

Atmospheric bromoform at Cape Point... Kuyper et al. (acp-2017-244)

Review of resubmission

The manuscript is much improved and I commend the authors on their hard work and perseverance. This still represents a rather limited dataset, but the authors have, in my opinion, made sensible alterations to their interpretation of the data and to the conclusions drawn. I still have some reservations, particular in the interpretation of some of the case studies, but I would be happy to recommend publication in ACP once the issues outlined below have been addressed.

P1, L5: replace “an” with “a”

P1, L12: apart from a few minor anthropogenic sources

P1, L12: are there individual references for the different anthropogenic sources or do they all come from Quack and Wallace (2003)?

P2, L30: higher atmospheric levels are not just seen in “tropical” regions – they are often associated with seaweeds at mid-latitudes as well (Mace Head, etc).

P3, L20: replace full stop with a comma – i.e. “.. into the UTLS, where bromine-initiated ...”

P3, L21: add “the”. i.e. “ ... contribution from the Cape Point region is”.

P3, L31: delete second use of the word “extensive”

P4, L11: typo “Perkin Elmer”, not “Perkin Elmar”.

P8, L13: what does pm mean (13.2 pm 9.7 ppt)? plus/minus?

P8, L13: Figure number is missing

P8, L14: I don't particularly like this sentence “The measurements were largely consistent within a few days, however could vary by 10s of ppt between days”. What are the authors trying to say here? Please try rephrasing. Something like “Bromoform was typically in the range of 1-20 ppt but on several occasions elevated mixing ratios were encountered that could last for several hours”

P8, L26 Should “Cape Town” read “Cape Point”?

P8, L28: missing parentheses around the reference.

P9, Fig 3: Units are missing from the y-axis

P9, Fig.3: please make it clearer either in the Figure caption or perhaps in the text which is high tide and which is low tide. The graph (2nd panel down) varies from 0.6 to 1.4, but what does this mean?

P9, L4-6: You say that the tidal height is a “necessary but not sufficient factor” in the high bromoform episodes but then go on to say that “it is therefore likely that the extensive local kelp beds are an important source of the observed bromoform”. These statements seem to contradict themselves a little. Please consider rephrasing these 2 sentences.

It is interesting that the seaweeds do not become completely exposed at Cape Point. Is this true of the wider region as well? Are you able to smell the seaweeds at low tide? This might be a good indicator of very local emissions!

P10, L3: replace “particularly” with “including”

P11, L1: missing Table number

P11, L2-4: I don't like this sentence very much either. "The introduction of". How does it allow for the determination of scale of the anthropogenic contributions in this region? Do you mean anthropogenic bromoform? As I mentioned in my first review when you have seaweed beds to the north of Cape Town it is very hard to distinguish whether the CHBr₃ comes from an anthropogenic source rather than a marine source further to the north.

P11, L9: strictly speaking the kelp beds were not "responsible" for the measurements. Please rephrase.

P11, L24-25: although you say there was no correlation between bromoform and boundary layer height you cannot say that BL ht has no influence. Even in the diurnal cycle shown in Figure 4, the gradually declining concentrations after 10 am could partly be due to an expanding boundary layer as the atmosphere warms up. This would cause a dilution and therefore contribute to the decline. Similarly in the evening when the nocturnal boundary forms, might this not contribute to the higher concentrations you observe in the early evening and through to 11 pm. There could also be a link between boundary layer height and tide. Low tide and low BL could lead to higher concentrations particularly if there are emissions at night?

P12, L5: delete "in"

P12, L6: the overnight low looks more like 12-13 ppt from Figure 4

P12, Fig 4: it would be useful to have an indication as to the number of samples in each hourly bin

P13, para 1: note my point about BL height (above).

P15, Fig 6: Does the sample with the maximum concentration of bromoform correspond to the back-trajectory that passes through Koeberg?

P15, Fig 6: why do the trajectories start at an altitude of over 200m? Is this the altitude of the sampling location (I had assumed it was lower)? Also, the trajectories look a bit odd as they seem to go to almost negative altitudes, particularly on the 18th? You do not comment on these altitude profiles in the text. What do they actually tell us?

P16, Fig 7: the line for mbl looks a little odd. Was there no change in boundary layer height on the 26 October? Also, the units are missing from the y-axis (same for Figs 5 and 8).

P17, L7: "The" should read "the" (no capital required).

P17, L25: missing word "between 3 and 6 pm"?

P18, L5: delete the first "known", and, better still, replace "known" with "potential". You haven't confirmed in this work that the power and water plants in CT actually produce bromoform.

P18, Fig 8: again the boundary layer height looks strange. No change between 9 am on the 7th Nov and 9 am on 8th Nov?

P19, Fig 9: The wrong date is used in the figure caption.

Comment on the case studies

I understand that the authors are trying to highlight some of the more interesting features in their data, but I worry that they do not really have enough data to come to any conclusions. For example,

in Case 1, the argument for an anthropogenic source is essentially based on one single data point, which occurs during a period of elevated CO and radon (and also at low tide). I wonder if the trajectories in Figure 6 could be coloured differently to show the gradual change of air mass origin over the period.

In Case 2 it is very hard to discern anything meaningful from the various parameters discussed, particularly in regard to the tidal heights. I do however notice that the wind speed increases over the period. As the winds are coming from the west, would an open ocean source (influenced by increasing winds) not be a possibility as well? Again this would be highly speculative.