

## ***Interactive comment on “Direct evidence for coastal iodine particles from Laminaria macroalgae - linkage to emissions of molecular iodine” by G. McFiggans et al.***

### **Anonymous Referee #2**

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#### General comments

The authors described an interesting study on the formation of iodine-containing particles by macroalgae, which, once released into the atmosphere, can be transformed into stable clusters by photochemical reactions. These clusters can influence the warming budget of the atmosphere. Thus, knowledge on origin and formation mechanisms of these clusters is of importance in global climate change. Until now it was generally assumed that atomic iodine involved in the cluster formation derives mainly from the photolysis of organoiodine compounds known to be released by marine macroalgae. The study presented here, however, assumed that atomic iodine in the atmosphere mainly originated directly from molecular iodine emitted by marine macroalgae. The

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importance of this mechanism could increase in future considering the expected elevated levels of tropospheric ozone.

The experiments and the results are presented in a clear and concise way. The manuscript, however, would benefit from a deeper discussion on the global importance of this new mechanism especially compared to organoiodine compounds, which also would make the manuscript interesting for a broader audience.

To stimulate the discussion: For the production of iodine-containing particles the authors hypothesised a mechanism, which requires a direct exposure of the macroalgae to the surrounding air. Otherwise the formed molecular iodine will not volatilises into the atmosphere, but will react with organic material instead. Laminariales, however, occur in the sublittoral zones down to a depth of 20m, usually exposed to air at spring tides only. Thus, the majority of Laminariales biomass will never be exposed to air. On the other side, screening studies revealed that Laminariales constantly released large amounts of organoiodine compounds into the surrounding seawater. In a second step these compounds can enter the atmosphere and will be a source for iodine involved on the oxidation processes with ozone. In consequence, although the mechanism the authors described in the manuscript is quite interesting, it may only have a negligible contribution to the atmospheric input of iodine. However, the direct volatilisation of molecular iodine may be of more importance considering macroalgae in mid-littoral zone (mainly green macroalgae).

Technical corrections

Unless the manuscript will be printed in colour, I suggest the authors change Figure 2. The bars in this figure are hardly recognisable.

In Figure 7, I assume the left part of the figure shows the light reaction. However, to do an assumption to recognise a Figure in a scientific paper would not be very wise, and I recommend clearly indicating Figure a) and b). Furthermore, unless the Figure is printed in colour, it is not possible to identify which is the graph for the 40nm and the

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60nm particle size.

Method and results section: What is a typical day/night cycle? Specify. Add more details on the investigation of the macroalgae (How were the macroalgae sampled? Time between sampling and conducting the experiment? Storage of the macroalgal samples until the experiment was conducted? Size and age of the macroalgae samples? Were whole plants or parts of the macroalgae investigated? Was the algal tissue damaged during the sampling procedure? Did the algal tissue change colour or was damaged during the experiment?)

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Interactive comment on Atmos. Chem. Phys. Discuss., 4, 939, 2004.

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