General Comments

The manuscript by Shechner et al. presents ambient measurements and fluxes for short-lived halocarbons at multiple sites around the Dead Sea. The unique characteristics of the Dead Sea make it a very interesting location to study the emissions from and detail the characteristics of this source for atmospherically important halocarbons. The paper contains an abundance of information, but I feel some key details are lacking that are needed to fully assess the author's interpretations. Additionally, the paper is very long and becomes difficult to follow in terms of the main points trying to be conveyed in the various sections of the paper. My opinion is that the paper could be distilled down in length and the key points be fleshed out a bit more cleanly. Additionally, I feel there are some significant improvements that could be made in dissemination of the information in both graphical and tabular form. While there is merit to the manuscript, I feel as though there are an array of issues that should be addressed before it is in an acceptable format for publication.

I will present a general list of issues here and elaborate on them in the Specific Comments section.

Urban and other source influences – it would be useful to provide some context to the potential of urban emissions, for the solvents like CHCl3 and C2HCl3, but also including things like wastewater treatment facilities and other agricultural activities that could influence the area.

The first time a chemical constituent is introduced, it should be spelled out – there are several places this occurs throughout the manuscript. For example, L72 chloroform (CHCl3), L73 chloroethane (C2H5Cl), L112 iron (Fe), L115 potassium bromide (KBr), nitric acid (HNO3), etc. – please address.

Percentages – there are spaces between the number and the percent sign. The most common convention is to not have a space between a number and the percent sign.

I would recommend either referring to the suite of halocarbons as VHOCs or VSLS, but not going back and forth between them.

From the measured fluxes, can you estimate the local/regional source or sink strength of the Dead Sea? How do your results play in to the scale of the source strength of the Dead Sea for these gases?

It would be useful to present some quantitative information in the abstract, such as mixing ratios and fluxes.

There are no uncertainties propagated through any of the fluxes.

I would be useful to include the atmospheric lifetimes and primary removal sources for the compounds in the manuscript.

The manuscript seem to try and agree with all previous studies.

Tables are difficult to read and digest.

Plots within the figures are too small making it difficult to extract information from them.

Flux section could be moved to SI

A more thorough overview of the site, including meteorology, would be useful to help set the stage for the reader.

Specific Comments

L46-7: You should include why CH3I and C2HCl3 are exceptions, as this is not intuitive to the reader.

L49-51: For the statement: "Correlation analysis, in agreement with recent studies, indicated common controls for the formation and emission of all the above trihalomethanes but also for CH2Br2.", I'm not convinced this is entirely accurate – for example, what about CHCl3? Also how does the correlation indicate that the factors controlling the formation and emissions are the same?

L55: "elevate" should be "elevated"

L61: When you introduce VSLSs here, you should include here that this refers to compounds that have lifetimes of less than 6 months.

L64: replace "destruction of ozone" with "ozone destruction"

L73: add "which", so it reads "…C2H5Cl, which originate…"

L134-5: Bromide (Br-) and chloride (Cl-) should be introduced and the sentence should be revised to read " with water salinity 12 times higher and a bromide to chloride ratio (Br−/Cl−) 7.5 times higher than in normal ocean waters.
L136: What do you mean by "landforms"? Formations from the residual salts left behind? In this case the use of the term "landform" invokes images of large scale topographical features, is this the case?

This brings in to question the use of the term landform in the title – is this really appropriate and accurate? I would say this work has been carried out on different terrains or ecosystems of the Dead Sea, but not different landforms.

L143: I would revise this to make it a stronger statement, something like: "Studying the emission of VHOCs at the Dead Sea is also fundamental for understanding local surface ozone depletion events…"

L169-70: Regarding the Tamarix vegetation and watermelon fields, more details, such as density, proximity, size of agricultural development, etc., would be useful to the reader.

Also, I would refer change your referencing of watermelon fields from "vegetation" to "agriculture" in later sections of the manuscript – because this is a perturbed system different that the natural vegetation, it should be distinguished as such.

L198: Revise to "Lastly, WM-KLY…"

P8, Sect. 2.1.2.

How many samples were collected in total, at each site, and at each corresponding height for each site? What were the meteorological conditions during the sampling?

In order to get better feel for the results presented, both for the ambient levels and the fluxes, knowing *N* is critically important. This will allow the reader better perspective on some of the interpretation presented.

