

## ***Interactive comment on “Historical greenhouse gas concentrations” by Malte Meinshausen et al.***

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The paper by Meinshausen and colleagues presents historical climate model scenarios of GHGs. There are numerous extensions over their CMIP5 efforts that together make considerable progress on a number of fronts. Particularly impressive is knitting together of observations and models. This will also help the two communities understand the others needs. The paper represents a huge amount of work by the author team and it provides huge community good. I was very impressed.

The paper is long, has complex figures and contains a lot of technical detail. I would argue that this is appropriate and necessary for the GMD approach to allow clarity of methods and their reproducibility. The paper goes beyond simply documenting the method and showing the data. It details comparison to other data, and has a very interesting discussion and limitations sections that has insights into ESM uncertainty and possible effects on climate.

C1

My suggestions of corrections are of only a technical nature, outlined below

Ln 26-27. I would argue that lots of things change climate not just GHGs and aerosol. I would maybe phrase as GHGs largely responsible for the warming and associated climate change ?

line 28 and 40. The future climate change comments seemed strange in abstract as to me the future is another but related problem - the paper really helps sort the past, but your call

Abstract. Time period is not mentioned - only 1850 date. Also not at all clear you are talking about historical scenarios - or changes through time. 0-2014 ins mentioned but analysts concentrates on 1850-2014?

Will historical runs end at the end of 2014? I thought it was 2015, but I may well be wrong!

Maybe I'm stupid but it did not seem clear where the data could be accessed?

The paper would benefit from a careful proof read. I am afraid that it is beyond my community spirit to do this! But examples are 1. Sections are not referred to consistently, sometimes by names, sometimes by numbers sometimes both cf Ln 70,128,210 (e.g.) 2. There are typos in places e.g.1026-1027 (to prove i read to end!) 3. The odd statement is repeated 4. Equations are not presented as uniformly as they might be e.g. 230-236 e.g.  $n \times m$  5. Do you want asterisks or for multiply or something else?

line 210 Figures 20 and 21 might also be useful here -these don't seem to be referred to in text?

Figures don't seem to appear in the correct order - I'm not sure what your logic is here?

line 167 - that are these AGAGE? files - maybe giving a web address early on where files could be found would help? Or adding more explanation?

189-193 - it is not clear which scalings are being referred to for what gases?

C2

I found Table 1 really useful in helping me understand your methods - could this be referred to earlier?

The figures are generally good considering their complexity - but details are hard to see even when zooming in online, such as the small "5" on fig 22 referred to in the text. I also found it hard to see the CMIP5 lines on the CMIP6/CMIP5 comparison figures.

On the science I had a few questions

1. It might be useful to quote 1750 PI concentrations and 2011 concentrations to compare to IPCC. A comparison might also be fun with IPCC historical forcings?
2. I guess your forcing estimates were all made with global radiative efficiency formula - are you going to run your fields through a radiation call to estimate actual forcings. Give me a shout if you would like someone to do this!

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