

***Interactive comment on* “Reactive and organic halogen species in three different European coastal environments” by C. Peters et al.**

C. Peters et al.

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General

We like to thank the referees for their valuable remarks on our manuscript. We agree with most of their propositions (the exceptions are noted below) and updated our manuscript accordingly. We revised the whole text in order to make it more easily understandable and improved the quality of some figures as requested. The main point mentioned by the reviewers regarding the content of the manuscript concern some inconsistencies between our Table 3 and respective passages of the text. We revised and extended both, text and table with respect to clarity and consistency (see also specific comments to referee N°1).

Referee N^o1:

1. We agree that the original version of our paper is a little bit confusing in that point. It is common praxis to use the 2σ statistical error from the non linear fit as the DOAS error. However, for individual cases this is a clear underestimation, due to systematic errors, caused by e.g. varying lamp structures, saturation effects of water vapor, . . .
For all data points regarding BrO, OIO and I₂ above the detection limit, we were not able to identify the spectral structure of the absorbers due to high remaining residual structures. We can't exclude the presence of these absorbers, but we have not found convincing evidence in the spectra.
We explain this problem now in greater detail in Section 4, as well as in Section 5. We revised Table 3, added an additional footnote for all maximum values, which couldn't be identified unambiguously, and extended the explanation in the caption.
2. See point 1.
3. We agree with the reviewer's comment that the biological state could have an important impact on the algae (as already stated in our manuscript). But since we did not measure water temperatures during the 3 campaigns, this point is somewhat speculative. We added an additional comment for that in the text now.
4. We did take heterogeneous processing into account in the model and included this information now in the text and updated Figure 16.

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- We checked all acronyms and explained them on the first occurrence, especially GC/ECD-ICPMS.
- We added at several passages in the manuscript a more precise description to differentiate between the two campaigns performed recently in the ReHaTrop project and the partly re-analysis of data from the PARFORCE campaign. .
- See answer 1.) to referee N°1
- On the 6th and 7th the wind direction is very clearly from the East. On the 8th the wind direction turned during the afternoon from the East to North (producing the peak), but after sunset turned back to the East. We can send a close-up look for verification.
- OIO is a hot topic at the moment, we know. However, the main focus of our paper are the new results of the recent campaigns Brittany and North Sea. For Brittany there is a fit example including OIO already shown in Figure 5. The identification of OIO in the Mace Head data set will be addressed in detail in a separate paper by J. Stutz. We included the time series for that species in our paper only to get a complete picture of all RHS compounds in all the described regions.
- We use the same axis limits for both panels now. Further, the error bars are estimated to be in the order of 10%, see Schwarz (2002) and we added that information in the figure caption. The outliers in the upper panel exceed 10 pptv during high tide, both cases very shortly after sunset, may indicating a late accumulation of the short lived CH_2I_2 . However we do not have a conclusive answer and we state this now in the text.

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- The cross section of Hönninger (1999) is recorded with a resolution of 0.09 nm, and $\sigma_{\text{diff}}(427.2 \text{ nm})=2.6 \times 10^{-17} \text{ cm}^2$ (4-0 transition band) as stated in our manuscript in Section 4. More recommended is to use $\sigma_{\text{diff}}(427.2 \text{ nm})=3.5 \times 10^{-17} \text{ cm}^2$, so that our absolute values for IO concentration have to be scaled down by 25%. However, the cross section of Hönninger is the one with the best resolution available at the moment. A really comprehensive comparison of several IO cross section is done by John Crowley and will be published in J. Photochem. soon.
- ok
- ok
- ok
- ok

Referee R.Sander

- We revised the manuscript in that point.
- We added this aspect to the manuscript .
- We added the original reference to Platt (1983), but we also want to keep the more recent one, which is more helpful for the modern technique of active longpath DOAS measurements.
- The length of the day is defined by the SZA ($\text{SZA} < 90^\circ$). This includes cloudy periods. We state this now in the text.
- We changed agriculture to collection, which maybe describes best the activities in that region.

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- We included all data of the Ph.D. thesis of J. Pruvost, 2001: Etude des composés organiques halogénés volatils en milieu marin. Origines biologiques et anthropiques, échanges avec l’atmosphère - Utilisation comme traceurs transitoires de la circulation dans l’Atlantique de Nord-Est
- Both figures are plotted now for model layer two (15 m altitudes) and we changed Figure 16 accordingly.
- We added the definition of ppt (ppmol/mol) at its first occurrence to make it clear that these units are identical. As we are using ppt and ppb consistently throughout the manuscript, there is no danger of confusing the reader.
- ok
- ok
- ok
- no, in low concentrations is correct
- ok
- ok
- ok, and see Referee Wittrock
- We included the AFO2000 project into the acknowledgements
- ok
- ok, see referee Wittrock, point 2
- We agree and changed the sentence accordingly.

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- We changed Figure 7 and 8 accordingly.
- ok
- We modified this sentence according to the proposition.
- We replaced that.
- I_2 - we changed the entry.
- See comments at referee 1.
- We changed Figure 2.
- These indications are touristic attractions on the original map and hence difficult to remove. As they don't obstruct the view on the important information where the intertidal zones are in proposition to the DOAS lightpath, we prefer to leave these arrows.
- We changed the axis of Figure 10.
- This technical problem should be fixed now.
- See referee Wittrock point 6.
- See again referee Wittrock point 6.
- In Figure 11 we removed the exponential fit, which was indicated by the dashed line. Just the polynomial fit is shown now, to avoid further confusion.
- and we exchanged Fig. 11.
- This technical problem should be fixed now.

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