



EGUsphere, community comment CC1
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Comment on egusphere-2022-838

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Community comment on "Chemical characterization of organic compounds involved in iodine-initiated new particle formation from coastal macroalgal emission" by Yibei Wan et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-838-CC1>, 2022

Wan et al. have performed an interesting laboratory study showing that the organic compounds co-emitted with iodine bearing molecules by exposed tidal macroalgae dominate particle growth in iodine-triggered NPF events. The chemical evolution of the emitted organic precursors is investigated by means of iodide-CIMS, showing that alkene ozonolysis and criegee intermediate gas-phase reactions and particle-phase accretion reactions increase the number of carbon and oxygen atoms of the organic compounds observed. Some information about inorganic iodine molecular cluster precursors is also obtained.

I have listed a few comments below that the authors may want to consider to improve their manuscript.

Page 2, line 35. Here and elsewhere: Martín et al., 2020 -> Gómez Martín et al., 2020

Page 2, line 38. A previous study also examined the growth of iodine oxide clusters in the presence of condensable vapours such as H₂SO₄ or oxalic acid (Saunders et al., 2010)

Page 2, line 47. An opening sentence indicating that organic compounds have been observed in particles formed in I-NPF events (Vaattovaara et al., 2006; Yu et al., 2019) would be useful.

Page 2, line 48. More common names for this compound are iodomethane and methyl iodide

Page 3, line 81. Indicate in this paragraph an estimate of water vapour concentration or RH in the experiment.

Page 3, line 84. Note that even though up to 10% of O₁D may end up as OH under atmospheric conditions, the rest will be quenched to O₃P, and that O₃P reacts both with I₂ and iodomethane to make IO. Moreover, it is well known that OH reacts quickly with I₂ to make HOI. Therefore, in these experiments additional photolytic sources of IO are present, plus a source of HOI. This may obscure the interpretation of the "OH-enhanced" experiments.

Page 4, line 117. Indicate ultrasonication time and power.

Page 5, line 145. It is likely that this effect is rather due to the presence of ground state oxygen atoms in the flow. O₃P will free additional iodine atoms by reaction with I₂ and CH₃I.

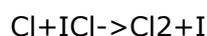
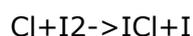
Page 6, line 171. Is HNO₃ then emitted by algae? I think explaining a bit more about the source of HNO₃ is necessary, since it indirectly allows detection of most of the inorganic compounds reported. In fact the iodide CIMS in practice operates in these experiments as a nitrate CIMS for inorganic iodine compounds.

Page 6, line 174. While iodide CIMS maybe a good technique for detecting organics, it is probably not be the best technique for detecting inorganic iodine compounds, for the obvious reason that the source of charge is the iodide anion, which may obscure the interpretation of the observed ion clusters. No discussion of this potential interference has been included in this paper.

Page 6, line 177. Alongside Figure 4, it would be very useful showing a table with the correspondences between observed anions and proposed parent neutral molecules. Such correspondence is not always straightforward, as we have argued recently (Gómez Martín et al., 2022).

Page 6, line 182. What about I₂ and HOI photolysis? Why are you ruling out I₂ and HOI as iodine sources?

Page 6, line 184. Unlikely. Much faster reactions are:



The time traces in Figure 2b are qualitatively consistent with this sequence of reactions

Page 6, line 188. These experiments employ UHP air. What is then the source of NO₂ in this system? There is no easy route from HNO₃ to NO₂.

Page 7, line 193. Again, what is the source of NO₂ in this system? This must be discussed, since you are concluding that IONO₂ is contributing to particle growth. In our recent work on the nitrate CIMS system in the context of I-NPF (Gomez Martin et al., 2022), we have found that IO₃⁻, HIO₃.NO₃⁻ (or rather HNO₃.IO₃⁻) and IONO₂.NO₃⁻ are products of the reaction between NO₃⁻ and I₂O₃. I am skeptical about the presence of IONO and IONO₂ in this system because of the unlikely presence of NO and NO₂, and I suspect that IONO.NO₃⁻ and IONO₂.NO₃⁻ could be products of IxO_y+NO₃⁻ also in these experiments.

Page 7, line 193. Following my previous comment, at least part of the signal attributed to HIO₃ results from I₂O_y+NO₃⁻ (Gómez Martín et al., 2022)

Page 7, line 194. Note that Gomez Martin et al., 2020 never argued in that HOIO₂ would form from I + H₂O + O₃ -they rather argued the opposite. The source of HOIO₂ remains to be confirmed, although the reaction between I₂O₅ and the water dimer is currently our best candidate, where I₂O₅ would be a photolysis product of a higher iodine oxide (Gómez Martín et al., 2022).

Page 7, line 196. This is in disagreement with the observations by He et al. 2022 using a Br-CIMS FIGAERO. They did observe HIO₃ in the particles. This disagreement should be discussed.

Heating of HIO₃ between 100°C and 200°C results in dehydration and formation of I₂O₅

(Selte and Kjekshus 1968\), so the desorption temperature in is critical.

The IO- and IO2- signals may be secondary products of the reaction between I2O5 and I-.