Atmos. Chem. Phys. Discuss., 14, C7849–C7850, 2014
www.atmos-chem-phys-discuss.net/14/C7849/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Iodine oxide in the global marine boundary layer" *by* C. Prados-Roman et al.

Anonymous Referee #1

Received and published: 9 October 2014

This is a very good paper which is suitable for publication in ACP, essentially as is. I did not find any substantive points to raise, but the authors may wish to consider one or two points made below.

The paper provides a very good synthesis of field data of IO measured by the MAX-DOAS method during several marine cruises, spanning a good range of geographical locations worldwide. The observed levels are consistent with the source term for iodine being predominantly from the reaction of ozone with iodide in sea-water and subsequent chemical conversions and release of photolabile I, mainly in the form of HOI. Organic I (from measurements of RI species where available, otherwise estimated from global models) are a minor source of I – at least outside of the polar regions, and this study shows that the % contribution towards I production between inorganic and organic source gases varies from location to location. All the measurements are made

using the MAX-DOAS method, which has a complex retrieval algorithm to generate slant column densities, and assumptions are then made regarding the sampling depth to convert to mixing ratios. In that regard including measurements using other methods based on fundamentally different principles of operation would be desirable in the future.

Perhaps the most important conclusion from this paper is that although the amounts of IO vary a little (0.4-1 ppt during the Malaspina cruise and other values close to this from other cruises), IO is present everywhere (polar regions not included in this analysis), demonstrating that iodine production from the oceans is a truly global phenomenon, and needs to be taken into account in Earth System Models, to properly calculate O3, HOx and other important intermediates which control, for example, the lifetimes and abundances of some non-CO2 greenhouse gases (CH4). The levels also show that the recently developed parameterisation for the release of inorganic I from the ocean is able to account for the typical levels observed (with the source rate varying owing to variations in O3, SST, wind speed and sea-water I-). Direct measurements of HOI mixing ratios in the future though above the oceans would be highly desirable top confirm this.

Uncertainties are discussed in the supplementary material, and briefly in the main paper, but some mention of the uncertainty of the measurements should be given in the abstract following the range of values that are given. This will allow the reader to gauge how significant the observed levels of IO are compared with the instrumental uncertainties or detection limits (which will include the uncertainty in the mixing depths assumed to convert slant columns into mixing ratios, this depth varying from study to study).

Page 22222, line 19, can the elevation angles also include the range of altitudes this corresponds to.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 22217, 2014.