Also, general information about the seasonal and local meteorology to provide an overview of the region would be instructive to the reader.

L209: Regarding the use of "fast" here: I personally wouldn't consider 20 minutes to be fast - I think the key point you are trying to make is that all samples were collected simultaneously and integrated over a 20 min period – please revise.

Also, I'm assuming "lifting of the canisters" should be "filling of canisters"

L209-12: Please revise the following sentence – very awkward as written:

Facilitated by passive grab samplers (RESTEK Corporation, PA, U.S.), we performed each sampling within 20 minutes by pulling air into evacuated 1.9 L stainless steel canisters, resulting in an internal canister pressure higher than 600 torr.

L215-16: Please revise: "…subjected to the analytical techniques…" – simply say they were analyzed by similar techniques described in Colman et al.

L218-21: You introduce all of the halocarbons here, but most, if not all should have been introduced previously. Please address.

L223-28: Please provide some statistical/quantitative rationale for this - you can't simply disregard this point because it doesn't "agree" with the other measured mixing ratios for CH3Cl. Also, I don't feel it's appropriate to state that it may result in a "less accurate flux" – how do we know what the "accurate flux" is? There is variability in all of this work, and while this may, in fact, be a spurious data point, what measures were carried out to deduce this issue?

Where is this listed, in Table 2? Please specify here for the reader to address.

L229, Table 1: It would be useful to provide the total number of samples and how many per height. This should be summarized such that the reader doesn't have to try and count how many samples were collected on the individual days from the information in the table.

L279: Sect 2.3
Following suit with the canisters, how many total soil samples were collected and analyzed? This potentially could be moved to the SI because the information os only used for general properties at each site.

L280-81: Please elaborate what you mean by this and what is the significance of this statement: "…at least 3 months following any rain event in the Dead Sea area."

L265: In line reference should be Golder (1972)

L290: Quotes are not needed around "Discover"

L292-93: High Resolution does not need to be capitalized

L294: “low-limit” should be “lower limit”

L302: What is meant by “corresponding available information.”

L306: What is the “Dead Sea Works”?

L326: There were surface seawater, ambient air and direct flux measurements of CHBr3 in Zhou et al., 2005 – how do these compare with the Dead Sea?

L330: It appears that a range of values is missing after 2-60 pptv – there is simple “(-)”

L335: Re C2HCl3 and CH3I - while the reader can look at the figure, it would be useful to also state in the text what these gases are doing, on average.

L336-39: Can you please clarify these two sentences: Figure 2 doesn't show values higher than these. Either present the values or revise text.

L376: for the following, you either have one too many or one too few brackets: (e.g., ~600 nmol m^{-2} d^{-1}; (Deventer et al., 2018).

L360: For “nmol $m^{-2-}d^{-1}$” there appears to be an extra dash in between m^{-2} and d^{-1}

L391-93: It is difficult to see this in Fig 2, and what/where are the anthropogenic emissions located? From DSW or other places? Can this be assessed by looking at something like the C2HCl3/C2Cl4 ratio? It is likely that this data is available from the UCI group, but this (or other pairs of compounds) could be used to do a more thorough analysis on the impact of anthropogenic emissions at the sampling sites. For example, this brings in to light things like wastewater treatment facilities and the corresponding emissions of CHCl3 and CHBr3. It would be useful to provide a more rigorous assessment of the influence of anthropogenic emissions in general - particularly for those not familiar with the region and to what extent they may be influencing this work - if minimal, that's great - just demonstrate this, as this statement affects your results - C2HCl3 isn't the only gas here with anthropogenic sources.

Suggestion: After looking at Figure 2, I feel as though it would be useful to have a summary flux figure (e.g., by compound) with the magnitude of the fluxes plotted by size or color on a map to enable the reader to get a better idea of the spatial variability of the flux magnitudes.

L418: Revise to: “…VHOCs, except C2HCl3, were…”

L431-33: Regarding the statement that there isn’t a difference between fluxes in the spring and winter, two things should be addressed: 1) is this statistically significant? 2) What is the seasonality of the temperature and overall meteorology for this area (i.e., local/regional transport patterns)? Being only slightly extratropical, would seasonality be expected to be an important driver?

L437: add comma after “properties”

L439-40: Regarding the sentence: “No clear impact of season or distance from the seawater on the mixing ratios can be discerned in this figure,…”, while I agree, it’s mostly because you can’t see the details in Figure 3.

