

It was a pleasure to review this paper. Along with the manuscript, I also looked at one reviewer's comments and the authors' response. When I was about to post my review yesterday, Prof. Ramanathan posted his view. I had to reduce my review quite a bit, since Prof. Ramanathan pointed out many things I wanted to say myself, and more. I appreciate the interactive nature of ACP review process.

The authors proposed a new metric, called SFP (Specific Forcing Pulse). I don't know if the naming is appropriate since the meaning can not be easily drawn intuitively as common concepts such as radiative forcing, forcing efficacy. Nevertheless, there is a value in the SFP concept, and for that reason alone this paper should be published. Ultimately, the usefulness of SFP will be determined by the science community later on.

The authors also applied the SFP metric to black carbon (BC) and organic carbon (OC) calculated by CAM. Including an example of application is desirable, but the paper is dominated by CAM-based BC and OC SFP estimates. The authors perhaps wanted to strike the accurate BC/OC SFP estimates by first starting with CAM simulation and making some adjustments. As Prof. Ramanathan pointed out, there are so many approximations and assumptions (some of them being implicit) in the authors' BC/OC estimates. Instead of presenting the authors' estimates as one set of estimates, the authors presented them as the most accurate ones, as the ABSTRACT indicates. I advise the authors to either re-calculate BC/OC SFP or re-write the paper to better reflect the work done. In case the authors decide to re-write, I also advise them to change the paper title. Furthermore, I advise the authors to expand the paper to establish the SFP concept more firmly so that the readers can fully understand SFP in comparison with radiative forcing and warming potential. For example, include enough visual illustrations to help readers to understand and appreciate SFP in comparison with other forcing concepts. If the authors can sell the SFP concept through this paper, I would say they made significant contribution to science.

Specific comments.

1. Abstract was too difficult to understand. Do not use “;” too much. Spend more sentences explaining aspects of SFP, and reduce the SFP concept application example part. Make sure that the authors' BC/OC SFP estimates is simply one set of estimates. If I were to write the abstract, I would make two clearly-separated equally-weighted parts: part 1 related to the SFP concept and part 2 related to an example.

2. As the first reviewer said, the paper was overall very difficult to understand. I had to read it multiple times to digest the overall work. To illustrate my point, see the following sentences in the paper:

“Imagine a box (Fig. 1a) that represents a column of the atmosphere containing a first order removal process with rate constant $1/\tau$.”

→ removal of atmosphere or removal of pollutant? Don't assume that every reader will know what τ means.

“The integrated concentration over time of a pulse of pollutant species S_0 emitted into the box is τS_0 .”

→ I couldn't immediately understand what pulse of pollutant means. Does pulse indicate emission pulse in contrast with continuous emission? I got this sentence eventually after reading the next paras a couple of times. Is S_0 referring to pollutant specie or specific pollutant emission pulse? Do not think that readers will have enough patience to repeatedly read the paper until they digest the paper.

3. The authors were right that radiative forcing does not include feedbacks, when they responded to the first reviewer's comments. No need to revise the manuscript in this regard in my opinion.

4. Some of terms are confusing. “atmosphere forcing” in Fig. 2 should mean “TOA forcing due to atmospheric processes”. Since some people give radiative forcing estimates at TOA, in the atmosphere and at the surface separately, I advise the authors to make their terms clearer.