

## ***Interactive comment on “Feasibility and difficulties on China new air quality standard compliance: PRD case of PM<sub>2.5</sub> and ozone from 2010 to 2025” by H. Liu et al.***

### **Anonymous Referee #1**

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#### First Referee Comment

RE: Feasibility and difficulties on China new air quality standard compliance: PRD case of PM<sub>2.5</sub> and ozone from 2010 to 2025

H. Liu, X. M. Wang, J. M. Pang, and K. B. He

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General Comments The present manuscript explores an important issue that would connect science and control policy in China in a timely manner. Naturally, the challenge

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lenges to any authors to articulate all relevant issues in a concise paper with due consideration of the feasibility and difficulties is real and obvious. This is a good first attempt but substantial revision work to improve the quality of the paper is also needed. For now, compelling evidence to project and substantiate PM (both PM<sub>2.5</sub> and PM<sub>10</sub>) compliance to China national standards in PRD is lacking. The notion that in the northern part of China only PM (PM<sub>2.5</sub> and PM<sub>10</sub>) presents a challenge, in terms of compliance with the national standards, owing to high levels of PM should be reviewed more carefully. In other words, ozone may also be a problem in the north as well. With the availability of air quality data both on regional and national levels, the authors should pay more attention of data analysis and come up with a more robust case. This effort might reveal that in the northern part of China, it has both PM and ozone (high oxidizing environment) problems. In that case, the control strategies might be very different.

Specific Comments A good starting point to discuss the present manuscript would be reviewing carefully the abstract section.

1. As stated in the general comments section above, the authors should collect and review both PM<sub>2.5</sub>, PM<sub>10</sub> and ozone data from the northern part of China and see if the statement “In north, PM<sub>2.5</sub> and PM<sub>10</sub> are still far beyond the standards. ....In south, O<sub>3</sub> goal is much challenged.” is still making sense. For PM<sub>2.5</sub> and PM<sub>10</sub>, the current and projected compliance status for both annual and 24-hr standards from monitoring data and modeling work should be verified for the northern and southern parts of China; also the 1-hr and 8-hr ozone should be checked carefully for the north and PRD.
2. Information pertaining to the scientific evidence for calculating the emission reduction potential should be presented; sources of information should also be highlighted (e.g., reduction targets committed by local or regional authorities) and cited. This kind of information should augment with the reduction targets committed by Guangdong and Hong Kong governments for 2015 and 2020; and the framework agreement for 2020. With the availability of this kind of information, the readers would be better inform about the feasibility of complying with the PM<sub>2.5</sub> and PM<sub>10</sub> standards in 2025.

3. Key assumptions of the MM5-STEM models employed in the present study should be clearly articulated. In addition, uncertainties analysis for data and model assumptions should be performed and reported in the paper. 4. "A comprehensive study. . . O<sub>3</sub> vary in 7-25% from May to November." Unclear which year the authors refer to these data and results. 5. As the major themes of the paper are about PM<sub>2.5</sub> and ozone, the problems are very much regional in nature. Nevertheless, for now, some key features of the successful regional cooperation between the governments in Guangdong and Hong Kong receive very little attention in the present paper. These key features can be summarized by two major points: 1, long-term regional cooperation by ways of sharing high quality data through operating the PRD regional network (see a PRD network paper cited below for reference); 2, data transparency – the scientists and the public can access the data and evaluate the effectiveness of key emission reduction measures or initiatives independently. In short, information pertaining to regional cooperation efforts would also tracks the evolution of industrial growth and emission control and provides an evidence-base air quality framework for the management of regional air quality problems.

RE: PRD regional air quality network paper and key regional initiatives

1. For further information about the PRD regional air quality network paper, please refer to the link and the article-in-press version of the paper below.

[http://aaqr.org/Doi.php?id=AAQR-12-10-OA-0276\\_proof](http://aaqr.org/Doi.php?id=AAQR-12-10-OA-0276_proof)

RE: Key regional initiatives currently not considered but highly relevant for the present paper: –

I. The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020) a) Chinese, [http://www.provost.cuhk.edu.hk/prvo/provost\\_media/academic\\_initiatives/PDR\\_Framework\\_1](http://www.provost.cuhk.edu.hk/prvo/provost_media/academic_initiatives/PDR_Framework_1) b) English, [http://www.provost.cuhk.edu.hk/prvo/provost\\_media/academic\\_initiatives/PDR\\_Fi](http://www.provost.cuhk.edu.hk/prvo/provost_media/academic_initiatives/PDR_Fi)

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II. Regional Cooperation Plan on Building a Quality Living Area a) English, [http://www.epd.gov.hk/epd/english/resources\\_pub/publications/files/qla\\_plan\\_eng.pdf](http://www.epd.gov.hk/epd/english/resources_pub/publications/files/qla_plan_eng.pdf) b) Chinese, [http://www.epd.gov.hk/epd/tc\\_chi/resources\\_pub/publications/files/qla\\_plan\\_chi.pdf](http://www.epd.gov.hk/epd/tc_chi/resources_pub/publications/files/qla_plan_chi.pdf)

6. RE: page 20938, lines 15-21 and Table 1, Without taking into consideration of the difference in VOC composition, OH concentration levels, emission sources and individual species reactivity levels in terms of ozone formation, it may be too crude to make estimations for VOC/NO<sub>x</sub> reduction ratios by simply comparing the control efforts between PRD and California. The authors should at least acknowledge the limitations of taking this approach or the scientific basis of making this kind of estimations of VOC/NO<sub>x</sub> reductions ratio should be stated carefully. Nevertheless, putting VOC as one of the pollutants to be targeted for specific control is a correct direction. But more scientific studies in the PRD region to support the evaluation of control strategies and formulation of effective control strategies are needed.

7. In terms of economic, China is on a significant growth path, how would the emission reduction targets account for the growth factor for all the major pollutant list in the paper (SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and VOC). In other words, are growth factors accounted for in model scenarios? If not, why not.

8. RE: page 20935, under air quality models and model evaluation, the evaluation of compliance for PM<sub>2.5</sub> and PM<sub>10</sub> with the annual standards were performed, however, the evaluation for 24-hr standards were missing. Why the evaluation for 24-hr standards were missing?

Technical corrections 1. I would recommend an English speaking to review and polish the paper with a view to add clarity and help the readers better understand the key issues. 2. Page 20925, line 22 "The annual health standard for PM<sub>2.5</sub> was setting. . . .for the first", this should be air quality standard rather than health standard. 3. Page 20929, line 19, "constant" should read "consistent". 4. Page 20929, line 22, "The problem would be a local issue rather than a regional issue". Any scientific basis to back up

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this claim? What is the share or ratios between local and regional contribution to PM10 levels in Guangzhou? 5. Page 20931, line 15, "...into secondary particulates such as sulfate and nitrite" should read"... into secondary particulates such as sulfate and nitrate". 6. Page 20933, line 6, "...standards, e.g., Euro 5 standards for vehicles...", not clear if Euro 5 and China national V standards are the same or not. For consistency sake, better stick to China national V standard.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 20923, 2013.

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