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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spectroscopic studies of molecular iodine emitted into the gas phase by seaweed" *by* S. M. Ball et al.

Anonymous Referee #1

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This study has measured I2 emission from a variety of seaweed species under various stress conditions using a highly sensitive optical measurement of enclosed samples. The material in this paper is appropriate for publication in ACP and will find use in the modeling of marine boundary layer new particle formation and ozone depletion by iodine chemistry. This work confirms some of the observations from several earlier studies as cited in the text. As noted by the authors it is difficult to develop reliable emission factors for use in atmospheric models on the limited observations in this work but this work will be useful in future studies. The paper is probably longer than necessary but is very well organized and written.

The overall length of the paper could be reduced in two areas. First, the instrument details could be reduced in favor of referencing other papers. In a second area, the

description of the model results from the field campaign should definitely be reduced. Almost all of this discussion could be left for the Leigh et al. modeling paper.

Here are a couple of thoughts for the authors to consider:

I find it a little perplexing that the flux of I2 in these experiments are related to the mass of the seaweed with no consideration of the surface area of the seaweed. I would have thought that both the mass and surface area would be important parameters, particularly in the ozone exposure experiments. Some mention of this in the paper would be worthwhile.

In the discussion there should be some mention to the Huang et al. paper (ACPD, 10, 361-390, 2010) and its conclusions in comparison with results from the present study. Although, the studies are done in different locations the seaweeds are the same.

The discussion of particle formation and the correlation with the I2 concentration infers a threshold concentration of I2. Although a threshold concentration of I2 has some implications and is an easy parameter to judge particle formation, it is also dependent on the conditions of the measurement. The I2 concentration may be a good proxy in these experiments but in general the more important parameter is the rate of I atom production in this chemical reaction system. The actual "threshold" concentration may depend on the experimental configuration and other loss processes for the iodine species (deposition losses for example). Therefore, on the basis of the present experimental observations it is not clear how the threshold concentrations actually translate into an actual nucleation mechanism, although a nucleation mechanism should be able to reproduce the observations given here. Another important parameter in the detection of new particle formation that is ignored here is the reaction time. Allowing longer reaction times may lead to even lower I2 thresholds, at lower I2 concentrations it will take longer to produce detectable new particles and condensation losses will be more important.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 26329, 2009.