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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Geoengineering by stratospheric SO_2 injection: results from the Met Office HadGEM2 climate model and comparison with the Goddard Institute for Space Studies ModelE" *by* A. Jones et al.

Anonymous Referee #3

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The paper is a clean comparison of two GCMS where geoengeneering options are tested. I recommend publication with minor revisions.

My small remarks:

p 7425 l10: "scatter in HADGEM2 probably larger because no ensembles": ??? Well - this could be tested since MODEL E results should be known per single member as well.

p7425 l18: Please document the geoengenic mean global AOD change and sulphur

loads from both simulations, also cloud cover changes. Maybe together with a standard deviation for the 10 year period investigated.

p7425 why is the net SW forcing at TOA not provided?

p7425-6: There is decadal cooling rate of 0.46 K/decade mentioned for the GISS model. But then the Model E arrives at 0.69 K cooler in the second decade. Does this mean that the GISS model is still constantly cooling further in the second decade? This is kind of in contrast to the rapid warming after the end of geoengeneering. Could this be explained?

p7426 l18 on: The forcing in the HADGEM model should be more uniform than in the GISS model due to the SO2 injection scheme. Is that a reason for stronger cooling in the HADGEM model?

p7429: "The stratospheric SO2 injection geoengineering simulations produce geographic responses which, being more homo1geneous, more closely counteract the responses due to increasing concentrations of GHGs than do the responses from stratocumulus modification." Isnt that simply due to the fact that the SO2 is injected homogeneously? Is that really realistic? Isnt that too idealistic when the comparison to the sea salt injection scheme is sought?

And a final question: Are the differences between the two models important? Are they reason to worry? How certain are the differences? Would the result change if another 10 year period were taken for comparison?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 7421, 2010.