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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Radiative forcing in the ACCMIP historical and future climate simulations" *by* D. T. Shindell et al.

Anonymous Referee #1

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This paper studies the radiative forcing in the ACCMIP historical and future simulations. This is very relevant and timely for the upcoming IPCC AR5 report. The paper contains a lot of information including the direct aerosol effect as radiative and adjusted forcing (AF) and the total aerosol AF both from pre-industrial to present-day as well as into the future following different RCPs. It also screens the models based on their ability to simulate the observed AOD and AOD trends and evaluates the relationship between aerosol AF and equilibrium climate sensitivity. By combining all these aspects into one paper, it is overloaded and the main messages don't come out. It therefore does not make for an easy reading as it is way too condensed.

I suggest to split the paper into 2 or 3 papers and to have a clear and only one message in each of them. As long as it already is, I almost don't dare to ask for clarifications,

as it would only increase the paper more. If the paper is not split in several parts it should be shorten it by at least 50% (in terms of pages of text, number of figures and tables) by focusing on the main messages. My specific recommendations are targeted towards shortening.

Specific comments:

Page 21113/21114: Focus less on individual models but more on the multi-model mean

Page 21129: Why does the CMIP5 subset of ACCMIP underestimate the negative aerosol RF?

Page 21140: Did ACCMIP and CMPI5 use the same protocol?

Page 21141: Why is the relative std.dev. of AF substantially smaller than on RF over East Asia?

Page 21142: Shorten by referring to Lohmann et al., 2010 where all these estimates are included.

Pages 21144-46: Partitioning of the AF is based on one model only. That's too speculative and does not belong in an intercomparison study. Please delete it.

Page 21152: Why is ECS not correlated with aerosol AF?

Page 21153: Why does ANWF not closely track aerosol AF+ozone RF in some models?

Pages 21156-21158: Get rid of autocorrelations

Fig 3/4: Show only one of them

Fig 5/6: Replace by model-mean

Fig 6: Red colors (sulfate vs. model) are not good to distinguish

Fig 8/27: Delete

Fig 25: Eliminate NCAR-CAM3.5 if it doesn't include indirect effects

Fig 26: Replace by model-mean

Typos:

Page 21109, line 1: response –> responses

Page 21111, line 1: amount radiative –> amount of radiative

Page 21114, line 6: all-sky –> all-sky values

Page 21137, in this regions –> in these regions

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 21105, 2012.