Atmos. Chem. Phys. Discuss., 13, C9415–C9416, 2013
www.atmos-chem-phys-discuss.net/13/C9415/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Observations of I_2 at a remote marine site" *by* M. J. Lawler et al.

Anonymous Referee #2

Received and published: 25 November 2013

This manuscript makes a very important contribution to the subject of iodine chemistry in the marine boundary layer. There are three significant aspects covered in the paper:

1) The demonstration of a chemical ionization mass spectrometric technique which is capable of measuring I2 at sub-ppt levels on a timescale of a few minutes. The authors use this instrument to show, for the first time, the diurnal variation of I2 in the remote MBL where there are insignificant emissions of I2 from local macroalgae.

2) The use of a 1D model (THAMO) to show that the diurnal variations of IO and I2 at a measurement site in the Cape Verde islands cannot be explained by the measured evasive flux of iodocarbons, or a steady flux of I2. Instead, the measurements can be modeled either using an I2 flux with a complex diurnal variation (which is hard to explain); or by introducing a flux of HOI based on a recent lab study by the groups of Carpenter and Plane. The conclusion of the paper is that the HOI flux is the dominant

source of atmospheric iodine in the remote MBL, and that this is likely to be the case over most of the world's oceans.

3) The CI-MS instrument also measures cross halogen species such as IBr and ICl. Suprisingly, neither of these species were observed at Cape Verde. According to conventional understanding, the cross halogens should be produced from the uptake of HOI into sea salt aerosol (with high levels of chloride and bromide ions). From this it is concluded that something significant is missing from models of the reactions of hypohalous acids in sea salt aerosol.

The paper is clearly written and appropriately illustrated. Apart from the (very) minor points below, it should be published without major changes.

page 25924, line 8: modification

At some point in the description of the Carpenter et al. (2013) study (probably in the paragraph beginning line 7 on page 25924), it should be pointed out that THAMO was used in that paper to model IO at Cape Verde successfully, so the good fit shown in Fig 6 (lower right panel) is not surprising. What is novel in the present paper is the very nice fit to the I2 in Fig 6 (lower left panel).

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 25911, 2013.