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Atmospheric Chemistry and Physics Discussions

Interactive comment on "In situ measurements of molecular iodine in the marine boundary layer: the link to macroalgae and the implications for O_3, IO, OIO and NO_x" *by* R.-J. Huang et al.

Anonymous Referee #2

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This manuscript describes primarily diffusion denuder measurements of molecular iodine (I_2) over seaweed beds near Mace Head, Ireland. The measurements are compared to long-path DOAS observations, which are inherently path averaged over long distances. The results are generally consistent with current understanding of coastal marine iodine chemistry (i.e. that molecular iodine is produced in hotspots very near seaweed beds and is diluted and photolysed giving lower inferred concentrations along DOAS paths than are observed directly over the seaweed beds). Interestingly, molecular iodine appears to be produced by ozone (there is a higher mixing ratio of molecular iodine with higher ozone on short length scales ≈ 5 cm) but molecular iodine is inversely correlated with ozone on longer length scales (e.g. DOAS path averaging

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length scales). These results appear to be able to constrain the timescale of possible iodine-induced ozone loss. In general, the work appears to be sufficiently careful and adds data to the discussion regarding iodine chemistry in marine coastal areas. It should be published, although there are some points that the authors should consider in their revision of the manuscript.

P392, line 7: In most of the manuscript, the authors use the phrase "hotspot of iodine chemistry" to describe Mweenish Bay. In this section, they say that the higher mixing ratios of molecular iodine are "indicating the emissions of I_2 are correlated with local algal biomass density and algae species". This statement appears to be too strong in comparison with the text's discussion. A wording of "is consistent with differences in algal biomass density" appears more appropriate.

P367 line 26: The word "flashed" should probably be "flash"

P369 line 13: The phrase "are fluctuant" should probably be "to fluctuate"

P373 line 10, and Figs. 6 and 7: Although it is observed that as I_2 increases, NO_3 decreases, there is also a relationship between the formation rate of NO_3 and ozone (one needs NO_2 and O_3 to form NO_3). Thus, the lower ozone levels at higher I_2 levels would also indicate that there is a lower source of NO_3. Can the authors discuss this concept, and also, have they observed the NO_2 levels and found them to be invariant such that they are not important for the observed NO_3 fluctuations?

P375, line 27: I believe that "form" should be "from"

P384 – Fig. 2: It is interesting to note that the I_2 mixing ratio would go to zero at around 18ppbv of ozone if the linear correlation of this plot were extrapolated to I_2 = 0. Can the authors discuss whether they believe that the plot is actually linear at lower ozone mixing ratio, or if they have a mechanistic reason for the linear correlation without a zero intercept?

Overall, although this paper does not resolve the outstanding controversies in marine

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iodine chemistry, it does add some interesting data points to the discussion that can assist in understanding the process. Clearly more laboratory work is needed to work out mechanisms and in addition, more field observations (particularly at other coastal regions) to see if the Mace Head area is representative or anomalous for coastal marine iodine chemistry.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 361, 2010.