of Br CIMS, how 0.3 is obtained. Are you claiming the sensitivity variations are same between NO3- and Br-. As many of the conclusions rely on good quantification for all of the instruments, a better of quantification of Br CIMS should be conducted.

(5)Line 150: The quantification of PTR-TOF is also way too simple. It would be better to use the relationship between the kinetic reaction rate constants (H3O+ with VOCs) and calibrated sensitivity (Sekimoto et al., 2017 IJMS; Yuan et al., 2017 CR).

(6) Line 160-175: Could the authors comment on the uncertainties form the calculation of volatility from the parameterization method.

(7) Figure 1: why Br CIMS has more data missing than NO3- CIMS, for example the period around May 17, as this is achieved by the same instrument.

(8) Line 275-280: can the authors also provide the comparison of time series for some of the important ions. May be also their correlation. It is expected PTR-TOF would measure more species, as almost all OVOCs has signals in the mass spectra with

similar sensitivities. It might be due some of the isomers are not measured by Br CIMS and NO3- CIMS.

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