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## ***Interactive comment on “A mechanism for biologically-induced iodine emissions from sea-ice” by A. Saiz-Lopez et al.***

### **Anonymous Referee #2**

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#### General Comments

The manuscript describes a mechanism for the release of iodine from sea-ice into the atmosphere. The motivation are recent studies which have recognized sea ice as an important source of reactive iodine to the Antarctic boundary layer, essentially based on ground based and satellite measurements of iodine oxide over the Antarctic sea ice. The primary source of iodine in this environment is suggested to be micro-algae underneath the sea-ice and the diffusion of iodine species through sea-ice brine channels resulting in an accumulation in the quasi-liquid layer (QLL) on the surface of sea-ice. The authors suggest that iodine is released into the polar boundary layer via different possible pathways, e.g. directly emitted from the QLL or emitted to the atmosphere directly through fractures in the sea-ice pack. The authors develop a multiphase model

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and run model simulations to interpret observations of elevated iodine oxide concentrations and conclude from the results that the levels of inorganic iodine (molecular iodine and interhalogens) released from sea-ice through the suggested mechanism could account for the observed IO concentrations. In fact, the sources and mechanisms of the release of iodine over sea-ice covered areas are still unclear. Thus, the suggested mechanism is an important contribution to improve our understanding of the boundary layer chemistry of iodine. In my opinion the results of the multiphase modelling study not only can account for the observed IO concentrations, the reported results might stimulate further investigations to better understand the halogen chemistry, e.g. the measurement of interhalogens. The paper is well written and fits perfectly to the scope of ACP. I highly recommend publishing the manuscript in ACP, however, have some very minor comments on the manuscript.

Minor comments:

Page 10261, line 9: I would suggest to list the ionic composition of seawater in a consistent way (i.e. not listing calcium sulphate individually and listing cations and anions one after the other)

Page 10266: The authors introduce “the rule of five” and refer to this expression several times. Since I assume that not all atmospheric chemists and physicists are familiar with this “rule” a general explanation in the beginning of this paragraph would be helpful for the reader.

Page 10268, line 20: “Frankenstein” instead of “Frankestein”

Page 10281, first line: R. Sander ?

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 10257, 2015.

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