Comment on egusphere-2022-838
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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:

\[ \text{Cl} + \text{I}_2 \rightarrow \text{ICl} + \text{I} \]

\[ \text{Cl} + \text{ICl} \rightarrow \text{Cl}_2 + \text{I} \]

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 IxOy+NO3- also in these experiments.

Page 7, line 193. Following my previous comment, at least part of the signal attributed to HIO3 results from I2Oy+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 100ºC and 200ºC results in dehydration and formation of I2O5.
(Selte and Kjekshus 1968), so the desorption temperature is critical.

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