

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-1059

Anonymous Referee #2

Referee comment on "Opinion: Coordinated development of emission inventories for climate forcers and air pollutants" by Steven J. Smith et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-1059-RC2>, 2022

In this perspective article, the authors present an overview of how GHG and air pollutant emission inventories have developed in the past motivated by different impacts, uses and mitigation goals, highlight challenges and benefits of coordinated GHG and air pollutant emissions inventory development and provide recommendations for such a coordinated reporting within the context of the UNFCCC and IPCC frameworks. Although aerosols, ozone and their precursors gases were recognized by IPCC as climate forcing agents as early as the first assessment report, no effort has been made thus far to define a globally consistent framework for reporting national inventories of short-lived climate forcers. This is partly also due to the fact that SLCFs (except methane which is also a well-mixed greenhouse gas) are not currently part of the mitigation goals. The historical perspectives and recommendations made in this article will be useful for informing the development of the new SLCF emissions reporting guidance initiated by the IPCC.

Some specific comments that authors may consider:

L28: Mannuci et al only highlight health effects of PM. Please cite studies that also consider ozone and ecosystem effects of air pollution

L29: CH₄ is considered short-lived (IPCC AR6 chapter 6) and is much shorter lived than well-mixed greenhouse gases such as CO₂ and N₂O.

L36: Naik et al (2021) should be cited as Szopa et al (2021)

L39: Replace air pollutant emissions with precursor emissions

L124-128: should be revised to: Inventories of air pollutants include emissions of compounds that are directly hazardous to human health (e.g., nitrogen oxides ($\text{NOx} = \text{NO}_2 + \text{NO}$)) or produce secondary pollutants with detrimental health and ecosystem effects (e.g., tropospheric ozone). These inventories generally include ozone precursor gases such as carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs), and NO_x, and primary aerosols (including BC, OC) as well as aerosol precursor gases such as ammonia (NH₃), and SO₂

L132-135: There seems to be a point of confusion about the level of direct PM_{2.5} emissions and their effect on climate. Can some references be given here?

L135: replace "as as well" with "as well as"

151-153: Can reference be provided here?

174-176: A reference would be useful here.

L182-184: Reference please?

L211-214: Tracking compliance will likely be a major reason for detailed inventories even if low SDI countries adopt high controls. Unless the fleet moves over to clean cars (e.g., EV), I don't think one could ignore the source.

L214: Insert a “.” between ‘access Therefore’

Section2.1 : Why only air pollution impacts are discussed here? Why not the climate change impacts of air pollutants and the uncertainty associated with lack of consistent information on their emissions trends, which is a significant motivating factor for IPCC to develop reporting methodology for SLCFs.

L249-250: what about methane? Methane's effect on climate is in the short-term

L251-254: This statement needs to be caveated since methane, a GHG, is short-lived and its concentrations have been helpful in developing top-down emissions inventories

L271: I don't understand this construct – is this ±?

L274: define EDGAR

L288: reference?

L376-381: References would be useful here.

L384-387: Also Szopa et al (2021)

L409: reference?

L504-506: reference?

L508: equivalent should be equivalent throughout the manuscript

L515-519: Allen et al (2022) <https://www.nature.com/articles/s41612-021-00226-2> could also be useful here.