Atmos. Chem. Phys. Discuss., 9, C5914–C5917, 2009
www.atmos-chem-phys-discuss.net/9/C5914/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Coastal measurements of short-lived reactive iodocarbons and bromocarbons at Roscoff, Brittany during the RHaMBLe campaign" *by* C. E. Jones et al.

C. E. Jones et al.

cej103@york.ac.uk

Received and published: 15 October 2009

We take on board the general comments from the reviewer and agree that the structure of sections 3.1 and 3.2 may make the discussion confusing for the reader. We have therefore restructured these sections in accordance with the reviewer's suggestions, with sections focussing on each of the different processes which influence the in situ halocarbon concentrations, and have discussed the measurements from this study independently before comparing them to previous measurements. A table has also been included giving the atmospheric lifetimes of the iodocarbons as suggested. Our response to specific points are given below.

P 17128 line 28: included relevant reference (Tokarczyk and Moore, 1994)

P17130 L23 - P17131 L15: As the main purpose of the comparison between our measurements at Roscoff with the Mace Head study was to demonstrate the influence of site topography and seaweed speciation upon ambient halocarbon concentrations, this is now presented in a self-contained sub-section of section 3.1 “Factors influencing ambient air halocarbon concentrations” (3.1.4). The general comparison to halocarbon measurements from other sites has been moved to a separate section, later in the discussion section as suggested (now section 3.3 “Comparison with other coastal measurements”). While we have mainly focused on comparison with Mace Head and Lilia, we do feel that it is important to also include a brief comparison with coastal measurements from other sites, simply in order to highlight the fact that, as there are so many factors that potentially influence the concentrations of these gases at coastal sites, there is considerable variability in their concentrations between different coastal locations. A sentence has been included at the beginning of this section to explain the reason for making these comparisons.

P17131 L16-L19: deleted

P17131 L21-L27: We have changed the discussion in accordance with the reviewers suggestion to focus on factors directly affecting Roscoff first (wind speed, tide height etc), then introduced the comparison of the two sites where this is fundamental to the discussion (i.e. the section evaluating the importance of site topography - section 3.1.4). We have also removed some detail and now simply state that “at Roscoff and Mace Head air was sampled at a similar height and distance from the high tide mark”.

The reviewer points out that the differences between measurements at Mace Head and Roscoff could also be due to “different wind directions and investigations during different tides”, but we feel that a day by day comparison of concentrations at the 2 sites with varying tide and wind conditions would be too detailed. Given that the ultimate aim is to improve estimates of global annual fluxes, day to day variations are

ACPD

9, C5914–C5917, 2009

less significant than the longer-term averaged similarities / differences in emissions from different coastal sites.

P17131 L27 - P17132 L21 and P17132 L23-P17133 L5: This discussion has been shortened and is now included in sub-section 3.1.4, focusing on the influence of site topography. The dominance of Fucus at Roscoff is mentioned because this order of macroalgae produce far lower levels of iodocarbons than the Laminaria order, and a sentence to this effect has been included at the start of section 3.1.1, when the influence of macroalgae is first discussed, to clarify this.

P17131 L27 - P17133 L5: This section has now been divided into separate, more targeted, discussions focusing on the influence of the sources (3.1.1) and coastline topography (3.1.4) upon atmospheric halocarbon concentrations. One of the main points is that it is the compounds with the shortest atmospheric lifetimes that are most strongly effected by variability in the local source strength.

P17133 L2 - P17133 L5: deleted

P17133 L6 - P17134 L8: Correlations between different halocarbons are now in a separate section (3.2). Results of Spearman's rank correlation tests between all species are summarized in table 4. We have also clarified that we are discussing correlations between bromocarbons in the atmosphere (as opposed to in water) in this section. As the correlation between CH2IBr and CHBr3 is just as strong as that between CH2IBr and CH2Br2, we consider it appropriate to also show the CH2IBr vs CHBr3 plot as part of Figure 6 (originally Figure 3).

P17134 L10 - P17135 L3: tidal influence is now included as one of the processes in section 3.1 (3.1.2), and the text has been re-ordered in accordance with the reviewers suggestions.

P17135 L3 - P17136 L7: This discussion has been separated as much as possible into discrete sections addressing the influences of tide and wind speed and direction

ACPD

9, C5914–C5917, 2009

individually, although it should be noted that it is difficult to completely separate these effects and attribute changes in concentration to one influence or another. The suggestion of an alternative source mechanism for CH2ICl is inferred directly from the different behavior of this species in response to the tide height compared to the other halocarbons, and therefore we feel it is appropriate to include this observation in the section discussing the influence of tide height on atmospheric halocarbon concentrations. The last sentence (previously P17136 L5-L7) has been removed and is now included in the separate section discussing correlations between halocarbons in air (section 3.2).

P17136 L5: changed "the site" to "the atmospheric measurement site" and re-ordered the text in line with the reviewer's suggestions. The incubation study is referred to because it supports our hypothesis based on our seawater measurements that C2H5I and CH2ICl may have a common source - hopefully the purpose of mentioning this study is clearer now that the text has been slightly re-worded.

P17138 L4. L14: references to table of photolysis lifetimes included

P17138 L4, L20-L28: As stated in the text, the assumption that at high levels of solar irradiance some fraction of reactive I atom precursors will be destroyed before the point of measurement, & therefore taking the average night-time concentration and applying midday photolysis rates to give an upper limit I atom flux, is a valid approach for I2 but is inappropriate for CH2I2 since the CH2I2 concentration is actually higher during the daytime than at night (we speculate that this is likely due to light-dependent emission, and incubation studies support this theory). We have however attempted to derive an "at source" midday CH2I2 concentration in a slightly different way - based upon the average midday measured concentration, its photolysis rate and an estimated time to reach the GC/MS inlet from the point of emission. We find that this would lead to a $\sim$ 5 % increase in the CH2I2 concentration, which means that CH2I2 is still a substantially smaller I atom source than I2.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 17125, 2009.