Atmos. Chem. Phys. Discuss., 1, S74–S76, 2001
www.atmos-chem-phys.org/acpd/1/S74/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Coastal zone production of IO precursors: A 2-dimensional study" *by* "L. J. Carpenter et al."

Anonymous Referee #1

Received and published: 29 October 2001

This paper reports a fascinating study of reactive organic iodine species and possible relationships to observed IO in the marine boundary layer at a coastal location. It follows on from an earlier paper reporting similar findings at the same location in a previous year. The data here, however, are a little more extensive and make a nice addition to the earlier study, both in confirming the earlier observations, and drawing some new conclusions. The principal novelty of the paper, however, is the attempt to use a box and a 2-d model to pick apart from where the organoiodine compounds originate. This is important as it was originally thought that iodine chemistry was only significant very close to large beds of intertidal seaweeds; such as proliferate on the west coast of Ireland. Subsequent observations of IO at marine locations where macrophytes are far less abundant, however, have raised the notion that iodine chemistry is much more widespread in the marine atmosphere, and therefore more than just a local curiosity.

Print Version

Interactive Discussion

Original Paper

The purpose of this study (in part at least) was, therefore, to distinguish offshore from near-shore emissions of organoiodines. The bottom line is a claim that they are about half-and-half from near and offshore.

There are some beautiful data sets reported here. The time series of IO and tidal height is a stunning example of IO appearing regularly at low tide when the low tide occurs during the day, but not during low tides at night. There is actually one curiosity, which is the appearance of IO during low tide late on the 14th September. On this occassion high IO levels continued well after the sun had set. This either tells us something about the lifetime of IO, or about its transport and geographical origin. A study of the trajectories experienced at that time might have been illuminating.

Rather less convincing is the discrimination of near-shore from offshore sources of CH2I2 and CH2BrI. This has been approached from a number of angles. One method was to plot correlations against tidal height. The presence of a 'baseline' of concentrations does not, however, indicate sources beyond the intertidal zone. Emissions from seaweeds once submerged will still be considerable (indeed others have shown enhanced production of halocarbons during rehydration), and transfer to the overlying atmosphere in shallow water, assisted by wave action, is likely to be efficient.

The model studies were set up to account for near and offshore source regions, but the arguments and assumptions sometimes appear to verge on the circular. Certainly the combined uncertainties and assumptions conspire to make conclusive discrimination difficult. The agreement of the above two lines of evidence with the slightly crude estimate, based on selective incubations studies, is encouraging but, as the authors readily admit, probably more fortuitious than accurate. In conclusion this is an excellent study with some very exciting observations, and much interesting speculation. The interpretation maybe somewhat overreaches itself, but firmly points to the need for actual observations to validate these ideas.

Technical points:

Line 4, page 198: NONO? NO4? Are these correct?

Caption Fig. 1: grey areas mark low tide periods DURING THE DAY.

ACPD

1, S74–S76, 2001

Print Version

Interactive Discussion

Original Paper

Caption Fig. 1 and elsewhere: not sure the use of lux for solar radiation is right Ű lux is a measure of illuminance (not luminance).

Figs. 2 and 4: set the letters used as data point symbols in different colours to make the plots better readable.

For consistency, I would suggest to use the term "(number) concentration" for units of cm-3 and the term "volume mixing ratio (VMR)" for ppt/ppb.

For consistency, square brackets should be reserved for concentrations (or VMRs) and units should be given in round brackets.

The figure captions are often not fully self-explanatory: Abbreviations like TH, SR, etc. should be defined explicitly (e.g.: TH in several figures, SR in Fig. 4, J(CH2I2) in Fig 5).

Fig 8: concentrations (or VMRs?) at 20 m altitude?, why are only arbitrary units given (to me this looks like cm-3)???

Page 198, line 4: Shouldn't this be NO3 instead of NO4?

Page 199, line 14: I guess dx must be replaced with dz and not dy.

Page 205, line 1: explain what the abbreviation STP is. And also say what temperature was used to convert molecules/cm3 to pptv. The conversion not only depends on p but also on T!

Page 206, line 19: The Cox paper is not sorted alphabetically.

Interactive comment on Atmos. Chem. Phys. Discuss., 1, 193, 2001.

ACPD

1, S74–S76, 2001

Interactive Comment

Print Version

Interactive Discussion

Original Paper