Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., author comment AC2
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Reply on RC2

Youwen Sun et al.

Author comment on "Monitoring greenhouse gases (GHGs) in China: status and perspective" by Youwen Sun et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-191-AC2, 2022

Response to Referee #2

Thanks very much for your comments, suggestions and recommendation with respect to improve this paper. The response to all your comments are listed below.

This paper by Sun et al. presented an extensive summary of status and perspective of GHGs monitoring in China. In addition, authors emphasized the necessity of establishing a creditable GHGs stereoscopic monitoring and assessment system at an operational level. This review gives the technical and methodological references for supporting low-carbon policy in China. In general, the topic is interesting and well done. The paper is well organized and written, but I recommend acceptance to of Atmospheric Measurement Techniques after addressing the comments below.

Response: All your comments listed below have been addressed. Please check the point by point response as follows.

Minor comments

Comment [2-1]: Line 21 in page 5: Why are only the XCO_2 precisions of GOSAT and OCO-2 given? What about other satellites?

Response: In the revised version, we have included the XCO_2 precisions of more satellites, i.e., "SCIAMACHY, GOSAT, OCO-2, and TanSat have XCO_2 precisions of 2.5ppmv, 1–2 ppmv, ~1 ppmv, and 1–4 ppmv, respectively (Reuter et al., 2011; Nassar et al., 2017; Boesch et al., 2021; Yang et al., 2020a). Studies with satellite data have yielded anthropogenic CO_2 flux estimates at the scale of megacities or larger regions (Eldering et al., 2017), and recently have extended CO_2 emissions estimate at the scale of an individual facility, such as a single power plant (Nassar et al., 2017; Zheng et al., 2020a). Jacob et al. (2022) have summarized the capability of current and scheduled satellite observations of atmospheric CH_4 in the shortwave infrared (SWIR) to quantify methane emissions from the global scale down to point sources, where XCH_4 precisions of various satellites are presented". Please check the marked up file for details.

Comment [2-2]: Line 16 in page 8: This sentence is inaccurate. Remote sensing technology should also include active forms. In addition, commonly used active and passive remote sensing techniques can be separately described in detail here.

Response: In the revised version, we have revised this sentence to avoid misleading. Now it becomes " Monitoring technologies include a variety of active and passive measurement technologies". In addition, commonly used active and passive techniques are separately described in detail here. Please check the marked up file for details.

Comment [2-3]: Line 4 in page 9: It is better to add a graphic to summarize the stereoscopic monitoring system of GHGs system. This can provide reference for relevant project designers.

Response: In the revised version, we have add a graphic to summarize the stereoscopic monitoring system for GHGs. Please check Fig.5 in the marked up file for details.

Comment [2-4]: Line 28 in page 11: Please clarify which satellites are capable of these functions.

Response: We have clarified that "Most recently, Chinese scientists have used the public accessible OCO-2 satellite observations to quantify CO_2 emissions down to individual point sources such as middle- to large-size coal power plants over China". Please check the marked up file for details.

Comment [2-5]: Line 4 in page 12: Please elaborate on the complexity of China's carbon emission scenarios and the corresponding reasons.

Response: In the revised version, we have elaborated on the complexity of China's carbon emission scenarios and the corresponding reasons. i.e., "GHGs emissions in China are complex and diverse (Liu et al., 2022). GHGs concentrations measured at a specific place include both local generation and long-range transport, which occurs not only near the surface but also in upper atmosphere. In addition, China has a complex ecological environment characterized as high aerosol levels, high variability, and compound pollution mixed with many constituents, which poses unprecedented challenges (i.e., increase monitoring uncertainty) to the establishment of GHGs stereoscopic monitoring network in China." Please check the marked up file for details.

Comment [2-6]: Line 14-17 in page 12: I don't understand this argument of the challenges here. Is it the challenge that the complex ecological environment brings uncertainty to the establishment of GHGs stereoscopic monitoring network? Or does the complex ecological environment bring challenges to the formulation of GHGs emission reduction policies? Or something else. Please clarify.

Response: The complex ecological environment will bring uncertainty to the establishment of GHGs stereoscopic monitoring network in China. Please check the marked up file for details.

Comment [2-7]: Line18 in page 12: The authors put forward these main technical problems and challenges, and whether some preliminary or mature solutions can be proposed.

Response: In view of status, advances, and challenges of China's GHGs monitoring, section 6 has proposed future developments (solutions) in a few aspects. Please check the marked up file for details.

Comment [2-8]: Line 7-16 in page 13: These sentences are too long. Please re-structure to make them easier for reading.

Response: In the revised version, we have re-structured these sentence and made them easier for reading. "It is suggested to take full advantages of various monitoring

technologies, monitoring platforms, numerical simulations, and inventory compilation techniques to form a creditable GHGs stereoscopic monitoring and assessment (M & A) system. Implementation of this M & A system should be coordinated with the established international networks, and routinely quantify GHGs on global, national, provincial, regional, and individual point scales with high spatiotemporal resolution and wide coverage. Improved knowledge of carbon emissions on different scales is very useful for adjustment of low-carbon policy in China". Please check the marked up file for details.

Comment [2-9]: Line 1-3 in page 14: I can't understand the logical relationship between these two sentences. I assume you mean, not all GHGs are needed, major GHGs are enough to improve China's GHGs monitoring capacity?

Response: Indeed, key GHGs are enough to improve China's GHGs monitoring capacity. There are many types of GHGs and they have different GHG effects. It is not necessary and also expensive to include all of them into China's surface environmental quality monitoring network. Key GHGs are enough. Please check the marked up file for details.

Comment [2-10]: Please do careful proofreading and grammar check, as well as the order of references. Besides, some sentences in the manuscript are repetitive and verbose. Please simplify them.

Response: Done. Please check the marked up file for details.

Grammar related comments:

Comment [2-11]: Line 22 in page 2: "has" should be "have", and "its" should be "their".

Response: Done. Please check the marked up file for details.

Comment [2-12]: Line 23 in page 2: "counties" should be "countries"

Response: Done. Please check the marked up file for details.

Comment [2-13]: Line 27 in page 2: "China is committed to achieve" should be "China is committed to achieving".

Response: Done. Please check the marked up file for details.

Comment [2-14]: Line 20 in page 5: Please unify the marking of CO_2 concentration throughout the manuscript.

Response: Done. Please check the marked up file for details.

Comment [2-15]: Line 34 in page 5: "provide" should be "provided".

Response: Done. Please check the marked up file for details.

Comment [2-16]: Line 9 in page 6: "station" should be "stations".

Response: Done. Please check the marked up file for details.

Comment [2-17]: Line 25 in page 8: "sun" should be "sunlight". In addition to sunlight, other natural light sources should also be listed.

Response: Done. Please check the marked up file for details.

Comment [2-18]: Line 24 in page 9: “the volume mixing ration” should be “the volume mixing ratio”.

Response: Done. Please check the marked up file for details.

Comment [2-19]: Line 31 in Page 9: “different spatiotemporal scale” should be “different spatiotemporal scales”.

Response: Done. Please check the marked up file for details.

Comment [2-20]: Line 1 in page 14: Please add a definite article for “targets”.

Response: For clarity, we have revised this sentence to “GHGs are not included in the atmospheric constituents routinely monitored by the China National Environmental Monitoring Center (CNEMC) network”. Please check the marked up file for details.