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Interactive comment on “Anthropogenic, biomass burning, and volcanic emissions of black carbon, organic carbon, and SO₂ from 1980 to 2010 for hindcast model experiments” by T. Diehl et al.

Anonymous Referee #1

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I have reviewed the paper "Anthropogenic, biomass burning, and volcanic emissions of black carbon, organic carbon, and SO₂ from 1980 to 2010 for hindcast model experiments" by Diehl et al. This paper describes two emission datasets that were developed for use in a model inter-comparison study. It appears that the authors did not develop new data, but have combined existing data sets. Given this purpose, this paper needs to describe the assumptions used in combining (and gridding) the datasets as well as provide scientific context for the resulting datasets. The paper fails to provide an adequate description of dataset development and is confusing in its presentation. On the second point, there is practically no scientific context given so that users can make informed choices in using these datasets. The paper is not suitable for publication in

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its present form.

Improvement sufficient for publication will require addressing the following points, which are not exhaustive. The present presentation is a very mechanical description of the data construction. Both more nuance and detail are needed. It is not clear what is the authors' own work and what was done by others, much clearer and complete referencing is needed. Much of the discussion appears to be a recapitulation of previous work (not all appropriately referenced). Much of this should be moved to a supplement. A table or two showing the sources for the different emissions (by time period as needed) for each of the data sets is needed.

The Gridding process needs to be more completely described. What regions were used, what assumptions for region/country boundary splitting, was gridding done by sector?

Much more comparison with the literature is needed, particularly with the RCP inventory data from Lamarque et al., since this is used already by many models and comparison projects, and is also the source of some of the data here. The authors can start with the work on Granier et al. (2011), and extend that to discuss the data here. Since there are only two data sets presented, and only three emission species, a more extensive discussion of these as compared to Granier et al. can be expected. This would allow the authors to discuss the reasons for some of the differences between the two data sets, and in some cases comment on which is likely to be closer to being correct, instead of just noting where they are different as is done now.

It is unclear why 5 or 10 year snapshots were used in some places when annually resolved data are available in the literature.

While BC and OC emissions are quite uncertain, SO₂ emissions are known to much better accuracy, particularly in developed countries. There is no reason to believe, for example that emissions are grossly inaccurate in the USA and Western Europe country level inventories, for example. Some of the data here, in contrast, appear to be outside

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of the estimated confidence range (e.g., smith et al. (2011). (Who also discuss some of the apparent biases in the Edgar 4.1 data used here.) Such issues need a much more through discussion.

Some of these comments would also apply for BC and OC, shipping, aircraft, and open burning emissions.

The use of the term inventory for this data is, in my view, incorrect. These are not consistent estimates, and often contain what are likely inconsistent assumptions due to the combination of different datasets (and this should be discussed in more detail). The term data sets is more appropriate.

More detailed data needs to be supplied. At minimum, time series of emissions by a reasonable number of regions (for example the ~ 30 regions used in the RCP data, see Table 2 Lamarque et al 2010) should be provided in a supplement. Emissions by sector would be even more useful. To be most useful, this should be the original country or region data, not data drawn from the gridded products, which can contain interpolation errors.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 24895, 2012.

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