

Dear Editor and Reviewers,

We would like to thank Referee #1 for valuable comments on our manuscript. We have carefully revised our manuscript according to the referee's comments. We have addressed the referee's comments and concerns point by point as follows (comments from referee in black, author's response in red and author's changes in the revised manuscript in blue):

Comment:

This manuscript presents an updated inventory of HCl and Cl₂ emissions from various sources in China. Sources of inorganic chlorine are - in general - poorly constrained, so this study is highly relevant and provides new information on both the sources and the impacts of chlorine as an atmospheric oxidant. I suggest it is published in ACP, after the authors have addressed a few questions and clarifications.

Responses:

We thank the referee for nice comments.

Changes in the manuscript:

No changes were needed for this comment.

Comment:

On page 5, line 4: what is the rationale behind this assumption? Also, is all coal used in China from domestic sources or is some of it imported? In the latter case, is the chlorine content different?

Responses:

For those regions where chlorine contents are not listed in the literature, we estimated the chlorine emissions using the average chlorine content (280 μg g⁻¹) in China according to Chen (2010). Some of the coals consumed in China were imported from other countries which might have different chlorine contents. According to the report of China Energy Statistical Yearbook (CESY, National Bureau of Statistics, 2013), the total amount of coals imported into China was 288 Tg and the total coal consumption in China was 3526 Tg in 2012. Over 91% of the coals were domestically produced in China. It is hence concluded that the different chlorine content of the imported coals has a minor influence on the estimation of chlorine emission in China. However, it is difficult to evaluate to what extent the influence is. Hence, we estimated the chlorine emission from coal combustion in China using the chlorine content of coal from domestic sources and did not take the different chlorine content of the imported coals into account.

References:

Chen, L. H.: Study on environmental geochemistry of chlorine in Chinese coals, M.S. thesis, Nanchang University, China, 46 pp., 2010.

National Bureau of Statistics: China Energy Statistical Yearbook 2013, China Statistics Press, Beijing, 2013.

Changes in the manuscript:

The above statements have been added in line 2-12 on page 5 in the revised manuscript.

Comment:

In Section 2.2, emissions from prescribed waste incineration are described. What about the open waste incineration?

Responses:

Open waste incineration is the uncontrolled emissions from both residential and dump waste burning. In this study, as the article title mentioned, we only focus on the anthropogenic chlorine emissions from coal combustion and prescribed waste incineration.

Changes in the manuscript:

No changes were needed for this comment.

Comment:

In Section 2.3, HCl is emitted primarily from the industrial sector. Is this due mostly to coal burning and if so for what purpose? I assume electricity generation is not included in this, but in the power plant sector.

Responses:

HCl is emitted primarily from the industrial sector, due mostly to the coal burning. The referee is correct that electricity generation is not included in the industrial sector but in the power plant sector. Many industrial processes (e.g., iron and steel processing, non-ferrous metals processing, cement production) that need coal burning are included in the industrial sector, leading to the highest source of HCl.

Changes in the manuscript:

The above statements have been added in line 6-7 on page 8 in the revised manuscript.

Comment:

page 12, line 26: do you mean "the highest chlorine emissions"? And do you mean Cl atoms or HCl and Cl₂?

Responses:

Yes, it means the highest chlorine emissions and it means HCl and Cl₂. We have revised this description to "the highest emissions of HCl and Cl₂".

Changes in the manuscript:

We have clarified this description in line 16-17 on page 13 in the revised manuscript.

Comment:

reactions 1 and 2: the 'H' should be lowercase

Responses:

We have corrected this typo.

Changes in the manuscript:

We have corrected it in line 16-17 on page 2 in the revised manuscript.

Comment:

page 9, line 21: "literature"

Responses:

We have corrected this typo.

Changes in the manuscript:

We have corrected it in line 3 on page 10 in the revised manuscript.

Comment:

page 10, line 22: what is "fine Cl"?

Responses:

It means fine particulate Cl. It has been revised to clarify this point.

Changes in the manuscript:

We have clarified it in line 6 on page 11 in the revised manuscript.

Comment:

In Table 1, maybe highlight the "Mainland China" line so that it is clear it is the sum of the previous lines?

Responses:

We have highlighted the "Mainland China" line with black border.

Changes in the manuscript:

We have marked this line in Table 1.

Comment:

In Figure 2, is "waste incineration" only the prescribed or the sum of prescribed and open?

Responses:

"Waste incineration" in Fig. 2 was only the prescribed waste incineration. It has been revised to clarify this point.

Changes in the manuscript:

We have clarified it in Fig. 2.

Comment:

In the Supplement, Figure S2 is split between two pages.

Responses:

We have corrected this issue.

Changes in the manuscript:

We have corrected it in Fig. S2.