Figure 3: In general, it is difficult to discern the spatial distributions and get useful information out of the vertical profiles because each panel is so small. From this figure, it is difficult to see and discern the gradients for many of the gases. I would recommend revising and either show a few key species and put the remainder that don’t show anything in the SI or revise the whole figure.

L460: replace “these parameters” with “the soil composition parameters”; also change “The table records…” to “The results presented in Table 3 show…”

L462: “larger distance” should be replaced with “ greater distances”

L465-66: replace “in” with “at” just before the site location abbreviation.

L472-75: What do you mean by “underestimated value of Fe”? A lower limit of the total iron? Again, “low-limit” should be “lower limit”.

What does “while the emission rates became saturated” mean – I’m assuming that you mean “plateau”. For example, Huber et al. use the term “plateau”.

L478: I would replace “merges” with “combines”

L481: “samplings” should be “sample”, and I would encourage revising this sentence to something like: “While the number of samples collected at each site was limited, Table 4 shows that the fluxes....”

L482: I would replace “In both” with “For the…sites,…”

L484: replace “in” with “at” before COAST-EGD-MD

L485: A comma is needed after “winter”

L505: For consistency, replace VSLS with VHOC.

L506-07: Replace “during” with “at” before the site abbreviations.

L515-19: Do you need the F:C ratio really aid in understanding these processes?

L544: Table 4. General comment: This is a hard table to read and extract information from - I almost feel as though presenting this graphically would be more impactful allowing the reader to see the trends rather than sifting through a lot of numbers that appear to vary greatly.

Because everything is bolded in the summary portion of Table 4, the rows should be explicitly labeled as to what the values are.

L553: Awkward as written, say something like: The results presented in Table 4 show that a higher…”

L554: comma is needed after CHCl3

L555: “tends” should be “tended”

L558: I would suggest deleting the following (not needed): “suggesting both high emission and their balance to some extent by sinks for this species.”

Because there were watermelon fields, was there any harvesting or drying and decomposing plant material in the vicinity of the sampling? This can be a source of an array of halocarbons, particularly gases like CHCl3 and CHClBr2.
L563: I would replace “are in general” with “were”

L566-70: Please revise – it is unclear what you are trying to say.

L577-9: revise to something like: “…emission rates from both bare and vegetated soil sites supports the work by Albers et al. (2017) concerning the emission of trihalomethanes from the soil after trihaloacetyl hydrolysis (Table 3).”

L584: Agricultural emissions, such as from the watermelon farming, could be such a source. More details regarding the scale and influence of these operations would be useful.

L589: replace “in” with “at” before the site name

L589-91: Please revise the following – awkward as written: “No clearly more elevated positive flux of brominated compared to chlorinated trihalomethanes was observed for this site…”

L600: include (Table 4) to direct the reader to this information

L601: For the statement “…indicating strong emission and deposition…”, if the flux is positive, then the emissions outweigh the deposition or other loss processes - revise to clarify your point. Figure 2 counters the point of “strong deposition” for the methyl halides.

L604-05: Cultivated watermelon fields (agricultural emissions) are different from local vegetation, please distinguish as such.

L644-46: please revise, reads awkwardly

L662-663: How are the data grouped for Table 5? Is this simply for all sampling heights lumped together? Is there a difference when grouped by height?

Replace “evaluated” with “measured”

L670: Please consider revising: “…reinforce predominant contribution of VHOCs from terrestrial sources…” – I would consider this to be an overstatement.

L672: The r^2 values are quite low, and without being able to see the correlation plots of these gases, it is difficult to adequately assess the commonality of their sources and sinks. How do these specific r^2 values translate in to common sources and sinks?

L678: Replace “records” with something like “shows”

L680-81: Change “For the two last,…” to something like: “For the latter two sites,…”

L685: Replace “demonstrates” with something like “shows” or The results in Table 6 show/illustrate…

L692-94: Can you please expand upon the correlations being attributable to “common sinks” – what are the sinks and how is this driving the correlations?

L740: replace “common emission” with something like “co-located emissions”

L826-27: I would recommend revising or omitting the following: “…from saline soil and salt lakes in stratospheric and tropospheric chemistry,…”, as there were no linkages made to how the compounds measured for this work play in to the local/regional/global budgets of tropospheric or stratospheric Cl, Br or I.