Dear editor,

Thank you very much for your careful reading and comments on our manuscript. We appreciated that your suggestions and comments have improved our paper. Accordingly, we responded your comments point by point, as shown bellowing.

Abstract

Please state the time period analyzed by the study. This is important, given the rapid changes in emissions and pollutants in China.

Response: We added time period in our revised version.

This last statement in the abstract maybe needs some thought: "and particularly the reduction of nitrate, sulfate and their precursor gases would contribute towards better air quality in China". Reduction in these components would improve visibility due to aerosol water uptake as you have demonstrated, but is this the same as improving air quality? This statement also needs to include the caveat that SO2 and NOx emissions have already declined substantially since the period studied in this paper.

Response: We revised the statement as' particularly the reduction of nitrate, sulfate and their precursor gases would contribute towards better visibility in China. '

Introduction

A concise review of previous work on trends in air pollution over China in recent years would be helpful. This was suggested by Referee #2, but not fully addressed in the revised manuscript. A paper that I co-authored (Silver et al., 2018) includes relevant references that could be cited here:

https://iopscience.iop.org/article/10.1088/1748-9326/aae718/meta

Response: We added previous work on the air pollution in recently years, as' A recent study have suggested significantly decreased trends of $PM_{2.5}$ and SO_2 in China from 2015-2017 by analyzing data sets from Ministry of Ecology and Environment of China

(Silver et al., 2018). The column NO_2 concentration obtained from OMI showed increased trend during 2005-2011, while a decreasing trend during 2012-2015 (Itahashi et al., 2016). The SO_2 concentration has decreased around 50% from 2012-2015 in North China Plain due to economic slowdown and governments efforts to restrain emissions from power and industrial sectors (Krotkov et al., 2016).'

Methodology

More additional details on the methods are needed to help the reader understand the paper. This was suggested by Referee #2 and not fully addressed in the revised manuscript. Specifically:

1) Time periods of the different datasets, particularly the visibility dataset.

2) Please provide brief details on the model product that you use. You use a model-satellite derived product and this needs to be stated.

3) More details on the AMS data. In particular, time period and location.

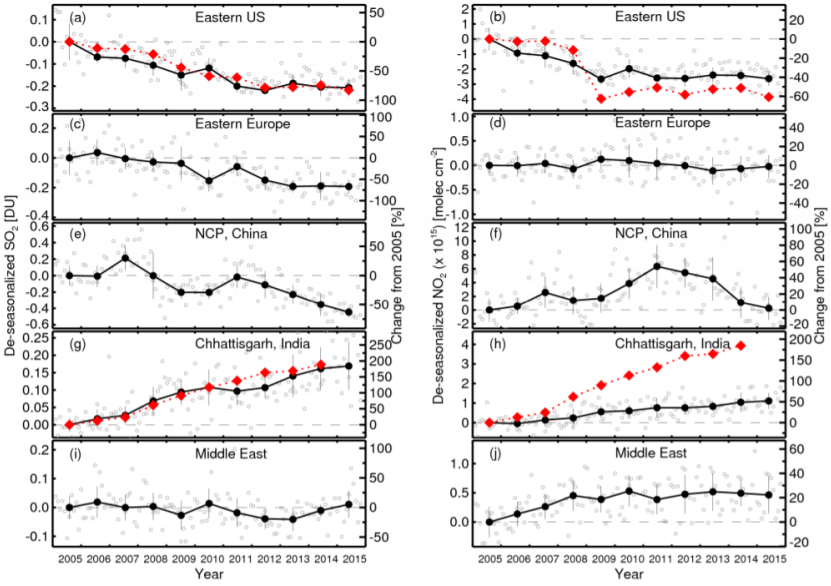
4) Details on the SCIAMACHY product including a reference.

Response: Please see revised version, we revised corresponding places as you suggested.

Section 3.1 There is an indication in Figure 2 that the long-term trend reversed in around 2007 to 2008, approximately the same time previous studies have reported a peak in SO2 and NOx emissions in China. Given the previous literature on this point I think this requires some brief discussion. See the related comment from Referee #2 on this point.

Response: Thanks for the comment, Actually, the concentrations of SO2 and NO2 decreased around 2008, also from previous work (please see figure as following) (Krotkov et al., 2016). The decreases in our work are consistent with their work. The decreases were due to combination of Chinese

economic downturn and emission reduction during the Olympic games.



Section 3.2 See Referee #2 comment on trends. There have been a number of papers written on NO2, SO2, and PM2.5 trends over China that are not referred to in the revised manuscript. It is not clear how the revised manuscript either confirms or contradicts previous analysis. Please clarify. Some important papers that report recent trends in SO2 and NO2 over China include:

Response: Please see revised version, we added this in our revised version

Krotkov N A et al 2016 Aura OMI observations of regional SO2 and NO2 pollution changes from 2005 to 2015 Atmos. Chem. Phys. 16 4605–29

Ling Z, Huang T, Zhao Y, Li J, Zhang X, Wang J, Lian L, Mao X, Gao H and Ma J 2017 OMI-measured increasing SO2 emissions due to energy industry expansion and relocation in northwestern China Atmos. Chem. Phys. 17 9115–31

Van Der A R J, Mijling B, Ding J, Elissavet Koukouli M, Liu F, Li Q, Mao H and Theys N 2017 Cleaning up the air: effectiveness of air quality policy for SO2 and NOx emissions in China Atmos. Chem. Phys. 17 1775–89

Irie H, Muto T, Itahashi S, Kurokawa J and Uno I 2016 Turnaround of tropospheric nitrogen dioxide pollution trends

in China, Japan, and South Korea Sola 12170–4

PM2.5 concentrations have also declined recently across China as demonstrated by surface observations (Silver et al., 2018) and satellite studies. Does the increase in NO2 and SO2 after 2007 contradict previous analysis. This requires some comment. Section 4. It is important to note that the present study ends in 2010 (2012?). There have been large reductions in Chinese NOx and SO2 emissions since 2012. This is a crucial caveat that needs to be mentioned in the conclusions.

Response: Thanks for the comment. The decreased trend of NO2, SO2 and PM2.5 were confirmed by some studies. However, we only analyzed visibility data from 1980-2010 and satellite data until 2012, so our conclusion was made very carefully. In our revised version, we added statement on time periods as the editor suggested. Also, we also revised our conclusion as 'Considering the vast energy consumption in the future decades and the sources of inorganic components in atmospheric aerosol, we demonstrate that the reduction nitrate, sulfate, ammonium and their precursors should be continued to get better visibility in China'.

Figure 5. Add an explanation of the x-axis to the figure caption.

Response: We labeled X-axis as visibility in our revised version.