

Review of “One year monitoring of volatile organic compounds (VOCs) from and oil-gas station in northwest China.

The authors of this paper have collected real-time high-resolution VOC concentration data for 56 VOCs in a location in China that is near high density oil and gas and petrochemical activity. VOC concentration data from oil and gas rich regions have been collected and published before, but the data are novel in that they were collected at a region where no such studies that targeted oil and gas emissions were conducted. The data and some of the discussion/comparison presented in the paper are valuable, however, there are a lot of redundant information in the paper and some parts that need additional clarification. There is also a lot of grammatical errors in the paper that need to be addressed before the paper is ready for publication. I recommend publication of the paper after major revisions.

General comments:

Title:

Throughout the paper, the term oil-gas or oil and natural gas have been used. Unless the authors are specifically directing attention to wet gas (which is a combination of oil and gas from the same well), they should use the term oil and gas.

The abstract needs major revisions (see Specific comments).

Section 3.3: The authors do a lot of correlation comparisons in the paper. This is noted in the abstract too. A correlation ($r=0.19$) is not a good correlation. Furthermore, the authors do not discuss what this actually would mean in the physical sense. This is noted in the abstract (for correlation with pressure) and page 8 and 9 (Section 2.2). What exactly does a negative correlation of $r=-0.29$ between VOCs and temperature? Which VOCs were correlated? Were some better or worse? Are we looking at total VOCs? If yes, this does not make sense as some VOCs are broken down by UV or other atmospheric constituents in place because of sunlight. This section needs a lot of revising and some deletion of information that is not relevant or useful.

The authors have collected data in China and the value of the data is that such data have not been collected in this area. The way they introduce this concept in the introduction is very-very confusing. I suggest the authors discuss the studies done in China in more detail (when justifying this research) and then when comparing their results with other oil and gas basins, discuss location other than China where there have been a multitude of such studies and data presented.

Was there a reason the authors did not use HYSPLIT for the back-trajectory analysis?

Throughout the paper authors should clarify their comments about other studies and data availability to show when they are talking about China vs other regions and locations.

Sections 2.3-2.5 should be re-written to be more concise and then combined. For example, PMF is a model widely used, so the amount of information given on the model is not useful in this paper.

In the photochemical and diurnal pattern discussion, the authors note that 8-14 is the time when the ratios are reduced because of photochemical removal due to enhancement of ambient temp. Ambient temp is not responsible for photochemical reaction. The increased in reactive radicals such as OH is. This should be corrected throughout this discussion.

What are the uncertainties associated with authors calculations and discussion in section 3.5? This is important as the authors want to show such specific contribution sources in a region where the sources are so close to each other. Also, acetylene is a strong marker for combustion, but it has known to be released from some industrial and oil and gas sources too. It is OK to use it as such, but this point should be addressed in the paper.

The conclusion section should be changed to summary as it is just summarizing the results not adding any conclusions. The conclusions of the paper should relate only to this area. Also, when discussing all VOCs, are the benzene concentrations in this study higher than those in the middle of a high traffic urban area? Using the term VOC to encompass everything discussed here is not a correct comparison. Isn't BLH a meteorological condition? So, what is the difference between it and the met conditions affecting monthly and daily VOC variations? #2 in conclusions does not add anything and should be removed.

The figures in this paper are not well prepared. There is too much going on in each figure (sometimes irrelevant information). For example, for diurnal pattern figures the addition of day and night color only add information that are not useful.

Specific comments:

Page 1, Line 15: The authors do not discuss the atmospheric behaviors of the VOCs in the paper. The closest they come to this is when they discuss the ozone formation potential of the VOCs. Most of the paper is on the VOC concentrations and correlations. The term behaviors should be deleted.

Page 1, Line 17-18: The authors note that the concentrations of VOCs in this study were 1-50 times higher than those measured in many other urban and industrial regions. This statement is vague. It should either be more specifically addressed (what VOCs, which other studies) or taken out.

Page 1, Line 21-22: After Section 3.3 is revised this sentence should be deleted. First, because the correlations were not very strong; second, because correlation (even if present) does not imply causality or influence.

Page 1, Line 24: What do the authors mean by asphalt? Is this an asphalt making factory or just asphalt on the roads?

Page 1, Line 25-26: What do the authors mean by "Clear temporal variations differed from one source to another was observed..." temporal variations of what?

Page 1, Line 28: define CWT

Page 1, Line 28: What do the authors mean by "local emissions"? Are these the emissions from the oil and gas field? From the urban location?

Page 1, Line 29-30: Even though the data presented here is a good first step to look at the oil and gas emissions in this region, it is far from filling the gaps. Please revise this sentence to reflect what the paper actually does.

Page 2, Line 5-6: The authors are implying that the reason for the detrimental effect of VOCs to human health is their activity as ozone precursors. This is not correct. It is a part of the picture. VOCs such as benzene are carcinogens and bad for human health, independent of their activity as ozone precursors.

Page 2, Line 7: Indicate the region of discussion because the previous studies in other regions have certainly focused on VOCs from oil and gas.

Page 2, Line 15-16: This sentence is not clear and needs revision. What do the authors mean by “depended on processing stages”? Are the authors discussing the processing stages (drilling, fracking, production) or something else?

Page 2, Line 17-18: Gilman et al found that oil and gas emissions contribute strongly to some VOCs not all VOCs. Please correct this sentence to reflect that.

Page 3, Line 9-10: How are the authors claiming that this specific study “contributes to establish the control measures of VOCs at this type of region”? What do they mean by this type of regions?

Page 3, Line 15-16: Where did the authors get the production and deposit size data? Please cite source

Page 4, Line 26: The authors note that 3-hour met data have been collected but then in Fig 2 they show hourly data? How was this done?

Page 4, Line 29: This should be in results not in methods.

Page 10, Line 1-5: The difference is not only due to fuel evaporation. Based on the information presented here there is an urban area nearby and may contribute to the i/n pentane ratios. If this is not the case, the authors should add clarification.

Page 10, Line 19-35: This section should be re-written for clarity.

Page 11, Line 10: What is asphaltic?

Examples of grammatical errors (these are not all the errors in the paper. The paper should go through a rigorous edit for grammar before publication).

Page 1, Line 13: add for between important and energy

Page 1, Line 14: replace abundant with a grammatically correct adjective

Page 1, Line 17: revise “set of monitor system”

Page 1, Line 25-26: revise for grammar

Page 2, Line 2: revise “volcanos eruption”

Page 2, Line 13: replace intensive with a grammatically correct adjective

Page 3, Line 2: revise “few have concerned the local and regional source...”

Page 3, Line 3: replace long time with long-term

Page 3, Line 5: Replace researches with grammatically correct term

Page 3, Line 16: Please correct sentence so that "It" does not refer to 126 petrochemical plants but the area.

Page 3, Line 23: revise deeply

Page 3, Line 28: The authors make it sound like there were 56 monitoring sites. I assume this refers to the number of VOCs? Please revise sentence to reflect that.

Page 7, Line 13-17: Revise sentences

There are much more, which made reading the manuscript very difficult. The authors should have used a technical writer.